The New Architecture of Our Financial System

A Work in Progress

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April 11, 2013
Outline

- Why does the financial system matter?
- How is the structure of the financial system changing?
- What are the weakest links in the system?
- How should one model inter-bank risk?
- Should we be concerned about the central clearing of derivatives?
Core Interbank Network
Transmission of Risk and Liquidity To Ultimate Investors
Bear Stearns’ Liquidity Pool Over its Last Days ($ billions)

Data Source: Cox (2008)
Central Bank Emergency Liquidity
Central Bank Emergency Liquidity
Central Bank Currency Swap Lines
Broad Programmatic Credit Facilities
Liquidity to Financial Market Infrastructure
Lending of Last Resort
Lehman’s tri-party repo book

Source: Copeland, Martin, Walker (2011) FRBNY
Tri-Party Repo

Cash

CASH INVESTOR (e.g. MMF) → TRI-PARTY CLEARING BANK → DEALER

Cash

Securities
Figure: Neoclassical centralized financial market.
Figure: Completely connected over-the-counter market.
Figure: Core-periphery financial network.
**Figure:** Daily trade in the federal funds Market. Source: Bech and Atalay (2012).
Static Network Payment Equilibrium
Eisenberg-Noe (2001)

- Node $i$ has net cash $c_i \in \mathbb{R}$ and a debt to node $j$ of $y_{ij} \in \mathbb{R}_+$, so a total debt of $Y_i = y_{i1} + \cdots + y_{in}$.

- The actual payment of $x_{ij}$ of $i$ to $j$ solves the equilibrium equations:

\[
x_{ij} = \frac{y_{ij}}{Y_j} \left[ \min(Y_j, c_i + x_{i1} + \cdots + x_{ni}) \right]^+, \quad i \in \{1, \ldots, n\}.
\]

- Existence follows from Tarski’s Fixed Point Theorem.

- Uniqueness applies under mild conditions.

Components of Payments Values over Time

Billions of U.S. Dollars

Source: Authors’ calculations, based on data from the Federal Reserve Bank of New York.
Note: Data are monthly averages.

Source: Sastry and Skeie (2013)
Prime-Brokerage

HEDGE FUND A

HEDGE FUND B

DEALER BANK (PRIME BROKER)

CASH AND SECURITIES

SECURITIES

CASH

INVESTOR
Morgan Stanley collateral received that can be pledged
($ billions)

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<th>Month</th>
<th>Value ($ billions)</th>
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<tr>
<td>Nov 05</td>
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<td>Mar 09</td>
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Data Source: Singh (2009)

Prime brokerage liquidity loss
- New York $44.8 billion
- London $17.6 billion

- Conduit finance roll off ($8.8 billion)
- Derivatives collateral loss ($7.3 billion)
- Debt maturing/buyback ($5.4 billion)
- Repo haircut widening ($4.0 billion)
- Other ($3.4 billion)

Data source: Morgan Stanley-FRBNY FCIC disclosure

Duffie (2011)
Prime-Brokerage Custodian

- HEDGE FUND
- DEALER BANK (PRIME BROKER)
- Cash and Securities
Net Default Exposure: 50
Figure: Source: Duffie, Scheicher, Vuillerney (2013).
10-by-10-by-10 Systemic Risk Monitoring

Source: Duffie (2011)
## A Bank’s 10-by-10-by-10 Submission

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<thead>
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Network CDS systemic exposures

Source: Brunnermeier, Clerc, Scheicher (2013). Data: DTCC.
Uncleared Foreign Exchange Derivatives

A → EUR-USD → CLS → USD-EUR → B
Margining of FX Derivatives

Source: Duffie (2011)
Money Market Fund Capital Buffers

Market Value

Accounting NAV

Buffer

Squam Lake Group (2011)
Money Market Funds

“Stable” NAV

100
99.60

Market Value

Floating NAV

99.60

Market Value