Securitization, Ratings, and Credit Supply

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Motivation

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:

- Mian and Sufi (2009), Keys et al (2010), Dell'Ariccia et al (2012)
- 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

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.

In This Paper

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

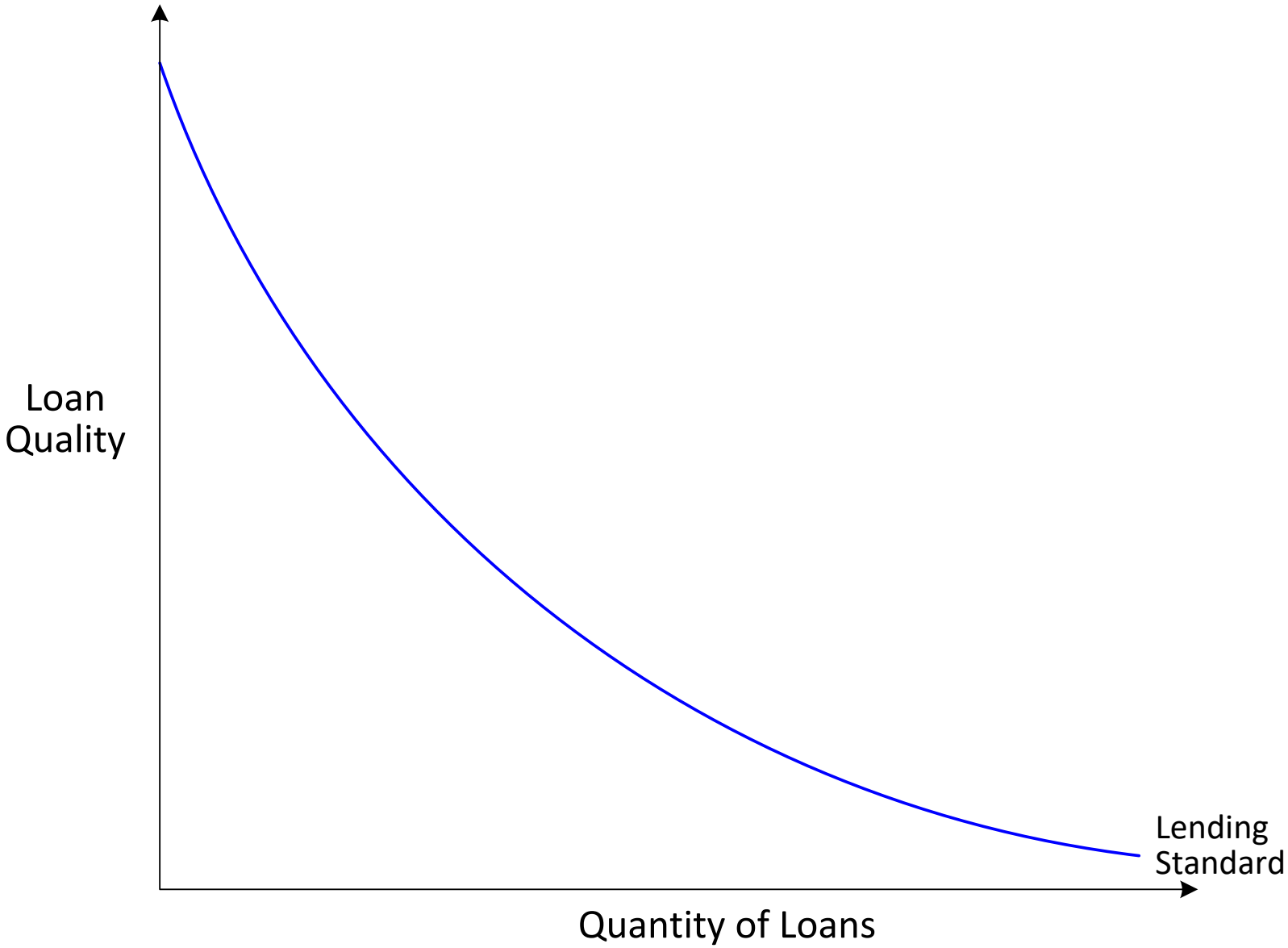
Main Results

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.

Preview of Findings

Primary Question: How does the accuracy of ratings effect the origination decision of banks?

Preview of Findings



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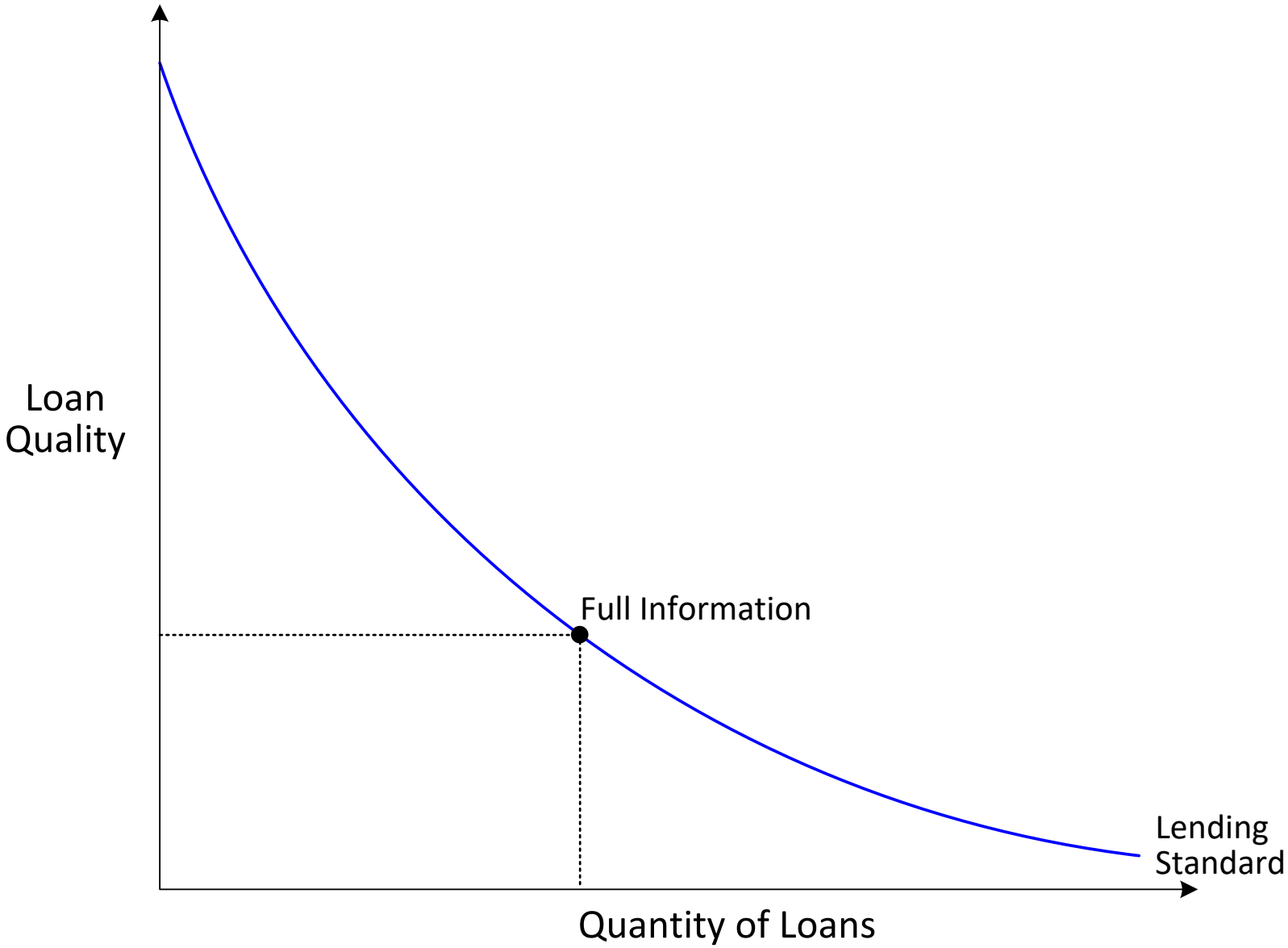

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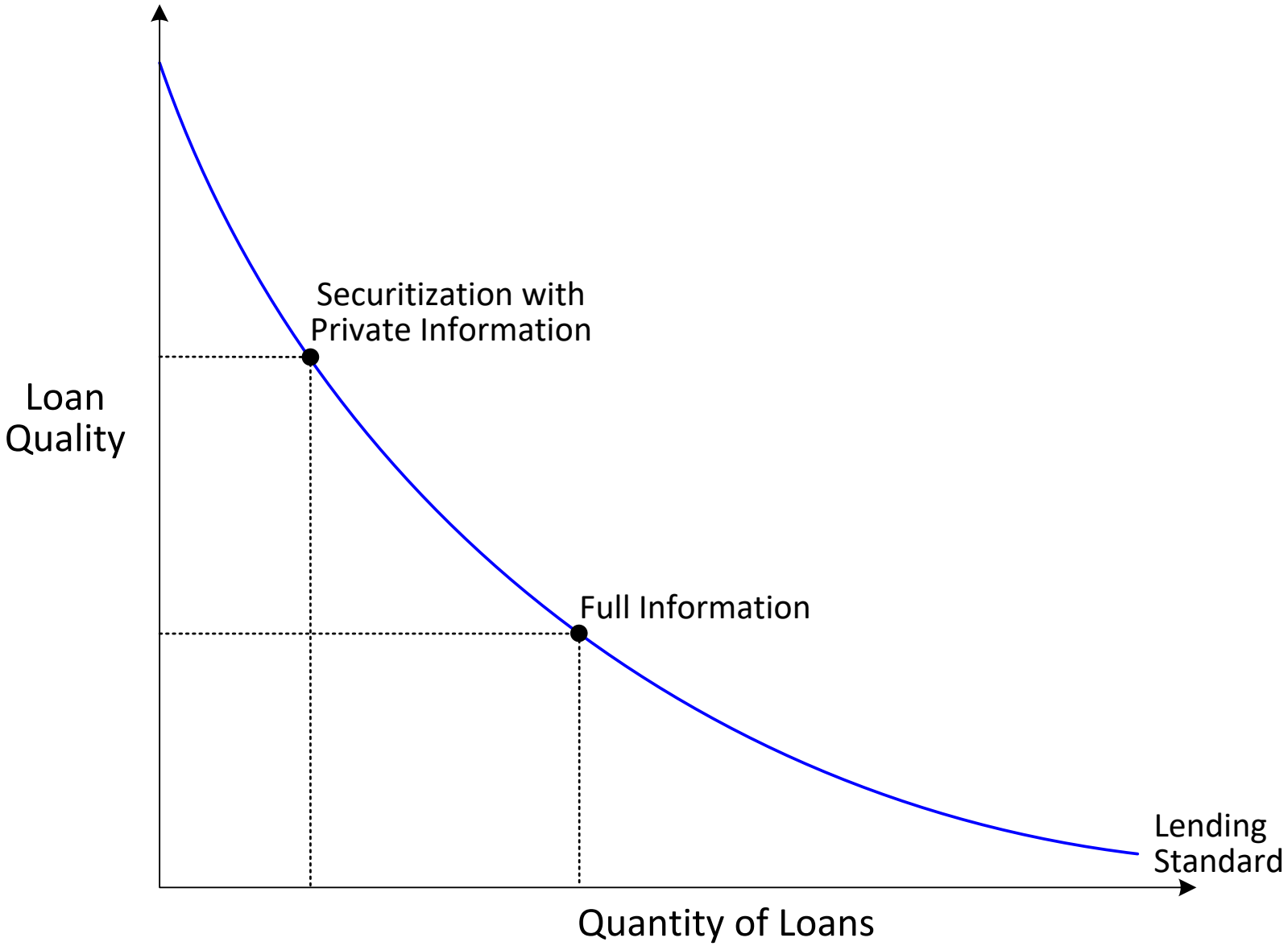

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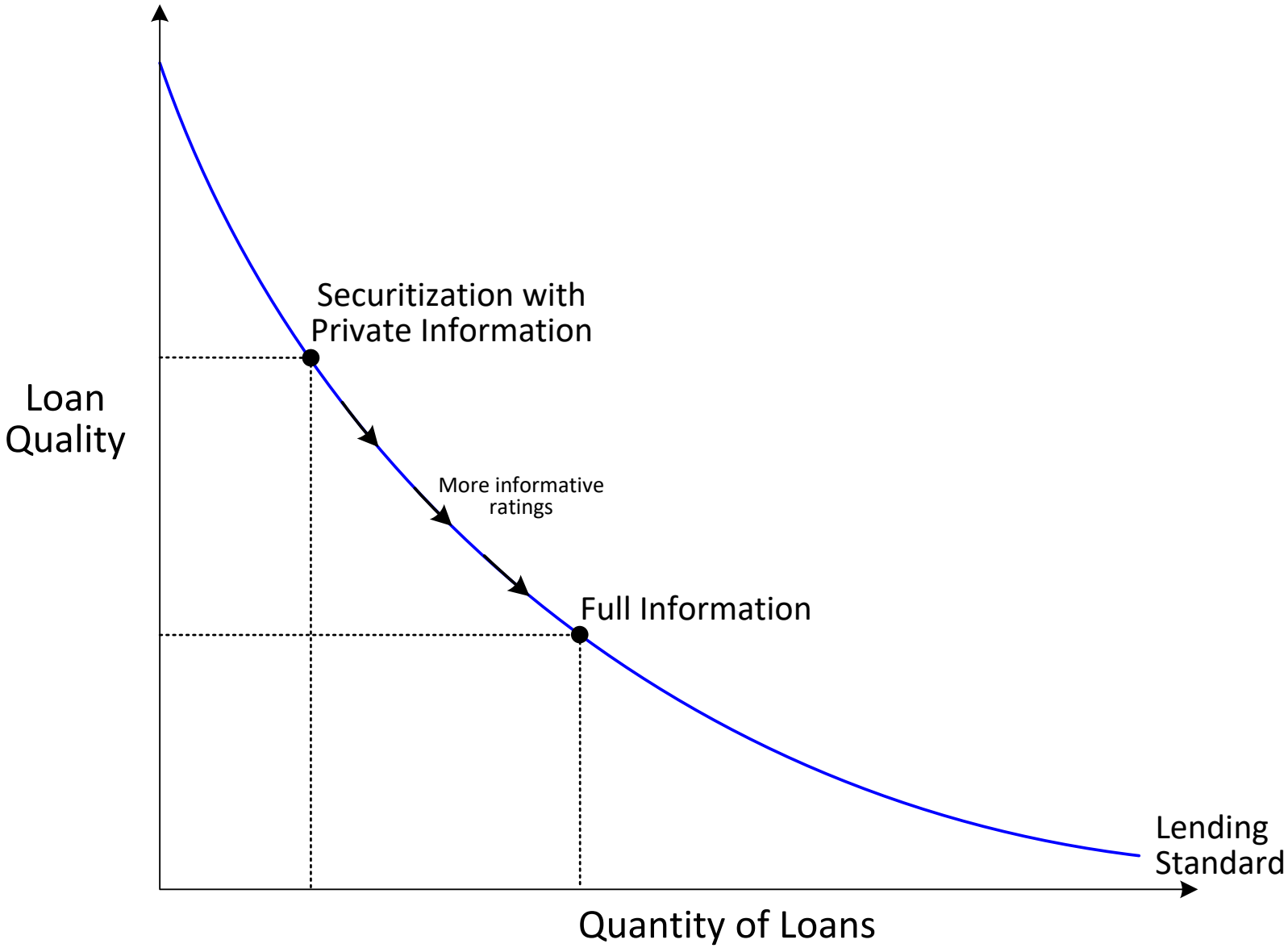

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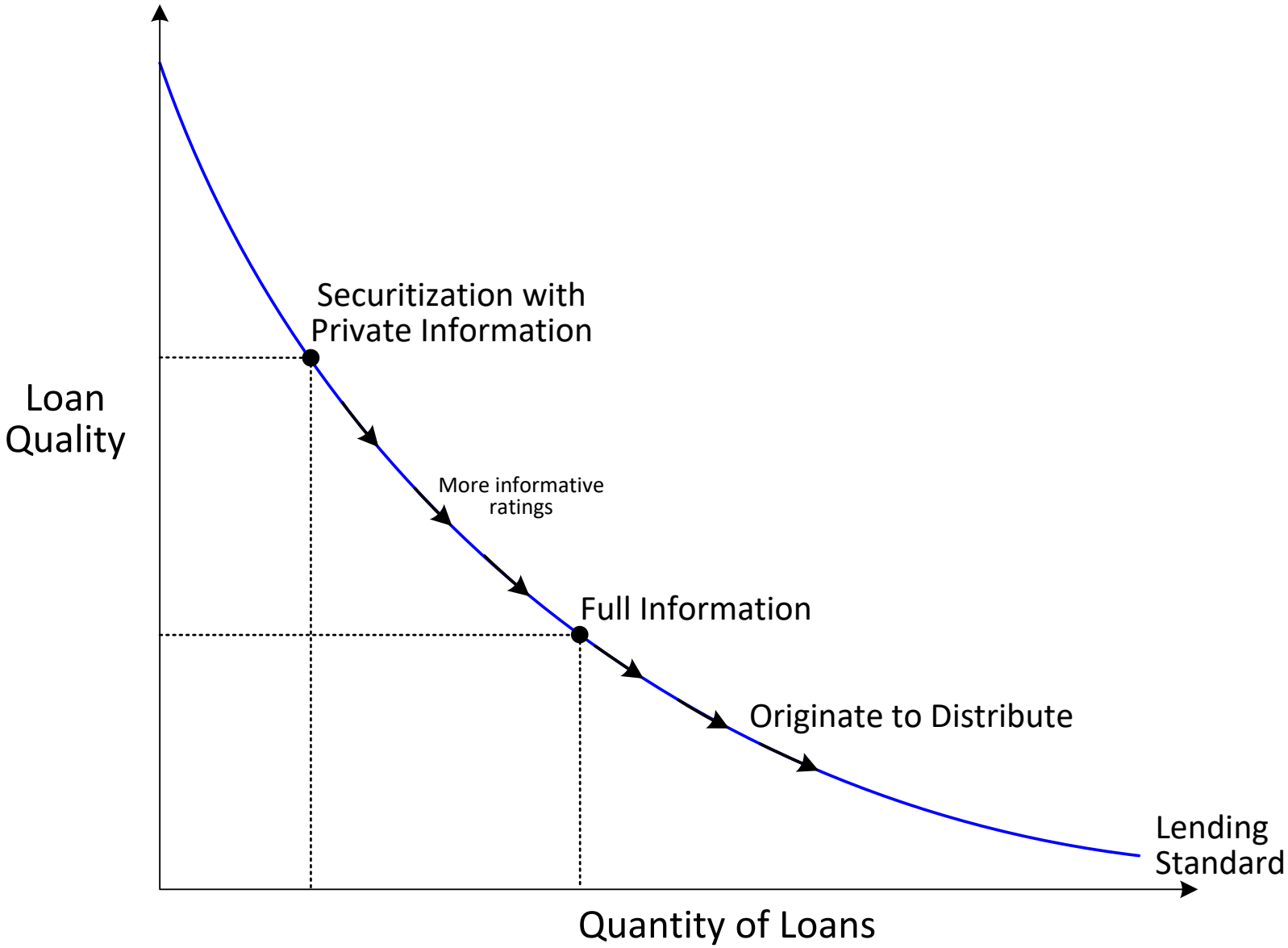

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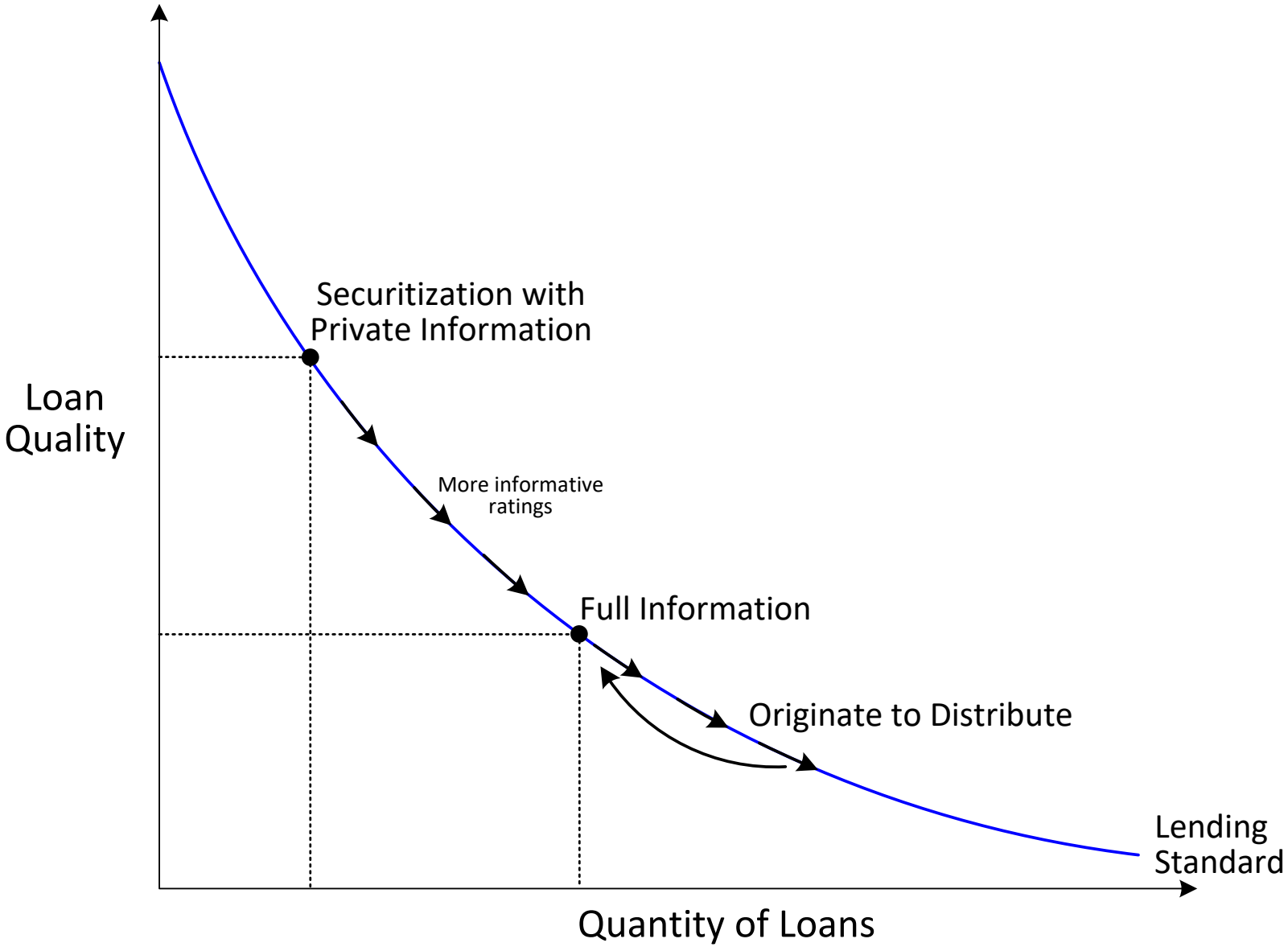


Related Literature

Securitization with ex-ante effort

- Chemla and Hennessy (2014), Parlour and Plantin (2008), Malherbe (2012), Vanasco (2017)

Signaling with ratings

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

Credit ratings

- Boot and Milbourn (2006), Skreta and Veldkamp (2009), Bolton et al (2012), Heski and Shapiro (2013), Harris and Opp[2] (2013), Josephson and Shapiro (2015), Goldstein and Huang (2017)

Security design with asymmetric information

- Nachman and Noe (1994), DeMarzo and Duffie (1999), DeMarzo (2005), Biais and Mariotti (2005), Axelson (2007), Daley et al (2016)

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 nuetral, but banks discount $t = 2$ at $\delta < 1$

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.

Securitization stage

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 γ measures rating accuracy.

Equilibrium

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:

$$pu_g + (1-p)u_b - 1.$$

   All loan pools with $p \geq p^*$ are originated, where p^* is the lending standard.

3. **Belief consistency.** Investors' beliefs are

$$\mu_0 = P(t = good) = E[p|p \geq p^*].$$

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:

$$p^{FB} v_g + (1 - p^{FB}) v_b - 1 = 0 \implies p^{FB} = \frac{1 - v_b}{v_g - v_b}$$

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: $p^{NR} > p^{FB}$.

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

Origination with ratings

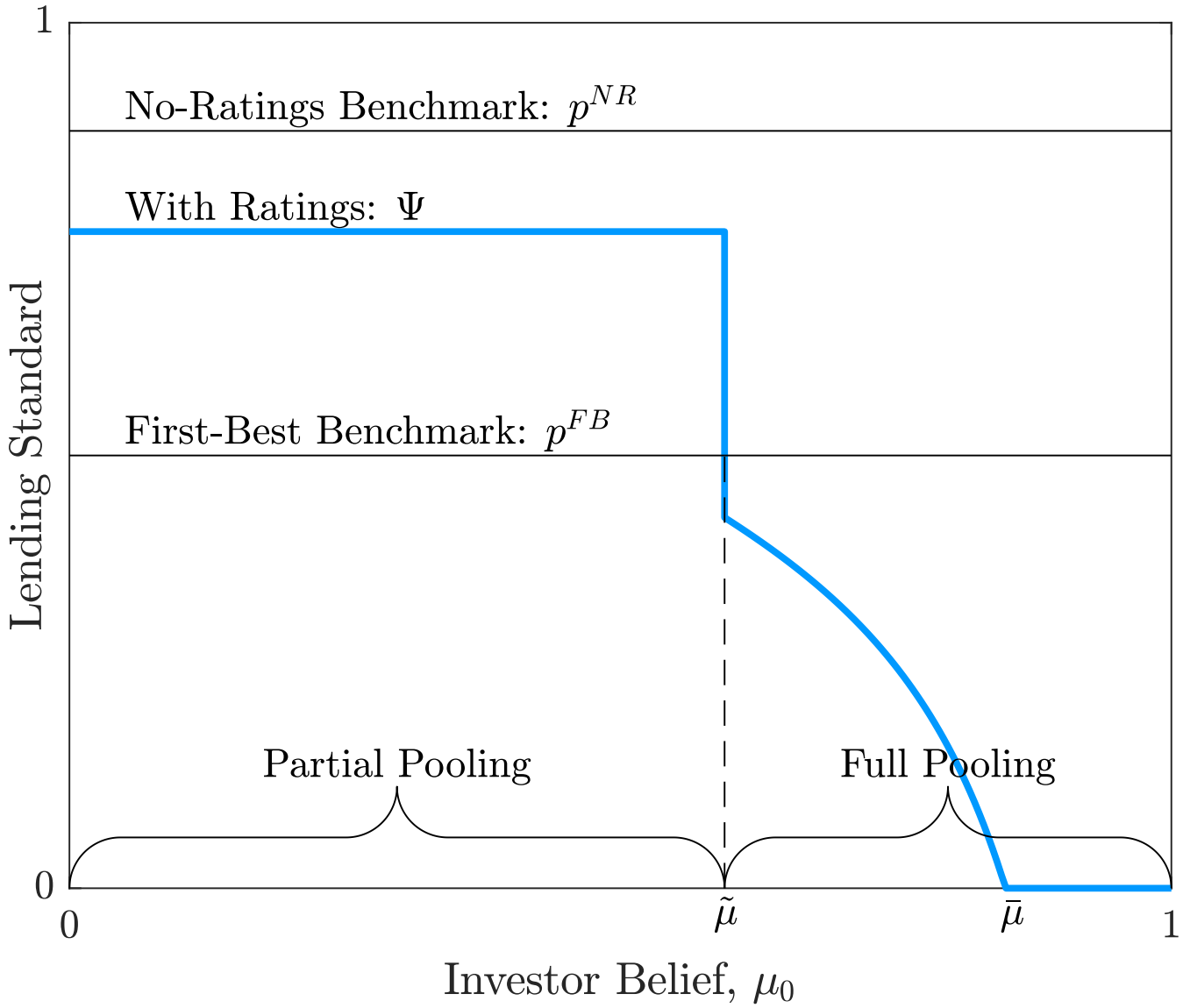
To understand the implications for loan origination...

- 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 μ_0 as given, the optimal lending standard must satisfy:

$$p^* \in \underbrace{\max\left\{\frac{1-u_b(\mu_0)}{u_g(\mu_0)-u_b(\mu_0)}, 0\right\}}_{\Psi(\mu_0)}$$

Lending Standards as a function of beliefs



Equilibrium credit supply with ratings

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

That is, if (p^*, μ_0^*) is part of an equilibrium, then

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

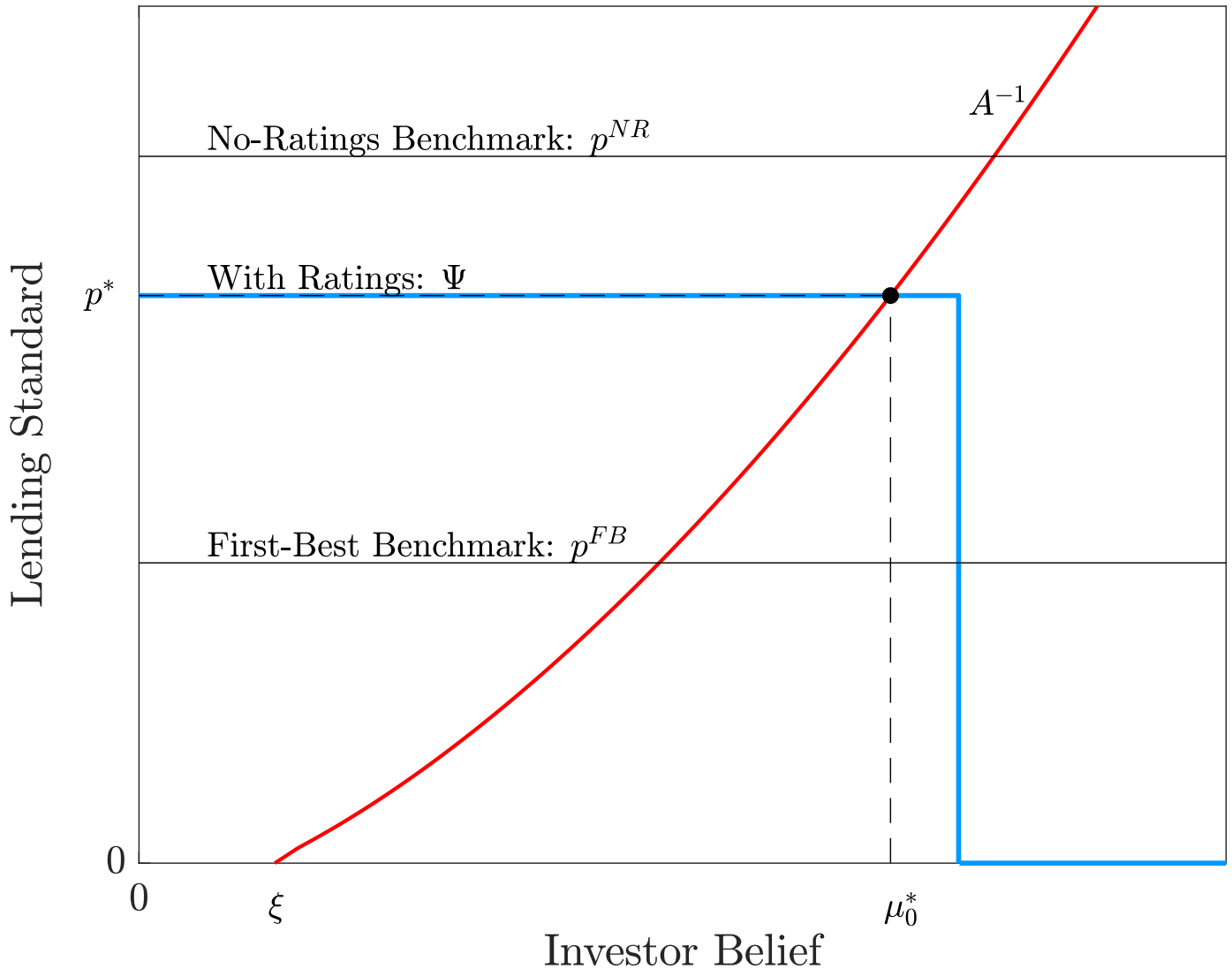
Graphically: the intersection of Ψ and A^{-1}

Result

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

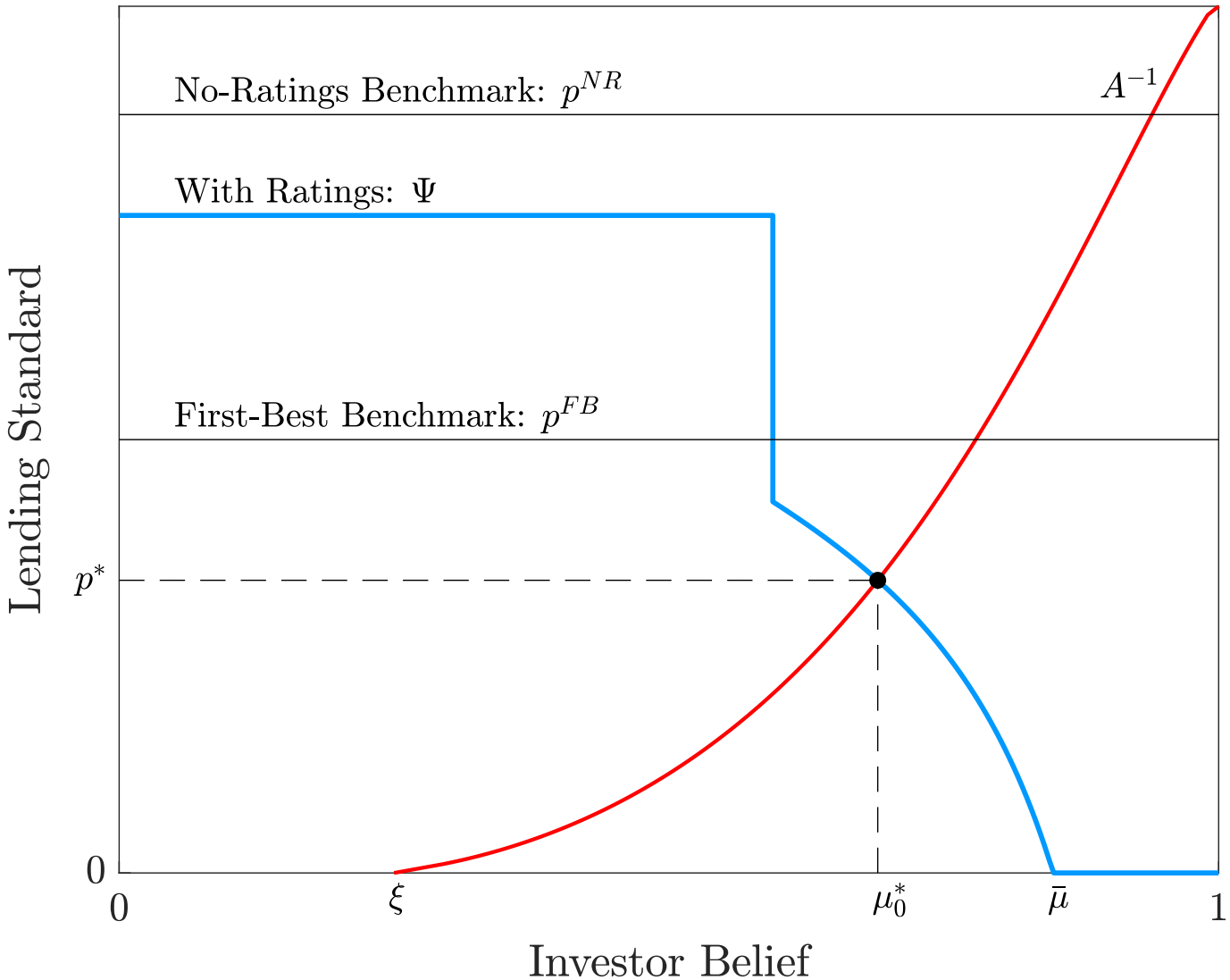
Signaling Equilibrium

Undersupply of Credit



OTD Equilibrium

Oversupply of Credit



When are lending standards too lax?

Result

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

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

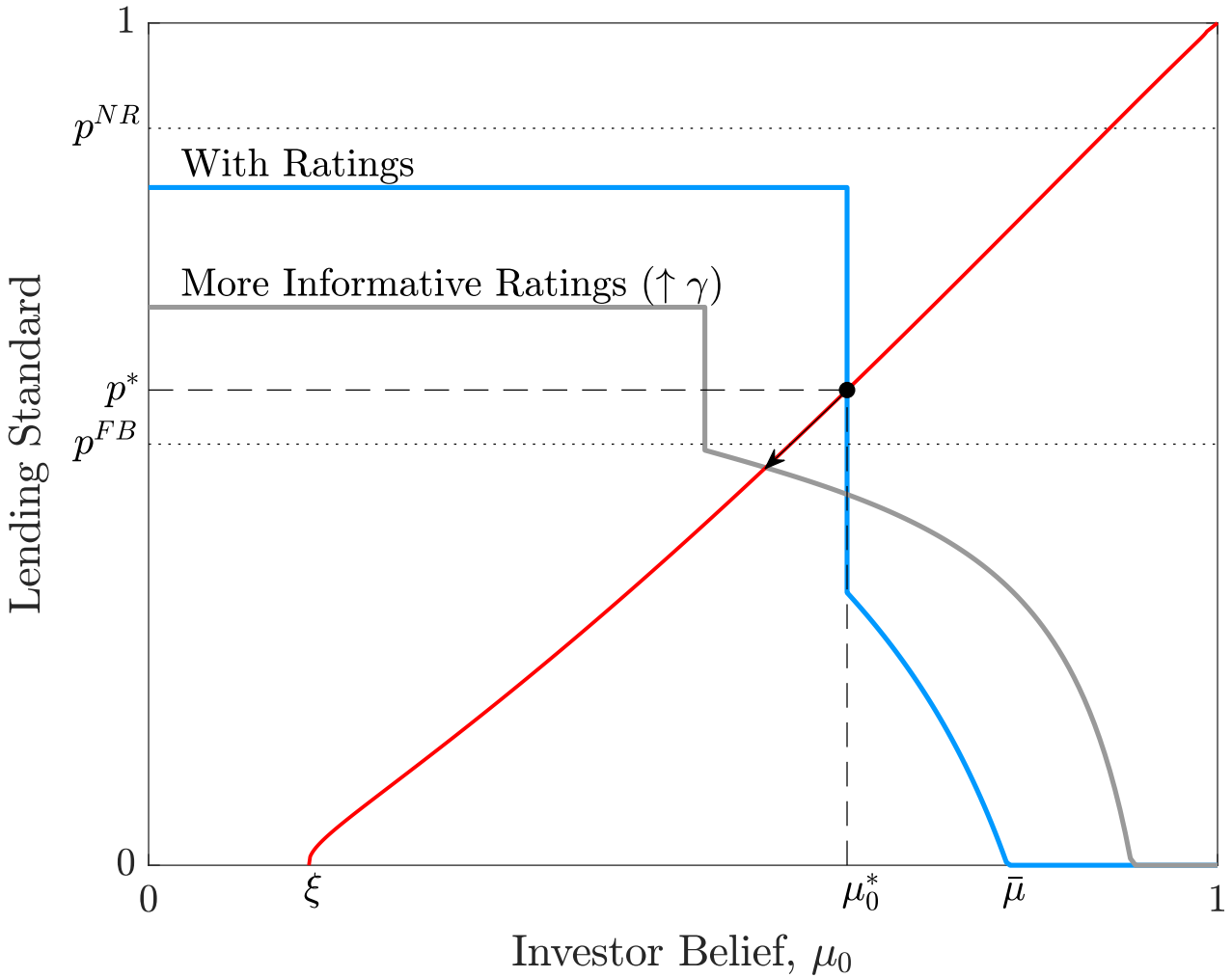
Fixing payoff parameters (e.g., v_t, δ):

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.

Determinants of Credit Supply

Rating Accuracy



Determinants of Credit Supply

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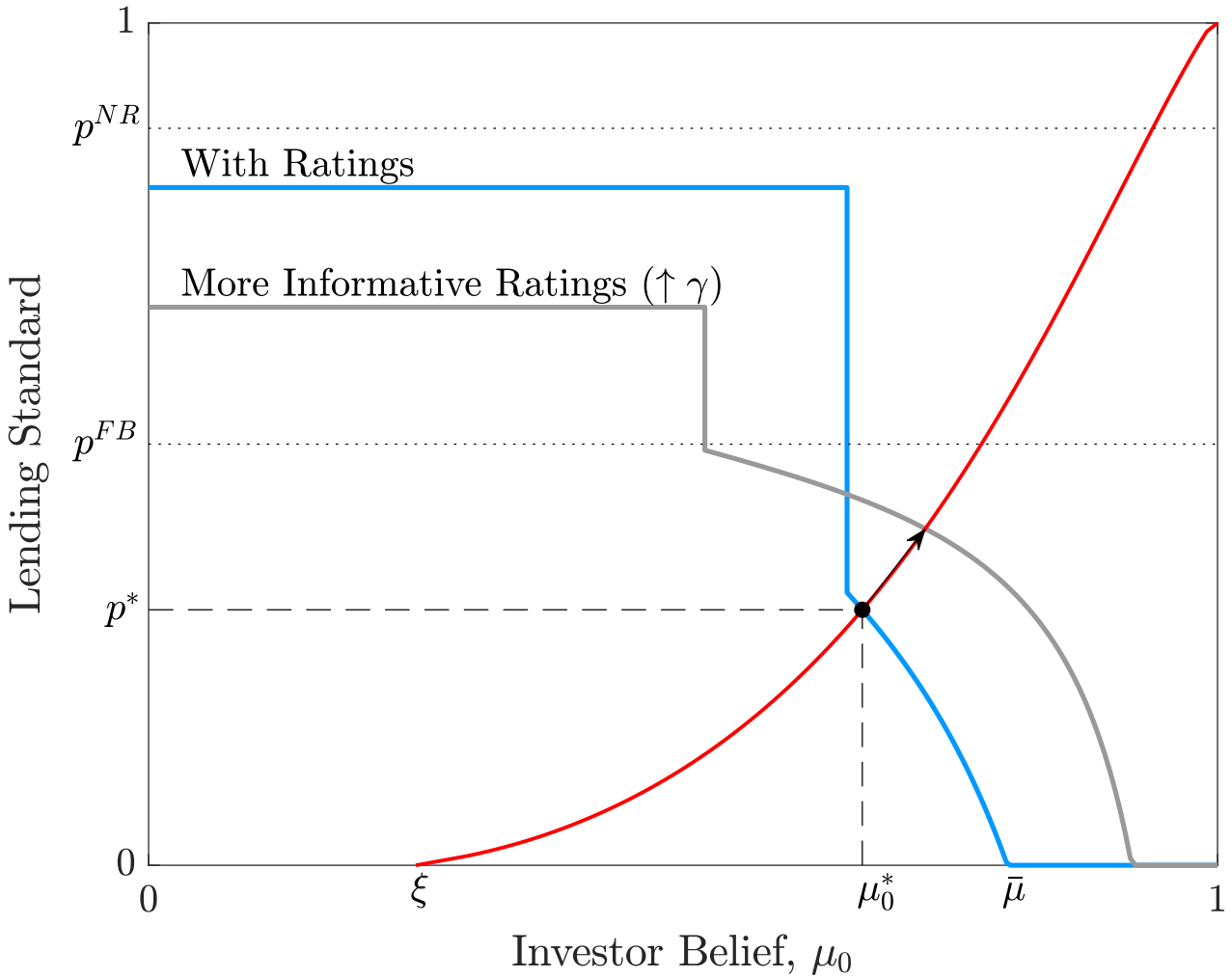

Determinants of Credit Supply

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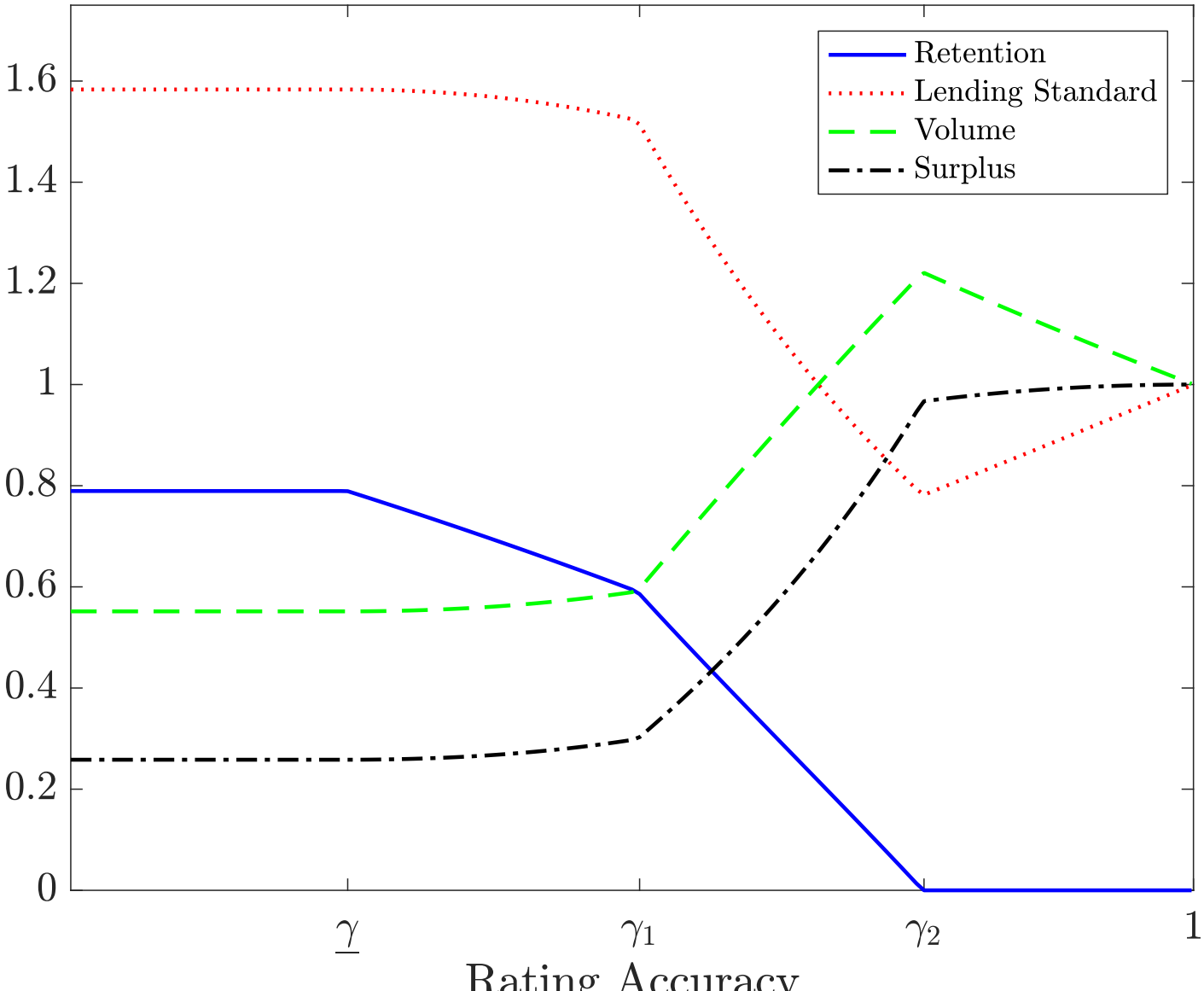
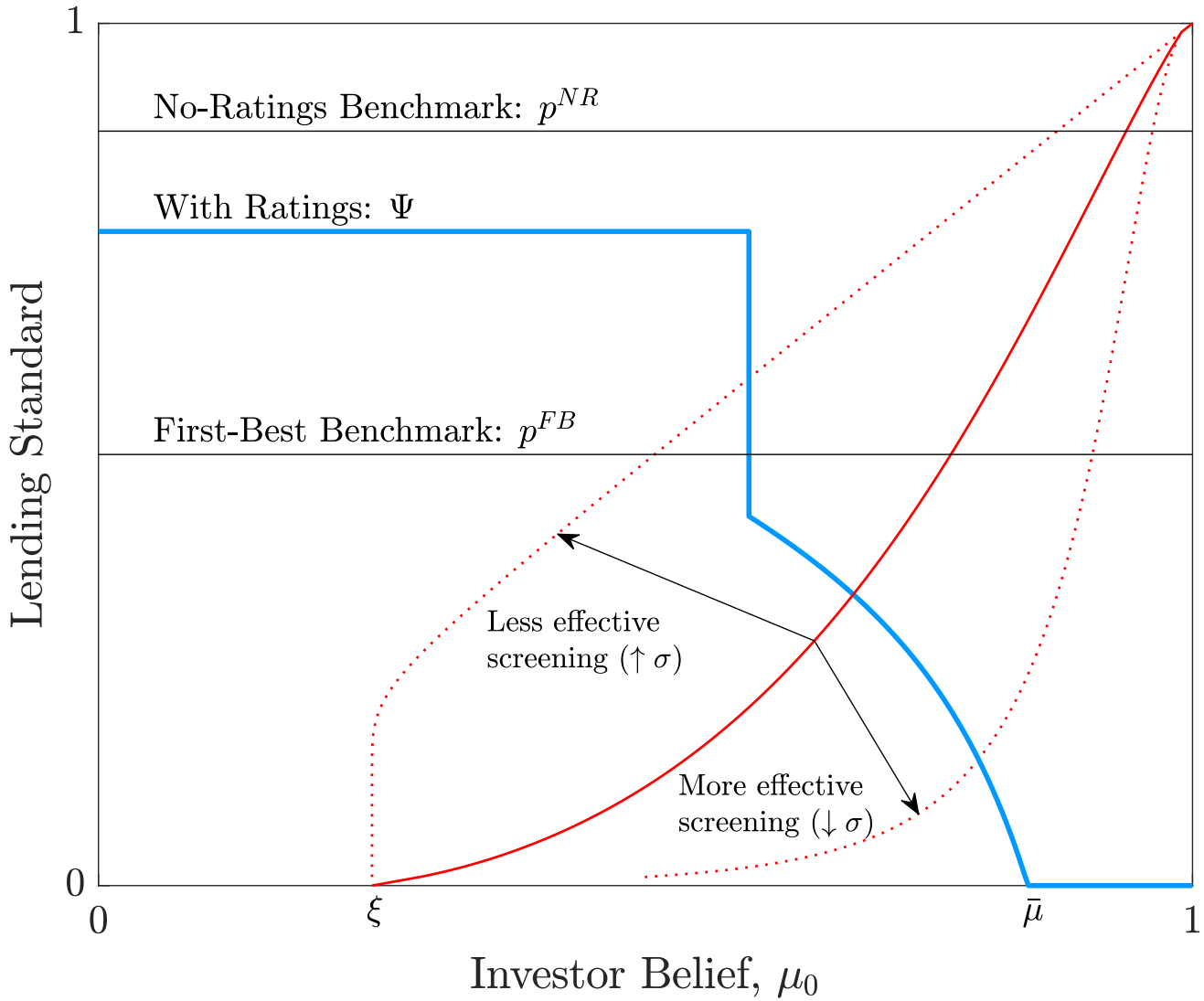


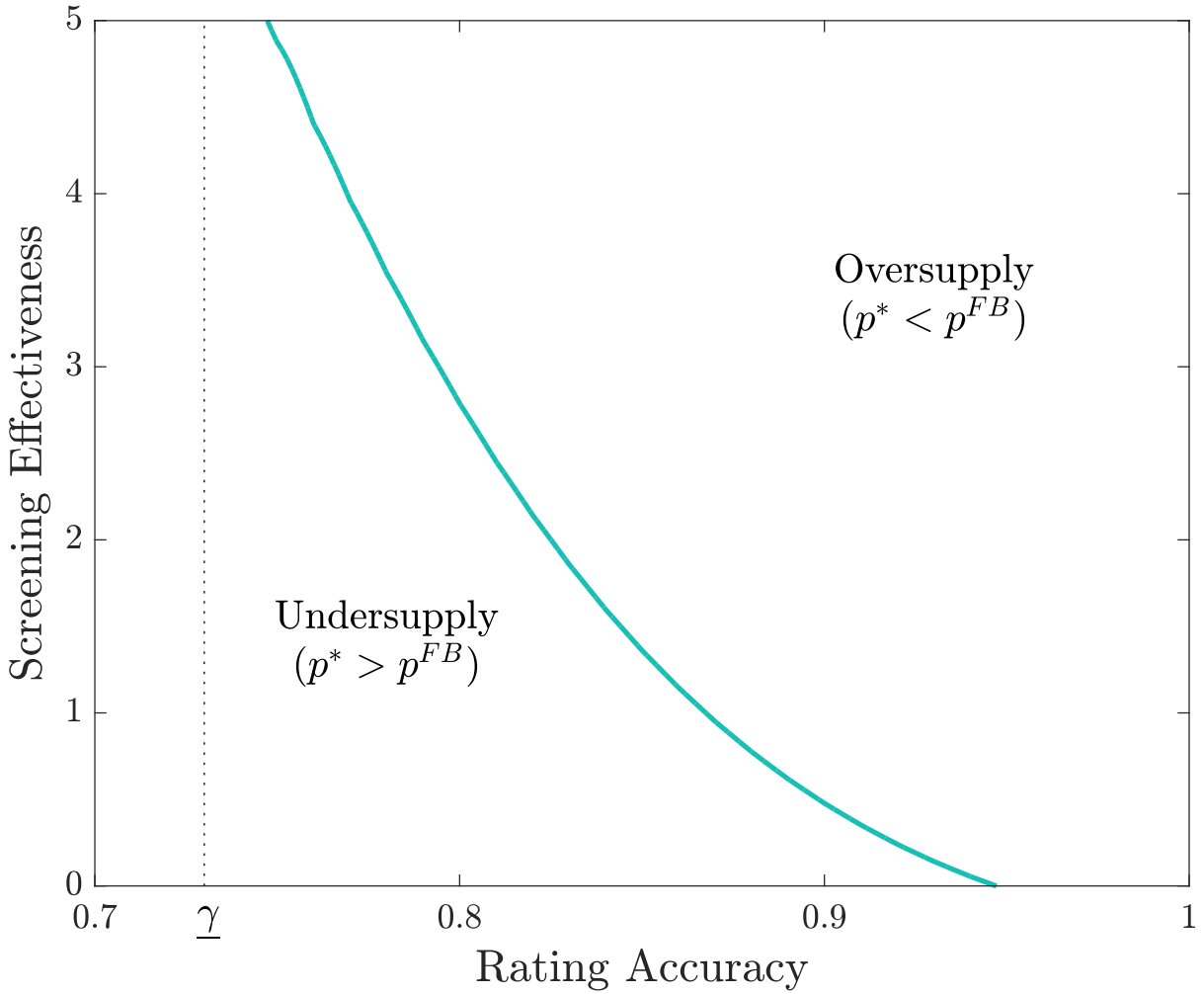
Determinants of Credit Supply

Screening Technology



Determinants of Credit Supply

Screening Technology vs Rating Informativeness



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 γ (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

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.