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Upfront versus rating contingent fees: Implications for rating quality

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ABSTRACT

This paper theoretically investigates whether compensating a credit rating agency (CRA) with an upfront fee, rather than a rating contingent fee, can improve rating quality. I show that an upfront fee delivers the same rating quality as the rating contingent fee if the CRA sets its rating policy before the issuer solicits a rating, whereas it can potentially improve quality if the rating policy is set only after a rating is solicited. These results suggest that the "Franken Amendment" that has been removed from the Dodd-Frank Act might be crucial for the proposed upfront fee regime to improve rating quality.

1. Introduction

The credit rating industry in the US has been the subject of intense criticism following the financial crisis of 2007–2009. It has been widely argued that, by providing inaccurately favorable ratings, the credit rating agencies (henceforth CRAs) have been instrumental in the origination of low quality loan pools and the transfer of the risks of these loans through securitization.[1] One of the most criticized aspects of the rating process has been the "issuer-pays" business model common in the rating industry

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[1] For example, the Financial Crisis Inquiry Commission (2011) concludes that "this crisis could not have happened without the rating agencies."

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(Weber and Darbellay, 2008; Partnoy, 2006). The prevailing business model prior to the crisis has allowed the issuers to pay a CRA only if they wanted to make the rating public, which was the case only if the issuers were "sufficiently happy" with the rating (White, 2010). Hence, the issuer-pays model was based on a rating contingent fee structure which compensated the CRAs only when they provided favorable ratings. A common criticism was that the fee structures in the rating industry prior to the financial crisis provided little incentives to the CRAs for accuracy, as only favorable ratings meant compensation (Weber and Darbellay, 2008).[2]

This apparent conflict of interest arising from the rating contingent fee structure has drawn particular attention in the policy reform proposals regarding the rating industry. As reported in the Wall Street Journal as early as the summer of 2008, an agreement between New York State Attorney General Andrew Cuomo and three main ratings agencies (Standards & Poor's, Moody's and Fitch) had the broad intention of preventing the issuers from paying only for favorable ratings and requiring them to pay the CRA an upfront fee, before the CRA provides a rating.[3] It has been argued that "the upfront fee model" could eliminate the potential conflict of interests by separating the link between the payment that the CRA receives and the particular rating it provides.

In this paper, I theoretically investigate the implications of an upfront fee regime for the informativeness of the ratings. I consider a model where an issuer solicits a rating from a CRA for a loan portfolio that it wants to sell, as regulation restricts investors to buy only those securities with a favorable rating. There is no asymmetric information between the issuer and potential investors on loan portfolio quality. The issuer's incentives to sell the loan arise solely due to liquidity benefits that will accrue from loan sale. In this setting, the CRA chooses the accuracy of its information signal technology along with a disclosure (reporting) rule that determines whether the CRA engages in strategic rating inflation.[4] The signal accuracy and the disclosure rule together constitute the CRA's "rating policy". The analysis focuses on whether an upfront fee paid to the CRA once the rating is solicited, but before any actual rating takes place, creates an improvement in the rating quality compared to the rating contingent fee regime. The main results are as follows:

- If the CRA sets its rating policy (signal accuracy and disclosure rule) before the issuer solicits a rating, then the rating contingent and the up-front fees deliver the same rating quality.
- If the CRA initially posts only its fee without setting its rating policy, and chooses the rating policy only after the issuer solicits a rating, then the up-front fee regime can introduce an improvement in rating quality compared to the rating contingent fee. In particular, while under the rating contingent fee the CRA engages in complete rating inflation and provides uninformative ratings when the issuer's liquidity benefit exceeds a certain endogenous threshold, for the same parameter configuration the CRA truthfully provides informative ratings when restricted to choose its rating policy ex post under the up-front fee regime.
- For the parameter configuration where the "upfront fee with ex post rating policy choice" regime improves rating quality, the CRA always prefers to set its rating policy ex ante before issuer solicits a rating.

These results have relevance for the recent reform proposals on the way the CRAs are compensated. The analysis illustrates the ineffectiveness of an up-front fee regime for improving rating quality when the CRA chooses its rating policy before a rating is solicited. This ex ante choice of rating policy should be understood as a scenario where the CRA makes the strictness of its evaluation criteria and the accuracy of its rating model a part of its initial negotiation with the issuer. In this scenario, the CRA sets its evaluation criteria, specifics of its rating model and the staff hours it will employ to provide a rating

[2] The Financial Crisis Inquiry Commission's 2011 report explicitly states that "the business model under which firms issuing securities paid for their ratings seriously undermined the quality and integrity of those ratings with the rating agencies placing profit considerations above the quality and integrity of their ratings."

[3] "Big Credit Rating Firms Agree to Reforms" by Aaron Lucchetti, Wall Street Journal, June 6, 2008.

[4] In particular, the CRA is not restricted to be truthful in the rating it provides. It can report a good rating despite observing a bad signal.

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before the issuer formally solicits a rating. In other words, the CRA can "market" the specifics of its rating policy to the issuer and commit to it under this scenario.[5]

The above results are particularly interesting when considered in the context of the so-called "Franken Amendment" which was taken out of the Dodd-Frank reform bill in the last minute, and was relegated to be the subject of a formal study by the SEC.[6] In particular, the "Franken Amendment" (sponsored by Senator Al Franken, Minnesota) proposed that the SEC sets up an independent body which would randomly assign issuers of structured financial products with rating agencies. Such an arrangement would prevent any preliminary discussions between the issuers and the CRAs, and eliminate any possibility that the CRA "markets" the specifics of its rating criteria before the issuer solicits a rating. According to the analysis in this paper, this proposed arrangement in the form of an "upfront fee with ex post rating policy choice" regime can potentially improve the quality of ratings by explicitly separating the rating process from marketing and sales. Therefore, the main contribution of this paper is to illustrate the equivalence of rating contingent versus up-front fee regimes in terms of rating quality when the CRA chooses its rating policy before the rating is solicited, and emphasize the importance of separating the rating process from marketing/sales by requiring the CRA to choose its rating policy after the rating is solicited, so that the up-front fee regime can improve rating quality under certain circumstances. This observation is especially important as the analysis also shows that when left to its own devices the CRA prefers to set its rating policy before a rating is solicited.

2. Related literature

There is a quite recent and growing body of theoretical literature analyzing the conflict of interests in the relationship between issuers and rating agencies. None of these papers, however, address the specific question in this paper, namely the implications of up-front versus rating contingent fees and the timing of the choice of the CRA's rating policy for the information content of ratings.

A recent line of theoretical papers on CRAs consider the impact of issuers' "rating shopping" on the accuracy of ratings. Bolton et al. (2012) develop a model with naive investors who take ratings at their face value along with sophisticated ones who rationally update their beliefs taking into account the CRA's equilibrium rating strategy. They show that competition between CRAs can actually reduce the information content of ratings as it facilitates rating shopping. In Skreta and Veldkamp (2009), the issuer's ability to select between CRAs leads to overly optimistic ratings even when all CRAs are honest. Their analysis also involve investors who do not rationally account for the upward bias in the reported ratings. Unlike these studies which rely on naive investors, Sangiorgi and Spatt (2013) provide a model of rating shopping with fully rational investors and focus on the implications of opacity about the contacts between the issuer and rating agencies. They show how the absence of disclosure requirements about rating contacts can give rise to endogenous uncertainty as investors do not know whether ratings are not disclosed because they were not obtained or because they were unfavorable. In their setting, ratings bias does arise from selective disclosure whenever in equilibrium the issuer publishes fewer ratings than those available. Instead of the implications of rating shopping with multiple CRAs, my paper considers a single CRA and investigates the relative performance of rating contingent versus up-front fee regimes in terms of quality of ratings.

Another strand of papers addresses the CRA's reputational concerns for delivering accurate ratings in dynamic models. Mathis et al. (2009) show that reputational concerns are not sufficient when rating complex products become a major source of income for CRAs; as in this case the benefit of maintaining a reputation to capture future income from other sources is less pronounced. For the same reason, they also predict that rating quality is lower in boom times. The relationship between rating

[5] As suggested by an anonymous referee, an alternative approach to initially commit to an accuracy level might be one where the CRA simply announces an accuracy level and rates a large sample of financial securities which allows for statistical inference about the underlying accuracy of ratings. The ex-post revelation of the accuracy measures for these ratings and associated reputational losses can provide an ex-ante commitment device to provide the announced accuracy level, as also discussed in Mathis et al. (2009) and Opp et al. (2013).

[6] See Section 939F of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

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quality and the business cycle is studied in a dynamic setting by Bar-Isaac and Shapiro (2013). They show that rating quality is lower in boom times, unless the economic conditions are too persistent. Rablen (2013) considers a dynamic reputational framework where the CRA operates both in the corporate bond market and the structured financial products market. He shows that as the CRA's reputation becomes good enough, the CRA can always inflate ratings in the structured products market while no such rating inflation occurs in the corporate bond market.

A closely related paper is Opp et al. (2013) where a CRA sets the accuracy of its signal and can also strategically misreport ratings. Different than this paper, the CRA in their model serves a screening function as the issuers (sellers) have private information about the quality of their assets when they solicit a rating. They focus on the implications of the regulatory benefits that investors derive from favorable ratings for the quality of ratings in a setting where only rating contingent fees are considered. Due to this different focus, Opp et al. (2013) does not address how an up-front fee regime and the timing of the choice of the CRA's rating policy affect the information content of ratings. While the ratings in their model serve a screening function to deny bad issuers any financing, in my model the only rationale for soliciting a rating is that investors are exogenously restricted to buy only securities with favorable ratings. An important similarity between Opp et al. (2013) and this one is the function that the investors' regulatory benefit in their setting and the issuer's liquidity benefit in mine play in the endogenous valuation of a good rating. In both models, these benefits are realized if the rating is good regardless of the accuracy of the rating. I discuss this paper's relationship with Opp et al. (2013) in further detail in Section 3.1.[7]

3. The model

This section presents a single period model with an issuer, a monopolistic CRA and fully rational risk-neutral investors.

The issuer: Consider an issuer who holds a risky loan portfolio whose size is normalized to one. The portfolio can either be of good (G) or bad (B) quality. A good portfolio never defaults and yields a final cash flow $R > 0$, whereas a bad portfolio always defaults and yields 0. The ex ante probability that the portfolio is good is given by λ. The issuer has no private information on the default risk, and all agents, including the issuer, ex ante share the same prior on the default probability of the loan portfolio. The assumption that the loan portfolio (asset) quality is ex ante unknown also to the issuer is quite common in the literature (see Bar-Isaac and Shapiro, 2013; Bolton et al., 2012; Mathis et al., 2009).[8] It can be justified, especially in the context of the "originate to distribute" business model, on the basis that the issuers typically do not invest in the resources to effectively evaluate the quality of the loans they originate and sell. Mathis et al. (2009) also argue that this "symmetric information" assumption fits well for the case of structured products where the CRAs have played an important advisory role in the design of the credit backed assets being sold.

In this environment with no asymmetric information, the issuer seeks credit risk transfer by selling the loan portfolio to investors for liquidity reasons. To quantify the issuer's preference for liquidity, I assume that the issuer incurs a liquidity cost α from holding the loan portfolio until its maturity.[9] This liquidity cost can arise due to the issuer having to liquidate some other assets at a loss in the event of a negative balance sheet shock; or it may refer to the opportunity cost of not being able to pursue another investment opportunity due to lack of liquidity (Parlour and Plantin, 2008). The parameter αintroduces

[7] In other very recent work, Kartasheva and Yilmaz (2013) show that some proposed policy reforms such as rating standardization and expert liability can reduce market efficiency. Manso (2013) describes a model that incorporates the feedback effects of credit ratings on default risk, and shows that even when the CRAs adopt an accurate rating policy, immediate default can occur in response to small shocks to fundamentals. Fulghieri et al. (2012) show how CRAs can issue unsolicited credit ratings to extract higher fees from issuers by credibly threatening to punish those that refuse to acquire a rating.

[8] Two exceptions are Opp et al. (2013) and Kartasheva and Yilmaz (2013) where the issuers know their type when they solicit a rating. In Sangiorgi and Spatt (2013), due to the opacity of the disclosure regime, the issuer has private information about which ratings are purchased.

[9] Sangiorgi and Spatt (2013) also assume that the issuer has an exogenous holding cost for the asset.

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the motivation for loan sale as potential investors who can buy shares in the securitized loan portfolio do not incur the same liquidity cost.

Due to regulatory restrictions, the loan sale is assumed to take place only if the issuer obtains a good rating for the loan portfolio from a CRA. This assumption can be justified by the existing regulatory rules that restrict most institutional investors only to invest in securities with favorable ratings from a nationally recognized statistical rating agency. For example, in the US regulated financial institutions such as pension funds are only allowed to purchase investment grade securities (see White, 2010; Weber and Darbellay, 2008). Similarly, Campbell and Taksler (2003) report that more than half of the corporate bonds are held by institutions that are subject to rating based restriction on their holdings of risky credit assets.

The **CRA:** The issuer can solicit a rating from a monopolistic CRA who can provide either a good rating ($r = g$) or a bad rating ($r = b$). The CRA has access to an information production technology which can generate an information signal $s \in \{g, b\}$ on the type of the loan portfolio. As in Opp et al. (2013) and Bolton et al. (2012), I consider a symmetric signal structure where both signals $s = g$ and $s = b$ have the same information accuracy on loan quality. Formally, I assume

$$\Pr(s = g|G) = \Pr(s = b|B) = z \in \left[\frac{1}{2}, 1\right], \tag{1}$$

where $z \in \left[\frac{1}{2}, 1\right]$ indicates the informativeness of the CRA's signal on loan portfolio quality. The cost to the CRA of adopting a signal technology with accuracy z is given by $c(z) \equiv (\phi z^2/2)$ for $z \in (\frac{1}{2}, 1]$ where $\phi > 0$ is a scale parameter. It is costless to generate a completely uninformative signal, and hence $c(\frac{1}{2}) = 0$.

Other than choosing the accuracy z of its signal, I also allow the CRA to engage in strategic misreporting. To this end, I follow Opp et al. (2013) and assume that the CRA can provide a good rating despite observing a bad signal with a positive probability. Formally, the CRA adopts a disclosure rule $\sigma \in [0, 1]$ where

$$\sigma \equiv \Pr(r = g|s = b) \tag{2}$$

is the probability that the CRA issues a good rating despite observing a bad signal. If the CRA chooses a signal accuracy z and a disclosure rule σ, the ex ante probability that it provides a good rating is given by

$$\Pr(r = g) = [1 - \lambda(1 - \sigma)] + (2\lambda - 1)(1 - \sigma)z. \tag{3}$$

The above expression for $\Pr(r = g)$ indicates that whether a more accurate signal technology increases or decreases the ex ante probability that the CRA provides a good rating depends on the prior probability λ that the loan portfolio is of good quality. In particular, for a given $\sigma < 1$ the probability of a good rating $\Pr(r = g)$ in (3) is decreasing in signal accuracy z for $\lambda < 1/2$, whereas it is increasing in z for $\lambda > 1/2$. For $\lambda = 1/2$, however, $\Pr(r = g)$ is independent of signal accuracy z. Furthermore, when the CRA engages in complete rating inflation by setting $\sigma = 1$, then $\Pr(r = g) = 1$.

Reputational Cost: I assume that the incentives of the CRA to provide accurate ratings stem from reputational considerations described as follows: If the loan portfolio defaults subsequent to a good rating, or if the portfolio succeeds subsequent to a bad rating, the CRA incurs an exogenous monetary loss $\beta > 0$. This cost can be thought as the discounted sum of future profits lost by the CRA if its rating proves to be at odds with the actual performance of the loan portfolio.[10] This formulation aims to capture the idea that the future profits of the CRA depend on providing ratings that prove to be in line with the actual performance of the asset being rated. It can be justified on the basis that in case of default despite a good rating, the regulators and investors are likely to be reluctant to rely on

[10] As Bolton et al. (2012) argue, this lost future business may be more likely in the case of newer financial instruments like structured finance products where demand for the product may dry up.

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the ratings of the CRA due to diminished confidence, whereas if the portfolio succeeds subsequent to a bad rating, those issuers who are unable to sell their assets are likely to reduce the volume of their business with the CRA.[11] Formally, for a given signal accuracy z and disclosure rule σ, the ex ante expected reputational loss $L(\cdot)$ that the CRA suffers is given by

$$L(z,\sigma;\beta) = [\lambda(1-z)(1-\sigma) + (1-\lambda)(1-z)(1-\sigma)]\beta. \tag{4}$$

Up-front versus rating contingent fee: Consistent with the common industry practice, I assume that the CRA operates under the issuer-pays business model and is compensated by the issuer. To address the main question of the paper, I consider two different payment regimes, an up-front fee and a rating contingent fee. In the up-front fee regime, the issuer pays the CRA an up-front fee π_u once the rating is solicited, but before the CRA provides a particular rating. In the rating contingent fee regime, the CRA receives a fee π_g only if the rating is good.

The **Investors:** The loan portfolio is purchased by risk neutral and fully rational investors who correctly value the portfolio according to the final cash flow that they expect it will generate. The investors correctly update their beliefs on the default probability of the underlying portfolio based on the "correct" signal accuracy z and disclosure rule σ that they infer the CRA adopts. Accordingly, for a given z and σ that they infer, the competive and risk neutral investors' valuation of the loan portfolio given by

$$p = \Pr(G|r=g)R \Rightarrow p(z,\sigma) = \frac{\lambda(z+(1-\sigma)z)R}{[1-\lambda(1-\sigma)] + (2\lambda-1)(1-\sigma)z}, \tag{5}$$

which is the expected final cash flow of the loan portfolio conditional on a good rating.

4. Analysis with ex antechoice of z and σ

In this section, I compare the two payment regimes under a setting where the CRA chooses its rating accuracy ex ante at the initial stage when it posts its endogenous fee, but before the issuer formally solicits a rating. The sequence of events is as follows. In Stage 1, depending on the payment regime in place, the CRA posts a rating contingent fee π_g^c for a good rating or an upfront fee π_u^c to be received regardless of the particular rating it provides. The CRA also chooses its signal accuracy z and disclosure rule σ. In Stage 2, the issuer decides whether to solicit a rating or not. If a rating is solicited, the CRA observes a signal and provides a rating. In the up-front fee regime, the issuer pays the CRA π_u^c once the rating is solicited, but before a particular rating is provided. In the rating contingent fee regime, the issuer pays the CRA the fee π_g only if the rating is good. In Stage 3, if the rating is good, the issuer sells the loan portfolio at a price p to investors. If the rating is bad, no loan sale takes place. Finally, in Stage 4, the loan portfolio payoff is realized. If the portfolio defaults subsequent to a good rating or if it succeeds subsequent to a bad rating, the CRA suffers a monetary loss β.

4.1. Rating contingent fee with ex ante choice of z and σ

Consider the rating contingent fee regime. The equilibrium under this regime with ex ante choice of signal accuracy z and disclosure rule σ is such that.

(i) The CRA posts a fee π_g^c for a good rating, and sets a signal accuracy z_g^c and disclosure rule σ_g^c to maximize its ex ante expected payoff

$$\Psi\left(z_g^c, \sigma_g^c, \pi_g^c\right) \equiv \Pr(r=g)\pi_g^c - c(z_g^c) - L(z_g^c, \sigma_g^c; \beta), \tag{E1}$$

[11] The one shot reputational cost from providing a rating that ex post proves to be at odds with the portfolio's actual performance is admittedly a reduced form approach, but as in Bolton et al. (2012), it helps to introduce incentives for providing informative ratings in a simple manner. In the dynamic model of Bar-Isaac and Shapiro (2013), the CRA (who is truthful by assumption) can only commit a one-sided error (identify a bad portfolio as good). Upon committing this error, all future profits of the CRA are lost as investors follow grim-trigger strategies to punish the CRA and no longer rely on its ratings.

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where $\Pr(r=g)$ is given by (5) and $L(z_g^c, \sigma_g^c; \beta)$ is given by (4).

(ii) Given π_g^c and z_g^c, the issuer solicits a rating only if

$$\Pr(r=g)[p-\pi_g^c] + \Pr(r=b)[\Pr(G|r=b)R-\alpha] \geqslant \lambda R - \alpha, \tag{E2}$$

where the loan portfolio price $p = \Pr(G|r=g)R$ as described by (5).

The equilibrium requirement in (E2) is essentially the issuer's participation constraint for soliciting a rating. By using (E2), one can derive the fee π_g^c for a good rating. In equilibrium, the constraint (E2) is binding, the issuer is indifferent between soliciting a rating or not, and (E2) holds as an equality. Substituting the price p from (3) into (E2) and solving for π_g^c yields

$$\pi_g^c = \alpha. \tag{6}$$

Interestingly, the fee contingent on a good rating does not depend at all on the CRA's signal accuracy z and disclosure rule σ. One should also note that the above expression for π_g^c holds regardless of any particular assumptions on the signal technology in (1) or any specific assumptions on $\Pr(r=g)$ in (3). The fee is driven completely by the liquidity cost α the issuer saves by selling the loan portfolio. It should be emphasized that the investors are not fooled in this setting. Although the fee for a good rating does not depend on the informativeness of the rating, the price p in (5) paid by the investors for the loan portfolio does depend on the accuracy of the rating. The investors' and the issuer's valuations of the loan portfolio differ only due to the issuer's liquidity cost α from holding the portfolio, which is completely captured by the fee the monopolistic CRA sets.

The endogenous fee structure in (6) also bears a similarity with the one derived in Opp et al. (2013). In their setting, different than this model the CRA serves a screening service to the issuers (as they have private information on their asset quality). Furthermore, the investors enjoy a regulatory benefit from a favorable rating regardless of the rating's accuracy. This benefit is essentially similar to the issuer's liquidity benefit α above as it is obtained conditional on a good rating regardless of the rating's accuracy.

Remark 1. Given the assumption of no asymmetric information between the issuer and investors ex ante, in this setting the CRA's ratings do not serve a screening function between different loan portfolio types (unlike Opp et al., 2013). In addition, when the loan portfolio is sold to the investors subsequent to a good rating, the issuer and the investors share the same posterior. Therefore, while the quality of the information in the rating does affect the price $p(z,\sigma)$ the investors pay for the loan, the gains from trade is always given by the issuer's liquidity benefit α independent of the rating's accuracy. This feature is similar to the one in the seminal paper by Lizzeri (1999) where the information intermediary does not create any surplus, and information intermediation results in pure transfer of surplus from the seller to the intermediary. The function that a good rating serves in my model is "regulatory compliance" as the investors are restricted by regulation to hold only those assets with a good rating. As such, the only economic rationale for improving rating's accuracy in this model is that it reduces the probability that the CRA incurs a reputational penalty β.[12] Implicit in the CRA's reputational penalty assumption, however, is the idea that the investors and the issuer do care about the CRA providing a rating that is not ex post revealed to be at odds with the loan performance. While the explicit channel why the issuer and investors are better off from more informative ratings is not modeled explicitly, the analysis here takes the conventional view that it is socially desirable that the CRA provides informative ratings.[13]

[12] As pointed out by an anonymous referee, without this reputational penalty a social planner would want the CRA not acquire any information and always report a good rating so that the benefit from trade (α) is realized.

[13] A straightforward way to justify the desirability of informative ratings is to introduce ex ante asymmetric information between the issuer and the investors on the loan portfolio quality as in Opp et al. (2013). The accuracy of the CRA's ratings would also create a surplus if due to possible correlation with the other assets that investors hold, more information on the quality of the loan portfolio in question did facilitate their portfolio adjustment and rebalancing decisions.

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The CRA's optimal signal accuracy and disclosure rule under the rating contingent fee regime can now be analyzed by substituting for $\pi_g^c = \alpha$ in (E1). Using $\Pr(r = g)$ in (3), and the reputational loss $L(z_g^c, \sigma_g^c; \beta)$ in (4), the CRA's expected payoff in (E1) can be rewritten as

$$\Psi\left(z_g^c, \sigma_g^c\right) = [(1 - (1 - \sigma_g^c)\lambda) + (2\lambda - 1)(1 - \sigma_g^c)z_g^c]\alpha - c(z_g^c) - [\lambda(1 - z_g^c)(1 - \sigma_g^c) + (1 - \lambda)(1 - z_g^c(1 - \sigma_g^c))]\beta. \tag{7}$$

The above expression for $\Psi(z_g^c, \sigma_g^c)$ is linear in the disclosure rule σ_g^c. Therefore, in equilibrium either full truthfulness ($\sigma_g^c = 0$) or complete rating inflation ($\sigma_g^c = 1$) obtains. To characterize the equilibrium, it suffices to compare the CRA's expected payoffs under $\sigma_g^c = 0$ and $\sigma_g^c = 1$. First, note that when the CRA chooses complete rating inflation by setting $\sigma_g^c = 1$, it will not acquire any costly information and set the signal accuracy at $z_g^c = 1/2$. The CRA's expected payoff Ψ_{RI} from complete rating inflation ($\sigma_g^c = 1$) can be computed as

$$\Psi_{RI}\left(z_g^c = \frac{1}{2}, \sigma_g^c = 1\right) = \alpha - (1 - \lambda)\beta. \tag{8}$$

On the other hand, if the CRA chooses to be fully truthful by setting $\sigma_g^c = 0$, then it will choose a signal accuracy z_g^c to maximize its expected payoff $\Psi_{TD}(z_g^c, \sigma_g^c = 0)$ under full truthfulness, which is given by

$$\Psi_{TD}\left(z_g^c, \sigma_g^c = 0\right) = [(1 - \lambda) + (2\lambda - 1)z_g^c]\alpha - c(z_g^c) - (1 - z_g^c)\beta. \tag{9}$$

This maximization yields

$$z_g^{*c} = \frac{\beta - (1 - 2\lambda)\alpha}{\phi}. \tag{10}$$

The CRA's choice of signal accuracy z_g^{*c} under full truthfulness illustrates that the CRA's accuracy incentives provided by its reputational cost β is diluted by the rating contingent fee $\pi_g^c = \alpha$ for $\lambda < 1/2$, whereas the incentives are enforced by α for $\lambda > 1/2$. This observation follows from the fact that $\Pr(r = g)$ in (3) is decreasing in signal accuracy z for $\lambda < 1/2$, whereas it is increasing in z for $\lambda > 1/2$. When the probability of a good rating $\Pr(r = g)$ that enables the CRA to secure the fee $\pi_g^c = \alpha$ is decreasing in signal accuracy z, which is the case for $\lambda < 1/2$, the fee α dilutes accuracy incentives, whereas the opposite is true for $\lambda > 1/2$.

To determine whether full truthfulness ($\sigma_g^c = 0$) or complete rating inflation obtains in equilibrium, one needs to compare $\Psi_{RI}(z_g^c = \frac{1}{2}, \sigma_g^c = 1)$ in (8) with $\Psi_{TD}(z_g^{*c}, \sigma_g^c = 0)$. The following result (proved in Appendix A) describes the equilibrium under the rating contingent fee regime with ex ante choice of rating policy z and σ.

Proposition 1. *Suppose the "rating contingent fee" regime is in place and the CRA sets signal accuracy z and disclosure rule σ before the issuer solicits a rating. There is a threshold level of liquidity benefit α^* implicitly described by*

$$[\beta - (1 - 2\lambda)\alpha^*]^2 = 2\phi\lambda(\beta + \alpha^*), \tag{11}$$

where (i) For $\alpha \leqslant \alpha^*$, the CRA is fully truthful ($\sigma_g^{*c} = 0$) and sets its signal accuracy level at $z_g^{*c} = Min[1, (\beta - (1 - 2\lambda)\alpha)/\phi)]$. (ii) For $\alpha > \alpha^*$, the CRA always strategically inflates ratings ($\sigma_g^{*c} = 1$) and observes completely uninformative signals by setting $z_g^{*c} = \frac{1}{2}$.

Remark 2. An immediate observation that follows from Proposition 1 is the case when $\lambda = 1/2$ and hence the probability of a good rating $\Pr(r = g)$ is independent of signal accuracy z. When the CRA sets z and σ before the issuer solicits a rating under the "rating contingent fee" regime, the equilibrium with $\lambda = 1/2$ is such that (i) for $\alpha \leqslant (\beta^2/\phi) - \beta$, the CRA is fully truthful ($\sigma_g^c = 0$), sets accuracy level $z_g^{*c} = Min[1, (\beta/\phi)]$, and (ii) for $\alpha > (\beta^2/\phi) - \beta$, the CRA always inflates ratings ($\sigma_g^c = 1$) and observes completely uninformative signals by setting $z_g^{*c} = 1/2$.

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Remark 3. The characterization of the CRA's rating policy under the rating contingent fee regime in Proposition 1 is somewhat similar to the one in Opp et al. (2013). In their framework, the issuers (borrowers) have private information on the quality of their projects when they solicit a rating, and the CRA's ratings serve to screen borrowers with bad projects from those with good projects. Furthermore, the investors derive a regulatory benefit from a favorable rating independent of the rating's information content, which is reminiscent of the role the liquidity parameter α serves in this paper, as the benefit is captured in this model when the rating is good. Similar to Proposition 1, the CRA in Opp et al. (2013) acquires information and provides truthful ratings as long as the regulatory benefit that investors enjoy from a favorable rating does not exceed an endogenous threshold, and the CRA opts for complete rating inflation when this benefit exceeds this threshold.

4.2. Up-front fee with ex ante choice of z and σ

Consider now the up-front fee regime. In this regime, if the issuer decides to solicit a rating, the fee is paid up-front regardless of whether the rating is good or bad. The equilibrium under the up-front fee regime is such that.

(i) The CRA posts an up-front fee π_u^c, sets a signal accuracy z_u^c and a disclosure rule σ_u^c to maximize its ex ante expected payoff

$$\Phi(z_u^c, \sigma_u^c, \pi_u^c) \equiv \pi_u^c - c(z_u^c) - L(z_u^c, \sigma_u^c; \beta), \tag{E3}$$

where $L(z_u^c, \sigma_u^c; \beta)$ is given by (4).

(ii) Given π_u^c, z_u^c and σ_u^c, the issuer solicits a rating only if

$$\Pr(r = g)p + \Pr(r = b)[\Pr(G|r = b)R - \alpha] - \pi_u^c \geqslant \lambda R - \alpha, \tag{E4}$$

where $p = \Pr(G|r = g)R$.

By using the issuer's participation constraint (E4) to solicit a rating, one can again derive the up-front fee π_u^c. In equilibrium, (E4) is binding. Substituting the price p from (5) into (E4) and solving for π_u^c yields

$$\pi_u^c = \Pr(r = g)\alpha \Rightarrow \pi_u^c = [(1 - \lambda(1 - \sigma)) + (2\lambda - 1)(1 - \sigma)z]\alpha, \tag{12}$$

where the last expression follows from using $\Pr(r = g)$ in (3). Using (11), one can rewrite the CRA's ex ante expected payoff in (E3) as

$$\Phi(z_u^c, \sigma_u^c) = [(1 - \lambda(1 - \sigma)) + (2\lambda - 1)(1 - \sigma)z]\alpha - c(z_u^c) - L(z_u^c, \sigma_u^c; \beta). \tag{13}$$

Note that the above objective function in (13) is identical to the one in (7) that the CRA maximizes under the "rating contingent fee" regime. Therefore, we have the following result.

Proposition 2. *The "rating contingent fee" and the "upfront fee" regimes yield the same equilibrium signal accuracy z and disclosure rule σ when the CRA sets z and σ ex ante before the issuer solicits a rating.*

The above irrelevance result holds regardless of whether $\Pr(r = g)$ is increasing or decreasing in signal accuracy z. The intuition for the result is as follows. In this model, the issuer's incentives to sell the loan arise solely due to the liquidity consideration captured by α. In particular, for a given rating policy (z, σ) the ex ante expected surplus from soliciting a rating is equal to $\Pr(r = g)\alpha$ as the liquidity benefit α accrues to the issuer only if the rating is good. In the rating contingent fee regime, the CRA extracts all this ex ante surplus by setting $\pi_g^c = \alpha$ which yields an expected fee $\Pr(r = g)\alpha$, whereas in the upfront fee regime, the surplus is extracted completely by setting a flat fee $\pi_u^c = \Pr(r = g)\alpha$. When the CRA can initially set both its fee and rating policy at the same time, whether the fee is upfront or rating contingent becomes irrelevant, as the ex ante expected issuer surplus to be extracted is identical in both regimes.

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5. Analysis with ex post choice of z and σ

5.1. Rating contingent fee with ex post choice of z and σ

In this regime, the CRA initially only sets its fee π_g^{nc} for a good rating, and chooses its signal accuracy z_g^{nc} and disclosure rule σ_g^{nc} only after the issuer solicits a rating. Once a rating is solicited, the CRA chooses z_g^{nc} and σ_g^{nc} to maximize

$$\Phi\left(z_g^{nc}, \sigma_g^{nc}\right) = \Pr(r = g)\pi_g^{nc} - c(z_g^{nc}) - L\left(z_g^{nc}, \sigma_g^{nc}; \beta\right), \tag{14}$$

where $\Pr(r = g)$ is given by (3) and $L\left(z_g^{nc}, \sigma_g^{nc}; \beta\right)$ is given by (4). Since the above expression for $\Phi(\cdot)$ is linear in the disclosure rule σ_g^{nc}, in equilibrium again either full truthfulness ($\sigma_g^{nc} = 0$) or complete rating inflation ($\sigma_g^{nc} = 1$) can obtain. The following result (the proof of which is similar to Proposition 1 and hence omitted) establishes that the "rating contingent fee" regime yields the same equilibrium rating policy under both ex ante and ex post choice scenarios.

Proposition 3. *The "rating contingent fee" regime delivers the same equilibrium choice of signal accuracy z and disclosure rule σ regardless of whether these choices are undertaken before or after a rating is solicited.*

5.2. Up-front fee with ex post choice of z and σ

In this regime, the CRA initially only sets an upfront fee π_u^{nc}, and chooses signal accuracy z_u^{nc} and disclosure rule σ_u^{nc} after the issuer solicits a rating. First, let us describe the CRA's optimal policy $(z_u^{*nc}, \sigma_u^{*nc})$ in Stage 2 once the issuer solicits a rating. The CRA chooses z_u^{nc} and σ_u^{nc} to maximize

$$\Phi\left(z_u^{nc}, \sigma_u^{nc}\right) = \pi_u^{nc} - c(z_u^{nc}) - L\left(z_g^{nc}, \sigma_g^{nc}; \beta\right), \tag{15}$$

which, after using (4) for $L\left(z_g^{nc}, \sigma_g^{nc}; \beta\right)$, takes the form

$$\Phi\left(z_u^{nc}, \sigma_u^{nc}\right) = \pi_u^{nc} - c(z_u^{nc}) - [\lambda(1 - z_u^{nc})(1 - \sigma_u^{nc}) + (1 - \lambda)(1 - (1 - \sigma_u^{nc})z_u^{nc})]\beta.$$

In the above expression, note that the fee π_u^{nc} is already paid. Since the CRA's expected payoff $\Phi(\cdot)$ in (15) is linear in σ_u^{nc}, it again suffices to compare the CRA's payoff from full truthfulness ($\sigma_u^{nc} = 0$) and complete rating inflation ($\sigma_u^{nc} = 1$). If the CRA adopts full rating inflation ($\sigma_u^{nc} = 1$), it does not acquire any costly information and sets $z_u^{nc} = \frac{1}{2}$. Therefore, we have

$$\Phi_{RI}\left(z_u^{nc} = \frac{1}{2}, \sigma_u^{nc} = 1\right) = \pi_u^{nc} - (1 - \lambda)\beta. \tag{16}$$

The intuition for Φ_{RI} is that with complete rating inflation, the only cost for the CRA is the expected reputational cost. Since no information is produced and the CRA always issues a good rating, the prior probability of the loan being bad quality remains unchanged at $(1 - \lambda)$,and hence the expected reputational cost is given by $(1 - \lambda)\beta$.

Under fully truthful disclosure rule ($\sigma_u^{nc} = 0$) the CRA chooses signal accuracy z_u^{nc} to maximize

$$\Phi\left(z_u^{nc}, \sigma_u^{nc} = 0\right) = \pi_u^{nc} - c(z_u^{nc}) - (1 - z_u^{nc})\beta,$$

which yields $z_u^{nc} = \beta/\phi$. Therefore, the CRA's expected payoff Φ_{TD} under the fully truthful disclusure rule ($\sigma_u^{nc} = 0$) is given by

$$\Phi_{TD}\left(z_u^{nc} = \frac{\beta}{\phi}, \sigma_u^{nc} = 0\right) = \pi_u^{nc} + \frac{\beta^2}{2\phi} - \beta. \tag{17}$$

A comparison of Φ_{TD} in (17) and Φ_{RI} in (15) gives the following result.

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Proposition 4. *Suppose the "upfront fee" regime is in place and the CRA sets z and σ after the rating is solicited. (i) For $\beta \geqslant 2\phi\lambda$, the CRA is fully truthful ($\sigma_u^{*nc} = 0$) and sets a signal accuracy $z_u^{*nc} = Min(1, \beta/\phi)$. (ii) For $\beta < 2\phi\lambda$, the CRA always inflates ratings ($\sigma_u^{*nc} = 0$) and observes a completely uninformative signal ($z_u^{*nc} = 1/2$).*

The crucial difference of the CRA's rating policy under the "up-front fee regime with ex-post policy choice" described above is that the liquidity parameter α and the probability of a good rating $\Pr(r = g)$ that together determine the CRA's fee π_u^{nc} no longer affect the CRA's rating policy. In particular, the CRA's trade-off when choosing z and σ is between minimizing the expected reputational loss $L(z_g^{nc}, \sigma_g^{nc}; \beta)$ by increasing the information content of the rating versus the cost of doing so captured by $c(z_u^{nc})$. As a result, the rating policy in this case is independent from α: it involves information acquisition an truthful disclosure if reputational cost satisfies $\beta \geqslant 2\phi\lambda$, and complete rating inflation/no information acquisition otherwise.

Recall from Proposition 1 that when the liquidity parameter α is sufficiently high, the CRA provides uninformative ratings. Therefore, by removing the role that α plays in determing the rating policy, the "up-front fee regime with ex-post policy choice" can improve the informativeness of ratings. The following Corollary (which follows from Propositions 1 and 4) provides a comparison of the informativeness of ratings in the "up-front fee regime with ex post choice of (z, σ)" versus the rating contingent fee regime. For simplicity of exposition and to preclude any biases stemming from the signal technology specification, the Corollary is stated for the case when $\lambda = 1/2$, and hence the probability of a good rating $\Pr(r = g)$ is independent of the CRA's signal accuracy z.

Corollary 1. *Suppose $\lambda = 1/2$. The "upfront fee" regime with ex-post choice of rating policy (z, σ) improves the informativeness of ratings over the "rating contingent fee regime" if $\beta \geqslant \phi$ and $\alpha > (\beta^2/\phi) - \beta$. Otherwise, the informativeness of ratings is identical across regimes.*

The above comparison establishes that, if the CRA initially posts only its fee and chooses its rating policy (z, σ) only after the issuer solicits a rating, then the up-front fee regime can introduce an improvement in rating quality compared to the rating contingent fee. In particular, while the CRA engages in complete rating inflation and provides uninformative ratings under the rating contingent fee when the issuer's liquidity benefit exceeds a certain endogenous threshold, for the same parameter configuration the CRA truthfully provides informative ratings when restricted to choose its rating policy ex post under the up-front fee regime.

Given Corollary 1 and the previous observation that the up-front fee regime with ex ante choice of rating policy (z, σ) does not improve rating's informativeness over rating contingent fee regime (Proposition 2), an important question is, when restricted to an up-front fee regime, whether the CRA prefers to set its rating policy (z, σ) ex ante before a rating is solicited, or prefers to set it ex post only after the issuer solicits a rating. Our final result (see Appendix A for a proof) shows that when the "upfront fee" regime with ex-post choice of rating policy (z, σ) can improve informativeness of ratings, the CRA always prefers to set its rating policy (z, σ) ex ante.

Proposition 5. *Suppose $\lambda = 1/2$, and consider the case with $\beta \geqslant \phi$and $\alpha > (\beta^2/\phi) - \beta$, hence the "upfront fee" regime with ex-post choice of (z, σ) improves the informativeness of ratings. When restricted to offer an "upfront fee", the CRA always prefers to set its rating policy (z, σ) ex ante before a rating is solicited, rather than setting it ex post after the issuer solicits a rating.*

This last result illustrates that, for the upfront fee regime to achieve an improvement in rating quality, there should be a policy intervention that prevents the CRA from setting its rating policy ex ante before the issuer solicits a rating. An implication that follows is that the policy reform attempts should pay a particular attention to deny the CRAs the possibility of "marketing their rating criteria" as part of the initial negotiations with the issuers. The CRAs should not be allowed to discuss the details of their evaluation criteria and the specifics of their rating model with the issuers before a rating is formally solicited. Interestingly, this point has been addressed precisely along those lines in the so-called "Franken Amendment" which was removed from the Dodd-Frank Act of 2010 in the last minute as discussed in Section 1.

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6. Conclusion

This paper theoretically investigates whether an up-front fee paid to the CRA by the issuer once the rating is solicited but before any actual rating takes place achieves an improvement in the rating quality compared to a rating contingent fee. I find that if the CRA sets its rating policy ex ante before the issuer solicits a rating, then the rating contingent fee regime and the up-front fee regime deliver the same rating quality. However, if the CRA posts only its fee initially, and chooses its rating policy only after the issuer solicits a rating, then the up-front fee regime can potentially improve rating quality compared to the rating contingent fee regime. Furthermore, for the upfront fee regime to achieve an improvement in rating quality, there should be a policy intervention that prevents the CRA from setting its rating policy ex ante before the issuer solicits a rating. These results suggests that preventing the CRAs from "marketing their rating policy standards" before a rating is solicited, as proposed by the "Franken Amendment" to the Dodd-Frank Act of 2010, can prove crucial for the proposed upfront fee regime to improve rating quality.

Appendix A

Proof of Proposition 1. Using (10), one can rewrite (9) as

$$\Psi^{*}_{TD}(z^{*c}_{g}, \sigma^{c}_{g} = 0) = (1-\lambda)\alpha + \frac{[\beta - (1-2\lambda)\alpha]^2}{2\phi} - \beta. \tag{A1}$$

Comparing $\Psi^{*}_{TD}(z^{*c}_{g}, \sigma^{c}_{g} = 0)$ in (A1) with (8) yields the result. □

Proof of Proposition 5. When $\alpha > (\beta^2/\phi) - \beta$, under the up-front fee regime with ex-ante choice of rating policy (z, σ), the CRA always inflates ratings $(\sigma^{c}_{u} = 1^{*})$ and sets $z^{*c}_{u} = 1/2$. Therefore, for $\alpha > (\beta^2/\phi) - \beta$and $\lambda = 1/2$, the CRA's expected payoff is given by

$$\Phi^{c}_{RI}\left(z^{*c}_{u} = \frac{1}{2}, \sigma^{c}_{u} = 1^{*}\right) = \alpha - \frac{\beta}{2}. \tag{A2}$$

Consider now the up-front fee regime with ex-post choice of rating policy (z, σ). For $\beta \geqslant \phi$, the CRA's expected payoff from this policy is given by

$$\Phi^{nc}_{TD}(z^{*nc}_{u} = 1, \sigma^{*nc}_{u} = 0) = \frac{\alpha}{2} + \frac{\beta^2}{2\phi} - \beta. \tag{A3}$$

Straightforward comparison of (18) and (19) for $\alpha > (\beta^2/\phi) - \beta$ establishes the result. □

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