Difficult to distinguish between fundamental and self-fulfilling crises.

Self-fulfilling Beliefs or Panic

- Can avert a bad equilibrium
- Eliminate early asset liquidation cost
- Delays a necessary adjustment
- Distorts market discipline and prices

Fundamentals

Welfare to the Financial System

- Distinction matters for the decision to intervene during a systemic crisis
- Immediate Intervention is optimal
- Immediate Intervention is suboptimal

Optimal Timing Depends on Two Trade-offs

1. Speed of Contagion
   - Identifies Optimal Time for Intervention
   - ... and Faster Contagion Necessitates More Immediate Intervention

2. Maturity of Liabilities
   - Costs and Benefits of Intervention

Environment

- Regulator and n = 6 Banks
- Each node has welfare: \( \bar{w} \)
- Maturity of Liabilities (Stochastic): \( \bar{e}_t \)
- Resilience of Nodes (Deterministic): \( \bar{e}_t \)

Optimal Stopping Problem

\[ V_t(h, e) = \max_{i \in \{1, 2\}} \left[ \sum_{i=0}^{\infty} (1 - \delta) V_{t+1}(h, e) \right] + \delta \bar{w}(h) \]

1. Horizon: \( T = 5 \)
2. Discount: \( \delta = 0.96 \)
3. Decision: \( x_t \) (bailout, no bailout)
4. Reward in each state \( (h, e) \)
5. Joint Probability Transition Matrix

Assumptions

- Untargeted Bailout: Regulator must bailout all nodes in default
- No Obligations Deferral: Liabilities cannot be deferred to future periods
- No Recurrent Obligations: Each node cannot owe the same node more than once
- Next Period Payment Clearing: Payments owed in each period are cleared next period
- Proportionality: Claimant nodes are paid in proportion to amount owed

Speed of Contagion

<table>
<thead>
<tr>
<th>Speed of Contagion</th>
<th># of Defaults per Period</th>
<th>Cost of Intervention</th>
<th># of Defaulter Periphery Nodes</th>
<th>Cost of Intervention</th>
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<tbody>
<tr>
<td>Immediate t=1</td>
<td>15</td>
<td>92</td>
<td>36</td>
<td>189</td>
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<tr>
<td>Wait until t=2</td>
<td>6</td>
<td>60</td>
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<td>Wait until t=3</td>
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<tr>
<td>Wait until t=5</td>
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<td>216</td>
<td>216</td>
<td>8,966</td>
</tr>
</tbody>
</table>

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When Is It Optimal to Bailout the Financial System?

- Too Early
  - Unnecessary: Uncertainty about whether or not the crisis is systemic
  - Not appropriately designed: Uncertainty about the nature of the crisis
  - Confirm market fears: May trigger a confidence crisis
- Too Late
  - ‘Miss’ the crisis: Ineffective in resolving and containing crisis/contagion
  - Incur substantial costs: Greater severity and duration

Optimal Timing of Systemic Bailouts

Normal State
- All nodes able to meet obligations (defaults)
- \( \bar{k}_t \leq \bar{e}_t \)

Cascade State
- Some nodes unable to meet obligations (defaults)
- \( \bar{k}_t > \bar{e}_t \)

Cost of Intervention

- High
- Medium
- Low

- Even When Expensive

... and Even When Core Nodes Contribute Less Welfare to the Financial System