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-through 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

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

→ \( p \) is probability of failure without monitoring
→ \( m \in [0, p] \) is monitoring intensity of lending bank
→ 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

\[
L = \sum_{j=1}^{n} l_j
\]
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 $l_j \rightarrow L = \sum_{j=1}^{n} l_j$
   \[ \rightarrow \text{This determines the loan rate } R = A(L) \]

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

$PD$

$\Delta n$

$n$

$R_0$
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

Investors → Banks → Entrepreneurs

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

\[ R \]

\[ R_M \]

\[ R_0 \]
Effect of market finance on loan rates

$R_M$
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

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

→ Investors’ participation constraint

$$[1 - p + m(B)]B = R_0$$
Effects of safe rate and competition on risk

$PD$ vs $R_0$

$n$ values:
- 1
- 2
- 5
- 7
- 10
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

\[
Risk = \alpha + \beta_0 \ R_0 + \beta_1 \ HHI + \beta_2 \ R_0 \cdot HHI + \text{Controls}
\]

→ where \( HHI = \text{Herfindahl index} = 1/n \)
Some references


