Optimal Prudential Regulation of Banks and the Political Economy of Supervision

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The views expressed in this paper are those of the authors and need not represent either the views of the World Bank, its Executive Directors or the countries they represent.

Introduction

- Tame risk taking incentives in the financial sector during booms and prepare capital buffers for downturns
- Was it lax monetary policy (Taylor, Rajan) or supervision (Bernanke)?
- Political pressures to relax lending standards during booms (Rajan, 2010; Johnson and Kwak, 2010)
- Basel III (CRDIV/CRR in the EU)
  - Capital: more and better
  - Liquidity
  - Macro-prudential measures:
  countercyclical measures and charges to SIFIs

Introduction

- Objectives:

  Develop a theory of bank "excessive risk taking"

  to analyze interplay between optimal capital regulations and political economy of banking supervision

- Derive optimal financial regulations:

CAR contingent on macro-economic conditions (interest rates, productivity) and institutional factors (efficiency of banks, quality of supervision and of corporate governance)

- Preferences of economic agents with respect to supervision vary through the cycle

Literature

- Macroprudential policies and pecuniary externalities
- Risk taking channel of monetary policy
- Prudential regulations and resilience and optimality of banking equilibrium
- Political economy of the financial crisis

Introduction

- Optimal financial regulation:

  - Standard moral hazard effect: incentives improve when return/productivity is high or interest rate is low

  - Collusion effect: low interest rate → bank capital is scarce, and there is more collusion

- Two opposite effects:

  - Should be binding when interest rates (or return on capital) are low while allowing for higher leverage

  - CAR that prevents collusion varies:

    pro-cyclically with interest rates

    counter-cyclically with return on capital/productivity

- CAR should be inversely related to efficiency of banks, quality of supervision and of corporate governance

Introduction

- Political economy:

  - Endogenous supervision quality: political economy pressures to relax supervision when it should be tightened:

  with low interest rates: banks prefer low quality of supervision

  with high interest rates: borrowers prefer better supervision to lower the cost of bank credit

Model

- Key elements:
  - Monitoring role of banks and scarcity of bank capital
  - Two layers of moral hazard (banks, borrowers) + collusion because of imperfect supervision
- With imperfect stochastic supervision, banks enjoy pure rent equal to private benefits of controls when audits are of poor quality
- When interest rates (or return on projects) are low, incentives to relax banks' incentive compatibility, and increase proportion of profits pledged to investors
- Not always socially optimal (pecuniary externalities), hence room for regulations

Model

- 4 types of agents (Holmstrom and Tirole (1997)):

  Entrepreneurs (wealth 1)

  Banks (capital K_B): monitoring role

  Investors (cost of funds $\gamma <$ cost of bank capital)

  Supervisor (stochastic auditing technology)
- No aggregate uncertainty
- Moral Hazard:

  (1) in production (choice of project not observable);

  (2) in banking (monitoring not observable).

Timing

Period 1: Agents write financial contracts.

Period 2: Agents discover extent of (bank specific) auditing,
audits take place and projects are undertaken.

Period 3: Realization of outcomes,
Payments to financiers, investors and entrepreneurs

- Projects funded, banks monitor (or not if collusion)
- Side-transfer from firm to bank when collusion

Production Structure

Linear technology with ex-ante moral hazard:

Two types of projects

- Good project: verifiable financial return : R per unit of capital

$Y = R$ with probability p

$= 0$ with probability $1-p$

-Bad project: non pledgeable private benefit (not verifiable)

$Y = B$ with probability 1 if no monitoring

$= b<B$ with probability 1 if monitoring

Banking Sector

- Monitoring: - Non verifiable cost c per unit of capital
  - Reduces private benefit $b < B$
  - Monitoring is not observable,

  → banks must co-finance projects to have incentives to monitor

- Market rate of return on bank capital: $\beta > \gamma$

  Each bank finances 1 project (not diversified)

  Many competitive intermediaries

- Collusion and the Quality of Banking Supervision

  - costly non-verifiable transfer from entrepreneur to Bank: S

$$S \longrightarrow k_C S$$

- Stochastic audit technology: perfect auditing $k_C = 0$ Proba q

  (idiosyncratic) Imperfect auditing $k_C = k<1$ Proba 1-q

Optimal financial contracts

Max b * I

s.t.: $1+I_B+I_I=1$

$R.I=R_E+R_B+R_I$

No Collusion Contracts

Incentives constraints:

Entrepreneur: $p \cdot R_E = b \cdot I$

Bank: $p \cdot R_B = (c + k\Delta B) \cdot I$

Participation constraints

Bank: $pR_B - cI = \beta \cdot I_B$

Uniformed investors : $pR_I = \gamma \cdot I$

Partial Collusion Contracts

Incentives constraints:

Entrepreneur: $p \cdot R_E = b \cdot I$

Bank: $p \cdot R_B = c \cdot I$

Participation constraints

Bank: $\tilde{p}R_B - qcI + (1-q)k\Delta B = \beta I_B$

Uniformed investors : $pR_I = \gamma \cdot I$

Basic trade-off

- Partial collusion occurs if and only if:

$$\beta > \gamma \cdot \Psi$$

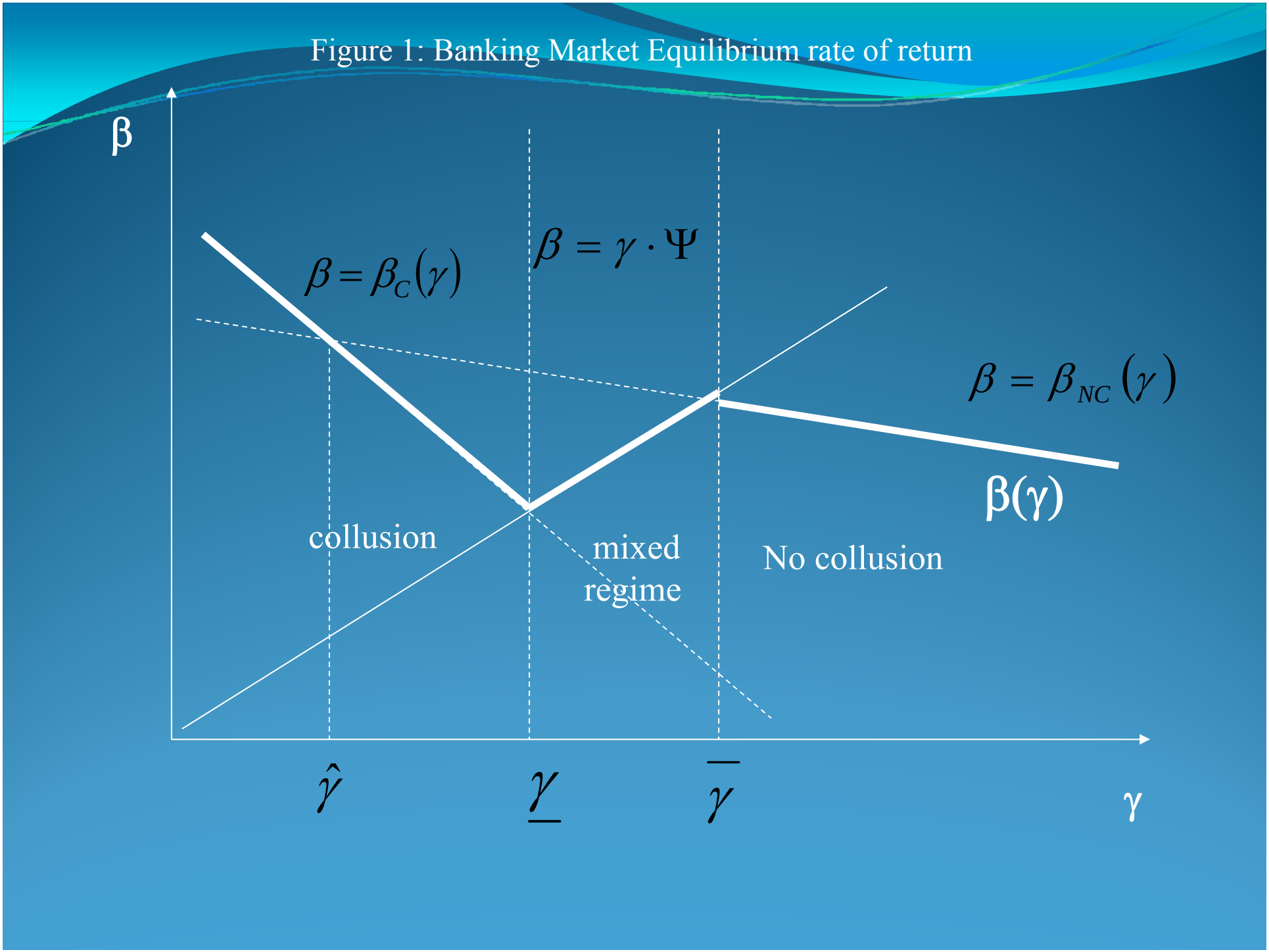
  - Basic tradeoff:

$$(\Lambda_{NC} - \Lambda_C) \cdot \left(1 - \frac{\gamma}{\beta}\right) > (p - \hat{p}) \cdot \left(R - \frac{b + c + k\Delta B}{p}\right)$$

LHS: gain in leverage from shifting financial return to investors from banks
RHS: cost = reduction in expected return

- Collusion easier when :
  - Low quality of bank supervision
  - High private benefits of control
  - High costs of monitoring

Figure 1: Banking Market Equilibrium rate of return



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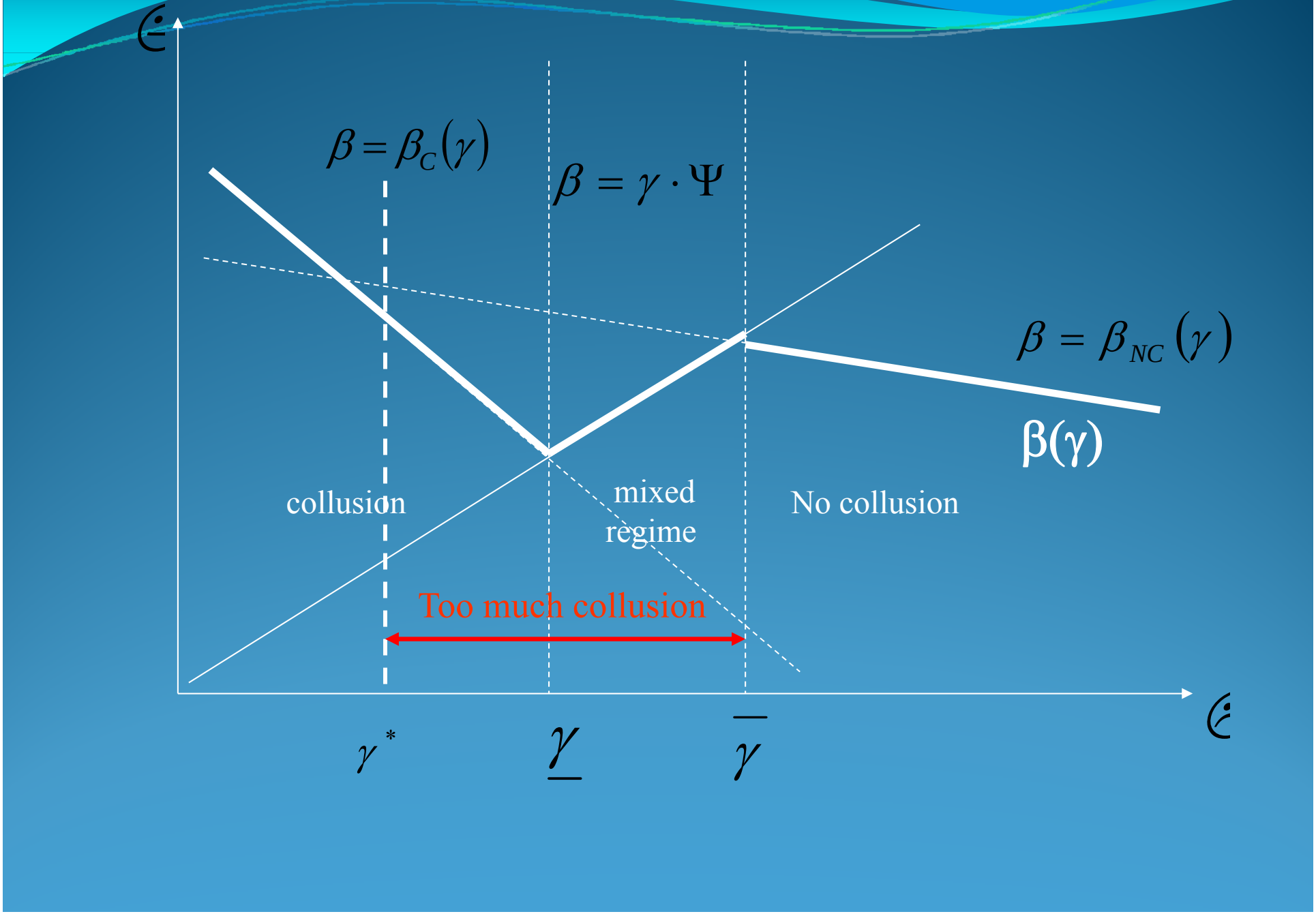


Banking Capital Regulation (I)

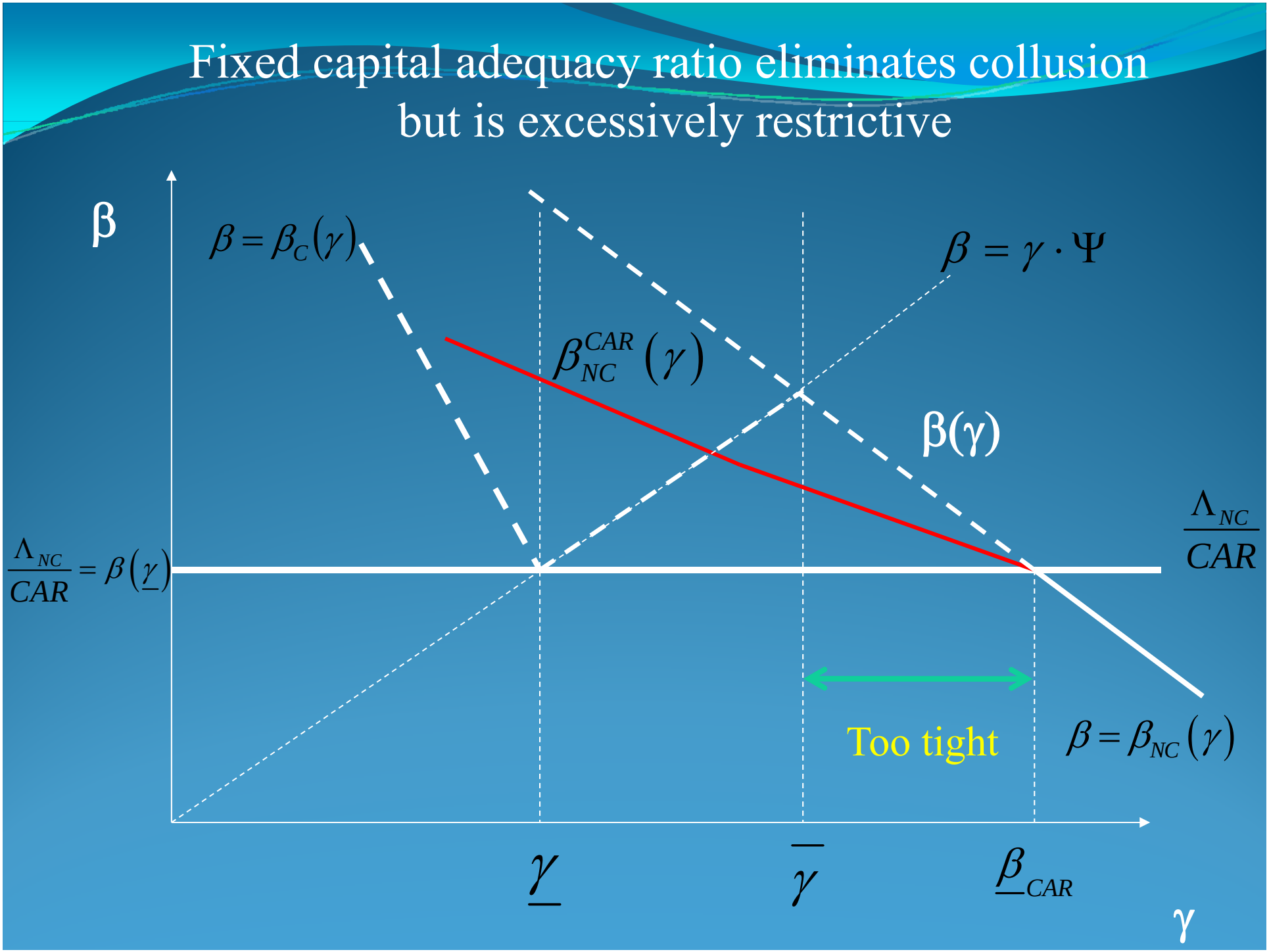
- **Fixed capital adequacy ratio:** $\frac{I_B}{I} \geq CAR$

- For collusion-proof contract: - binding when $CAR > \frac{\Lambda_{NC}}{\beta}$
  - investment ↘

- For collusion contract: - binding when $CAR > \frac{\Lambda_C}{\beta}$

- **Basic concern:** CAR is either too tight or does not prevent collusion

Fixed capital adequacy ratio eliminates collusion but is excessively restrictive



Banking Capital Regulation (II)

- Optimal capital adequacy rule:

(1) Investment maximized with no collusion contracts
(2) Collusion contracts never chosen in equilibrium

$$CAR\left(\beta(\gamma)\right) = \frac{I_B}{I} = \frac{\Lambda_{NC}}{\beta_{NC}(\gamma)}$$

And verifies for all γ: $CAR > \dfrac{\Lambda_C}{\beta_C(\gamma)}$

$$CAR\left(\overset{+}{\gamma}, \overset{+}{K_B}, \overset{-}{R}, \overset{+}{c}, \overset{+}{k\Delta B}, \overset{+}{b}\right)$$

- Procyclical with cost of funds γ
- Countercyclical with physical capital return R
- More stringent when supervision or corporate governance low quality or banks less efficient at monitoring

Calibration of the Countercyclical Capital Buffer

- Basel III uses gap between the credit-to-GDP ratio and its long-term trend as a guide for setting CCB.

- Standard criticisms:

  (i) the suitability of the guide given the objective of the buffer;
  (ii) the early warning indicator properties of the guide for banking crises
  (iii) practical measurement problems

- Implications of model:

  - Does credit to GDP gap reflect risk taking from low interest rate environment of acceleration of productivity?
  - Quality of supervision and corporate governance are important parameters

Political Economy of Banking supervision (I)

• Agents preferences on quality of supervision:

$$k \in \left[k_{\min}, k_{\max}\right]$$

• **With collusion-proof contracts:**

- A higher k (less efficient supervision) redistributes financial return of investors towards banks.
- At given β this reduces borrowing capacity of entrepreneur
- Return β declines

• **With collusion contracts:**

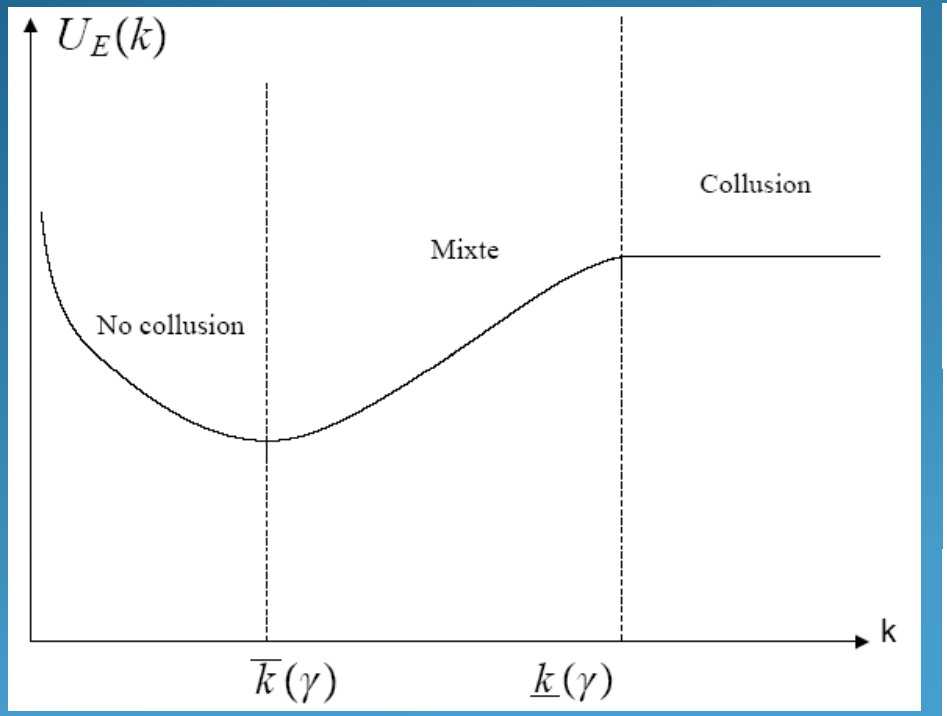
- A higher k increases private benefits of bad project for the bank
- No effect on financial return received by investors (because bank incentivized only if audit perfect)
- Increase investment leverage of entrepreneur

• A higher k makes collusion regime more likely

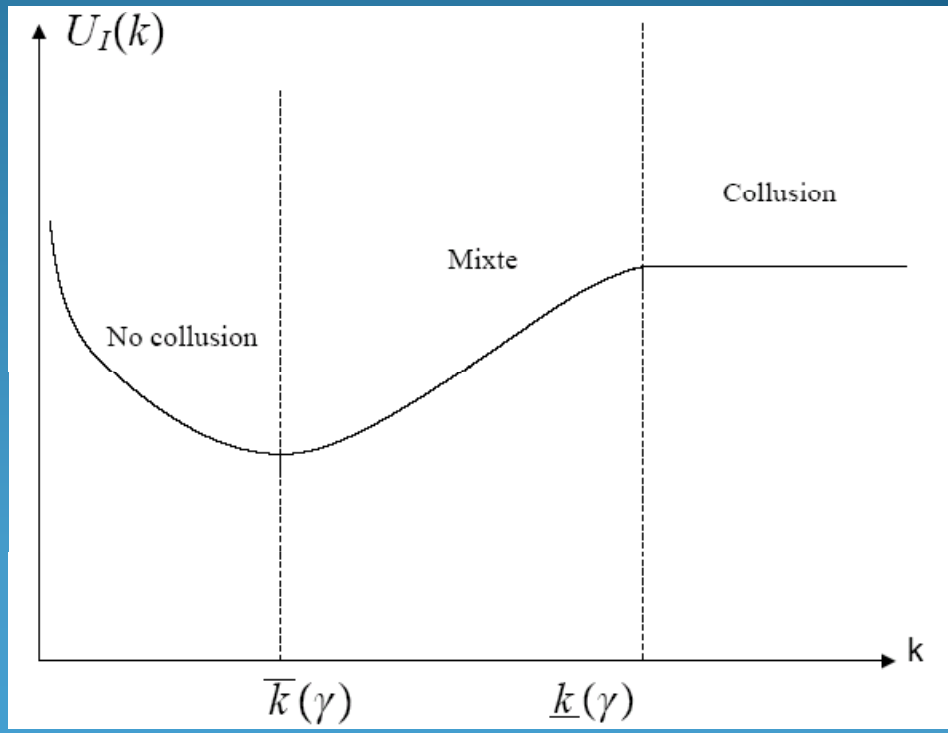
Political Economy of Banking supervision (II)

- Taking into account the general equilibrium effects of k on β

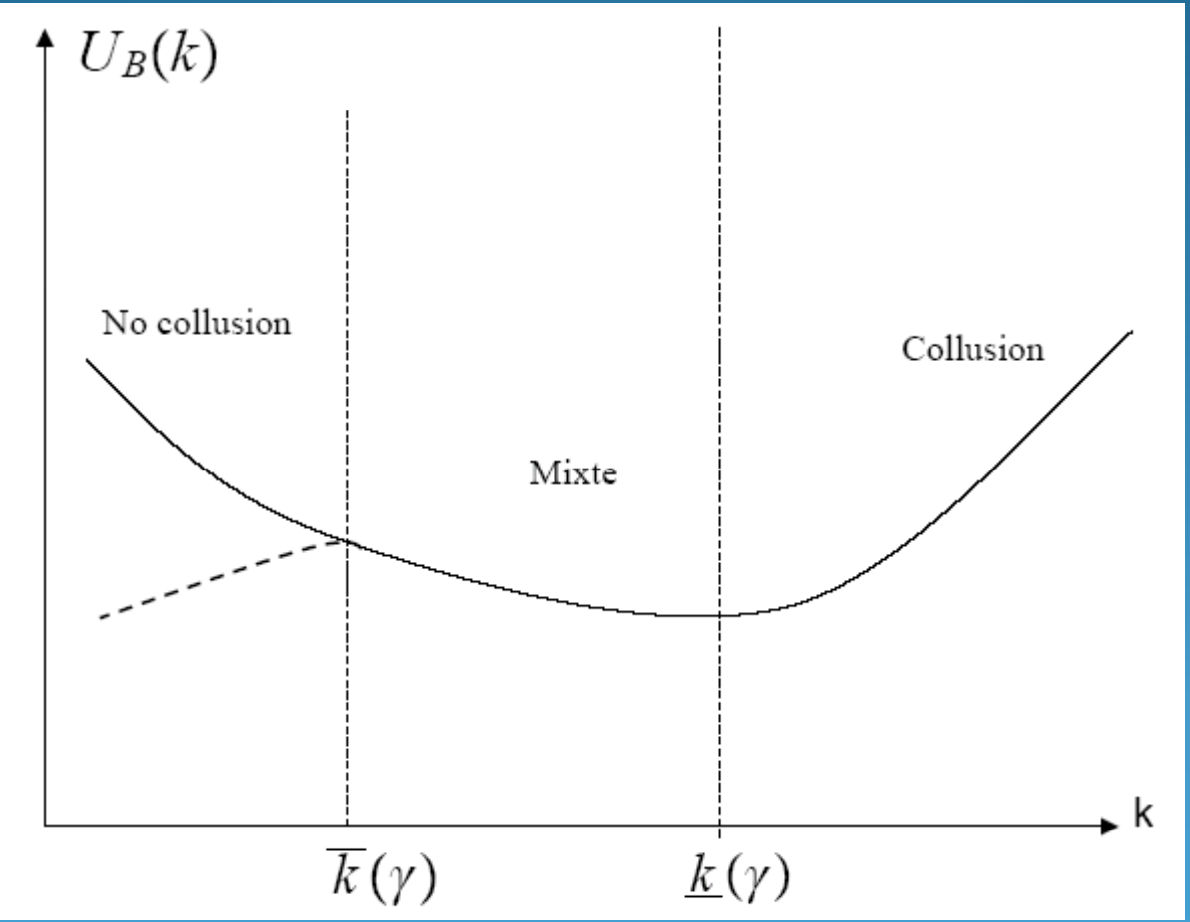
Entrepreneurs



Investors



Preferences of banks



Political Economy of Banking supervision (III)

- Political support for /against better quality of banking supervision depends on audit technology and value of cost of funds γ

- For low interest rates or low return on project:

  Collusive regime /political support for weak banking supervision

- For high interest rates or high return on projects:

  Political support for stricter banking supervision
  Banking capital market characterized by collusion proof regime

- **Financial regulation:** Optimal CAR rule $\uparrow$ with k

  when interest rates γ are low, optimal CAR rule has to be tightened because of political economy considerations

Conclusion

- Theory of excessive risk taking when supervision quality is imperfect and influenced by political process
- Equilibrium contracts are not always efficient hence need for ex-ante capital regulation
- Optimal regulation is:
  - Pro-cyclical with interest rates
  - Countercyclical with return on projects
- Political economy of supervision results in weakening of audits quality when it should instead be improved during booms

Additional Slides

Optimal Financial Contracts: size of projects

- Net expected return per unit of capital invested (j=C,NC):

Investors: $$\Phi_j = \gamma \frac{I_I}{I}$$

Banks: $$\Lambda_j = \beta \frac{I_B}{I}$$

⟹ Investment size: $$I = \frac{1}{1 - \frac{\Phi_j}{\gamma} - \frac{\Lambda_j}{\beta}}$$

Contract chosen maximizes present value of financial returns to external financiers (banks & investors):

$$\frac{\Phi_j}{\gamma} + \frac{\Lambda_j}{\beta}$$

Social Optimum

$$Max_{j\in\{C,NC\}}\left[bI_j+\beta_j K_B+\gamma I_{I,j}\right]$$

- Incentives constraints,
- Participation constraints,
- Resource constraint

$$Max_{j\in\{C,NC\}}\left[b+\Lambda_j+\Phi_j\right]\cdot I_j\left(\gamma,\beta_j(\gamma)\right)$$

i) Collusion is socially optimal when $\gamma > \gamma^*$

ii) $\gamma^* < \underline{\gamma}$

- Too much collusion under Market Equilibrium: Pecuniary externality
- Switch to collusion contracts: maximize leverage I
- No internalization that social return on project & β ↘

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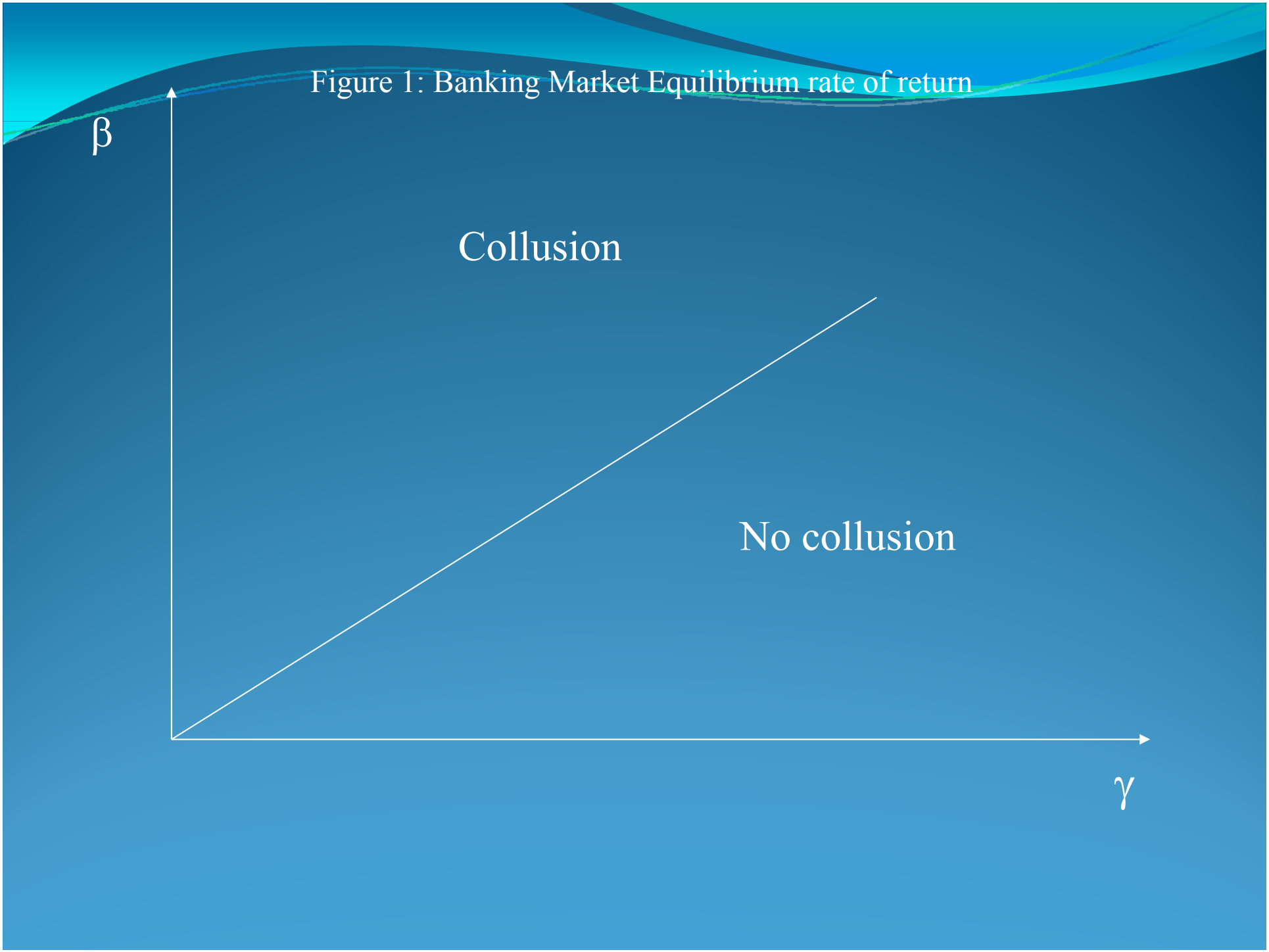


Role of Bailouts

• Two effects of « exogenous guarantees » :
- probability of financial payment rises: return to investors ↗
- more difficult to incentivize banks : return to investors ↘

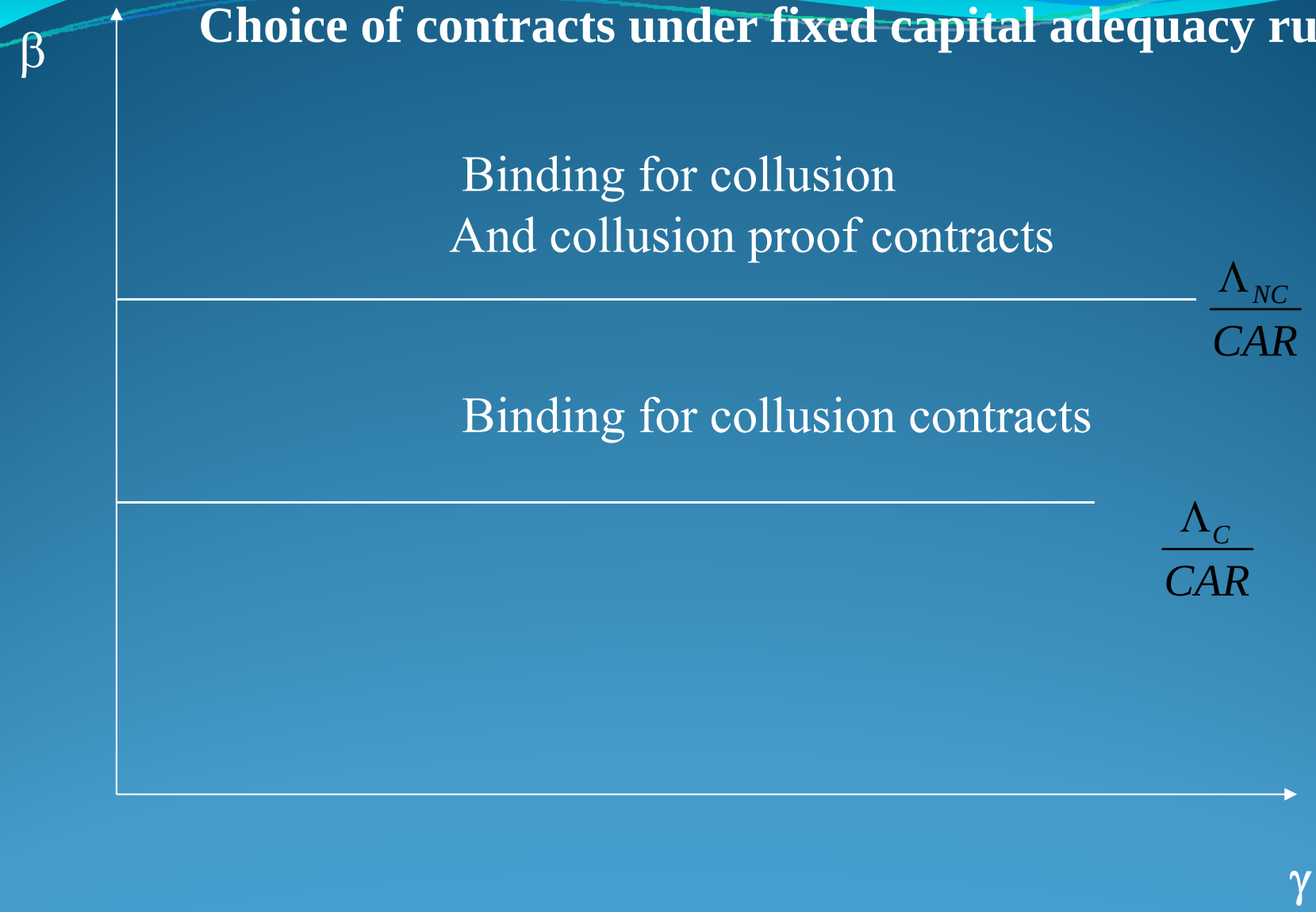
first effect dominates for small bailout guarantees
second effect dominates for large bailout guarantees.

⇒ Optimal capital adequacy rule: non monotonic in θ.

↘ with small bailouts and ↗ with large bailouts.

• Endogenous systemic bailout guarantees if Loss/GDP large enough
multiple equilibria: collusion contracts & bailouts
collusion proof contracts & no-bailouts

Choice of contracts under fixed capital adequacy rule



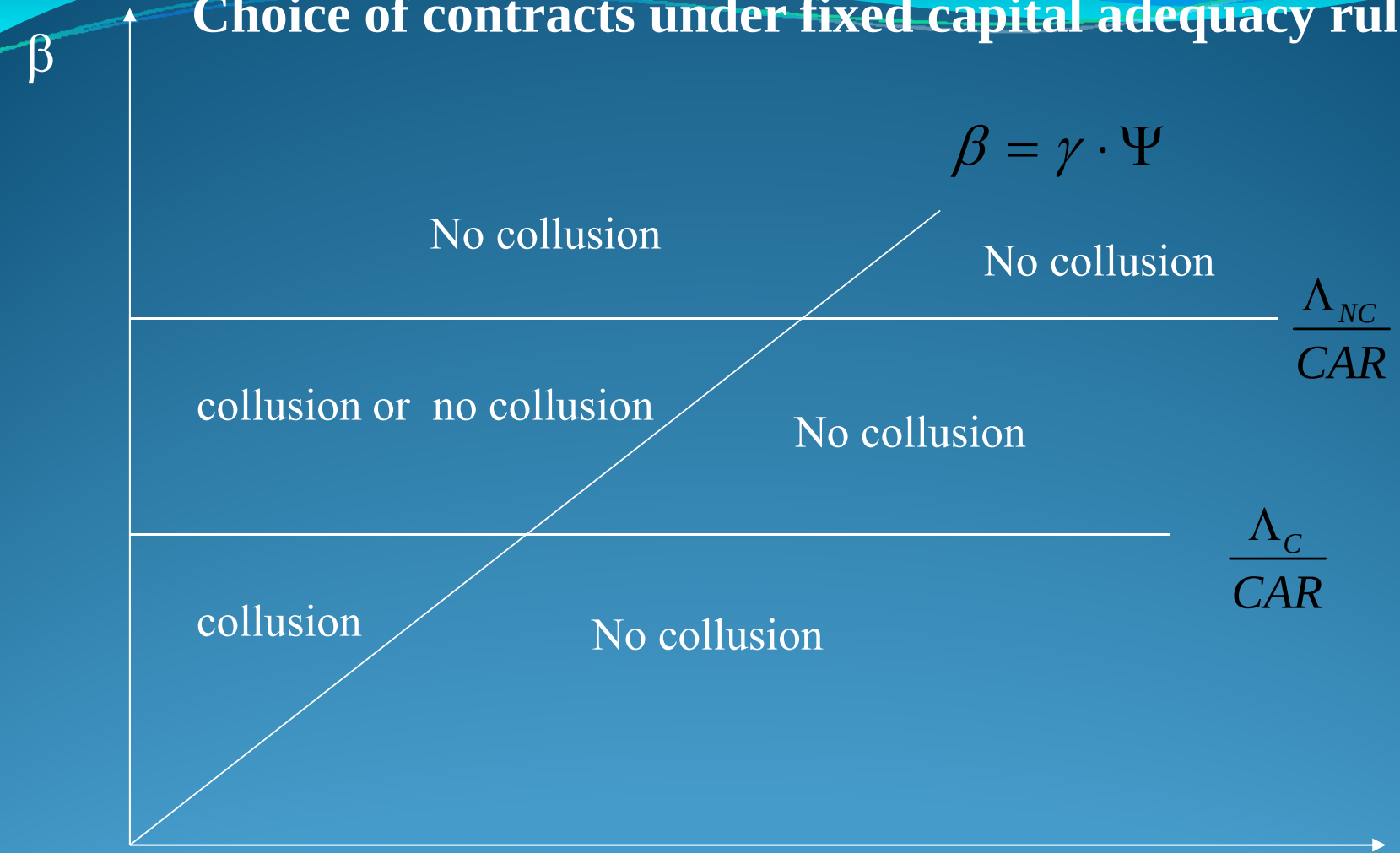
Intuition:

- At given return on bank capital:
  - Expectation of many failed projects (more likely in collusion regime)
  - Lowers return on good productive projects
  - Worsens moral hazard problem / more difficult to incentivize banks

  ⟶ increases benefit of collusion contracts
  (relax bank incentive constraint)

- General equilibrium effect :
  - When contracts anticipated to be collusion contracts,
  - Overall borrowing capacity of entrepreneur is lower.
  - Lower aggregate demand for bank capital,
  - Fall in equilibrium return on bank capital.

Choice of contracts under fixed capital adequacy rule



CAR restrictive enough can deter collusion

Banking Capital Market Equilibrium

$$K_B = I_B(r, R)$$

$$I_B(r, R) = I_B^{NC}(r, R) = \frac{1}{\theta} \frac{\partial V_{NC}(r, R)}{\partial r} \quad \text{when } \theta < \theta^*$$

$$= I_B^{C}(r, R) = \frac{1}{\theta} \frac{\partial V_{C}(r, R)}{\partial r} \quad \text{when } \theta > \theta^*$$

$$= \Delta I_B^{NC}(r, R) \equiv \Delta I_B^{C}(r, R) \text{ when } \theta = \theta^*$$

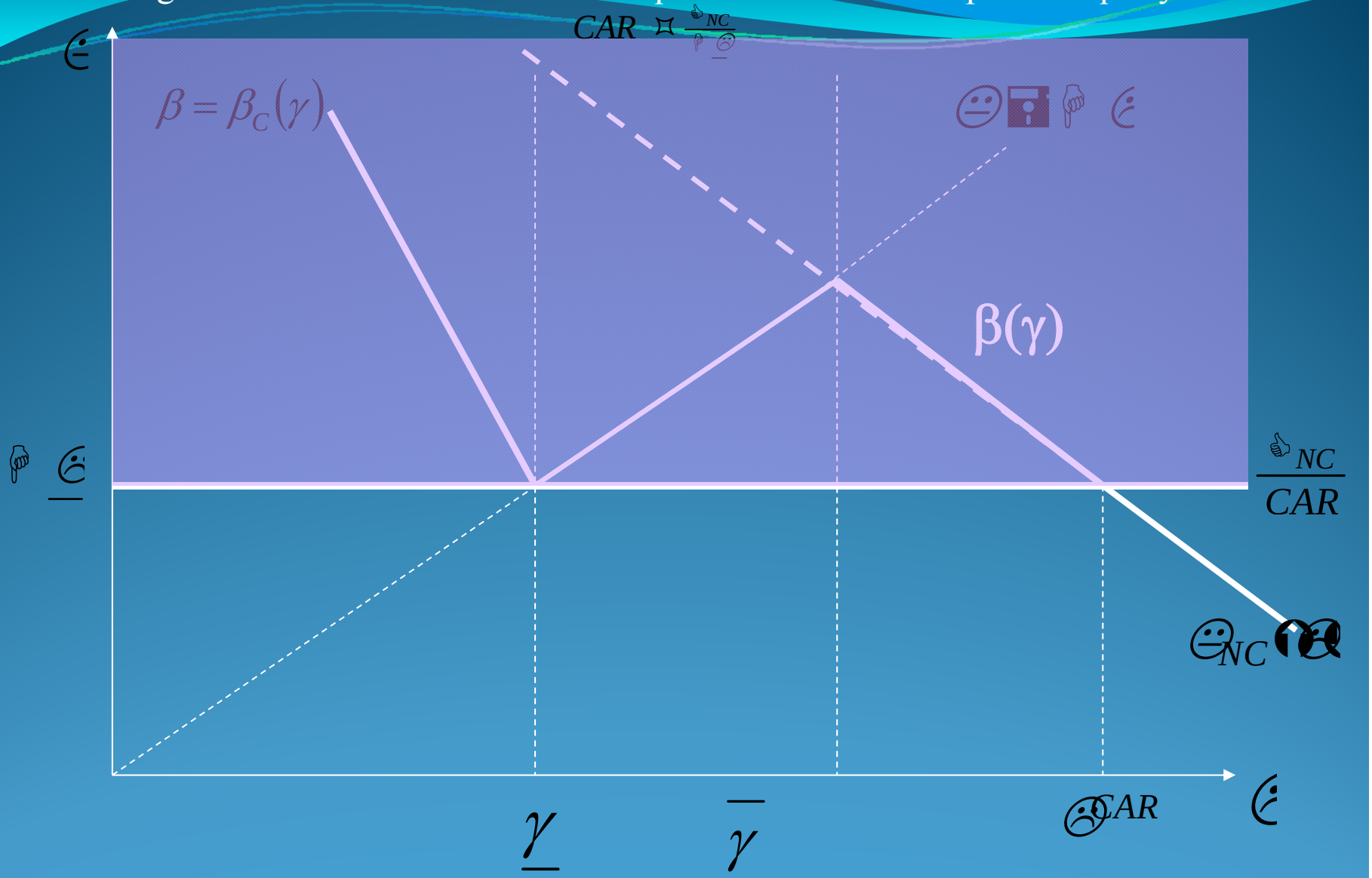
$\Rightarrow \theta_{NC}(R)$ And $\theta_C(R)$

Bailout guarantees

- Ex-post bail-out/closure policy of banks:
  - exogenous probability θ of a public guarantee ex-post if the project fails

  - bailout is financed by lump-sum taxes.

Figure 3: Elimination of collusion equilibria with fixed capital adequacy ratio



CAR restrictive enough can deter collusion

Systemic endogenous Bailouts

- Fraction ❑ endogenous :

  Paid when value of failed projects to GDP above threshold x

  x such that bailouts occur with collusion regime

  does not occur with no collusion regime

- For expected bailouts

  Multiple banking market equilibria can occur:

  - Equilibrium with no systemic bailout

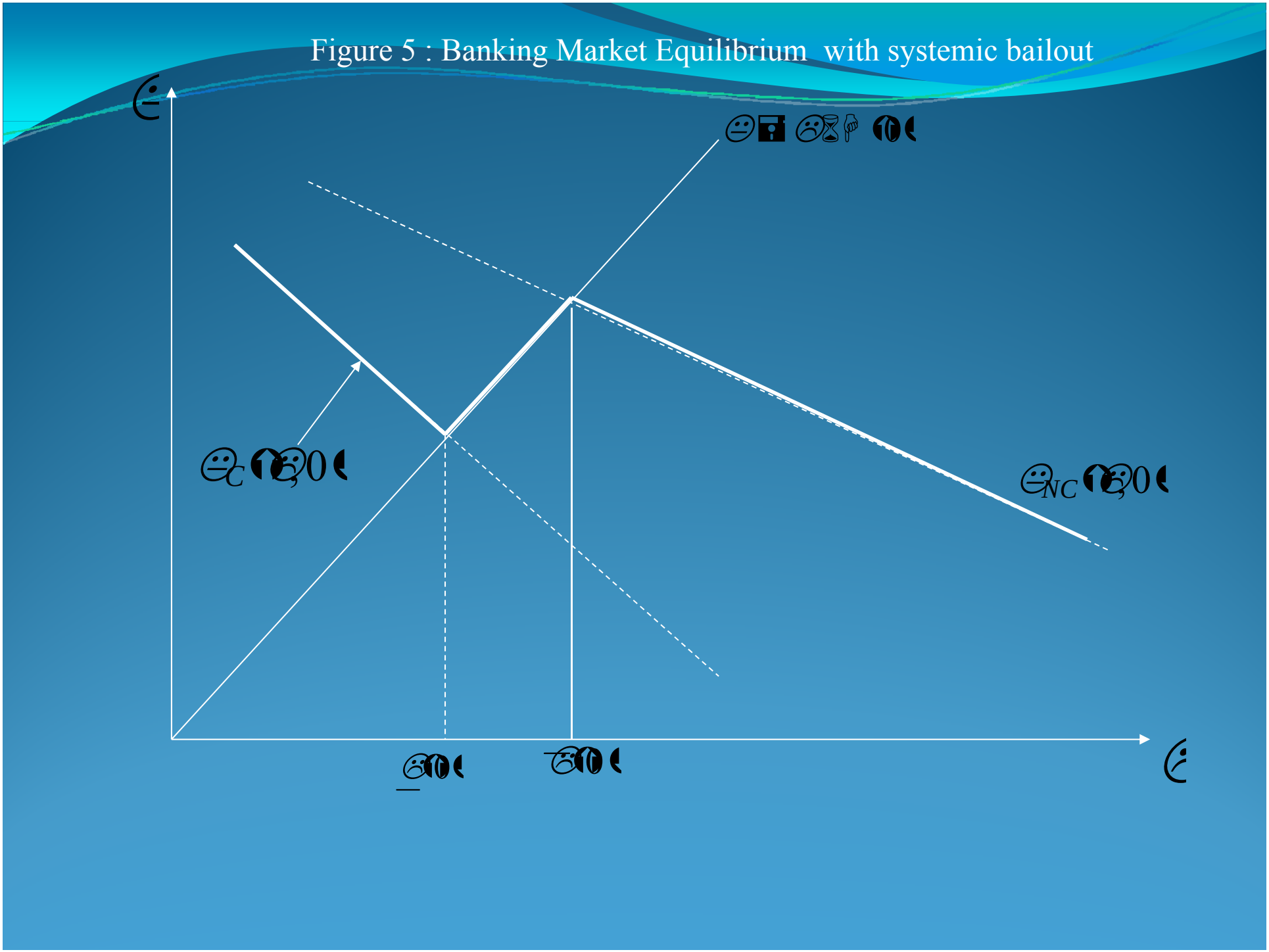
    high proportion of collusion-proof contracts

  - Equilibrium with systemic bailout of size θ.

    high proportion of collusion contracts

potential for a systemic bailout leads to complementarity between choices of financial contracts.

Figure 5 : Banking Market Equilibrium with systemic bailout



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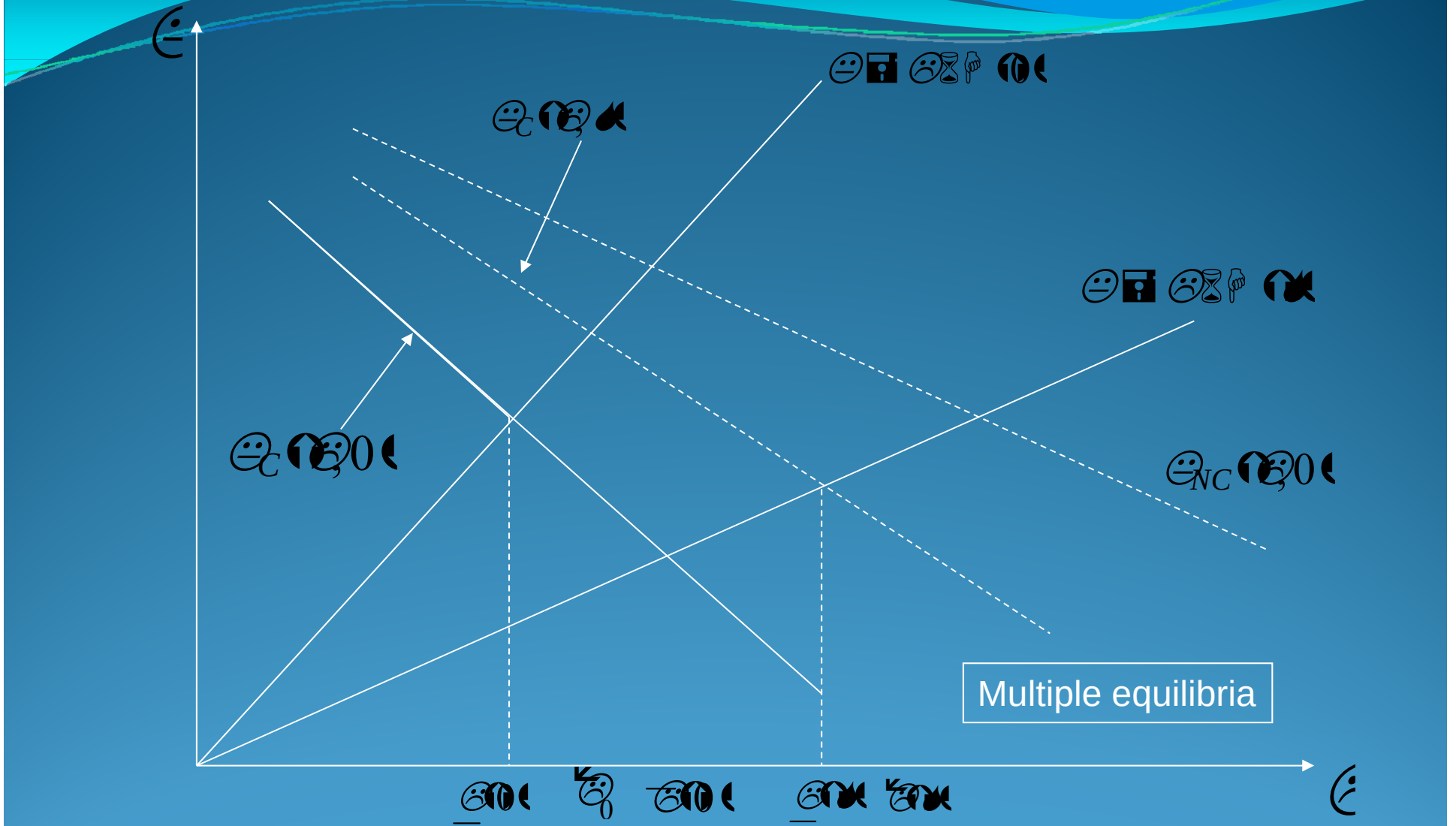

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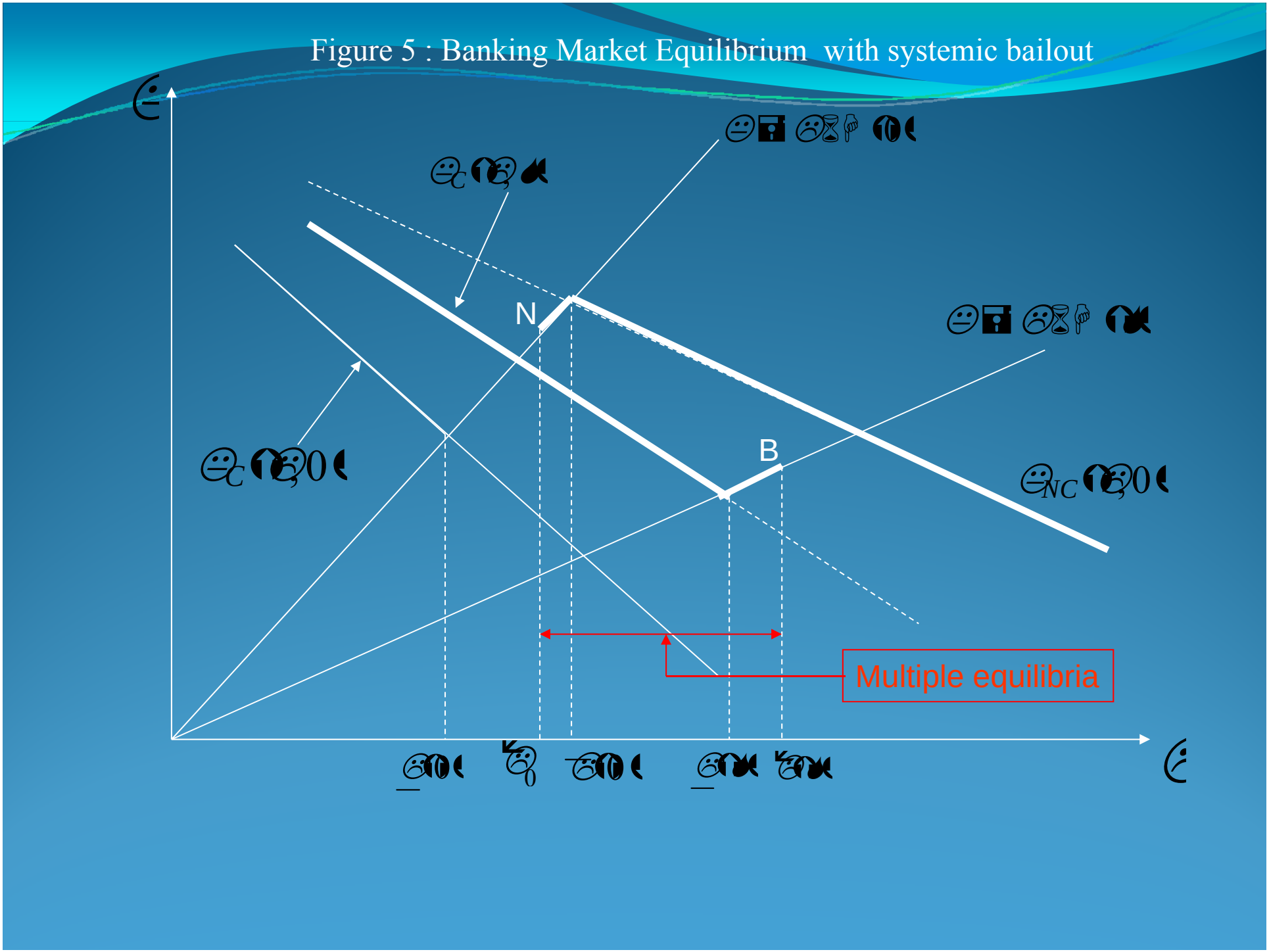

Capital adequacy ratios and systemic Bailouts

- Again two effects :

- probability of financial payment rises: lower I_B/I and CAR ↘

- more difficult to incentivize banks : higher I_B/I and CAR ↗

first effect dominates for small expected bailouts
second effect dominates for large expected bailouts.

Optimal Financial Regulation with Productive Externalities

- Productive externality: Return R on the project if successful, depends on number X of other successful projects in the economy

When externalities are strong enough :

- Banking market equilibrium is more likely to sustain a collusion regime
- For ranges of γ : multiple equilibria

- Optimal capital adequacy:
  1. Make CAR rule contingent on estimate of state of the economy
  2. CAR + share μ of bank capital is invested in storage technology to raise the return on bank capital in bad equilibrium

Capital adequacy rule has to be modified:

$$CAR\left(\overline{\beta}(\gamma)\right) = \frac{\Lambda_{NC}}{\overline{\beta}_{NC}(\gamma)}$$

Effective at deterring collusion iff

$$\frac{\Lambda_{NC}}{\overline{\beta}_{NC}(\gamma)} > \frac{\Lambda_{C}}{\underline{\beta}_{C}(\gamma)} \Leftrightarrow \Phi_{NC}\left(\overline{R}(\varepsilon)\right) < \Phi_{C}\left(\underline{R}(\varepsilon)\right)$$

May not hold :

- Lower expected return on projects R ⟶ fall in total investment
- Depressed return on bank capital
- Increased share of bank finance because moral hazard worse: I_B/I

if effect large enough, flexible CAR **not binding for collusion contracts**

$\overline{R}$

Optimal CAR with productive externalities

1. Make CAR rule contingent on estimate of state of the economy:

   if $R = \overline{R}$ use $CAR\left(\overline{\beta}(\gamma)\right) = \dfrac{\Lambda_{NC}}{\overline{\beta}_{NC}(\gamma)}$

   if $R = \underline{R}$ use $CAR\left(\underline{R}(\gamma)\right) = \dfrac{\Lambda_{NC}}{\underline{R}_{NC}(\gamma)}$

2. Keep initial CAR but impose that a share μ of bank capital is invested in storage technology to raise the return on bank capital in bad equilibrium