Overview

1. **Underlying mechanism**
   - Fire-sale externality + Liquidity spirals (due to maturity mismatch)
   - Hoarding externality (interconnectedness)
   - Runs

2. **Crisis prevention**
   - Macro-prudential regulation
   - Countercyclical regulation
   - Encourage long-term funding
   - Transparency - clearing house
   - Compensation schemes
   - ...

3. **Crisis management**
   - Bad bank, guarantee, receivership,...
1.1 Fire-sale externality

- **Leverage** (alone)  
  - Danger of risk shifting by leveraged institutions
    - Difficult to raise (new) funds

- **Maturity mismatch** (+ Leverage)  
  - New funds are needed
    - Two ways out
      - Raise new funds  
      - Sell off assets  
        - (at fire sale prices)

*Funding Liquidity*  
*Market Liquidity*  
*(rollover risk)*

*Fire-sales depress price also for others*
1.1 Liquidity spirals

- **Loss spiral**
  - same leverage
  - mark-to-market

- **Margin/haircut spiral**
  - delever!
  - mark-to-model

+ “mark-to-funding” incentivize long-term funding
  (reduce maturity mismatch)
1.1 Procyclicality – Margin/haircut spiral

- Margins/haircut increase in times of crisis \( \Rightarrow \) delever margin = \( f(\text{VaR}) \)

- Three Reasons
  1. Backward-looking estimation of \( \text{VaR} \)
     - Use forward looking measures
     - Use long enough data series
  2. Time-varying volatility
  3. Adverse selection
     - Debt becomes more information sensitive (not so much out of the money anymore)

- Credit bubbles
  - whose bursting undermines financial system

\[ \text{Countercyclical regulation} \]
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\[ \rightarrow \text{Countercyclical regulation} \]
1.2 Hoarding externality

- Individual bank’s perspective:
  - Possible interim shock (SIV might draw on credit line)
  - + future borrowing difficult
  - **micro-prudent response:** Hoard funds/reduce lending
    - Amount
    - Maturity (rat race)

- Systemic perspective
  - What’s micro-prudent can be macro imprudent!
    - Related to Keynes’ “paradox of thrift”

*Systemic risk is endogenous* (multiple equilibria/amplifier)
1.3 Runs

- *Run before others run* – racing b/c it’s better to be among first
  - *first mover advantage* - dynamic co-opetition
- Run externality from early to late movers

- Financial Institutions
  - On C-Banks: Classic bank-run by demand depositors
  - On I-Banks: “Client run” by margin account holders
    - *Bear Stearns’ case*
  - On HFs: “Margin run” by prime brokers – ask for more collateral
    - *AIG case*
    - Redemption run by investors
  - On SIVs: Rollover stop by money market investors
Overview

1. Underlying Mechanisms
   -...

2. Crisis Prevention
   - Macro-prudential regulation
   - Countercyclical regulation
   - Encourage long-term funding
   - Transparency - clearing house
   - Compensation schemes
   -...

3. Crisis Management
   -...

2.1 Macro-prudential regulation

- **Rational for regulation:** externality
  - **Fire-sale externality**
    - A’s fire-sales depress prices for other institutions as well
  - **Hoardings - Interconnectedness**
    - (prob. of) default affects other institutions
  - **Runs**

- **Response to current regulation**
  - “hang on to others and take positions that drag others down when you are in trouble” (maximize bailout probability)
    - become big
    - become interconnected

**Charges \( \alpha \) contribution to systemic risk, e.g. CoVaR

<table>
<thead>
<tr>
<th>Should cover</th>
<th>Institutions</th>
</tr>
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<tbody>
<tr>
<td>Risk spillovers</td>
<td>“individually systemic”</td>
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<tr>
<td>Tail risk correlations</td>
<td>“systemic as part of a herd”</td>
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</tbody>
</table>

- contrast to micro-prudential: bank’s risk in isolation, e.g. VaR
2.1 CoVaR

- CoVaR = VaR of financial sector conditional that institute $i$ is in distress (at it’s VaR level)
- Contribution of institution $i$ to systemic risk

$$ CoVaR_{ij}^q = \text{VaR}_q^i \mid \text{VaR}_q^j = \hat{\alpha}_{ij}^q + \hat{\beta}_{ij}^q \text{VaR}_q^j $$

- Endogenous! $\Rightarrow$ That’s an advantage here!

- Illustration:
  - Same individual VaR, but A’s CoVaR > B’s CoVaR
  - Analogy to Covariance in CAPM

- Calculations
  - Quantile regressions
  - Variables that predict CoVaR (leverage, maturity mismatch, …)
### 2.1 Classification of institutions

<table>
<thead>
<tr>
<th>group</th>
<th>examples</th>
<th>macro-prudential</th>
<th>micro-prudential</th>
</tr>
</thead>
<tbody>
<tr>
<td>“individually systemic”</td>
<td>International banks (national champions)</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>“systemic as part of a herd”</td>
<td>Leveraged hedge funds</td>
<td>x</td>
<td>o</td>
</tr>
<tr>
<td>non-systemic large</td>
<td>Pension funds</td>
<td>o</td>
<td>x</td>
</tr>
<tr>
<td>“tinies”</td>
<td>unlevered</td>
<td>o</td>
<td>o</td>
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</table>
2.2 Countercyclical regulation

- Lean against “credit bubbles”
  - Bubbles that impair financial (leveraged) sector
  - (NASDAQ vs. Housing bubble)
  - Combination of “bubbles + maturity mismatch” are toxic

- Margin/haircut spiral causes procyclicality
  - Steep yield curve in booms induces investors to finance themselves more short-term (“rollover risk” with negative fire-sale externalities)

- Look out for excesses in funding liquidity
  - Credit growth
  - Credit spreads
  - Haircuts/margins (LTV ratios)

- Laddered response (act early!) & prompt corrective action
2.3 Encourage long-term funding

- Liquidity charge
  - Capital charge
    - Strictly binding
    - Might stifle competition
  - Pigovian tax + government insurance
    - Generates revenue
    - In times of crisis it is cheap to issue government debt
  - Private insurance scheme (Kashap, Rajan & Stein, 2008)

- Mark-to-funding accounting rule + mark-to-market
  - Dual role of accounting
    - Transparency
    - Constrain business decision
    - two balance sheets
    - creditor protection
    - economy-wide concern
    (for capital requirements)
Overview

1. Underlying Mechanisms

2. Crisis Prevention
   - ...
   - Transparency - clearing house
   - Compensation schemes
   - ...

3. Crisis Management
   - Bad bank, guarantee, receivership,...
3. Crisis management - systemic

- What are toxic assets?
  - Assets that are not written down yet – easy to make them non-toxic

- Objective: stimulate (efficient) lending
  1. Recapitalize banks
     - recombine funds & expertise
     - invite new private capital
  2. Reduce information asymmetries

- Different implications:
  - Wealth transfer

<table>
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<tr>
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<th>to</th>
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<td>Debt holders</td>
<td>borrowers</td>
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<td>Taxpayers</td>
<td></td>
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</tbody>
</table>

- Different ways
3. Recapitalization at expense of debt holders

How to do? ideally uniform across all debt holders

1. Debt equity swap-provision
   - Triggered by aggregate conditions (change in law required)
2. Prompt corrective action
   - Forced merger of bank with new government entity
3. Tender offer by government to buy debt at current market price (feasible?)

Caution:

1. can’t wipe out short-term funding (since this would induce a run on money market funds)
2. At least $500bn long-term debt in large banks
3. Long-run consequence: rely even more on short-term funding
3. Recapitalization at expense of tax payers

- Equity injection
  - From internal JPMorgan Chase conference call: no new lending!
    “What we do think it will help us do is perhaps be a little bit more active on the acquisition side .... I think we have an opportunity to use that $25 billion in that way”, NYTimes Oct 25, 2008

- Purchase of toxic assets (at artificially high price)
  - No upside for tax-payers, less bang for the buck
  - Easy-exit as asset mature

- Guarantee – provide floor for assets
  - Only interbank market? (subsidize short-term debt)
  - Asset-specific guarantees to restart trading (price discovery)
    - Non-recourse loans at the current market price (30 cents to the $)
    - (current debt holders potentially participates)
    - Time-limited (e.g. 2 years)
    - Easy-exit
  - “Bad bank light”

- ...
3. Recapitalization at expense of tax payers

- Prop up house prices with mortgage subsidies
- Nationalization (receivership)
  - Can restart lending
  - But subject to political distortions - pet projects
3. Reduce asymmetric information

- Split banks into bad and good bank(s) after nationalization
  - Debt in good bank is less informationally sensitive
    - Uninformed are willing to lend to good bank again
    - Inject new private capital
      - matching scheme?
  - Privatize good bank soon

- Price discovery for toxic assets
  - Government purchase via reverse auctions
  - Stimulate private trade with time-limited “floor guarantee”
Conclusion

- Macro-prudential regulation
  - Focus on externalities
  - Measure for systemic risk is needed, e.g. CoVaR
  - Maturity mismatch (+ Leverage) – encourage long-term funding

- Countercyclical regulation
  - Lean against “credit bubbles”
    – interaction with monetary policy
  - Forward-looking measures, spreads, ...

- Incentives: compensation, ...

- Transparency: Clearing houses, ...

- Crisis Management
  - Objective: Reignite (efficient) lending
  - Choice: wealth transfer from debt holders or tax payers
  - Set up “transfer system” in advance based on aggregate state of economy
  - Reduce asymmetric information