IESE Business School University of Navarra Banking Initiative

Interest Rates, Market Power, and Financial Stability

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Discussion

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Introduction

- Loose monetary conditions resulting in low real interest rates identified as a factor that can lead to a financial crisis.
  - The low monetary policy rates observed before the 2007-2008 financial collapse serve as an example.
- This paper theoretically analyzes the effect of monetary policy on financial institutions' risk-taking, and how this effect depends on the financial sector's market structure.

Approach and results

- Ingredients: intermediaries
    1. have market power in loans,
    2. monitor borrowers lowering their probability of default, and
    3. monitoring is not observable (moral hazard problem).
- Robustness:
    - non-monitored market finance, heterogeneity in monitoring costs, entry and exit of intermediaries, replacing uninsured by insured deposits, market power in raising deposits, and funding including capital.
- Main result:
    - lower (safe) rates lead to lower intermediation margins and higher risk-taking when intermediaries have low market power, but the result reverses for high market power.
- Also:
    - higher competition results in higher risk-taking for any level of the safe rate.

The model (I)

- Two periods, $t = 0{,}1$, and three types of risk-neutral agents:

i. a continuum of deep pocket investors with infinitely elastic supply of funds finance n identical banks at (exogenous) expected return R_0 (safe rate),

ii. a continuum of penniless entrepreneurs, who have projects that require a unit of investment at $t = 0$ (can be borrowed from banks) and yield return $\tilde{R}$ at $t = 1$, where:

$$\tilde{R} = \begin{cases} R(L) & \text{with probability } 1 - p + m \\ 0 & \text{with probability } p - m \end{cases}$$

where $p \in (0{,}1)$ is known, while $m \in [0, p]$ is the monitoring intensity of the lending bank, unobserved by investors.

iii. $R(L) = a - bL, a, b > 0$, where L the sector's total amount of loans is the inverse demand for loans and the success return.

The model (II)

- Project returns are perfectly correlated. Project fails when $z < p - m$ with z uniformly distributed on $[0,1]$.
- Banks compete à la Cournot for loans, have limited liability, offer interest rate $B(L)$ to the (uninsured) investors, and choose monitoring intensity $m(L)$.
- Cost of monitoring is given by:

$$c(m) = \frac{\gamma}{2} m^2, \gamma > 0$$

Results (I)

1. ***Number of banks:*** increasing the number of banks increases equilibrium total lending, decreases the loan rate, lowers monitoring intensity and thus increases the probability of default.
2. ***Main result: Safe rate (I):*** for competitive (concentrated) enough markets, that is n high (low), a higher safe rate translates into higher (lower) intermediation margin and lower (higher) probability of default.
3. ***Safe rate (II):*** if the investors can *lend directly* to entrepreneurs (but cannot monitor), then still for competitive enough markets a higher safe rate translates into lower bank risk-taking, but in concentrated markets: higher safe rates initially reduce the probability of default and only beyond a certain point they increase it.
4. ***Safe rate (III):*** with banks of *heterogeneous monitoring cost*, increases in the safe rate translate into increases in the probability of default of the loans of high cost banks, and decreases in the probability of default of the loans granted by low cost banks, whose market share increases, so that the average probability of default decreases.

Results (II)

5. ***Free entry:*** lower safe rate induces entry and strengthens (weakens or reverses) the negative (positive) relationship between the safe rate and bank risk-taking in competitive (concentrated) markets.
6. ***Insured deposits:*** when deposits are insured, an increase in the safe rate (at which banks borrow) leads to a decrease in the intermediation margin and an increase in the probability of default (as in the base monopoly case).
7. ***Endogenous deposit rates:*** if banks also have market power in raising deposits competing à la Cournot for deposits with linear supply, then as in the baseline model for competitive (concentrated) enough markets a higher safe rate translates into lower (higher) probability of default.
8. ***Endogenous leverage:*** (i) if there is a fixed aggregate supply of bank capital, then as in the baseline model for competitive (concentrated) enough markets a higher safe rate translates into lower (higher) probability of default; (ii) if there is an infinitely elastic supply of capital with a fixed exogenous premium on top of the safe rate, then a lower safe rate always leads to an increase in the probability of default (by increasing leverage and reducing monitoring) similarly to Dell'Ariccia et al. (2014).

General comments

1. Very timely and important issue.
2. Insight: market structure matters on the transmission of safe rates into risk-taking.
3. Work in progress: paper with many specific assumptions, many variations, one proposition and many simulation results. Better settle in one base model.
4. Robustness of the main mechanism:
    - Monitoring increases in the intermediation margin (and lowers probability of default)
    - In the model of the paper lowering safe rate increases (decreases) intermediation margin with monopoly (competition)
    - But sign of impact depends on pass-through (determined by curvature of demand and supply functions) as well as degree on competition.
5. Empirical relevance: is the loan side or the deposit side the main channel for safe rates to influence margins?

Monti-Klein model

- Monopoly bank's profit is the sum of intermediation margins on loans and on deposits minus management costs (no reserve requirement, r is the interbank rate)

$$\pi(L,D) = r_L(L)L + r(\underbrace{D - L}_{Net\ position\ interbank}) - r_D(D)D - C(D,L)$$

$$= (r_L(L) - r)L + (r - r_D(D))D - C(D,L)$$

- Assume $\pi(L,D)$ is concave. FOC:

$$\frac{\partial \pi}{\partial L} = r_L'(L)L + r_L - r - C_L'(D,L) = 0,$$

$$\frac{\partial \pi}{\partial D} = -r_D'(D)D + r - r_D - C_D'(D,L) = 0$$

Monti-Klein model

- Elasticities of demand for loans and supply for deposits:

$$\eta_L = -\frac{r_L L'(r_L)}{L(r_L)} > 0 \text{ and } \eta_D = \frac{r_D D'(r_D)}{D(r_D)} > 0$$

Lerner indices:

$$\frac{r_L^* - (r + C_L')}{r_L^*} = \frac{1}{\eta_L(r_L^*)},$$

$$\frac{r - C_D' - r_D^*}{r_D^*} = \frac{1}{\eta_D(r_D^*)}$$

- Solution of FOCs is independent for *D* and *L* if costs are separable.

Cournot oligopoly model (symmetric)

$$\frac{r_L^* - (r + C_L')}{r_L^*} = \frac{1}{N\eta_L(r_L^*)},$$

$$\frac{r - C_D' - r_D^*}{r_D^*} = \frac{1}{N\eta_D(r_D^*)}.$$

- Monti-Klein can be reinterpreted as model of imperfect competition with extremes $N = 1$ (monopoly) and $N = +\infty$ (perfect competition)

The determinants of pass-through (loans)

- Given $f(Q)$, let $\delta_f \equiv Qf''/f'$ be constant. For $f' < 0$, $1 + \delta_f > (<) 0$, f is log-concave (log-convex).
  - Log-concavity of demand is standard in Cournot models (then game is of Strategic Substitutes and equilibrium exists).
  - With constant elasticity demand for loans we have log-convexity and $1 + \delta_L = -\frac{1}{\eta_L} < 0$.
- Pass-through (with constant marginal costs):

$$\frac{\partial r_L^*}{\partial r} = \frac{1}{1 + \frac{1 + \delta_L}{N}}$$

- With log-concave demand for loans, $\frac{\partial r_L^*}{\partial r} < 1$ and margin $r_L^* - r$ decreases with r.
- With log-convexity $\frac{\partial r_L^*}{\partial r} > 1$ there is overshifting and margin $r_L^* - r$ increases with r.
- As the intensity of competition increases (N grows), r_L^* becomes more (less) sensitive to changes in r if $r_L(L)$ is log-concave (log-convex): $\frac{\partial r_L^*}{\partial r \partial N} > 0$ ($\frac{\partial r_L^*}{\partial r \partial N} < 0$).
- Effect of entry: A lower safe rate r increases loan profits if $2 + \delta_L > 0$.

The determinants of pass-through (deposits)

- Pass-through (with constant marginal costs):

$$\frac{\partial r_D^*}{\partial r} = \frac{1}{1 + \frac{1 + \delta_D}{N}}$$

- When $1 + \delta_D > 0,$ (e.g., with linear or with constant elasticity supply for loans $1 + \delta_D = \frac{1}{\eta_D} > 0$), which implies SS in deposit game,

$$\frac{\partial r_D^*}{\partial r} < 1 \text{ and margin } r - r_D^* \text{ increases with } r$$

- Opposite result when $1 + \delta_D < 0$.
- As the intensity of competition increases (N grows), r_D^* becomes more (less) sensitive to changes in r if $1 + \delta_D > 0$ $(1 + \delta_D < 0)$.

Market structure matters, but how?

- Pass-through (of safe rate into loan rate/margin):
  - With log-concave loan demand pass-trough is incomplete (i.e. *decrease in safe rate increases margin*), more competition increases pass-through and margin tends to increase less (no change in the limit when N tends to infinity)
  - With log-convex demand there is overshifting (i.e. decrease in safe rate lowers margin) and more competition lowers pass-through and margin tends to decrease less (no change in the limit when N tends to infinity)
- Pass-through (of safe rate into deposit rate/margin):
  - With $1 + \delta_D > 0$, *decrease in safe rate decreases margin*, more competition increases pass-through and margin tends to decrease less (no change in the limit when N tends to infinity). And with negative rates there is no pass-through!
  - With $1 + \delta_D < 0$, decrease in safe rate increases margin, more competition lowers pass-through and margin tends to increase less (no change in the limit when N tends to infinity)

Consistency of results

- To obtain that margin moves positively with safe rate with competition and negatively with monopoly
  - i.e. lowering safe rate increases (decreases) intermediation margin with monopoly (competition)
- If we think $1 + \delta_L > 0$ and $1 + \delta_D > 0$ are the normal cases (they deliver SS in Cournot games) then could have that for N low, loan margin effect predominates over deposit margin effect and the opposite for N high.
- In loan market: could have log-concave demand for N low and log-convex demand for N large.

Empirical relevance

- Is the main impact of decrease of safe rate coming from the deposit or from the loan side?
  - Conjecture: A decrease in safe rate lowers profits out of deposits (in particular, with negative rates) and increases them from loans but the first effect dominates.
  - With negative rates, profits and entry go down.
- Main channel: decrease in safe rate leads to decrease in deposit charter value and increase in risk taking (Keeley 1990, Matutes and Vives 2000, Hellman et al. 2000, Repullo 2004):
  - Result in paper that higher competition results in higher risk-taking for any level of the safe rate is in line with charter value literature.
  - Drechsler et al. (2018): the deposit franchise is what allows banks to lend long term (hedge of maturity transformation).
- Macropudential considerations
  - Risk factor should depend on aggregate activity which in turn is influenced by the volume of loans: boom and bust.
  - Coordination problems in loans: Bebchuk and Goldstein (2011), Vives (2014).

Other comments

1. Linear demand for loans (and all bargaining power for banks).
2. Assumption of perfect correlation of project returns leaves no room for diversification through higher loan provision amount by the banks, which can serve as an alternative risk-management tool to monitoring.
3. Monitoring:
    - When banks as well as entrepreneurs can influence the risk of investment projects, the relationship between competition and risk taking becomes ambiguous.
    - The choice between monitoring and credit rationing depends on the degree of competition. A monopoly bank uses more monitoring and less credit rationing (Caminal and Matutes 2002).
    - Degree of transparency of monitoring: Cordella and Yeyati (2002) extending Matutes and Vives (2000).
4. Competition à la Cournot for loans or Bertrand competition with differentiated products?
    - What is the capacity constraint today for a bank to give loans?
5. Competition à la Cournot for deposits or Bertrand competition with differentiated products (Matutes and Vives, 1996, 2000)?