Securitization has been an important driver of economic activity.

- Substantial growth in numerous asset classes: mortgages, student loans, commercial loans, credit card debt
- Facilitated by credit rating agencies (CRAs)
- Inherent trade-off: incentives to originate vs efficient allocation of cash flow rights

Evidence of incentive problems and information asymmetries in origination, securitization, and rating practices:

- Pagano and Volpin (2010), Benmelech and Dlugosz (2010), Ashcraft et al. (2011), Griffin and Tang (2011, 13), Kraft (2015),
- Begley and Purnanandam (2017), Adelino et al. (2018)
Motivation

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The securitization process has come under intense scrutiny since the financial crisis...

- Policies implemented in attempt to discipline market participants

For example, Dodd-Frank imposed:

- Mandatory skin in the game for securitizers.
  - To “align the interests of the securitizer with investors”
- Information disclosure requirements on CRAs.
  - To ensure they “perform their functions as market gatekeepers”

Clearly, there are interactions between the information content of ratings and banks’ decisions of which loans to originate and securitize.

- Yet, surprisingly little academic research on the topic.
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In This Paper

We propose a model of origination and securitization with both private and public information (e.g., ratings) to study these interactions.

Main Results

1. The presence of informative ratings:
   - Increases allocative efficiency, but reduces lending standards (in contrast to regulators' view of CRAs)
   - Rationalizes an originate-to-distribute (OTD) environment with no retention and an oversupply of credit

2. As banks’ screening becomes more precise, lending standards fall
   - In the limit, some bad loans are deliberately originated.

3. Policy effects sensitive to characteristics of market equilibrium.
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Primary Question: How does the accuracy of ratings effect the origination decision of banks?
Preview of Findings

![Graph showing the relationship between Lending Standard and Quantity of Loans]

- Loan Quality decreases as the quantity of loans increases.
- Lending Standard increases as the quantity of loans decreases.

The graph illustrates the inverse relationship between lending standards and loan quality, indicating that as the quantity of loans increases, the quality decreases, and vice versa.
Preview of Findings

![Graph showing the relationship between Loan Quality and Quantity of Loans. The graph illustrates that as the quantity of loans increases, loan quality decreases, with a point labeled Full Information indicating a trade-off.](image)
Preview of Findings

![Graph showing the relationship between loan quality and lending standard, with a downward sloping curve representing securitization with private information and a point labeled 'Full Information' indicating the highest quantity of loans with full information.](image)
Preview of Findings

Loan Quality

Securitization with Private Information

More informative ratings

Full Information

Originate to Distribute

Quantity of Loans

Lending Standard
Preview of Findings

- Quantity of Loans
- Loan Quality
- Lending Standard
- Securitization with Private Information
- More informative ratings
- Full Information
- Originate to Distribute

Diagram with axes:
- Quantity of Loans
- Loan Quality
- Lending Standard
Related Literature

Securitization with ex-ante effort


Signaling with ratings

- Feltovich et al (2005), Daley and Green (2014)

Credit ratings


Security design with asymmetric information

Setup

• Players
  ▶ Continuum of banks
  ▶ Competitive investors

• Banks makes decisions over two stages:
  1. Origination stage
     • Which loans to originate?
  2. Securitization stage
     • What portion of loans to securitize?

• Banks are good at screening loans, investors are the efficient owners of the cash flow risk.
  ▶ Both risk neutral, but banks discount $t = 2$ at $\delta < 1$
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Origination stage

Each bank has access to a loan pool that requires one unit of capital.

- Loan pools can be
  - Good and pay $v_g > 1$ at $t = 2$, or
  - Bad and pay $v_b < 1$ in $t = 2$.

- Banks have a screening technology that allows them to observe a private signal $s$ about their pool quality, where

$$p = \Pr(\text{pool} = \text{Good}|s)$$

and they originate a loan pool if doing so is profitable.
If a bank originates the pool, it subsequently observes $t$ and can design and sell a security backed by its cash flows.

- We restrict the security design to equity (more on this later...).
- Banks choose the fraction $1 - x$ of cash flows to sell to investors.
- Investors observe $x$ as well as a rating ($R$) about the quality of each loan pool.
  - Example: $R \in \{0, 1\}$ with
    \[
    \gamma = Pr(R = 1|G) = Pr(R = 0|B),
    \]
    where $\gamma$ measures rating accuracy.
1. **Securitization stage.** Taking investors’ beliefs as given, a bank with $t$-pool chooses how much to retain, $x$, to maximize its expected payoff, $u_t$.
   - Signaling game—use D1 to refine off-path beliefs.

2. **Origination stage.** Expected payoff from originating a loan pool with quality $p$ is:
   \[ pu_q + (1 - p)u_b - 1. \]
   All loan pools with $p \geq p^*$ are originated, where $p^*$ is the lending standard.

3. **Belief consistency.** Investors’ beliefs are
   \[ \mu_0 = P(t = good) = E[p|p \geq p^*]. \]
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Equilibrium

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Benchmarks

1. First-Best (or full information)
   ▶ All cash flows sold to investors since $\delta < 1$, thus
     \[ u_b = v_b, \quad \text{and} \quad u_g = v_g \]
   ▶ All positive NPV loans are originated:
     \[
p^F B v_g + (1 - p^F B)v_b - 1 = 0 \implies p^F B = \frac{1 - v_b}{v_g - v_b}
     \]

2. No Ratings (private information, no public information)
   ▶ Banks with $g$-pools perfectly signal quality through retention, thus
     \[ u_b = v_b, \quad \text{and} \quad u_g < v_g \]
   ▶ There is an undersupply of credit relative to first-best, lending standards are too strict: $p^{NR} > p^F B$. 

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Equilibrium of Securitization Stage

Without ratings:

- Equilibrium is separating, independent of investors' beliefs

Result

With sufficiently accurate ratings, the equilibrium of the securitization stage involves some degree of pooling:

- For $\mu_0 < \tilde{\mu}$, it involves partial pooling at some $\tilde{x} \in (0, \bar{x})$
- For $\mu_0 > \tilde{\mu}$, it involves full pooling at $x = 0$

Intuition:

- With ratings, $g$-banks need not signal as vigorously
- Public information crowds out banks' investment in signaling private information
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To understand the implications for loan origination...

- Note that payoffs in the securitization stage depend on investors belief about average quality of loans originated.
  - Denote it by $u_t(\mu_0)$

- Taking $\mu_0$ as given, the optimal lending standard must satisfy:
  \[
p^* \in \max \left\{ \frac{1 - u_b(\mu_0)}{u_g(\mu_0) - u_b(\mu_0)}, \frac{\psi(\mu_0)}{0} \right\}
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$$\Psi(\mu_0)$$
Lending Standards as a function of beliefs

No-Ratings Benchmark: $p^{NR}$

With Ratings: $\Psi$

First-Best Benchmark: $p^{FB}$

Lending Standard

Investor Belief, $\mu_0$

Partial Pooling

Full Pooling

0

$\tilde{\mu}$

$\bar{\mu}$

1
In equilibrium, investors’ belief must be consistent with the banks lending standard, which must be optimal given investors’ belief...

That is, if \((p^*, \mu_0^*)\) is part of an equilibrium, then

- \(p^* \in \Psi(\mu_0^*)\), and
- \(\mu_0^* = A(p^*) \equiv E[p|p \geq p^*]\)

**Graphically:** the intersection of \(\Psi\) and \(A^{-1}\)

**Result:** There is a unique equilibrium with ratings. It may involve more or less credit being supplied than the socially efficient level.
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**Result**

*There is a unique equilibrium with ratings. It may involve more or less credit being supplied than the socially efficient level.*
Signaling Equilibrium

Undersupply of Credit

No-Ratings Benchmark: $p^{NR}$

With Ratings: $\Psi$

First-Best Benchmark: $p^{FB}$

Lending Standard

Investor Belief
OTD Equilibrium

Oversupply of Credit

No-Ratings Benchmark: $p^{NR}$

With Ratings: $\Psi$

First-Best Benchmark: $p^{FB}$

Lending Standard

$p^*$

$\xi$

$\mu^*$

$\bar{\mu}$

Investor Belief

$A^{-1}$
When are lending standards too lax?

Result

The equilibrium lending standard is below first best if and only if

\[ \tilde{\mu} < A(p^{FB}) \]

Fixing payoff parameters (e.g., \( v_t, \delta \)):

1. \( \tilde{\mu} \) is determined by the rating technology
   - Decreases with rating accuracy

2. \( A(p^{FB}) \) is determined by screening technology
   - Increases with screening effectiveness

Takeaway: Oversupply more likely to obtain when either public or private information is more informative.
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Determinants of Credit Supply

Rating Accuracy

Diagram showing the relationship between investor belief and lending standards with and without ratings. The graph illustrates how more informative ratings affect the supply of credit through changes in the investor belief parameter, $\mu_0$. The transition from $p^{NR}$ to $p^*$ as $\gamma$ increases, highlighting the impact on lending standards.
Determinants of Credit Supply

Rating Accuracy

![Graph showing the determinants of credit supply with different ratings and investor beliefs.](image-url)
Determinants of Credit Supply

Rating Accuracy

![Graph showing the relationship between rating accuracy and various factors.]
Determinants of Credit Supply
Screening Technology

![Graph showing the relationship between investor belief (μ₀) and lending standard with and without ratings, comparing No-Ratings Benchmark (p^{NR}) and First-Best Benchmark (p^{FB}). The graph illustrates how less effective screening (↑σ) and more effective screening (↓σ) impact the lending standards.](image-url)
Determinants of Credit Supply

Screening Technology vs Rating Informativeness

![Graph showing the relationship between Screening Effectiveness and Rating Accuracy. The graph illustrates the trade-off between lending standards and rating accuracy. The curve indicates that as rating accuracy increases, screening effectiveness decreases, and vice versa. The graph highlights the points where lending standards are above or below the first best standard.]
What else do we do?

1. Policy Analysis
   - Skin-in-the-game requirements
   - CRA disclosure requirements
   - Relaxing liquidity needs of banks

2. Rating Shopping/Manipulation/Gaming
   - Rating accuracy endogenously determined
   - Similar effect to a reduction in $\gamma$ (with fully rational investors)

3. Optimal Security Design
   - DGV (2016): public information influences optimal security design
   - But the main results of this paper are robust
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Conclusion

We study the interactions between private and public information on securitization and origination:

- More accurate ratings reduce costly retention and generally improves welfare, but can lead to inefficiently low lending standards and an oversupply of credit.

- Oversupply is also more likely to obtain when ratings are more informative or banks screening technology is more effective.

- Can rationalize the observed trend from originate-to-hold to originate-to-distribute loans.