Three Essays on Credit Ratings

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Abstract

This thesis focuses on preliminary ratings, studying Credit Rating Agencies (CRAs) decisions in the light of different disclosure regulations. To begin, a brief introduction provides the rationale for these studies.

Chapter 1 models the strategic interaction between a monopolistic CRA and an entrepreneur. The results have three main implications. First, consistently with a strand of the literature, disclosure is not necessarily welfare improving. Second, disclosure policies and regulation cannot be a one off decision, they require tailoring and timely revisions. Thirdly, for disclosure to be effective, the rating process needs to be as accurate as possible.

Chapter 2 models a competitive situation, whereby the emphasis is on the effort choice made by the CRAs. The results have a few implications. First, if financial products are complex, mandatory disclosure has no effect. Second, in bad times, mandatory disclosure gives the second contacted CRA the incentives to invest in information. Overall, disclosure never results in more information in the system.

Chapter 3 fulfils the role of drawing a junction among economic literature, policy proposals and CRA regulation in order to identify the problems which have been dealt with, the successes and failures and the upcoming challenges.

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After four years of hard work, disappointment and sometimes huge satisfaction, I am at the same time glad and sorry for this life experience to end. A PhD has always a bitter taste, it makes you feel conflicting emotions over and over again. It continuously tests ones willingness to pursue a goal. But once the goal is close enough, the energy and the dedication seem to be endless. This means, or at least it does to me, that getting through a PhD proves that you more than enjoy what you are doing.

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Introduction

Economic interactions in financial markets are characterised by two main issues, the absence of perfect information among agents and the importance of reputation. The aim of this thesis is to extensively model the interaction between credit rating agencies and an entrepreneur. To better understand the theoretical consequences of regulatory requirements on the incentives of the credit rating agencies to perform their function effectively, a solid theoretical comprehension is indispensable.

The idea for this thesis originates in the Regulation. The financial crises, by uncovering real issue affecting the ratings industry, triggered regulatory amendments. The Regulation at the base of this work is the Regulation (EU) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation (EC) No 1060/2009 on credit rating agencies. The regulatory amendment that I refer to in Chapter 1 and Chapter 2 touches on preliminary ratings. It requires credit rating agencies to disclose any issuers' request of initial reviews (i.e preliminary ratings) independently of rating publication. The reason to focus on 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 is twofold. First, most of the concerns that have been raised in response to the crisis are centered around preliminary ratings. Secondly, this particular amendment provides an easy interpretation of transparency.

In consideration of the complexity of the environment in which credit rating agencies operate, this work aims at investigating mainly the behaviour of these experts under different market structures (i.e monopoly and competition) in the presence of polar disclosure regimes and with reputation concerns.

The general set up models a situation where the experts have reputation concerns. The novelty with respect to the CRA literature is that in these models the CRA operates in two stages, first providing a preliminary confidential evaluation and then, upon payment of a fee, she provides a published

rating. The outcome of this interaction affects both the access to funding for the issuer and the possible reputation gain for the expert.

Despite the application of the same regulatory requirements, the first two Chapters explore two different settings. Both works focus on the widespread practice of obtaining an indicative evaluation prior to deciding on the purchase of the published rating. However they differ not only in the market structure but also in the information structure and in the decision to be made by the CRA. The results contribute to the analysis in developing a bigger picture which can give insights on the good intentions of the Regulator.

In Chapter 1, the question is whether the requirement of disclosure of preliminary rating affects the CRAs' reputation and how their incentives change in response to this different environment. I identify a tradeoff between the fee and the CRA's reputation.

In Chapter 2, the question is to what extent an increase in transparency impacts on the incentive of the credit rating agency to exert effort when performing a preliminary certification in a competitive environment. I identify cost thresholds which trigger different behaviours.

In Chapter 3, the question is to what extent suggestions in the literature have been taken into account in the regulatory world and at the same time how effective are the regulatory amendments in meeting the results they were targeted for.

Chapter 1

Preliminary Credit Ratings and Contact Disclosure

Marta Allegra Ronchetti

Abstract

A recent amendment to the European Regulation on credit rating agencies (CRA) requires CRAs to disclose any issuers' request of initial reviews (i.e preliminary ratings). This paper constructs a model of preliminary ratings and uses it to investigate the effect of contact disclosure. A CRA issues a preliminary rating. After receiving this confidential rating, the entrepreneur has the opportunity either to purchase an official rating at a cost or to remain unrated. I identify a tradeoff between the fee and the CRA's reputation. When the project is likely to be good, the CRA issues a good preliminary rating because the risk of loosing reputation is extremely low whereas when the project is likely to be bad the CRA prefers to issue a bad preliminary rating avoiding to risk reputation. I show that when there is disclosure of the contact between the CRA and the entrepreneur, the CRA issues more good preliminary ratings then when there is no evidence of preliminary contact. Disclosure results in a lower probability of stopping high quality projects but also in a higher probability of financing low quality ones.

JEL Classification: D82, D83, G24, G28

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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, providing a rating, their opinion on the creditworthiness of the issuer.[1] Their ratings assist investors making investment decisions.

In the light of the recent financial crises, international bodies, regulators and policy makers have suggested possible ways to overcome some of the industry drawbacks.[2] Both the US and the EU Regulations underwent amendments in conjunction with international bodies such as the FSB and IOSCO[3].

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 its services. An issuer can contact several rating agencies for initial reviews. Subsequently the issuer decides whether or not to ask for the official rating from one of the agencies. If it does so, it provides further detailed information to the evaluator. The CRA performs a detailed investigation and issues a report. At the end of the process the rating is published and the agreed fee is paid.

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 widely regarded as a problem because it can bias ratings and causes poor information provision.[4] Indeed, in October 2009 the US Security and Exchange Commission attempted to impose mandatory disclosure of preliminary ratings[5], even though this proposal is yet to be finalized.

Similarly, in Europe[6]

[1] An issuer is defined as an entity selling securities to finance its business. Generally speaking an issuer is a borrower seeking financing from lenders (investors).

[2] The main drawbacks affecting the rating industry relate to the CRAs' conflict of interest, to the lack of competition and to excessive regulatory reliance on ratings.

[3] 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 and to develop and promote high standards for securities regulation.

[4] Selective release of ratings when there is no evidence of interaction between the issuer and the CRAs may lead to upward biased ratings.

[5] 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`.

[6] 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.

> "*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 an official rating.*

The OECD hearing held by the Competition Committee[7] 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 requirement of disclosure of preliminary rating affects the CRAs' reputation and how their incentives change in response to this different environment. 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 of 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 modify 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, I develop a game theoretic model of the interaction between the issuers of financial products and the credit rating agency. I 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 one 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. I investigate two different regimes, the first characterised by no disclosure of the contact between the players while the second features compulsory contact disclosure.

I find 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 accessing funding. This in turn implies preliminary disclosure results in a higher probability of default. The

[7]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`.

reasoning goes as follows: with disclosure in place the CRA's reputation suffers because all the projects which went through a preliminary evaluation are visible to the market. That is, investors can consistently update their beliefs even in the absence of a published report. Thus the CRA becomes confident more often because by doing so she earns a higher payoff than the achievable one from acting conservatively. In other words, the CRA benefits form the opaqueness of the market.

The financial crises brought about many criticisms of CRAs' conduct, generating renewed attention. The theoretical literature studying rating agencies 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 to rating shopping and rating bias[8], 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. I focus on how transparency can alter the perception that the market has of the CRA and relax the assumption that preliminary and official ratings do not diverge. Sangiorgi et al. [2009] conjecture that notching[9] can arise in equilibrium due to the selection effect of rating shopping. Unlike these articles, my setting considers 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.[10]

This paper is also related to the strand of the literature on the effect of reputation on the CRAs behaviour. Bolton et al. [2012] show for instance

[8]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.

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

[10]This two stage rating process is well described in IOSCO [November 2016]when explaining Structured Finance Preliminary Assessments. This consultation report discusses all types of other CRA products which are not Traditional Credit Ratings.

how the exogenous expected reputation cost drives the reporting strategy of the CRA. Unlike their work, my setting allows for endogenous reputation. To capture the potential gains associated with reputation, Camanho et al. [2012], look at 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 cycle. By investigating how CRAs' incentives to provide quality ratings are affected by the business cycle, they find that ratings quality is countercyclical.[11] Mariano [2012] instead shows that in a monopolistic setting, a CRA may disregard its private information, conforming to public information when driven by reputation maximisation and market power protection.[12] The main implication is that reputational concerns may lead to inaccurate and unreliable ratings.

In my setting, I focus only on the reputation that the CRA can gain from the market. Investors update the probability that the CRA is well informed (their measure of the CRA's reputation). I am abstracting from the possibility for the CRA to also gain a different type of reputation among issuers[13]. I 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. I 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 revelation of additional information to the investors causes the CRA to suffer from adverse market inference.

[11] In Bar-Isaac and Shapiro [2011] the authors show that the CRA's ability to monitor its analysts and investment bank profitability can improve the accuracy of the ratings.

[12] 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 [2015]). In the first case the analysis focuses on monitoring while in the second it focuses on market concentration.

[13] 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.

The role of credit rating agencies can be seen as to that of an intermediary who delivers information[14]to the market, information that the investors will be relying on either because they want to or because they have to due to regulation[15]. 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 information environment with market power has an incentive to manipulate information when information revelation is a strategic decision. In the first case the experts do not truthfully reveal private information because reputation is updated on the basis of both the reported signal and the realised state, thus they have an incentive to manipulate the report to achieve a better reputation. In the second one, the results show that the monopolist discloses the minimum amount of information needed to allocate the good. 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 [2016] is that the tendency to push certification to be precise might end up in less reputation building and thus in less resistance to capture[16]. 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, Section 2 presents the no disclosure assumption and the results. Section 3 deals with the disclosure of preliminary contacts and the result of this model. In Section 4 a discussion of the results, of the possible implications and two extensions are presented.

[14]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.

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

[16]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.

1.1 The model

Consider a credit rating agency (CRA), entrepreneurs (ENT) and investors. Investors have a limited role, they observe the published rating, if available, and choose whether to fund the project. After that, they form beliefs on the quality of the CRA. Details about the game are provided in the following sections.

1.1.1 Agents

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 probability of default. For simplicity, 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). The quality of the project is not known ex-ante, but there is a common prior belief $\alpha \in (0, 1)$ that the project is good. Whether an investment grade rated project results in a success or in a failure is of no interest to the entrepreneur.

Assumption 1. *Irrespective of its quality the entrepreneur wants to carry out the project.*

To carry out the project the entrepreneur just needs investors to invest in it.[17] Investors observe the published official rating $r \in \{IG, J\}$, if available, and subsequently decide whether to fund the project. The investment takes place when an *investment grade* (IG) rating is published and does not take place either when a *junk* (J) rating is published or when the project remains unrated.[18] The entrepreneur does not know the quality of his project and hence cannot credibly communicate the quality of the project to the market.[19] The market needs a trustworthy source to certify and issue an evaluation.[20] Asking for a rating is not compulsory, however the CRA offers a preliminary rating, $P \in \{G, B\}$, at no cost and thus it is always in

[17] A situation where the entrepreneur is not concerned about failure could be when he does not invest his own money

[18] In the following sections I will make a distinction between unrated not visible projects and unrated but visible projects. Regardless of the disclosure regime and their belief about the CRA type, the investors purchase after an IG rating and don't purchase after a J rating.

[19] 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 is uninformed is a simplifying assumption which does not however affect the results.

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

the interest of the entrepreneur to ask for one. Knowing the result of the preliminary rating P, the entrepreneur can either ask for a official rating at a fee Φ, or remain unrated and hence abandon the project.

The CRA offers 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 an official rating stage producing a published official rating $r \in \{IG, J\}$. This stage is only reached if the entrepreneur decides to go ahead and pay the CRA. 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 release the official rating, 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.[21]

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.[22] Hence, the CRA is not paid for the initial evaluation but only for the rating that is disclosed.[23] The quality of the CRA is denoted by $I \in (I, U)$. 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 is an exemplary CRA that always produces correct ratings and reveals them honestly.[24] The CRA

[21] According to the Parliament and the Council [May 2013], once the official rating is ready, the CRA has to communicate to the issuer the evaluation a full working day before the rating 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.

[22] A common practice (i.e. Bolton et al. [2012]) is that of assuming that the entrepreneur pays the CRA only if the rating is good. In my model, publishing occurs regardless of whether the rating is good or bad and there is no space for contingent fees. By doing so I 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.

[23] The decision of having an exogenous fee is dictated by the choice of having results for a non restricted value of the fee. The fee could be determined endogenously by the monopolist, but the value added by this extra step is out of the scope of the present paper where the focus is more on reputation. Moreover, in the presented setting what can influence the entrepreneur is not the fee in absolute terms but its relation to the funding. Therefore this simplifing assumption allows not to restrict the range of possible fees. Notice that in reality the fee is determined as a percentage of the issuance which is different according to the type of product.

[24] I follow the literature in which one type of CRA is behavioural. For instance 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

knows its type.

1.1.2 Credit Ratings

In the preliminary stage the informed CRA always has the ability to correctly assess the quality of the project 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.[25] This can be summarised by the following Assumption:

Assumption 2. *The informed CRA correctly evaluates the project throughout the whole rating process.*

The informed CRA is committed to providing the correct evaluations. Given that this type of CRA has the ability to release the correct rating knowing that she is informed, she is behavioural in the sense that sticks to the reputation argument and has no incentive to misbehave. In the preliminary stage the uninformed CRA can wrongfully evaluate the project.[26]. The uninformed 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 can become informed when asked to provide an official report. At the official 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 $1 - e$.

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

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

unique active equilibria, a truthful and a non-truthful one. Similarly to Camanho et al. [2012] "honest" CRA, the informed CRA in this paper, issues the correct rating to the project.

[25]If the informed CRA has access to an information acquisition technology which generates an information signal $\theta \in \{G, B\}$ on the quality of the project, it is the case that $Pr(\sigma = G|G, I) = Pr(\sigma = B|B, I) = 1$ and $Pr(\sigma = G|B, I) = Pr(\sigma = G|B, I) = 1$. In other words the signal in the rating stage is always sufficient for the informed CRA to correctly assess the project.

[26]In an initial version, the model allowed, in the preliminary stage, for the uninformed 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 in the preliminary stage with probability β whereas it would receive no signal ($\sigma = \varnothing$) with the complementary probability, where β was the signal precision, exogenously given and not costly. This version, simplified by $\beta = 0$, does not affect the results.

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

1.1.3 Strategies and Payoffs

As Assumption 2 states, the informed CRA behaves truthfully. I am interested in studying the behaviour of the uninformed CRA. 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 $x = 1$ when issuing a positive preliminary ($P = G$) or $x = 0$ when issuing a negative preliminary ($P = B$).[27] The incentives of the CRA are to choose the preliminary rating which leads to the purchase of the official rating from the entrepreneur and to the build of a reputation in the market.

After the entrepreneur receives P, he decides when to go ahead and pay the fee to the CRA. I denote this strategic decision $y_i \in Y = \{0, 1\}$ with $i \in G, B$. More precisely $y_i = 1$ indicates the entrepreneur asking for the official rating at a cost Φ given the preliminary P and $y_i = 0$ indicates the decision to stop and remain unrated. In other words, faced with a good preliminary rating, the entrepreneur will ask for the official rating for $y_G = 1$, whereas he will ask for it when the preliminary is bad for $y_B = 1$.

The entrepreneur's only concern is to carry out the project which requires funding. Recall that, 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 obtained and the cost of the rating. Whenever a project receives an IG official rating the entrepreneur has access to funding V_G, however he also has to bear the cost Φ of hiring a CRA to produce the official rating. In the eventuality that a J official ratings is issued, the entrepreneur doesn't get funded and loses the fee he paid. When the entrepreneur decides not to purchase the official rating, he has to abandon the project, because only an investment grade rating allows the entrepreneur to access financing. Therefore V_G has to be large enough to cover the fee that has to be paid to get rated. Formally

Assumption 3. $V_G - \Phi > 0$.

[27] I introduce x as a notation for mathematical convenience in the computation of payoffs. This is necessary because the decision on whether to issue $P = G$ or $P = B$ is non numerical.

The are three possible outcomes for the entrepreneur

$$\Pi_{ENT} = \begin{cases} V_G - \Phi, & \text{if } r = IG \\ -\Phi, & \text{if } r = J \\ 0, & \text{otherwise} \end{cases} . \tag{1.1}$$

The CRA earns the fee when the official 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 investors have 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

$$\Pi_{CRA} = \delta\Phi + \mu \tag{1.2}$$

Where δ takes the value one if the entrepreneur asks for the official rating and zero otherwise and μ represents the reputation payoff given by the beliefs of the investors.

Summary of Notation	
α	Prior probability of G projects
λ	Prior probability of informed CRAs
e	official rating stage signal precision
Φ	Fee paid to Cra if official rating issued
V_G	Amount of funding
P	Preliminary rating
y_G	ENT's decision after $P = G$
y_B	ENT's decision after $P = B$
x	CRA's strategic decision
r	Official rating
m	Ratio between Φ and V_G

1.1.4 The Timing

The timing of the game is as follows:

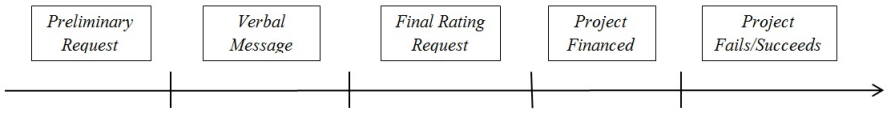


Figure 1.1: Order of events.

1. Nature chooses state $\omega \in \{G, B\}$ and types $I \in \{I, U\}$;
2. the CRA costlessly verbally discloses its preliminary evaluation $P \in \{G, B\}$;
3. The entrepreneur, knowing the preliminary evaluation decides whether or not to purchase the official report;
4. The CRA issues an official rating $r \in \{IG, J\}$ which is published;
5. Investors invest. IG project which are then carried either succeed or fail, investors update their believes concerning the quality of the CRA and payoffs are realised;

Figure 1.1 shows the order of events. There is a preliminary rating request followed by an evaluation in the form of a verbal message. The entrepreneur can then request the official rating which leads to the project being financed. Projects that are carried out in the end either succeed or fail.

Figure 1.2 shows the extensive form of the game. It does not indicate payoffs at the end nodes but those are implied by the type of rating which is published. The end nodes labelled IG, s (from now on IGS) are those in which the entrepreneur gets funded and the uninformed CRA can be perceived as informed. Those labelled IG, f (from now on IGF) represent the cases in which the entrepreneur accesses funding but the project fails. At these nodes the CRA is revealed to be uninformed. The J nodes imply no funding for the entrepreneur and no reputation gain for the CRA whereas the NR nodes represent the cases in which the entrepreneur decides to stop after the preliminary and the associated reputation for the CRA depends on the disclosure regime described in the next section.

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 investors. The investor doesn't observe whether official rating comes from an informed or uninformed CRA. Thus it constructs

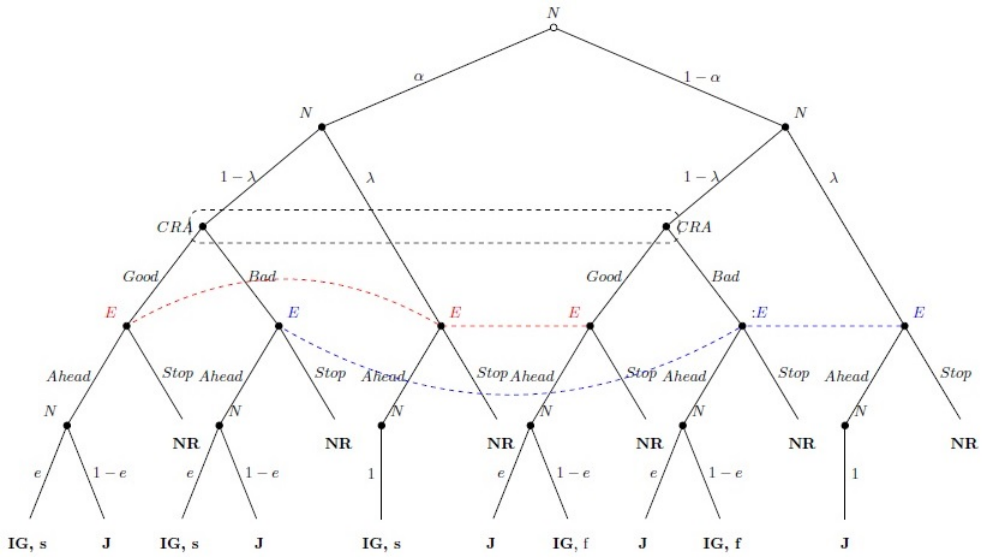


Figure 1.2: The game in extensive form.

beliefs based on what has happened prior to publication of the official rating. Such believes do not change the purchasing strategy of the investors which consists in only investing in IG rated projects.[28]

1.2 Equilibrium Analysis

This section is devoted to the characterisation of the equilibrium in a general disclosure scenario. Subsection 1.2.1 deals with the choice of the entrepreneur to ask for the official rating, subsection 1.2.2 deals with the update of investors' beliefs, subsection 1.2.3 investigates the CRA's choice and presents the results. This section is followed by section 1.3 where two disclosure requirements are analysed.

1.2.1 The Entrepreneur's decision to buy the official rating

After having received the preliminary rating, the entrepreneur has to decide whether to buy the official rating or stop and abandon the project. There are three possible outcomes from going ahead. Either the project is valued

[28]The rationale for the relevance of the investors beliefs for the CRA but not for the investors' own decision on whether to fund or not is the following: on the one hand investors are bounded to invest in *IG* rated projects, thus their belief on the quality of the CRA is irrelevant, on the other however the CRA has an interest in the investors' beliefs for market recognition. Indeed if investors end up not believing in the CRA, the very role of the CRA fails and future regulation could end up removing rating contingent requirements.

IG and succeeds or the project is valued IG but then fails or the project is valued J and no funding is obtained. Regardless of the preliminary, asking for the official rating involves a cost Φ to be paid to the CRA. On the one hand, if the entrepreneur buys he gets V_G with some probability q_i, with $i = \{G, B\}$ and can fund the project. Recall that by Assumption 1 the entrepreneur is only concerned about funding. On the other hand if he does not buy the official rating, his payoff is zero.[29]. Let q_G be the probability that a project is certified as IG given a positive preliminary

$$q_G = \frac{\alpha\lambda + \alpha(1-\lambda)xe + (1-\alpha)(1-\lambda)x(1-e)}{\alpha\lambda + \alpha(1-\lambda)x + (1-\alpha)(1-\lambda)x} \tag{1.3}$$

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

$$q_B = \frac{\alpha(1-\lambda)(1-x)e + (1-\alpha)(1-\lambda)(1-x)(1-e)}{\alpha(1-\lambda)(1-x) + (1-\alpha)\lambda + (1-\alpha)(1-\lambda)(1-x)} \tag{1.4}$$

The numerator of q_G (q_B) is the sum of the probabilities associated with ending the game with an investment grade rating after receiving a positive (negative) preliminary rating, whereas the denominator accounts for all the possible outcomes following the received preliminary. Notice that both (1.3) and (1.4) depend on x because they take into consideration not only the case in which the preliminary comes from an uninformed CRA but also the case in which the CRA is informed.[30]

In the case of $P = G$, the entrepreneur compares the expected payoff from asking for the official rating and paying the fee with zero,[31] 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 $q_G V_G - \Phi > 0$. When the initial evaluation is bad ($P = B$), the entrepreneur compares the expected payoff for choosing to go ahead with abandoning the project and will ask for the official rating

[29] I assume success or failure do not affect the entrepreneurs decision because he does not invest his own funds.

[30] This is to say that the entrepreneur doesn't know whether the CRA is informed or uninformed. Thus receiving a good preliminary rating doesn't imply that $x = 1$. It could be that $x = 0$ and the good preliminary ratings is due to an informed CRA.

[31] 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.

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 $q_B V_G - \Phi > 0$. For future references, define q_G^1 (q_B^1) and q_G^0 (q_B^0) as q_G (q_B) when $x = 1$ and $x = 0$. Given the choice of the uninformed CRA, these are the probabilities that the entrepreneur gets funded after a certain preliminary.

Lemma 1. *Given a preliminary rating $i = \{G, B\}$, the entrepreneur buys the official rating if*

$$q_i > \frac{\Phi}{V_G} \tag{1.5}$$

where q_G and q_B are defined in (1.3) *and* (1.4) *respectively.*

The entrepreneur will therefore buy if $q_G > \frac{\Phi}{V_G}$ and stop if $q_G < \frac{\Phi}{V_G}$. Similarly, the entrepreneur will choose to buy if $q_B > \frac{\Phi}{V_G}$ and will stop if $q_B < \frac{\Phi}{V_G}$. Notice that $q_G > q_B$, it is more likely to get funded after receiving a good preliminary rating than it is after a bad preliminary has been issued.

Lemma 2. *There cannot be an equilibrium in which the entrepreneur faced with $P = G$ remains unrated ($y_G = 0$) and the entrepreneur faced with $P = B$ buys the official rating ($y_B = 1$).*

Proof. The proof goes as follows;: $y_G = 0$ and $y_B = 1$ require $q_B > \frac{\Phi}{V_G} > q_G$. However, q_G is always greater than q_B. Hence $y_G = 0$ and $y_B = 1$ cannot occur at the same time. □

For the sake of clarity, let me introduce the following definitions[32]

Definition 1. *A CRA is (i) confident when she issues $P = G$ ($x = 1$) (ii) conservative when she issues $P = B$ ($x = 0$).*

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

Proof. If $x = 1$ then $q_B^1 = 0$. This implies that Lemma 1 cannot hold. □

Intuitively, if the uninformed CRA is overconfident, a $P = B$ result of the preliminary evaluation can only be due to an informed CRA. The

[32]The terms confident and conservative indicate a rational behaviour of the CRA, they do not carry any behavioural implication.

entrepreneur knows that the preliminary evaluation will be confirmed in the rating stage if he decides to go ahead and therefore prefers a zero payoff from stopping to paying the fee an surely loosing Φ.

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

Proof. If $x = 0$, then to $q_G^0 = 1$. This implies that 1 holds by Assumption 3. □

This is intuitive: if the uninformed CRA is conservative, a $P = G$ evaluation can only be due to an informed CRA. The entrepreneur knows this and buys because there is no risk to receive a J rating in the rating stage. The expected payoff of the entrepreneur faced with a good preliminary rating when asking for the official rating is $V_G - \Phi$ which is greater than zero that is the payoff if he remains unrated.

1.2.2 The investors' beliefs

After funding has occurred and the project is, in case, carried out, the market observes one of three possible outcomes: a project rated investment grade which succeeds (IGS), a project rated investment grade which fails (IGF) 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 by assumption.

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

$$\mu_{\text{IG, s}} = \frac{\lambda y_G}{e(1-\lambda)\left((1-x)y_B + xy_G\right) + \lambda y_G} \tag{1.6}$$

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

$$\mu_J = \frac{(1-\alpha)\lambda y_B}{(1-\lambda)(\alpha - 2\alpha e + e)\left((1-x)y_B + xy_G\right) + (1-\alpha)\lambda y_B} \tag{1.7}$$

When a project rated IG fails, the market infers that the rating came from an uninformed CRA, $\mu_{\text{IG, f}}$ is therefore zero in this case. I am going to consider two different disclosure assumptions, for now let β be the posterior probability that the market holds about the CRA being informed after no rating is published.[33]

1.2.3 The Uninformed CRA's decision on the preliminary rating

The CRA, if of the uninformed type, decides whether to issue a good preliminary or a bad one. The CRA does not know whether the project is good or bad. Recall that $\mu_{\text{IG, f}}$, $\mu_{\text{IG, s}}$, μ_J and β are respectively the updated believes of the market when a successful project is given an investment grade rating, when a project which results in a failure was given an investment grade rating, when a project received a junk rating and when a project didn't receive a rating.

The payoff of the CRA from issuing $P = G$ in the preliminary stage is

$$\pi_{G,s}\mu_{IG,s} + \pi_{G,f}\mu_{IG,f} + \pi_{G,J}\mu_J + \pi_{G,NR}\beta + \Phi y_G \tag{1.8}$$

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

$$\pi_{B,s}\mu_{IG,s} + \pi_{B,f}\mu_{IG,f} + \pi_{B,J}\mu_J + \pi_{B,NR}\beta + \Phi y_B \tag{1.9}$$

Both (1.8) and (1.9) consist 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 gets β. [34]

[33] In Section 1.3.1 and 1.3.2 there are assumptions on disclosure requirements which lead to two different posterior beliefs of the investors. For now, let β be the general posterior belief held by investors.

[34] Full derivation of these probabilities con be found in Appendix.

Thus, (1.8) and (1.9) can be written as

$$(\alpha e y_G)\mu^1_{IG,s} + (\alpha - 2\alpha e + e)y_G\mu^1_J + (1 - y_G)\beta + \Phi y_G \tag{1.10}$$

$$(\alpha e y_B)\mu^0_{IG,s} + (\alpha - 2\alpha e + e)y_B\mu^0_J + (1 - y_B)\beta + \Phi y_B \tag{1.11}$$

Where μ^1_J (μ^0_J) and $\mu^1_{IG,s}$ ($\mu^0_{IG,s}$) are respectively (1.6) and (1.7) when $x = 1$ ($x = 0$).

In words, if the entrepreneur does not buy, the reputation of the uninformed CRA is only β. If the entrepreneur buys, the CRA earns the fee. In addition, if the project is good and thus successful the reputation becomes $\mu_{IG,s}$ whereas if the project is rated junk the reputation is μ_J. Before stating the result, for $y_G \neq y_B$ define

$$\Phi^* \equiv \frac{\alpha e(y_B\mu^0_{IG,s} - y_G\mu^1_{IG,s}) + (\alpha - 2\alpha e + e)(y_B\mu^0_J - y_G\mu^1_J)}{y_G - y_B} + \beta \tag{1.12}$$

which leads to

Lemma 5. *Let Assumption 3 hold*

(i) if $y_G > y_B$ then the uninformed CRA strictly prefers to issue a good preliminary rating ($P = G$) if and only if $\Phi > \Phi^*$

(ii) if $y_G = y_B$ the the CRA is indifferent between issuing a good preliminary rating ($P = G$) or a bad preliminary rating ($P = B$)

For greater clarity let me introduce labels for the strategies of the entrepreneur

Definition 2. *An entrepreneur is (i) responsive when he goes ahead after a good preliminary ($y_G = 1$) but stops after a bad one ($y_B = 0$) (ii) pessimistic when he always stops ($y_G = y_B = 0$) (iii) optimistic when he ways goes ahead ($y_G = y_B = 1$)*

This discussion can be summarised in the following proposition

Proposition 1. *If Assumption 3 holds the equilibrium in the model is as follows:*

(i) For $\Phi > \Phi^*(1, 0)$ and $0 < \frac{\Phi}{V_G} < q^1_G$ the CRA is confident and 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 confident and the entrepreneur is pessimistic.*

(iii) *For* $0 < \Phi < \Phi^*(1,0)$ *and* $q_B^0 < \frac{\Phi}{V_G} < 1$ *the CRA is conservative and the entrepreneur is responsive.*

(iv) *For* $0 < \frac{\Phi}{V_G} < q_B^0$ *the CRA is conservative and the entrepreneur is optimistic.*

To show that the above mentioned are the only possible equilibria, the reasoning goes as follows. All the potential equilibria 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. Proof is given in the appendix

1.3 Disclosure requirements

Focusing on the European Regulation, 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[35].

I consider two different disclosure assumptions. In the no disclosure model, there is no evidence of the preliminary contact between the CRA and the entrepreneur whereas the disclosure setting allows for the disclosure of the contact. In the no disclosure case, asking for a preliminary rating is a confidential action, known only to the parties involved (i.e the CRA and the entrepreneur. As a result, unrated projects are not visible to the market and investors do not update their beliefs on the quality of the CRA.

Assumption 4. *The contact between the CRA and the entrepreneur is not seen by the investor. The investors act myopically and do not react to the lack of information.*

The strong assumption in myopic investors aims at representing the real issue concerning the impossibility for the investors to monitor the whole market, keeping an eye on all entrepreneurial projects which could arise. A myopic investor is simply an investor for whom the lack of a published rating

[35]For the purpose of the model I 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 not necessarely lead to more transparency.

is uninformative.[36] Under this assumption, the investors fail to update their belief on the quality of the CRA. Conversely, under contact disclosure, when costlessly checking the project, the CRA must disclose that it has been contacted by the entrepreneur for a preliminary evaluation. As a result, the requirement of making the market aware of who has asked for the services of the CRA results in the visibility of unrated project. This in turn affects the CRA's reputation through the updated belief that the market has of it being of the informed type.

Assumption 5. *The contact between the CRA and the entrepreneur is public information.*

Note that the timing of the game is the same under the two scenarios and that the actual result of the preliminary evaluation is communicated only to the entrepreneur in both cases. If on the one hand the second scenario adds complexity to the payoff of the CRA, on the other it allows the payoff of the entrepreneur to remain unchanged. Indeed, the entrepreneur receives no additional information under the contact disclosure scenario, whereas the CRA's reputation is affected by the different belief that investors hold in the two cases. More details will be given in section 1.3.1 and section 1.3.2.

1.3.1 The Model without Contact Disclosure

This section is devoted to the characterisation of the equilibrium under no disclosure, thus suppose Assumption 4 holds. Without evidence about the contact between the CRA and the entrepreneur, if the entrepreneur decides not to purchase the official rating the updated reputation is represented by the prior λ on the quality of the CRA[37]. In other words, when the CRA is

[36] To justify such an assumption one can think of a situation at the outset of the model characterised by uncertainty on the existence of a project. For instance, if the environment is such that at the outset the investors have a prior τ that there is a project out for evaluation and with the complementary probability there isn't. The investor cannot be certain about the existence of the project whereas CRA and entrepreneur have this information. Thus the updated belief when no rating is published is $\beta = \frac{\tau((1-\alpha)\lambda(1-y_B)+\alpha\lambda(1-y_G))}{y_B(-\alpha\lambda+(\lambda-1)x+1)+y_G(\alpha\lambda-\lambda x+x)-1} + \lambda(1-\tau)$. It can be easily shown that if $\eta = 1$ then $\beta = \mu_{NR}$ whereas if $\eta = 0$ then $\beta = \lambda$. Moreover it is the case that $\mu_{NR} < \beta < \lambda$. This implies that the setting presented in this paper is a simplified version of the one explained here. As long there is some lack or wrongful information on the side of the investors, the results hold.

[37] 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

not mandated to disclose the contact with the entrepreneur, investors fail to update their belief on the quality of the CRA if the project is unrated. Unrated projects are not visible and investors hold the same belief as their prior. Hence (1.8) > (1.9) can now be written as

$$y_G[(\alpha-2\alpha e+e)\mu_J^1+\alpha e\mu_{IG,s}^1-\lambda+\Phi] > y_B[\alpha e\mu_{IG,s}^0+(\alpha-2\alpha e+e)\mu_J^0-\lambda+\Phi] \tag{1.13}$$

Corollary 1. *If the CRA is not required to reveal the contact (Assumption 4) then* $\beta = \lambda$ *and* $\Phi^* = \bar{\Phi}$*, where*

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

The above implies that $\bar{\Phi}(1,0) = \frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda}$, where $\bar{\Phi}(1,0)$ is $\bar{\Phi}$ when $y_G = 1$ and $y_B = 0$.

Corollary 2. *There is multiplicity of equilibria when*

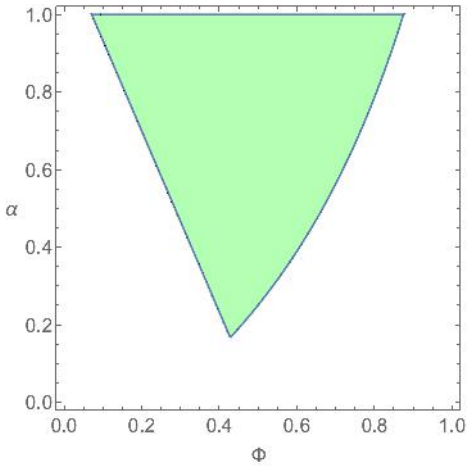
(i) $0 < \Phi < \bar{\Phi}$ *and* $q_G^1 < \frac{\Phi}{V_g} < 1$

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

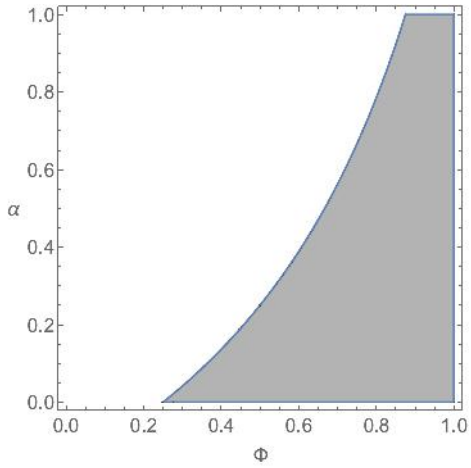
Multiplicity occurs when $\frac{\Phi}{V_G}$ is either sufficiently low or sufficiently high with respect to the likelihood of getting funded. If ${q_B}^0$ is big enough the entrepreneur faced with a bad preliminary may be willing to go ahead and risk the fee. The reasoning goes as follows: even though he received a bad preliminary, the fee is low, therefore he is willing to pay the fee for the official rating. Similarly, if ${q_G}^1$ is small enough, the entrepreneur faced with a good preliminary may prefer to stop and remain unrated rather than risking the fee. The reasoning goes as follows: even though he received a good preliminary, the fee is however high, therefore he is not willing to pay and risk the fee for the official rating

For the sake of the discussion, fix $e = 3/4$, $\lambda = 1/2$ and $\Phi = 1/3$ and 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 along the equilibrium

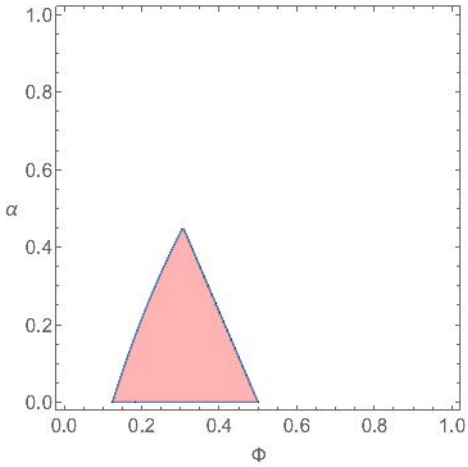
the contracting invisible and no disclosure is valuable in the sense that it does not affect the CRA's reputation.



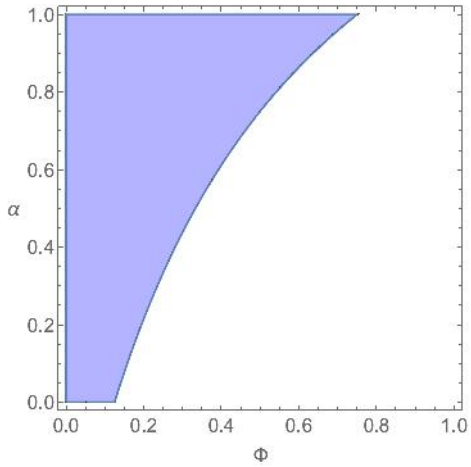
(a) Equilibrium *(i)*



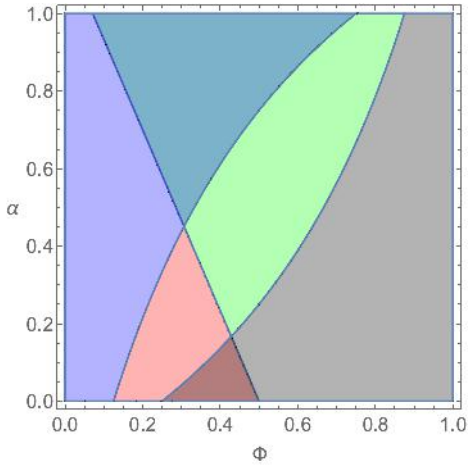
(b) Equilibrium *(ii)*



(c) Equilibrium *(iii)*



(d) Equilibrium *(iv)*



(e) Equilibrium *(i)* to *(iv)*. Top left dark turquoise area of multiplicity (i) and (iv); bottom burgundy area of multiplicity (ii) and (iii)

Figure 1.3: Equilibrium without disclosure for $e = 3/4$, $\lambda = 1/2$ and $V_G = 1$.

path in which 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 official rating would only result in the loss of the fee.

In equilibrium (iii), projects are more likely to be 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 along the equilibrium path where 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), unfavourable 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), favourable 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 official rating regardless of the opinion of the CRA.

1.3.2 The Model with Contact Disclosure

Suppose Assumption 5 holds. The fact that a project remains unrated is now a fourth outcome which has the same consequences in terms of possible funding[38] of an $r = J$ outcome but which is radically different in terms of reputation. Now, even when the entrepreneur decides not to purchase the official rating, the market can update its belief on whether the preliminary rating was issued by an informed CRA or not. The market now observes an 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

$$\mu_{NR} = \frac{\lambda\left((\alpha-1)y_B - \alpha y_G + 1\right)}{y_B(\alpha\lambda - \lambda x + x - 1) + y_G((\lambda-1)x - \alpha\lambda) + 1} \tag{1.14}$$

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

which represents the probability that the CRA is of the informed type given no rating (NR). The presence of a new outcome means that now $\beta = \mu_{NR}$, therefore (1.8) > (1.9) can now be written as

$$y_G[(\alpha - 2\alpha e + e)\mu_J^1 + \alpha e \mu_{IG,s}^1 - \mu_{NR}^1 + \Phi] + \mu_{NR}^1 > y_B[\alpha e \mu_{IG,s}^0 + (\alpha - 2\alpha e + e)\mu_J^0 - \mu_{NR}^0 + \Phi] + \mu_{NR}^0 \quad (1.15)$$

It stands to reason that, (1.15) differs from (1.13) only for the μ_{NR} term. The first thing that has to be noticed is that in the model without disclosure the reputation payoff in the no rating 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.

Corollary 3. *outcome. If the CRA is required to reveal the contact (Assumption 5) then $\beta = \mu_{NR}$ and $\Phi^* = \hat{\Phi}$, where*

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

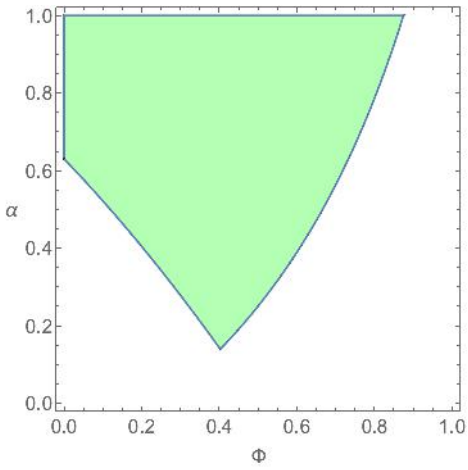
The above implies that $\hat{\Phi}(1,0) = \frac{\lambda\left(-\alpha\lambda + e\left(\left(\alpha^2+\alpha-1\right)\lambda - 2\alpha + 1\right) + \lambda\right)}{(\alpha\lambda - 1)(e(\lambda - 1) - \lambda)}$, where $\hat{\Phi}(1,0)$ is $\hat{\Phi}$ when $y_G = 1$ and $y_B = 0$. For the sake of the discussion once again fix $e = 3/4$, $\lambda = 1/2$ and $V_G = 1$. $\bar{\Phi}$ and $\hat{\Phi}$ share a common term that has to do with the $r = NR$.

Equilibrium (ii) and equilibrium (iv) resemble those in the no disclosure. This is not surprising given that the introduction of disclosure only affects the CRA's payoff, leaving the entrepreneur with the same payoff.

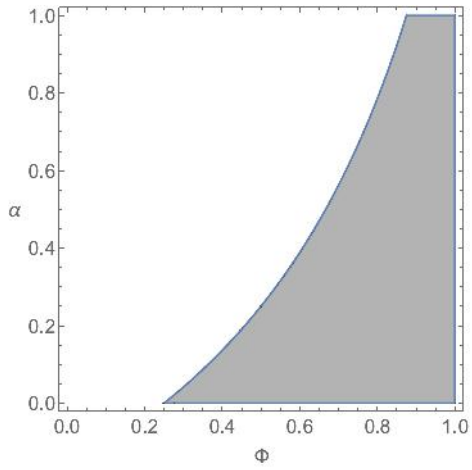
Corollary 4. *(i) For $0 < \alpha \leq \frac{1}{2}$ or for $\frac{1}{2} < \alpha < 1$ and $\frac{(2\alpha-1)e}{-\alpha+(\alpha^2+\alpha-1)e+1} < \lambda < 1$ there is multiplicity of equilibria either when $0 < \Phi < \hat{\Phi}$ and $q_B^0 < V < 1$ or when $\Phi > \hat{\Phi}$ and $0 < \frac{\Phi}{V_G} < q_G^1$*

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

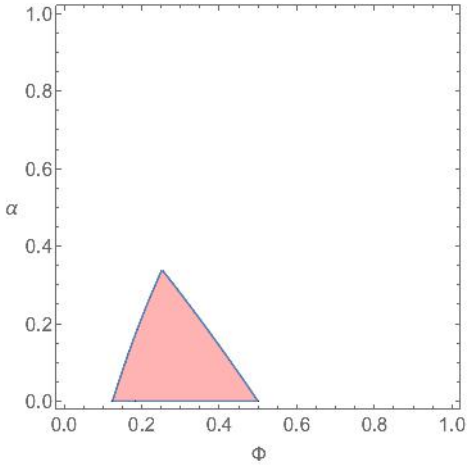
Multiplicity occurs for either low α or for both high α and sufficiently large λ when $\frac{\Phi}{V_G}$ is either sufficiently low or sufficiently high with respect to the likelihood of getting funded. Moreover for low enough λ multiplicity occurs when $\frac{\Phi}{V_G}$ is greater than the likelihood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



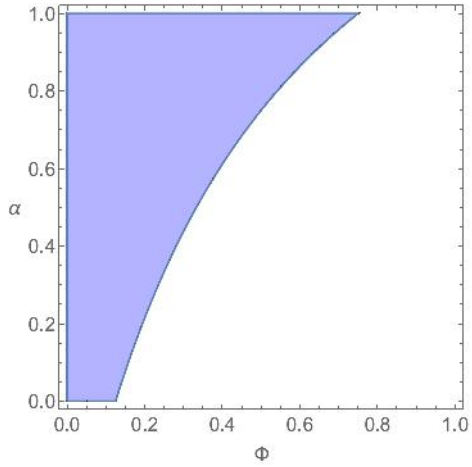
(a) Equilibrium *(i)*



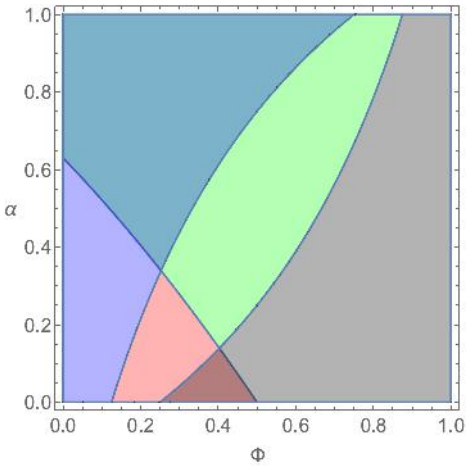
(b) Equilibrium *(ii)*



(c) Equilibrium *(iii)*



(d) Equilibrium *(iv)*



(e) Equilibrium *(i)* to *(iv)*. Top left dark turquoise area of multiplicity (i) and (iv); bottom burgundy area of multiplicity (ii) and (iii)

Figure 1.4: Equilibrium under contact disclosure for $e = 3/4$, $\lambda = 1/2$ and $V_G = 1$.

1.3.3 Discussion

The initial question can be rephrased as follows: does anything change 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 the behaviour of the CRA through reputation.

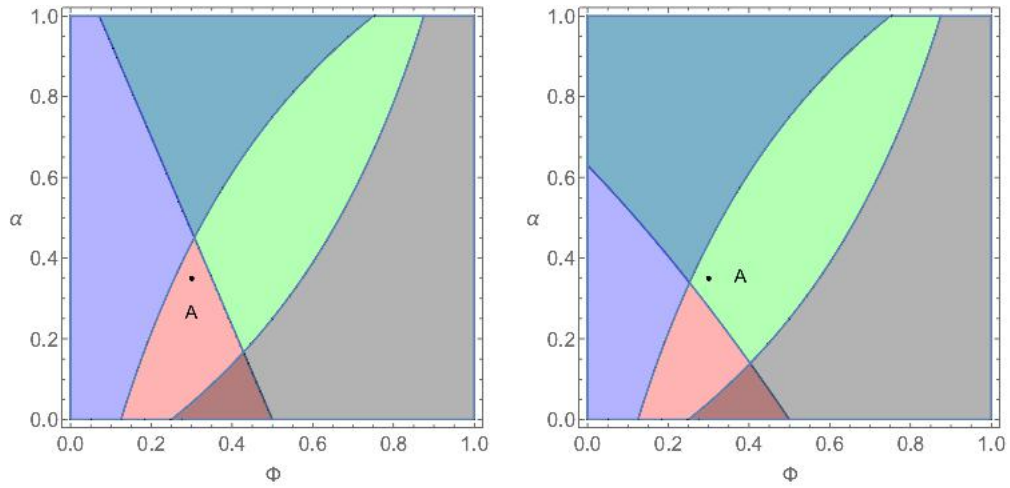
Results from the no disclosure model and from the contact disclosure model show that in both settings two scenarios can arise when the uninformed CRA is confident ($x = 1$). It is either the case that the entrepreneur is responsive and faced with a good (bad) preliminary rating asks for the official rating (stops and remains unrated) or that he ignores the CRA's opinion, acts pessimistically and always stops. Similarly, two scenarios arise when the CRA is conservative ($x = 0$). The entrepreneur is either responsive and faced with a good (bad) preliminary asks for the official rating (stops and remains unrated) or he ignores the CRA's opinion, acts optimistically and always purchases the official 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 confident 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 willing to issue a good preliminary rather than issuing a bad one. This in turn leads to more requests for official ratings and ultimately to the possibility that more projects get funded.[39] Comparing λ and μ_{NR} should shed some light on this finding. Whether λ is greater or lower of ether μ^1_{NR} or μ^0_{NR} crucially depends on y_G and y_B.

Lemma 6. *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 receives a lower reputation payoff when issuing a bad preliminary. To compare the two settings, now focus on an example. I have already fixed e, λ and V_G and I now analyse what happens when α is fixed to 0.35 and Φ is fixed to 0.3.

[39] Figure 2.7a and Figure 2.7b show that when disclosure is in place even for lower values of α the CRA is overconfident.



(a) No disclosure model (b) Contact disclosure model

Figure 1.5: Comparison of equilibrium representation where $e = 3/4$, $\lambda = 1/2$ and $V_G = 1$.

Let A represent this specific set of fixed parameters. In Figure 2.7a and Figure 2.7b it can be seen that point A was chosen as an example because it lies in the "conservative-responsive" area in the no disclosure model whereas it is part of the "overconfident-responsive" area in the extension[40]. Provided that for the entrepreneur nothing has changed and that, in the two equilibrium under consideration, receiving a good preliminary corresponds to going ahead while receiving a bad one, results in a stop, the focus is on the CRA's payoff. Note that the payoff for the CRA for issuing a good preliminary is the same in the model with contact disclosure and in the one without disclosure whereas the payoff from issuing a bad preliminary differs, namely it is lower in the contact disclosure model. This is due to the different reputation gain enjoyed by the CRA in the two models when no rating is published. If the CRA knows that the entrepreneur goes ahead after having been provided with a good preliminary ($y_G = 1$), issuing $P = G$ would give the CRA the same profit in both because it is as if it were avoiding the possibility to end at the no rating situation. (1.8) in the two regimes differs only with respect to the NR reputation payoff $\beta\pi_{G,NR}$, namely $\mu_{NR}\pi_{G,NR}$ in the contact disclosure model and $\lambda\pi_{G,NR}$ in the model without disclosure. 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. On the other side, knowing that the entrepreneur faced with a bad preliminary will stop ($y_B = 0$) creates a divergence in the payoff of the two settings. The

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

reputation payoff from saying $P = B$ is higher in the no disclosure setup 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 no disclosure case as opposed to $\frac{\lambda(1-\alpha)}{1-\alpha\lambda}$ in the contact disclosure case. It can be easily seen that the first payoff is greater than the second one, meaning that the reputation gain from an NR rating in the no disclosure case 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 no disclosure model the payoff relation is reversed.

Proposition 1 shows that in Equilibrium (i) and in Equilibrium (iii) the role of the fee is crucial; the tradeoff fee in the no disclosure case always exceeds the tradeoff fee in the contact disclosure one. In other words, when disclosure is in place, the conservative equilibrium loses out to the overconfidence equilibrium.

Lemma 7. *For all parameters values* $\bar{\Phi}(1,0) > \hat{\Phi}(1,0)$.

The 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 confident even for lower fees because this still provides a higher payoff than the achievable one from being conservative. More generally it is the case that

Lemma 8. $\bar{\Phi}$ *is always greater than* $\hat{\Phi}$

Proof. $\bar{\Phi} > \hat{\Phi}$ requires $y_G > y_B$. Using a proof by contradiction approach, assume $y_B > y_G$ this implies that $q_B > \frac{\Phi}{V_G} > q_G$. This however is impossible because $q_G > q_B$. Hence, y_G cannot be lower than y_B and the proof follows. □

Provided that $y_G \geq y_B$ always holds, it is easy to see that the returns from $p = B$ are either equal or lower under disclosure. Whenever the CRA

is indifferent (i.e. when $y_G = y_B$), the return is equal in the two regimes, whereas whenever $y_G > y_B$ it is lower under disclosure. The intuition works as follows: when the behaviour of the entrepreneur is not preliminary rating dependent, the incentives of the CRA do not change when disclosure is in place. Instead, the incentives for the CRA dampen when $y_G > y_B$ because issuing a bad preliminary is now less profitable. This has to do with the fact that the entrepreneur is generally more likely to proceed to the official rating stage after a good preliminary, minimising the chances for the CRA to end up with $r = NR$. With no official rating and without disclosure the market cannot update its belief and therefore sticks 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 stopped because of a $P = B$ indicative rating due to an uninformed CRA. Thus the market updates its belief of whether the issuing CRA is of the informed type. The reputation concerns are not strong enough to lead to a better outcome under disclosure, instead they end up making the CRA more responsive to the fee.

When α is high the CRA has a high chance of evaluating correctly the project if she issues a good preliminary rating. So in this situation if the fee is reasonably high (i.e green area), the CRA issues a good preliminary rating because the risk of loosing reputation is low. When instead α is low, the CRA has a high chance of issuing an incorrect preliminary rating. If the fee is low (i.e. pink area), the CRA prefers to issue a bad preliminary rating avoiding to risk reputation. In the first scenario (α high) the fee is more important than reputation whereas in the second (α low) the driving force is reputation.

1.3.4 Is contact disclosure beneficial?

The model presented in this paper allows two different types of errors. Indeed it can happen that a G project is stopped and therefore it is not financed or that a B project, which should have been stopped, gets financed and eventually results in a failure. I know from the analysis above that allowing for contact disclosure results in an increase in the overconfidence of the CRA when, after a good preliminary, the entrepreneur buys straight away and when after a bad preliminary the entrepreneur stops. In order to investigate the extent to which this shift is beneficial, I compare the probabilities of the two mistakes happening under both regimes.

On the one hand confident-responsive equilibrium bears a probability

$\alpha(1-\lambda)(1-e)$ to dismiss good projects and a probability $(1-\alpha)(1-\lambda)(1-e)$ to wrongly finance bad projects. On the other hand, the conservative-responsive equilibrium avoids wrongful finance of bad projects but causes with probability $\alpha(1-\lambda)$ the stop of good projects. It is also known that the overconfident-responsive equilibrium gains prominance while the conservative-responsive equilibrium shrinks.

Lemma 9. *Under disclosure the probability of dismissing good projects is lower while the probability of financing bad projects is higher with respect to the case where there is no evidence of contact.*

Proof. The probability of stopping good projects is lower in the overconfident-responsive equilibrium than in the conservative-responsive equilibrium. Indeed $\alpha(1-\lambda)(1-e) < \alpha(1-\lambda)$ always holds. Conversely, the probability of funding bad projects is greater in the overconfident-responsive equilibrium than in the conservative-responsive equilibrium. In formula, $(1-\alpha)(1-\lambda)(1-e) > 0$ always holds. So if the overconfident-responsive equilibrium becomes more prominent, disclosure results in fewer stopped good projects and more financed bad ones. □

As an example, now take recessions and booms. In recessions, society is more concerned about not funding good projects rather than financing bad ones whereas in booms the opposite holds. In both cases the idea is that as much as possible money wasting should be avoided. In turn, ideally in recessions a CRA should be confident to boost the economy while she should be conservative during booms to avoid bubbles. This implies that the increased overconfidence of the CRA under disclosure may be beneficial in recessions (allowing more projects to reach the official rating stage) but it may be harmful in booms (allowing too many bad projects to get funded). In the light of this simple model implication, disclosure requirements seem to be helpful when the economy is facing a recession, but discretion in terms of implementation is needed. One way of doing so in order to avoid adverse effects would be to make the requirement more stringent in times of need and to relax it in good times, for instance introducing time revisions of the requirement every twelve months.

1.3.5 Why preliminary ratings?

A question which might arise relates to the actual benefit provided by preliminary ratings to CRAs. In this setting, the advantage for the CRA stands

only in the possibility for the expert to minimise the chance to end up with an incorrect rating which could penalise her reputation. It is however true (but out of the scope of the present work) that such a structure is more of interest for the entrepreneur which could acquire valuable information on its project before presenting it to the market. The rationale behind the choice to have a two stage evaluation is primarely dictated by the willingness to capture more realistically the structure of the interaction between the players. Here there is no question on the necessity or not of preliminary ratings but a pure representation of how the CRA earns reputation in an opaque or transparent market. This view is reinforced by the regulatory attention devoted to this matter. Merging the two stages (i.e having only the official rating stage) would mean ignoring an important driver, especially when dealing with structured finance.

1.4 Extensions

This section presents three extensions to the model solved above which add robustness to the findings.

1.4.1 Availability of partial funding

We now 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 6. $V_G - \Phi > V_{NR}$

Similarly to Assumption 1 this assumption states that low cost funding net of the fee exceeds the 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 compares the payoff from asking the official rating and paying the fee with V_{NR}, and will go ahead according to

$$\begin{cases} q_G^x > \frac{\Phi + V_{NR}}{V_G}, & \text{if } P = G \\ q_B^x > \frac{\Phi + V_{NR}}{V_G}, & \text{if } P = B \end{cases} \tag{1.16}$$

Even though the market now observes more outcomes than in the absence

of partial funding,[41] 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

$$\pi_{G,s}\mu_{IG,s} + \pi_{G,f}\mu_{IG,f} + \pi_{G,J}\mu_J + \lambda\pi_{G,NR,f} + \lambda\pi_{G,NR,s} + \Phi y_G \tag{1.17}$$

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

$$\pi_{B,s}\mu_{IG,s} + \pi_{B,f}\mu_{IG,f} + \pi_{B,J}\mu_J + \lambda\pi_{B,NR,f} + \lambda\pi_{B,NR,s} + \Phi y_B \tag{1.18}$$

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 unaware of the contact between the CRA and the entrepreneur and therefore sticks to the prior λ. It is straightforward that (1.17) and (1.18) perfectly resemble (1.8) and (1.9) 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

$$\mu_{NR,s} = \frac{\lambda\,(y_G - 1)}{(\lambda-1)(x-1)y_B + y_G(\lambda - \lambda x + x) - 1} \tag{1.19}$$

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

$$\mu_{NR,f} = \frac{\lambda\,(y_B - 1)}{y_B((\lambda-1)x + 1) + y_G(x - \lambda x) - 1} \tag{1.20}$$

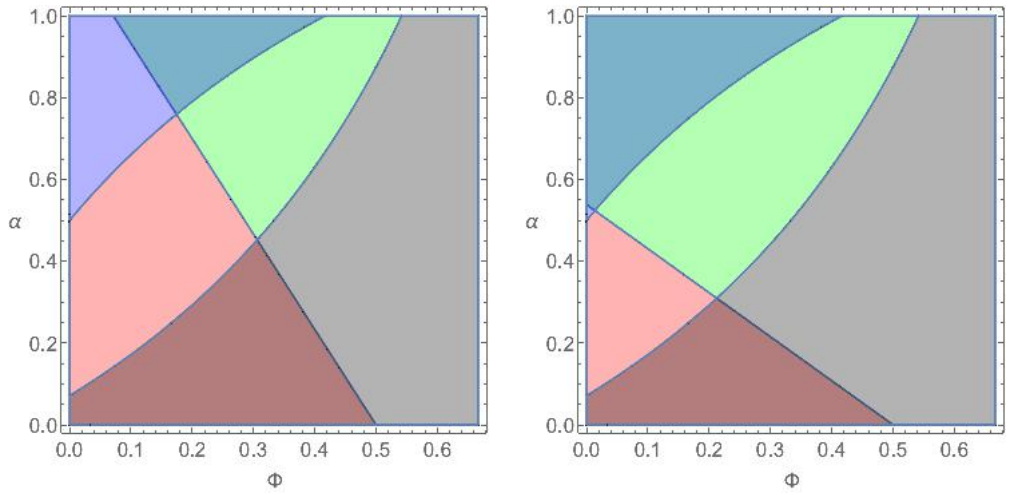
Thus the CRA compares the payoff from issuing a good preliminary

$$y_G[(\alpha - 2\alpha e + e)\mu_J^1 + \alpha e\mu_{IG,s}^1 - \alpha\lambda - (1-\alpha)\mu_{NR,f}^1 + \Phi] + \alpha\lambda + (1-\alpha)\mu_{NR,f}^1 \tag{1.21}$$

with the payoff from issuing a bad preliminary

$$y_B[\alpha e\mu_{IG,s}^0 + (\alpha - 2\alpha e + e)\mu_J^0 - (1-\alpha)\lambda - \alpha\mu_{NR,s}^0 + \Phi] + (1-\alpha)\lambda + \alpha\mu_{NR,s}^0 \tag{1.22}$$

[41] An unrated project 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).



(a) No disclosure model (b) Contact disclosure model

Figure 1.6: Comparison of equilibrium representation with high cost funding where $e = 3/4$, $\lambda = 1/2$, $V_G = 1$ and $V_{NR} = \frac{1}{3}$.

Corollary 5. *When there is availability of partial funding*

(i) if the CRA is not mandated to disclose the contact (Assumption 4) then Corollary 1 applies;

(ii) if the CRA is required to reveal the contact (Assumption 5), then $\Phi^* = \widetilde{\Phi}$*, where*

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

The above implies that $\widetilde{\Phi}(1,0) = \lambda\left(\alpha\left(-\frac{e}{e(-\lambda)+e+\lambda} - 1\right) + 1\right)$ where $\widetilde{\Phi}(1,0)$ is $\widetilde{\Phi}$ when $y_G = 1$ and $y_B = 0$. It is still the case that four types of equilibria arise, for the sake of the discussion let's fix $e = 3/4$, $\lambda = 1/2$, $V_G = 1$ and $V_{NR} = 1/3$, then use Figure 1.6 to summarise the findings. The outside option which ensures some funding also in the absence of a rating, results in the CRA being confident even more often than in the case without partial funding.

Lemma 10. *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 official report, the probability that

the project will be certified as IG, given a certain preliminary, has to be higher.[42] 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 make the entrepreneur more willing to go ahead. Overall the results from the baseline model not only hold, but they are also reinforced by the presence of alternative funding.

1.4.2 Entrepreneur's Preference for Success

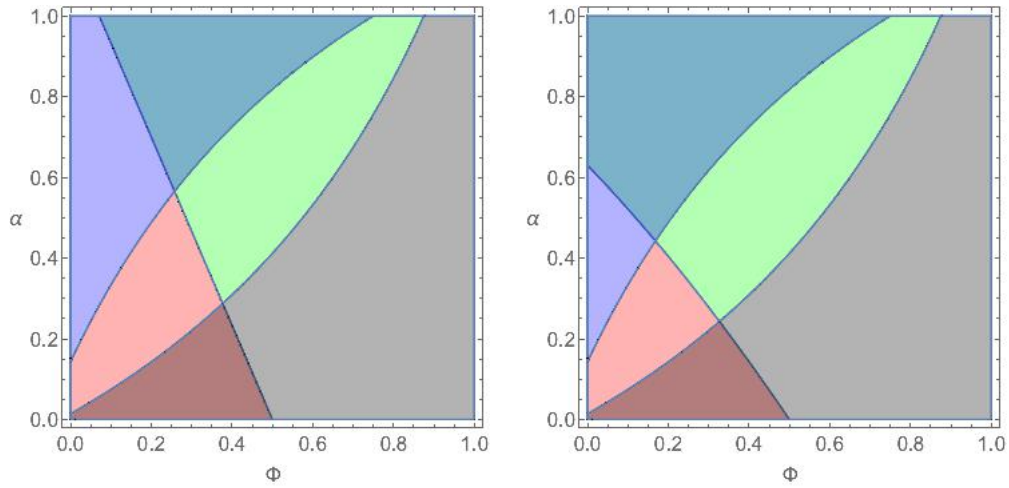
We now relax Assumption 1 stating that the only concern of the entrepreneur is to get funded. In order to have an entrepreneur who prefers success rather than default, let $v < V_G$ be the entrepreneurs own funds. In order to carry out the project v is not sufficient, thus funding from the investors is needed.

The payoff of the entrepreneur can now be written as

$$\begin{cases} {q_G}^{IG} V_G - {q_G}^{J} v > \Phi, & \text{if } P = G \\ {q_B}^{IG} V_G - {q_B}^{J} v > \Phi, & \text{if } P = B \end{cases} \tag{1.23}$$

where ${q_P}^{IG} + {q_P}^{J} = q_P$. In this setting, with probability ${q_G}^{IG} = \frac{\alpha(e(1-\lambda)x+\lambda)}{\alpha\lambda+(1-\lambda)x}$ (${q_B}^{IG} = \frac{\alpha e(1-\lambda)(1-x)}{-\alpha\lambda+(1-\lambda)(-x)+1}$) the project which received a good preliminary (bad preliminary) gets funded and succeeds and the entrepreneur gets V_G, whereas if the project gets funded and fails the entrepreneur loses its own money v with probability ${q_G}^{J} = \frac{(1-\alpha)(1-e)(1-\lambda)x}{\alpha\lambda+(1-\lambda)x}$ (${q_B}^{J} = \frac{(1-\alpha)((1-e)(1-\lambda)(1-x)+\lambda)}{-\alpha\lambda+(1-\lambda)(-x)+1}$). Under these new preferences it can be shown that all four equilibria still arise and that contact disclosure makes the CRA more overconfident. Let $v = \frac{1}{10}$ be the amount of own funding Figure 1.7 graphically provides the result. Comparing Figure 1.7 with Figure 1.5 a similarity can be picked. This is due to the fact that the change in the preferences of the entrepreneur does not affect the choice tradeoff value according to which the CRA acts. This implies that only equilibrium (i) and (iii) change, the first becoming smaller while the second becoming larger. The main difference is that one of the multiplicity area becomes larger. Once again, overall previous results hold.

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



(a) No disclosure model (b) Contact disclosure model

Figure 1.7: Comparison of equilibrium representation when the entrepreneur has a preference for success. where $e = 3/4$, $\lambda = 1/2$, $V_G = 1$ and $v = \frac{1}{10}$.

1.4.3 Perfect Information in the Official Rating Stage

Assume that instead of being uninformed throughout the game, the CRA becomes informed in the second stage. This means that, regardless of the type of CRA, once the entrepreneur buys the official rating, this will be correct with certainty. The rationale may have to do with the quality of the information provided to the CRA by the entrepreneur after he has paid for a rating.[43]

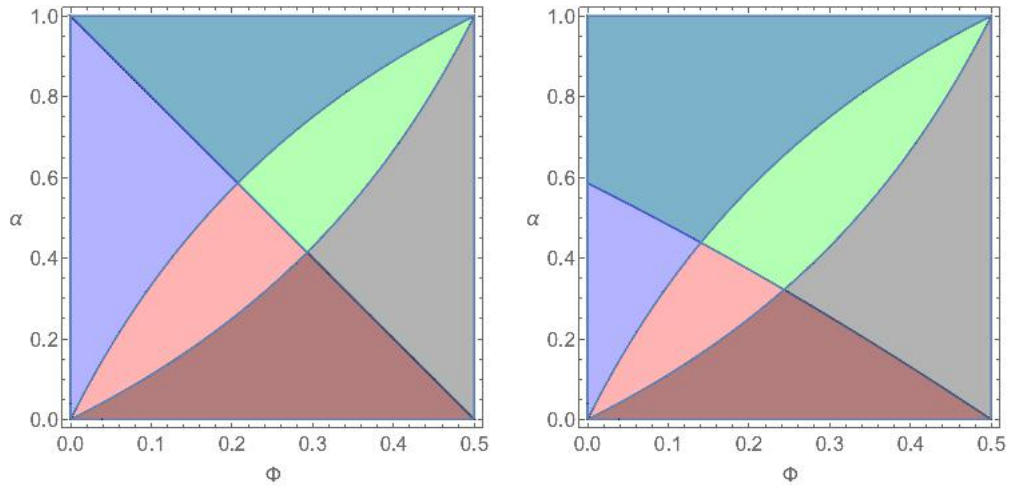
Corollary 6. *Under the assumption of perfect information in the official rating stage* $\bar{\Phi} = (1-\alpha)\lambda$ *and* $\hat{\Phi} = \frac{\lambda\left(\alpha^2\lambda - 2\alpha + 1\right)}{1-\alpha\lambda}$.

When $e = 1$, only one type of mistake can occur. It can only happen that a good project is wrongfully stopped but no bad project gets funded. Figure 1.8 gives a graphical representation of the equilibria.. Under this perfect information assumption, contact disclosure has a positive effect because this requirement results in fewer good projects being dismissed.

Lemma 11. *If there is no noise in the official rating stage, contact disclosure is welfare improving.*

Proof. The probability of stopping good projects in the overconfident-responsive equilibrium is zero while in the conservative responsive equilibrium the same

[43]It is not unreasonable to assume that at the preliminary evaluation the information at the CRA's disposal is less precise or less vast than the information the CRA has access to when it is to provide a published rating.



(a) Model without disclosure (b) Model with disclosure

Figure 1.8: Comparison of equilibrium representation when the CRA is perfectly informed in the official rating stage. Here $\lambda = 1/2$ and $V_G = \frac{1}{2}$.

probability is $\alpha(1-\lambda)$ always greater than zero. Hence if the confident responsive equilibrium becomes more prominent with mandatory disclosure, such a requirement results in fewer good projects stopped. □

Concluding Remarks

I 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. I characterise the equilibrium under a general framework and then look separately at the case where no evidence of preliminary ratings is available to the market and at what happens when preliminary rating contact has to be disclosed by the CRA.

I show that four types of equilibria can arise. Two of them feature the entrepreneur being responsive by remaining unrated following a bad preliminary or buying the official rating following a good one, while the CRA acts overconfidently in one and conservatively in the other. The tradeoff between the fee and the reputation is such that when α is high the CRA issues a good preliminary rating because the risk of loosing reputation is extremely low whereas when α is low the CRA prefers to issue a bad preliminary rating avoiding to risk reputation.

I find that under contact disclosure, when the entrepreneur is responsive, the equilibrium where the CRA is pushy gains prominence to the expenses

of the equilibrium where the CRA is conservative. Thus more projects, even of lower quality, access the official rating stage and can get funded. On the one hand, mandatory contact disclosure reduces the probability of good projects not being financed while on the other hand it opens the ground to the funding of bad projects.

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

The other two equilibria that I find show an optimistic entrepreneur who buys the official rating regardless of the preliminary and a pessimistic entrepreneur remaining unrated 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. Favourable combinations of the two lead the entrepreneur to continue, unfavourable ones result in a stop.

I also show that the result are robust in extensions where funding of unrated projects is available, where the entrepreneur has a preference for success or when in the second stage of the certification the CRA has access to perfect information.

There are three main implications. First, consistently with a strand of the literature, disclosure is not necessarily welfare improving. Second, disclosure policies and regulation cannot be a one off decision, they require tailoring and timely revisions. Thirdly, for disclosure to be effective, the rating process needs to be as accurate as possible.

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Appendix

The probability at each node

The CRA knows when playing $P = G$ or $P = B$ with which probability she is going to gain reputation. As mentioned, $\pi_{B,s}$ 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, only one branch leads to this outcome, therefore

$$\pi_{G,s} = \frac{\alpha e(1-\lambda)xy_G}{(1-\alpha)(1-\lambda)x + \alpha(1-\lambda)x} = \alpha e y_G$$

$$\pi_{B,s} = \frac{\alpha e(1-\lambda)(1-x)y_B}{(1-\alpha)(1-\lambda)(1-x) + \alpha(1-\lambda)(1-x)} = \alpha e y_B$$

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 eight official nodes only two are consistent with this outcome, thus

$$\pi_{G,J} = \frac{(1-\alpha)e(1-\lambda)xy_G + \alpha(1-e)(1-\lambda)xy_G}{(1-\alpha)(1-\lambda)x + \alpha(1-\lambda)x}$$

$$\pi_{B,J} = \frac{(1-\alpha)e(1-\lambda)(1-x)y_B + \alpha(1-e)(1-\lambda)(1-x)y_B}{(1-\alpha)(1-\lambda)(1-x) + \alpha(1-\lambda)(1-x)}$$

which simplified are respectively $(\alpha - 2\alpha e + e)y_G$ and $(\alpha - 2\alpha e + e)y_B$. 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

$$\pi_{G,f} = \frac{(1-\alpha)(1-e)(1-\lambda)xy_G}{(1-\alpha)(1-\lambda)x + \alpha(1-\lambda)x} = (\alpha-1)(e-1)y_G$$

$$\pi_{B,f} = \frac{(1-\alpha)(1-e)(1-\lambda)(1-x)y_B}{(1-\alpha)(1-\lambda)(1-x) + \alpha(1-\lambda)(1-x)} = (\alpha-1)(e-1)y_B$$

Finally, for each information set, of all the possible end nodes, just 2 branches lead to the NR outcome, which means

$$\pi_{G,NR} = \frac{(1-\alpha)(1-\lambda)x\,(1-y_G) + \alpha(1-\lambda)x\,(1-y_G)}{(1-\alpha)(1-\lambda)x + \alpha(1-\lambda)x} = 1 - y_G$$

$$\pi_{B,NR} = \frac{(1-\alpha)(1-\lambda)(1-x)\,(1-y_B) + \alpha(1-\lambda)(1-x)\,(1-y_B)}{(1-\alpha)(1-\lambda)(1-x) + \alpha(1-\lambda)(1-x)} = 1-y_B$$

The sum of the probabilities with which the CRA gains reputation sums up to one.

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

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

Proof of Lemma 5

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

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

which can be rewritten as

$$y_G[(\alpha-2\alpha e+e)\mu_J^1+\alpha e\mu_{IG,s}^1-\beta+\Phi] > y_B[\alpha e\mu_{IG,s}^0+(\alpha-2\alpha e+e)\mu_J^0-\beta+\Phi] \tag{1.24}$$

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 which can be simplified to

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

Proof of Proposition 1

If $y_G = 1$, $y_B = 0$, for the CRA to prefer to issue $P = G$ instead of $P = B$ it has to be that Lemma 5 (i) holds. When the CRA is confident, the ENT faced with $P = G$ will choose to ask for the full report instead of remaining unrated if Lemma 1 holds. By Lemma 3 the ENT faced with $P = B$ would rather not purchase the final rating than ask for it. For the CRA to prefer to issue $P = B$ instead of $P = G$ it has to be the case that Lemma 5 (i) holds with the opposite sign ($\Phi < \Phi^*$). By Lemma 4, the ENT faced with $P = G$ always chooses to get rated whenever the uninformed CRA issue $P = B$, whereas the ENT faced with $P = B$ prefers to stop when Lemma 1 is not satisfied ($q_B < \frac{\Phi}{V_G}$). Lemma 3 rules out equilibria in which the CRA is confident and the ENT faced with $P = B$ prefers to ask for the official rating. Thus, there exist an equilibrium of the type $x = 1$, $y_G = 1$, $y_B = 0$ and an equilibrium of the type $x = 0$, $y_G = 1$, $y_B = 0$.

If $y_G = 0$, $y_B = 0$, the CRA is indifferent between issuing $P = G$ or $P = B$. When the CRA is confident, the ENT faced with $P = G$ chooses not get rated if Lemma 1 is not satisfied ($q_G < \frac{\Phi}{V_G}$), whereas the ENT faced with $P = B$ chooses not to get rated by Lemma 3 . When the CRA is conservative, the ENT faced with $P = G$ always chooses to get rated by Lemma 4, whereas for the ENT faced with $P = B$ to ask for the full report it has to be the case that Lemma 1 holds. Lemma 4 rules out equilibria in which the CRA is conservative and the ENT faced with $P = G$ prefers to remain unrated. Hence there exists an equilibrium of the type $x = 0$, $y_G = 1$, $y_B = 1$ and an equilibrium of the type $x = 0$, $y_G = 1$, $y_B = 1$.

Proof of Corollary 1

The choice on whether to issue a good ($P = G$) or a bad ($P = B$), formally (1.8) > (1.9) in the model without contact disclosure becomes

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

To find the threshold, assume the above holds with equality, leading to

$$\begin{aligned}\bar{\Phi} &= \lambda+\frac{\alpha e(\frac{\lambda y_B y_G}{e(1-\lambda)y_B+\lambda y_G}-\frac{\lambda y_G^2}{e(-\lambda)+e+\lambda})}{y_G-y_B} \\ &\quad+\frac{(\alpha-2\alpha e+e)(\frac{(\alpha-1)\lambda y_B^2}{-2\alpha\lambda+\alpha+(2\alpha-1)e(\lambda-1)+\lambda}-\frac{(1-\alpha)\lambda y_B y_G}{(1-\alpha)\lambda y_B+(1-\lambda)(\alpha-2\alpha e+e)y_G})}{y_G-y_B}\end{aligned}$$

If $y_G = 1$ and $y_B = 0$ it becomes $\bar{\Phi} = \frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda}$.

Proof of Corollary 3

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

$$\begin{aligned}&\frac{(1-\alpha)\lambda y_B(\alpha-2\alpha e+e)y_G}{(1-\alpha)\lambda y_B+(1-\lambda)(\alpha-2\alpha e+e)y_G}+ \\ &\quad\frac{\lambda\left(1-y_G\right)\left((\alpha-1)y_B-\alpha y_G+1\right)}{(\alpha\lambda-\lambda)y_B+(-\alpha\lambda+\lambda-1)y_G+1}+\frac{\alpha e\lambda y_G}{e(1-\lambda)+\lambda}+\Phi y_G > \\ &\quad\frac{\alpha e\lambda y_B y_G}{e(1-\lambda)y_B+\lambda y_G}+\frac{(1-\alpha)\lambda y_B(\alpha-2\alpha e+e)}{(1-\alpha)\lambda+(1-\lambda)(\alpha-2\alpha e+e)}+ \\ &\quad\frac{\lambda\left(1-y_B\right)\left((\alpha-1)y_B-\alpha y_G+1\right)}{(\alpha\lambda-1)y_B-\alpha\lambda y_G+1}+\Phi y_B\end{aligned}$$

To find the threshold, assume the above holds with equality, leading to

$$\begin{aligned}\hat{\Phi} &= \frac{\alpha e(\frac{\lambda y_G y_B}{e(1-\lambda)y_B+\lambda y_G}-\frac{\lambda y_G^2}{e(-\lambda)+e+\lambda})}{y_G-y_B} \\ &\quad+\frac{(\alpha-2\alpha e+e)(\frac{(\alpha-1)\lambda y_B^2}{-2\alpha\lambda+\alpha+(2\alpha-1)e(\lambda-1)+\lambda}-\frac{(1-\alpha)\lambda y_B y_G}{(1-\alpha)\lambda y_B+(1-\lambda)(\alpha-2\alpha e+e)y_G})}{y_G-y_B} \\ &\quad+\frac{\frac{\lambda((\alpha-1)y_B-\alpha y_G+1)}{(\alpha\lambda-1)y_B-\alpha\lambda y_G+1}(1-y_B)-\frac{\lambda((\alpha-1)y_B-\alpha y_G+1)}{(\alpha\lambda-1)y_B-\alpha\lambda y_G+1}(1-y_G)}{y_G-y_B}\end{aligned}$$

If $y_G = 1$ and $y_B = 0$ it becomes $\hat{\Phi} = \frac{\lambda\left(-\alpha\lambda+e\left(\left(\alpha^2+\alpha-1\right)\lambda-2\alpha+1\right)+\lambda\right)}{(\alpha\lambda-1)(e(\lambda-1)-\lambda)}$.

Proof of Lemma 6

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 6 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 7

From Proposition 1, Corollary 1 and Corollary 3 we know that

$$\bar{\Phi} = \frac{\lambda(e(\alpha+\lambda-1)-\lambda)}{e(\lambda-1)-\lambda}$$

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

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. $e(\lambda-1)-\lambda < 0$ 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 $\forall \lambda, \alpha$.
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 $\hat{\Phi}(1,0)$.

Proof of Corollary 5

With contact disclosure and availability of partial funding, 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

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

To find the threshold, assume the above holds with equality, leading to

$$\begin{aligned}\widetilde{\Phi} \;=\; & \frac{\frac{(1-\alpha)\lambda y_B(\alpha-2\alpha e+e)y_G}{(1-\alpha)\lambda y_B+(1-\lambda)(\alpha-2\alpha e+e)y_G}}{y_B-y_G}-\frac{\frac{\alpha e\lambda y_B y_G}{y_B(e-e\lambda)+\lambda y_G}}{y_B-y_G}-\frac{\frac{(\alpha-1)\lambda y_B((2\alpha-1)e-\alpha)}{-2\alpha\lambda+\alpha+(2\alpha-1)e(\lambda-1)+\lambda}}{y_B-y_G}\\ & +\frac{\frac{\alpha e\lambda y_G}{e(-\lambda)+e+\lambda}}{y_B-y_G}+\frac{\frac{(\alpha-1)\lambda(y_B-1)(y_G-1)}{\lambda y_B-(\lambda-1)y_G-1}}{y_B-y_G}-\frac{\frac{\alpha\lambda(y_B-1)(y_G-1)}{(\lambda-1)y_B-\lambda y_G+1}}{y_B-y_G}\\ & -\frac{(\alpha-1)\lambda\left(y_B-1\right)}{y_B-y_G}-\frac{\alpha\lambda\left(y_G-1\right)}{y_B-y_G}\end{aligned}$$

If $y_G = 1$ and $y_B = 0$ it becomes $\widetilde{\Phi} = \lambda\left(\alpha\left(-\frac{e}{e(-\lambda)+e+\lambda}-1\right)+1\right)$.

Proof of Corollary 6

Without contact disclosure and with perfect information in the official rating stage 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

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

To find the threshold, assume the above holds with equality, leading to

$$\begin{aligned}\bar{\Phi} &= \frac{-\frac{(1-\alpha)^2\lambda y_B y_G}{(1-\alpha)\lambda y_B+(1-\alpha)(1-\lambda)y_G}}{y_G-y_B}+\frac{\frac{\alpha\lambda y_B y_G}{(1-\lambda)y_B+\lambda y_G}}{y_G-y_B}\\ &\quad+\frac{\frac{(1-\alpha)^2\lambda y_B}{(1-\alpha)(1-\lambda)+(1-\alpha)\lambda}}{y_G-y_B}+\frac{\lambda\left(1-y_B\right)}{y_G-y_B}-\frac{\alpha\lambda y_G-\lambda\left(1-y_G\right)}{y_G-y_B}\end{aligned}$$

if $y_G = 1$ and $y_B = 0$ it becomes $\bar{\Phi} = (1-\alpha)\lambda$ Similarly, with contact disclosure and with perfect information in the official rating stage 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

$$\begin{aligned}&\frac{(1-\alpha)^2\lambda y_B y_G}{(1-\alpha)\lambda y_B+(1-\alpha)(1-\lambda)y_G}-\frac{\lambda\left(y_G-1\right)\left(-(\alpha-1)y_B+\alpha y_G-1\right)}{(\alpha-1)\lambda\left(y_G-y_B\right)+y_G-1}+\\ &\qquad\alpha\lambda y_G+\Phi y_G>\frac{\alpha\lambda y_B y_G}{(1-\lambda)y_B+\lambda y_G}+\\ &\frac{\lambda\left(1-y_B\right)\left((\alpha-1)y_B-\alpha y_G+1\right)}{(\alpha\lambda-1)y_B-\alpha\lambda y_G+1}+\frac{(\alpha-1)^2\lambda y_B}{-2\alpha\lambda+(2\alpha-1)(\lambda-1)+\alpha+\lambda}+\Phi y_B\end{aligned}$$

To find the threshold, assume the above holds with equality, leading to

$$\begin{aligned}\hat{\Phi} &= \frac{-\frac{(1-\alpha)^2\lambda y_B y_G}{(1-\alpha)\lambda y_B+(1-\alpha)(1-\lambda)y_G}}{y_G-y_B}+\frac{\frac{\alpha\lambda y_B y_G}{(1-\lambda)y_B+\lambda y_G}}{y_G-y_B}+\frac{\frac{\lambda(1-y_B)((\alpha-1)y_B-\alpha y_G+1)}{(\alpha\lambda-1)y_B-\alpha\lambda y_G+1}}{y_G-y_B}\\ &\quad+\frac{\frac{\lambda(y_G-1)(-(\alpha-1)y_B+\alpha y_G-1)}{(\alpha-1)\lambda(y_G-y_B)+y_G-1}}{y_G-y_B}+\frac{\frac{(\alpha-1)^2\lambda y_B}{-2\alpha\lambda+(2\alpha-1)(\lambda-1)+\alpha+\lambda}}{y_G-y_B}-\frac{\alpha\lambda y_G}{y_G-y_B}\end{aligned}$$

if $y_G = 1$ and $y_B = 0$ it becomes $\hat{\Phi} = \frac{\lambda\left(\alpha^2\lambda-2\alpha+1\right)}{1-\alpha\lambda}$.

Chapter 2

What if I knew you did it? An Analysis of Competition using Preliminary Ratings

Marta Allegra Ronchetti

Abstract

This paper constructs a model of preliminary ratings under competition and uses it to investigate an amendment to the European Regulation on disclosure matters. The first credit rating agency (CRA) issues a preliminary rating. After receiving this, the entrepreneur can either purchase a final rating at a cost or ask a second opinion to another CRA. I compare the old no mandatory disclosure regime to a new one mandating the disclosure of the contact between the CRAs and the entrepreneur. I identify cost thresholds. If it is costly for the CRAs to become informed, the equilibrium is unique and mandatory disclosure has no effect. When instead the effort cost is relatively low, the space of parameters' combinations for which an informative equilibrium exists becomes smaller and the non informative equilibrium area becomes larger. It is shown that the first CRA's decision to become informed is negatively affected by disclosure whereas the second CRA is either more likely or less likely to exert effort according to the reputation at the outset. In bad times, mandatory disclosure gives the second CRA the incentives to invest in information.

JEL Classification: D82, D83, G24, G28

Keywords: rating agencies, preliminary ratings, reputation, disclosure, competition

Introduction

The literature on competition in the credit rating industry is the result of the recently growing debate due to the continuous call for more competition from legislators and international bodies. In the wake of the financial crises, credit rating agencies (CRAs) have been questioned and the attention devoted to the credit rating industry has targeted market structure and lack of transparency as possible causes of bad functioning. The industry is an oligopoly, with the Big Three CRAs, namely Standard & Poor's, Moody's and Fitch, having a corporate bond market share above 90%. While competition exists, it is in niche markets such as rating of insurance companies or ratings of commercial mortgage-backed securities (MBS). In recent years, the only market in which a fourth CRA conspicuously expanded is the structured financial instruments (SFI) market, where DBRS is now regarded as large.[1] Legislators and regulatory bodies have been repeatedly calling for more competition and improved information disclosure, to the benefit of both issuers and especially investors.

On the grounds of this thought, I here construct a model of informal reviews under competition and use it to investigate two disclosure regimes. The aim is to provide a framework to look at the market structure and at transparency at the same time. I model a situation where the entrepreneur has the possibility to approach more than one CRA at a preliminary stage. I am interested in a competitive situation where the CRAs would like to gain reputation among a third party (i.e. investors) through the provision of a published certification but where competition occurs in the preliminary ratings market. This market has several peculiarities. First of all, CRAs compete in the issuance of preliminary ratings which have the characteristics of being provided confidentially to the entrepreneur. As a consequence these ratings are not directly relevant to the opinion that investors holds regarding the quality of the CRA. The CRAs however value the opinion of the market on their quality and need the entrepreneur to buy a final rating in order to make it publicly available. I consider two regimes, one in which disclosure is not in place and one in which disclosure of the contact between the CRA and the entrepreneur is mandatory. These regimes reflect a recent amendment to the European Regulation on credit rating agencies which requires these

[1] According to Commission [2016], slight increases in market shares can be seen in corporate finance bonds (GBB in Germany), in corporate insurance (Assekurata in Germany and AM Best in Spain) and in corporate non financial (Axesor in Spain). These are increases in local markets which seem not to be replicated at the aggregate level.

experts to disclose any issuers' request of preliminary ratings.[2]

The CRA decides whether to exert effort at a cost in order to increase the accuracy of the preliminary evaluation and in turn the perception that the market has on its quality. There is no fee at the preliminary stage, only the final rating stage involves a cost for the entrepreneur. I assume that this certification fee, which is non contingent on the outcome of the evaluation, is paid to a different division within the CRA, thus when the CRA is assessing the quality of the project only reputation matters. [3]

I ask to what extent an increase in transparency impacts on the incentive of the CRAs to exert effort when performing a preliminary certification. I expect that more information available to investor results in a more accurate assessment of the quality of the CRAs and in turn in a different incentive of the CRAs to become informed.

When the disclosure of preliminary evaluations is not in place CRAs do not know whether the entrepreneur is approaching an expert for the first time.[4] Mandatory disclosure of any contact between the CRAs and the issuer leads to the CRA knowing whether its opinion is the first one received. Under these circumstances, informing investors about an action which has occurred can affect the incentive of the CRA.[5]

When the cost of effort is high, I expect the CRA not to invest in effort and exert the minimum possible effort. Similarly, I expect the entrepreneur not to ask for a second opinion when approaching a second CRA is expensive.

I find that mandatory disclosure when the cost of effort is high (which may happen for more complex financial products) has no effect; the CRAs exert no effort and the entrepreneur acts according to the magnitude of the ratio between the cost of contacting the second CRA and the fee. I show that when the effort cost is relatively low (which may happen for traditional debt instruments), disclosure decreases the space of parameters' combinations for which an informative equilibrium exists. Under disclosure there are two types of informative equilibrium, as opposed to only one type

[2]This requirement is disciplined in 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.

[3]In Commission [2016] it is suggested that the reputation that CRAs enjoy among investors is crucial when they compete. I follow this view, abstracting from the major source of revenue of the CRAs.

[4]It might be the case that the uninformed party has already approached another CRA.

[5]Contact disclosure can be interpreted as partial information provided to investors. Partial because the actual outcome of the evaluation is only known to the entrepreneur and to the CRA.

under no disclosure. In one type, the effort is exerted only by the first CRA and the entrepreneur does not shop for ratings. In the other, the entrepreneur requests a second opinion and effort is exerted only by the second CRA. It is shown that the first CRA is less likely to exert effort whereas the second CRA can either be more likely or less likely to exert effort according to the reputation at the outset.

Under disclosure, I show that as the cost of effort decreases, there are two effects. On the one side the willingness of the first contacted CRA to exert effort increases, preventing the entrepreneur form contacting the second CRA. On the other the willingness of the second contacted CRA to exert effort increases in the light of the choice of the entrepreneur to ask for a second opinion. One of the main implication of the findings is that if choosing no effort is preferred to exerting effort this result is reinforced under disclosure whereas when the CRA prefers to exert effort, the increase in the payoff from not exerting effort can either trigger the same decision under disclosure or it could alter the decision of the CRA towards no effort.

When switching to a different CRA is not too costly and becoming informed does not require a high investment, I find an increase in the parameter space where the second CRA exerts effort. Moreover the area where multiplicity occurs becomes larger. I also analyse what happens if contacting a second CRA is extremely expensive, removing competition. [6] In this situation, the entrepreneur always buys from the first CRA and therefore never contacts the second one. I find that moving from no disclosure to mandatory disclosure has two effects. When there are few good projects, the threshold cost below which the CRA is willing to exert effort is lower. Thus disclosure results in a weaker incentive to exert effort. When good projects are numerous, the threshold cost below which the CRA is willing to exert effort is higher so the incentive to invest in information is stronger. Overall this paper shows that, under the assumption that more information is beneficial, disclosure never results in more information in the system.

Recent theoretical and empirical works have dealt with competition from different angles. For instance the presence of multiple CRAs is a necessary condition in order to tackle with shopping for rating, a practice of contacting several agencies in order to choose among the given evaluation the most favourable ones. This practice has been studied in models such as

[6] This corresponds to a situation where there is long term relationship between the parties such that approaching another CRA requires time and effort to provide the information needed.

Skreta and Veldkamp [2009] where as the number of CRAs increases, the bias increases as well. Faure-Grimaud et al. [2009] focuses on the optimal ownership contract between the CRA and a firm showing that competition in the rating markets should not be encouraged because it leads to less information conveyed in equilibrium. I restrict attention to a limited possibility to shop for rating, whereby the entrepreneur can consult at most two CRAs for the preliminary evaluation at no cost. In Sangiorgi et al. [2009], notching can be an equilibrium outcome consistent with a purely competitive environment, nevertheless it may still be consistent with behaviours that go against competition.[7] Starting from the consideration that the informativeness of rating is affected by ratings shopping, Kronlund [2013] investigates to which extent bond issuers engage in such a practice. An interesting finding shows that delay in the publication of lower ratings until after a bond is issued, is a common practice. Hence not only a choice is made regarding the CRA but also a choice in terms of timing takes place.

In the presence of rating shopping, competition has an effect on rating inflation. In Bolton et al. [2012] competing when shopping for rating is possible reduces market efficiency and CRAs are found to be more prone to inflate ratings during booms.[8] A similar conclusion of high likelihood to ratings' inflation under competition is reached by Camanho et al. [2012]; yet unlike the model by Bolton et al. [2012], here the authors do not address shopping for rating as one of the causes. Competition has a disciplining effect, which is said to decreases rating inflation trough incentives to maintain or to gain market leadership and a market sharing effect ,which lowers the reward from maintaining reputation. According to Vasconcelos and Wang [2014] competition may reduce the efficiency of the service provided by the CRA. Rating inflation is an equilibrium outcome and truth telling gives rise to a lower surplus in duopoly than in monopoly. The suggestion of the authors is that the outcome of a regulation requiring the issuers to purchase a rating from both CRAs, avoiding contingency on content, would turn out to be better than an unregulated duopoly. I partially follow this idea by having non contingent fees in the model. Bongaerts et al. [2012] identify a

[7]Notching is a practice that involves the reduction of a competitor's rating when reporting the rating on another scale;

[8]In Bar-Isaac and Shapiro [2013] lower ratings quality in booms and higher in recessions are suggested by many economic fundamentals; for instance in booms, employees face more outside options and therefore the CRA may not be able to maintain the same quality, or the incentive to monitor a CRA in booms is less strong and therefore the returns from rating quality shrink;

different explanation than rating inflation when Fitch acts as a tiebreaker. If $S\&P$ and Moody's have different evaluations of a financial product, it is likely that the issuer solicits a rating from the third agency if he expects the evaluation to lean towards investment grade.

The empirical literature on competition in the rating industry gives divergent findings. Griffin et al. [2013] claim that encouraging competition may lower rating quality unless safeguards are put in place. They have two main points: one is that empirically $S\&P$ issues more positive AAA size adjustments when there is competitive pressure from Moody's. The other is that collateralized debt obligations (CDOs), which are a type of structured financial products, rated by both CRAs result in a default more often than those rated from just one CRA. An overall lower quality of ratings after the entry of a third player is found in Becker and Milbourn [2011] as well. The authors identify as a reason for competition affecting incumbent quality the fact that competitive pressure may force CRAs to decrease accuracy to meet the expectations of the issuers, in the short run, even though they should focus on the long run pursuing the goal of maintaining reputation high among investors. Instead of ratings competiion Bae et al. [2015] show that the effect of Fitch's market share on credit ratings issued by the other two CRAs can be driven by industry heterogeneity. By focusing on reputation and ignoring the fee I am abstracting from the short run considerations to solely investigate the long run ones. Xia [2014] investigates how information quality of ratings issued by an issuer-pay rating agency changes when an investor-pay rating agency enters the market. Unlike Becker and Milbourn [2011], here incumbent's ratings improve significantly and it is argued that increase in reputation concerns is one of the causes.

Competition has also been studied in relation to the CRAs reputation. The results from Lugo et al. [2014] seem to be consistent with the idea that a CRA with a low reputation is the most influenciable and the least influencing among rival CRAs, whereas the more reputable ones influence each other symmetrically. By Considering Fitch to have the lowest reputation, they find that Moody's and $S\&P$ react quicker to a downgrade issued by the other compared to the case of Fitch being the first to downgrade. Bizzotto [2014] shows that if reputation incentives for the CRAs are weak, competition among them results in the issuer investing more in the security's quality to the benefit of the market. In the rating industry the revelation of information can be affected by competition. When the CRA

aims at maximising its reputation with respect to that of the competitors for market power reasons, Mariano [2012] finds that reputation concerns do not guarantee that the rating is accurate. This happens because public information gets contradicted from the CRA just because of the reputation gain if it is proved to be right. Good ratings are issued more often in order to avoid the possibility of a second rating.[9] In Doherty et al. [2012] full disclosure is not optimal and a second rating (i.e competition) is worth only if it allows the seller to signal his higher quality. Their empirical analysis of the market for insurance ratings shows that those who decided to purchase a second rating were of higher financial quality; nonetheless the average rating was either the same or even lower than that assigned by the incumbent. In Lizzeri [1999] oligopolistic competition among intermediaries leads to an equilibrium with no profits and full information. In S.Hirth [2014] the interaction studied is that between the CRAs and investors. Pure strategy outcomes show that either honest or inflating CRAs dominate and that the investors are either trusting or sophisticated. In my model investors are non strategic and only update beliefs on the CRAs' type, while the studied interaction is that between the CRAs and the entrepreneur. Manso [2013] investigates feedback effects on the credit quality of issuers, showing that a downward pressure on ratings can be due to increased competition among CRAs. The focus in Cohen and Manuszak [2013] is on the effect of competition on ratings using the market for commercial mortgage-backed securities (CMBS).[10] The main implication of the findings identified by the authors states that as a new CRA reaches a market share similar to that of the incumbent CRAs, competition may worsen. This paper as many others uses the rise of Fitch to empirically investigate competition questions.

Looking at soverign ratings, Gomes [2013] shows that having more CRA does not increase the monitoring. CRAs put weight on the competitors rating so as to increase the precision of their own rating. It is shown that the incentive to rely on the analysis performed by others is present.

To some extent this paper relates to the literature stream focusing on the consequences of information disclosure. For instance Kurlat and Veldkamp [2015] investigate the recent requirement for issuers to disclose relevant payoff information to the benefit of investors. They show that if uncertainty in payoffs is reduced by means of additional information disclosure, risk is

[9] Under full disclosure the rating is a perfect signal of the seller's quality

[10] CMBS are structured debt instruments composed of commercial mortgages.

lower which in turn reduces returns because these are meant to compensate for the risk taken. I focus on a different requirement and instead of holding the entrepreneur's behaviour fixed I hold that of the investors. In Mählmann [2008], the author analyses the economic role of rating publication rights showing that in the absence of an obligation to request a public rating, investors can't be sure about the reason for non disclosure, thus an an equilibrium with non disclosure of low quality ratings can occur. Jorion et al. considers Regulation Fair Disclosure and investigates how the implementation of the regulation changed the information content of rating announcements.[11] They find that downgrades (upgrades) cause larger falls (increases) in stock prices with respect to the pre-regulation period.

The reminder of this article is as follows: Section 2 is devoted to the model general set up. Section 3 deals with the equilibrium analysis focusing on (i) the model without disclosure and (ii) the model with contact disclosure. Section 4 compares the two disclosure regimes and Section 5 considers what happens in the absence of competition.

2.1 The model

This section presents a model with an entrepreneur, investors and CRAs. The entrepreneur needs funding for a project. He approaches a CRA to have the project evaluated because investors rely on the published rating to make investment decisions. The CRAs operate in two stages. In the preliminary rating stage, they provide a preliminary evaluation which is confidential. In the final rating stage, upon payment of a fee, they provide a published rating. The CRA can either issue an investment grade final rating or a junk final rating. The entrepreneur goes to a CRA and asks for a preliminary evaluation after which he can approach at a cost a second CRA. The outcome of this interaction determines the access to funding for the entrepreneur and the reputation of the CRA. I consider two different regimes, one in which disclosure is not mandatory and one in which disclosure is mandatory. Details on the disclosure requirements are provided later.

[11]The Regulation Fair Disclosure is a U.S. transparency regulation implemented to deal with selective disclosure. CRAs were granted an exemption to this regulation.

2.1.1 The Entrepreneur

The entrepreneur has a project of type $\omega \in \{g, b\}$ which is good (g) with probability α and bad (b) with probability $(1 - \alpha)$. A good project always succeeds while a bad one always fails. The entrepreneur is unaware of the quality of the project and needs the CRA to certify the quality of the project. Only project which are reported to be investment grade access funding.

The entrepreneur has potentially two decisions to make; first he chooses whether to buy the report from the first CRA, contact a second one or stop and remain unrated. If a second CRA is contacted, he decides whether to buy the final report from the first CRA, from the second CRA or remain unrated. Buying the final rating involves a cost Φ to be paid to the chosen CRA.[12] Contacting a second CRA involves a costs δ.

Assumption 7. $0 < \delta < \Phi$

Asking a second opinion is less expensive than purchasing the final report. The cost of approaching a second CRA can be justified as the amount of time forgone to obtain a second opinion.[13] After the entrepreneur receives the preliminary rating $P \in \{G, B\}$ from the first CRA, he decides whether to pay the fee for the final rating. I denote this strategic decision $y_P \in Y = \{0, 1\}$. Similarly after receiving the second preliminary rating, the entrepreneur decides whether to buy the final from the second CRA. I denote this strategic decision $z_{PP} \in Z = \{0, 1\}$. I assume that the final rating stage reveals the true quality of the project with certainty. If after receiving the two preliminaries the entrepreneur decides to buy, he is indifferent between paying the first or the second CRA because both give him the same outcome. Thus I assume that he pays the last which gave its opinion.

Definition 3. *The entrepreneur shops for ratings when he asks for a second opinion ($y_G = 0$) and he doesn't otherwise ($y_G = 1$).*

2.1.2 The Investors

Investors form beliefs on the quality of the CRA by means of the observed published rating, if available. They consequently fund the project whenever

[12] Final here refers to the non confidential nature of this rating. Once the entrepreneur decides to pay for the rating, the outcome of the evaluation becomes official. The fee is exogenous and can take any positive value.

[13] Another way of thinking of the cost is in terms of a switch cost. Going to another CRA imposes a burden on the entrepreneur.

an *investment grade* rating (IG) is publicly available and do not provide funding if the project is rated *junk* (J).[14] In the no disclosure model, there is no evidence of the preliminary contact between either of the approached CRAs and the entrepreneur whereas the second regime model makes the disclosure of the contact mandatory.

2.1.3 The Credit Rating Agencies

The certification happens as follows: upon asking to the first CRA for a preliminary evaluation the entrepreneur receives a verbal message. The entrepreneur can then approach a second CRA and a second verbal message might be obtained. Each CRA contacted provides a preliminary rating $P \in \{G, B\}$.

There is a large number of CRAs which can offer an informal review of the quality of the project. Each CRA can be of the *informed* (I) or *uninformed* (U) type. A CRA is informed with probability λ and uninformed with probability $(1 - \lambda)$. An informed CRA is always correct in its preliminary assessment of the quality of a project, whereas an uninformed one is correct only if an investment in information occurs. CRA's type is private information.

The uninformed CRA, after exerting effort, receives a signal $\theta \in \{g, b\}$ on the quality of the project. The informed CRA correctly assesses the project at the preliminary stage, namely

$$Pr(\theta = g|\omega = g, I) = Pr(\theta = b|\omega = b, I) = 1$$

In other words the informed CRA is committed to play the strategy consisting of always giving good (bad) preliminary rating to a good (bad) project.[15] There is then an final rating stage which produces a published report $r \in \{IG, J\}$.[16] I assume that the fee charged for the final rating is paid to a different division within the CRA, thus when the CRA is assessing the quality of the project it only cares about its reputation.[17] There is private

[14]Investors belief over CRA's type is assumed to be irrelevant for investment decisions but only relevant for the CRAs when choosing how to behave.

[15]The use of a committed type in modelling reputation is a common practice which dates back to Kreps and Wilson [1982]. Such a tool has been often followed also in the CRA literature (Mathis et al. [2009], Camanho et al. [2012]), Bizzotto [2014].

[16]Recall that only projects receiving an investment grade rating (IG) access funding, those receiving a junk rating (J) are abandoned.

[17]Abstracting from the fee is a modelling tool which is justified by those policies and procedures put in place by CRAs in order to discern monetary compensation from the

information in the final rating stage (which occurs after having seen the preliminary and after the purchase of the rating) revealing the true quality of the project with certainty. The final rating the entrepreneur receives is correct.

Once the CRA has exerted effort and has received a signal, she follows the signal and reports a verbal message to the entrepreneur.[18]

Information Structure

The uninformed CRA knows its type and unlike the informed one it has to decide whether to exert effort $\eta \in \{0, 1\}$ in order to obtain the correct signal about the project's quality. Not exerting effort ($\eta = 0$) is costless whereas exerting effort ($\eta = 1$) involves a cost c. The cost function is simply $c\eta$, where $c > 0$. The choice of effort is unobservable to the other players and once the CRA decides on the effort, if the project is good the CRA receives a good signal $\theta = g$ with probability one:[19]

$$Pr(\theta = g|\omega = g, U) = 1$$

regardless of the chosen η. If the project is bad the CRA receives the correct signal $\theta = b$ with probability $\frac{1}{2} + \frac{\eta}{2}$ and the wrong signal with the complementary probability. This is the accuracy of the signal. More precisely, if the CRA chooses to exert effort

$$Pr(\theta = b|\omega = b, \eta = 1, U) = 1$$

$$Pr(\theta = g|\omega = b, \eta = 1, U) = 0$$

whereas if the CRA chooses not to exert effort

$$Pr(\theta = b|\omega = b, \eta = 0, U) = Pr(\theta = g|\omega = b, \eta = 0, U) = \frac{1}{2}$$

Definition 4. *The uninformed CRA is dutiful ($\eta = 1$) when she exerts effort and is lax otherwise ($\eta = 0$).Even though the terms dutiful and lax have a behavioural connotation, here they just refer to the fact that the*

actual activity leading to the analysts' decisions and opinions.

[18]The CRAs always report truthfully their signal. I abstract from the moral hazard problem arising from the possibility that the CRA misreports the signal. The rationale for this choice has to do with the decision to focus on the easiest situation and show that even in the absence of distortions, interesting behaviours can arise.

[19]No matter what level of effort the CRA beliefs to be optimal, any level the CRA may exert is sufficient to evaluate the project correctly when the state of the world is good.

CRA by exerting effort performs her job properly whereas by not investing in information she acts loosely.

Notice that the only possible mistake is therefore that the CRA receives a good signal when the project is bad because she didn't exert effort.

2.1.4 The Timing

The timing of the game is as follows:

1. Nature chooses state $\omega \in \{G, B\}$ and type of CRA and matches the entrepreneur with a CRA;
2. The CRA, if uninformed, decides on the level of effort to exert;
3. Nature chooses the signal $\theta \in \{g, b\}$;
4. The first CRA reports a verbal message $P \in \{G, B\}$;
5. The entrepreneur decides whether to stop, purchase the full report or contact another CRA. If the last happens, nature chooses the type of the CRA and matches it with a CRA;
6. The second CRA, if uninformed, decides on the level of effort to exert and checks the quality of the project and reports a verbal message $P \in \{G, B\}$;
7. The entrepreneur decides whether to stop or purchase the full report from the second CRA;
8. The CRA issues a rating $r \in \{IG, J\}$ which is published, investor invest and update their beliefs on the CRA's quality. Payoffs are realised.

2.2 Equilibrium Analysis

This section characterises the equilibrium. This is a dynamic game of incomplete information where the relevant equilibrium concept is Perfect Bayesian Equilibrium. This section is divided in two parts; subsection 2.2.1 is built on the assumption of no mandatory disclosure whereas subsection 2.2.2 deals with compulsory disclosure of the contact.

The choice of the regime has two main implications. On the one hand, when there is no evidence of a preliminary evaluation, the contacted CRAs don't know whether or not the entrepreneur has already approached another CRA. Hence, the first and the second CRA, when uninformed, behave in the same way. Conversely, when disclosure of the contact is mandatory the CRAs know if they are the first or the second and therefore their behaviour can be different. On the other hand instead, moving from no disclosure to compulsory disclosure results in unrated projects becoming visible to the market. Thus, investors have more information to update their beliefs on the type of CRA. No matter in which regime the CRAs operate, if the CRA is informed, the behaviour will always be correct. For future reference, define two possible types of equilibria in the following way.

Definition 5. *An equilibrium is informative when at least one of the CRAs exerts effort and uninformative otherwise*

2.2.1 The model without disclosure

When disclosure is not mandated, there is no evidence of the entrepreneur approaching a CRA. The reputation of the CRAs in the case of an unrated project is unaffected. The posterior belief on the type of the CRA held by investors is equal to the prior.

Assumption 8. *Contacts for preliminary ratings are known only to the involved parties.*

The above means that only the CRA and the entrepreneur are aware of the request of a preliminary ratings, the investor instead doesn't see this happening.

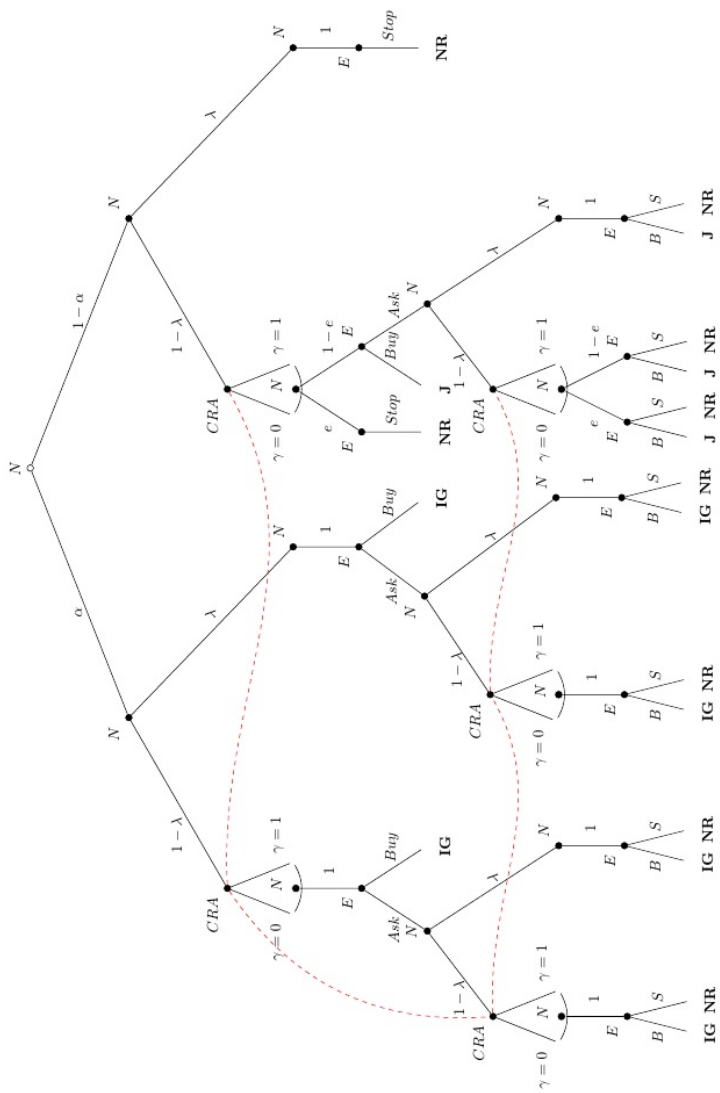


Figure 2.1: The game without disclosure in extensive form. The CRAs are represented as a single player (CRA), thus there is only one information set. When choosing effort (γ) they take into account the possibility of either being the first or the second CRA to be contacted. On the LHS of the tree the effort choice does not determine the informativeness of the signal. Conversely on the RHS the effort choice contributes to the accuracy of the signal and thus determines its informativeness. At the NR end nodes the investors are unaware of the existence of the project.

Investors' Beliefs

Once a project rated investment grade is funded, the investors update beliefs on the quality of the rating agency. The accuracy of the final rating stage, results in either an investment grade rating which in turn allows to carry out the project or in a junk rating which results in the entrepreneur abandoning the project due to the impossibility of obtaining funding. Investors observe the outcome of the evaluation (if available) and following Bayes' rule update their beliefs. If they observe $r = IG$, their belief that the issuing CRA is of the informed type is

$$\mu_{IG} = \frac{\alpha[\lambda y_G + (1-\lambda)(1-y_G)\lambda + \lambda^2(1-y_G)]}{\alpha} = \lambda \tag{2.1}$$

where the denominator is the probability that an IG rating is published and the numerator is the probability that such a rating was due to an informed CRA. Similarly, if they observe $r = J$, the probability that the CRA is of the informed type is

$$\mu_J = 0 \tag{2.2}$$

In other words, when a junk rating is published the market knows that the evaluation was due to an uninformed CRA. This happens because, even though the informed CRA would issue junk rating, in equilibrium this never happens as it will be explained in section 2.2.1. The idea is that a junk rating reveals the quality of the project to the entrepreneur with certainty ad therefore there is no incentive for him to purchase the official rating. This in turn implies that $r = J$ can only be the result of a $p = G$ preliminary rating which was wrong. Given the lack of evidence of the preliminary contact, whenever the rating from a certain CRA is not published, the CRA's reputation remains λ.

Assumption 9. *Without disclosure, the lack of a published a rating does not affect the belief of the investor that the CRA is informed with probability* λ.

The assumption above has to do with the fact that at the outset the number of CRAs is large. As a result, in the absence of pubic information when the entrepreneur decides to remain unrated, it is impossible to determine which CRA was contacted. Under this scenario the market rationally beliefs that each CRA still holds the same probability of being of the informed type.

Entrepreneur's Decision on Publishing or Remaining Unrated

Whenever the entrepreneur decides to ask for a second opinion from a different CRA, he will end up facing two evaluations which can be consistent or differ among themselves. The decision that the entrepreneur has to make involves a choice on whether to buy the final rating from the first CRA, buy from the second CRA or remain unrated. This boils down to the entrepreneur deciding between asking the second CRA for the final rating or not being publicly rated.[20]

Lemma 12. *After receiving the second rating the entrepreneur buys the final rating and pays* Φ *if and only if both preliminaries are good (*$z_{GG} = 1$*).*

Proof. After receiving two good preliminaries the entrepreneur purchases the final rating with probability one. Remaining unrated is not a valid strategy because if that were the case, the entrepreneur would be better off by stopping after the first preliminary evaluation thereby saving the cost of approaching a second CRA (δ). Since a good project is correctly evaluated by the CRA with probability 1, receiving a bad preliminary evaluation from either the first or the second contacted CRA reveals to the entrepreneur that the project is indeed bad. Buying after a bad preliminary from either CRA gives the entrepreneur a junk rating. There is no uncertainty in the final rating stage, thus the entrepreneur ends up saving the cost of contacting a second CRA (δ) and the fee (Φ). □

The CRA Decision on Effort

Let γ denote the effort level of the CRAs and $e = \frac{1}{2} + \frac{\gamma}{2}$ denote the accuracy of the signal without disclosure.

The uninformed CRA decides whether to exert effort when assessing the quality of the project submitted by the entrepreneur. Recall that μ_{IG} and μ_J are the updated beliefs on the reputation of the CRAs held by investors, respectively, when the project is given an IG rating or a J rating. When the preliminary contact is confidential, it is impossible for the contacted CRA

[20] As explained previously, if the entrepreneur buys, he will do so from the second contacted CRA. Thus buying from the first CRA is ruled out by assumption. This assumption has no controversial effect on the results for three reasons: (i) The CRAs do not care about the fee by assumption and therefore paying the first or the second is indifferent for them (ii) in the light of Lemma 12, the entrepreneur purchases only if he receives $P = G$ twice, leading to the same reputation payoff for both experts (iii) without disclosure the CRAs behave as one. This implies that it doesn't matter that the entrepreneur never buys from the first CRA when both issue a good preliminary

to know whether the entrepreneur has already received an evaluation from another CRA. In the light of this, the CRA has to choose the effort taking into account that when she is contacted she could either be the first or the second expert to be approached.

The uninformed CRA is contacted with probability

$$\Pi = (1-\lambda)\left((1-\alpha)(1-e)(1-\lambda)\left(1-y_G\right)+\alpha\left(1-y_G\right)+1\right)$$

The expected payoff for the CRA is

$$\begin{aligned} B(\gamma, y_G) = \pi_2\left((1-e)\lambda\left(1-y_G\right)+e\lambda\right)+\pi_5 e\lambda \\ +\left(\pi_1+\pi_3+\pi_4\right)\lambda - c\gamma \end{aligned} \tag{2.3}$$

where $\pi_1 = \frac{\alpha(1-\lambda)}{\Pi}$, $\pi_2 = \frac{(1-\alpha)(1-\lambda)}{\Pi}$, $\pi_3 = \frac{\alpha(1-\lambda)(1-\lambda)(1-y_G)}{\Pi}$, $\pi_4 = \frac{\alpha\lambda(1-\lambda)(1-y_G)}{\Pi}$ and $\pi_5 = \frac{(1-\alpha)(1-e)(1-\lambda)(1-\lambda)(1-y_G)}{\Pi}$. These are the probabilities the contacted CRA is uninformed, corresponding to the nodes where this type of CRA has to make a decision. This can be seen in Figure 2.1. Moreover, recall that $c\gamma$ is the cost that the uninformed CRA has to incur in order to become informed. The decision of the CRA can be summarised by the following

Lemma 13. *Let* $c_{ND} = \frac{(\alpha-1)\lambda((\lambda+1)y_G-\lambda+1)}{2((\alpha-1)\lambda+\alpha+1)y_G-2((\alpha-1)\lambda+\alpha+3)}$*, the CRA chooses to exert effort* ($\gamma = 1$) *when*

$$c < c_{ND} \tag{2.4}$$

When the cost of effort is lower than the threshold cost, the CRA exerts effort, whereas when the cost of getting informed is high, the CRA does not invest in effort. In a real world setting this could mean that when the CRA deals with relatively simple products (i.e. corporate bonds) she invests in effort whereas when products are complex (i.e. SFI) investment in information does not occur. This interpretation is in line with the findings in Rablen [2013] on optimality for the CRA to lie in the structured products market and truth tell in the corporate bond market.

Entrepreneur's Request of a Second Opinion

After the first informal review the entrepreneur can receive a good ($P = G$) or a bad ($P = B$) preliminary rating. After a good preliminary the entrepreneur decides whether to buy directly from the first CRA, ask for a second opinion or remain unrated. Similarly, after a bad preliminary the

entrepreneur must decide whether to buy the final rating from the first CRA, from the second CRA or remainig unrated.

Lemma 14. *Following a*

(a) good preliminary the entrepreneurs does not remain unrated

(b) bad preliminary the entrepreneurs remains unrated

Proof. Since a good project is correctly evaluated by the CRA with probability one, stopping after a good preliminary is not optimal for the entrepreneur because, if it were the case, he would have never entered the game in the first place.
Since a good project is correctly evaluated by the CRA with probability one, receiving a bad preliminary evaluation reveals to the entrepreneur that the project is indeed bad. There is no uncertainty in the final rating stage, thus the entrepreneur by stopping saves δ. □

The above implies that the entrepreneur, when deciding, compares his payoff from buying from the first CRA with the payoff from asking a second opinion. Buying straight away gives him

$$\frac{\alpha V_G}{\alpha + (1-\alpha)(1-\lambda)(1-e)} - \Phi \tag{2.5}$$

while going ahead gives

$$\frac{\alpha V_G}{\alpha + (1-\alpha)(1-\lambda)(1-e)} - \delta - \Phi \frac{\alpha + (1-\alpha)(1-\lambda)^2(1-e)^2}{\alpha + (1-\alpha)(1-\lambda)(1-e)} \tag{2.6}$$

The decision of the entrepreneur is summarised by the following

Lemma 15. *Let* $m = \frac{\delta}{\Phi}$ *and* $q_\Phi = \frac{\alpha+(1-\alpha)(1-\lambda)^2(1-e)^2}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$*, given a good preliminary rating, the entrepreneur buys the final rating without contacting a second CRA if*

$$m > 1 - q_\Phi \tag{2.7}$$

Notice that q_Φ is the probability of paying the fee to the second CRA.[21] The higher q_Φ, the less likely it is that the entrepreneur decides to contact the second CRA. The idea is that the higher the consistency of the two CRAs

[21] q_Φ can also be interpreted as the probability of receiving two good preliminary ratings, provided the decision to ask for a second opinion. Recall that according to Lemma 12 for the entrepreneur to buy after two preliminary ratings it has to be the case that they are both good.

towards a good rating, the higher the probability that the entrepreneur would buy from the second and therefore knowing that he is more likely to save δ by paying immediately the fee to the first CRA. The entrepreneur chooses to ask for a second opinion when the above relation is reversed. This happens when the probability that the entrepreneur will receive another good preliminary is low and therefore he values the opinion of the second CRA as a mean of saving the fee.

The Equilibrium

This section investigates the equilibrium of the game. It can be shown that whenever the uninformed CRA exerts effort ($\gamma = 1$), the entrepreneur buys straight away because the investment in information ensures a correct signal. The signal is then followed by the CRA and upon payment of the fee it in turn leads to the correct final rating. Moreover if the entrepreneur prefers to ask a second opinion, the CRA doesn't have the incentive to exert effort. In other words

Lemma 16. *There cannot be an equilibrium where the CRA is dutiful and the entrepreneur shops for rating.*

Proof. If $\gamma = 1$ then $e = 1$, equation (2.7) becomes $m > 0$, which is always satisfied. Thus $y_G = 1$ is the entrepreneur's best response. □

If the CRA exerts effort, the preliminary is correct with certainty and therefore the entrepreneur knows what the final rating will be. Approaching a second CRA would make him lose the time cost (δ). A second opinion does not benefit the entrepreneur.
The Proposition below characterises the equilibria which can arise in the game without disclosure.

Proposition 2. *Let* $c^0_{ND} = \frac{\alpha\lambda^2-\alpha\lambda-\lambda^2+\lambda}{2\alpha\lambda+2\alpha-2\lambda+6}$, $\bar{m} = \frac{\alpha\lambda^2-\alpha-\lambda^2+1}{2\alpha\lambda+2\alpha-2\lambda+2}$ *and* $c^1_{ND} = \frac{1}{4}(2\lambda - 2\alpha\lambda)$ *, the equilibria in the model without disclosure are as follows*

(i) For $c > c^0_{ND}$ *and* $0 < m < \bar{m}$*, the entrepreneur shops for ratings, both CRAs, if uninformed, are lax and Lemma 12 applies*

(ii) For $0 < c < c^1_{ND}$*, the entrepreneur doesn't shop for ratings and the uninformed CRA is dutiful*

(iii) For $c > c^1_{ND}$ *and* $\bar{m} < m < 1$*, the entrepreneur doesn't shop for ratings but the uninformed CRA is lax*

		Cost: *Low*	Cost: *High*
$\frac{\delta}{\Phi}$: *Low*		a	b
$\frac{\delta}{\Phi}$: *High*		c	d

Table 2.1: c can take the values (0.125, 0.5) and $\frac{\delta}{\Phi}$ can take the values (0.1, 0.9). Combinations (c, m) are as follows: a $(0.125, 0.1)$; b $(0.5, 0.1)$; c $(0.125, 0.9)$; d $(0.5, 0.9)$.

Notice that c^0_{ND} (c^1_{ND}) is c_{ND} defined in Lemma 13 when $y_G = 0$ ($y_G = 1$) and that $c^1_{ND} > c^0_{ND}$. This relation among threshold simply states that the threshold below which the CRAs decide to exert effort is higher if the entrepreneur prefers not to ask for a second opinion.

Only equilibrium (ii) is informative according to Definition 5. The other two possible equilibria feature a lazy CRA which does not invest in information.

To better grasp the characteristics of these three types of equilibria and to figuratively view them, let us separately look at four different combinations of c and m. Table 2.1 identifies four examples were c and m can be either high or low. Additional combinations of c and m can be found in Appendix A.

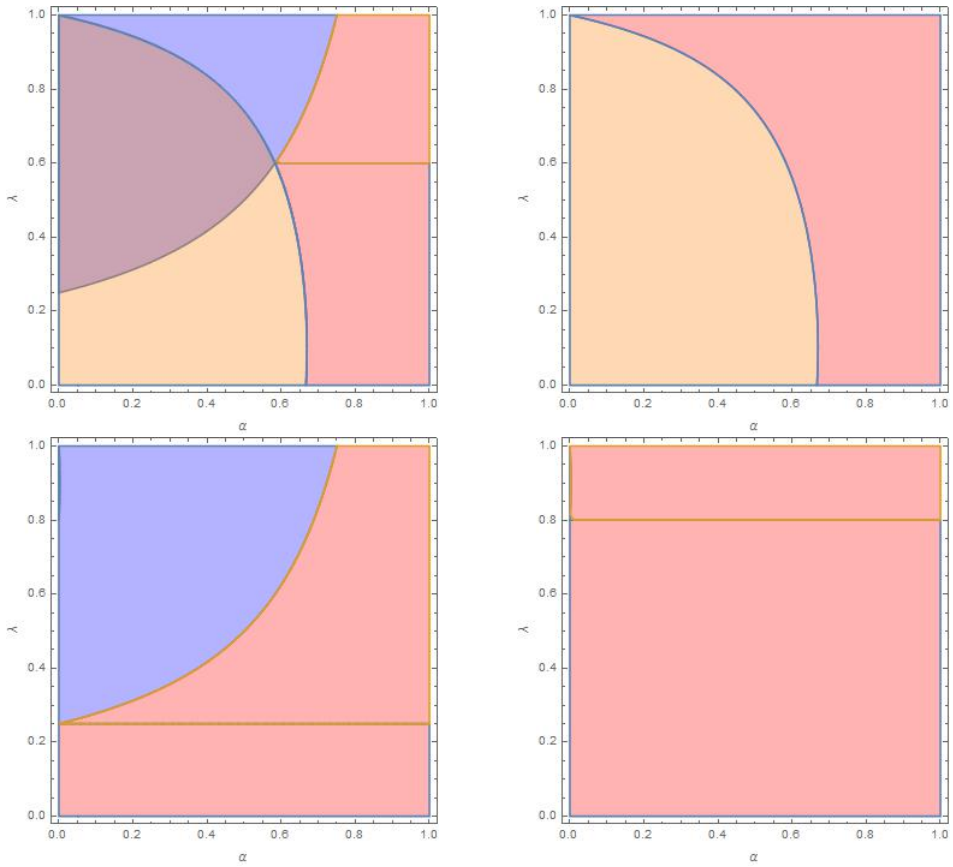
How do effort and contact costs alter the equilibrium outcome?

As represented in Table 2.1 Configuration a (d) picture a situation in which both the effort cost and the relative cost of approaching a second CRA are low (high), Configuration b (c) instead represents a situation where the effort cost is high (low) and the cost of approaching a second CRA is low (high).

When c is high the equilibrium is unique and is either of type (i) and (iii). On the one hand, type (ii) is not an equilibrium because if the cost of effort is sufficiently high, the CRAs' incentive to invest in effort shrinks resulting in the CRAs not exerting effort. On the other hand, as the cost of approaching another CRA decreases, the decision of the entrepreneur to ask for a second opinion becomes more likely.

As m increases, equilibrium of type (i) disappears. Indeed a higher ratio between the cost of approaching a second CRA and the fee implies either an increase in δ without change in Φ or a reduction in the Φ but with a constant δ. Both cases make approaching a second CRA more costly for the

(a) Configuration a (b) Configuration b



(c) Configuration c (d) Configuration d

Figure 2.2: Equilibrium without disclosure. From Proposition 2 the pink area pictures equilibrium (iii), the orange area equilibrium (i), and the blue area equilibrium (ii). The dark pink area shows multiplicity between equilibrium (i) and equilibrium (ii). Appendix A shows the different areas originating each of the configurations represented in this Figure. Each of the four graphs is the representation of the combinations of c and $\frac{\delta}{\Phi}$ shown in Table 2.1.

entrepreneur. Hence he will buy from the first CRA. When c is also high, the CRA chooses not to exert effort and thus the only equilibrium in this case is equilibrium (iii).

2.2.2 The Model with Contact Disclosure

I now assume that legislation is in place, so that the CRAs have to disclose any contact with the entrepreneur. In this case, the CRA knows if she is the first or the second to be contacted. The signal acquisition technology resembles the one previously described, however the effort level exerted by the CRA if uninformed is different, namely it is γ_1 for the first CRA and γ_2 for the second contacted CRA. The two CRAs no longer behave in the same way. Investors can now Bayesian update also in the case of no report. Investors know that an unrated project is of bad quality, but have to update their belief on the quality of the CRA.

Assumption 10. *Contacts for preliminary ratings are publicly known.*

Investors' Beliefs

In this setting, there are several possible observable outcomes. The investors can observe one or two contacts which did not result in a published rating. Similarly they can observe a published rating and either one or two contacts.[22] Investors update beliefs on the quality of the CRA according to which outcome they see. When they see $r = IG$ and just one contact the probability that the CRA is of the informed type is $\frac{\alpha\lambda y_G}{\alpha(1-\lambda)y_G+\alpha y_G} = \lambda$ and similarly if they see two contacts the probability is $\frac{\alpha\lambda(1-y_G)\lambda+\alpha(1-\lambda)(1-y_G)\lambda}{\alpha(1-y_G)} = \lambda$. The market is sure that the CRA is of the uninformed type whenever they see $r = J$, thus the probability that the CRA is informed is 0. This is because the informed CRA correctly evaluates the projects therefore a bad project never receives a published rating. With contact disclosure in place, even in the absence of a published rating the investors can infer something about the quality of the CRA. When they are informed of only one contact, the probability that the CRA is of the informed type is given by $\frac{\lambda}{(1-\lambda)e+\lambda}$ whereas in case of two contacts the probability becomes $\frac{\lambda}{(1-\lambda)\epsilon+\lambda}$. [23]

[22] The list of possible outcomes is $r = IG$ or $r = J$ with one contact, $r = IG$ or $r = J$ with two contacts, one contact or two contacts without any rating.

[23] The first formula is the simplified version of $Pr(I|NR, 2contacts) = \frac{Pr(NR,2contacts|I)Pr(I)}{Pr(NR,2contacts)} = \frac{(1-\alpha)(1-e)(1-\lambda)\lambda(1-y_G)}{(1-\alpha)(1-e)\lambda(1-\lambda)(1-y_G)+(1-\alpha)(1-e)(1-\lambda)^2\epsilon(1-y_G)}$ and the sec-

Second Choice of the Entrepreneur

As pointed out earlier, allowing for contact disclosure does not affect the entrepreneur. His payoff does not change. With or without disclosure the information that the entrepreneur holds is the same. The burden of disclosure is on the CRA. Thus Lemma 12 still holds.

The Second CRA

Let γ_2 denote the effort level and $\epsilon = \frac{1}{2} + \frac{\gamma_2}{2}$ denote the accuracy of the signal of the second CRA with disclosure . To determine the level of effort the CRA compares its expected payoff. Compute the probability Π_2 for the CRA of being in the CRA2 information set in Figure 2.3

$$\begin{aligned}\alpha(1-\lambda)^2(1-y_G) + \alpha\lambda(1-y_G)(1-\lambda) + (1-\alpha)(1-\lambda)^2(1-e)(1-y_G)\\ = (1-y_G)(1-\lambda)[\alpha + (1-\alpha)(1-\lambda)(1-e)]\end{aligned}$$

The probability for the CRA of earning the payoff associated with $r = IG$ when two CRAs are contacted is $\frac{\alpha(1-\lambda)(1-\lambda)(1-y_G)+\alpha(1-\lambda)\lambda(1-y_G)}{\Pi_2}$. Similarly the probability of earning the payoff associated with $r = NR$ when two CRAs are contacted is $\frac{(1-\alpha)(1-\lambda)(1-e)(1-y_G)(1-\lambda)\epsilon}{\Pi_2}$. The CRA gets 0 when a junk rating is published.[24] Thus the payoff takes the form

$$\begin{aligned}D(\epsilon, e) = &\frac{\lambda((1-\alpha)(1-e)(1-\lambda)\epsilon)}{(\lambda + (1-\lambda)\epsilon)(\alpha + (1-\alpha)(1-e)(1-\lambda))}\\ &+ \frac{\alpha\lambda}{\alpha + (1-\alpha)(1-e)(1-\lambda)} - c\gamma_2\end{aligned} \tag{2.8}$$

The decision of the second CRA is summarised by the following

Lemma 17. *Let* $c_{D2} = \frac{(\alpha-1)(\gamma_1-1)(\lambda-1)\lambda^2}{(\alpha-1)(\gamma_1-1)\lambda^2-\alpha(\gamma_1+1)-2\alpha\lambda+\gamma_1-1}$*, the CRA chooses to exert effort (*$\gamma_2 = 1$*) when*

$$c < c_{D2} \tag{2.9}$$

Proof is given in Appendix B. If the cost of becoming informed is high enough ($c > c_{D2}$), it is expensive for the CRA to exert effort and therefore

ond is the simplified version of $Pr(I|NR, 1contact) = \frac{Pr(NR,1contact|I)Pr(I)}{Pr(NR,1contact)} = \frac{(1-\alpha)\lambda}{(1-\alpha)\lambda+(1-\alpha)e(1-\lambda)}$. Notice that e and ϵ are the accuracy of the signal of the first and second CRA respectively in the model without disclosure. Their formal definition is provided later.

[24] Recall that the payoff associated with $r = IG$ is simply λ while the one associated with $r = NR$ is $\frac{\lambda}{(1-\lambda)\epsilon+\lambda}$.

she prefers not to do so. If the cost is sufficiently low instead ($c < c_{D2}$), the CRA could gain more investing in effort and becoming perfectly informed.

First Choice of the Entrepreneur

The first choice of the entrepreneur involves deciding if it is optimal to contact a second CRA or not. To do so the entrepreneur compares his payoff from buying from the first CRA with the payoff from asking a second opinion. Buying straight away gives him (2.5) whereas going ahead gives

$$\frac{\alpha V_G}{\alpha + (1-\alpha)(1-\lambda)(1-e)} - \delta - \Phi \frac{\alpha + (1-\alpha)(1-\lambda)^2(1-e)(1-\epsilon)}{\alpha + (1-\alpha)(1-\lambda)(1-e)} \quad (2.10)$$

Summarising the decision of the entrepreneur

Lemma 18. *Let* $m = \frac{\delta}{\Phi}$ *and* $z_\Phi = \frac{\alpha+(1-\alpha)(1-\lambda)^2(1-e)(1-\epsilon)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$*, given a good preliminary rating, the entrepreneur buys the final rating without contacting a second CRA if*

$$m > 1 - z_\Phi \quad (2.11)$$

The equivalent of Lemma 14 still holds. In Lemma 18, z_Φ can be interpreted as q_Φ. In particular

Corollary 7. *If (i)* $e = \epsilon$ *then* $q_\Phi = z_\Phi$ *(ii)* $e < \epsilon$ *(*$e > \epsilon$*) then* $q_\Phi > z_\Phi$ *(*$q_\Phi < z_\Phi$*)*

The above implies that Lemma 15 is a special case of Lemma 18. If the first CRA exerts effort and the second does not, under disclosure there is a higher probability of receiving two good preliminary ratings having decided to ask for a second opinion. It is therefore less likely that the entrepreneur decides to contact the second CRA with respect to the case in which the CRAs operate in an opaque market.

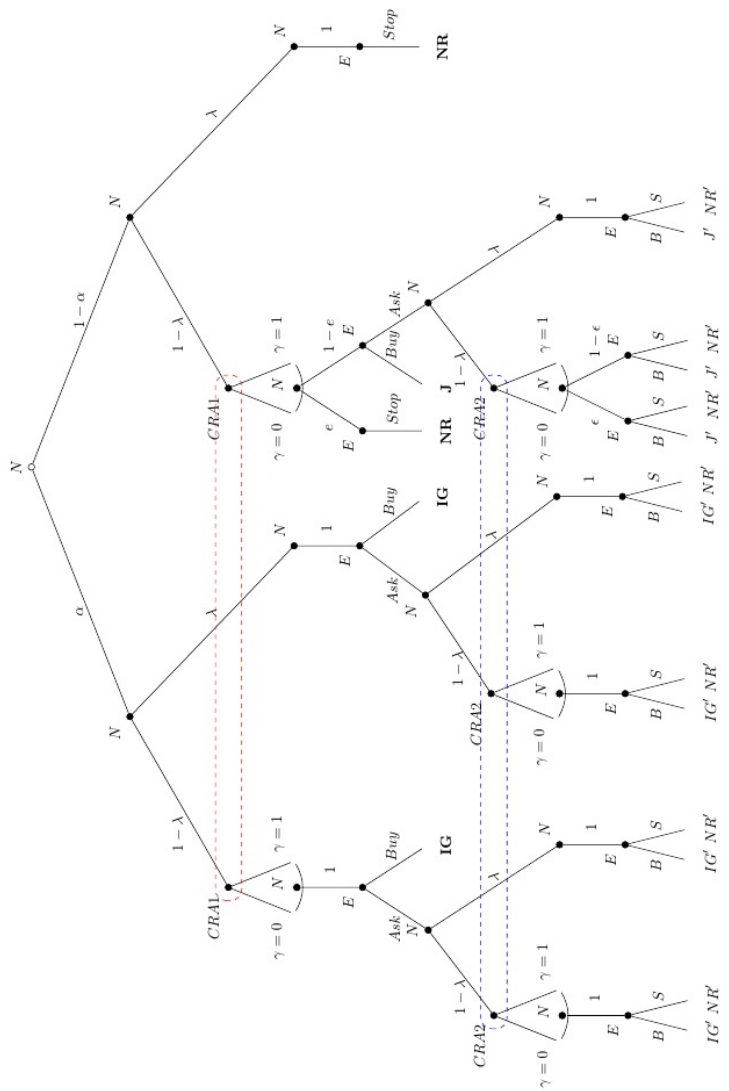


Figure 2.3: The game with contact disclosure in extensive form. The red information set refers to the first CRA to be contacted whereas the blue information set refers to the second CRA. On the LHS of the tree the effort choice does not determine the informativeness of the signal. Conversely on the RHS the effort choice contributes in the definition of e for CRA1 and ϵ for CRA2. At the NR nodes investors now about the existence of a project which has gone through a preliminary evaluation.

The First CRA

Let γ_1 denote the effort level and $e = \frac{1}{2} + \frac{\gamma_1}{2}$ denote the accuracy of the signal of the first CRA with disclosure . To determine the level of effort the first CRA compares its expected payoff. Compute the probability for the CRA of being in the CRA1 information set in Figure 2.3

$$\Pi_1 = \alpha(1-\lambda) + (1-\alpha)(1-\lambda) = 1-\lambda$$

The CRA earns the payoff derived from a $r = IG$ when only one contact occurs with probability $\frac{\alpha(1-\lambda)y_G}{1-\lambda}$. The probability of earning the payoff associated with $r = IG$ when two CRAs are contacted is $\frac{\alpha(1-\lambda)(1-y_G)}{1-\lambda}$. Similarly the probability of earning the payoff associated with $r = NR$ when two CRAs are contacted is $\frac{(1-\alpha)(1-\lambda)(1-e)(1-y_G)[(1-\lambda)\epsilon+\lambda]}{1-\lambda}$ whereas when only one is contacted the probability is $\frac{(1-\alpha)(1-\lambda)e}{1-\lambda}$. Notice that whenever the CRA issues a junk rating its payoff is 0.

The expected payoff therefore is

$$d(\gamma_1, y_G) = \alpha\lambda + \frac{(1-\alpha)e\lambda}{e(1-\lambda)+\lambda} + (1-\alpha)(1-e)\lambda\,(1-y_G) - c\gamma_1 \qquad (2.12)$$

In $d(\gamma_1, y_G)$ there is no opaqueness about being the first CRA to be contacted thus the payoff only depends on the decision of the CRA and on that of the entrepreneur. Instead, $B(\gamma, y_G)$ not only depends on the decision of the entrepreneur but also on the decision of both CRAs. The decision of the first CRA can be summarised in the following way

Lemma 19. *Let* $c_{D1} = -\frac{(\alpha-1)\lambda((\lambda+1)y_G+\lambda-1)}{2(\lambda+1)}$*, the CRA chooses to exert effort* $(\gamma_1 = 1)$ *when*

$$c < c_{D1} \qquad (2.13)$$

Proof is given in Appendix B. As it is for the first CRA, if the cost of becoming informed is high ($c > c_{D1}$), it is too costly for the CRA to exert effort and therefore she prefers not to do so. If the cost is sufficiently low instead ($c < c_{D1}$), the CRA gains more investing in effort and becoming perfectly informed.

The Equilibrium

This section investigates how the game's equilibrium differs from the model without disclosure. The relevant equilibrium concept is Perfect Bayesian Equilibrium.

Lemma 20. *There cannot be an equilibrium where*

(a) the first CRA is dutiful and the entrepreneur shops for ratings.

(b) both the first CRA and the second CRA are dutiful.

(c) the entrepreneur prefers to buy from the first CRA and the second CRA is dutiful.

Proof. (a) $\gamma_1 = 1$ implies $e = 1$ and in turn z_Φ simplifies to 1. Thus Lemma 18 is satisfied because $m > 0$. Thus $y_G = 1$ is the entrepreneur's best response regardless of the choice of the second CRA.

(b) If $e = 1$, equation (2.8) becomes $\lambda - c\left(\frac{\epsilon}{2} + \frac{1}{2}\right)$. By substituting the maximum and the minimum level of effort, it can be shown that the second CRA always prefers $\gamma_2 = 0$ to $\gamma_2 = 1$. In formula $c > \frac{c}{2}$ which is true $\forall\{\alpha, \lambda\} \in (0, 1)$ and $\forall c > 0$

(c) If $(y_G = 1)$, the second CRA is aware that she won't be contacted. Thus she has no incentive to exert effort.

□

The intuition goes as follows: (a) if the uninformed CRA is dutiful, the preliminary is for sure correct and so will be the final rating, thus asking a second opinion only results in the pointless payment of δ with the possibility of ending up with no funding if the report is negative. In (b) there is no incentive for the second CRA to exert effort if the first CRA has already done so because the entrepreneur would buy from the first and the second wouldn't even be contacted. Similarly if the second CRA prefers to exert effort it has to be the case that the first didn't do so because otherwise the second would not be contacted by the entrepreneur. Thus only one CRA has the incentive to invest in information. In (c), a purchase from the first CRA gives no incentive to the second one because the entrepreneur won't buy from her.

As in the benchmark, if the entrepreneur prefers to ask a second opinion, the first CRA will never exert effort. In other words Lemma 16 still holds with the only difference that γ is now γ_1. Moreover, if the first CRA exerts effort, the best response for the second CRA is not to exert effort.

The Proposition below characterises the equilibria which can arise in the game with contact disclosure.

$\frac{\delta}{\Phi}$		$Cost$	
		Low	$High$
	Low	A	B
	$High$	C	D

Table 2.2: c can take the values (0.125, 0.5) and $\frac{\delta}{\Phi}$ can take the values (0.1, 0.9). Combinations (c, m) are as follows: A $(0.125, 0.1)$; B $(0.5, 0.1)$; C $(0.125, 0.9)$; D $(0.5, 0.9)$.

Proposition 3. *Let* $c^0_{D2} = \frac{\alpha\lambda^3-\alpha\lambda^2-\lambda^3+\lambda^2}{\alpha\lambda^2+2\alpha\lambda+\alpha-\lambda^2+1}$ *and* $c^1_{D1} = \frac{\lambda^2-\alpha\lambda^2}{\lambda+1}$ *the equilibria in the game with contact disclosure are as follows*

(i) For $c > c^0_{D2}$ *and* $0 < m < \bar{m}$ *, the entrepreneur shops for ratings and both CRAs are lax*

(ii) For $0 < c < c^1_{D1}$*, the entrepreneur doesn't shop for ratings the* 1^{st} *CRA is dutiful and the* 2^{nd} *is lax*

(iii) For $c > c^1_{D1}$ *and* $\bar{m} < m < 1$*, the entrepreneur doesn't shop for ratings and both CRAs are lax*

(iv) For $0 < c < c^0_{D2}$ *and* $0 < m < \bar{m}$*, the entrepreneur shops for ratings, the* 1^{st} *CRA is lax and the* 2^{nd} *is dutiful*

Moreover in (i)*,* (ii)*,* (iii) *and* (iv) *Lemma 12 applies.*

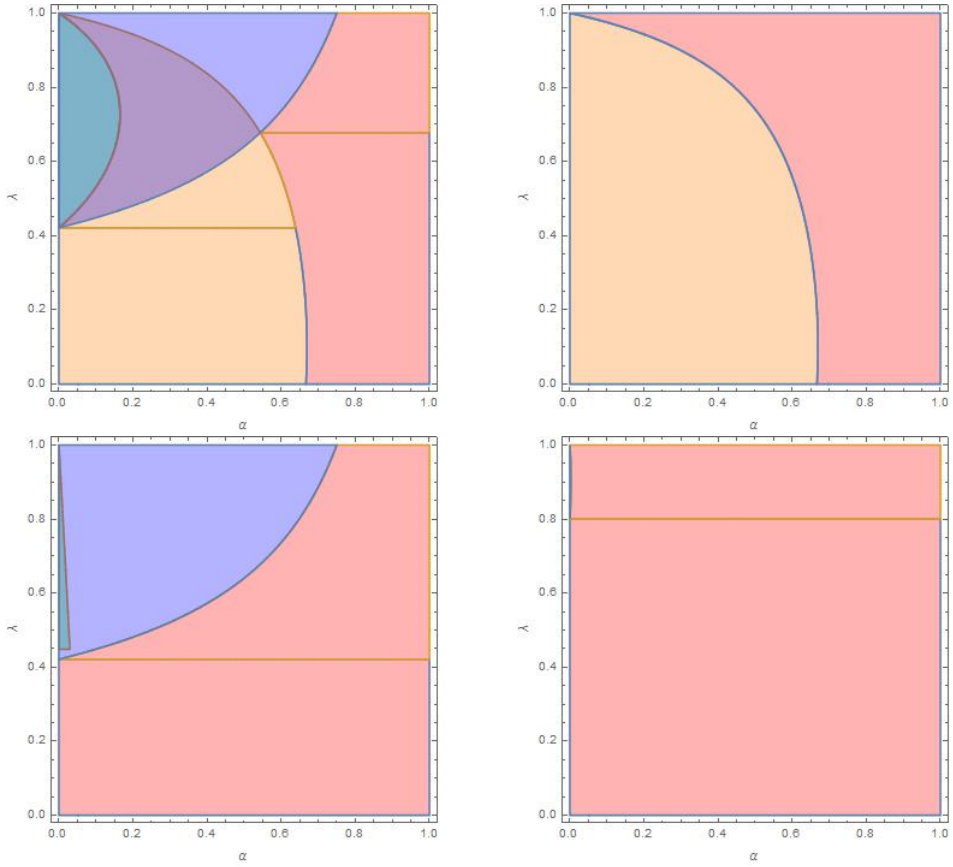
Notice that c^0_{D2} is c_{D2} defined in Lemma 17 when $\gamma_1 = 0$ and c^1_{D1} is c_{D1} defined in Lemma 19 when $y_G = 1$ and that $c^1_{D1} > c^0_{D2}$. This relation saying that the second CRA, if contacted, has a lower threshold below which she invest in information compared to the threshold below which the first CRA exerts effort when no second opinion is asked. The reason stands in the possibility for the second CRA to free ride on the first CRA, dampening the incentives for the second CRA to exert effort.

The relation among the thresholds from Proposition 2 and Proposition 3 is explained in Lemma 22. Equilibrium (ii) and (iv) are informative equilibria whereas equilibrium (i) and (iii) are uninformative. The informative ones feature respectively an investment in information on the side of the first CRA or effort exerted by the second contacted CRA.

As before to better grasp the characteristics of these four types of equilibria and to picture them, let us separately look at four different combinations of c and m. Table 2.2 identifies four examples were c and m can be either high or low.

How do effort cost and contact cost alter the equilibrium outcome

(a) Configuration A (b) Configuration B



(c) Configuration C (d) Configuration D

Figure 2.4: Equilibrium with contact disclosure. From 3 the pink area pictures equilibrium (iii), the orange area equilibrium (i) and the blue area equilibrium (ii). The dark pink area shows multiplicity between equilibrium (i) and equilibrium (ii) and the dark turquoise area shows multiplicity between equilibrium (ii) and equilibrium (iv). Appendix A shows the different areas originating each of the configurations represented in this Figure. Each of the four graphs is the representation of the combinations of c and m shown in Table 2.2.

As represented in Table 2.2 Configuration A (D) represent a situation in which both the effort cost and the relative cost of approaching a second CRA are low (high), Configuration B (C) instead represents a situation where the effort cost is high (low) and the cost of approaching a second CRA is low (high).

When c is high the equilibrium is unique and can be of type (i) or (iii). Type (ii) and (iv) are not equilibria because if the cost of effort is sufficiently high, none of the CRAs would have an incentive to invest in order to exert effort. On the other hand, as the cost of approaching another CRA

decreases, the entrepreneur is more likely to ask for a second opinion. The parameter space covered by Equilibrium (*iii*), everything else equal, shrinks as the cost of effort decreases. The reason is the higher willingness of the first contacted CRA to exert effort de facto preventing the entrepreneur from contacting the second CRA. A similar reasoning applies to equilibrium (*iv*), everything else equal, expands as the cost of effort decreases. The reason stands in the higher willingness of the second contacted CRA to exert effort in the light of the choice of the entrepreneur to ask for a second opinion.

As m increases, equilibrium (*iv*) shrinks and equilibrium (*i*) disappears. When it becomes expensive for the entrepreneur to contact another CRA, the entrepreneur will pay such a cost only if the environment is bad (α is extremely low). In all other cases the entrepreneur prefers to buy the final rating from the first CRA. Increasing m cancels equilibrium (*i*) de facto eliminating one of the two situations in which none of the contacted CRAs would exert effort.

2.3 Comparing the two regimes

Comparing Figure 2.2 with Figure 2.4 reveals a clear pattern. Combination b and d in Figure 2.2 are unaffected by the mandatory disclosure requirement. Indeed combination B and D in Figure 2.4 resemble them perfectly. Thus for sufficiently high levels of c, disclosing the contact between the CRA and the entrepreneur has no effect on the equilibrium. The reasoning goes as follows: when the cost of becoming informed is high (which may happen when the projects are complex), CRAs don't invest in information because it is too expensive and mandating disclosure has no effect on c. Similarly the entrepreneur is unaffected by the disclosure requirement. Hence the behaviour of the players is unaffected and so is the resulting equilibrium. From now on the focus will only be on the case where becoming informed comes at a low cost.

Disclosure results in a higher probability that both CRAs exert no effort whenever the cost of becoming informed is sufficiently low. Thus the area defining the informative equilibrium characterised by the first CRA exerting effort and the entrepreneur purchasing the final rating from her, shrinks when the disclosure requirement is in place. Figure 2.10 (b), Figure 2.12 (a) and Figure 2.13 (b), Figure 2.15 (a) in Appendix A clearly picture the difference in this informative area.

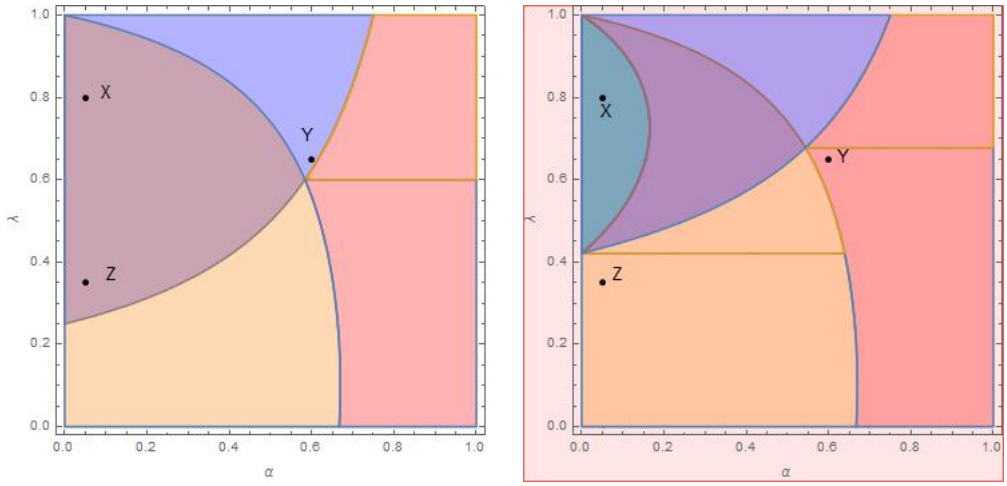
In this setting, improved competition can result from a lower cost of contacting a second CRA (δ). Given a fixed fee, a decrease in δ and therefore a decrease in m causes the increase in the space of parameters' combinations regarding the other informative equilibrium featuring effort for the second CRA. Such an equilibrium is a feature of the model mandating contact disclosure as it does not exist in the absence of disclosure. It arises because, once the contact is public and the second CRA is contacted, the CRA has an incentive to become informed and in turn gain reputation.

Despite the fact that under disclosure the space of parameters' combinations for an informative equilibrium is characterised by two different types of equilibria, overall, improved competition does not result in more information, because equilibrium (iv) replaces part of equilibrium (i) but equilibrium (ii) shrinks.

The CRA's payoff from exerting effort is unaffected by the disclosure regime in place. In both cases it is equal to $-c + \lambda$. What changes is the CRA's payoff from not exerting effort.

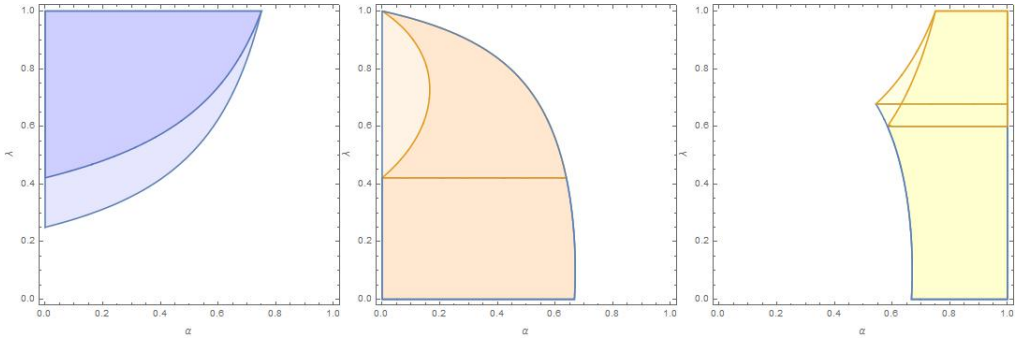
Lemma 21. *Regardless of the decision of the entrepreneur, not exerting effort is more profitable under disclosure than with no disclosure in place.*

Proof is given in the appendix. The idea is that exerting effort provides a payoff of λ at a cost c irrespective of the disclosure regime because of the effort structure (i.e. correct signal). Not exerting effort instead is more costly in terms of reputation without disclosure because with disclosure each of the two CRAs free rides on the other. The second CRA can free ride the first CRA, whereas the first CRA can get something for nothing if the second CRA happens to be correct in its evaluation. The main implication of Lemma 21 is that whenever no effort is preferred to exerting effort this result is reinforced under disclosure whereas, when effort is preferred to no effort the increase in the payoff from not exerting effort can either result in the same decision under disclosure or it could cause a shift in the preference of the CRA towards no effort. To show this, consider the parameter combinations given by points X, Y and Z in Figure 2.5. Without disclosure Z belongs to a multiplicity area where either an informative equilibrium (equilibrium (ii)) applies or where an uninformative one applies (equilibrium (i)). Mandating contact disclosure leads to a situation where only equilibrium (i) occurs. Similarly in Y is characterised by an informative equilibrium (equilibrium (i)) when there is no evidence of contact disclosure. As this becomes mandatory the relevant equilibrium is of the



(a) Model without disclosure (b) Contact disclosure model

Figure 2.5: Comparison of equilibrium representation where $c = 0.125$, and $m = 0.1$.



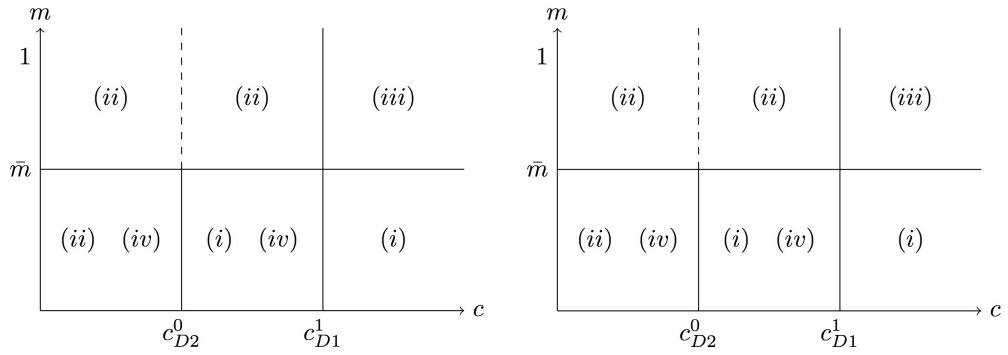
(a) Lighter area (z) corresponds to the loss for the informative equilibria (b) Lighter area (x) corresponds to the gain for the informative equilibria (c) Lighter area (y) corresponds to the loss for the informative equilibria

Figure 2.6: Areas of gain (losses) and losses (gain) for the informative (uninformative) equilibria

uninformative type (equilibrium (*iii*)). Slightly different is the case of X where the implementation of the disclosure regime results in the raise of two informative equilibria instead of a single one and in the disappearance of the uninformative one.

To prove that it is indeed the case that the space of parameters' combinations for which an informative equilibrium exists becomes smaller while the non informative equilibrium area becomes larger, let x y, z be the areas in Figure 2.6. In this particular configuration, by finding area x, y, z it can be proved that the sum of the two loss (gain) areas is greater than the gain (loss) area for the informative (uninformative) equilibria.

It is worth to compare the thresholds in Proposition 2 and Proposition 3 to provide a general Lemma.



(a) Proposition 2 (b) Proposition 3

Figure 2.7: Summary of equilibria .

Lemma 22. *The relation among the thresholds* c_{ND}, c^0_{ND}, c^1_{D1} *and* c^0_{D2} *is such that*

1. $c_{ND} > c_{D1}$
2. $c^0_{ND} > c^0_{D2}$ *if* $0 < \lambda < \widetilde{\lambda}$ *otherwise* $c^0_{ND} < c^0_{D2}$

where $\widetilde{\lambda} = -\sqrt{\frac{\alpha^2+8}{(\alpha-1)^2}} - \frac{3}{\alpha-1}$ *and* $\frac{\partial\tilde{\lambda}}{\partial\alpha} > 0$

Lemma 22 states that when disclosure is mandatory (i) no matter the decision of the entrepreneur to contact another CRA, the threshold below which the first CRA exerts effort is lower; (ii) if the entrepreneur shops for ratings and the first CRA does not exert effort, the threshold below which the second CRA would exert effort is lower (higher) when λ is low (high). Proof is given in Appendix B.

Moreover the following is true: (i) the equilibrium characterised by no shopping for rating and both CRAs being possibly dutiful become an equilibrium where only the first CRA is dutiful; (ii) the equilibrium characterised by no shopping for rating and both CRAs being possibly lax still exists but is now larger; (iii) an equilibrium characterised by shopping for rating where only the second CRA is dutiful arises.

Hereafter I will focus only on the relation on the one hand between c^1_{ND} and c^1_{D1} while on the other between c^0_{ND} and c^0_{D2}. It is easy to see from Figure 2.7 that if $c^1_{ND} > c^1_{D1}$, both uninformative equilibria under disclosure occur for lower cost. More complex is the case if c^0_{ND} and c^0_{D2}. In particular if $c^0_{ND} > c^0_{D2}$, the larger is the threshold cost without disclosure with respect to the one with disclosure, the less likely it is that the new informative equilibrium arises. Conversely in a situation where $c^0_{ND} < c^0_{D2}$, the same equilibrium occurs also for higher values of c. This implies that

undoubtedly disclosure results in an increase of the uninformative equilibria and in the shrink of the informative one. It is also without any doubt that this transparency requirement results theoretically in the creation of another informative equilibrium. If λ is sufficiently low, this novelty is combined with the increase in one of the uninformative equilibria, whereas if λ is high this equilibrium shrinks.

Overall, the first CRA is less likely to exert effort than before whereas the second CRA can either be more likely or less likely to exert effort according to the reputation at the outset. The reasoning goes as follows: if α is low, the entrepreneur prefers to save the Φ and ask for a second opinion because it is likely that the project is bad. In this situation the second CRA prefers to exert effort, hence evaluating correctly the project to the benefit of its reputation.

Disclosure dampens the incentives of the first CRA to exert effort while it provides the correct ones to the second CRA in certain situations. The rationale is as follows: the opacity of the market results in the CRA not knowing the sequence of events and therefore more willing to take the chance to exert effort to compensate for this lack of information. When there is transparency instead, the second CRA free rides on the first ($c^0_{D2} < c^1_{D1}$), the first CRA exerts less effort because she can gain also thanks to the second CRA ($c_{ND} > c_{D1}$). Moreover the second CRA has the correct incentives when the state of the world is such that not exerting effort is likely to result in a mistake whereas she has less incentives when the situation is the opposite.

2.4 Absence of competition

2.4.1 The Model without Disclosure

I want to ask what happens when δ is sufficiently high. [25] If contacting a second CRA is extremely expensive then 2.5.2 implies that the entrepreneur always buys from the first CRA and therefore never contacts the second one. The CRA in turn has an expected payoff of $-c + \lambda$ when effort is exerted ($\gamma = 1$) and of $\frac{1}{2}(1 + \alpha)\lambda$ when no effort is exerted ($\gamma = 0$). The CRA will

[25] δ high corresponds to a situation where the relationship between the parties is well established and the information held is extensive. Under these circumstances, approaching a different CRA requires a lot of time and huge effort such that the switch cost is nearly unbearable.

prefer not to exert effort whenever

$$-c+\lambda<\frac{1}{2}(1+\alpha)\lambda \tag{2.14}$$

If $\alpha>\frac{1}{2}$, 2.14 is true $\forall c,\lambda$. When instead $\alpha<\frac{1}{2}$, the choice of the CRA is

$$\begin{cases}\gamma=0, & c>\lambda(\frac{1}{2}-\alpha)\\ \gamma=1, & \text{otherwise}\end{cases} \tag{2.15}$$

In other words, when there are many good projects in the economy the CRA has no incentive to exert effort if the entrepreneur is not going to approach another CRA. On the other hand when good projects are rare, if the cost of becoming informed is high, the CRA prefers not to exert effort, but if the cost is low she makes the investment.

The rationale is that with a high cost of contacting another CRA the entrepreneur prefers to buy directly from the first CRA. Thus the incentive for the CRA to invest in effort is strong only when a priori the probability of the project being good and the cost are both low.

2.4.2 The model with Contact Disclosure

As above, if contacting a second CRA is extremely expensive then equation 2.5.2 implies that the entrepreneur always buys from the first CRA and thus he never contacts the second one. The first CRA has an expected payoff of $-c+\lambda$ when effort is exerted ($\gamma_1=1$) and of $\frac{\lambda(1+\alpha\lambda)}{1+\lambda}$ when no effort is exerted ($\gamma=0$). The first CRA will prefer not to exert effort whenever

$$-c+\lambda<\frac{\lambda(1+\alpha\lambda)}{1+\lambda} \tag{2.16}$$

When $c>\lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$, the first CRA doesn't exert effort, whereas if $c<\lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$ the CRA exerts effort.

2.4.3 Discussion

Rearranging (2.14) and (2.16) it is possible to isolate the thresholds above which the CRA chooses not to exert effort under the two different disclosure regimes. Whenever the cost of getting informed exceeds $\lambda(\frac{1}{2}-\alpha)$ under no disclosure and $\lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$ under disclosure, the CRA has a 50% chance of providing a correct preliminary without bearing the cost of effort.

Proposition 4. *With contact disclosure and absence of competition (δ high), relative to the case with no disclosure*

1. *if $\alpha > \frac{1-\lambda}{2}$, the CRA is less likely to exert no effort*
2. *if $\alpha < \frac{1-\lambda}{2}$, the CRA is more likely to exert no effort*

Proof is given in the appendix. Figure 2.8 and Figure 2.9 summarises

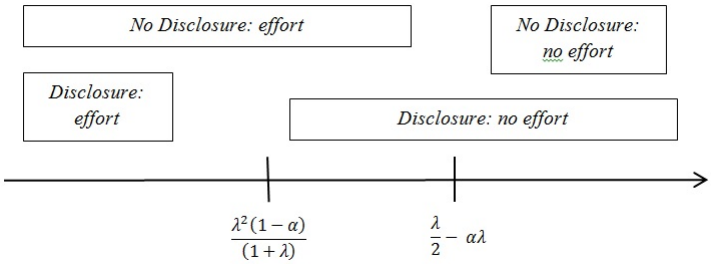


Figure 2.8: Thresholds cost when $\alpha < \frac{1-\lambda}{2}$

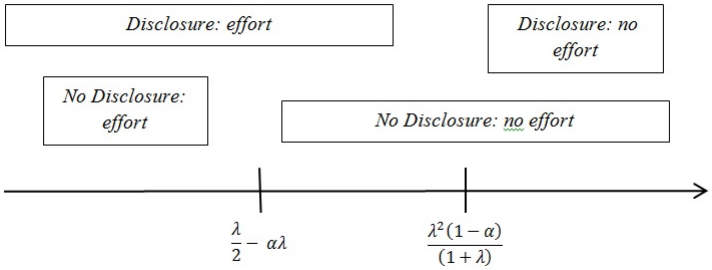


Figure 2.9: Thresholds cost when $\alpha > \frac{1-\lambda}{2}$

this finding. With no mandatory disclosure below $\lambda(\frac{1}{2}-\alpha)$ the CRA exerted effort whereas with disclosure in place effort is exerted up to $\lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$. When $\alpha < \frac{1-\lambda}{2}$ the first threshold is higher than the second, while when $\alpha > \frac{1-\lambda}{2}$ the opposite is true. When α is low, disclosure results in a weaker incentive to exert effort whereas when α is high, the incentive to invest in information is stronger. The intuition goes as follows. Investing in information ensures that the preliminary is correct. When the projects are more likely to be good, this means that the CRA is likely to issue a good preliminary making the entrepreneur willing to buy the final rating. When the projects are more likely to be bad, the fact that the preliminary rating is correct reduces the chances for the CRA to get the fee because with a bad preliminary the entrepreneur remains unrated.

2.5 Further Discussion

2.5.1 The Fee

The exogeneity of the fee and its irrelevance for the CRA payoff provide an extreme framework where reputation becomes the only incentive for the CRA. Under this scenario, abstracting from purely monetary terms has the merit of showing all possible equilibria. Allowing for an endogenous fee would most likely narrow the types of equilibria which can arise.

The environment pictured in this paper is a duopoly, every CRA is aware that at most two of them will be contacted. Therefore the fee can be thought of as being competitively set. Rating fees are either determined in terms of basis points for most transactions with a minimum fee required or determined on a case by case basis if transactions are large, complex or frequent.

The choice of abstracting from the nature of the fee has the advantage of showing that controversial result can arise even in the simplest framework without distortions.

2.5.2 Multiple Ratings

There are two remarks that have to be made concerning multiple ratings in this framework. For multiple ratings to play a role, assumptions on the value of more than one evaluation for investors would have to be made. This results in a more complex structure that deserves attention on its own. Studying investors is out of the scope of the present work and therefore I abstract from multiple ratings. Secondly, multiple ratings in this setting would probably have the benefit of providing more possibilities for the investors to evaluate the CRA, however the quality of the results would, most likely, be unchanged. This has to do with the irrelevance of the fee for the CRA and with the possibility of contacting at most two CRAs. Under this scenario, the entrepreneur would purchase and publish two ratings if and only if they are both positive. Thus there would be no value added to the current framework except that in the case with no disclosure the opaqueness on preliminary ratings would in some cases disappear.

Concluding Remarks

This paper models an environment where CRAs compete in the issuing of preliminary ratings. I focus on the effect of contact disclosure on the choices of the competing CRAs. In this setting, the entrepreneur can contact at most two experts. The first 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 ask a second opinion. Following the second preliminary rating, the entrepreneur decides whether to remain unrated or to pay for the final rating.

Comparing the regime with no mandatory disclosure to the regime with disclosure, if it is costly for the CRAs to become informed, the equilibrium is unique and mandatory disclosure has no effect. When instead the effort cost is relatively low, disclosure implies that the space of parameters' combinations for which an informative equilibrium exists becomes smaller. Nonetheless an additional informative equilibrium arises where the second CRA exerts effort. Disclosure never results in more information in the system but gives either of the CRAs the incentive to exert effort.

Increased competition results in the increase of the parameters' space where the entrepreneur shops for rating and only the second CRA exerts maximum effort. Under disclosure this tendency is reinforced.

There are a couple of main implications. First, if financial products are complex, mandatory disclosure has no effect. Second, in bad times mandatory disclosure gives the second contacted CRA the incentives to invest in information. Thirdly, contact disclosure affects negatively the first CRA to be contacted.

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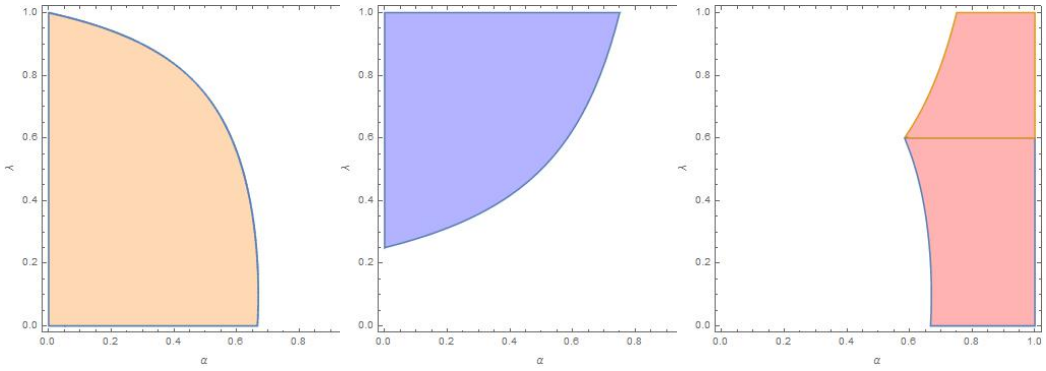
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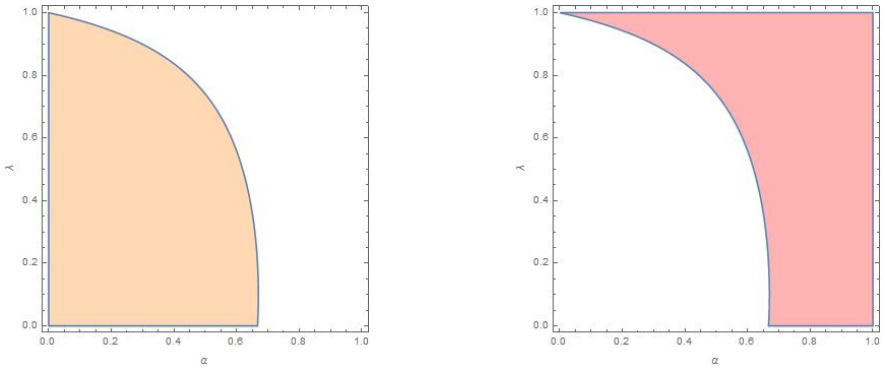
Appendix A

No Disclosure and Contact Disclosure equilibrium areas



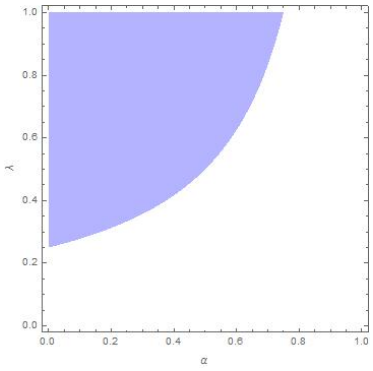
(a) Equilibrium (i) (b) Equilibrium (ii) (c) Equilibrium (iii)

Figure 2.10: Figure 1 (a) areas covered by each type of equilibria

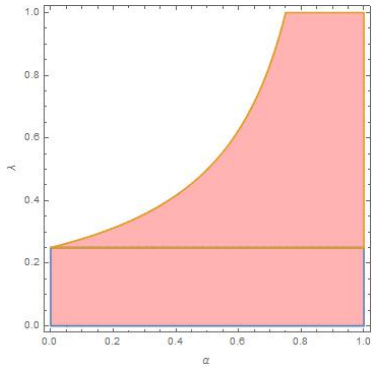


(a) Equilibrium (i) (b) Equilibrium (iii)

Figure 2.11: Figure 1 (b) areas covered by each type of equilibria

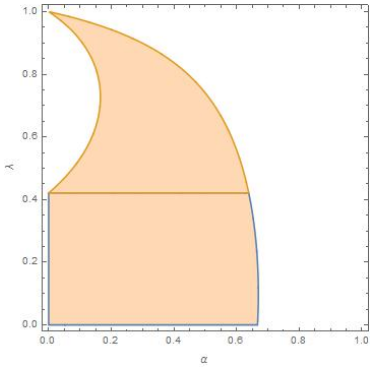


(a) Equilibrium (ii)

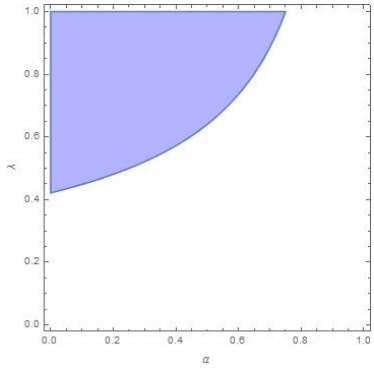


(b) Equilibrium (iii)

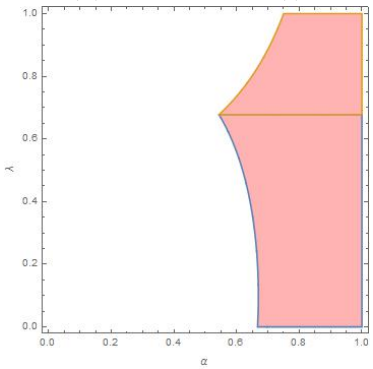
Figure 2.12: Figure 1 (c) areas covered by each type of equilibria



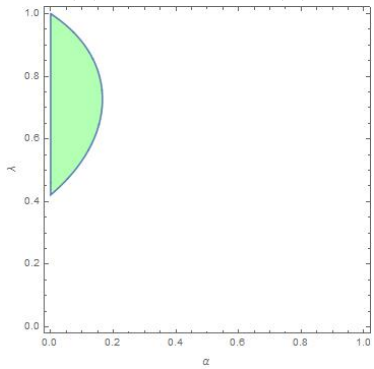
(a) Equilibrium (i)



(b) Equilibrium (ii)



(c) Equilibrium (iii)

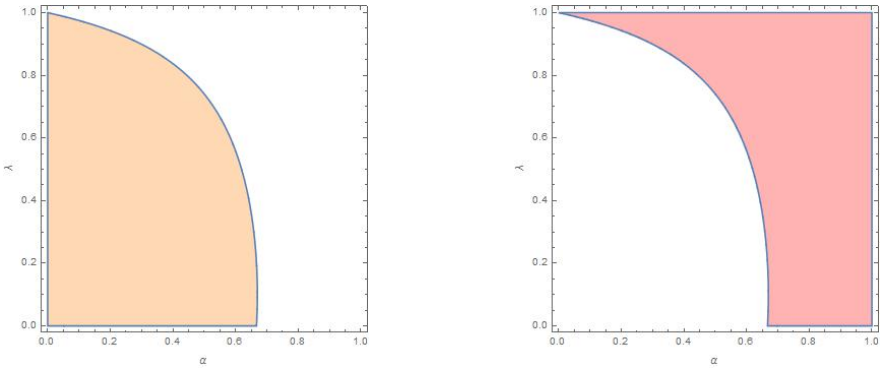


(d) Equilibrium (iv)

Figure 2.13: Figure 2 (A) areas covered by each type of equilibria

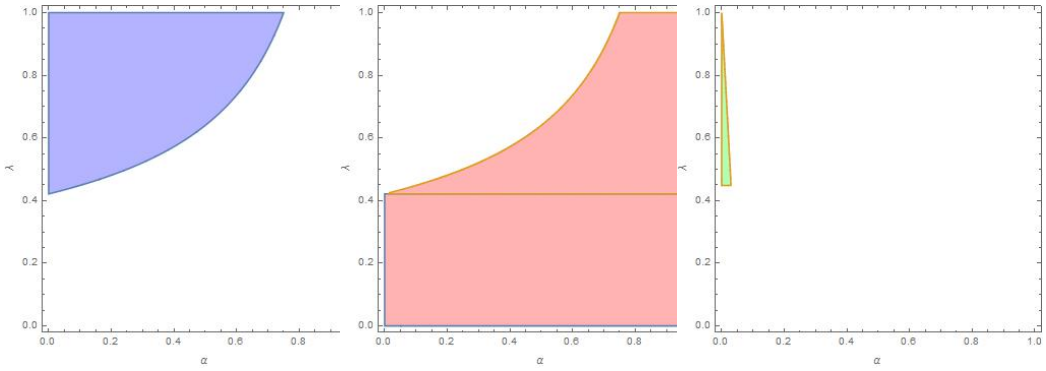
		k		
		High	Medium	Low
m	High	a	b	c
	Medium	d	e	f
	Low	g	h	i

Table 2.3: Robustness exercise for additional values of the cost of getting informed (k) and m. k can take the values (0.1, 1, 2) and m can take the values (0.1, 0.45, 0.9). Notice that the relation between c and k is $c = \frac{k}{4}$



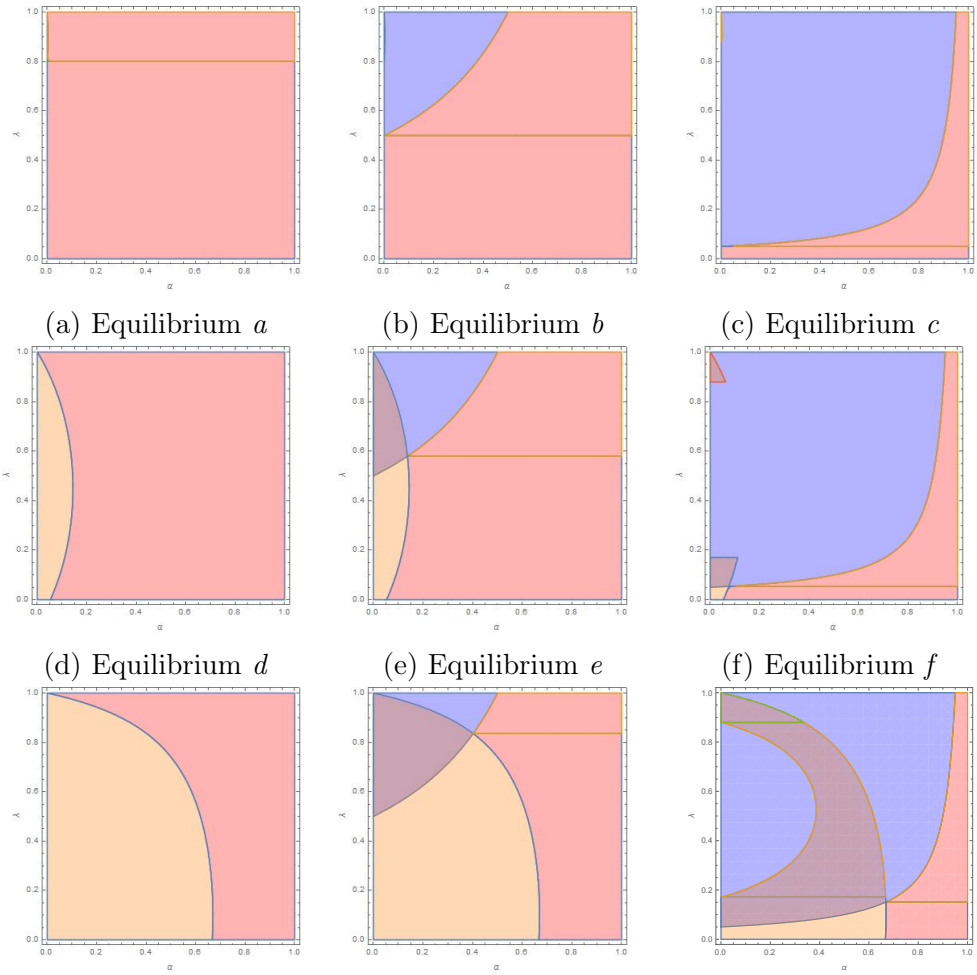
(a) Equilibrium (i) (b) Equilibrium (iii)

Figure 2.14: Figure 2 (B) areas covered by each type of equilibria



(a) Equilibrium (ii) (b) Equilibrium (iii) (c) Equilibrium (iv)

Figure 2.15: Figure 2 (C) areas covered by each type of equilibria

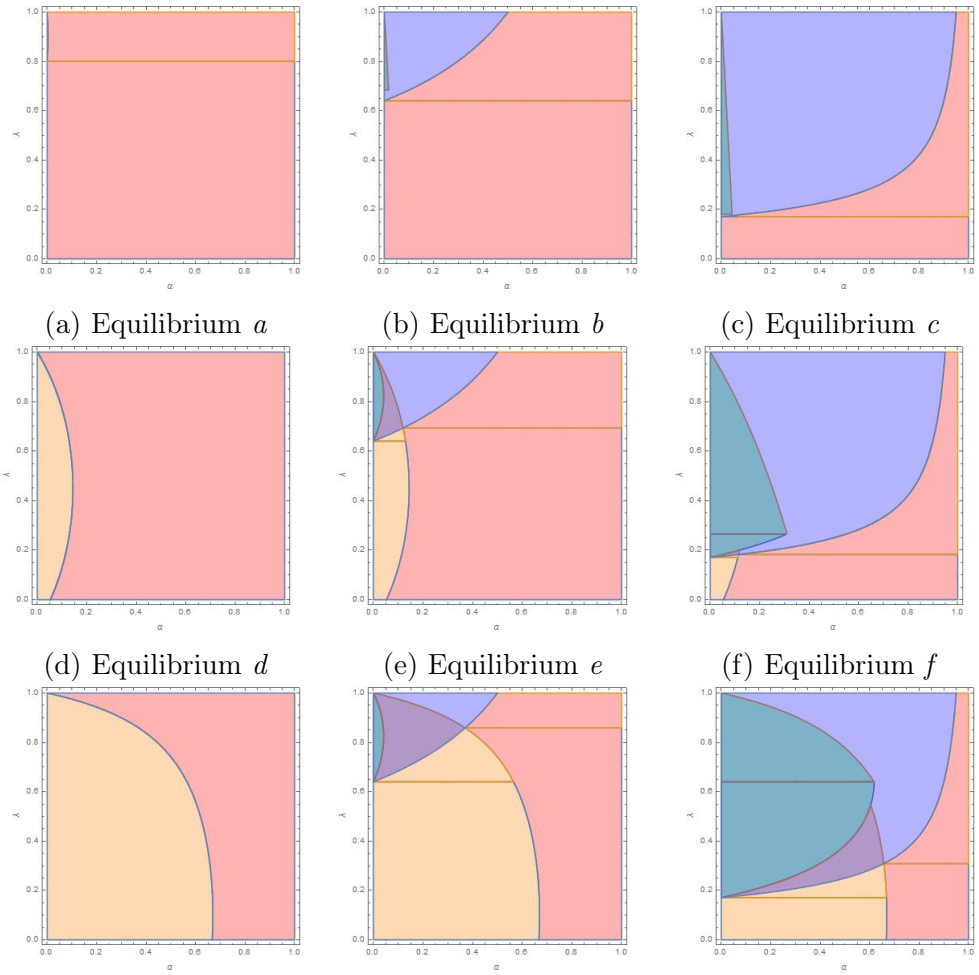


(a) Equilibrium a (b) Equilibrium b (c) Equilibrium c

(d) Equilibrium d (e) Equilibrium e (f) Equilibrium f

(g) Equilibrium g (h) Equilibrium h (i) Equilibrium i

Figure 2.16: Equilibrium in the model without disclosure.



(a) Equilibrium a (b) Equilibrium b (c) Equilibrium c

(d) Equilibrium d (e) Equilibrium e (f) Equilibrium f

(g) Equilibrium g (h) Equilibrium h (i) Equilibrium i

Figure 2.17: Equilibrium in the model with disclosure.

Appendix B

Proof of Lemma 13

Let $B(1, y_G)$ be 2.3 when the CRA exerts effort and similarly let $B(0, y_G)$ be 2.3 when the CRA doesn't exert effort. In order for the CRA to prefer to exert effort $B(1, y_G)$ has to be greater than $B(0, y_G)$, in formula

$$\lambda - c > \frac{\lambda\left(-\alpha(\lambda+3) + ((\alpha-1)\lambda+\alpha+3)y_G + \lambda - 5\right)}{2((\alpha-1)\lambda+\alpha+1)y_G - 2((\alpha-1)\lambda+\alpha+3)}$$

which rearranging leads to $c < c_{ND}$.

Proof of Lemma 15

The probability associated with receiving a good preliminary from the first CRA is

$$\alpha\lambda + \alpha(1-\lambda) + (1-\alpha)(1-\lambda)(1-e) = \alpha + (1-\alpha)(1-\lambda)(1-e)$$

When purchasing the final report the entrepreneur pays the fee Φ with probability 1, receives V_G with probability $\frac{\alpha\lambda+\alpha(1-\lambda)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$, and 0 with probability $\frac{(1-\alpha)(1-\lambda)(1-e)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$. Hence the payoff in this case is 2.5.
When asking for a second opinion the entrepreneur pays the cost δ with probability 1, receives V_G and 0 with the same probability of the purchasing case but pays the fee with probability $\frac{\alpha+(1-\alpha)(1-\lambda)^2(1-e)^2}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$. Hence the payoff in this case is 2.6. The entrepreneur chooses to buy if $2.5 > 2.6$, namely

$$m > \frac{(1-\alpha)(1-\lambda)(1-e)[1-(1-\lambda)(1-e)]}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$$

where $m = \frac{\delta}{\Phi}$.

Proof of Proposition 2

To begin, recall that without contact disclosure the effort is the same for both CRAs, thus both CRAs behave in the same way, as if they were one player. If $y_G = 1$, for the CRA to prefer to exert effort instead of not exerting it has to be that Lemma 13 holds. When the CRA exerts effort, the ENT faced with $P = G$ never remains unrated (Lemma 14 a) and chooses to ask for the official rating instead of approaching a second CRA if Lemma 15 holds. The CRA prefers not to exert effort when Lemma 13 is not satisfied.

When the CRA doesn't exert effort, the ENT faced with $P = G$ will choose to ask for the official rating instead of approaching a second CRA if Lemma 15 holds. By Lemma 14 b, the ENT faced with $P = B$ always chooses to remain unrated. Thus, there exist an equilibrium of the type $\gamma = 1$, $y_G = 1$ and an equilibrium of the type $\gamma = 0$, $y_G = 0$. If $y_G = 0$ for the CRA to prefer not to exert effort it has to be the case that Lemma 13 isn't satisfied. When the CRA doesn't exert effort, the ENT faced with $P = G$ will choose to ask for the official rating instead of approaching a second CRA if Lemma 15 holds. Lemma 16 rules out equilibria in which the CRA exerts effort and the ENT faced with $P = G$ prefers to ask for a second opinion. Lemma 14 once again rules out equilibria in which the ENT faced with $P = B$ prefers something different from remaining unrated. Hence there exists an equilibrium of the type $\gamma = 0$, $y_G = 0$.

Proof of Lemma 17

Let $D(1, \gamma_1)$ be 2.8 when the CRA exerts effort and similarly let $D(0, \gamma_1)$ be 2.8 when the CRA doesn't exert effort. In order for the CRA to prefer to exert effort $D(1, \gamma_1)$ has to be greater than $D(0, \gamma_1)$, in formula $\lambda - c > \frac{\lambda(\alpha(\gamma-3)\lambda-\alpha(\gamma+1)+\gamma(-\lambda)+\gamma+\lambda-1)}{(\alpha-1)(\gamma-1)\lambda^2-\alpha(\gamma+1)-2\alpha\lambda+\gamma-1}$ which rearranging leads to $c < c_{D2}$.

Proof of Lemma 19

Let $d(1, y_G)$ be 2.12 when the CRA exerts effort and similarly let $d(0, y_G)$ be 2.12 when the CRA doesn't exert effort. In order for the CRA to prefer to exert effort $d(1, y_G)$ has to be greater than $d(0, y_G)$, in formula $\lambda - c > \frac{\lambda(\alpha(\lambda-1)+(\alpha-1)(\lambda+1)y_G+\lambda+3)}{2(\lambda+1)}$ which rearranging leads to $c < c_{D1}$.

Proof of Lemma 18

When purchasing the final report the entrepreneur pays the fee Φ with probability 1, receives V_G with probability $\frac{\alpha\lambda+\alpha(1-\lambda)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$, and 0 with probability $\frac{(1-\alpha)(1-\lambda)(1-e)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$. Hence the payoff in this case is 2.5. When asking for a second opinion the entrepreneur pays the cost δ with probability 1, receives V_G and 0 with the same probability of the purchasing case but pays the fee with probability $\frac{\alpha+(1-\alpha)(1-\lambda)^2(1-e)(1-\epsilon)}{\alpha+(1-\alpha)(1-\lambda)(1-e)}$. Hence the payoff in this case is slightly different from 2.6, namely 2.10. The entrepreneur chooses to buy

if $2.5 > 2.10$, namely

$$m > \frac{(1-\alpha)(1-e)(1-\lambda)(1-(1-\lambda)(1-\epsilon))}{\alpha+(1-\alpha)(1-e)(1-\lambda)}$$

where $m = \frac{\delta}{\Phi}$.

Proof of Proposition 3

If $y_G = 1$, for the first CRA to prefer to exert effort instead of not exerting it has to be that Lemma 19 holds. When the first CRA exerts effort, the second CRA never does so (Lemma 12). When Lemma 19 is not satisfied the first CRA prefer not to exert effort. When the first CRA doesn't exert effort, the ENT faced with $P = G$ will choose to ask for the official rating instead of approaching a second CRA if Lemma 18 holds. Moreover by Lemma 20, when $y_G = 1$, the second CRA doesn't exert effort. Thus, there exist an equilibrium of the type $\gamma_1 = 1$, $\gamma_2 = 0$, $y_G = 1$ and an equilibrium of the type $\gamma_1 = 0$, $\gamma_2 = 0$, $y_G = 1$. If $y_G = 0$, the first CRA always prefers not to exert effort (Lemma 20). When the first CRA doesn't exert effort, the ENT faced with $P = G$ will choose to approach a second CRA if Lemma 18 is not satisfied. For the second CRA to prefer to exert effort it has to be that Lemma 17 holds. Hence there exists an equilibrium of the type $\gamma_1 = 0$, $\gamma_2 = 0$, $y_G = 0$ and an equilibrium of the type $\gamma_1 = 0$, $\gamma_2 = 1$, $y_G = 0$.

Proof of Proposition 4

From (2.14) and ((2.16)) let $\bar{c} = \lambda(\frac{1}{2} - \alpha)$ and $\tilde{c} = \lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$ be the values above which the CRA prefers not to exert effort. Start by assuming that $\lambda(\frac{1}{2} - \alpha) > \lambda^2\left(\frac{1-\alpha}{1+\lambda}\right)$, which simplified leads to $\frac{1}{2} < \frac{\lambda+\alpha}{1+\lambda}$. In turn if $\alpha < \frac{1-\lambda}{2}$, then $\bar{c} > \tilde{c}$ meaning that the threshold cost below which the CRA is willing to exert effort is now lower. This in turn implies that instead if $\alpha > \frac{1-\lambda}{2}$ then $\bar{c} < \tilde{c}$ meaning that the threshold cost below which the CRA is willing to exert effort is now higher.

Proof of Lemma 21

By exerting no effort in the no disclosure regime both contacted CRA's earn

$$\frac{\lambda\left(-\alpha(\lambda+3)+((\alpha-1)\lambda+\alpha+3)y_G+\lambda-5\right)}{2((\alpha-1)\lambda+\alpha+1)y_G-2((\alpha-1)\lambda+\alpha+3)} \tag{2.17}$$

Under disclosure the payoff for CRA1 and CRA2 becomes respectively

$$\frac{\lambda\left(\alpha(\lambda-1)+(\alpha-1)(\lambda+1)y_G+\lambda+3\right)}{2(\lambda+1)} \tag{2.18}$$

$$\frac{\lambda(\alpha(\gamma_1-3)\lambda-\alpha(\gamma_1+1)+\gamma_1(-\lambda)+\gamma+\lambda-1)}{(\alpha-1)(\gamma_1-1)\lambda^2-\alpha(\gamma_1+1)-2\alpha\lambda+\gamma_1-1} \tag{2.19}$$

Start with CRA1. If $y_G=1$, (2.17) simplifies to $\frac{1}{2}(\alpha+1)\lambda$ and similarly (2.18) becomes $\frac{\lambda(\alpha\lambda+1)}{\lambda+1}$. If (2.18)$>$ (2.17) it has to be that $-\frac{(\alpha-1)(\lambda-1)\lambda}{2(\lambda+1)}<0$. This holds $\forall\alpha,\lambda\in\{0,1\}$. If $y_G=0$ (2.17) simplifies to $\frac{1}{3}(\alpha+1)\lambda$ and (2.18) becomes $\alpha\left(\lambda-\frac{1}{2}\right)+\frac{3}{2}$. Once again, if (2.18)$>$ (2.17) it has to be that $\frac{1}{6}(\alpha(8\lambda-3)+2\lambda-9)<0$. As before, this holds $\forall\alpha,\lambda\in\{0,1\}$. Now move to CRA2. If $y_G=1$ the entrepreneur does not contact CRA2. If $y_G=0$, for (2.19)$>$ (2.17) it has to be that

$$\frac{1}{3}\lambda\left(-\frac{3(\alpha(\gamma_1-3)\lambda-\alpha(\gamma_1+1)+\gamma_1(-\lambda)+\gamma_1+\lambda-1)}{(\alpha-1)(\gamma_1-1)\lambda^2-\alpha(\gamma_1+1)-2\alpha\lambda+\gamma_1-1}+\alpha+1\right)<0 \tag{2.20}$$

When $\gamma_1=1$, (2.20) simplifies to $\frac{1}{3}(\alpha-2)\lambda<0$ which holds $\forall\alpha,\lambda\in\{0,1\}$. When $\gamma_1=0$, (2.20) becomes $\frac{1}{3}\lambda\left(-\frac{3(3\alpha\lambda+\alpha-\lambda+1)}{(\lambda+1)(\alpha\lambda+\alpha-\lambda+1)}+\alpha+1\right)<0$. Given that $\frac{3(3\alpha\lambda+\alpha-\lambda+1)}{(\lambda+1)(\alpha\lambda+\alpha-\lambda+1)}>1$, the condition is once again satisfied $\forall\alpha,\lambda\in\{0,1\}$.

Proof of Lemma 22

Recall that $c_{ND}=\frac{(\alpha-1)\lambda((\lambda+1)y_G-\lambda+1)}{2((\alpha-1)\lambda+\alpha+1)y_G-2((\alpha-1)\lambda+\alpha+3)}$,
$c_{D2}=\frac{(\alpha-1)(\gamma-1)(\lambda-1)\lambda^2}{(\alpha-1)(\gamma-1)\lambda^2-\alpha(\gamma+1)-2\alpha\lambda+\gamma-1}$ and $c_{D1}=-\frac{(\alpha-1)\lambda((\lambda+1)y_G+\lambda-1)}{2(\lambda+1)}$.

1. when $y_G=1$, $c_{ND}>c_{D1}$ simplifies to $\frac{(\alpha-1)(\lambda-1)\lambda}{2(\lambda+1)}>0$ which holds $\forall\alpha,\in\{0,1\}$. Similarly, when $y_G=0$ $c_{ND}>c_{D1}$ simplifies to $\frac{(\alpha-1)(\lambda-1)\lambda(\alpha\lambda+\alpha+4)}{2(\lambda+1)((\alpha-1)\lambda+\alpha+3)}$ which holds $\forall\alpha,\in\{0,1\}$.

2. when $y_G=0$ and $\gamma_1=0$, $c_{ND}>c_{D2}$ simplifies to $\frac{1}{2}(\alpha-1)(\lambda-1)\lambda\left(\frac{1}{\alpha\lambda+\alpha-\lambda+3}-\frac{2\lambda}{(\lambda+1)(\alpha\lambda+\alpha-\lambda+1)}\right)>0$ which holds $\forall\alpha\in\{0,1\}$ and for $\lambda<-\sqrt{\frac{\alpha^2+8}{(\alpha-1)^2}}-\frac{3}{\alpha-1}$. This implies that when $\lambda>-\sqrt{\frac{\alpha^2+8}{(\alpha-1)^2}}-\frac{3}{\alpha-1}$ ita has to be that $c_{ND}<c_{D2}$.

Notice also for completeness that when $y_G=0$ and $\gamma_1=1$, $c_{ND}>c_{D2}$ simplifies to

$$\frac{(\alpha-1)(\lambda-1)\lambda}{2((\alpha-1)\lambda+\alpha+3)}>0$$

which holds $\forall\alpha,\in\{0,1\}$.

Chapter 3

Bureaucrats facing Academics: An Overview of the Credit Rating Industry

Marta Allegra Ronchetti

Abstract

This paper presents a description of the environment in which credit rating agencies operate. The paper discusses the existing literature on the relation between CRAs and regulation and highlights policy proposals to solve issues such as the conflict of interest, the lack of transparency and the lack of competition. It moreover focuses on the recent regulatory changes, on the industry and market characteristics and on the successes and failure of the regulation. Finally, it presents open questions which are yet to be answered and on going concerns which need further investigation

JEL Classification: G24, G28, K23

Keywords: rating agencies, regulation, disclosure, competition

Introduction

In the wake of the financial crisis, economists were provided with food for thought. With out any doubt, regulatory usage of ratings brings a distortion in the industry. The heavy reliance on such opinions on the one hand overstates the role of ratings and their importance while on the other it undermines many of the issues that affect this industry. It is the case that the various researchers have investigated the effects of regulation on the market dynamics.

In this paper, by using the existing literature and the relevant regulation, I try to assess recent policy proposals and address possible causes for their poor performance. I moreover try to identify open questions and ongoing concerns which seem to need further investigation.

Even though regulation has not been the main area of investigation on CRAs, there are works which look at regulatory questions while analysing other drawbacks of the environment where CRA operate.

By incorporating the regulatory use of ratings in their analysis, Opp et al. [2013] investigate the effect that selling favourable regulatory treatments can have on rating standards, providing an explanation for rating inflation driven by rating contingent regulation. They introduce an exogenous variable that can be thought of as a regulatory advantage that A rated bonds enjoy. They do so because better ratings tend to be associated with lower compliance costs. The main result of this work states that when regulatory advantage is sufficiently large, the rating agency rates all firms as A and stops acquiring information avoiding the cost related to full disclosure.

For Stolper [2009] rating inflation can be avoided. The author claims that there exists an approval scheme which may induce credit rating agencies to assign correct ratings. To achieve such a result he employs a repeated principal agent model in which the credit rating agencies are to be approved by a regulator. The threat to deny approval in future periods seems to work as a deterrent for offering inflated ratings whenever the CRA's discount factor is sufficiently high, whereas prevention of collusion can be achieved by providing a real incentive to deviate, namely introducing a reward for the deviating CRA by reducing the number of approved entities in the future.

In contrast with the literature claiming that investors are victims of inflated quality ratings, Efing [2013] argues that what happened in 2007 is consistent with a dual moral hazard problem with voluntary rating inflation and risk-shifting. Here there is no need for naive investors for rating

inflation to arise, instead this time a sophisticated bank colludes with the rating agency for its own well being. Just as in Stolper [2009], the loss of accreditation for regulatory purpose may represent the penalty that a CRA has to face when rating inflation is discovered. In this setting the players are an opportunistic CRA, a bank regulator (i.e. uninformed party) and a banking sector. Through rating inflation it is possible to relax the regulatory constraints that banks face and in turn increase risk-taking to the benefit of bank's equity holders. Moreover, by providing favourable rating, also the CRA has a gain in terms of higher fees.
It should be in the regulator's interest to either discipline CRAs through a penalty or to switch to regulation which does not involve rating-contingent bounds.

Another big regulatory discussion targets the type of payment model that the CRAs follow. In Kovbasyuk [2013] three regulatory environments are taken into consideration: publicly disclosed fixed payment, publicly disclosed and rating contingent payment, private rating contingent payment and solve for the seller's optimal rating scheme. For instance, observing an unusually high fee paid by a seller for a rating leads to a lower perception of the products quality whereas if the fee was not disclosed this would not happen and the buyer would be left only with the rating's face value. According to this work mandatory disclosure of payments should occur, nonetheless there might be some undesirable consequences. The main idea behind this recommendation is that when transparency is low, buyers have less chances to learn the payment between seller and rater causing rating inflation to arise.[1].

In investigating how the regulatory premium associated with a positive rating affects the CRA Ozerturk [2014] finds that not only the informativeness of the issued rating decreases as the issuer's default cost increases but also it decreases in the ratings regulatory premium. The literature in financial regulation gives different explanations to explain what is the rationale behind regulations based on ratings. For instance Weber and Darbellay [2008] highlight that the use of ratings within the regulation of financial institutions is a way of simplifying the task of prudential oversight. This view finds validation in both the US and in Europe were first the incorporation in rules and regulations of rating was a general practice in many

[1]Sellers may have an incentive to manipulate payments in order to bias the rater report

areas (i.e pension funds, institutional investors and banks) only to then be overturned when stigmatised as one of the various causes of the crises. Jorion et al. [2005] find empirical evidence that the privileged position held by CRAs in Regulation Fair Disclosure resulted in an increased effect of rating changes on stock prices informational advantage of rating agencies.[2] Already before the crisis, Partnoy [2006] pointed out that the value of ratings is well beyond providing credit worthiness information, they hold regulatory privileges which are important for the investors.

Kisgen and Strahan [2010] show that ratings affect the cost of capital of firms because regulatory constrains on bond holdings affect yields. In particular the authors exploit a quasi- natural experiment, the recognition from the SEC of DBRS as a NRSRO. Similarly Bongaerts et al. [2012] suggest that the certification effect can lower the cost of capital. They investigate different reasons for observing multiple ratings but find that only regulatory purposes seem to play a role. They find that, about 25% of issues who require a third rating from Fitch's result in a regulatory rating improvement.

Overall there seems to be a general consensus that regulatory matters play a fundamental role in the functioning of the industry. It is the case that valuable suggestions have been made in order to improve both the quality of the ratings and the structure of the market. Nonetheless, these matters are far from being solved.

The remainder of this paper is as follows. Section 1 gives an overview of the credit rating industry in Europe, focusing on rating processes and CRA products. Section 2 looks at the European Regulation, at the recent amendments, the Financial Stability Board (FSB) role and the European Securities and Markets Authority (ESMA) prominent role.[3] Section 3 focuses on the interdependent relation between the literature and regulatory

[2]In 2000, the Securities and Exchange Commission implemented Regulation Fair Disclosure requiring that public companies when disclosing information to a selected group should also inform the public. Credit Ratings Agency were granted and exception under Rule 100(b)(2).

[3]The Financial Stability Board coordinates at the international level the work of national financial authorities and international standard setting bodies and develops and promotes the implementation of effective regulatory, supervisory and other financial sector policies. It brings together national authorities responsible for financial stability in significant international financial centres, international financial institutions, sector-specific international groupings of regulators and supervisors, and committees of central bank experts. The European Securities and Markets Authority aims at the protection of investors and at improving financial markets to achieve stability in the EU financial system.

proposals and provisions. Section 4 is an outlook on open matters and possible future research questions.

3.1 The European Credit Rating Industry

CRA's are meant to mitigate the problem of asymmetric information to the benefit of a better capital allocation. However, in the years, their initial role has gradually been distorted due to the increased complexity in financial markets and in the light of a favourable regulation.

According to Langohr and Langohr [2009], originally ratings were meant to "measure the credit risk of the issuer's business and its debt financing". In one of the Financial Stability Papers published by the Bank of England[4], it is claimed that the decision of CRAs have potentially systemic consequences on the grounds that ratings nowadays are strongly involved in financial contracts, investment processes, and also in the regulatory framework.

The credit rating industry in Europe increased from 37 recognized and registered CRAs operating in the EU in 2013 to three more in 2014 to remaining stable at 40 in 2015.[5] The well known three largest CRAs, Standard & Poor's, Moody's and Fitch, are present with respectively seven, seven and three legal entities[6] and they account in total in 2015, for 92.85% of the whole market constantly growing from 90.24% in 2013 and 91.89% in 2014.[7] This percentage changes if two of the registered CRAs, namely ICAP Group SA and CERVED Group S.p.A., are removed from the sample because not directly comparable to the other CRAs. In particularl market shares would be 93.82% in 2014 and 88.85% in 2013. [8]

Among the many rating categories, around 69% of the revenues from rating activities come from corporate ratings and SFI are rated only by 8

[4]BE

[5]In ESMA [2014], ESMA [2015a] and ESMA [2016] the full list is provided.

[6]List of Legal Entities for each group. **Fitch**: Fitch France S.A.S; Fitch Deutschland GmbH; Fitch Italia S.p.A.; Fitch Polska S.A.; Fitch Ratings España S.A.U.; Fitch Ratings Limited and Fitch Ratings CIS Limited. **Moody's**: Moody's Investors Service Cyprus Ltd; Moody's France S.A.S.; Moody's Deutschland GmbH; Moody's Italia S.r.l.; Moody's Investors Service España S.A.; Moody's Investors Service Ltd; and Moody's Investors Services EMEA Ltd. **Standard & Poor's**: Standard Poor's Credit Market Services France S.A.S.; Standard Poor's Credit Market Services Italy S.r.l.; and Standard Poor's Credit Market Services Europe Limited.

[7]Statstics in ESMA [2014] p. 6, ESMA [2015a] p. 8 and ESMA [2016] p. 6

[8]ICAP and CERVED can be excluded in the statistics in ESMA [2015a] due to their non comparability with the other CRAs in the light of their activity of credit scoring on small local corporations.

CRAs in Europe.[9] Surprisingly, in the US the registered nationally recognized statistical rating organizations (NRSROs) are only 10.
ESMA [2017a] shows that the largest CRAs can now be considered out of the crisis, with operating margins in 2015 close to those pre crisis. It is acknowledged that these CRAs are offering more and more ancillary services while retaining and valuing existing rating relationships whereas small CRAs are exploring new markets with the intention of improving coverage. As of November 2016 the number of outstanding issuers' credit ratings is of $37,839$ and of financial instruments credit ratings $89,693$.[10]

Only 6 issue rating in more than 5 categories, 4 of which reach full coverage while 7 operate in more than 2 but less than 5 categories. The number of categories of ratings offered by EU smaller CRAs is increased, in particular there are more CRAs offering structured finance ratings and sovereign ratings with resppect to 2011.[11]

3.1.1 How does the rating process work?

By looking at the rating process details disclosed by the the three main agencies, it is clear that the followed pattern is similar.[12] After the first contact, each costumer is assigned a lead (or primary) analyst and a back-up analyst for support. To perform the rating process, the agencies take into consideration both public and private information, where the latest is provided by the costumer himself. Following an initial discussion with the relevant management figures, the analysis can begin and can be refined with additional information and necessary clarifications provided by the rated entity. Once this phase is over, the analysts make a recommendation to the rating committee. Consensus is needed among the committee members before the assigned rating can be communicated to the entity. Dissemination of ratings happens simultaneously through the publication on the rating agency's website and through the press release on the major news. Once published, ratings undergo monitoring and when relevant, they are reviewed and updated. The timing of the rating process varies according to the type of product and the agency.[13]

[9] [Commission, 2016]
[10] These statistics can be found in ESMA [2017a] p. 36.
[11] Details on rating categories can be found in ESMA [2016] p.7.
[12] Ratings [2016], Ratings [2015].
[13] Corporate ratings asked to Fitch take six to eight weeks and around four weeks for Moody's. Structured finance ratings have a longer timeframe due to additional complexity.

The most widely employed remuneration model is the so called issuer-pays model. Not only it's the issuer that solicits and pays for the rating, but also the fee charged to the issuer contributes widely to the revenues of the CRAs. If on the one hand this payment method allows a widespread costless flow of information to investors on the other it is subject to a possible bias of such information. This might be caused by either the power enjoyed by the issuer or the willingness of the CRA to please the costumer. [14]

3.1.2 Other CRA Products

A detailed description of products and services provided by CRAs that differ from traditional credit ratings can be found in IOSCO [November 2016]. This extensive consultation report gives a clear overview of these so called other CRA Products (OCP) which are often used by issuers to decide if or from whom to obtain a rating.[15] Annex 1 Section D of the European Regulation on CRAs (2009) deals with the rules on the presentation of credit ratings. Before the amendment to the Regulation, Point 5 of the previously mentioned Section it was only stated that a CRA, when announcing rating, had to explain the elements on which the credit rating was based. Following the financial crisis and the consequent amendment of the European Regulation, rules have been put in place concerning the disclosure of any preliminary rating request on entities or debt instruments. Such disclosure should happen both on the CRA's website and through the notification to ESMA.

3.2 New Rules on Credit Rating Agencies

To set the scene it is worth briefly mentioning what international bodies and jurisdictions have done recently concerning the credit rating industry. The first step is to briefly mention what process did the rules on CRAs undergo as a consequence of the crisis.

As a response to the G20 Summit call for urgent measures with regards to mechanistic reliance on ratings, transparency and competition among CRAs, the FSB issued in 2010, Principles for reducing reliance on CRA ratings followed in October 2012 by a roadmap aiming at accelerating the

[14] Commission [2016] provides a non exaustive list of considerations

[15] The IOSCO board divides such products in 6 categories: OCP - Research, Private - OCP, Non-Final OCP, OCP - Part of the Rating Process, OCP - Outside the Rating Process, OCP - Hybrids.

implementation of such principles.[16] Such principles have been formulated in the first place because of the shared belief on the importance of the role covered by CRAs, moreover the idea behind them was to force a shift from mechanistic use of ratings to a world in which they could just be inputs for subsequent own credit assessment. To see to which extent the FSB principles have been implemented, a Progress Report FSB [August 2013] to the St Petersburg G20 Summit was released.[17]

The International Organization of Securities Commission (IOSCO) issued guidance on transparency on competition among CRAs strengthening the fact that transparency requirements are helpful in comparing CRAs through information disclosure of methodologies, performance and so forth.[18] Among jurisdictions, the US and EU have made significant step forward whereas other countries are still behind.

3.2.1 Amended EU CRA Regulation

During 2008 the European Commission held consultations regarding CRAs regulation and the outcome of this process was the publication of a proposal that soon became effective. The current EU Regulation on Credit Rating Agencies[19] has been in force since 2009 but underwent an amendment[20] following the creation of the European Securities and Markets Authority in July 2011. Core points of this regulation are ESMA responsibility to register CRAs, to supervise them and to investigate on their actions when necessary. Other important aspects are CRAs conduct of business in terms of transparency, ratings methodology, ratings' quality and avoidance of conflict of interest.

Despite the strong impact that CRAs are widely recognised to have on financial markets, their use and related consequences for the market have not yet been regulated.

The above mentioned CRA Regulation has been amended in 2013. The first step towards the achievement of the major goal is that of requiring, in

[16]The G20 Summit refers to the 7th Summit held in Los Cabos in June 2012.

[17]The St Petersburg G20 Summit is the 8th Summit held in St Petersburg in September 2013.

[18]IOSCO is an international body that brings together the world's securities regulators and is recognized as the global standard setter for the securities sector. Form now on IOSCO.

[19]Parliament and the Council [May 2013] No 1060/2009 of the European Parliament and of the Council of 16 September 2009 on credit rating agencies, from now on CRA Regulation.

[20]Parliament and the Council [May 2013] and EC [January 2013];

the medium term, financial institutions to put in place internal procedures, for investors to perform a due diligence exercise in order to come up with their own risk assessments and for ESMA to review guidelines avoiding references to external credit ratings.

Provided that the remuneration of credit ratings mostly comes from the rated entity (i.e. issuer pay model), it is necessary to strengthen independence. The Regulation aims at improving this aspect by means of mitigation of the conflict of interest which requires CRAs to disclose publicly if a relevant shareholder[21] holds 5% or more of the rated entity. 5% is also the upper bound to simultaneous investments in more than one credit rating agency. Another way is to consider appointing a CRA with less than 10% market share whenever soughing for more than one rating or requiring structured financial products issuers to engage at least two different CRAs. Furthermore the Regulation introduces a mandatory rotation mechanism forcing the above mentioned issuers to be in a contractual relation with a certain agency for no more than four years after which a switch is necessary[22]. Note that there is a proposal for this measure to be extended also to other asset classes.

In order for such a system to be sustainable and effective, more players should be present in the market and in order to provide them with sufficient visibility there is the need, according to the Regulation, to establish a European Platform. In this regard, ESMA launched at the end of 2016 the European Rating Platform (ERP), a database intended to give free access to information on credit ratings. The rationale for the ERP can be found in the growing attention that ESMA has been giving to increased transparency with the hope to help investors to make informed decisions. By having access to an instrument for comparing available ratings, small and medium CRAs could gain visibility.

Concerning sovereign debt of EU member state, ratings now have to be reviewed at least every 6 months, unsolicited sovereign ratings will now be scheduled by the CRA, at the end of each year, by means of a calendar. Deviation from the three ratings per year rule have to be motivated by a detailed explanations of the reasons behind the choice.

Regarding the accountability for their actions, CRAs are now subject to new rules which ensure that they can be held liable both in case of gross

[21]Here by relevant it is meant a shareholder with 5% or more of the capital or voting rights of the CRA.

[22]Not applicable to small rating agencies.

negligence or intentional infringement of the CRA Regulation. Even though this is clearly a step forward, the fact that no reversal burden of proof has been included in the amendment is still a drawback.

3.2.2 FSB Progress report

It is worth describing how and to which extent the FSB principles have been implemented, to do so we refer to the Progress Report FSB [August 2013] to the St Petersburg G20 Summit[23]. Such principles have been formulate in the first place because of the shared belief on the importance of the role covered by CRAs, moreover the idea behind them is to force a shift from mechanistic use of ratings to a world in which they will be just inputs for subsequent own credit assessment. Three are the main core steps to be taken and they will be explained in detail in the forthcoming paragraphs.

In order to monitor and assist jurisdictions in the transition towards the implementation of the principles, the FSB is conducting a two stage peer review. The first stage has produced an interim report[24] which argues that the US have implemented a more stringent rule, the Dodd-Frank Act, which requires a total removal of references to CRA ratings while the other jurisdictions have put some effort in giving effect to the principles with the EU adopting CRA III Regulation. Despite these improvements though, over reliance is still present in bank capital requirements whereas in other financial intermediaries it has been significantly reduced. For instance most Central Banks have declared their reduction in mechanistic reliance and their process towards internal credit risk assessment measures. What is still missing are incentives for market participants to do so, each jurisdiction should deal with this issue. Furthermore, changes are needed thus each of them should identify areas and disclose action plans for the achievement of such an objective and the related time line which will ensure that the process sticks to the plan.

The focus for further progress is on finding alternative measures of creditworthiness, amending international standards still based on credit references and avoiding their appearance in private contracts and investment decisions.

In May 2014 the EU responded to the request of the FSB to show how a

[23] 8th Summit held in St Petersburg in September 2013

[24] Thematic Review on FSB Principles for Reducing Reliance on Credit Rating Agency Ratings, http://www.financialstabilityboard.org, published on 29 August 2013;

reduction in ratings reliance could be achieved. This staff working paper identifies a multi-layer approach involving (i) EU regulation, (ii) legislation in financial services and (iii) actions by European Supervisory Authorities as well as (iv) national competent sectoral authorities.

The key findings of the second stage of the peer review are summarised in FSB [May 2014]. While all FSB member states have prepared action plans after having laid out the amount of reference to CRA ratings that each of them enjoy, few jurisdictions have come up with alternative measures of creditworthiness. Moreover some of the action plans lack to mention ways to find these alternatives and do not identify reasonable ways to induce market participants to perform their own risk assessment. Members are waiting for the international standard setting bodies to do so.

IOSCO instead, has been focusing on enhancing transparency and competition among CRAs and in its report to the G20 shows how these two issues are linked. Transparency requirements are helpful in comparing CRAs through information disclosure of methodologies, performance and so on.

According to this report the whole issue about competition stands in the perception that investors have of small CRAs and in turn on the issuers willingness to hire them. At this point the link with transparency should be clear: smaller CRAs can credibly show to the market their differences with respect to the three main players which now have an incentive to retain credibility by improving their quality. By putting into place transparency measures, nowadays situation should sensibly improve.

3.2.3 The European Securities and Markets Authority

ESMA was not always related to the CRA legislation. Following the first amendment of the 2009 CRA Regulation, ESMA became, in 2011, the supervisor in the credit rating industry. If in the beginning the primary goal was to set the standards and the reporting strategies, after the second amendment of the 2009 Regulation in 2013, ESMA had to pursue a wider agenda. Due to the growing concerns on transparency and investor protection issues, ESMA was given the tough task of coming up with technical advice on those matters. This duty, in the own words of Evert van Walsum[25] has been well performed

[25]In van Walsum [2017] the Head of Investors and Issuers Department European Securities and Markets Authority gives an opening statement for Econ scrutiny on CRA regulation.

"*From this vantage point almost four years later, I am pleased to say that all of the technical standards requested of ESMA have been delivered..*

He also gives a brief summary of what has been done and what is yet to be done. Achievements were the European Rating Platform (ERP), the provisions dealing with the supervision of the fees charged by the CRAs and the forthcoming arrangement of a reporting template benefiting transparency of Structured Finance Instruments. In particular the ERP presents ratings and rating outlooks issued by CRAs on a daily base with the goal of providing access to free information. Technical advice has been given also on the over-reliance on credit ratings showing that a change in the instrument (i.e. looking for a different requirement to be linked to regulation) is not the first best while finding ways to mitigate the reliance on credit ratings could be helpful. The possible areas of improvement include the refinement ESMA's sanctioning powers aiming at increasing accountability of the CRAs and a more tailored sanctioning regime together with the revision of the guidelines governing the recognition of foreign CRAs in the EU.

The most recent provision in terms of competition has to do with encouraging the use of smaller CRAs. According to the ESMA [2016] big CRAs perceive an increase in CRA'a competition whereas smaller ones hold an opposite view. In the last released supervisory briefing ESMA [2017b], ESMA acts on the extensive belief that the new rules for issuers when dealing with multiple designation of CRAs lack implementation because the 'comply or explain' mechanism is insufficient.

3.3 Economic Literature and Regulatory Proposals

Both before and in the aftermath of the financial crises many economists while investigating CRAs have come up with policy implications. Some of these suggestions found their way into policy proposal first and regulations after. Some others have served the role of testing, in a theoretical environment, the effect of policies and regulations. In this section I will analyse some of them and discuss their appropriateness.

In this section I try to focus on some of the recent suggestions and implementations brought about by the literature on CRAs. In particular I will discuss (i) transparency requirements, (ii) competition mechanism, (iii)

conflict of interest. These areas also happen to be the subject of Technical Advices (ESMA [2015b] and ESMA [2015c]) required to ESMA in the amended CRA Regulation. In detail, the advice focused on conflicts of interest, competition and structured finance instruments (SFIs) in ESMA [2015b] and on reliance on credit ratings in ESMA [2015c].

3.3.1 Transparency

A still very much present concern is that of transparency in the rating industry. First of all transparency may refer to many different areas. As explained before, transparency requirements can be directed to industry specific features such as charged fees, ancillary services and rating standards and processes. They can also address concerns about information transmission due to hidden ratings.

In Kovbasyuk [2013] a suggested desirable regulation should allow rating contingent fees and require their disclosure whereas mandatory up front fees are said to lead to low welfare and uninformative ratings. The author suggests that this might have drawbacks in terms of competition. Just after the amendment to the European Regulation on CRAs,, ESMA was required to draft regulatory technical standards regarding the fees.

Doherty et al. [2012] suggest that in order to benefit from competition in the rating industry transparency on both ratings standards and the processes is needed. What the CRAs should compete on is the information content of ratings rather than focusing on maintaining their regulatory power. As we have seen, there is a general consensus on reforming the regulation so to decrease the regulatory power enjoyed by the main players.

For what it concerns ancillary services, not much has been done up to now. In 2015 ESMA advised that there was a need for a clarification of what these services are.[26] The Regulation sets out provision to be followed when providing these services, however it is the case that CRAs have not applied them exploiting the fact that there is a blury line delimiting the activities which may be considered ancillary. Skreta and Veldkamp [2009] claims that

[26]Point 4, Section B of Annex I of the Regulation: "A credit rating agency may provide services other than [the] issue of credit ratings (ancillary services). Ancillary services are not part of credit rating activities; they comprise market forecasts, estimates of economic trends, pricing analysis and other general data analysis as well as related distribution services. A credit rating agency shall ensure that the provision of ancillary services does not present conflicts of interest with its credit rating activities and shall disclose in the final ratings reports any ancillary services provided for the rated entity or any related third party."

controlling the transmission of information by mandating disclosure of all ratings is de facto unachievable also in the light of the fact that many assets change structure after a negative rating is proposed.

Freixas and Laux [2011] claim that increased transparency need not to come from the provision of additional information, which is difficult to process, but from making the investors more able to process the available information. This result goes in the direction of improving transparency to the benefit of investors. The first step towards this goal is represented by the ERP which by providing access to all ratings can help investors to make more informed decisions. The risk according to ESMA is that some investors still take into account only ratings coming from the Big Three.[27] Another step is that of requiring disclosure of several aspects of SFI. The following step is that of addressing whether such provisions should be extended to other classes of products.

Transparency, together with a fee issue, are the core concepts to work on in the second best policy that, Pagano and Volpin [2010] propose in order to avoid conflict of interest. According to the authors, changing the incentives of rating agencies may be the solution to both the problem of rating inflation and that of coarse ratings, however their preferred policy (i.e. investors pay for ratings) may suffer from incentive problems itself and its implementation may be highly problematic. In the relevant Call for Evidence, one of the views that came out suggested that investors paying for ratings might encourage reliance and decrease due diligence together with harming even further competition. Instead, the authors second best policy suggests on the one side the payment of an upfront fee, as prescribed by the Cuomo plan, supported by strong monitoring, strict penalties and the impossibility to shop for rating whereas on the other it calls for information sharing in order for the investing public to have access to some of the information that issuers and credit rating have so as to enhance transparency and stimulate personal analysis. The first suggestion, shared also by Bolton et al. [2012], would however need an additional provision forcing CRAs to disclose ratings each time they receive the fee. Currently there is no up front fee, but steps have been taken in terms of disclosing initial rating requests, so that issuers now have harder times to hide ratings. The second suggestion instead is in line with what ESMA has been doing and with what is planning to do in the near future.

[27] ESMA [2015b].

3.3.2 Competition

Whenever an industry resembles an oligopoly, fairness concerns arise. In the rating industry, the close to absent presence of competition has continuously worried regulators. The reason why competition is believed to be necessary has to do with several aspects. To begin with, there might be a concern that such market structure can result in increased fees not matched by higher quality ratings. Secondly, not facing strong competition may put away any additional effort to improve.[28]. Moreover, if barriers to entry are too high, new entrants and small players might not even be able to play a role unless interventions are put in place to facilitate their participation in the industry. There are however practical impediment to competition due to the direct recognition of the incumbents and to the costly compliance with the requirements. In turn, those who are already part of the market have a strong advantage, credibility and market acceptance, while potential entrants are disadvantaged.

Well before the recent amendments Prof. Coffee in OEC [2010] suggested three models to reform the industry. One of these proposals had the intention of inducing competition for investor favour through either the mandatory request for institutional investors to have a rating from a CRA not paid by issuers, or the necessity for issuers to have a second rating from a CRA owened by investors. [29] Another of the models named "Government as Umpire" according to which the issuer of SFI has the faculty to request a rating from a CRA of his choice in addition to that released by the rater chosen by the Credit Rating Agency Review Board. Such a proposal partially found its way into the regulation because this model contemplates a lottery or rotation system which resembles the mandatory rotation provision of the EU Regulation together with the multiple ratings requirement for SFI, without however empowering an ad hoc Board to the choice of the first rater.

Stolper [2009] makes the case that competition and monitoring should be pursued simultaneously. The suggested scheme highlights a shortcoming of the actual regulation. The author claims that a regulator should threaten to deny approval whenever the CRA's performance is worse than that of the competitor while it should reduce the number of approvals as a reward for

[28]Improvement can be in terms of innovation, fees, investment in new areas and so on.

[29]The model is referred to as Jumpstarting a "Subscriber Pay" Model. for the sake of completeness, Prof.Coffe mentions also another way of achieving the same goal involving a "Government Agency Selects the CRA preferred by a poll or vote of investors".

the entity which deviates by a collusive agreement. Such a scheme would rely on the ability of the current regulation, which still grants regulatory reliance, to foster accurate ratings. However accurate ratings may not be provided due to the already held regulatory power.

3.3.3 Conflict of Interest

The CRA Regulation tried to provide guidelines aimed at addressing the management of conflicts of interest which CRA are said to be experiencing. The conflict of interest argument arises whenever the payment method adopted by most CRAs is questioned. Moreover the conflict of interest matter tangentially relates also to the whole discussion on ancillary services.

In OEC [2010] suggestions were made on a platform-pays model. The idea came up as a possible solution to solve, at least partially, the concerns due to the prevalent business model. A mentioned alternative featured a long-term incentive structure with a different payment timing. Issuers would pay ex-ante and the CRA would receive its fee ex-post. Similarly, Mathis et al. [2009] would solve the conflict of interest problem by having a "central platform" to bridge the relation between the CRAs and the issuer. They also suggest the use of multiple ratings to improve comparability. Multiple ratings are now mandatory for SFIs. Even before this obligation, there was a tendency to use more than one CRA.

Frenkel [2015] suggests a few regulatory recommendations such as preventing long term relationships from establishing and mandating the disclosure of the paid fees. The first remedy was addressed in the 2013 CRA Regulation by means of mandatory rotation when rating complex ratings. The second one instead has been tangentially dealt with recently in the discussion about the supervision of the fees charged by the CRAs.

White [2010] was among the first suggesting that reduced reliance on ratings through a change in prudential regulation of financial institution was the way to proceed. This seems to be the direction that regulators are now embracing.

Camanho et al. [2012] by investigating how the conflict of interest due to the dominant payment model reacts to competition, tried to evaluate the proposal that calls for more competition. As a result, it seems that such a measure brings about a reduction in total welfare. According to this model, a measure such as mandatory rotation of CRAs would have the drawback of entitling the CRA to a certain market share regardless of its performance-

By means of a theoretical model, Stahl and Strausz [2017] address the concerns about the issuer-pays model showing that a shift to the investor-pays model would not be effective in fostering transparency. An often mention regulatory improvement refers to the accountability and punishment of the inaccurate CRA. This area is still widely unexplored.

3.4 What comes next?

Now that we are close to reaching a decade from the financial crisis and that adjustments have been suggested, implemented and tested, there are still unsolved issues and upcoming problems that deserve an answer. The questions to be investigated by the economic literature should be grounded in the regulatory doubts and should try to provide solid bases for a revision of the legislation. Only through the combination of these two complementary areas, valid conclusions can be drawn.

A promising area refers to the study of the CRAs accountability and the effect of monitoring of their conduct. Another interesting question has to do with the link between increased transparency and investor effort to use such information.

It is clear by now that analysing CRAs requires to investigate multiple aspects at the same time, it is no longer sufficient to focus only on one aspect in order to provide valuable answers. This opens the ground to the study of many combinations which can have policy and regulatory implications.

Just as the regulators and international bodies have been doing by collaborating in pursuing common goals, also the credit rating agency literature needs to come up with simple frameworks that serve the scope of looking at multiple problems.

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Conclusion

The aim of this thesis is to first model the interaction between credit rating agencies and an entrepreneur and second to better understand the theoretical consequences of recent European regulatory requirements.

By means of the regulation mandating the disclosure of preliminary ratings, a specific transparency requirement could be investigated. The results from Chapter 1 and Chapter 2 seem to suggest that increased transparency may be beneficial only in bad times (i.e recessions). In particular, findings from Chapter 1 point in the direction of different effects of increased confidence under disclosure. In recessions a CRA should be confident to boost the economy by allowing more projects to reach the official rating stage and therefore transparency may be beneficial. In booms instead, financing bad projects is worse than not funding good projects and therefore increased transparency may be harmful because it allows too many bad projects to get funded.

In Chapter 2, the effect of increased transparency in a competitive setting may be beneficial only for the second contacted CRA. When good projects are rare, by mandating disclosure the second CRA has the correct incentive to invest in information.

These results, together with the open questions highlighted in Chapter 3 lead to believe that disclosure is not necessarily welfare improving and that despite it being an easy fix, more interventions are needed in order to make transparency measures beneficial.

Future research goes in this direction, open questions relate to the link between transparency and investors ability/capability to process information and to the relation between CRAs accountability and the effect of monitoring of their conduct.