Monetary Policy and Financial (In)Stability: An integrated micro-macro approach

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Motivation

- Recent interest in Financial Stability
  - Bank level stress-tests
    - BIS
    - Partial
  - Macro stress-tests
    - Interaction:
    - From macro to financial sector, and back

Motivation

- Frequently, Financial Stability Reports (e.g. ECB, 2006) and papers (e.g. Goodhart, 2006, JBF) state « wishlists »
  - i.e. aspects of the economy that one would like embedded in a macro stress test

- This paper can be viewed as an effort to address some of these aspects
  - Maintain the link with the micro bank level
  - Allow for feedback, possibly simultaneous
  - Structural interpretation of scenarios
  - Non-linearity
  - Multiple types of risk

What we do:

- Build on Jacobson, Lindé and Roszbach (2005, JFS), who:
  - Combine VAR
    - Swedish macroeconomy
  - With micro model
    - Firm default risk
  - Study effect of monetary policy shock

- Extend JLR in mainly two directions:
  - Interaction
    - Simultaneous, agnostic
  - Application
    - Banks (German)
    - Disaggregate financial response
  - Of more direct relevance for financial stability

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Structure of the talk

- The data
- The approach
- Results
- Implications

The data

- Outright bank defaults are only rarely observed
- We use supervisory data on German banks
  - Bundesbank distress database
- Solves the problem of few observed defaults
- Allows a more precise inspection of problems in the banking sector:
  - Distressed events, rather than default
  - Captures different types of risk
  - Varying degree of severity

Distress data: Some examples

- Automatic signals (I)
  - E.g. bank needs to notify the supervisor when facing substantial capital losses
- Supervisory warnings (II)
  - E.g. admonishment hearings or warning letters
- Supervisory interventions (III)
  - E.g. activity restrictions, fire CEO, capital injections
- Bank defaults (IV)
  - E.g. outright default, distressed M&A's

Distress data: Some numbers

Year	All	Banking groups			Distress categories			
		Com'cl	*Sav's*	*Coop's*	*I*	*II*	*III*	*IV*
1995	1.9%	2.2%	0.3%	2.3%	0.1%	0.4%	0.8%	0.6%
1996	2.5%	4.9%	0.8%	2.8%	0.1%	0.4%	1.2%	0.7%
1997	3.4%	6.3%	0.9%	4.0%	0.1%	0.7%	0.9%	1.7%
1998	4.7%	7.5%	2.1%	5.3%	0.1%	1.4%	1.3%	1.9%
1999	5.6%	4.4%	0.7%	7.2%	0.2%	2.4%	0.9%	2.1%
2000	5.0%	5.0%	1.6%	6.1%	0.1%	2.2%	1.0%	1.7%
2001	6.9%	9.2%	2.2%	8.3%	0.8%	3.1%	1.1%	1.9%
2002	7.0%	4.4%	3.4%	8.7%	1.2%	3.3%	0.9%	1.6%
2003	6.6%	4.7%	1.8%	8.8%	0.8%	3.4%	1.1%	1.3%
2004	4.1%	0.8%	1.1%	5.8%	0.5%	2.5%	0.8%	0.3%

The approach

- Want to study empirical relation btw macro and financial sector

- Take most common model used for each purpose separately
  - Macro: VAR
  - Micro: logit

- And combine them

The macro side

- Monetary VAR:
  - Output
  - Inflation
  - Interest rate
  - Z=(Y,P,R)
- Add one exogenous variable:
  - Aggregate frequency of distress (D)
  - Measures (reduced form) feedback from financial sector to macro

- Z(t)=A*Z(t-1)+B*D(t-1)+u(t)

The micro side

- Logit: Probability of «bank distress»

- As a function of:
  - Bank specific covariates
    - CAMEL
    - Cross-sectional variation in distress
  - Macro variables
    - Same as in VAR (Y,P,R)
    - Time variation in distress
- D(t)=C*Z(t-1)+a(t)

The combined model

- Micro: D(t)=C*Z(t-1)+a(t)
- Macro: Z(t)=A*Z(t-1)+B*D(t-1)+u(t)

- Has a VAR type structure
  - X(t) = G*X(t-1) + e(t)
  - Where X=(Y,P,R,D)

- Exploit this structure to identify structural shocks
  - i.e. H*X(t) = K*X(t-1) + s(t)

- Simultaneity financial-macro wanted (H≠I)
- FS theory in early stage (H=?, K=?)

- We refrain from timing restrictions
  - Use sign-restrictions instead

Identification restrictions

- Monetary policy shock
- Impose « what we know » happens after a policy shock:
- Y↓, P↓, R↑

- While remaining agnostic about timing and direction of distress (D) response, and its effects

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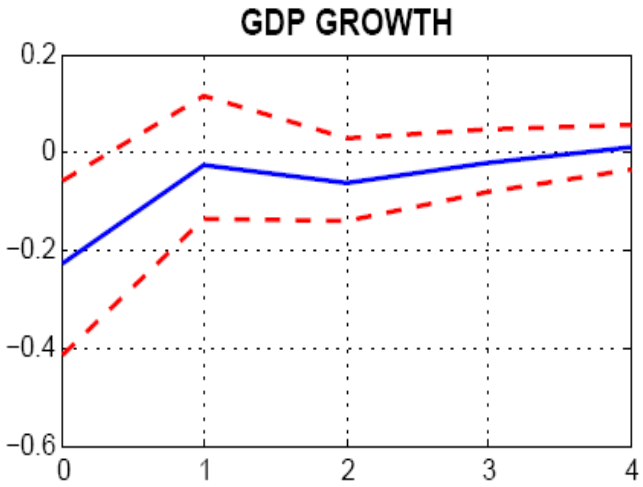
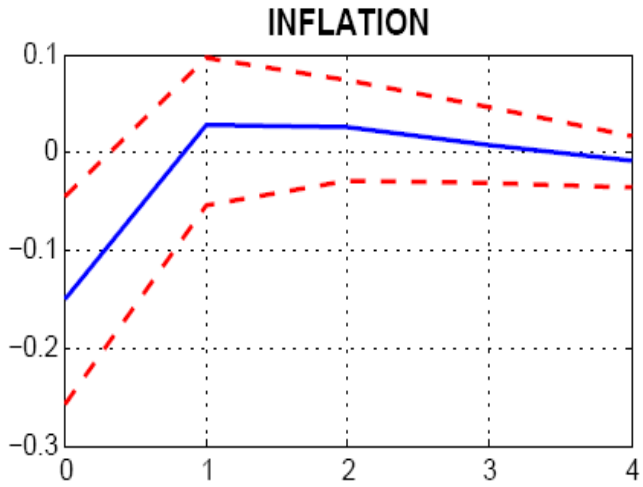
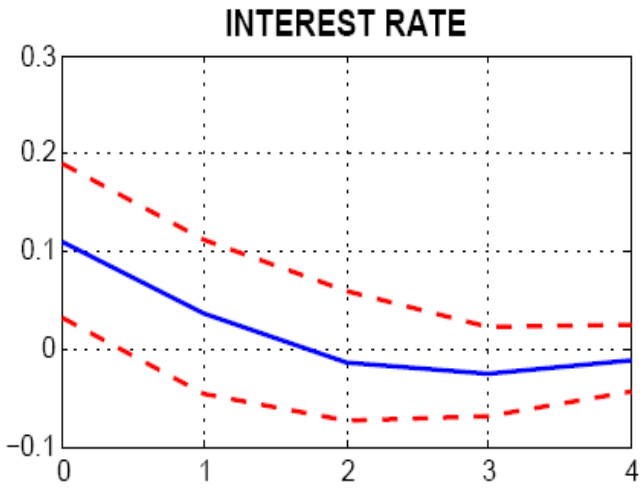
Results

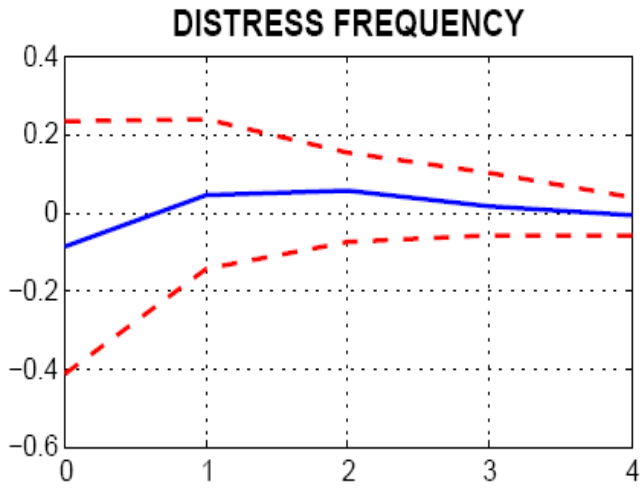
- Aggregate response to a MP shock
  - In a VAR on Y,P,R,D
  - In the combined micro-macro model
- Disaggregate responses to a MP shock
  - Per banking group
  - Per distress category
- Further evidence:
  - State-dependence

Traditional macro VAR

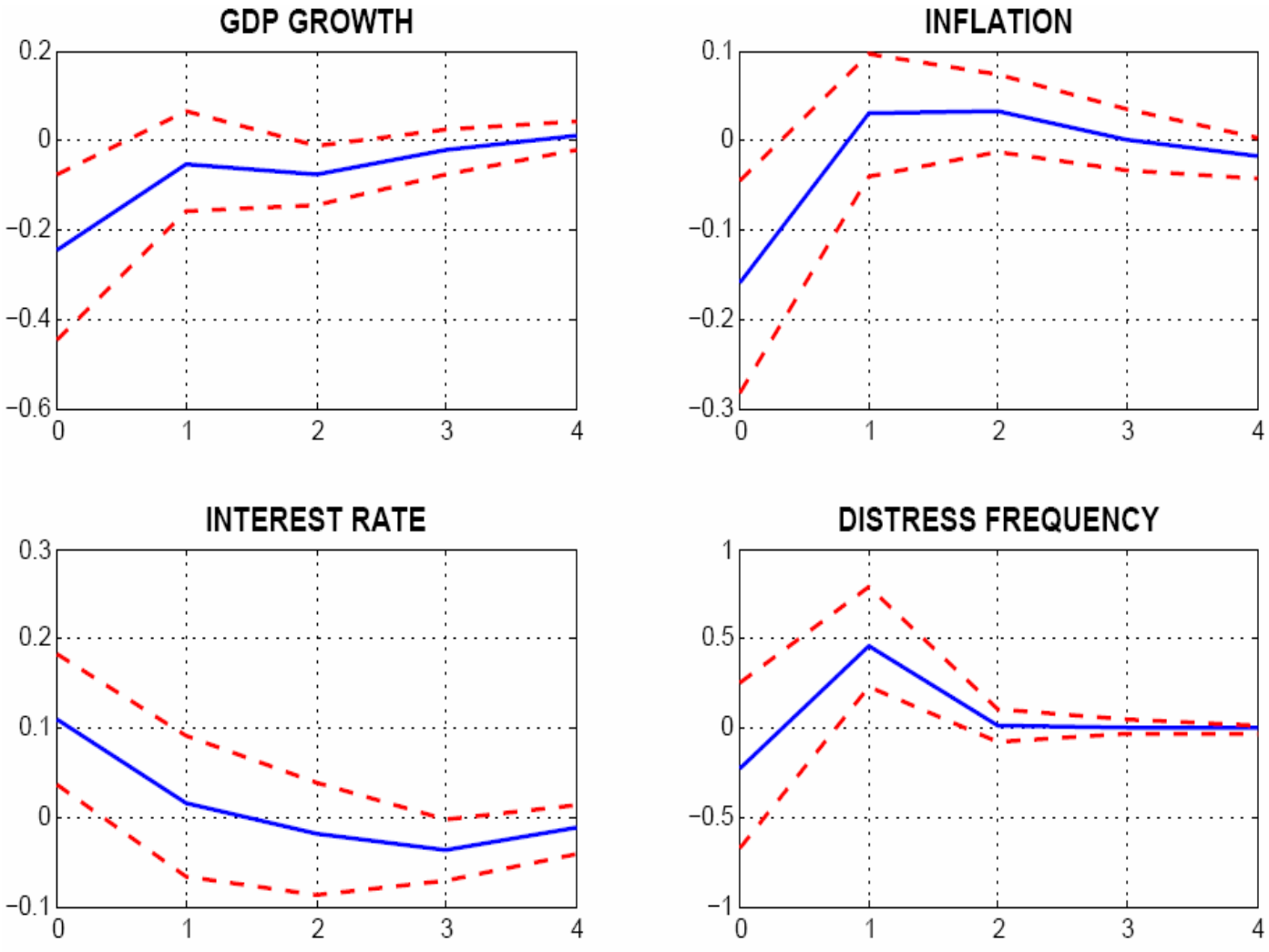








Combined model

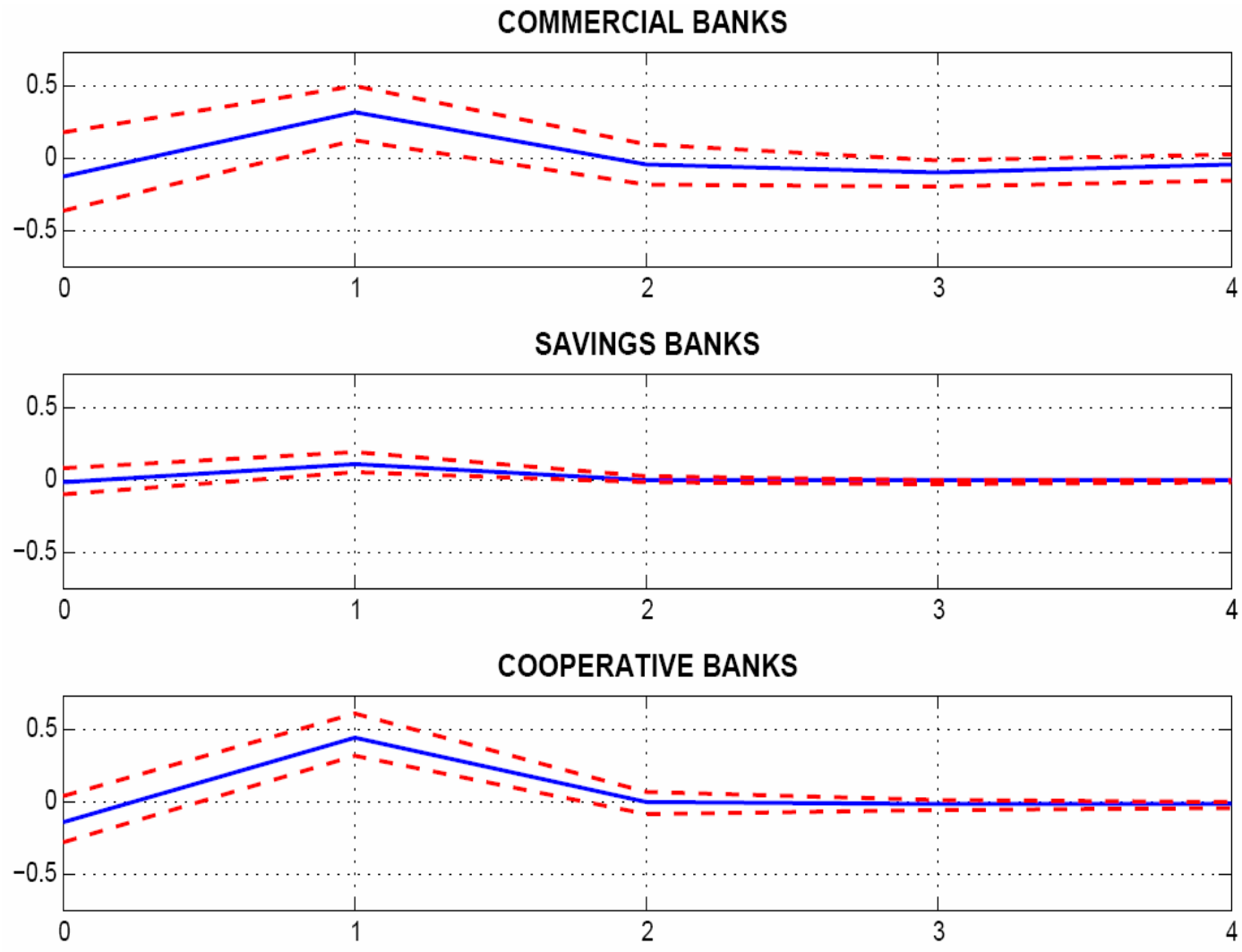


Disaggregate results

- German banking system: Three-pillars
  - Commercial banks
  - Savings banks
  - Cooperative banks
  - ▸ Estimate separate risk model for each group of banks
    - Note: big banks

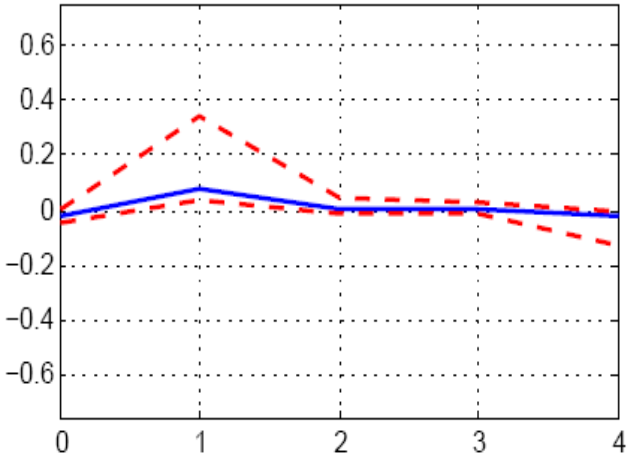
- Distress measure covers many layers
  - ▸ Estimate separate risk model for different types of distress

Distress per banking group

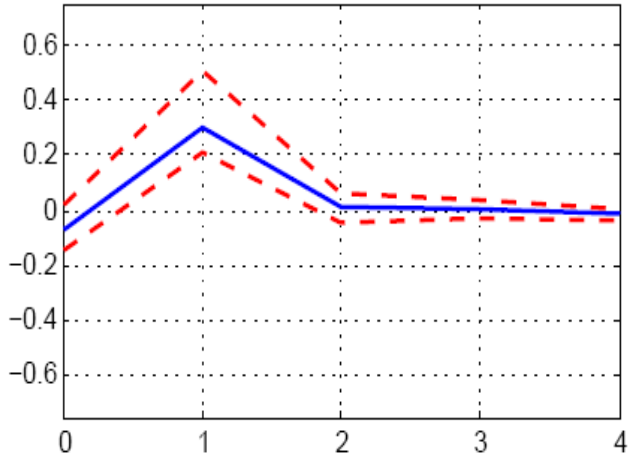


Distress categories

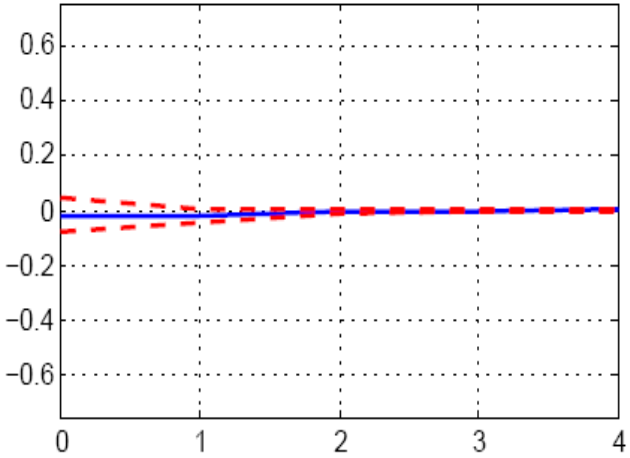
AUTOMATIC SIGNALS



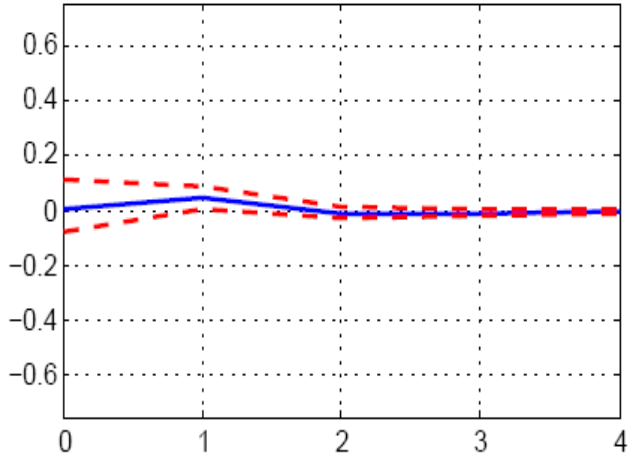
WARNINGS BY THE FINANCIAL AUTHORITY



MEASURES BY THE FINANCIAL AUTHORITY



DEFAULTS AND ACQUISITIONS



In sum

- The combined model reveals an increase in financial sector distress following a MP shock

- Most of the distress is borne by commercial and local cooperative banks

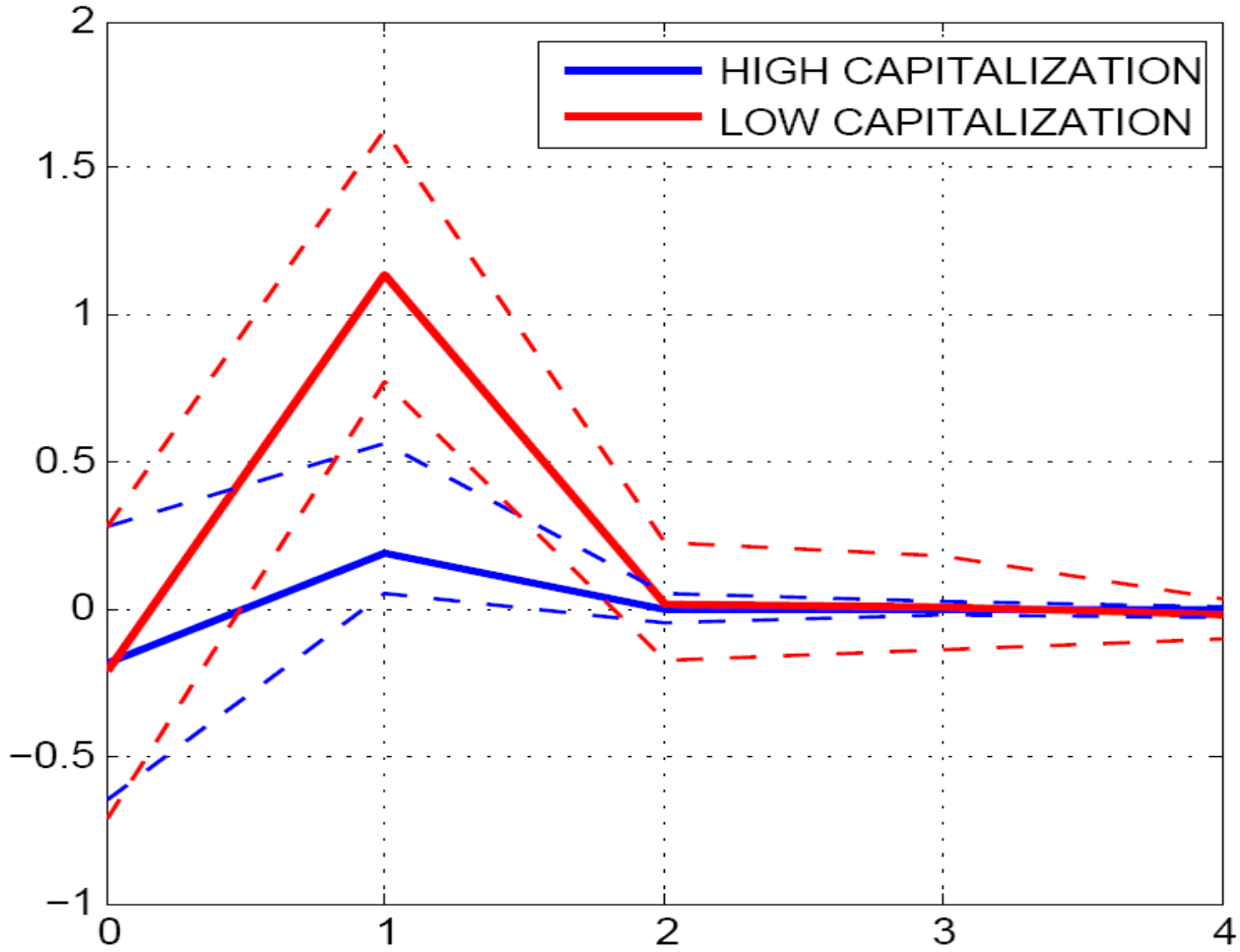
- The degree of distress is not too severe:
  - MP shocks
  - Cause mostly warnings by the supervisor
  - But do not seem to instigate supervisory interventions, nor bank default

State-dependence: An example

- Initial conditions matter:
  - State of the economy + financial sector
  - Affects the response

- Banking sector capitalization:
  - Idea behind Basel:
  - Capitalization increases resilience
  - Evaluate response to MP shock under different initial conditions

Banking sector capitalization



Conclusions

- Monetary policy affects banking sector stability
  - Reason for concern?
  - Yes:
    - MP shocks account for about 1/3 of variance of financial distress fluctuations
  - No:
    - Degree of distress is not too severe (signals, warnings)
    - Feedback to real economy is limited

- Capitalization (regulation?) increases resilience to shocks