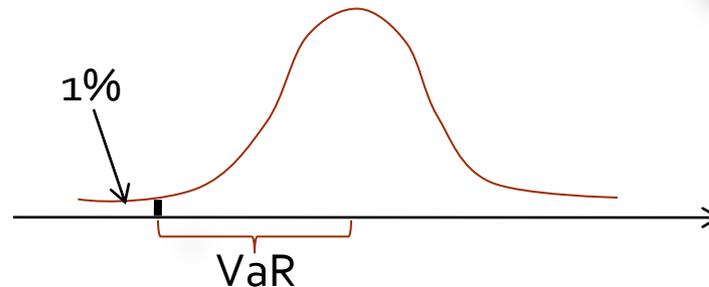# MACROPRUDENTIAL REGULATION
MARKUS K. BRUNNERMEIER

- Munich Economic Summit 2010 -

Current regulation

1. Risk of each institution in isolation ⟹ Value at Risk

1%

VaR

2. Procyclical capital requirements
   - VaR and ratings are countercyclical
3. Focus on asset side of the balance sheet
4. Differential capital treatment across industries.

Response to current regulation: "take positions that drag others down when you are in trouble" (maximize bailout probability)
become big, interconnected, hold similar positions

6

Challenges ….

1. Focus on externalities – systemic risk contribution
   - Internalize externalities (… just like pollution)
   - Fire-code analogy: fire-protection wall
   - $CoVaR^i = VaR^{system}|i$ in distress
2. Countercyclical regulation
   - Regulate based on characteristics that give rise to *future* systemic risk contributions
3. Incorporate funding structure
   - asset-liability interaction, debt maturity, liquidity risk
4. Objective regulatory criteria across financial institutions
   - Banks, broker-dealers, insurance companies, hedge funds,…

…. Bankruptcy procedure, living will, …. (see Geneva Report)
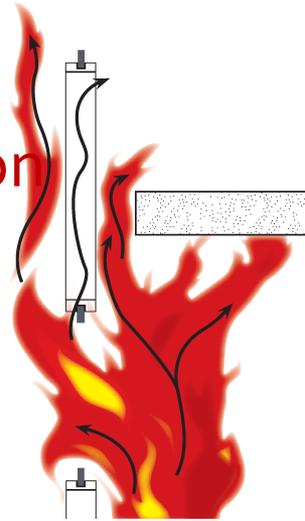
1. Externalities   "stability is a public good"

- Externalities within financial sector

  1. Pecuniary (fire-sale) externality
     - Maturity mismatch + Leverage
       ➡ *Fire-sales depress prices for others*

  2. Credit Crunch: Precautionary hoarding externality due to volatility effect

  3. Runs – dynamic co-opetition

  4. Network Externality
     - counterparty credit risk due to interlocking of claims
     - Hiding own's commitment ➡ uncertainty for counterparties

- Externalities to labor sector

  - Bonus payouts occur to early   FAT

2. Procyclicality: Bubbles & Liquidity spirals

- Risk *builds up* during (credit) bubble
  - Why did nobody delever/act against it earlier?
    - Ride bubble: "dance as long as the music plays"
    - Lack of coordination/synchronization as to when to go against the bubble

    Abreu-Brunnermeier (2003)

- … and materializes in a crisis

- Credit bubble led to housing bubble
  - Note similarity to Nordic countries, Japan,…
    (foreign capital, agency problems were less of an issue there)

2. Procyclicality – Liquidity spirals

Unstable dynamics due to (nonlinear) liquidity spirals
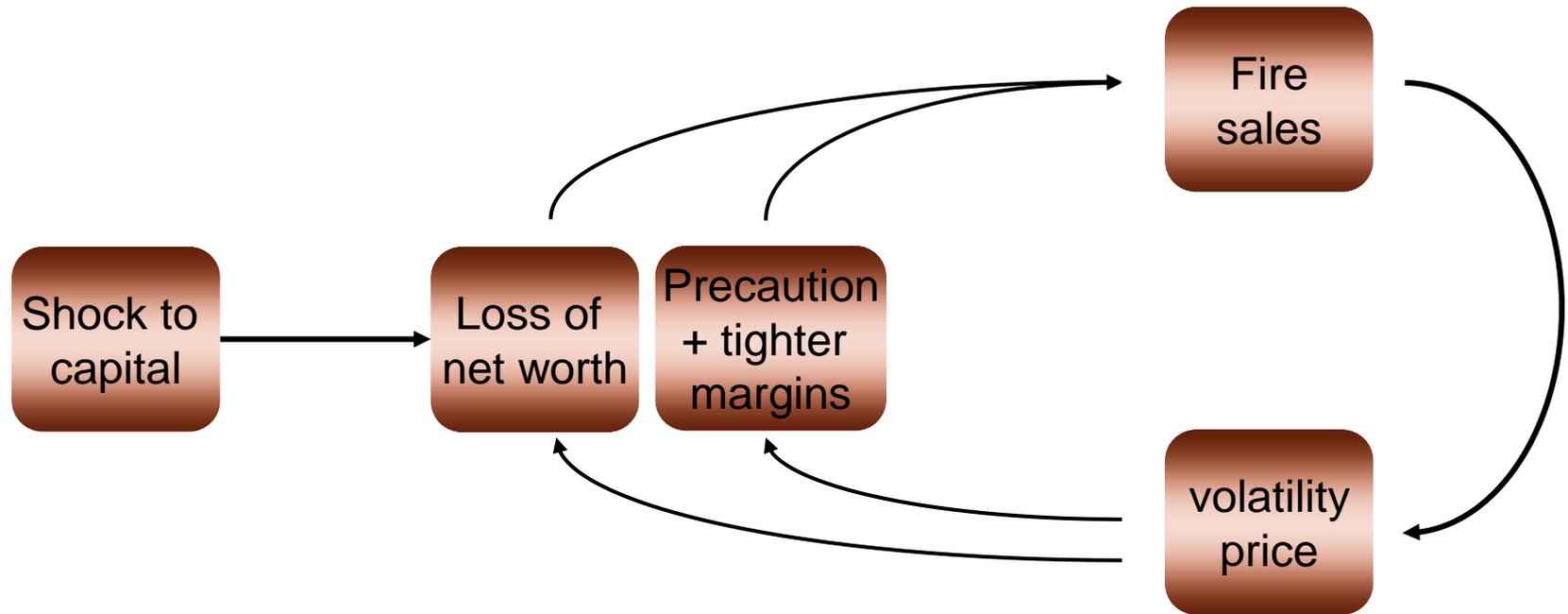
Loss spiral (outer)
very pronounced in mark-to-market accounting regime

Magin/haircut spiral (inner)
more pronounced in mark-to-model accounting regime

Overview – next steps

- **Who should be regulated?**
  - Financial Institutions versus instruments (shadow baking system)
  - Micro-prudential versus macro-prudential
- **How much?**
  - Based on contribution to systemic risk (externalities)
  - ➡ Objective risk contribution measure – like CoVaR
- **Countercyclicality**
  - Predict future CoVaR with high frequency variables
  - Laddered response
- **How?**
  - Caps: capital ratio requirements – Basel III
  - Pigouvian tax - "bank levy"
  - Private insurance scheme

Financial Institutions vs. Instruments

- **Financial institutions**
  - Based on objective criteria across all financial institutions
  - "Boundary problem"
  - Shadow banking system
  - Style
    - Top-down
    - bottom-up
      - Assets by asset....

- **Financial instruments/ markets**
  - ... get handle on shadow banking system
  - Margins/haircuts
    - Limit change to enforce higher initial margin

Macro- vs. Micro-prudential regulation

▪ Fallacy of the Composition:
what's micro-prudent need not be macro-prudent

Balance sheet	action	micro-prudent	macro-prudent
Asset side	(fire) sell assets	Yes	Not feasible in the aggregate
	no new loans/assets	Yes	Forces others to fire-sell + credit crunch
Liability side	(raise long-term debt)		
	raise equity	Yes	Yes

- ▪ Micro: based on risk in isolation

- ▪ Macro: Classification on systemic risk contribution measure, e.g. CoVaR

- ▪ Jeremy Stein's words: Ratios versus Dollars

Who should be regulated?

group	examples	micro-prudential	macro-prudential
"individually systemic"	International banks (national champions)	Yes	Yes
"systemic as part of a herd"	Leveraged hedge funds	No	Yes
non-systemic large	Pension funds	Yes	No
"tinies"	unlevered	No	No

- Includes shadow banking system

- *Clone property:* split i in n identical clones, $CoVaR^i = nCoVaR^c$

How to regulate?

- Size limits:
  - **Problem 1:** "too big to fail" ≠ "too systemic to fail"
  - split "individually systemic" institution into 10 clones
    - (clones perfectly comove with each other)

    "systemic as part of a herd"

    Lessons:
    - Regulation should provide incentive to be heterogeneous
    - Spillover risk measure should satisfy "clone property"
  - **Problem 2:**
    one-dimensional threshold
    "bunching" below threshold

    Lesson: Smooth transition -- "have to pay" in leverage …
- Mix of size, leverage, maturity mismatch, connectedness, risk pockets, crowded trades, business model, …
  …. but what weights?

CoVaR method

1. Find optimal mix/trade-offs between size, leverage, ..., across institutions   objective weights
2. Countercyclical implementation   forward-looking weights

Method:

- *Predict* ΔCoVaR using frequently observed characteristics
  - Size, maturity mismatch, leverage,
  - …. special data only bank supervisors have
        (e.g. crowdedness , interconnectedness measures)

How to measure externalities: CoVaR

- VaR_q^i is implicitly defined as quantile

$$\Pr(X^i \leq VaR_q^i) = q$$

- $CoVaR_q^{j|i}$ is the VaR_q^j conditional on institute i (index) being in distress (i.e., at it's VaR level)

$$\Pr(X^j \leq CoVaR_q^{j|i} \mid X^i = VaR_q^i) = q$$

- $\Delta CoVaR_q^{j|i} = CoVaR_q^{j|i} - VaR_q^j$

q-prob. event

- Various conditionings? (direction matters!)

  ΔCoVaR
  - Q1: Which institutions move system (in a non-causal sense)
  - VaR^{system}| institution i in distress

- Exposure ΔCoVaR
  - Q2: Which institutions are most exposed if there is a systemic crisis?
  - VaR^i | system in distress

- Network ΔCoVaR
  - VaR of institution j conditional on i in non-causal sense!

Results 1: Summary based on US data

- **Suppose**
  - 8 % microprudential capital requirement = leverage < 12.5 : 1
  - Focus on 1% CoVaR, 1 year in the future
- **Size-leverage tradeoff**
  - Small bank with   1% market share has   8% capital requirement
  - Large bank with 21% market share has 11% capital requirement
- **Maturity mismatch-leverage tradeoff**
  - Bank with 20% MMM has   8% capital requirement
  - Bank with 30% MMM has 9.1% capital requirement,

    where MMM = (short-term debt – cash) / total assets

- **Tax-base for "bank levy" can be based on same analysis**

Conclusion

1. Focus on externalities – systemic risk contribution
2. Countercyclical regulation
3. CoVaR Method: quantify optimal policy mix across various measures
4. Regulating institutions and assets/markets (top down, bottom up)
5. Misc - Other issues
   - Prompt resolution for bank holding corporation and debt-equity swaps
   - Living will – prepackaged bankruptcy
   - Remuneration
   - Big banks-small countries problem
   - Loan-to-Value Ratio limitations
   - Credit Rating Agencies
   - Own bankruptcy contingency plan for individually systemic financial institutions
   - Year-end spikes