

Stress-Testing and Systemic Risk / Tracking Variation in Systemic Risk

by

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The views in this discussion are my own and not those of the Federal Reserve Board or System, the Office of Financial Research, or the U.S. Treasury.

Summary of Luc's Presentation

- Macro-Prudential stress-testing
 - Focuses on the financial system as a whole.
 - Captures spillovers among banks and real economy.
- Regulatory Stress-testing practice is imperfect.
- Contingent Claims Analysis as Sys. Risk Measure
 - Related to Huang, Zhou, Zhu (2012).
 1. IP = Price of insurance that pays $D-V$ if $V < D$ after 1 yr.
 2. Where $V = \sum V_i$. $D = \sum D_i$.
 3. Average Cost of Insurance, $IPD = IP/D$.
 4. Bank i 's systemic risk contribn = $IPD - IPD \setminus i$
= Difference in average cost w/ and w/o bank i .

Initial Comments

- CCA is a valuable but imperfect diagnostic tool.
- Focus is on $\sum V_i$ and $\sum D_i$
 1. Analysis abstracts away from OTC derivatives among banks, and how that might contribute to systemic risk.
 2. A bank that has almost no debt but very volatile assets could be considered systemically risky in this framework, even if it could almost never default.
 3. Information set is no better than the market's information set.
 4. Merton style frameworks may not capture network interconnections until it is too late.
 5. Additional covariates should be analyzed with CCA i.e. indicators of valuation in asset markets.

Policy Question

- How should we use diagnostic tools, capital regulations, and stress-tests to measure and manage systemic risk?
- Outline: Broader perspective on this work.
 - Background on stress-testing and systemic risk.
 - Framework for thinking.
 - Approaches to controlling systemic risk.
 - Parting thoughts and conclusions.

Background

- Regulatory Stress-Testing
 - Regulators specify paths for macro/fin variables
 - Banks compute losses on paths.
 - Banks capital adequacy evaluated / remedial actions.
- Systemic Risk: Based on probability distribution of loss of financial intermediation capacity.
 - Banks becoming jointly undercapitalized.
 - Coordination failures such as plans to sell that are inconsistent with general equilibrium.
 - Market break-down from asym. info or ambiguity.
- How to control systemic risk.
 - Require banks to hold more capital.
 - Encourage changes in portfolio holdings.
 - Collateralize more transactions
 - Central Clearing.

Framework

- Banks' positions evolve through time.
- Position prices evolve through time.
- There are a set of states in which banks become undercapitalized, disorderly liquidations occur, or markets breakdown.
- We want mechanisms that keep systemic risk low, and do so at low economic cost.
 - How should we use stress-tests and capital standards in this framework?

1. Use capital standards and stress-testing.

- Regulatory Capital standards:
 - Are adaptive to banks portfolios.
 - But are mostly backwards looking.
 - Based on accounting ratios.
- Regulatory stress-tests:
 - Scenarios are forward looking. i.e. scenarios could be made more severe in face of a bubble.
 - Ensure FI's are well capitalized against scenarios used in the test.
 - Do not necessarily ensure FI's are well capitalized against other scenarios.
- Multiple scenarios or well chosen scenarios can make stress-testing better.

2. Choose stress scenarios well.

- Choose scenarios such that if banks are well capitalized against scenarios then systemic risk is low, and capital costs are low.
- Choose scenarios that encourage banks to substitute away from systemically risky positions.
 - This requires the stress testing program to identify and measure if positions are systemically risky.
- Systemic risk charges coming from Merton-style contingent claims models do not identify the positions that contribute to systemic risk.
 - Contingent claims models call for more work to track down the positions that cause a firm's systemic risk contribution to be high.
 - CCA supplemented with regulatory information might help: Identify factors that cause variation in V , or variation in V among firms deemed to be systemically risky.

Choosing Scenarios to Control Systemic Risk with Regulatory Info

- Choose which banks **B** to focus on.
 - Role for CCA in this choice.
- Simulate loss of intermediation capacity as a function of variables **X**, bank's positions, and capital ratios.
- Dimension reduction: Identify systemic risk factors (**F=XB**) that explain loss of intermediation capacity.
- Design stress-scenarios (**Delta X**) based on **F** such that if banks are well-capitalized against the scenario then systemic risk is low and cost is low.
- Banks can also adjust their positions to the scenarios.

Parting Thoughts

- Relying on a single systemic risk measure is dangerous.
 - Several banks becoming undercapitalized could be systemic
- Relying on recent history or public information alone to validate risk measures is problematic.
 - Systemic risk may manifest itself differently in the future.
- Many scenarios may be needed to achieve regulatory objectives.
- Example: Oil price bubble.
 - 1/2 of banks make loans to oil producers.
 - 1/2 to airlines.
 - Bubble grows more it wipes out 1/2 of banks.
 - Bubble collapses it wipes out the other 1/2.
- 2 scenarios based on oil prices may be needed to ensure the banking system is well enough capitalized against oil price risk.
- Reverse stress-testing based on a single worst scenario will be insufficient.

Conclusions

- Stress-tests and capital standards can reduce some aspects of systemic risk.
 - Stress-tests are valuable because they are forward-looking.
- We have much to learn about how to choose stress-scenarios.
 - This paper emphasized the value of using market info to identify stressful conditions.
 - More thought is needed on how to incentivize position changes.
- More thought is needed on realistic systemic risk objectives.
 - On what stress-testing methods can accomplish.
 - What is best accomplished through other means.