Wege zur neuen Finanzarchitektur

Markus K. Brunnermeier

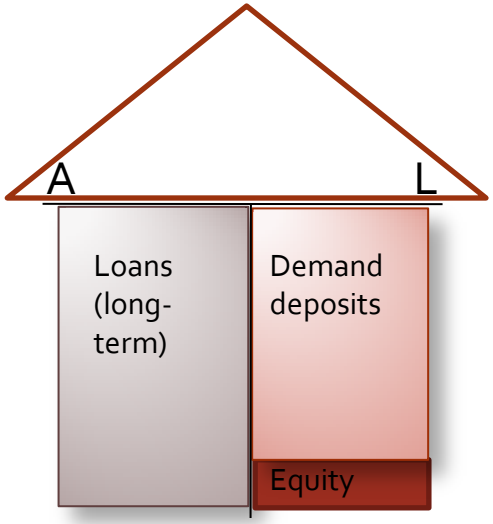
- Berlin Finance Lecture 2010 -

Overview

- Role of financial intermediaries
  - Banks
  - Shadow banking system
- Challenges to financial stability
  - Macroprudential regulation
- Challenges to monetary stability

Shadow banking system

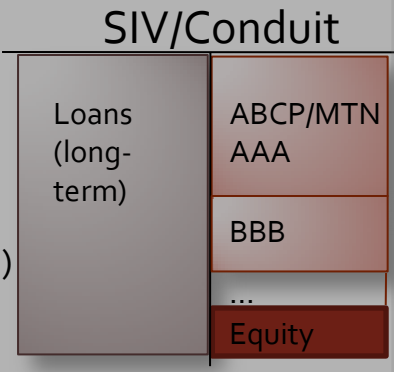
- Traditional Banking



- Role of banks

Channel funds	Long-run repayment	Prospect of selling off
Maturity transformation	Retail funding	Wholesale funding (money market funds, repo partners, conduits, SIVs, …)
Info-insensitive securities	Demand deposits	ABCP, MTN, overnight repos, securities lending

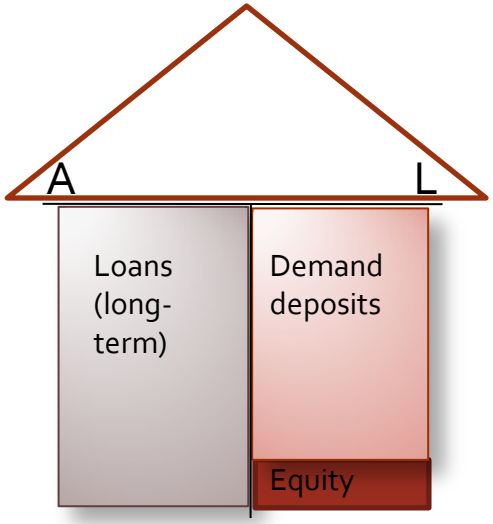
- Originate & distribute
  - Securitization
    - Pooling
    - Tranching
    - Insuring (CDS)
  - Dual purpose
    - Tradable asset
    - Collateral



→ *feeds repo market for levering*

Changing banking landscape

- Traditional Banking



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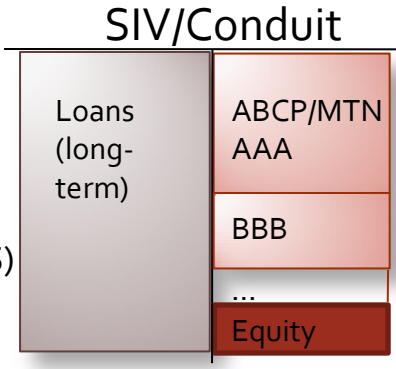

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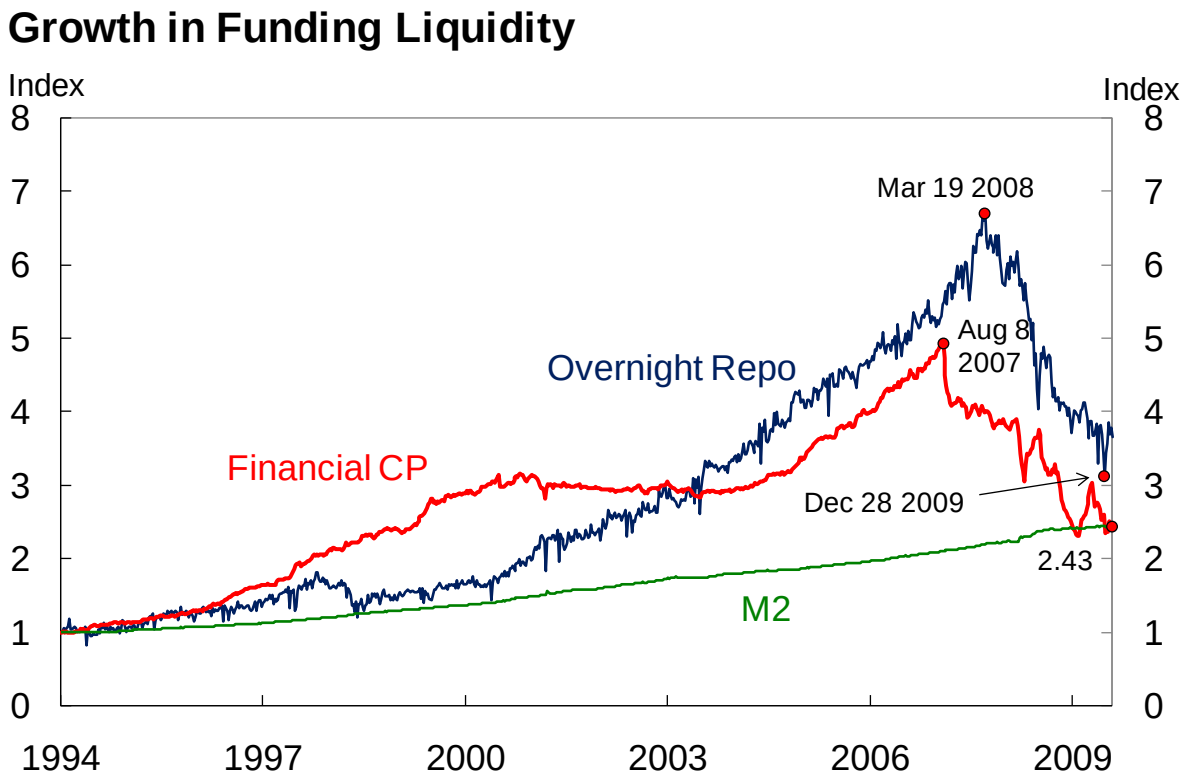
Two trends

1. Shift towards shadow banking system
2. Increasing reliance on short-term funding

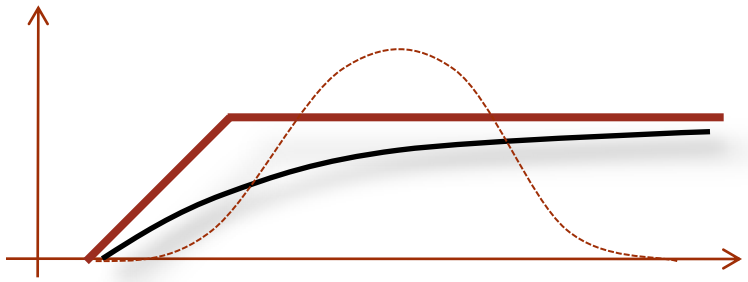


Source: Adrian, NYFed

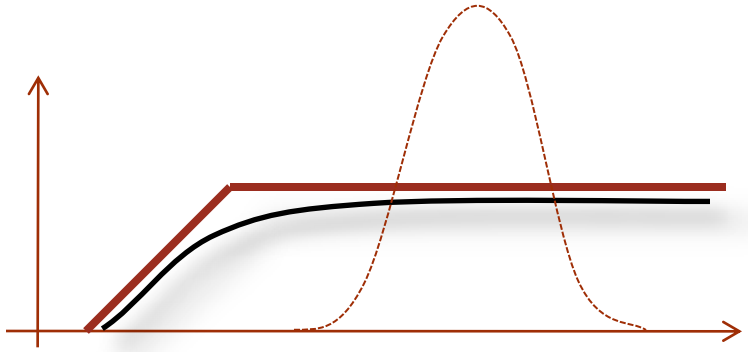
Two trends

1. Shift towards shadow banking system
2. Increasing reliance on short-term funding
   - Allows for higher leverage (lower margins)
   - Less info sensitive, …. but sharper switch
     lower delta, but higher gamma (option language)

long-term debt



short-term debt



   - Maturity rat race

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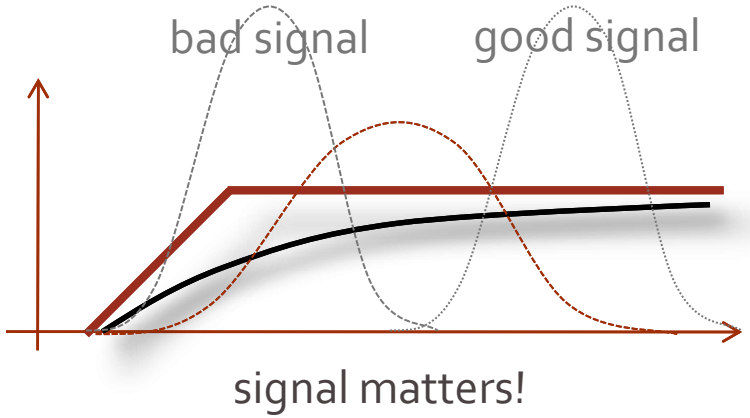

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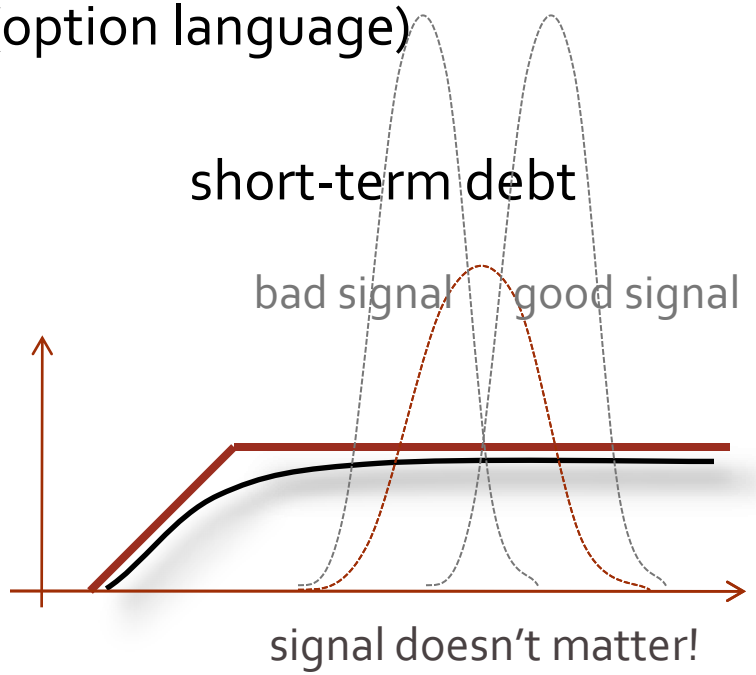
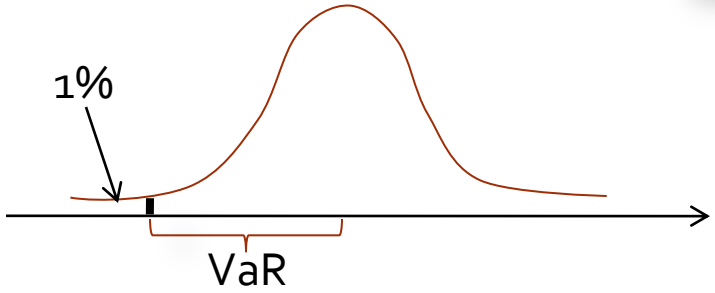


   - Maturity rat race

Current regulation

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

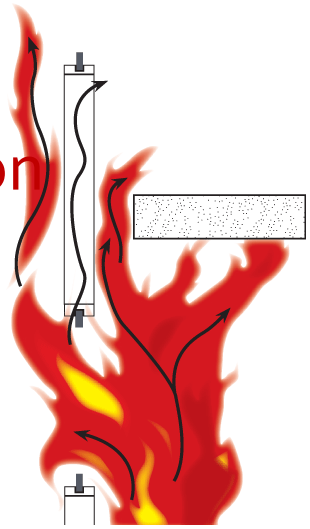


2. Procyclical capital requirements
   - VaR and ratings are countercyclical
3. Focus on asset side of the balance sheet
4. Differential capital treatment across industries.

Response to current regulation: "take positions that drag others down when you are in trouble" (maximize bailout probability)

become big, interconnected, hold similar positions

Challenges ….



1. Focus on externalities – systemic risk contribution
   - Internalize externalities (… just like pollution)
   - Fire-code analogy: fire-protection wall
   - $CoVaR^i = VaR^{system} | i \text{ in distress}$
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. Direct effect: Network externalities – interconnectedness
     - counterparty credit risk due to interlocking of claims
     - Hiding own's commitment ⇒ uncertainty for counterparties
  2. Price effect: 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
- Externalities to real economy
  - Bonus payouts occur to early FAT

1.1 Fire-sale externality & Liquidity

A | L

Funding liquidity

- Can't **roll over** short term debt
- **Margin**-funding is recalled

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Market liquidity

- Can only sell assets at **fire-sale prices**

Ease with which one can raise money by selling the asset

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Ease with which one can raise money by borrowing using the asset as collateral

Each asset has two values/prices

1. price
2. collateral value

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Each asset has two values/prices
1. price
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- Low funding liquidity = excessive maturity mismatch
  - Dynamic
- Low capital = excessive leverage

Liquidity problems

A L

Market liquidity

- Can only sell assets at **fire-sale prices**

Funding liquidity

- Can't **roll over** short term debt
- **Margin**-funding is recalled

measures	quantity	price	quantity	price
static	Trading volume	Bid-ask	Unsecured vs. collateralize funding	TED spread (term spread)
		VIX Downside correlation	Haircuts/ margins/LTV	
dynamic			Debt maturity to • Asset maturity • Asset market liq	

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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

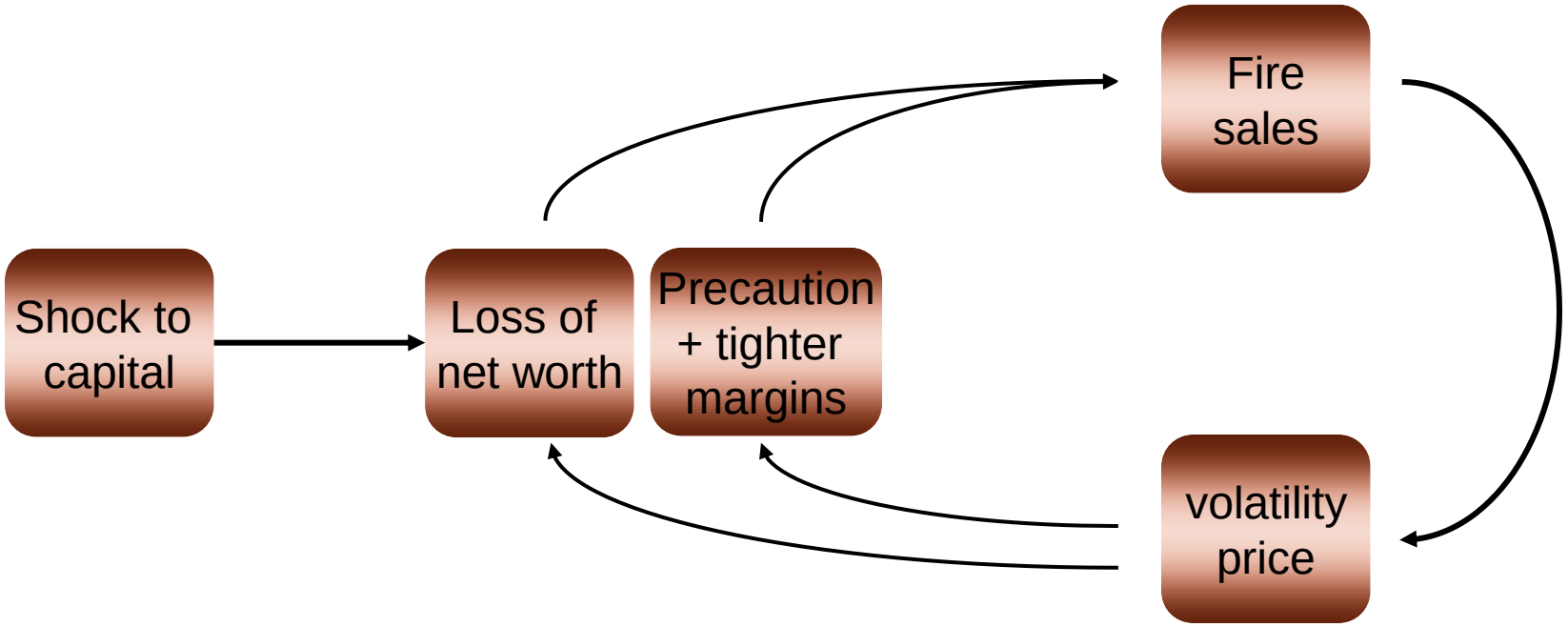
Abreu-Brunnermeier (2003)

- … 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 (bank fund)

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
- 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 (with Tobias Adrian)

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)

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

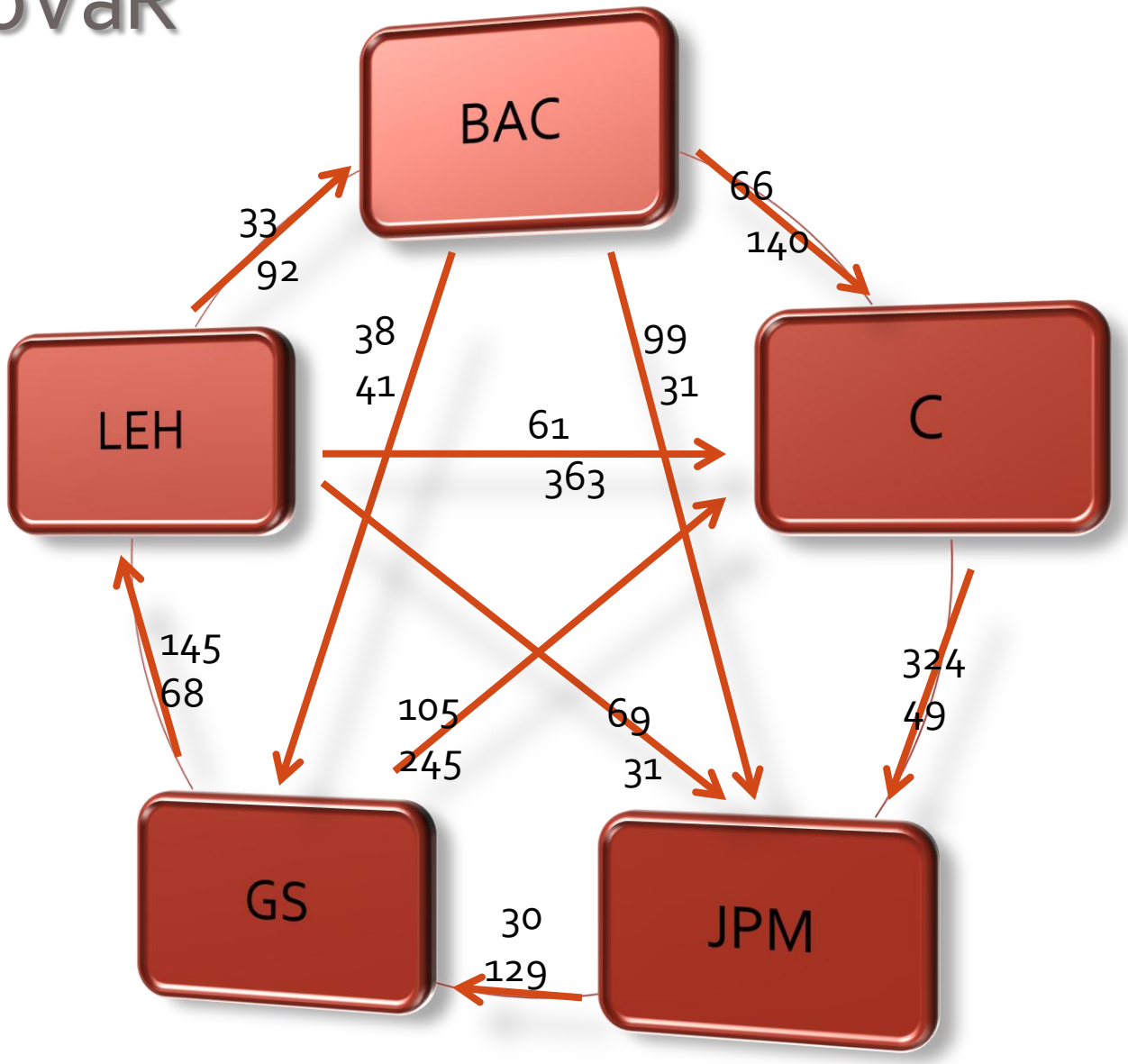
q-prob. event

- $\Delta CoVaR_q^{j|i} = CoVaR_q^{j|i} - VaR_q^j|_{\text{normal times}}$

- 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!

Network CoVaR



- conditional on origin of arrow

Quantile Regressions: A Refresher

- OLS Regression: min sum of squared residuals

$$\beta^{OLS} = \arg\min_{\beta} \Sigma_t \quad y_t - \alpha - \beta x_t \quad ^2$$

  - *Predicted value:* $E[y \mid x] = \alpha + \beta x$

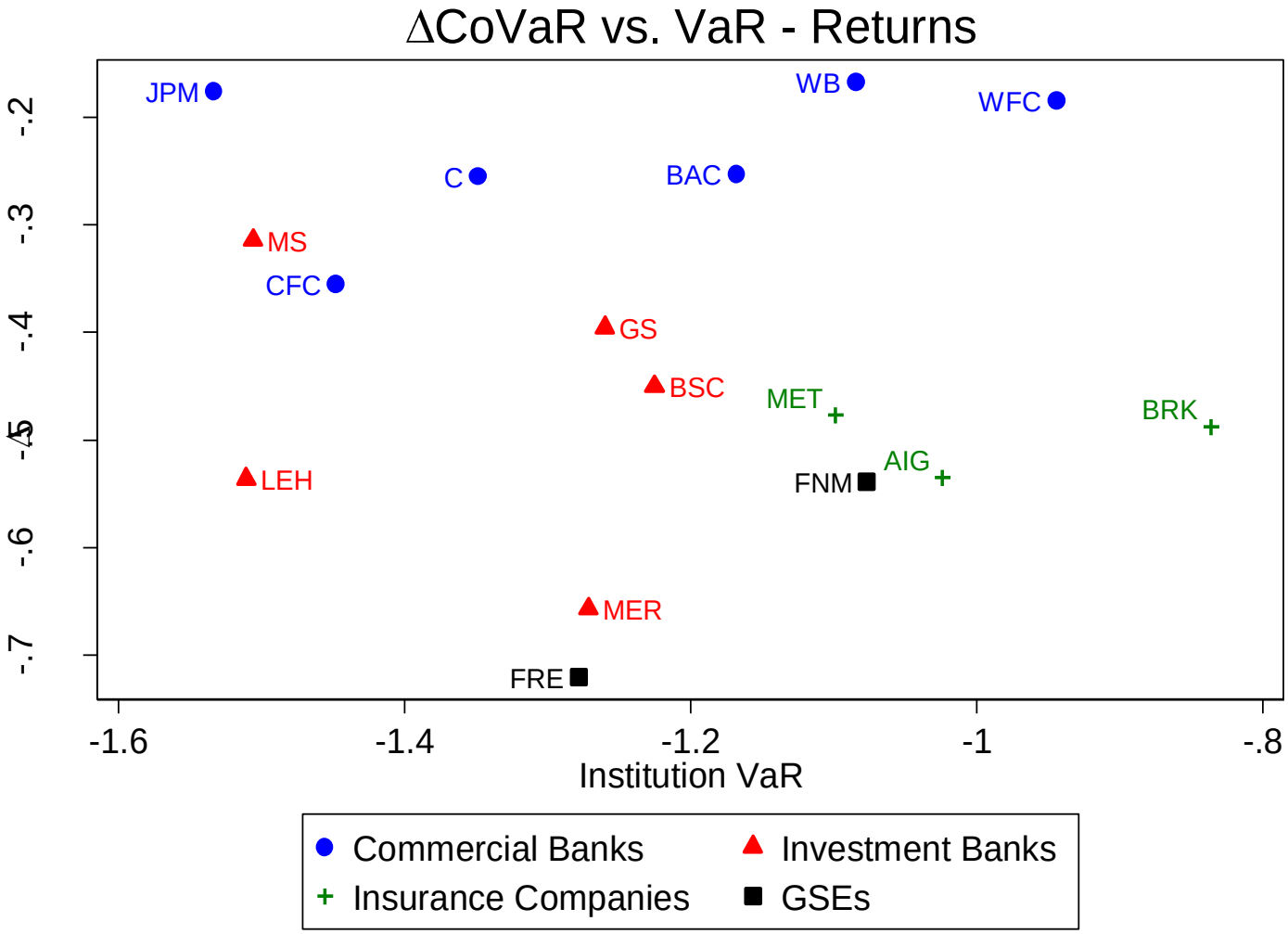
- Quantile Regression: min weighted absolute values

$$\beta^q = \arg\min_{\beta} \Sigma_t \begin{cases} q\left|y_t - \alpha - \beta x_t\right| & \text{if} \quad y_t - \alpha - \beta x_t \geq 0 \\ 1-q \ \left|y_t - \alpha - \beta x_t\right| & \text{if} \quad y_t - \alpha - \beta x_t < 0 \end{cases}$$

  - *Predicted value:* $VaR_q \mid x = F_y^{-1}(q \mid x) = \alpha_q + \beta_q x$

Note out (non-traditional) sign convention!

ΔCoVaR and VaR unrelated in cross-section



VaR does not capture systemic risk contribution

Δ CoVaR$_{contri}$

Data up to 2006/12

Translating analysis in systemic risk charges

- *Suppose*
  - 8 % microprudential capital requirement = leverage < 12.5 : 1
  - Focus on 5% CoVaR, 1 year in the future
- Size-leverage tradeoff
  - Small bank with 5% market share has 8.0% capital requirement
  - Large bank with 10% market share has 8.7% capital requirement
- Maturity mismatch-leverage tradeoff
  - Bank with 50% MMM has 8.0% capital requirement
  - Bank with 55% MMM has 10.3% capital requirement,

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

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

What type of charge?

- Capital charge (incl. systemic risk/liquidity surcharge)
  - Binds in crisis, less in booms!
  - Might stifle competition
  - + cap and trade
- Pigouvian tax + (uncertain) government insurance
  - Paid in booms (countercyclical) + very salient
  - generates revenue
  - In times of crisis it is cheap to issue debt for ***some*** governments
- (Private) insurance scheme – bank rescue fund
  - Fees will be lowered after a prolong boom phase
  - Too small
  - Moral hazard - requires lots of regulation
- Financial activity tax (FAT) - the VAT for the financial sector

Countercyclical Regulation

- *When market is relaxed*
  Strict Laddered Response
  - **Step 1:** supervision enhanced
  - **Step 2:** forbidden to pay out dividends
    - See connection to debt-overhang problem)
  - **Step 3:** No Bonus for CEOs
  - **Step 4:** Recapitalization within two months + debt/equity swap
- *When market is strict*
  Relax regulatory requirement

Countercyclical instruments

- Lean against credit bubbles/buildup of risk + capture externalities
  - Time-varying capital/liquidity requirements – Loan-to-Value (systemic risk surcharge)
  - Dynamic provisioning
  - Pigouvian tax – Obama tax
  - Lending criteria
  - Communication policy – warnings of risk buildup
    - Coordinate/synchronize investors to go against a bubble
    - use financial stability reports.
  - Interest rate policy
    - Effective only in early phase
    - SIV financing would have been much less attractive

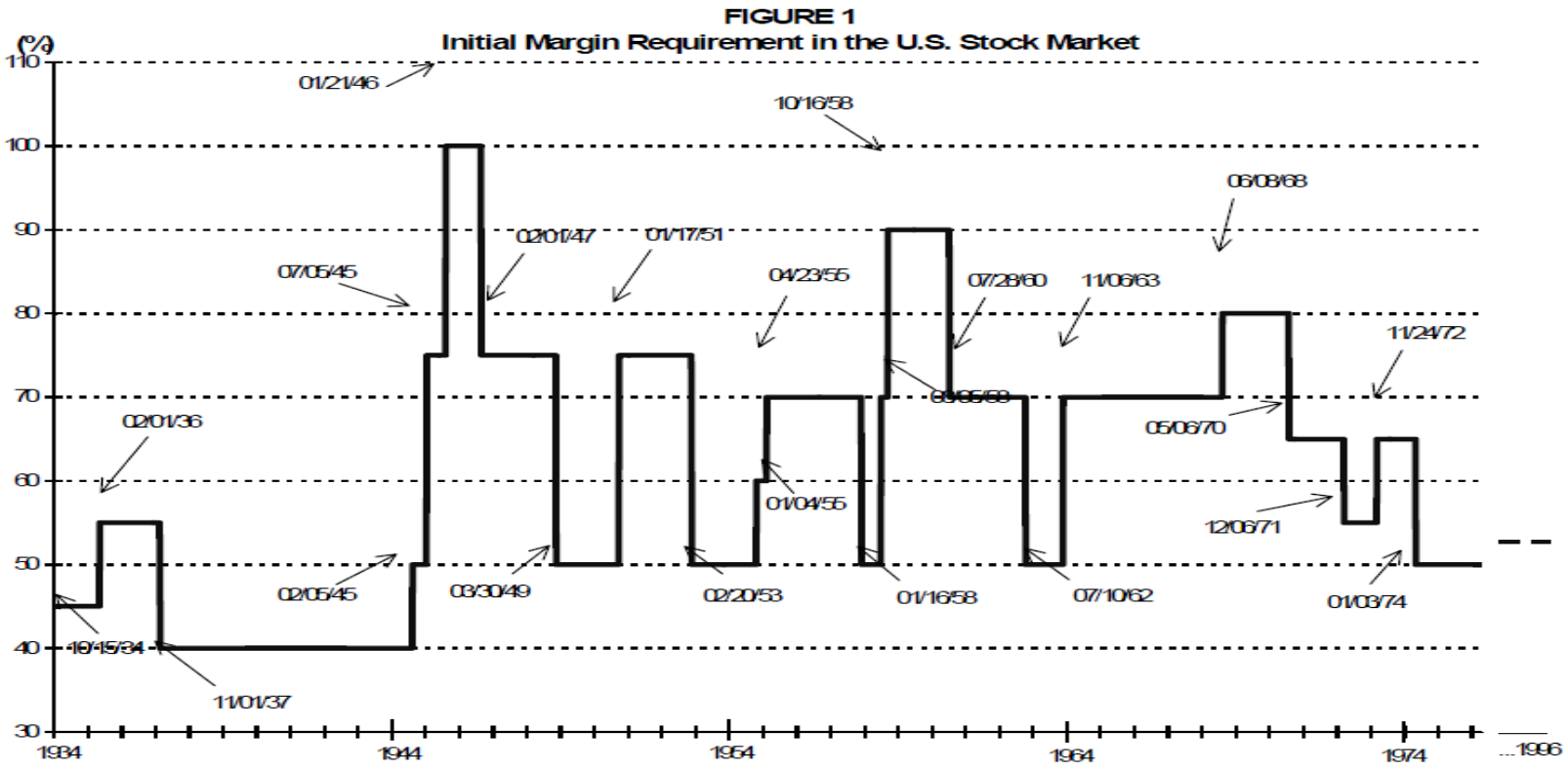
Independence of a political pressure!

Regulating shadow banking system

- Regulate assets (financial products) directly
- Problem: haircut/margin spiral
- Proposal:
  - Allow lenders to adjust margin only infrequently
    - = long-term loans (instead of short-term loans)
    - Less (funding) liquidity risk due to maturity mismatch
    - Endogenous response:
      - Margins/haircuts will be higher
      - Leverage will be lower
  - FED can reinstate policy requiring margins
    - Has to be extended to many financial instruments
    - Easy to get around it

Regulation T

- The Fed decided the initial margins in US stock market, which kept unchanged since 1974.



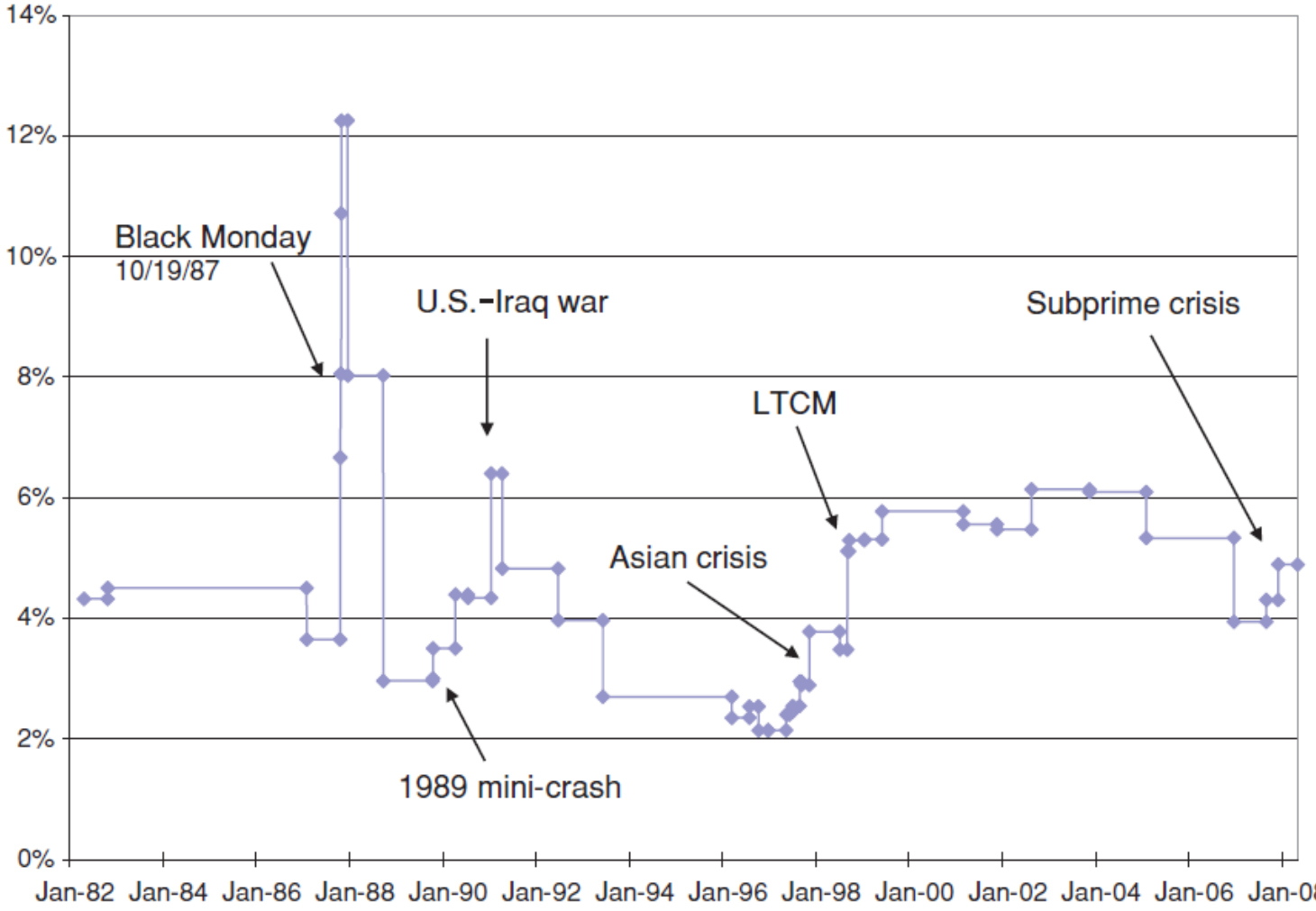


Figure 1
Margins for S&P 500 futures
The figure shows margin requirements on S&P 500 futures for members of the Chicago Mercantile Exchange as a fraction of the value of the underlying S&P 500 index multiplied by the size of the contract. (Initial or maintenance margins are the same for members.) Each dot represents a change in the dollar margin.

Prompt resolution bankruptcy for holdings

- *Problem:* Bankruptcy resolution is too slow for financial institutions.
  - Shareholder approval is needed for "forced merger" (bailout)
  - Prompt resolution framework that was introduced only for commercial banks (and executed by FDIC) after the S&L crisis
- *Debt-overhang problem*

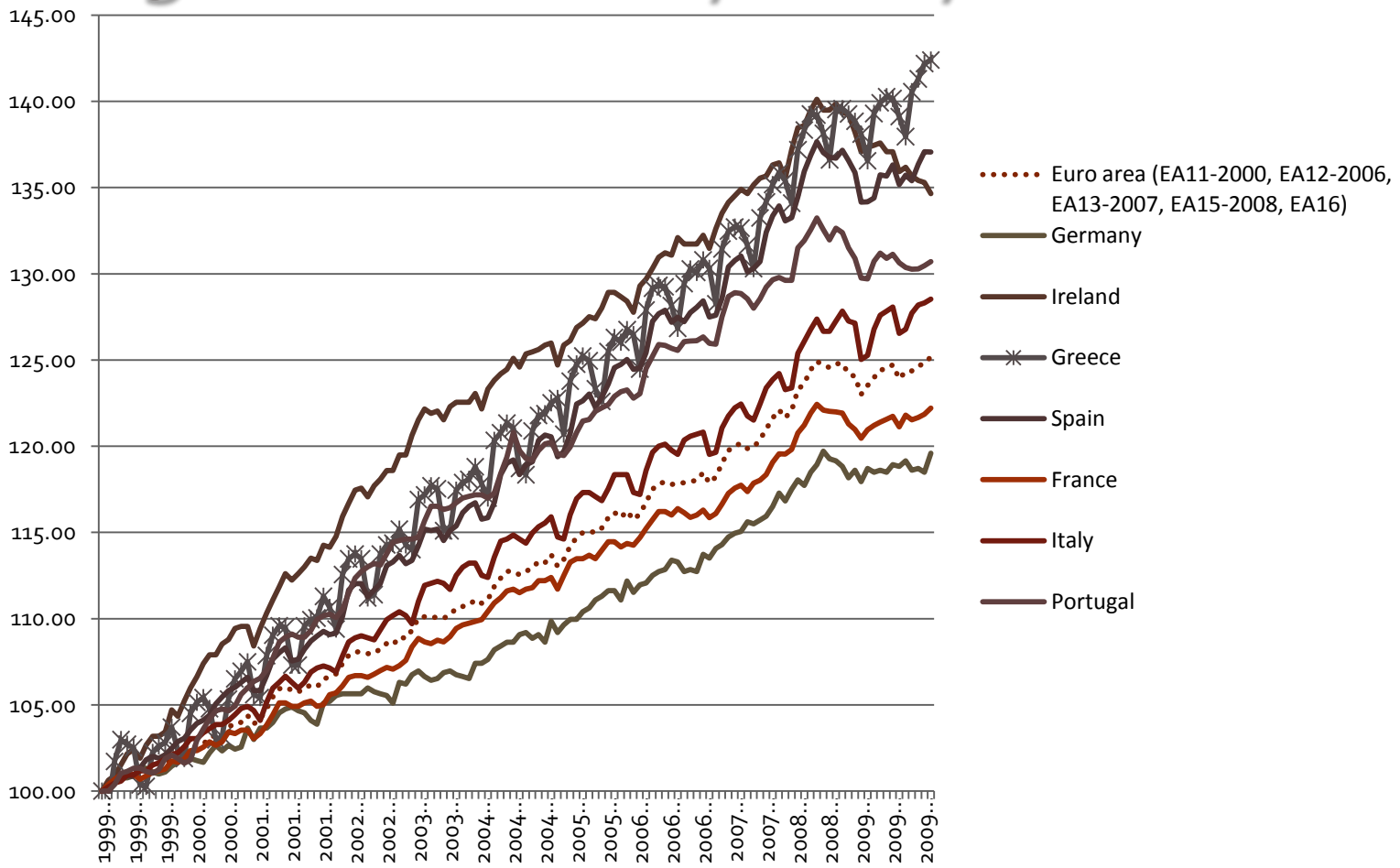
⇒ Extend prompt resolution framework to all financial institutions (worldwide) (include bank holding companies and investment banks)

⇒ Convert long-term debt in equity if needed
  - Based on aggregate state of the economy

Capital flows – Information systems

- Fund flow
  - Who is indebted?
    - Households
    - Banks
    - Governments
  - Which instrumetns
    - Equity versus debt
- Information collection – risk topography
  - "catch all systems" unrealistic
  - Division of labor (make use of banks' expertise)
    - Banks report
      - Sensistivity to risk factors
      - Reaction
    - Regulators derive
      general equilibrium effects and liquidity effects

Challenges to Monetary Policy



- HICP index of several Euro countries

Financial versus monetary stability

- When is there a trade-off?
  - Times of "great moderation":
    - Inflation is (seems to be) contained
    - Credit and asset price expansion – "credit bubble"
    - *Build-up of risk*, which will only materialize later
    - After burst,
      - deflationary pressure
      - monetary transmission mechanism can be impaired
      - bailouts + government deficits (potentially leading to long-run inflation?)
  - Should interest rate be increased
    - Price stability (inflation targeting) No
    - Financial stability Yes
- New rationale for modified monetary aggregates
  - Was the ECB ahead of the Fed?
  - Modify monetary aggregates to reflect new rationale

Defusing "benign neglect policy"

1. Difficult to identify bubble
   1. Any policy is a decision under uncertainty
   2. Risk management approach
2. Clean versus lean
   1. Asset bubble vs. credit bubble
3. Interest rate is not most effective tool to prick bubbles
   1. Effective in early face and when spreads are thin
4. Too crude
   1. Bubbles affect large part of economy
   2. Other instruments
5. Pricking bubble led to disastrous outcomes (US 1928, Japan 1989

Quantitative aggregates

- Credit aggregates
  - Credit (growth) aggregates
  - Credit lines
    - Excessive draws on credit lines are signs of upcoming troubles
    - Newly extended credit lines
  - Repo growth

  + asset bubbles + "bubble anecdotes"
  - Features
    - Maturity structure
    - Counterparties (banks, households)
- Money aggregates (related)
  - Portfolio shifts to shorter maturity, safer assets

Optimal Currency Area - reconsidered

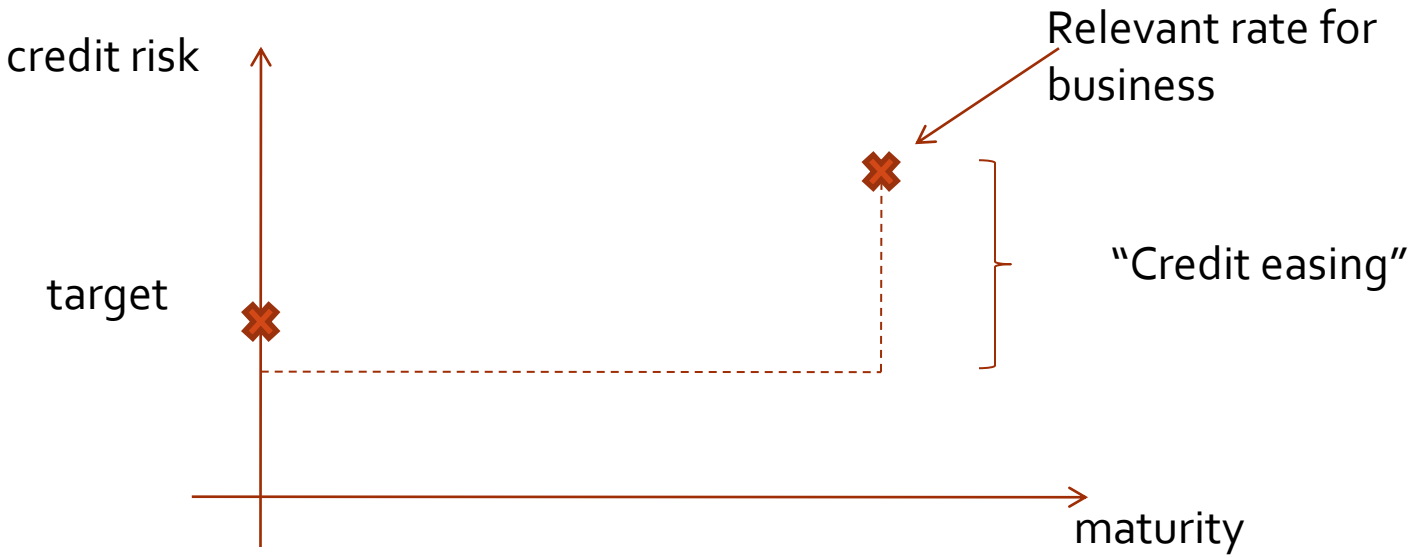
- Traditional view
  - Asymmetry of shocks
  - Fiscal integration
  - Labor mobility

  Lose instrument, since same interest in whole area
- New view (see Brunnermeier 2010)
  - Regional/segmented banking landscape
  - More (region specific) tools
    - Collateral policy
    - Haircut/margin regulation
    - Purchase regional MBS
    - Financial supervision

    → control regional bubbles/blows

→ Justifies larger currency area, but needs clear governance structure

Unconventional monetary policy



	Quantitative easing	Credit easing
buy	Long-term government securities	Commercial paper MBS,...
lend against (collateral policy)		

Conclusion

1. Regulate institutions and products (top down, bottom up)
2. Focus on externalities – systemic risk contribution
3. Countercyclical regulation
4. CoVaR Method: quantify optimal policy mix across various measures
5. Smart data collection system
6. Modify monetary policy
7. 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
   - Year-end spikes