

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 advice 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?

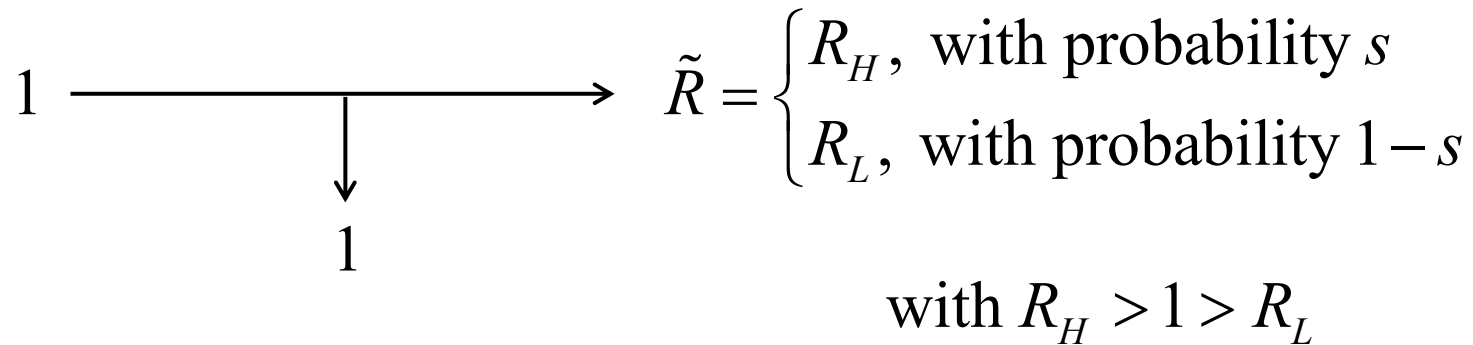
- Consider a simplified version of the model
- Using specific parameterization + numerical solutions
 - Characterize equilibrium with deposit insurance
 - Compute optimal deposit insurance
- Assumptions
 - Early and late consumers get the same in a bank run
 - Reduced form modeling of the cost of taxation
 - 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



- 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

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

- Late consumers will run on the bank if

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

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

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

Optimal contract without insurance (ii)

- There is a bank run with probability $\bar{s} = \Pr(s < \bar{s})$
 - Early and late consumers get $u(1)$
- There is no bank run with probability $1 - \bar{s} = \Pr(s \geq \bar{s})$
 - Early consumers get $u(c_1)$
 - Late consumers get

$$\begin{aligned} E(s|s \geq \bar{s})u(c_{2H}) + E(1-s|s \geq \bar{s})u(c_{2L}) \\ = \frac{1+\bar{s}}{2}u(c_{2H}) + \frac{1-\bar{s}}{2}u(c_{2L}) \end{aligned}$$

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

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

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

→ 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

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

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

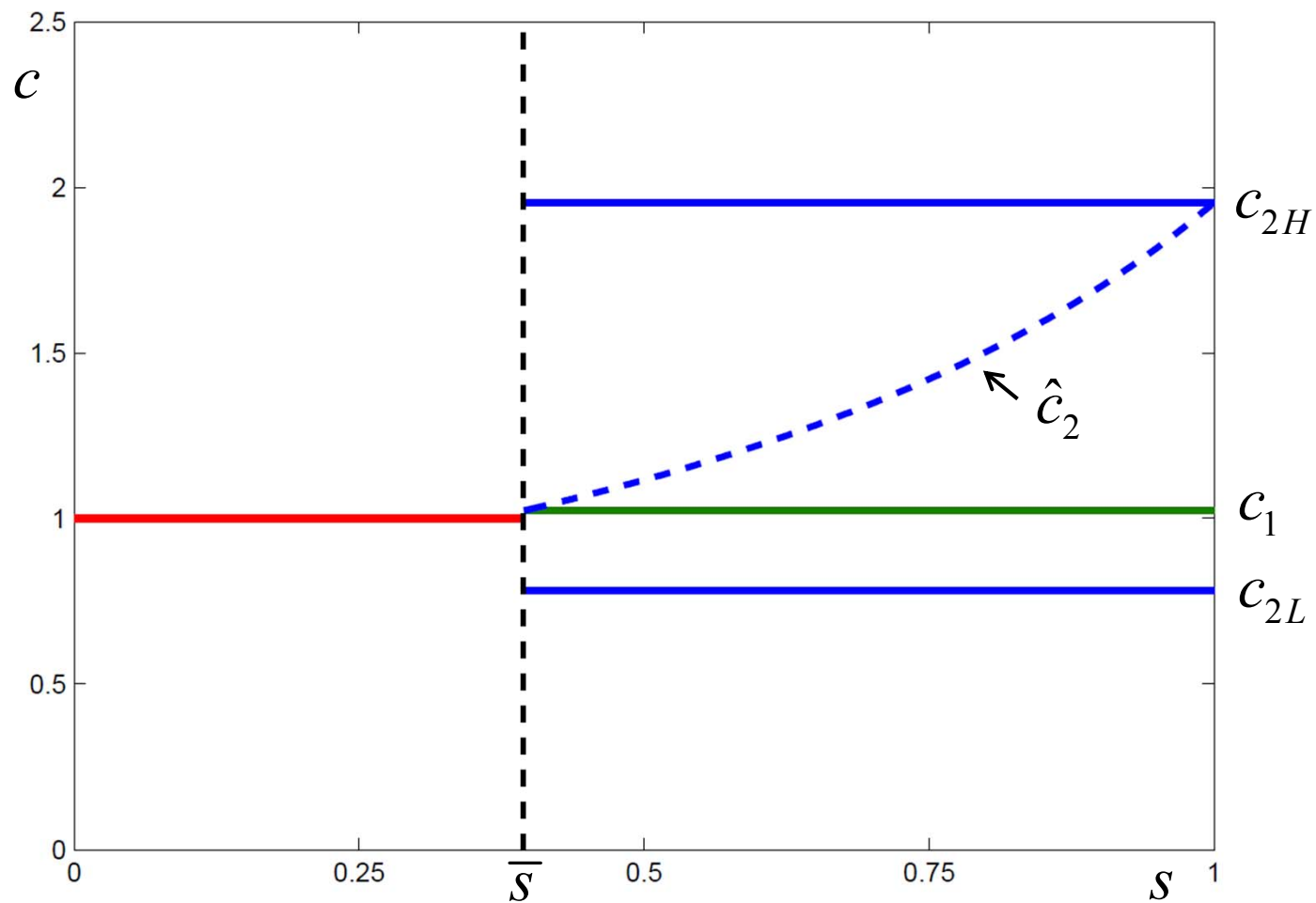
- Early and late consumption (if no run) c_1, c_{2H}, c_{2L}

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

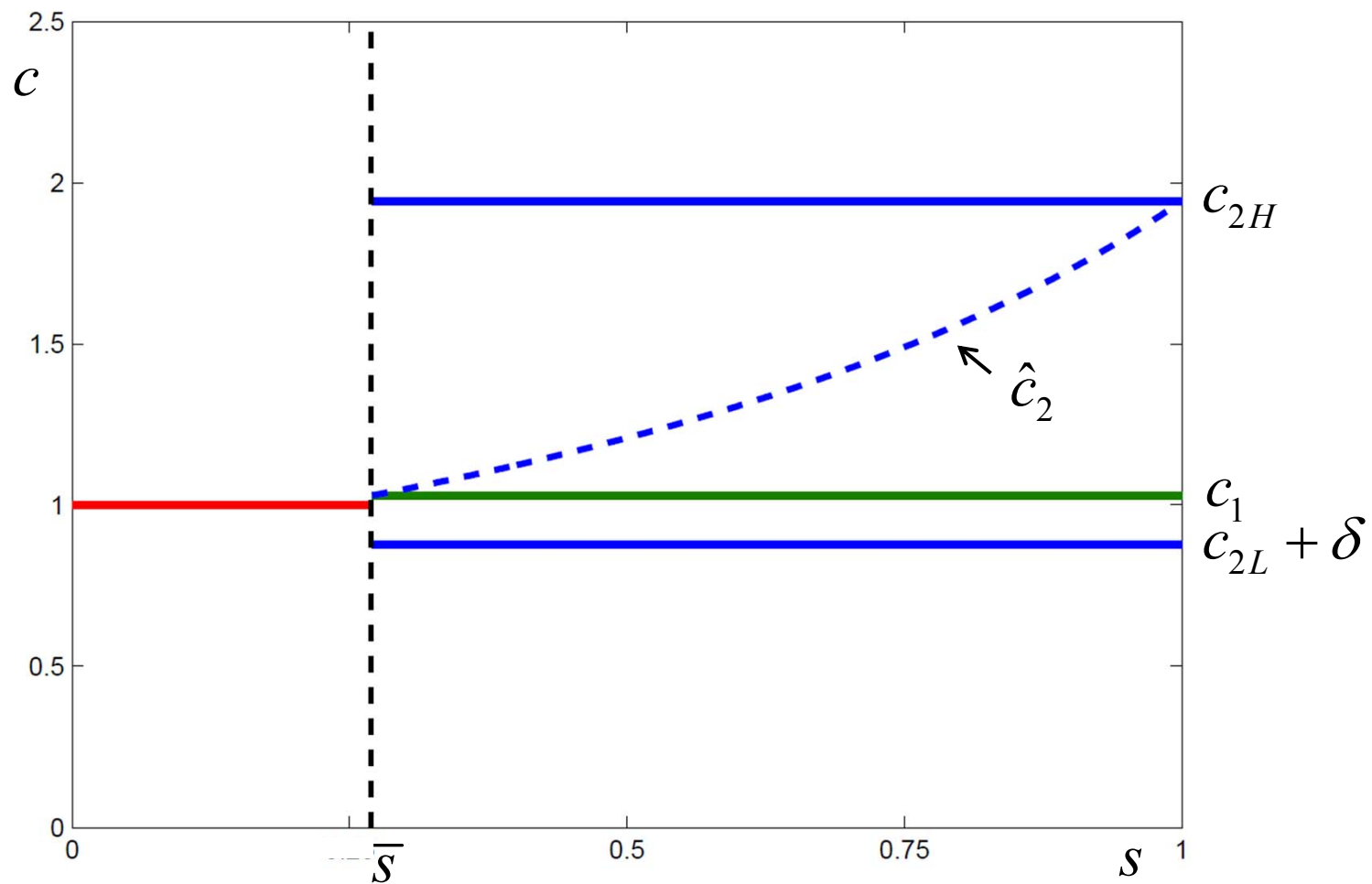
- Probability of run $\bar{s} = \Pr(s < \bar{s})$

- Compute optimal deposit insurance

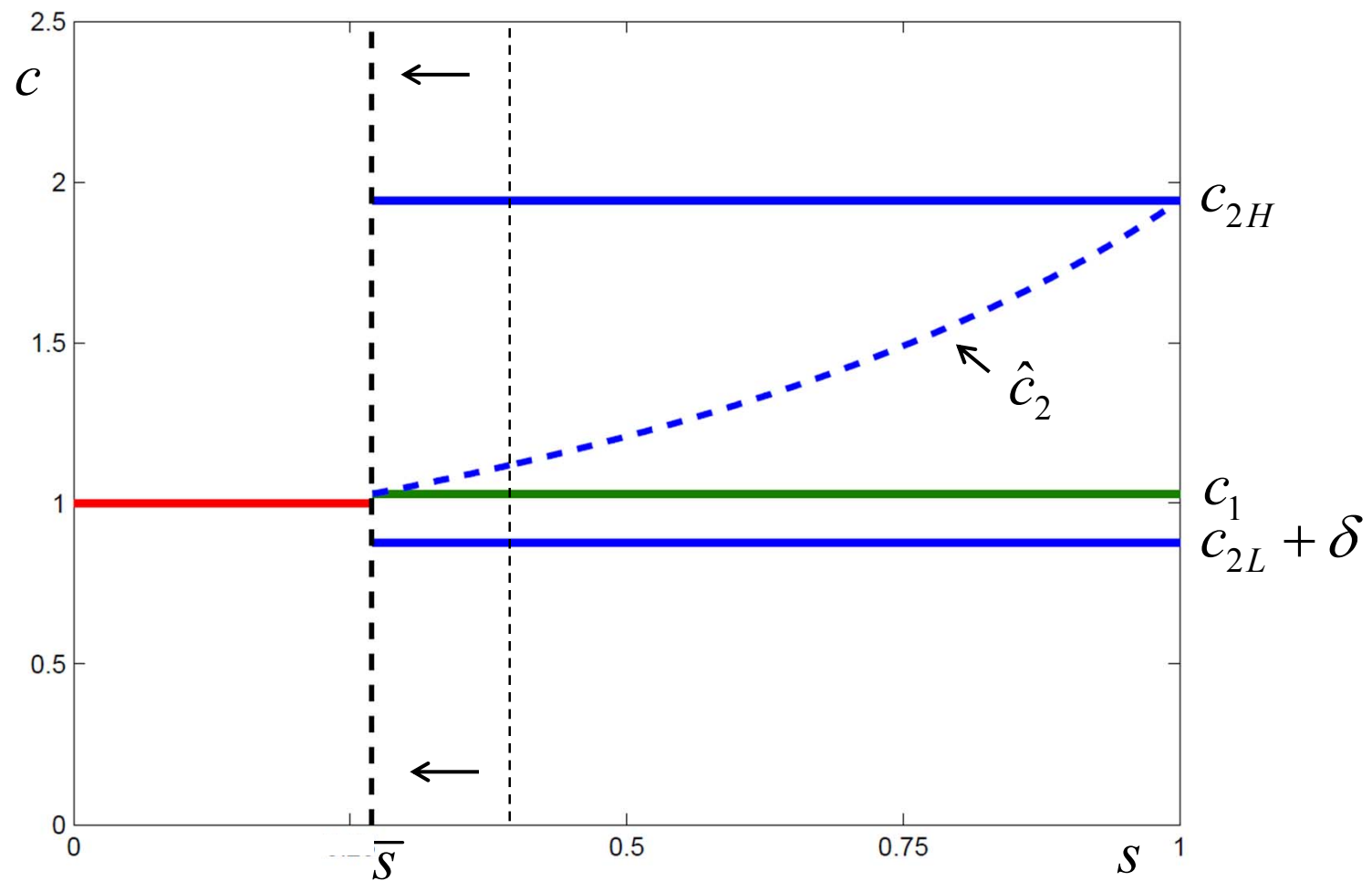
Equilibrium consumption without insurance



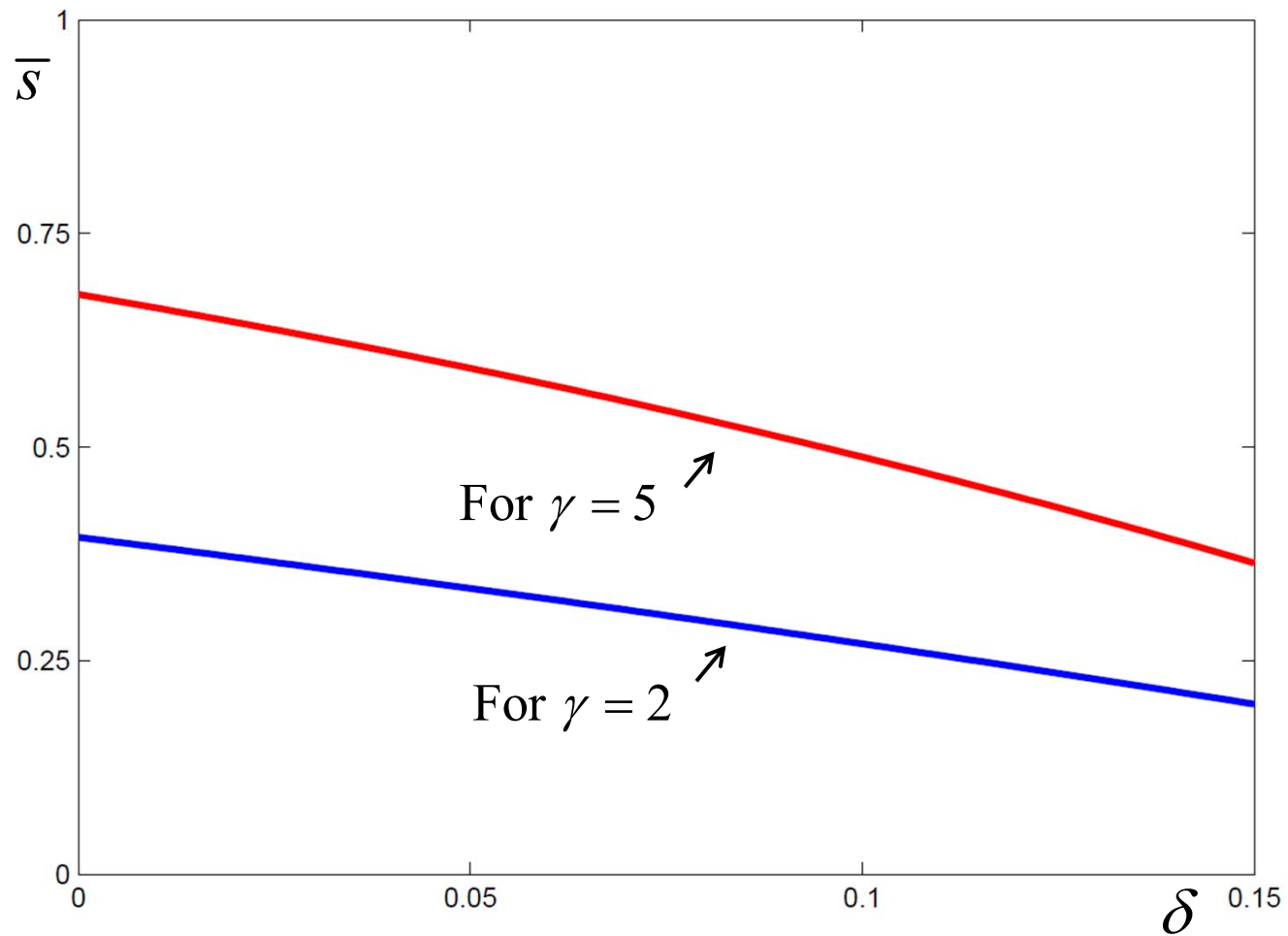
Equilibrium consumption with insurance



Equilibrium consumption with insurance



Effect of insurance on probability of run



Optimal deposit insurance

- Tax revenues needed to cover expected insurance payouts

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

- Social welfare

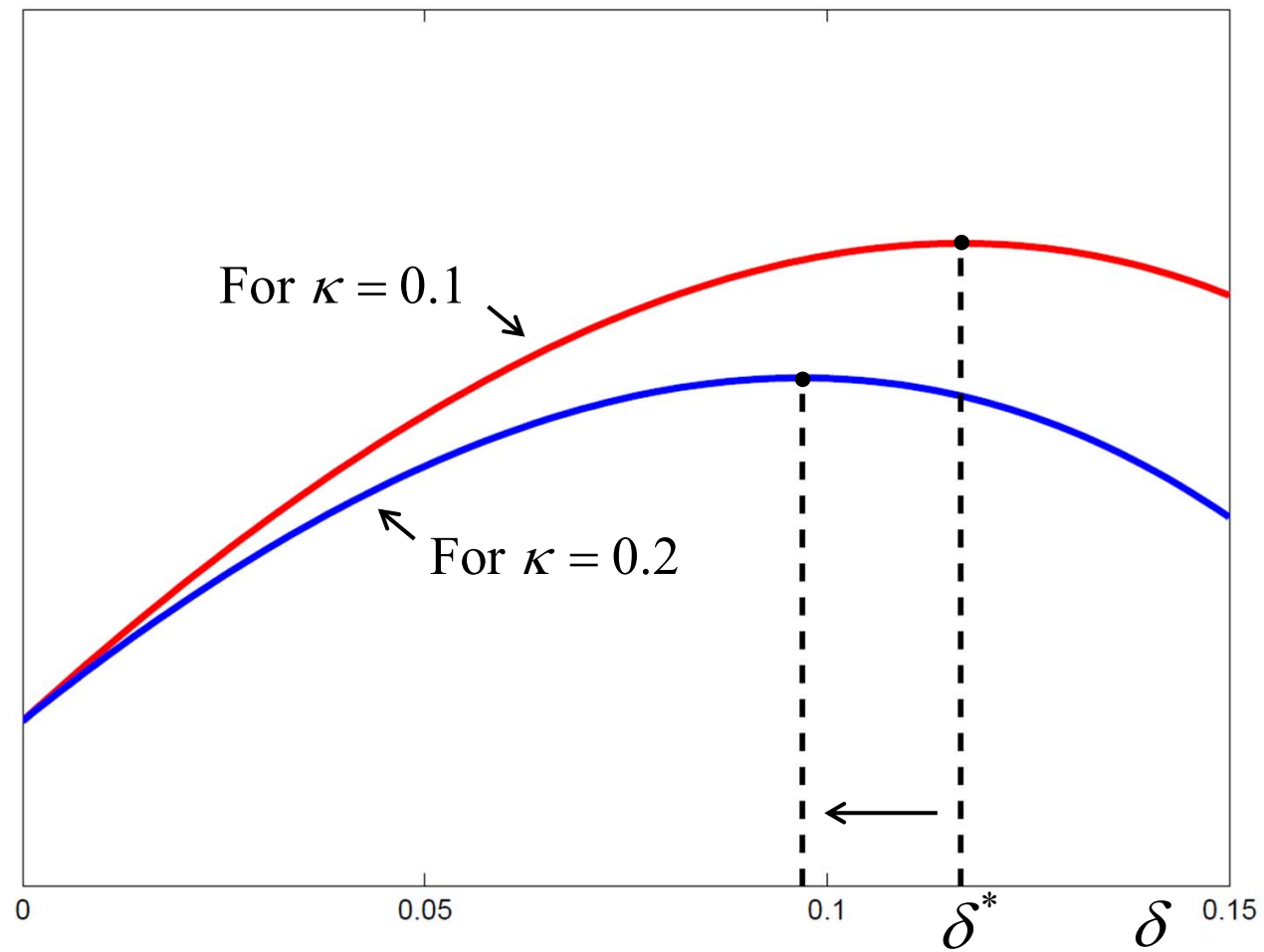
$$W(\delta) = V(c_1(\delta)) - (1 + \kappa)T(\delta)$$

→ 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?