

Quantifying contagion in funding markets: a model-based stress-testing approach

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Summary of the paper

Building blocks

- Research question: assess banks' vulnerability to shocks.
- Bank runs and illiquidity as in Diamond and Dybvig (JPE 1983).
- Global games refinement to avoid multiple equilibria.
- B/S inputs: liquid assets vs risky assets; demandable debt vs equity.
 - Rochet and Vives (JEEA 2004) framework
- Market price for bank assets.
- Banks are passive.
- The regulator does not play a role.

Summary of the paper

Main results

- Identify a new amplification mechanism.
 - Lower market price for bank assets \Rightarrow banks are more vulnerable to runs, and runs occur more often (PROPOSITION 1).
 - A bank run is negative news about the quality of bank assets \Rightarrow investors revise their beliefs downward, i.e., the market price for bank assets is lower, and vice versa (PROPOSITIONS 2 & 3).
- Provide a framework to assess solvency, illiquidity and contagion risks faced by banks.

Bank sources of liquidity

Following a creditor run

- Asset sales.
- Interbank market.
- Equity issues, M&A.
- Central bank liquidity (Farhi and Tirole AER 2012).

Model assumptions

- Creditors indifferent between consuming at $t = 1$ and $t = 2$, and deep-pocketed investor \Rightarrow why have demandable debt contracts?
- Bank assets are perfectly correlated.
 - Either high quality (worth ψ_H) or low quality (worth ψ_L).
 - Investor belief that bank assets are high quality = $w \in [0, 1)$.
 - Market price $\bar{\psi} = w\psi_H + (1 - w)\psi_L$
 - Why not a systematic and an idiosyncratic component?
 - The assumption that each bank knows the quality of its assets (and therefore the asset quality of all the other banks) but that investors and creditors do not is very strong.
- Banks do not need to know the quality of their assets in the model.
- The $t = 2$ shock is not needed.
- Binary payoff to creditors, as in Rochet and Vives.
- “Adverse selection”: asymmetric information, the uninformed party moves first, the informed party makes a decision that depends on its information.

The equilibrium: B/S and market price

- Each bank's balance sheet is exogenously given.
 - If banks know the quality of their assets, they should optimally take this information into consideration when designing their B/S
→ signaling model.
 - Banks' objective functions would need to be specified.
- The market price $\bar{\psi}$ of bank assets is not microfounded.
 - From which distribution is w drawn? If uniform distribution on $[0, 1]$, for example, then the investor's unconditional expectation of w should be $\mathbb{E}[w] = \frac{1}{2}$.
 - Instead, this unconditional expectation is a parameter in the model. Is this consistent with rational expectations?
- The market price $\bar{\psi}$ of bank assets is assumed to be equal to investor's unconditional expectation of bank asset value, but it should be lower.
 - Only banks that face sufficiently high withdrawals from their creditors at $t = 1$ sell assets.
 - The probability that a bank sells assets at $t = 1$ is not independent of the realization of the shock S_i to bank asset value.
 - Market for lemons.

The equilibrium: beliefs updating

- The market price of bank assets is based on public information. Bank runs are also based on private information.
 - Investors do not have any private information. Creditors have private signals.
- \Rightarrow The market price of bank assets is not informative (the stock market does not aggregate information of market participants), while bank runs are informative (the extent of the bank run reveals the shock S_i).
- The global games refinement (introduction of private creditor signals) does not merely identify a unique equilibrium, it also makes bank runs informative. Why aren't market prices informative too?
- Bank runs only matter insofar as they are informative in this model. Different from Liu (2015, The Interbank Market Run and Creditor Runs).
- “pooling price” but all banks have the same type.

Random thoughts

- Cascade of runs: virtuous circle in good times, vicious circle in bad times.
- To break the vicious circle in bad times, the regulator can reveal information, for example by disclosing stress tests results.
 - If banks have different types, this allows to save the good banks (cf. Bouvard, Chaigneau, de Motta (JF 2015)).
- Suppose creditors' private signals (and therefore bank runs) are driven by idiosyncratic and systematic shocks. That is, some runs will be primarily driven by idiosyncratic shocks, others by systematic shocks.
 - What is the optimal disclosure policy of a central bank that can credibly reveal information about the systematic shock?

Calibration

- Calibrating a stylized model.
- Only dimension of heterogeneity: short-term liabilities.
 - The assets of banks with more short-term liabilities may be more or less exposed to market shocks.
- Two papers?
 - Comprehensive framework for central banks.
 - Academic contribution, identify a new feedback loop.