Interest Rates, Market Power, and Financial Stability

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Introduction (i)

- Question: How do interest rates affect financial stability?
  - → Focus on bank risk-taking
  - → Using simple theoretical model
  - → Based on "Search for Yield" paper (*Econometrica* 2017)
- In a competitive setting (like in "Search for Yield")
  - → Lower safe rates lead to higher risk-taking
  - → **What happens when we introduce market power**?

Introduction (ii)

- Why do safe rates affect banks' risk-taking?
  - → Safe rates affect banks' funding costs
  - → Impact on loan rates and intermediation margins
  - → Impact on banks' monitoring incentives
  - → Impact on loans' probability of default
- Why is competition relevant?
  - → It affects **pass-trough** of funding costs to loan rates
  - → It affects margins and monitoring incentives

Main results (i)

- Two cases
  - → When banks compete with other banks
  - → When banks also compete with market sources of finance
- With **inside competition**: lower safe rates lead to
  - → Higher risk-taking in competitive environments
  - → Lower risk-taking in monopolistic environments

Main results (ii)

- With **outside competition**: lower safe rates lead to

  → Higher risk-taking in competitive environments

  → Lower or higher risk-taking in monopolistic environments

  → Which case obtains depends on level of safe rate

  → For low rates higher risk-taking obtains

Part 1

Cournot model of bank competition

Model setup

- Two dates ($t = 0, 1$)
- Three types of risk-neutral agents
  - → **Entrepreneurs** have projects that require bank finance
  - → **Banks** have to raise funds from (uninsured) investors
  - → **Investors** require expected return R_0 (the safe rate)

Entrepreneurs (i)

- Continuum of penniless entrepreneurs have risky projects

$$\text{Unit investment} \quad \rightarrow \quad \text{Return} = \begin{cases} A, & \text{with prob. } 1-p+m \\ 0, & \text{with prob. } p-m \end{cases}$$

$\rightarrow p$ is probability of failure without monitoring

$\rightarrow m \in [0, p]$ is monitoring intensity of lending bank

$\rightarrow$ **Monitoring reduces probability of failure**

Entrepreneurs (ii)

- **Assumption 1**: Decreasing returns to aggregate investment L

$$A(L) = a - bL$$

- **Assumption 2**: Single aggregate risk factor

  → Perfectly correlated project returns (for any given m)

- **Assumption 3**: Free entry of entrepreneurs

  → Enter the loan market until $A(L) = R$ (loan rate)

  → $A(L)$ is the inverse loan demand function

Banks (i)

- There are *n* identical banks that compete à la Cournot

  → Strategic variable of bank *j* is its lending l_j to entrepreneurs

  → Total amount of lending is

$$L = \Sigma_{j=1}^{n} \; l_j$$

Banks (ii)

- **Assumption 1**: Banks have no (inside) capital

  → Entirely funded with uninsured deposits (outside capital)

- **Assumption 2**: Bank monitoring is not contractible

  → Moral hazard problem

- **Assumption 3**: Bank monitoring is costly

  → Cost of monitoring

$$c(m_j) = \frac{\gamma}{2} m_j^2$$

Structure of the game

- Three stages

  1. Each bank j sets supply of loans $l_j \rightarrow L = \Sigma_{j=1}^{n} l_j$

     $\rightarrow$ This determines the loan rate $R = A(L)$

  2. Banks offer interest rate $B(L)$ to investors

  3. Banks (privately) choose monitoring $m(L)$

Characterization of equilibrium (i)

- Banks' choice of monitoring (given L)

$$m(L) = \arg\max_m \left[(1-p+m)[A(L)-B(L)]-c(m)\right]$$

- Investors' participation constraint

$$[1-p+m(L)]B(L) = R_0$$

- Two equations with two unknowns

  → Solution gives $B(L)$ and $m(L)$

Characterization of equilibrium (ii)

- Banks' choice of monitoring requires solving

$$\max_m \left[(1-p+m)[A(L)-B(L)]-c(m)\right]$$

→ First-order condition

$$\underbrace{A(L)-B(L)}_{\text{Intermediation margin}} = c'(m) = \gamma m$$

→ **Monitoring intensity is proportional to margin**

Characterization of equilibrium (iii)

- Banks' profits per unit of loans

$$\pi(L) = [1 - p + m(L)][A(L) - B(L)] - c(m(L))$$

- Symmetric Cournot equilibrium condition

$$l^* = \arg\max_{l_j} \left[\pi(l_j + (n-1)l^*) l_j \right]$$

Preliminary result

- Effect of changes in number of banks n on banks' risk-taking

$$\frac{dm^*}{dn} < 0$$

→ where $m^* = m^*(L^*)$

- Negative effect of competition on financial stability

→ Standard "charter value" result

- What's the intuition?

→ Higher n reduces intermediation margin and monitoring

Main result

- Effect of changes in safe interest rate R_0 on banks' risk-taking

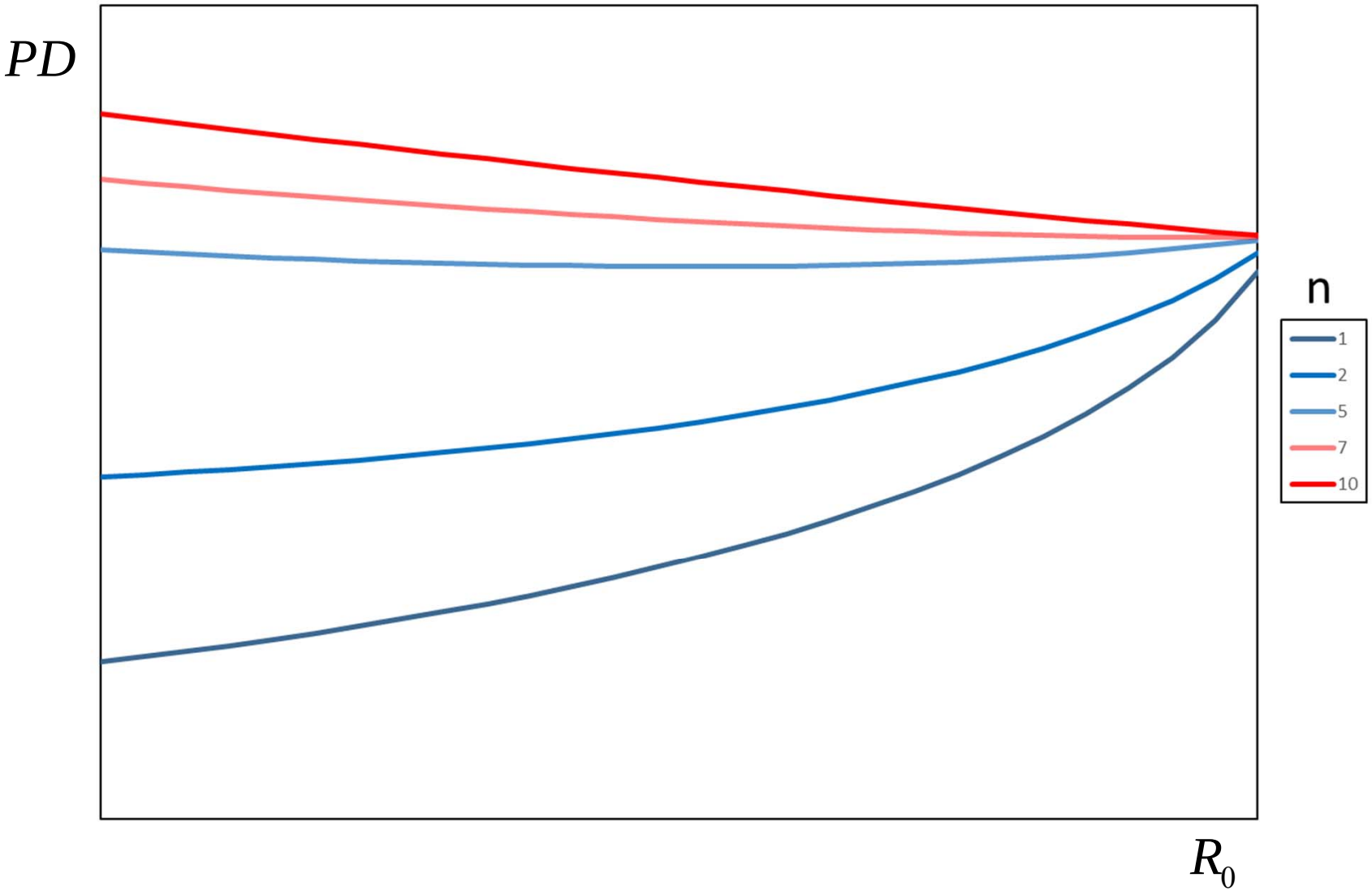
  → Depending on the extent of competition in loan market

  → Measured by number of banks n

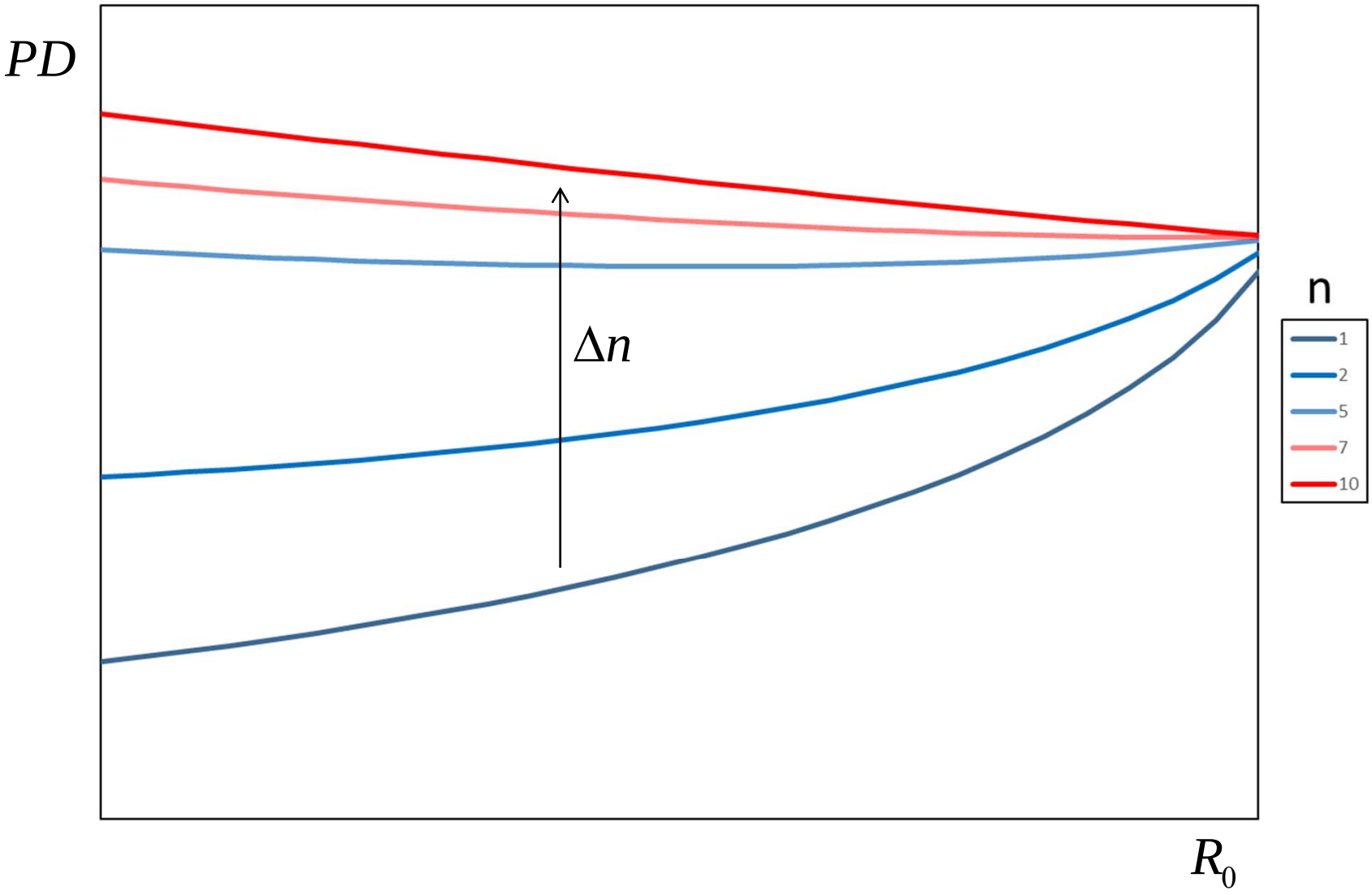
- Probability of default is $PD = p - m^*$

- Compute effects of R_0 and n on PD

Effects of safe rate and competition on risk



Effects of safe rate and competition on risk



Summing up

- Competition increases banks' risk-taking

  → Standard "charter value" result

- With high competition lower rates **increase** banks' risk-taking

  → "Search for Yield" result

- With low competition lower rates **decrease** banks' risk-taking

  → Novel result

What's the intuition?

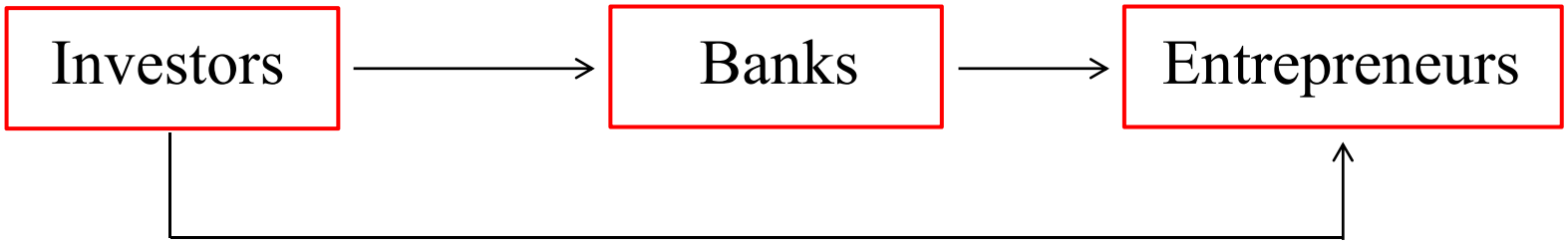
- Refer to literature on **pass-through** in Cournot oligopoly
- With high competition lower costs have little impact on margins
  - → In our case positive margins to cover monitoring costs
  - → One can show that margins (and monitoring) go down
  - → Riskier banks
- With low competition lower costs have large impact on margins
  - → In our case margins (and monitoring) go up
  - → Safer banks

Part 2

Introducing market finance

Introducing market finance

Intermediated finance



Direct market finance

Introducing market finance

- Suppose that entrepreneurs can also borrow from the market

  → Bond financing

- Assume that market finance entails no monitoring

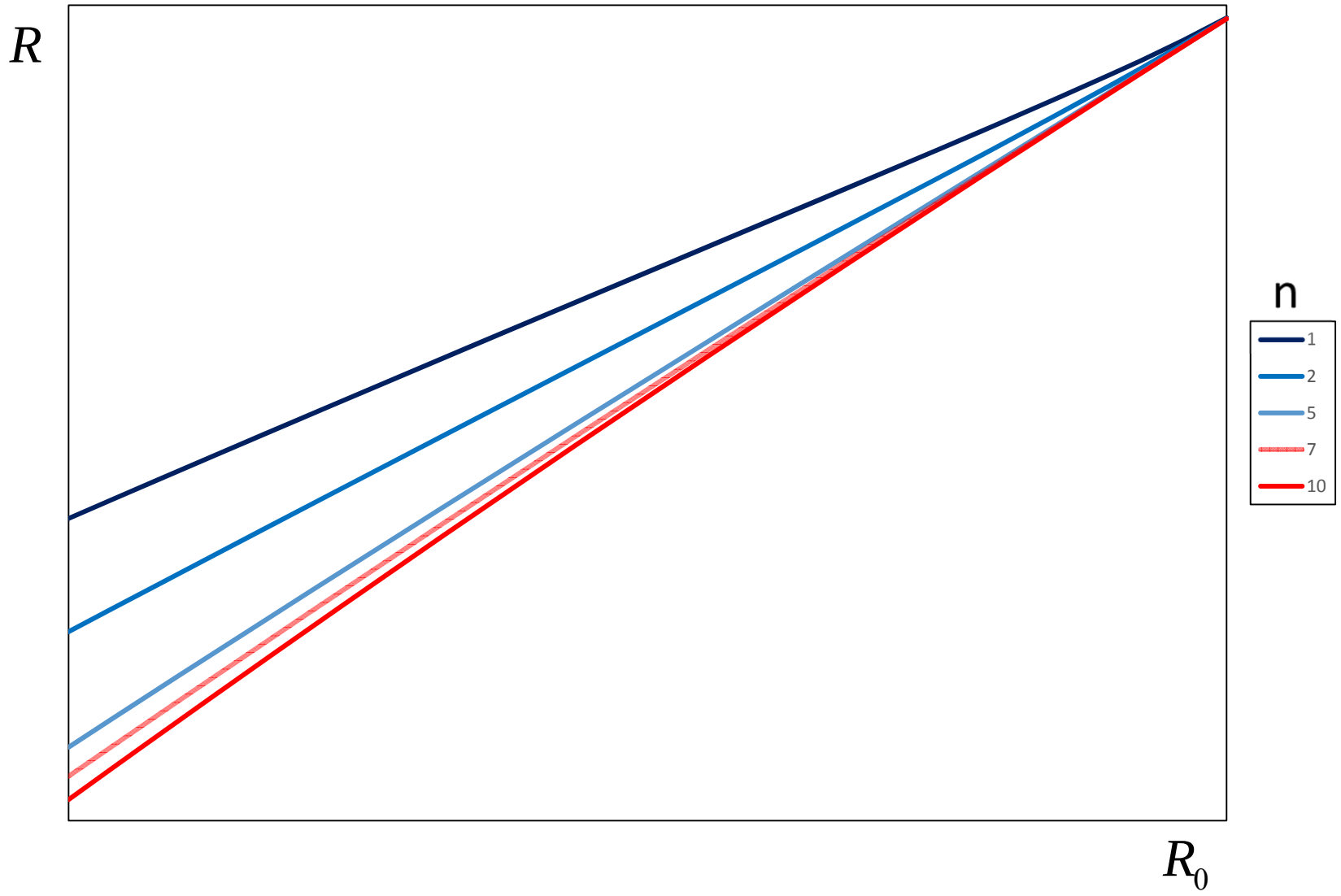
  → Market interest rate R_M satisfies

$$(1-p)R_M = R_0 \quad \rightarrow \quad R_M = \frac{R_0}{1-p}$$

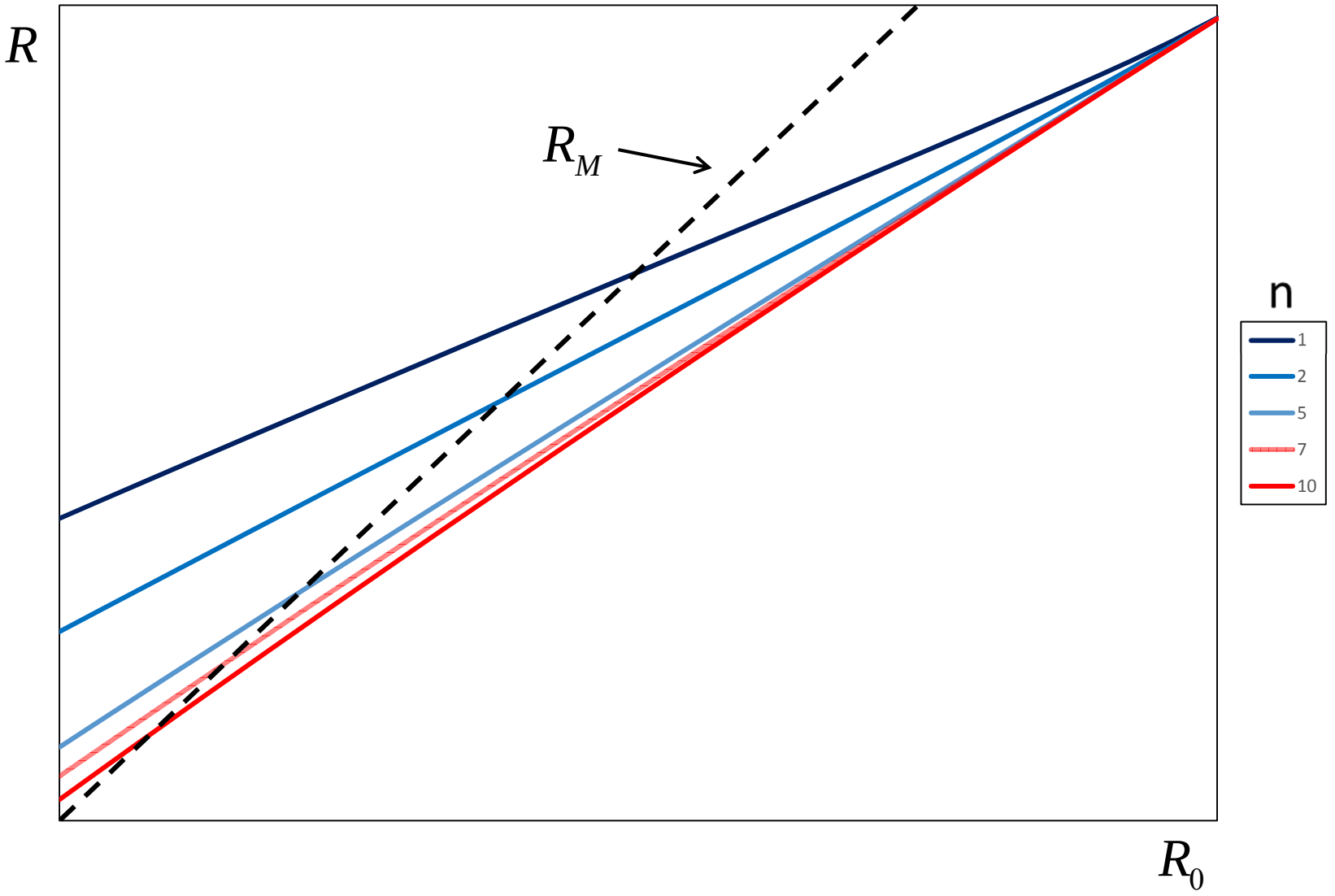
  → Upper bound on the rate that banks can charge

  → When will the bound be binding?

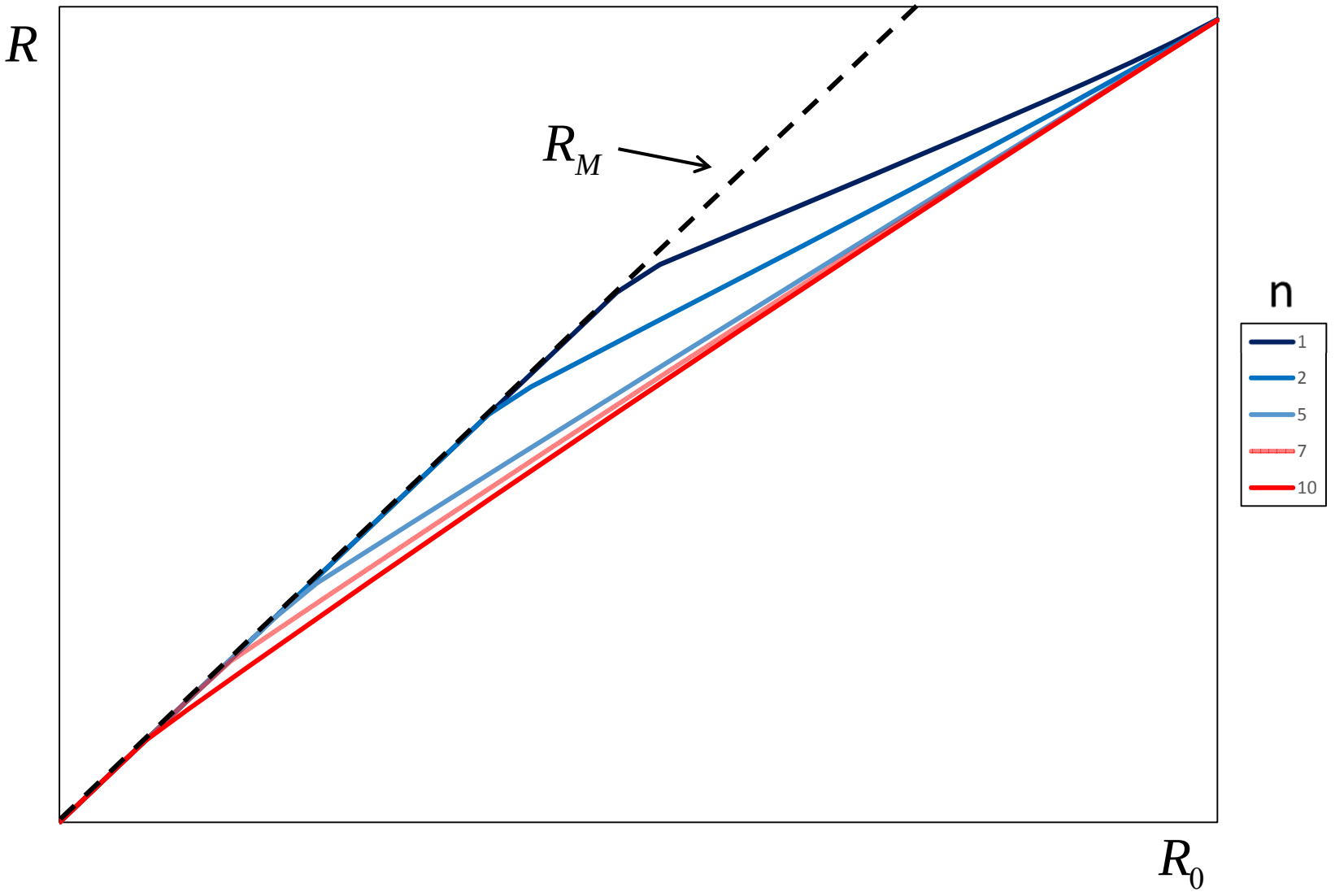
Effect of market finance on loan rates



Effect of market finance on loan rates



Effect of market finance on loan rates



Characterization of equilibrium

- When the bound is binding banks will choose L_M such that

$$R_M = R(L_M)$$

- Equilibrium characterized by

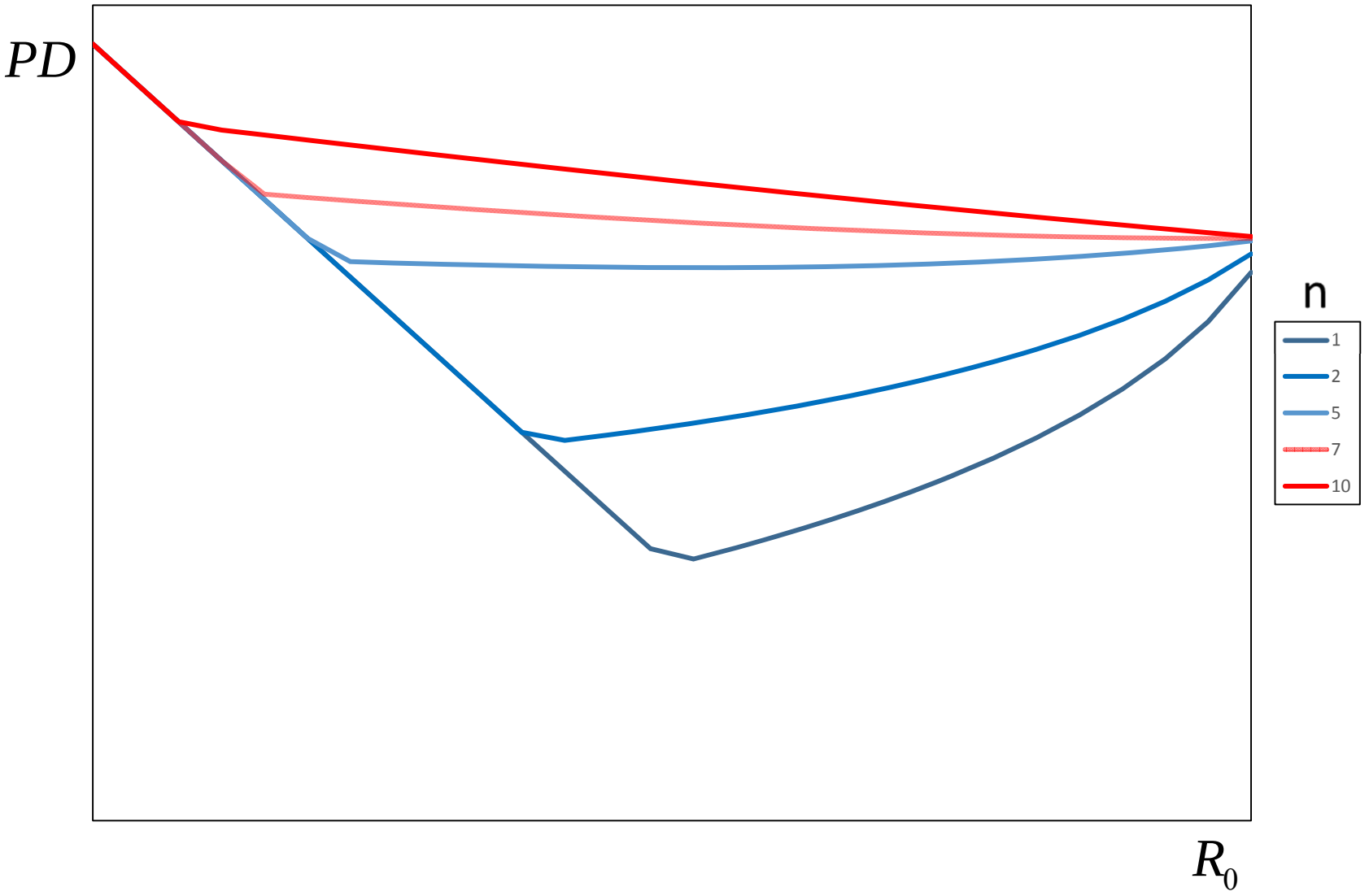
→ Banks' choice of monitoring

$$m(B) = \arg\max_m \left[(1 - p + m)(R_M - B) - c(m)\right]$$

→ Investors' participation constraint

$$[1 - p + m(B)]B = R_0$$

Effects of safe rate and competition on risk



Summing up

- Competition with outside sources of finance
  - → Limits bank's market power
  - → Reduces equilibrium loan rates and intermediation margins
  - → Reduces monitoring and increases banks' risk-taking
- Constraint is binding when interest rates are low
  - → In such case **lower rates increase banks' risk-taking**
  - → Regardless of the degree of competition in loan market

Part 3

Extensions

Extensions

- Effect of alternative funding sources for banks
  - → Equity capital [Dell'Ariccia et al. (2014)]
  - → Insured deposits
- Effect of competition in deposit market
- Heterogeneous monitoring costs
  - → Effect of changes in shares of small and large banks
- Bank entry (and exit)
  - → Effect of rates that are "too low for too long"

Concluding remarks

Concluding remarks (i)

- Results are consistent with charter value hypothesis

  → Competition increases banks' risk-taking

  → In line with current view of bank supervisors

  → However there are models that predict otherwise

Concluding remarks (ii)

- Results show that you can have higher credit and lower risk

  → With high market power lower rates decrease risk-taking

  → No trade-off between credit and financial stability

- Testable implications

$$Risk = \alpha + \underbrace{\beta_0}_{-} R_0 + \underbrace{\beta_1}_{-} HHI + \underbrace{\beta_2}_{+} R_0 * HHI + \text{ Controls}$$

  → where HHI = Herfindahl index = $1/n$

Some references

• Adrian, T., and N. Liang (2018), "Monetary Policy, Financial Conditions, and Financial Stability," *International Journal of Central Banking*.

• Boyd, J., and G. De Nicoló (2005), "The Theory of Bank Risk-Taking and Competition Revisited," *Journal of Finance*.

• Dell'Ariccia, L. Laeven, and R. Marquez (2014), "Real Interest Rates, Leverage, and Bank Risk-Taking," *Journal of Economic Theory*.

• Martinez-Miera, D., and R. Repullo (2010), "Does Competition Reduce the Risk of Bank Failure?," *Review of Financial Studies*.

• Martinez-Miera, D., and R. Repullo (2017), "Search for Yield," *Econometrica*.

• Repullo, R. (2004), "Capital Requirements, Market Power, and Risk-Taking in Banking," *Journal of Financial Intermediation*.