Interest Rates, Market Power, and Financial Stability

Rafael Repullo

(joint work with David Martinez-Miera)

Conference on Financial Stability

Banco de Portugal, 17 October 2017

Introduction (i)

- Session with a very ambitious goal
- Discuss effect of changes in environment since global financial crisis (tougher regulation, low interest rates, low growth) on

  → Profitability of financial institutions

  → Risk-taking

  → Financial stability

Introduction (ii)

- Answering these questions is not straightforward
  - → There is no generally accepted analytical framework
  - → In fact, most reasonable answer is: “It depends”
- This presentation will illustrate this statement
  - → Focus on risk-taking and financial stability
  - → Using simple theoretical model
  - → Based on “Search for Yield” paper (*Econometrica* 2017)

Introduction (iii)

- Specific question to be addressed

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

  → In a setup in which banks may have market power

- 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 (iv)

- 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 investors
  - → **Investors** require expected return R_0 (the safe rate)
- Banks monitor entrepreneurs' projects
  - → Reduces probability of failure

Entrepreneurs (i)

- Continuum of penniless entrepreneurs have risky projects

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

$\rightarrow p$ is probability of failure without monitoring

$\rightarrow m \in [0, p]$ is monitoring (screening) of lending bank

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

Entrepreneurs (ii)

- Assumption 1

  → p is observable while m is unobservable (moral hazard)

- Assumption 2

  → Success return R is a decreasing function of total lending L

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

- Assumption 3

  → Project returns are perfectly correlated

Banks

- 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

- Assumption 1

  → Banks have no (inside) capital

  → Entirely funded with uninsured deposits (outside capital)

- Assumption 2

  → Bank monitoring is costly

  → Cost of monitoring

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

Structure of the game

- Three stages

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

  → Banks offer interest rate $B(L)$ to investors

  → Banks (privately) choose monitoring

- Since $R = R(L) = a + bL$

  → we can write $B(R)$ instead of $B(L)$

Characterization of equilibrium (i)

- Banks' choice of monitoring (given L)

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

- 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

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

→ First-order condition

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

→ **Monitoring intensity is proportional to margin**

Characterization of equilibrium (iii)

- Banks' profits per unit of loans

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

- Symmetric Cournot equilibrium condition

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

Results

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

  → Depending on the extent of competition in loan market

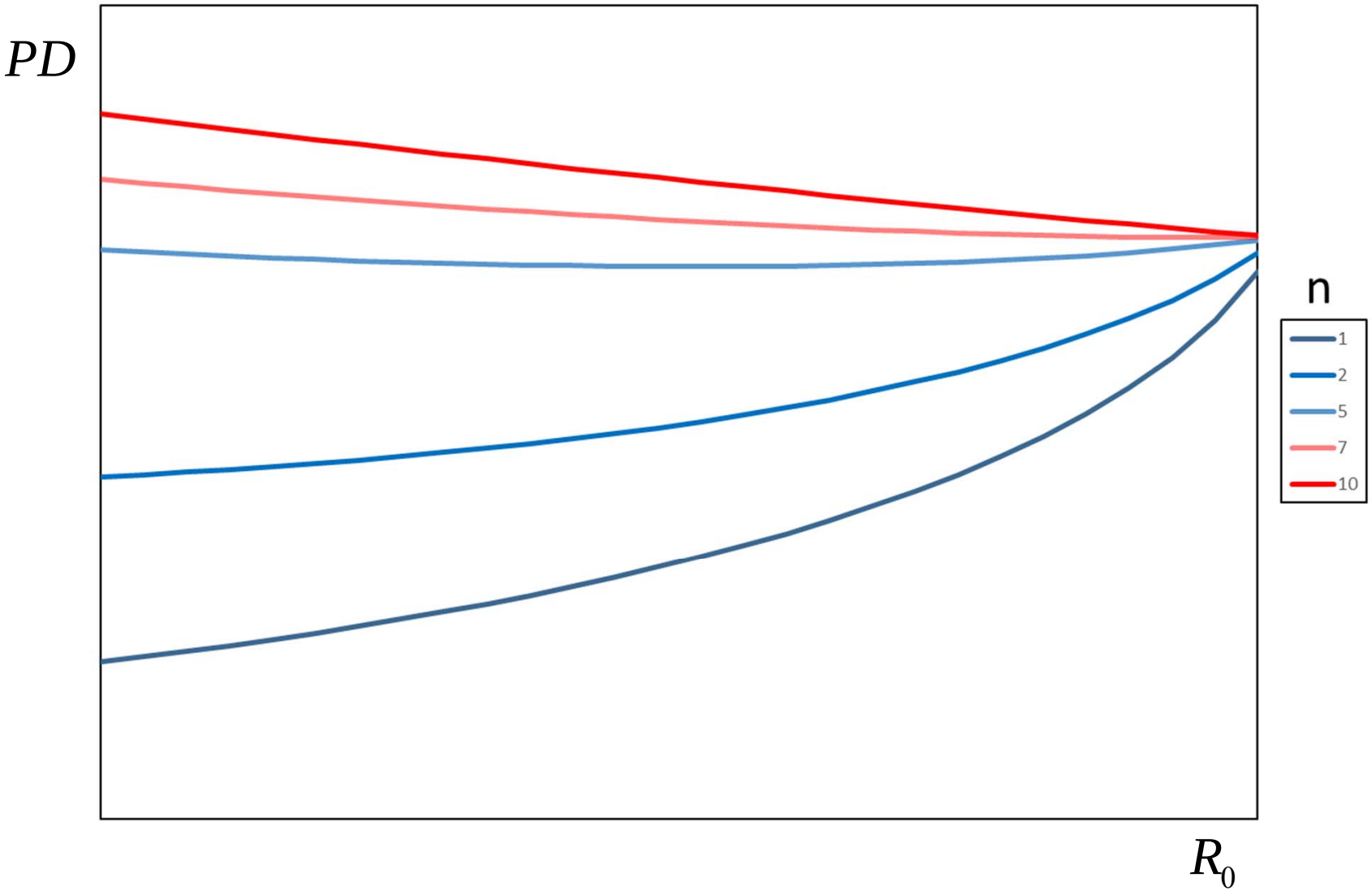
  → Measured by number of banks n

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

  → where $m^* = m^*(L^*)$

- Compute effects of R_0 and n on PD

Effects of safe rate and competition on risk



Comments on the results

- Competition increases banks' risk-taking

  → Well-known 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

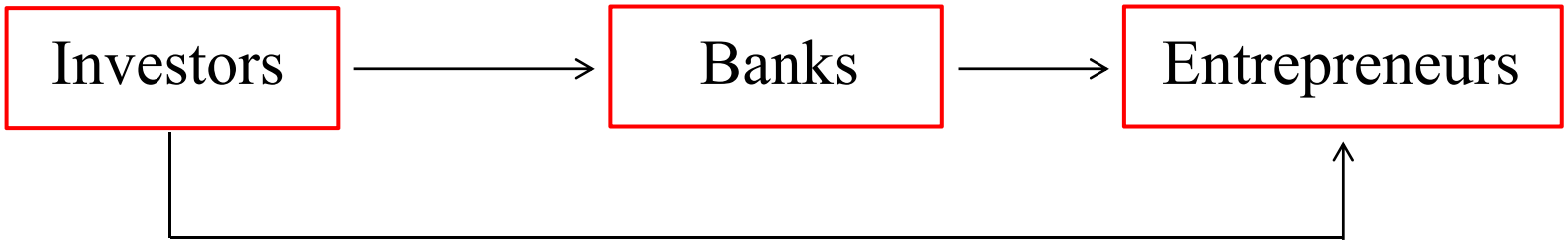
  → Novel result

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
- Assume that market finance entails no monitoring

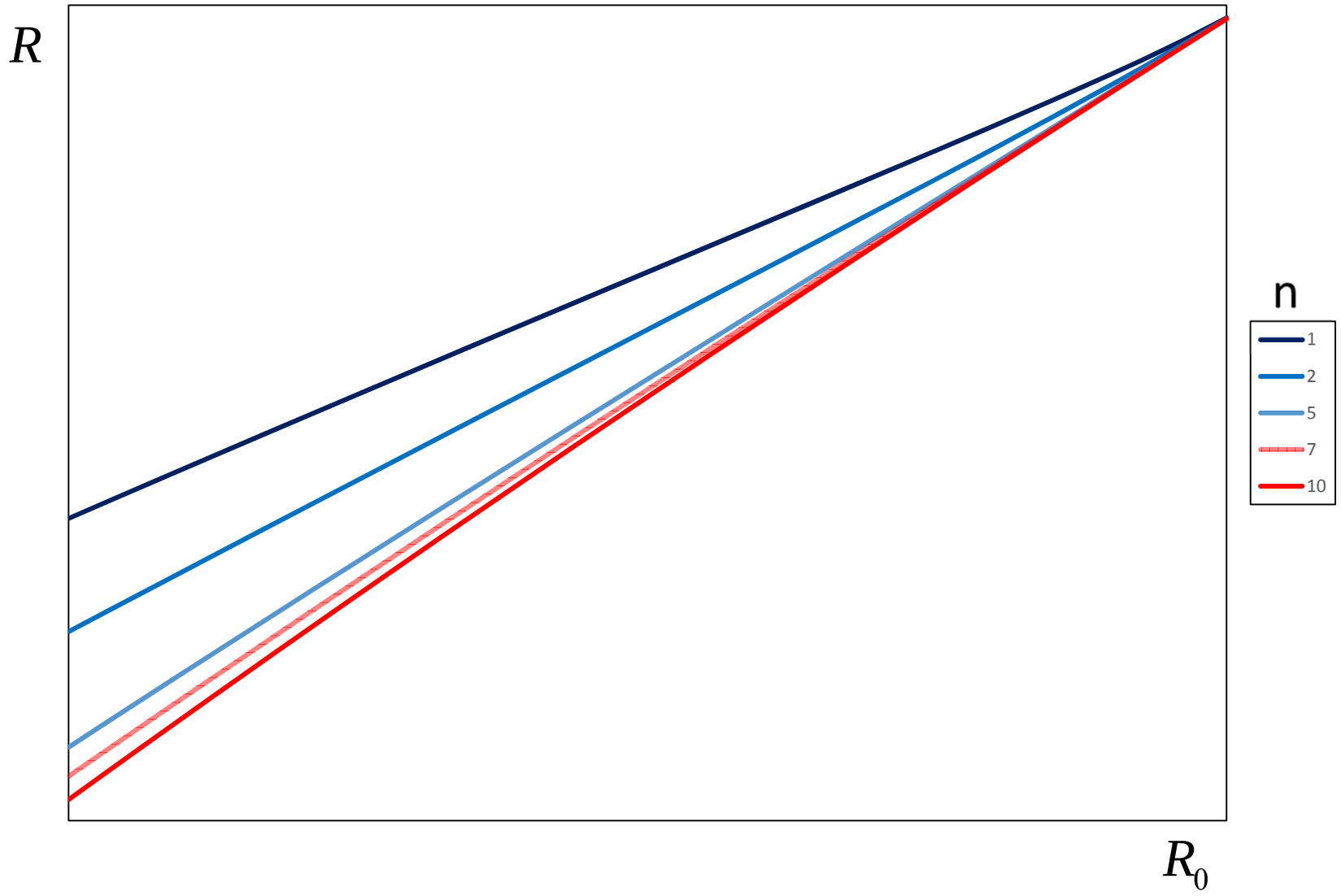
  → Market interest rate R_M satisfies

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

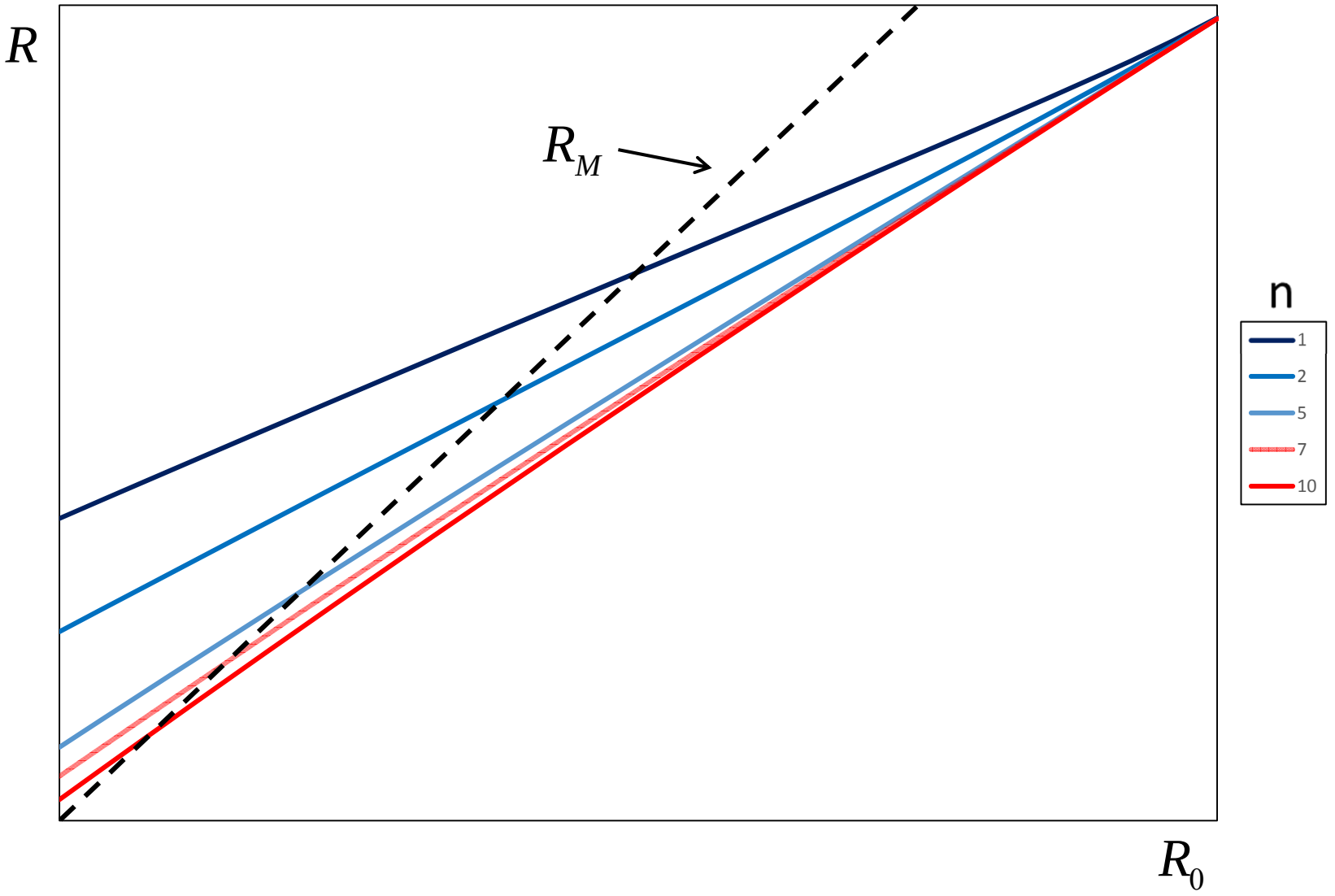
  → Upper bound on the rate that banks can charge

  → When will the bound be binding?

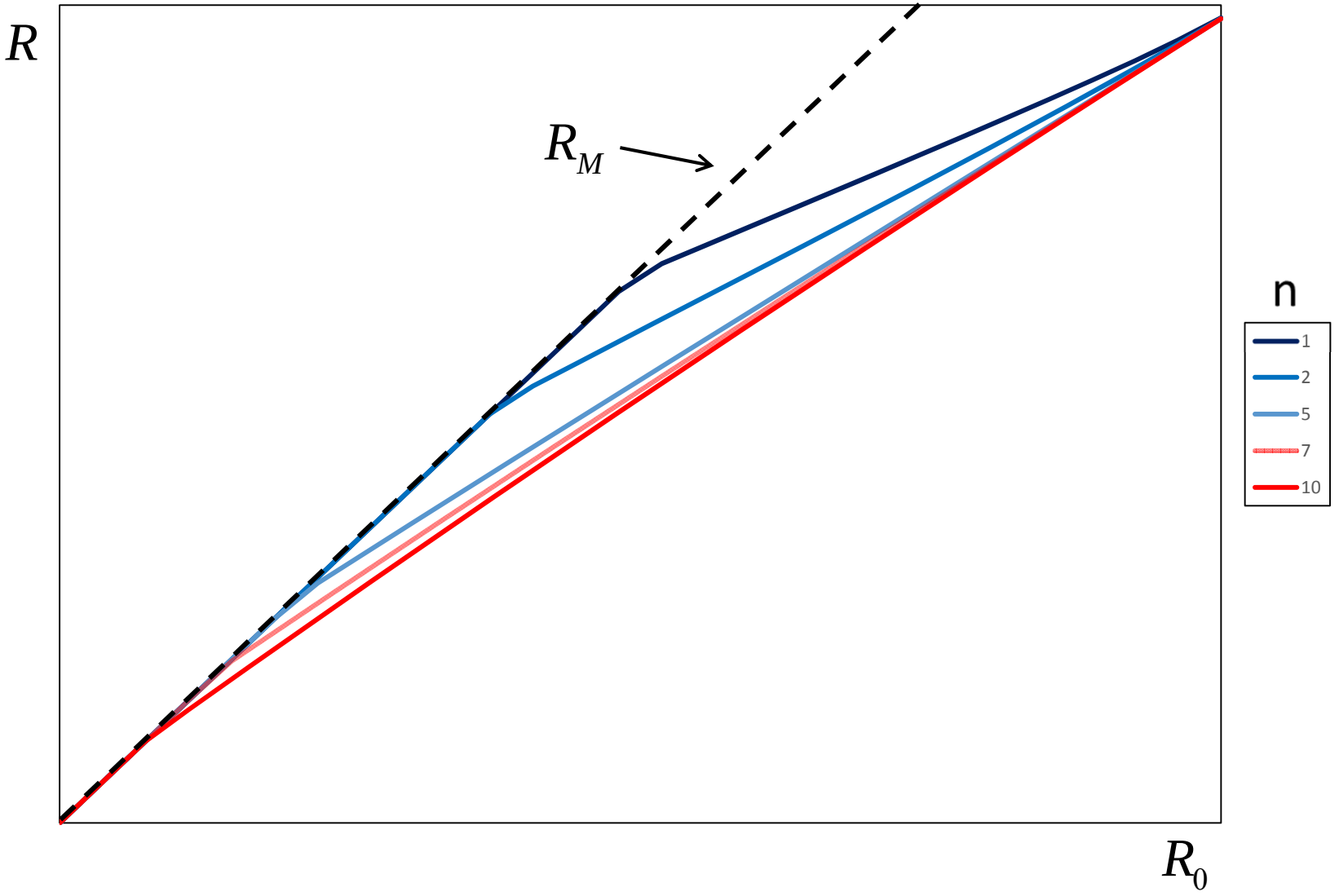
Effect of market finance on loan rates



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

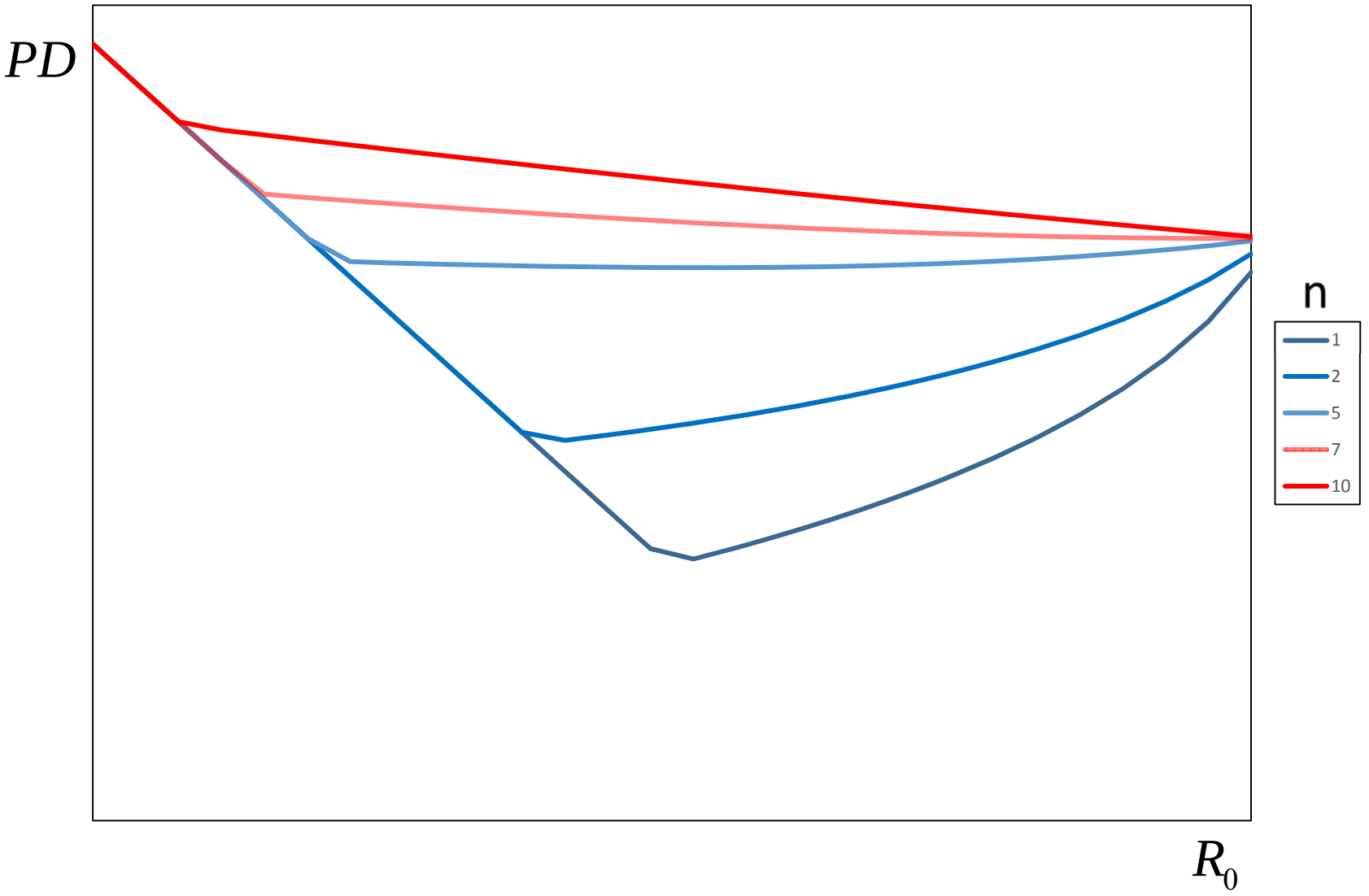
→ Banks' choice of monitoring

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

→ Investors' participation constraint

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

Effects of safe rate and competition on risk



Comments on the results

- 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

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 = $1/n$

Concluding remarks (iii)

- Model is silent about what drives changes in safe rate

  → It may be real factors (savings glut, secular stagnation)

  → It may be monetary policy

- Literature on "risk-taking channel" claims it is the latter

  → But real factors may be driving monetary policy decisions

Some references

• Adrian, T., and N. Liang (2014), "Monetary Policy, Financial Conditions, and Financial Stability," NY Fed Staff Report.

• 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*.