Comments by Rafael Repullo on

Optimal Deposit Insurance

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Purpose of paper

- Characterize optimal deposit insurance

    → In an environment with fundamental-based bank runs

    → Taking explicitly into account fiscal costs of insurance

- Provide quantitative guidance to set deposit insurance optimally

    → Formula for that embeds key trade-offs

    → Calibration for US data

Setup

- Variation of Diamond and Dybvig (1983)
  - → Return of long asset at $t = 2$ is stochastic
  - → Return is observable at $t = 1$: source of fundamental runs
  - → But not verifiable: demand deposit contracts
- Representative bank maximizes depositors' expected utility
  - → Insurance against idiosyncratic (preference) shocks
  - → In the presence of aggregate (asset return) shocks
- To deal with multiple (panic-based) runs
  - → Equilibrium selection with sunspots

Main comments

- Highly desirable goal: provide practical advise to policymakers
  - → Could be applied to other areas of regulation
  - → For example, capital requirements
- However, model and formal analysis are pretty complicated
  - → It is not easy to see what is driving the results
  - → How robust are they?
- More generally, can we put so much trust in our models?
  - → To provide such precise advice to policymakers

Comments on two assumptions

- Early consumers are repaid first in case of a bank run

    → Against assumption of unobservable idiosyncratic shocks

- Taxes to cover deposit insurance are levied on late consumers

    → They pay in taxes what they receive in insurance

    → Why not tax both agents (or other agents in the economy)?

    → Or charge deposit insurance premia ex ante?

What am I going to do?

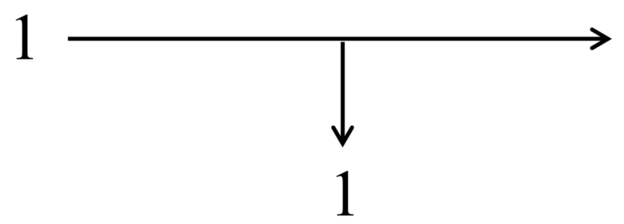
- Consider a simplified version of the model
- Using specific parameterization + numerical solutions
  - → Characterize equilibrium with deposit insurance
  - → Compute optimal deposit insurance
- Assumptions
  - → Early and late consumers get the same in a bank run
  - → Reduced form modeling of the cost of taxation
  - → Focus on fundamental runs (no sunspots)

Depositors

- Unit endowment at $t = 0$ and zero endowments at $t = 1, 2$
- Storage technology with unit return
- Proportion of early consumers $\lambda = 1/2$
- CRRA utility function $u'(c) = c^{-\gamma}$, with $\gamma > 0$

Banks

- Investment returns



$$\tilde{R} = \begin{cases} R_H, & \text{with probability } s \\ R_L, & \text{with probability } 1 - s \end{cases}$$

with $R_H > 1 > R_L$

- At $t = 0$ agents know that $s \sim U(0,1)$
- At $t = 1$ agents observe s (but as in the model s is not verifiable)

Optimal contract without insurance (i)

- Bank offers a contract with promised payments

$$c_1 \text{ and } c_2 = \begin{cases} \dfrac{(1-\lambda c_1)R_H}{1-\lambda} = (2-c_1)R_H = c_{2H}, \text{ with prob. } s \\ \dfrac{(1-\lambda c_1)R_L}{1-\lambda} = (2-c_1)R_L = c_{2L}, \text{ with prob. } 1-s \end{cases}$$

- Late consumers will run on the bank if

$$E(c_2) = su(c_{2H}) + (1-s)u(c_{2L}) < u(c_1)$$

$$\rightarrow \; s < \overline{s} = \frac{u(c_1) - u(c_{2L})}{u(c_{2H}) - u(c_{2L})}$$

$\rightarrow$ In which case all consumers get $c_1 = c_2 = 1$

Optimal contract without insurance (ii)

• There is a bank run with probability $\overline{s} = \Pr(s < \overline{s})$

→ Early and late consumers get $u(1)$

• There is no bank run with probability $1 - \overline{s} = \Pr(s \geq \overline{s})$

→ Early consumers get $u(c_1)$

→ Late consumers get

$$E(s \mid s \geq \overline{s}) u(c_{2H}) + E(1 - s \mid s \geq \overline{s}) u(c_{2L})$$

$$= \frac{1+\overline{s}}{2} u(c_{2H}) + \frac{1-\overline{s}}{2} u(c_{2L})$$

Optimal contract without insurance (iii)

- Banks maximize

$$V(c_1) = \bar{s}u(1) + (1-\bar{s})\left\{\frac{1}{2}u(c_1) + \frac{1}{2}\left[\frac{1+\bar{s}}{2}u(c_{2H}) + \frac{1-\bar{s}}{2}u(c_{2L})\right]\right\}$$

where $c_{2H} = (2-c_1)R_H$ and $c_{2L} = (2-c_1)R_L$

Optimal contract with insurance (i)

- Suppose that insurer pays $\delta > 0$ to late consumers when

  → The return on the investment at $t = 2$ is R_L

- Late consumers will now run on the bank if

$$E(c_2) = su(c_{2H}) + (1-s)u(c_{2L} + \delta) < u(c_1)$$

$$\rightarrow \; s < \overline{s} = \frac{u(c_1) - u(c_{2L} + \delta)}{u(c_{2H}) - u(c_{2L} + \delta)}$$

→ In which case all consumers get $c_1 = c_2 = 1$

→ Insurer pays zero when there is a bank run

Optimal contract with insurance (ii)

- Banks maximize

$$V(c_1) = \overline{s}u(1) + (1-\overline{s})\left\{\frac{1}{2}u(c_1) + \frac{1}{2}\left[\frac{1+\overline{s}}{2}u(c_{2H}) + \frac{1-\overline{s}}{2}u(c_{2L}+\delta)\right]\right\}$$

where $c_{2H} = (2-c_1)R_H$ and $c_{2L} = (2-c_1)R_L$

Numerical illustration

- Assumptions

  → Risk aversion $\gamma_L = 2$ (and $\gamma_H = 5$)

  → $R_H = 2$ and $R_L = 0.8$

- Compute effect of deposit insurance δ on

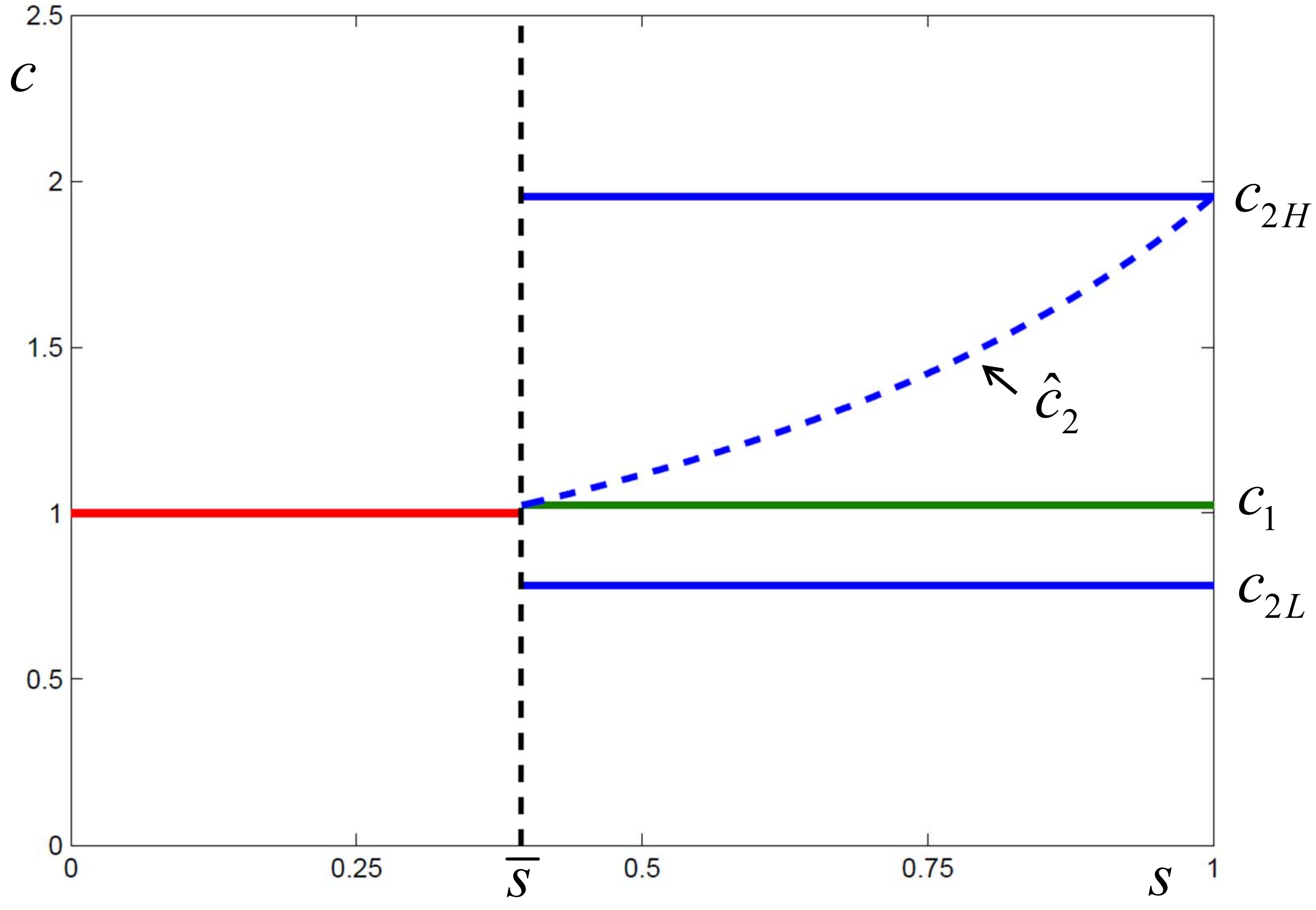
  → Early and late consumption (if no run) c_1, c_{2H}, c_{2L}

  → Certainty equivalent $\hat{c}_2$ s.t. $u(\hat{c}_2) = su(c_{2H}) + (1-s)u(c_{2L})$

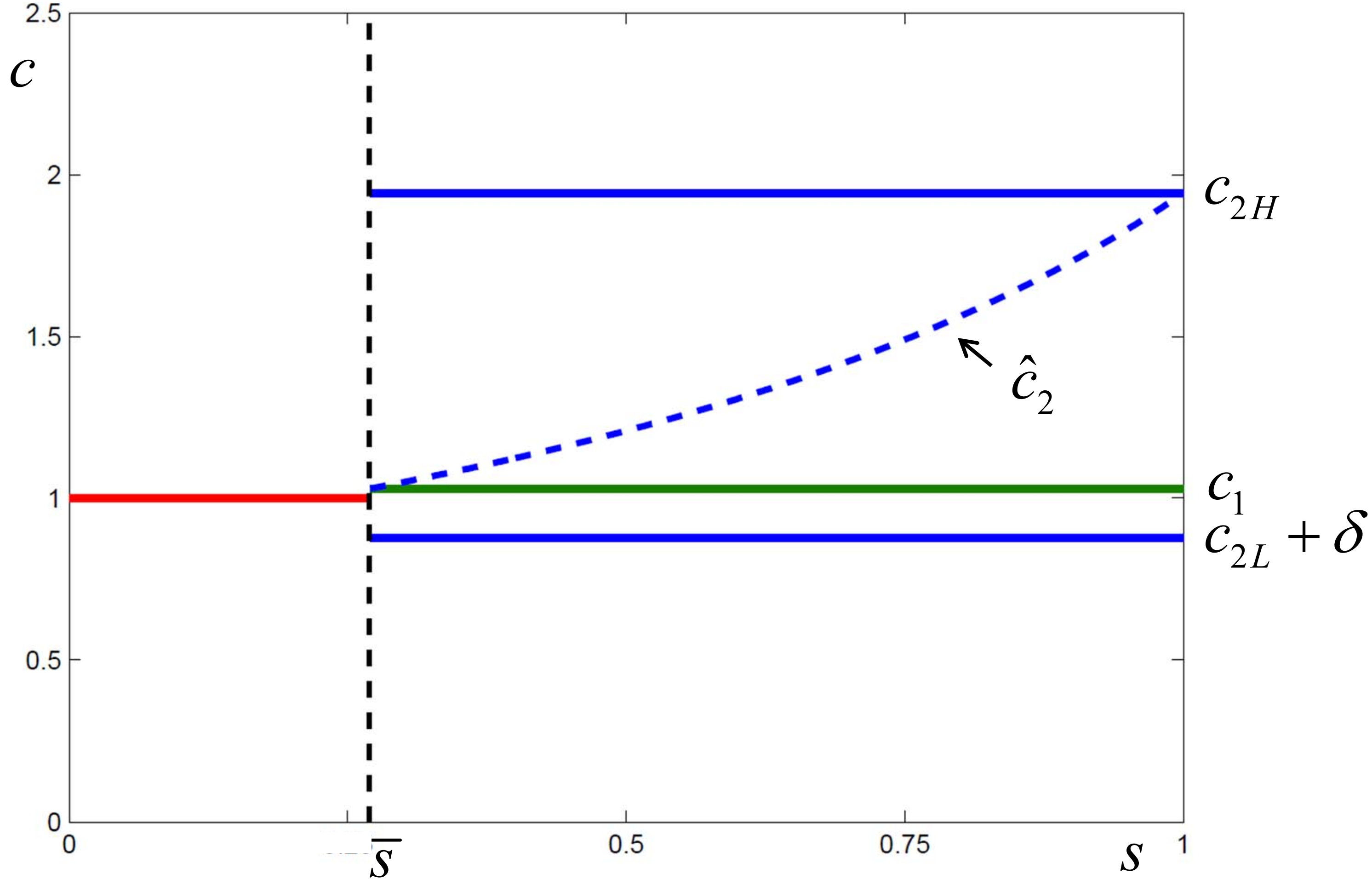
  → Probability of run $\overline{s} = \Pr(s < \overline{s})$

- Compute optimal deposit insurance

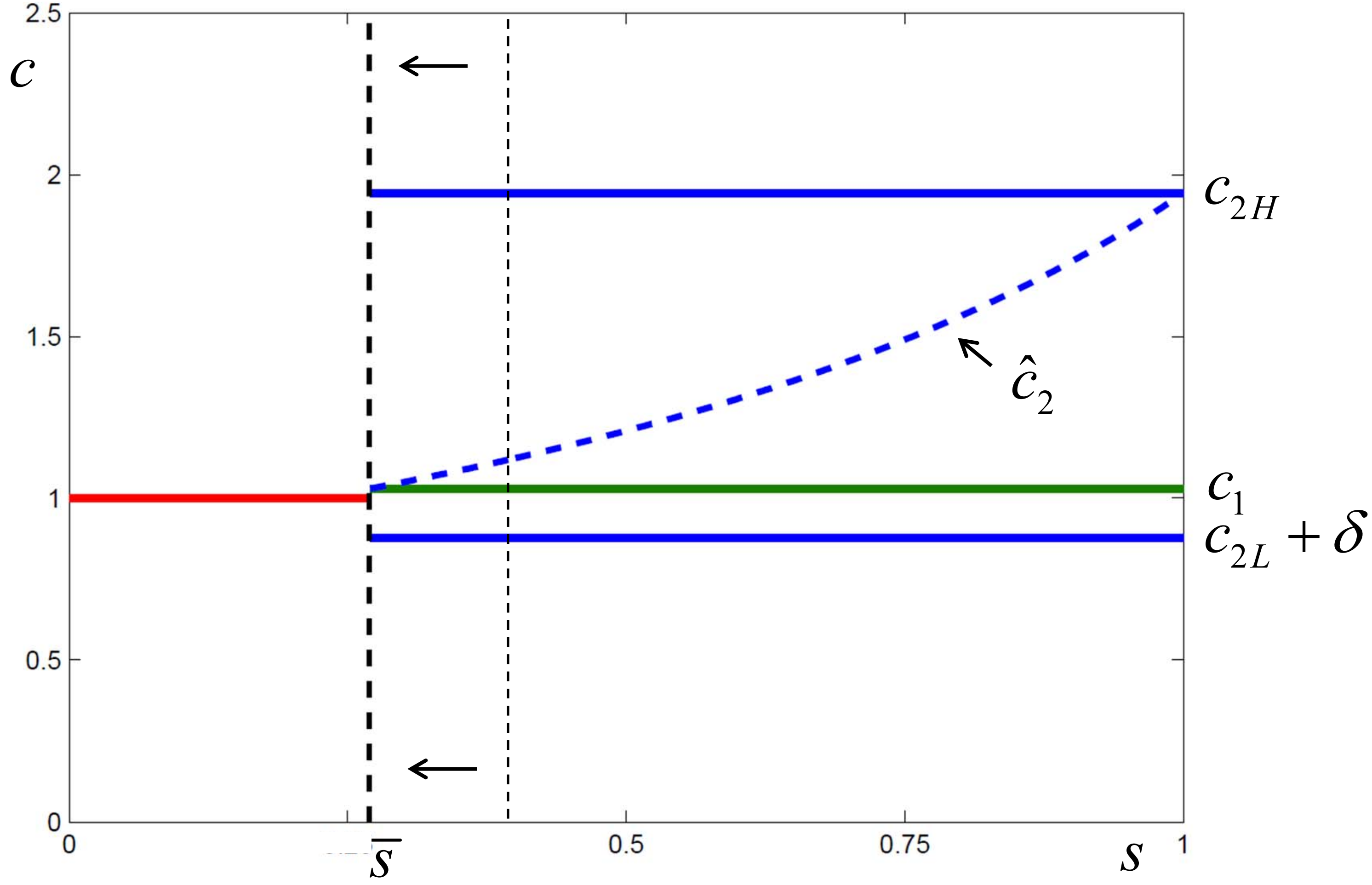
Equilibrium consumption without insurance



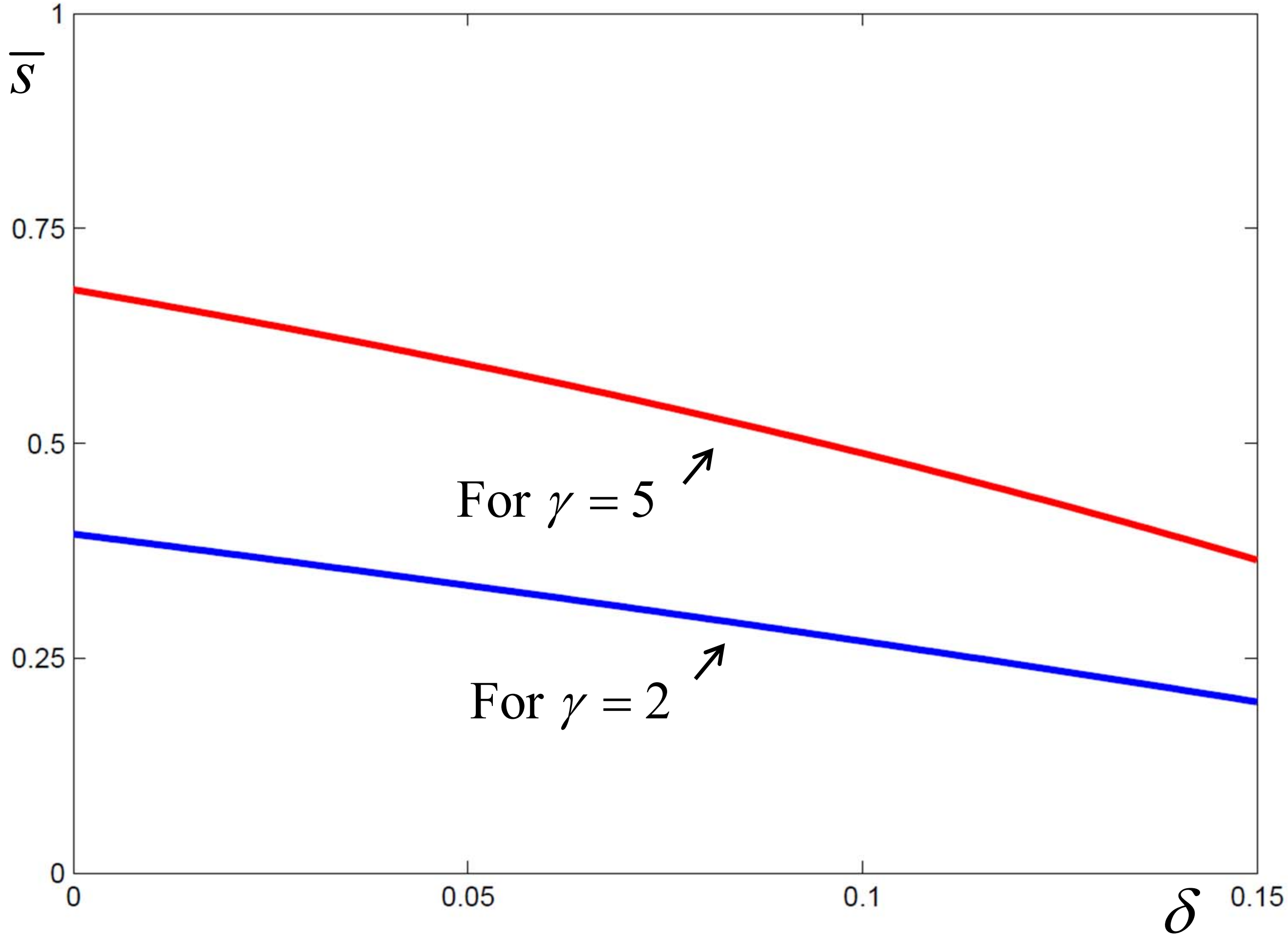
Equilibrium consumption with insurance



Equilibrium consumption with insurance



Effect of insurance on probability of run



Optimal deposit insurance

- Tax revenues needed to cover expected insurance payouts

$$T(\delta) = (1-\bar{s})\frac{1}{2}E(1-s \mid s \geq \bar{s})\delta = \left(\frac{1-\bar{s}}{2}\right)^2 \delta$$

- Social welfare

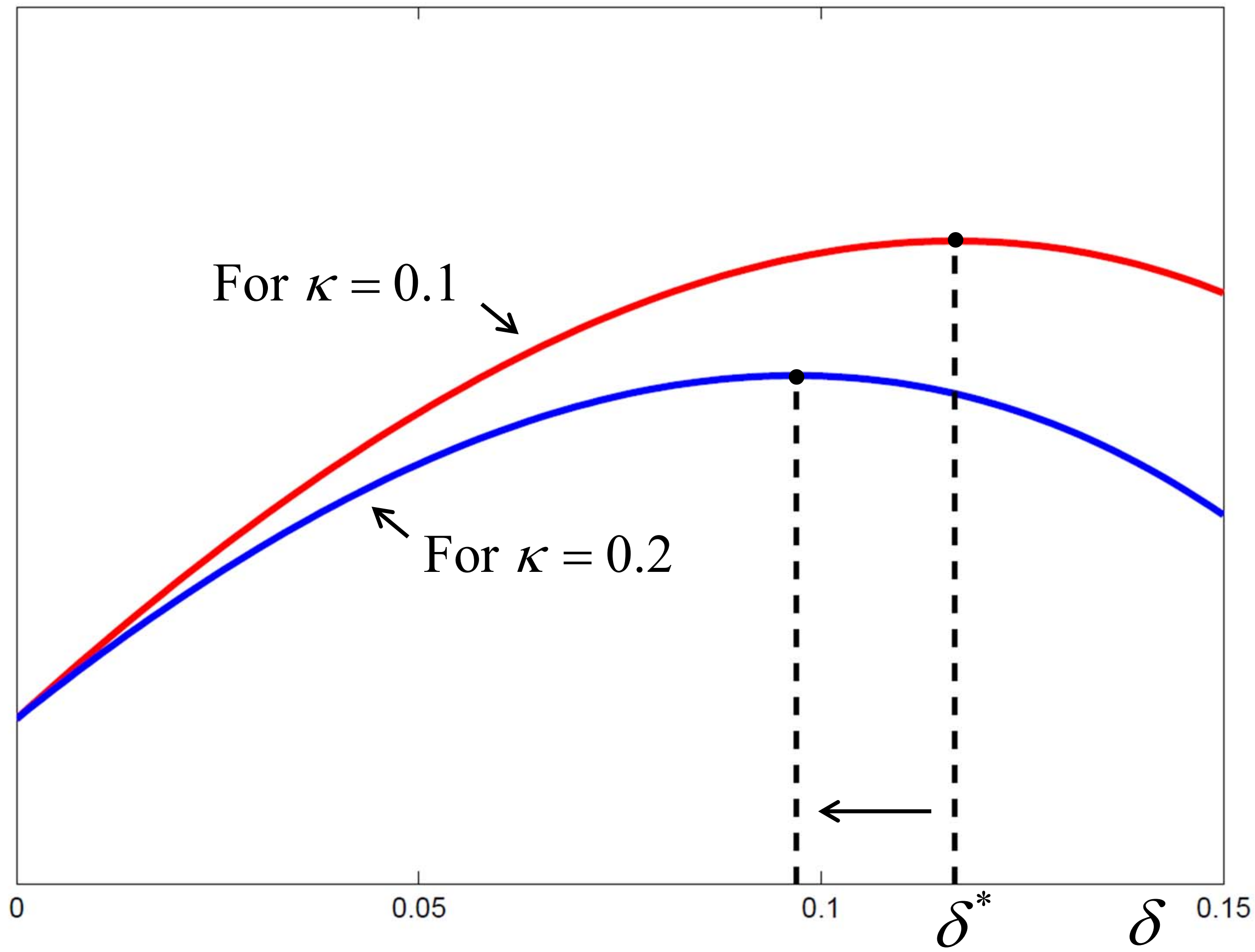
$$W(\delta) = V(c_1(\delta)) - (1+\kappa)T(\delta)$$

→ where κ denotes the net social cost of public funds

- Notice that $u'(c) = c^{-\gamma}$ implies $u'(1) = 1$

→ Marginal utility of early consumers is approximately 1

Optimal deposit insurance



Concluding remarks

- Simplified version of model
  - → Provides intuition for results of paper
  - → Without assumption that early consumers are repaid first
- Numerical results are very sensitive to parameter values
  - → For example, the effect of risk aversion γ
- Diamond and Dybvig (1983) is a very special model
  - → Is it useful to give precise policy recommendations?