

Ratings Shopping and Asset Complexity: A Theory of Ratings Inflation

Vasiliki Skreta and Laura Veldkamp

New York University, Stern School of Business

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Why were credit derivative ratings upward biased?

- Answer #1: Selection bias

“The banks pay only if [the ratings agency] delivers the desired rating. . . . If Moody’s and a client bank don’t see eye-to-eye, the bank can either tweak the numbers or try its luck with a competitor like S&P, a process known as *ratings shopping*.”

Tom McGuire, Former chief of Moody’s

- But this system has existed since early '70s. Why was bias not apparent earlier?

Why were credit derivative ratings upward biased?

- Answer #2: Asset Complexity

“The complexity of a typical securitization is far above that of traditional bonds. It is above the level at which the creation of the methodology can rely solely on mathematical manipulations. Despite the outward simplicity of credit ratings, the inherent complexity of credit risk in many securitizations means that reasonable professionals starting with the same facts can reasonably reach different conclusions.”

Mark Adelson, Director of structured finance research, Nomura Securities.

- But errors alone do not produce bias.

Why were credit derivative ratings upward biased?

- Our answer: An interaction effect.
- Ratings shopping only became optimal once ratings agencies issued sufficiently different ratings.
 - Asset complexity + ability to shop for ratings → ratings bias
- Issuers who shop for ratings, prefer more complex assets, to broaden the menu of ratings they can choose from.

complexity → rating-shopping
←

- Investors did not observe the increase in asset complexity. If they had, asset prices would not have risen.

Goals of this Paper

- Goal 1: Identify a plausible trigger for recent ratings inflation
 - what features of the credit rating industry contribute to biased disclosed ratings?
 - is it possible to get bias even if ratings agencies issue unbiased ratings?
- Goal 2: Evaluate policy proposals to resolve bias
- What we don't do: Prove that bias existed.

Overview

- A model of issuer-initiated ratings
 - Asset issuer auctions off his assets to investors in a menu auction
 - Ratings agencies are technologies for producing unbiased signals about an asset's payoff.
 - Before the auction, the issuer chooses how many (shadow) ratings to observe privately and which ones to make public.
- What happens when asset complexity (noise in ratings) rises?
 - Ratings bias emerges.
- Policy implications

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- 1 risky asset with payoff $u \sim N(\bar{u}, \sigma_u^2)$.
- 1 riskless asset with return r and elastic supply.

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- A continuum of **investors** has objective: $U = -e^{-\rho W}$
and budget constraint: $W = rm_i^0 + (u - pr)q$.

A Uniform Price Auction

- **Supply:** The supply x of the asset is exogenous.
- **Demand:** Each investor submits a bidding function $b(q, \text{info})$.
 - It specifies the maximum amount that the bidder is willing to pay for q units as a function of his information.
- **Market-clearing price** The auctioneer specifies a price p per share that equates aggregate demand and supply $\int_i q_i di = x$.

Equilibrium

- Stage 1 The issuer decides whether to obtain a first rating, and then whether to obtain a second.
- Stage 2 Given realized ratings, the issuer decides which ratings investors will observe. The issuer's choices maximize $E[\text{II}]$.
- Stage 3 Investors submit bid functions to maximize $E[U]$:

$$b(q, \text{info}) = \frac{E[u|\text{info}] - q\rho V[u|\text{info}]}{r}.$$

The auction determines the market-clearing price:

$$p = \frac{1}{r}(E[u|\text{info}] - \rho V[u|\text{info}]x).$$

Assumption: Investors do not correct for ratings selection bias. For every announced rating, they believe $\theta \sim N(u, \sigma_\theta^2)$. For unrated assets, they believe that $u \sim N(\bar{u}, \sigma_u^2)$.

Asset Prices

- With zero ratings,

$$p_0 = \frac{1}{r}(\bar{u} - \rho\sigma_u^2x).$$

- With one rating, $\bar{\theta}$,

$$p_1(\bar{\theta}) = \frac{1}{r} \left(\frac{\sigma_u^{-2}\bar{u} + \sigma_{\theta}^{-2}\bar{\theta} - \rho x}{\sigma_u^{-2} + \sigma_{\theta}^{-2}} \right).$$

- With two ratings, $\bar{\theta}$ and $\underline{\theta}$,

$$p_2(\bar{\theta}, \underline{\theta}) = \frac{1}{r} \frac{\sigma_u^{-2}\bar{u} + \sigma_{\theta}^{-2}(\bar{\theta} + \underline{\theta}) - \rho x}{\sigma_u^{-2} + 2\sigma_{\theta}^{-2}}.$$

- Disclosure increases the asset price by reducing risk. It decreases the price because worse signals reduce the expected payoff.

The Disclosure Decision

Given 2 observed ratings: $\bar{\theta} > \underline{\theta}$

- Net profit from disclosing 1 vs. 0 ($\Pi_{D=1}(\bar{\theta}) - \Pi_{D=0}$)

$$p_{1x} - p_{0x} - \chi = \frac{x\bar{\theta} - \bar{u} + \rho x \sigma_u^2}{r \frac{1 + \sigma_u^{-2} \sigma_\theta^2}{\sigma_\theta^2}} - \chi$$

- = 0 at $\bar{\theta} = a$.
- Monotonicity in $\bar{\theta} \rightarrow$ disclose if $\bar{\theta} \geq a$.
- Disclosing 2 vs. 1 ($\Pi_{D=2}(\bar{\theta}, \underline{\theta}) - \Pi_{D=1}(\bar{\theta})$)

$$p_{2x} - p_{1x} - \chi = \frac{x}{r} \frac{(\sigma_\theta^{-2} \sigma_u^{-2} (\underline{\theta} - \bar{u}) + \sigma_\theta^{-4} (\underline{\theta} - \bar{\theta}) + \rho x \sigma_\theta^{-2})}{(\sigma_u^{-2} + 2\sigma_\theta^{-2}) (\sigma_u^{-2} + \sigma_\theta^{-2})} - \chi$$

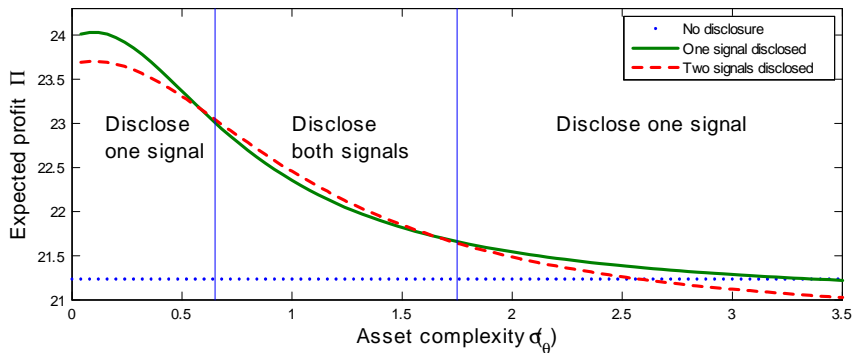
- = 0 at $\underline{\theta} = b(\bar{\theta})$.
- Monotonicity in $\underline{\theta} \rightarrow$ disclose if $\underline{\theta} \geq b(\bar{\theta})$.
- Disclose one of two ratings (shop) when $\bar{\theta} - \underline{\theta}$ is large.

Asset Complexity and Disclosure

A numerical example

Definition

A more complex asset has more noise in its ratings (higher σ_θ^2).



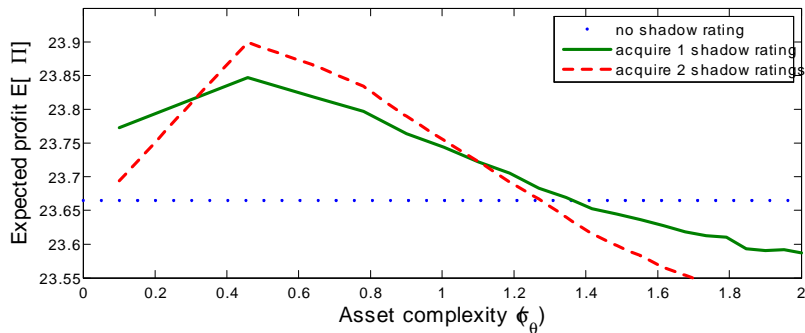
The Decision to Observe Shadow Ratings

- Start with the decision to acquire a second rating, conditional on the first. Then work backwards.
- The decision to observe a first rating considers four cases: The issuer discloses
 - ① both ratings
 - ② only the first rating
 - ③ only the second rating
 - ④ no ratings

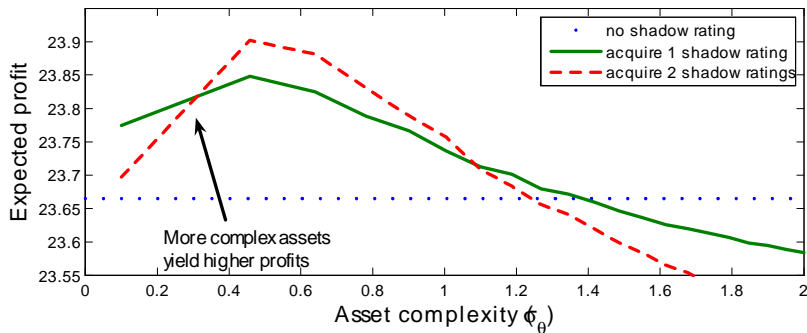
We compute expected profit in each case, conditional on the signals being in the range that would lead to each decision. Then, weight each expected profit by the probability of that outcome.

- Decisions are non-monotonic in asset complexity.

Asset Complexity and Shadow Ratings

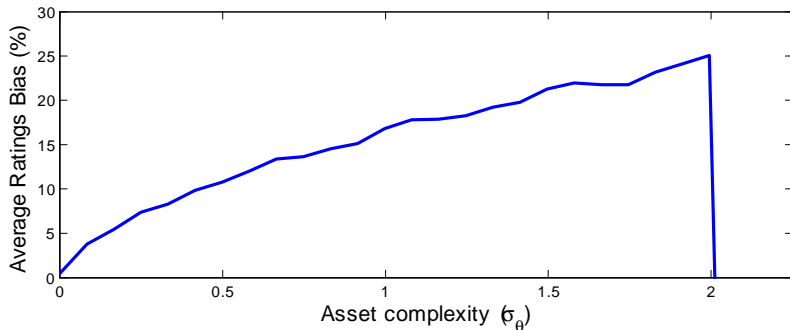


Asset Complexity and Shadow Ratings



Asset Complexity and Bias

The combined effect of the observation and disclosure decisions on the average disclosed rating:



Evaluating Proposed Reforms

- **Increasing competition:** If ratings shopping is the source of the problem, more competition only produces more bias.
- **Investor-initiated ratings:** Investors might not be willing to pay for information in situations where the issuer would. Quantity/quality trade-off.
- **Mandatory disclosure** is difficult to enforce. If an asset is given a bad rating, tinker with its structure so that it is no longer technically the same asset. Then, re-rate. Hides the first rating.
- **Key question:** Are investors now more savvy? If they have learned to correct for shopping, the only equilibrium is full disclosure. No policy change is needed.

Contributions

- Build a model of ratings disclosure with endogenous asset price.
- Main ideas:
 - The rise in asset complexity could trigger ratings shopping
 - Ratings shopping encourages issuers to structure more complex assets
 - Bias resulted despite each rating agency issuing unbiased ratings
- More general issues: Many certification services, e.g. academic testing, appraisals
 - What market structures create incentives to collect and reveal information?
 - How might the nature of the evaluated products change to game the ratings system?