Macro-Prudential Risk Management & Stress Testing

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Outline

- Framework for crisis resolution and stress testing
  - Surprising results on moral hazard
  - Strong links with micro-pru. & PCAs
- Challenges
  1. Speed & Segmentation
  2. Market Power & Market Discipline
  3. Conflicts & Political Risks

Moral Hazard

T=0

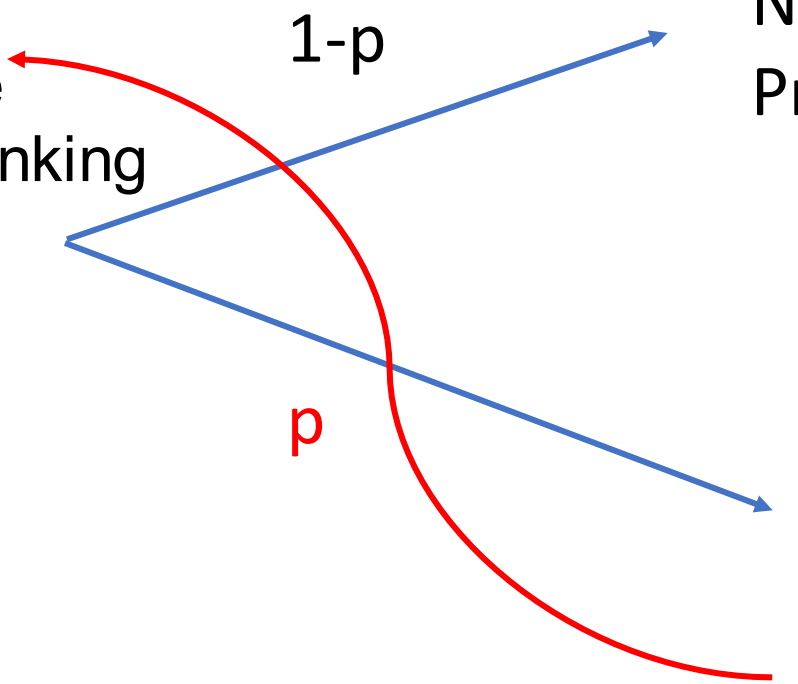
T=1

Risk Taking / Shifting

- Micro: hidden leverage
- Macro risk: shadow banking

Regulations

- Solvency, liquidity
- Stress testing



Normal Times
Profits

Crisis

- Market failures
- Interventions

Losses &Bailouts

Three Classic Market Failures

Crisis

- Objective of regulator
  - Ex-post welfare
  - No commitment: Chari and Kehoe (2016)
- Market failures

What are the right tools?

1. Runs
2. Debt Overhang
3. Adverse Selection / Market Freeze

Optimal Intervention against Debt Overhang

Crisis

- Objective of regulator
  - Min{cost to taxpayers} s.t. {Welfare>W}
- Market failures

Debt Overhang (Philippon and Schnabl, 2013)

- Efficient recapitalization program injects capital
- .. against preferred stock & warrants
- .. to reduce opportunistic participation

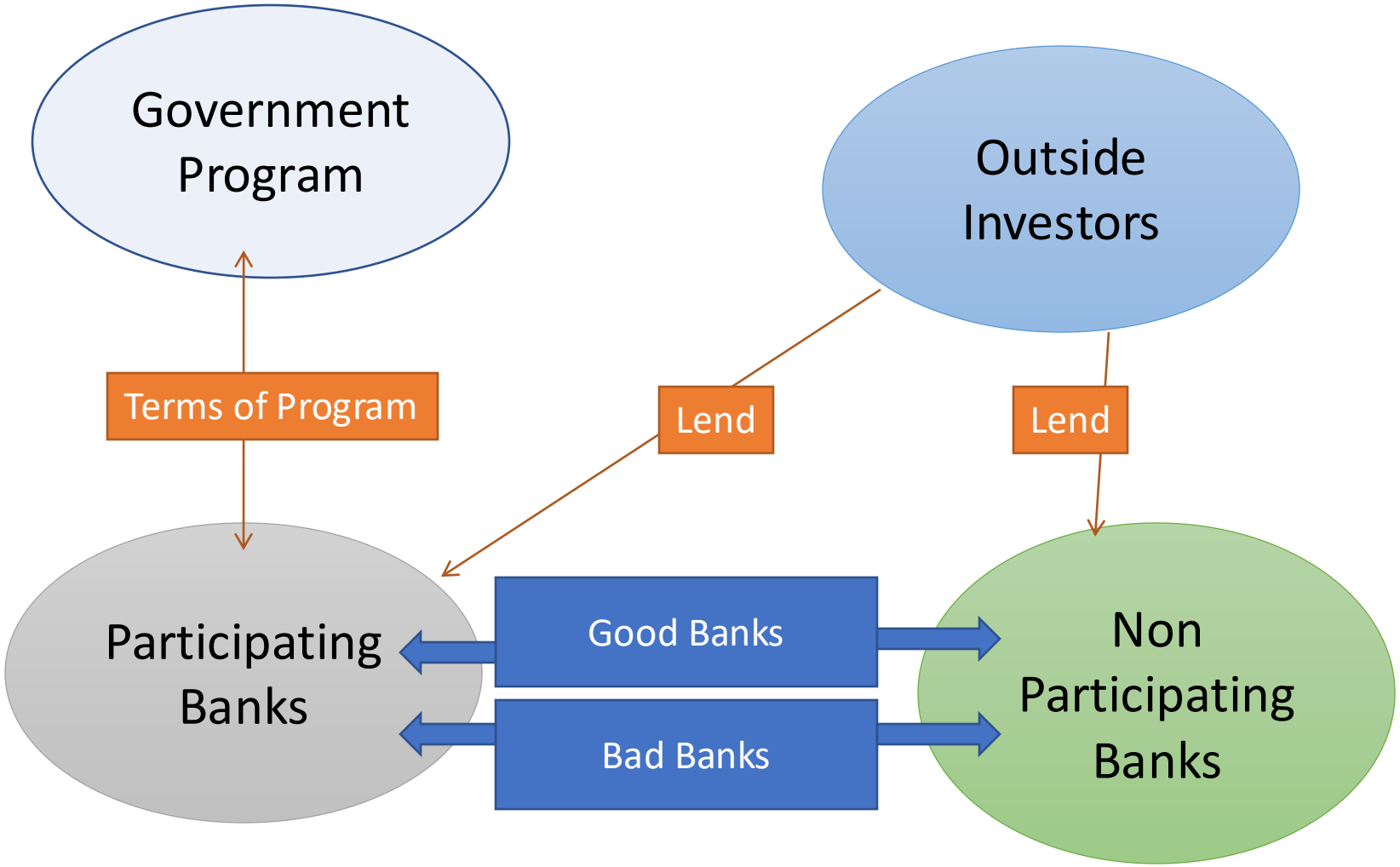
Type 3: Adverse Selection

Crisis

- Objective of regulator
  - Min{cost to taxpayers} s.t. {Welfare>W}
- Market failures

Adverse Selection (Philippon and Skreta 2012, Tirole 2012)

Investment at Time 1



Crisis

- Objective of regulator
  - Min{cost to taxpayers} s.t. {Welfare>W}
- Market failures

Adverse Selection (Philippon and Skreta 2012, Tirole 2012)

- Optimal instrument: debt guarantee or direct lending
- Efficiency of intervention assessed by its impact on the market interest rate, not by size of program
- No need to shut down markets

Lesson #1: Appropriate tools

- Optimal instrument aligned with market failure
  - DI v runs; Equity v debt overhang; Guarantees v credit freezes
  - Asset purchase rarely a good idea
- What about
  - Other tools: Disclosure? AQR
  - Time to act? Stress tests

Runs vs Lemons (Faria-e-Castro et al. 2017)

Objective of regulator

- Min{cost to taxpayers} s.t. {Welfare>W}

Credit crunch & disruptions

2 frictions

- Runs & Adv Selection

2 interventions

- Bailouts & Disclosure (AQR)

Crises

- Objective of regulator
  - Min{cost to taxpayers} s.t. {Welfare>W}
- Market failures

Asset quality reviews / Stress Testing (AQR-ST)

- Unfreeze the market but can create runs
- Despite lack of commitment, rich governments do better
  - More aggressive AQR-ST for wealthy governments
  - Inefficient to restrict government bailout options

Moral hazard: the aggregate view

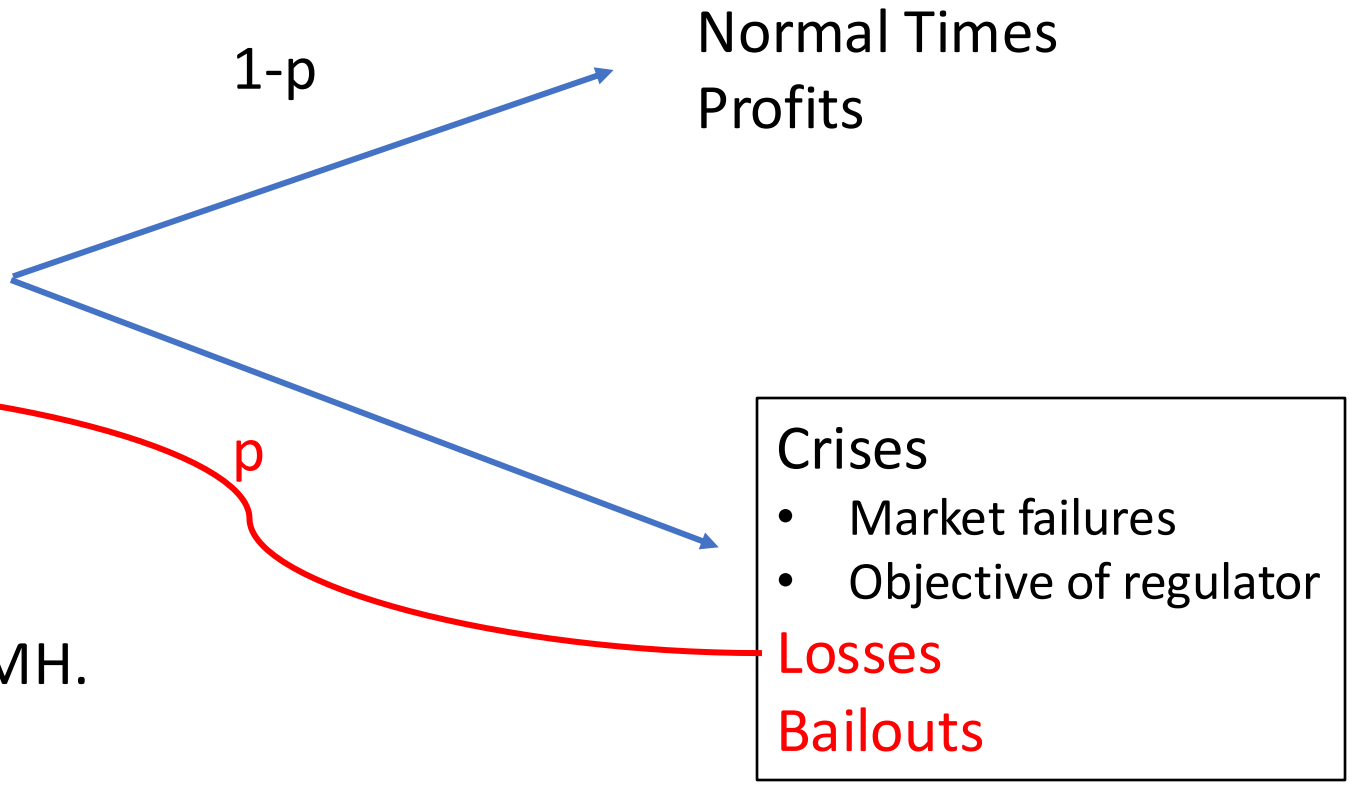
Key idea:

Cost to taxpayers
= Transfer to risk takers

Moral Hazard ~ E[transfer]

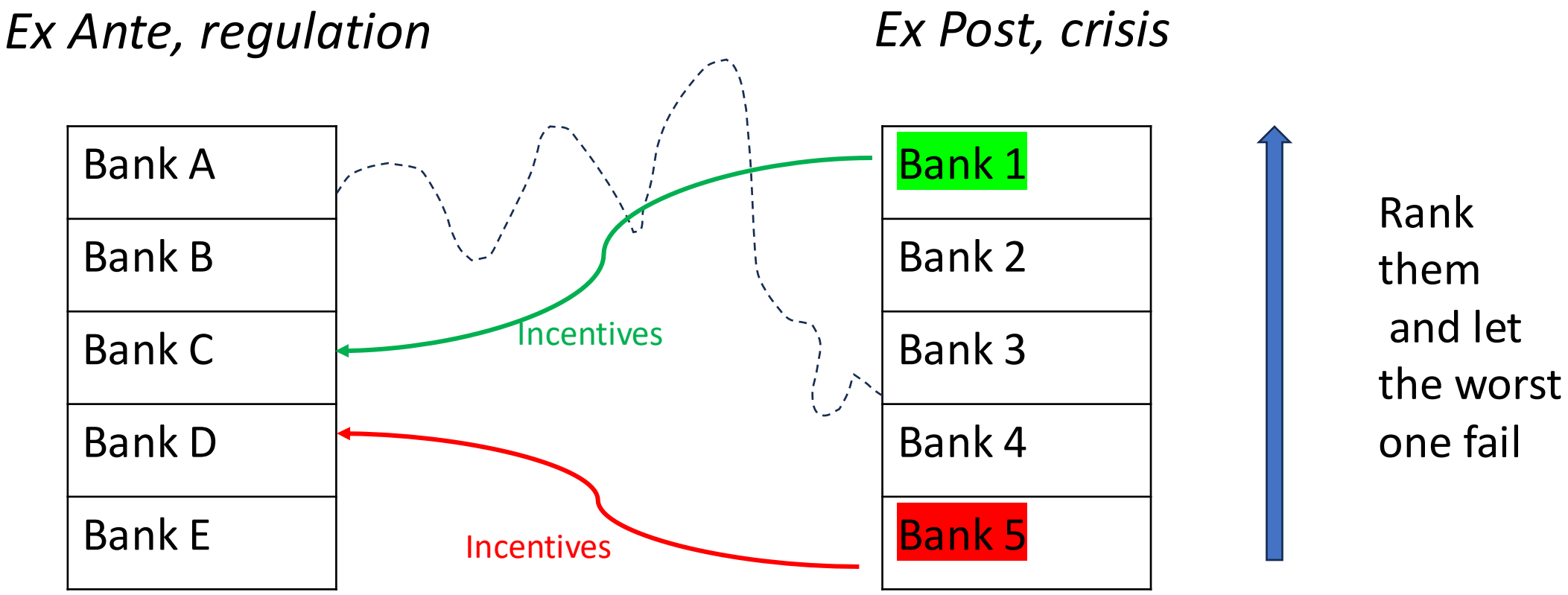
So, min{cost} is correct obj. with MH.

Yes but..



Moral Hazard and Bailouts: Volume vs Distribution

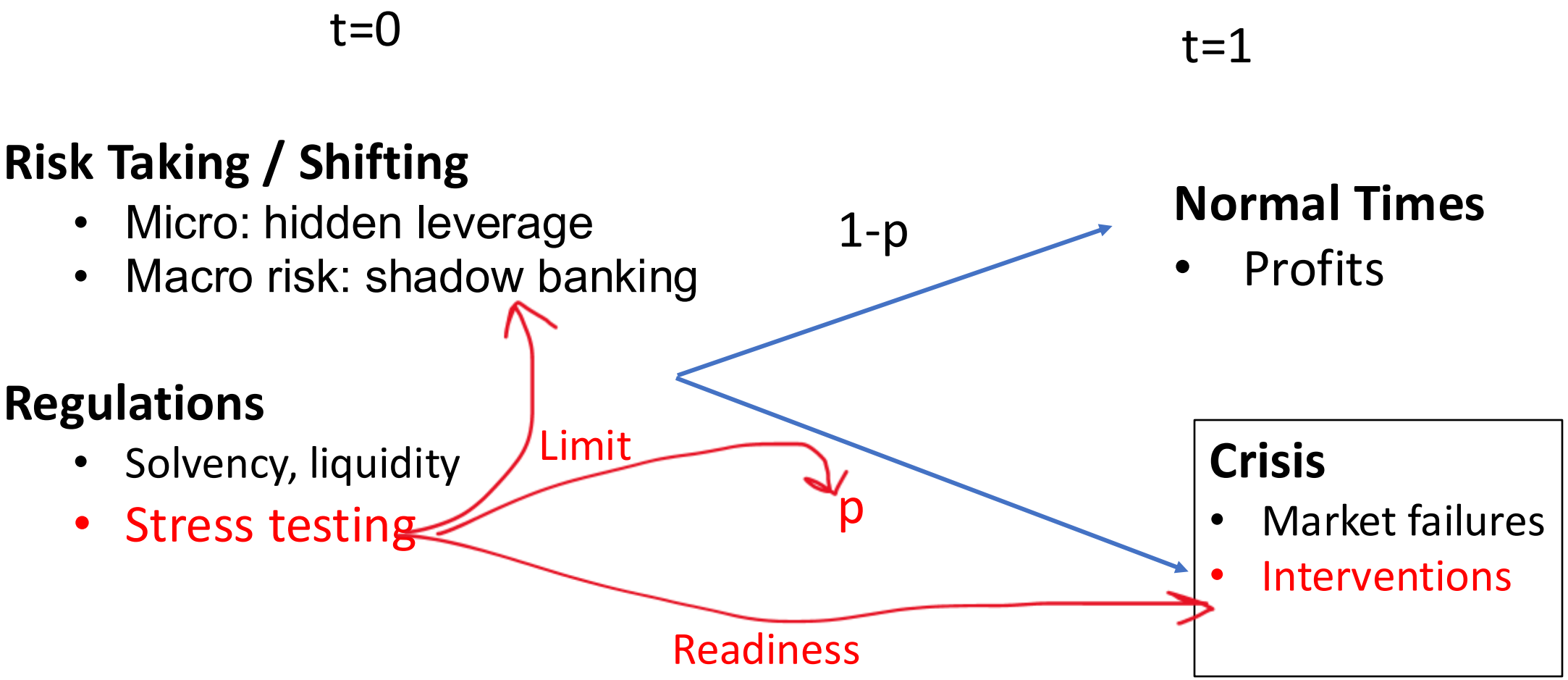
(Philippon-Wang 2023)



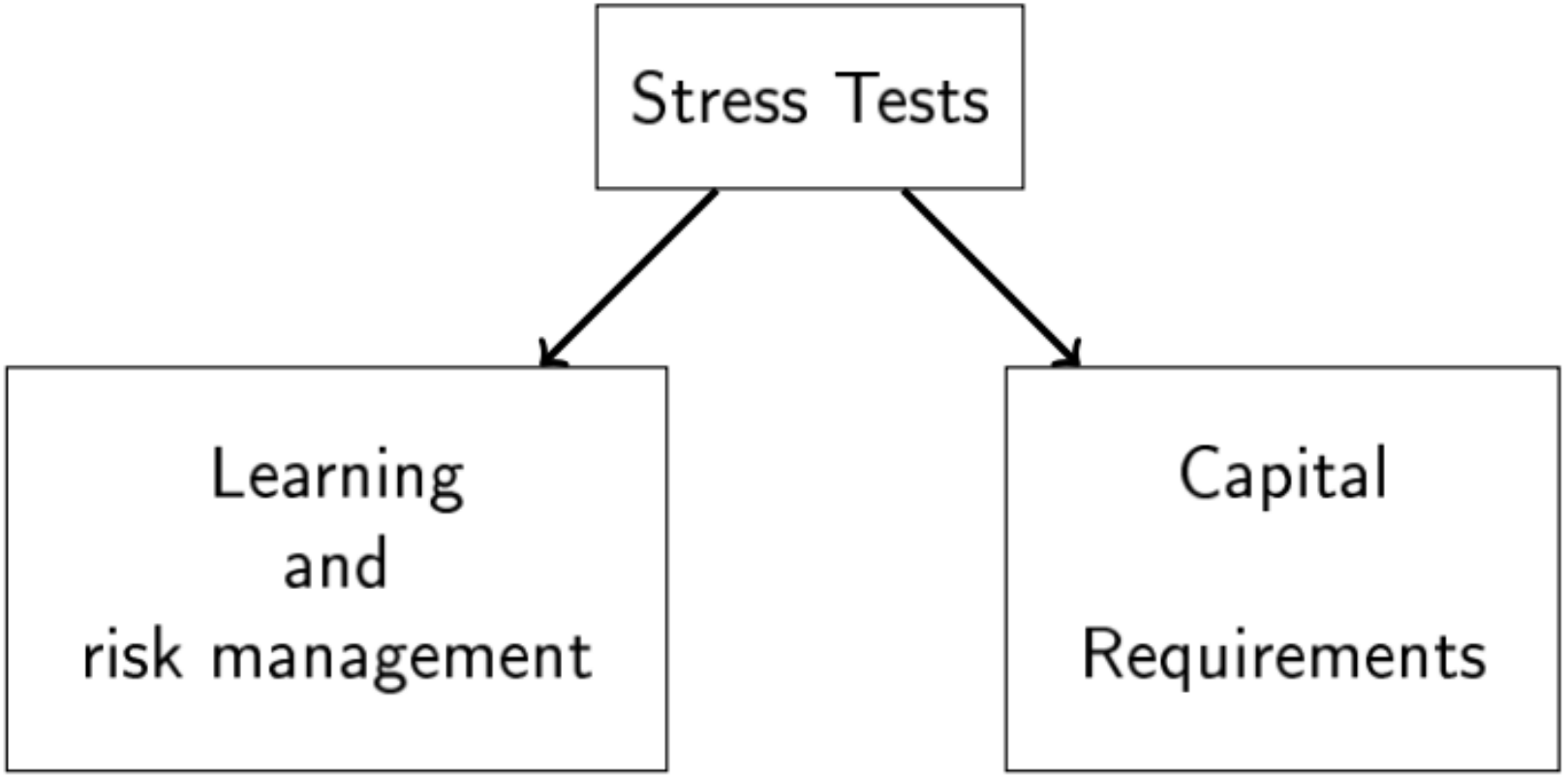
Lesson #2: Moral Hazard

- *First generation models of MH are basically wrong*
- *Potential* bailout as insurance policy -> aggressive Stress Test
  - limiting funds can lower welfare and even increase average bailout size
- Distribution matters
  - Micro incentives, limiting funds again lowers welfare, complementarity with PCA
- Two questions regulators should ask themselves
  1. Total cost / profits : how much will we loose?
  2. Distribution of P&L: do we punish/reward the right agents?

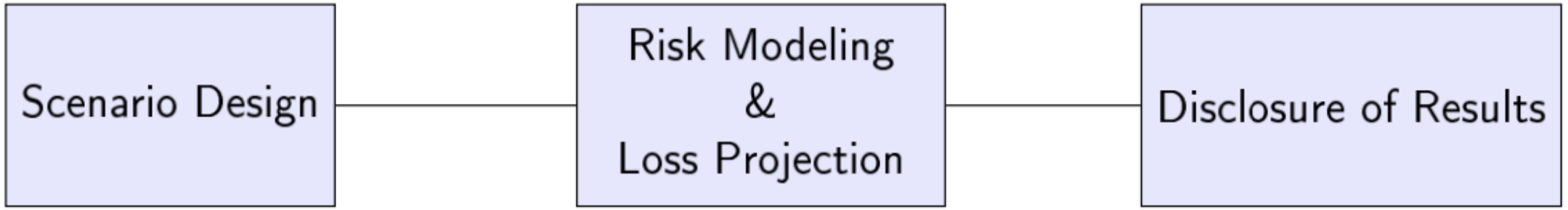
Anticipation & Planning



Using Stress Tests



Designing Stress Scenarios
(Parlatore-Philippon 2023)



- Literature focuses on *disclosure* of results
- We provide guidance on how to design the forward-looking scenarios

Stress Test Model

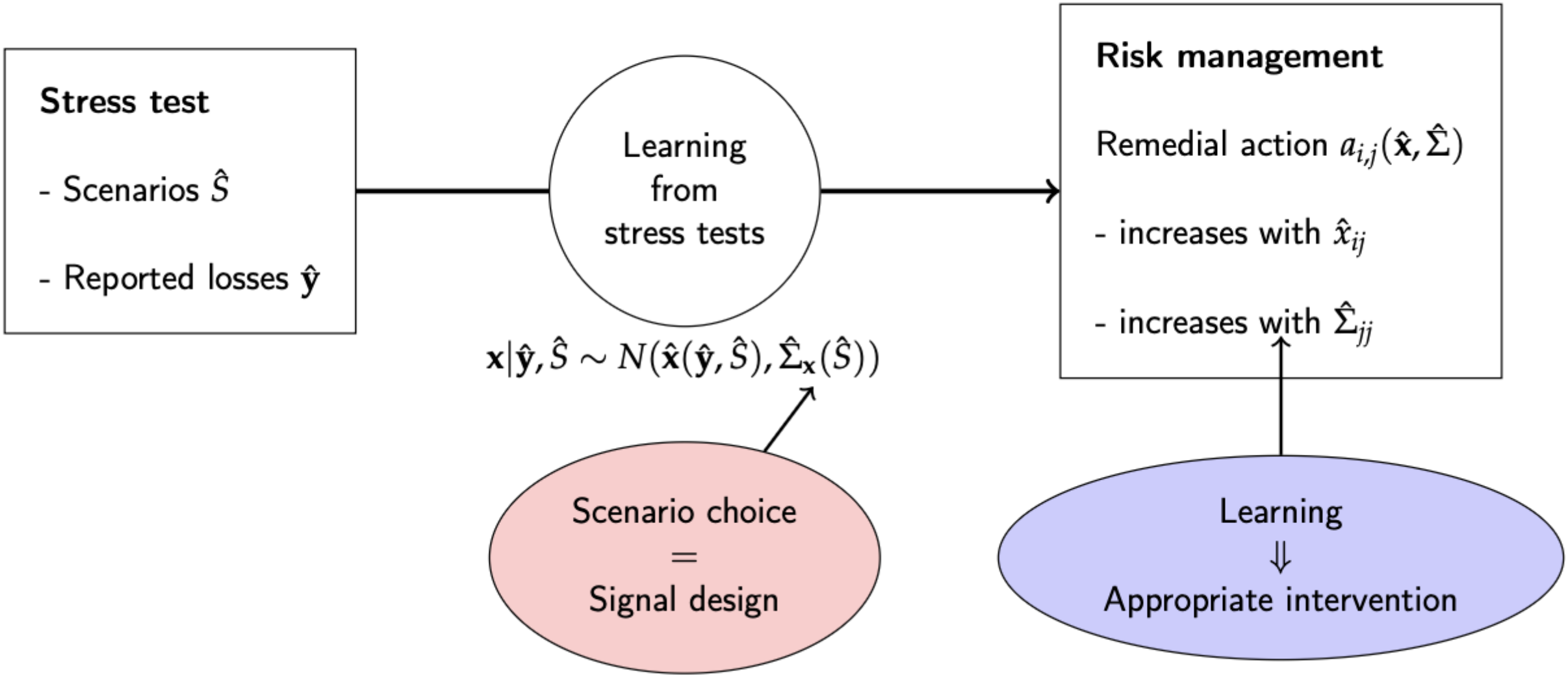
- J macroeconomic factors, $s = [s_1, ..., s_J]$
- N banks, $i = 1, \ldots, N$
  - Losses of bank i given s

$$y_i(\mathrm{s}) = \mathrm{s} \cdot \mathrm{x}_i + \eta_i,$$

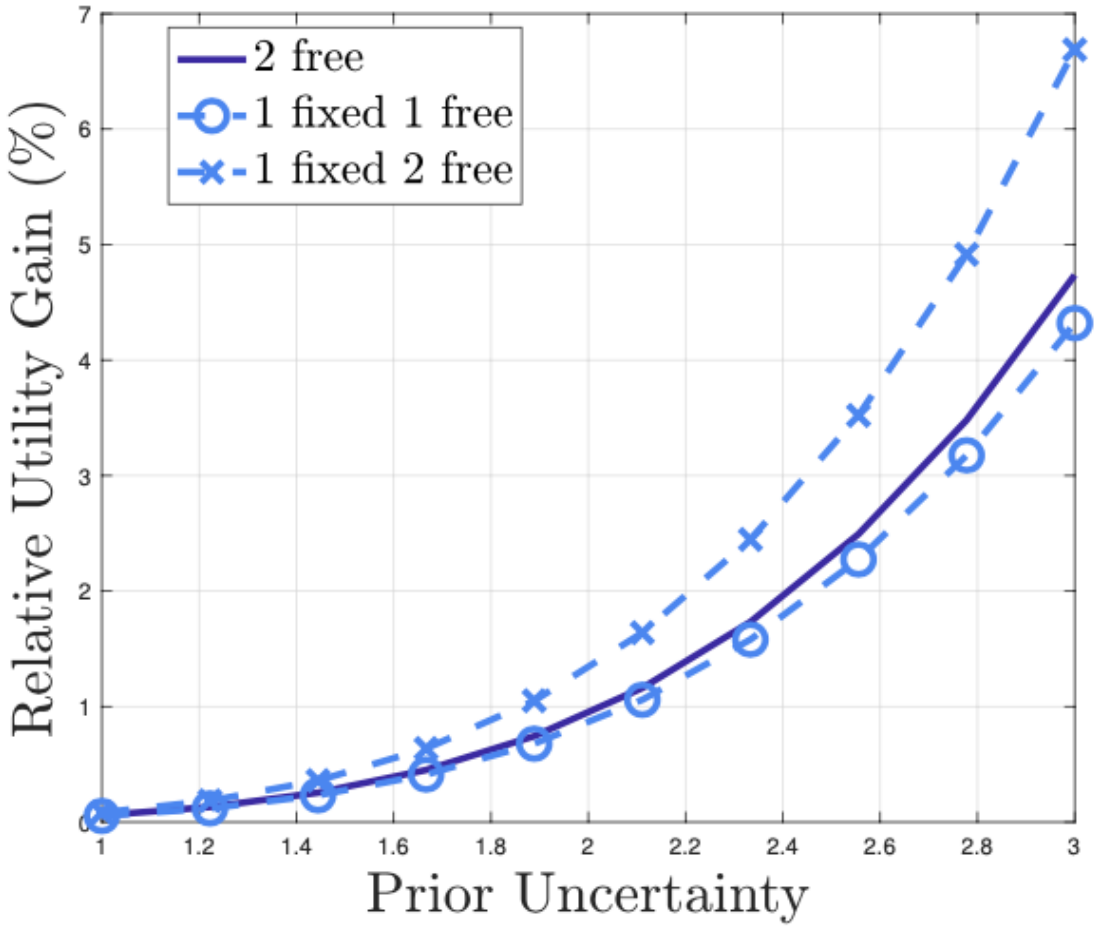
where x_i is the vector of exposures and η_i is idiosyncratic risk

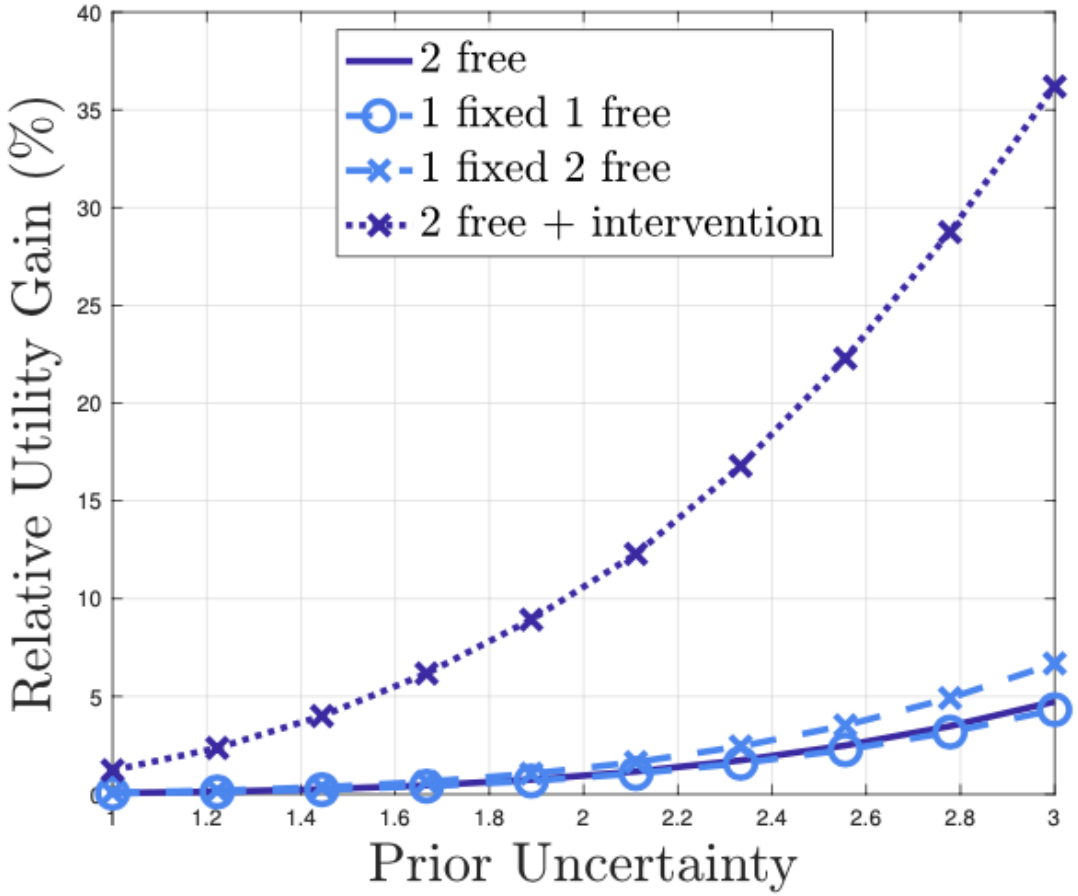
- One regulator with linear quadratic preferences over aggregate wealth

$$W = \bar{W} - \sum_i y_i(\mathrm{s})$$


Stress test
- Scenarios $\hat{S}$
- Reported losses $\hat{\mathbf{y}}$
Learning from stress tests
$\mathbf{x}|\hat{\mathbf{y}}, \hat{S} \sim N(\hat{\mathbf{x}}(\hat{\mathbf{y}}, \hat{S}), \hat{\Sigma}_{\mathbf{x}}(\hat{S}))$
Scenario choice
=
Signal design
Risk management
Remedial action $a_{i,j}(\hat{\mathbf{x}}, \hat{\Sigma})$
- increases with $\hat{x}_{ij}$
- increases with $\hat{\Sigma}_{jj}$
Learning
⇓
Appropriate intervention

Gains relative to gains from a **1%** decrease in cost of capital requirements





Lesson #3: Stress Testing

- Baseline vs explorations
- Complementarity between learning and targeted interventions (PCA)
  - Micro-Macro Again!
  - Learning has limited value for broad cap. Requirements
- *Ask the right questions*
  - *Governance: what if these questions are “uncomfortable” ?*

Three Lessons and Three Challenges

- Framework for planning and using the right tools in the right sequence
    1. Complementarity between micro and macro tools
    2. Limiting moral hazard does not imply limiting available funds
    3. Importance of distribution of P&Ls for incentives
- Challenges
    1. Speed & Segmentation
    2. Market Power & Market Discipline
    3. Conflicts & Political Risks

1: Speed & Segmentation

- Previous arguments assume minimum amount of time to intervene
  - Announce program, deploy funds, etc. Reasonable assumption in the past.

    Runs were surprisingly slow. Time to find a buyer.
- But
  - SVB: What if we can't even get to the "weekend"?
  - LDI: What if private capital is slow moving?

2: Market power vs market discipline

- Concentration → strategic behavior
- Relates to speed issue
  - Slow down the help (Rajan-Diamond)
  - Speed up the risk (predatory trading)

Implications for Stress Testing

- More important to run the “right” stress test
  - Speed: when you send the money matters
  - Segmentation: where you send the money matters
- Suggest third role for ST: credible pre-positioning
  - Financial and political
- Top-down nimble, more scenarios, NBFI
- Bottom-up: robust, compare across banks: partial reversal of information disadvantage

3: Conflicts

- With monetary policy
  - Run stress test with high inflation? Signaling vs learning
  - All interventions become / act like plans (Haddad Moreira Muir)
- With fiscal policy
  - Scenarios for political risk?
  - Market discipline: clearly useful (US). Are we all EM now?
  - Private uncertainty about public policy can be costly
- Independent advisors for scenarios?

Appendix

Type 1: Runs

Crisis

- Objective of regulator
- Runs

- Tool: Deposit insurance

Diamond and Dybvig (1983), Allen and Gale (2000), Goldstein and Pauzner (2005), Keister (2016), Dávila and Goldstein (2023)

- Uninsured deposits?

Drechsler, Savov, Schnabl, Wang (2024)

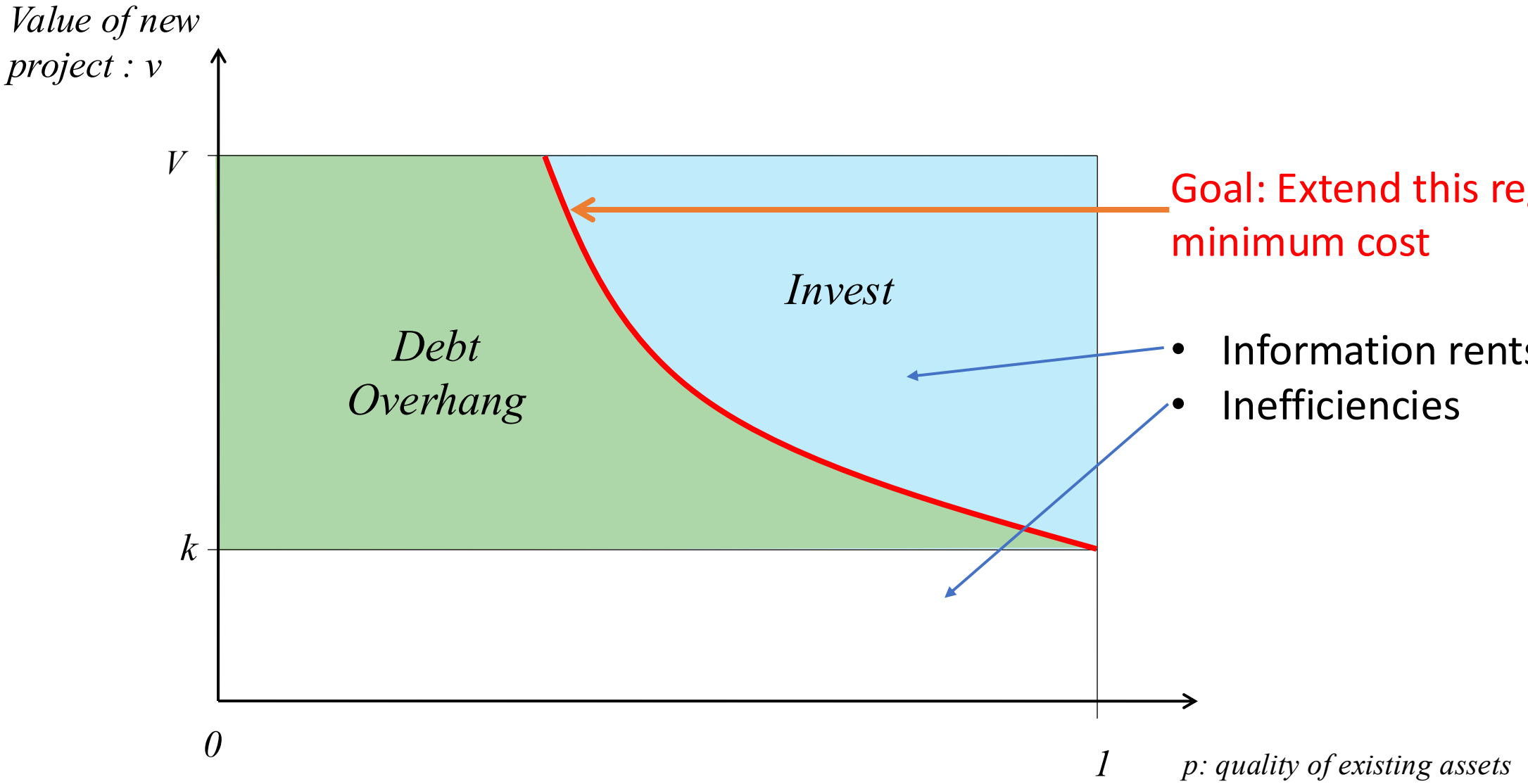
Type 2: Debt Overhang

Crisis

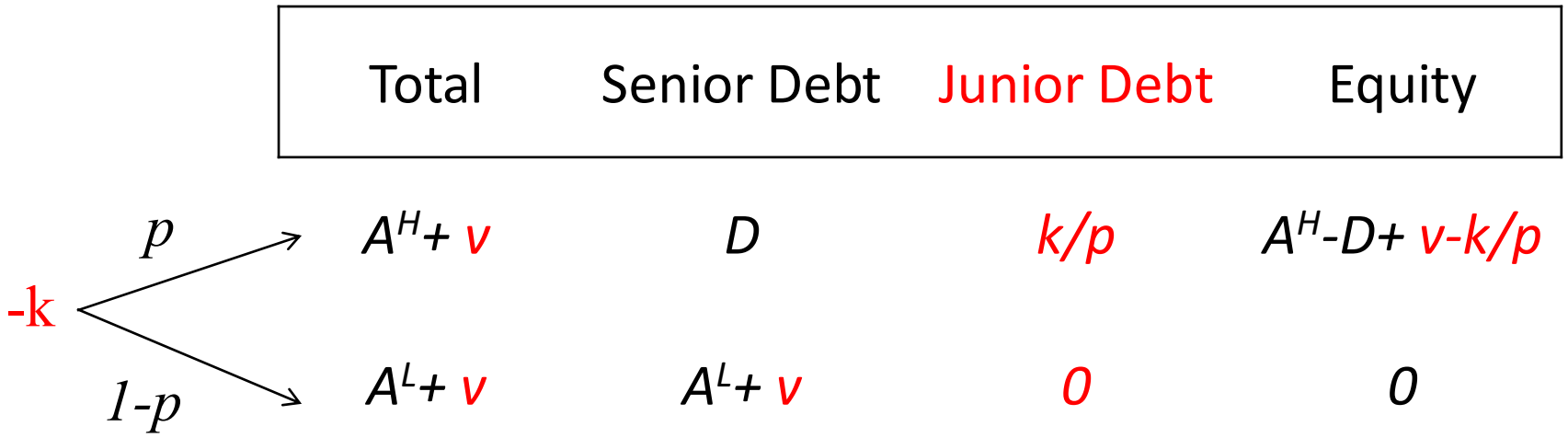
- Objective of regulator
  - Min{cost to taxpayers} s.t. {Welfare>W}
- Credit crunch

Debt Overhang (Philippon and Schnabl, 2013)

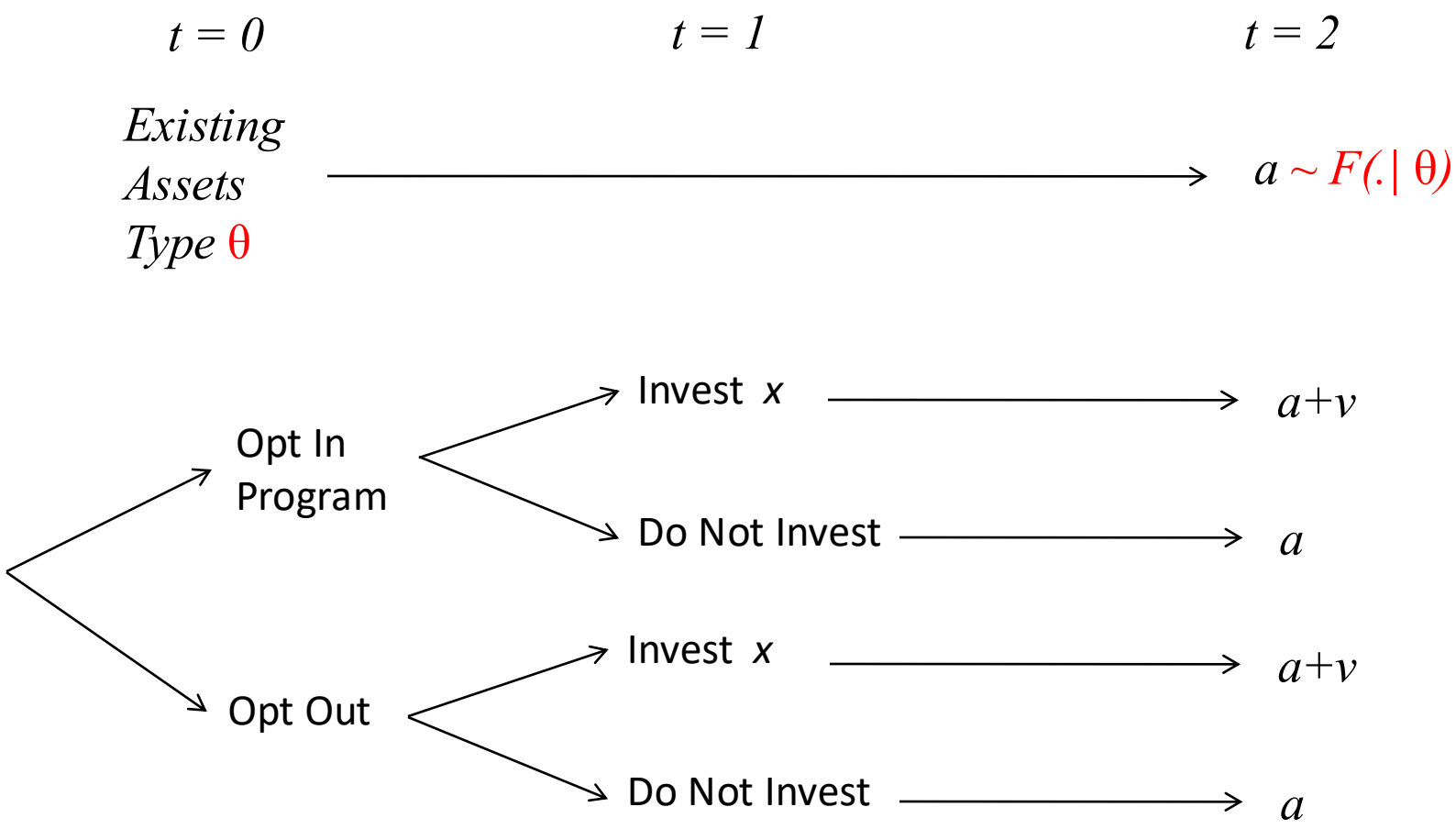
Philippon-Schnabl (2013)



A1: Debt overhang: Underinvestment in Safe Projects

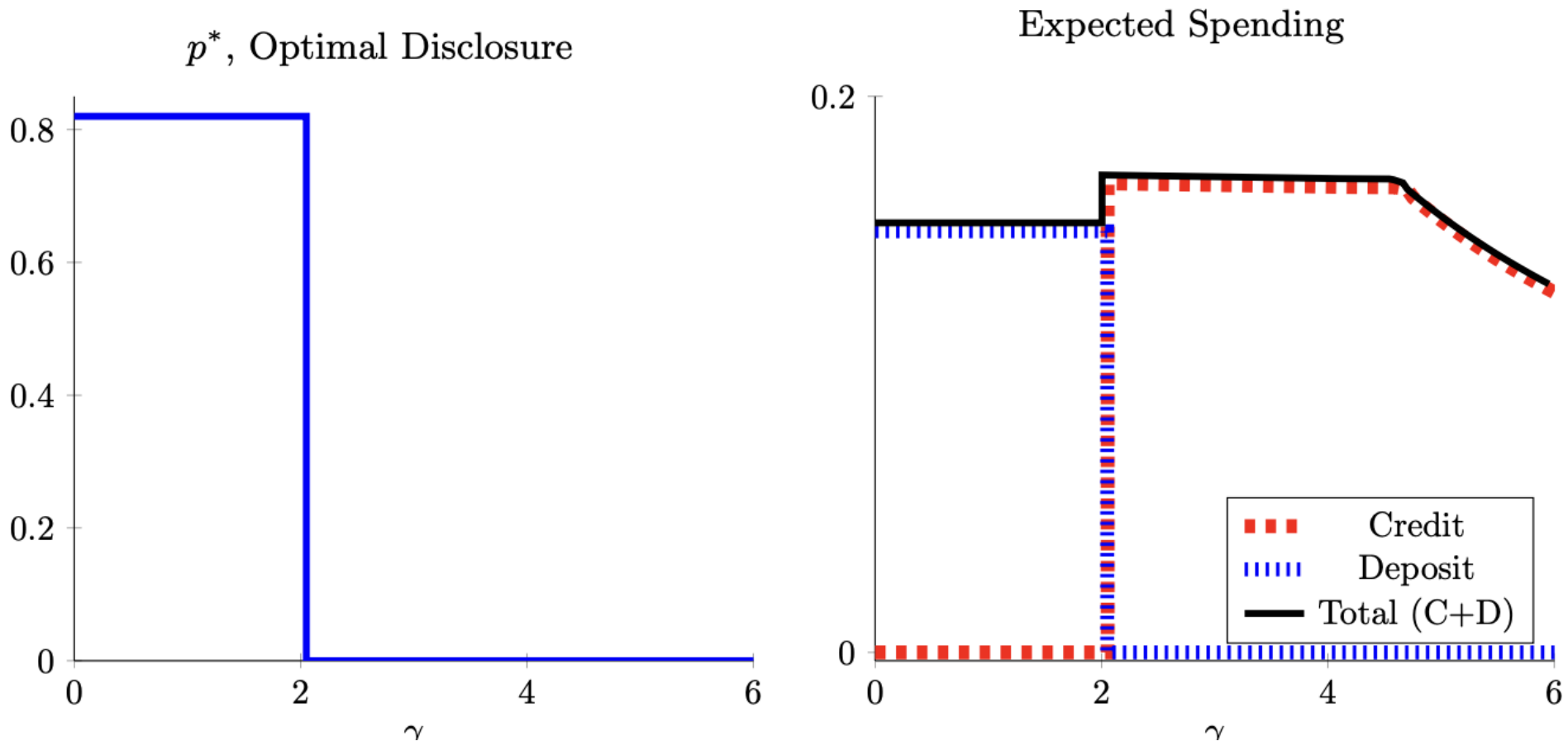


A2: Adverse Selection: Timing & Technology



A3: Runs vs Lemons

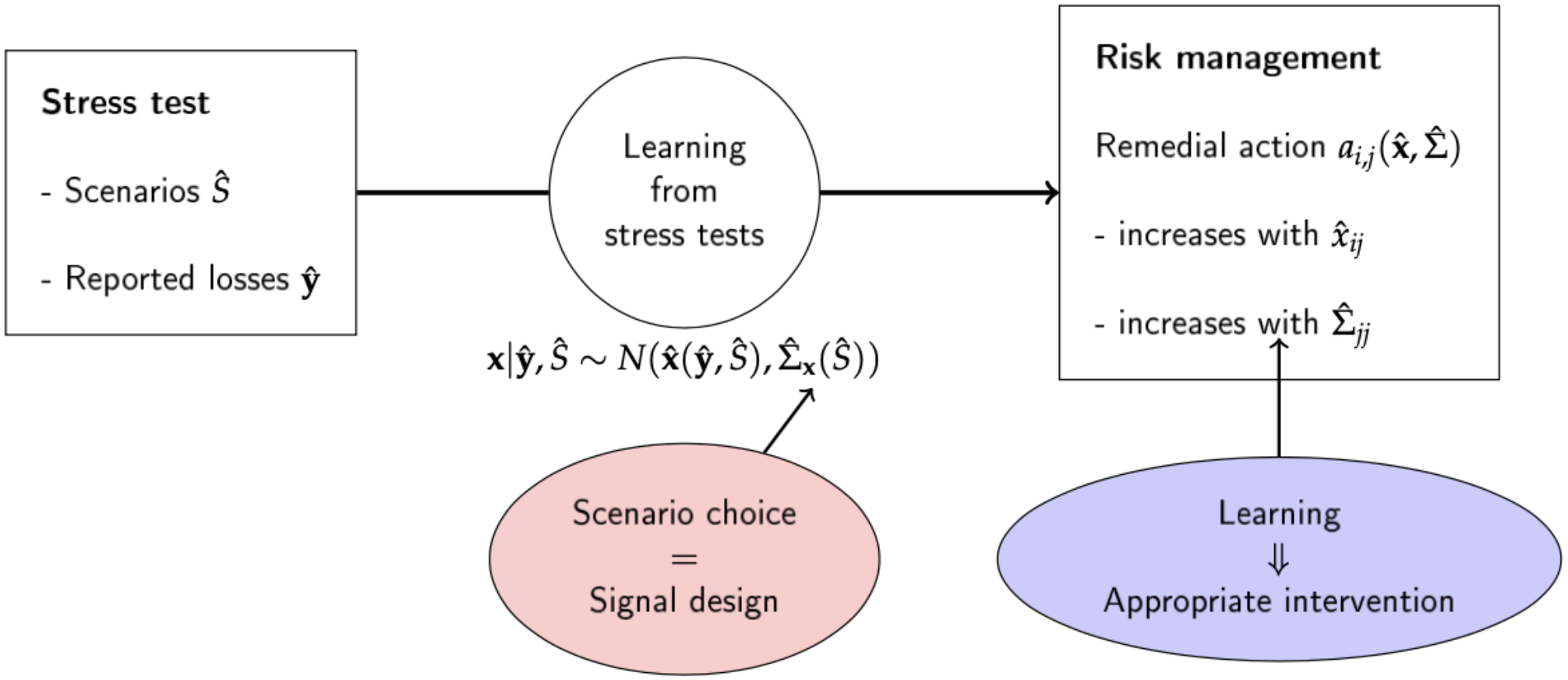
FIGURE 9
Paradox of Fiscal Capacity



(Faria-e-Castro et al. 2017)

A 4: Designing Stress Scenarios
(Parlatore-Philippon 2023)

- Losses y= x s + e
- Ask about y to learn about x



A5: Uninsured Deposits & Moral Hazard

Assets	Liabilities
• Loans • Credit Lines • Liquid Assets	• Insured Deposits (iD) • Uninsured Deposits (uD) • Debt • Equity

A5: Uninsured Deposits (UD) and Moral Hazard

- Bailouts create moral hazard even if UD do not monitor
  - Usual free leverage, max government put + Indirect by starving monitors from funds
- If we bail out UD, we need quantity restrictions on min junior debt
  - Realistic? If not, must limit bailouts : impose losses on UD

Bailouts: Volume vs Distribution
(Philippon-Wang 2023)

- If banks are substitutes, get first best even if government has no commitment
- With limited liability, moral hazard decreases when government has deep pockets
- Losses on shareholders and bond holders are good for incentives
  - Mergers, including loss sharing subsidies