

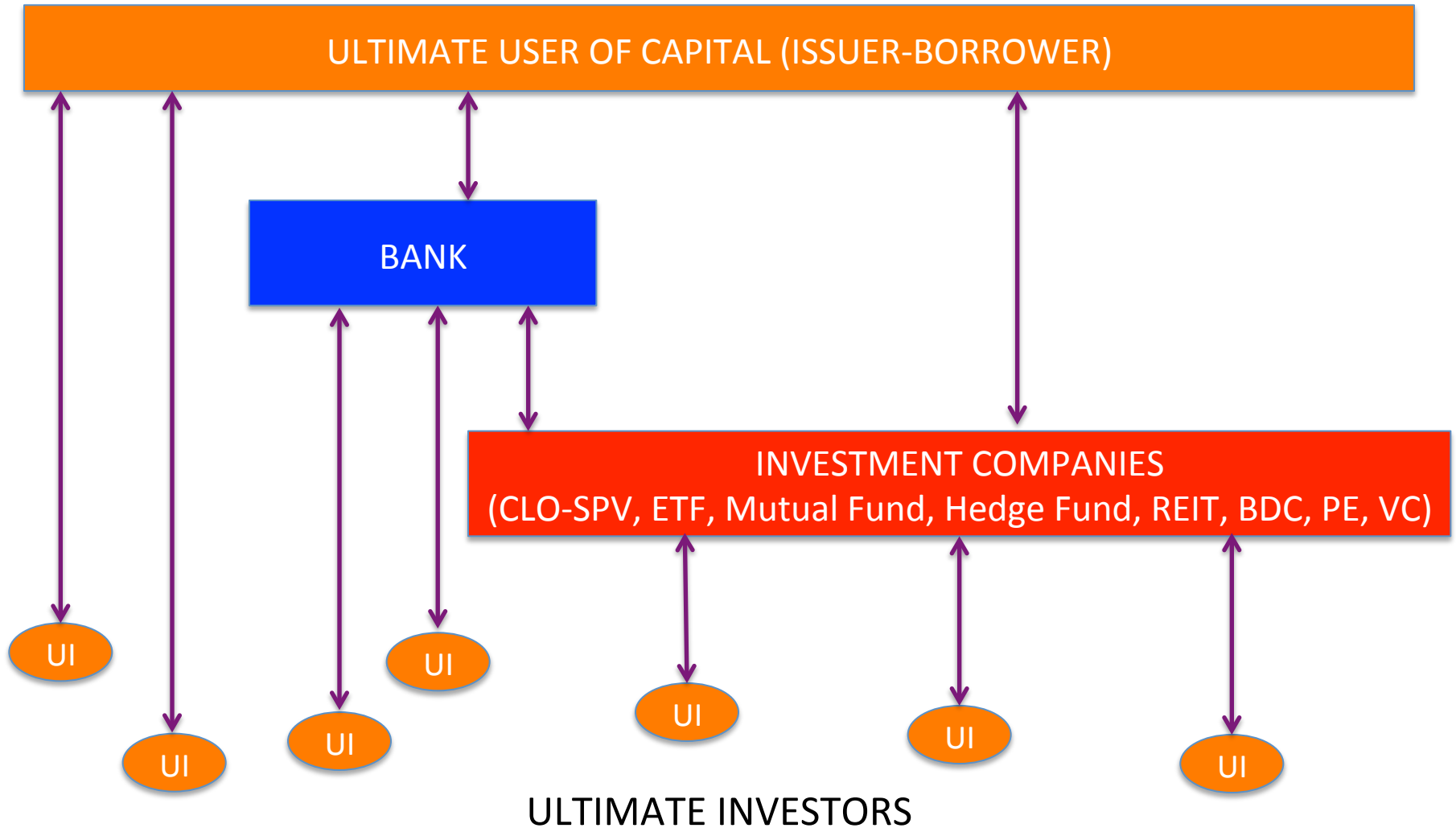
Financial System Architecture

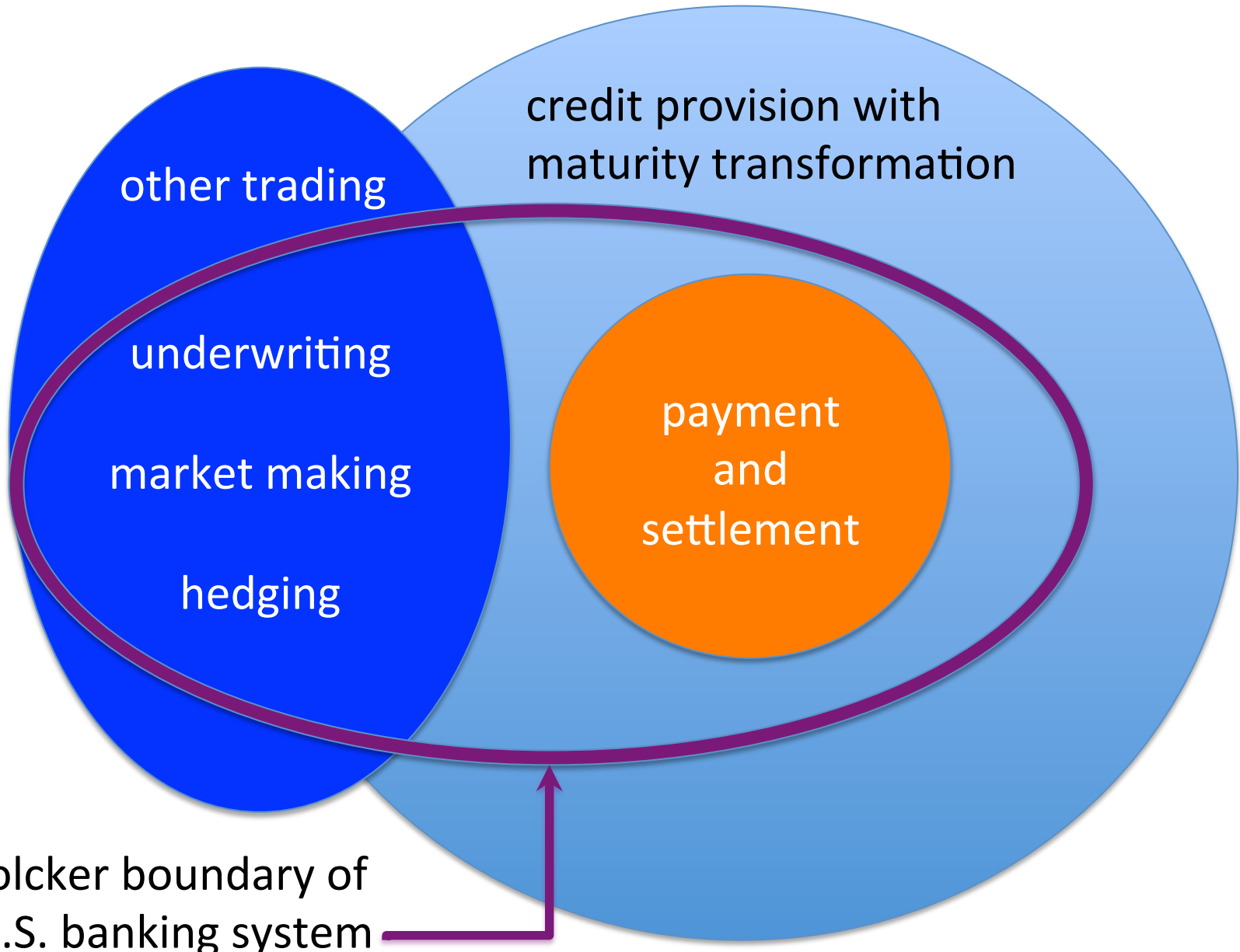
Adapting to Systemic Concerns

Darrell Duffie
Stanford University

Pacific Institute for the Mathematical Sciences, Summer School
Economics and Mathematics of Systemic Risk and Financial Networks
Vancouver, July, 2014

Capital and Liquidity Provision

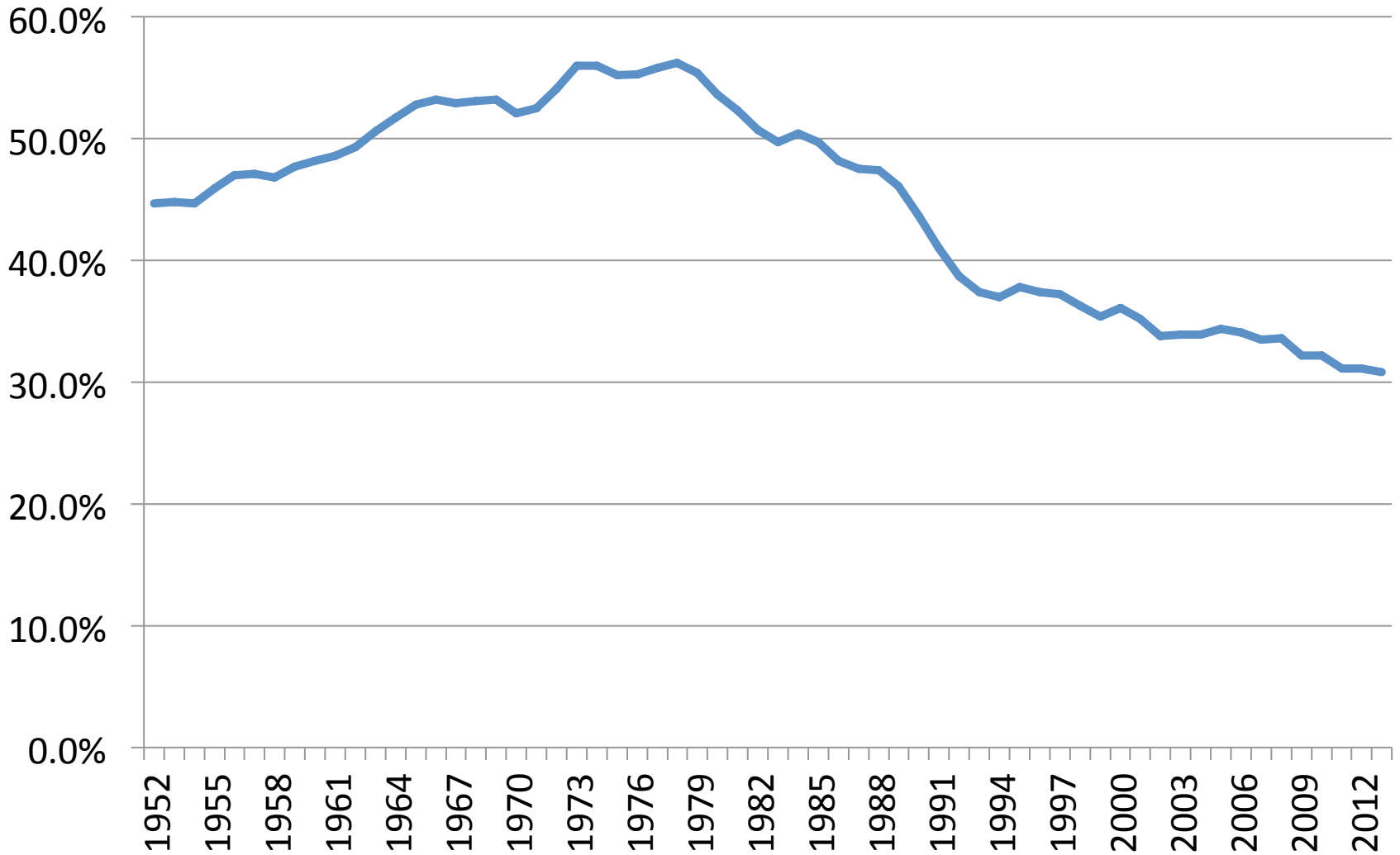




Policy changes affecting market structure

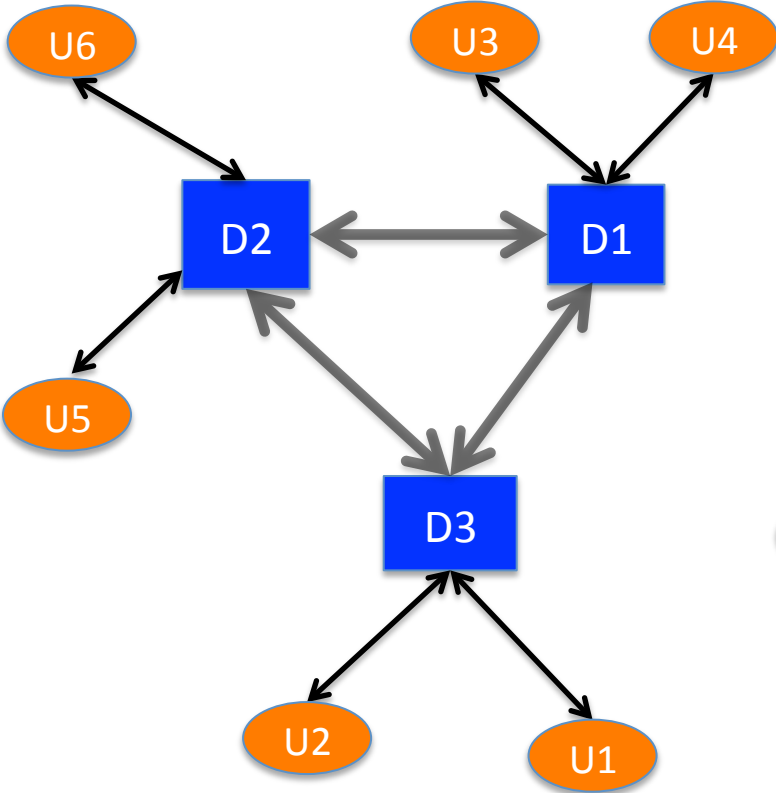
- Bank capital and liquidity rules (Basel, stress tests)
- Bank activity limits (Volcker)
- Derivatives market competition and transparency
- Collateral, central clearing, counterparty limits
- Monetary policy (ZLB, LSAP, RRP)

Fraction of U.S. Private Credit Provided by Banks

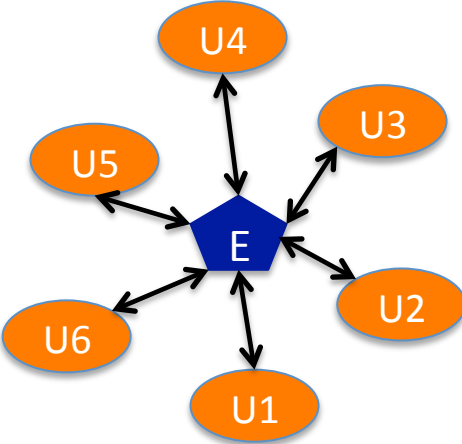


Data Source: Federal Reserve, BIS, adjusted for breakpoints

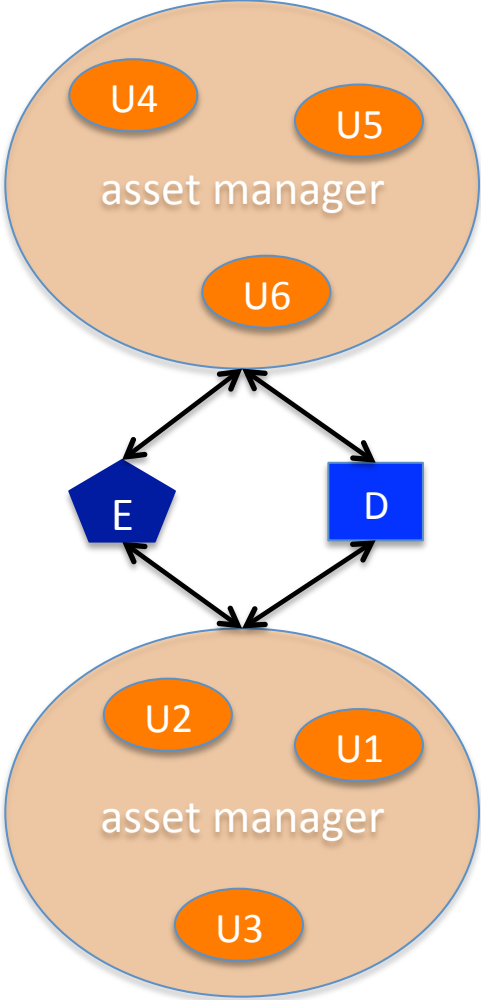
Secondary Market Architecture



OTC (dealer as principal)

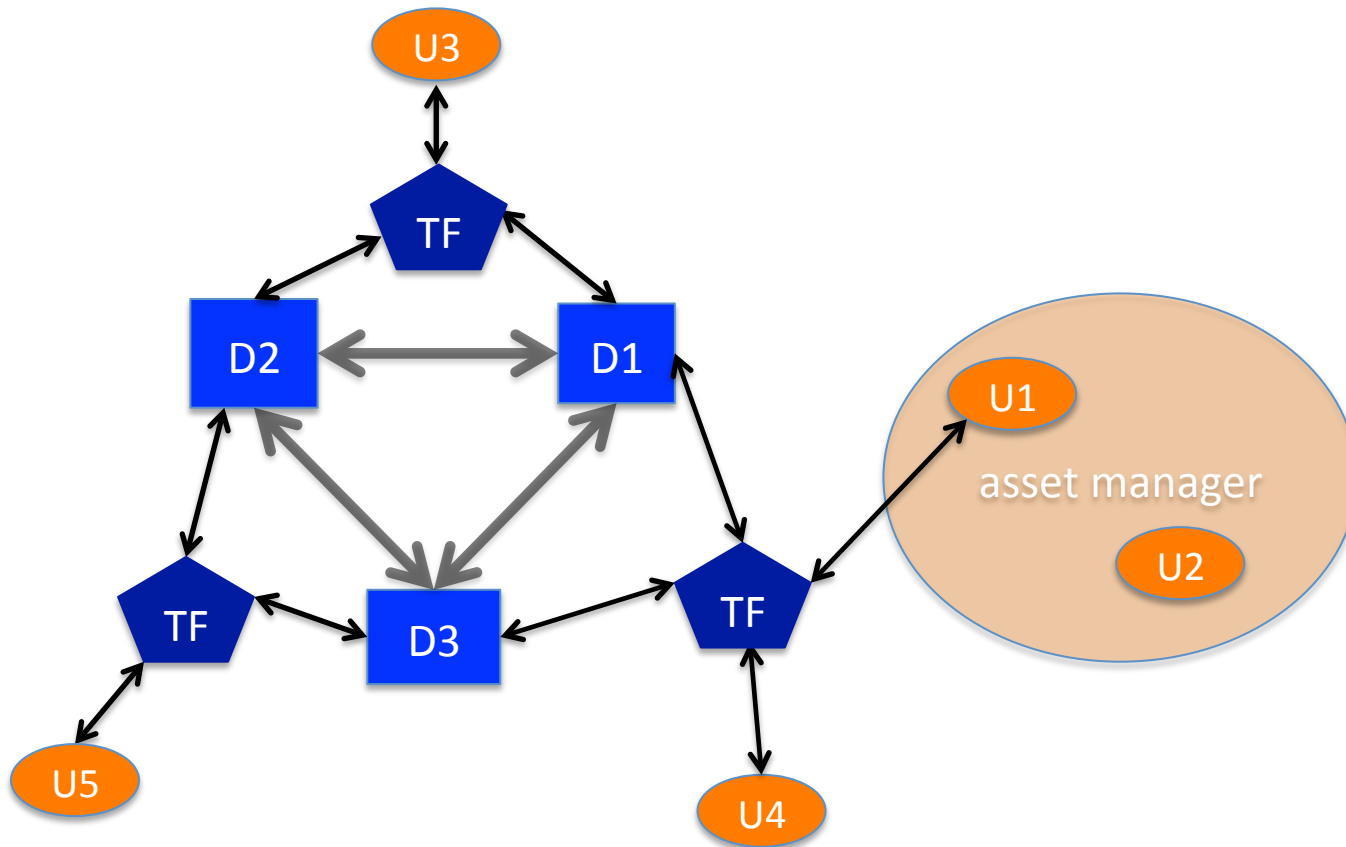


direct exchange

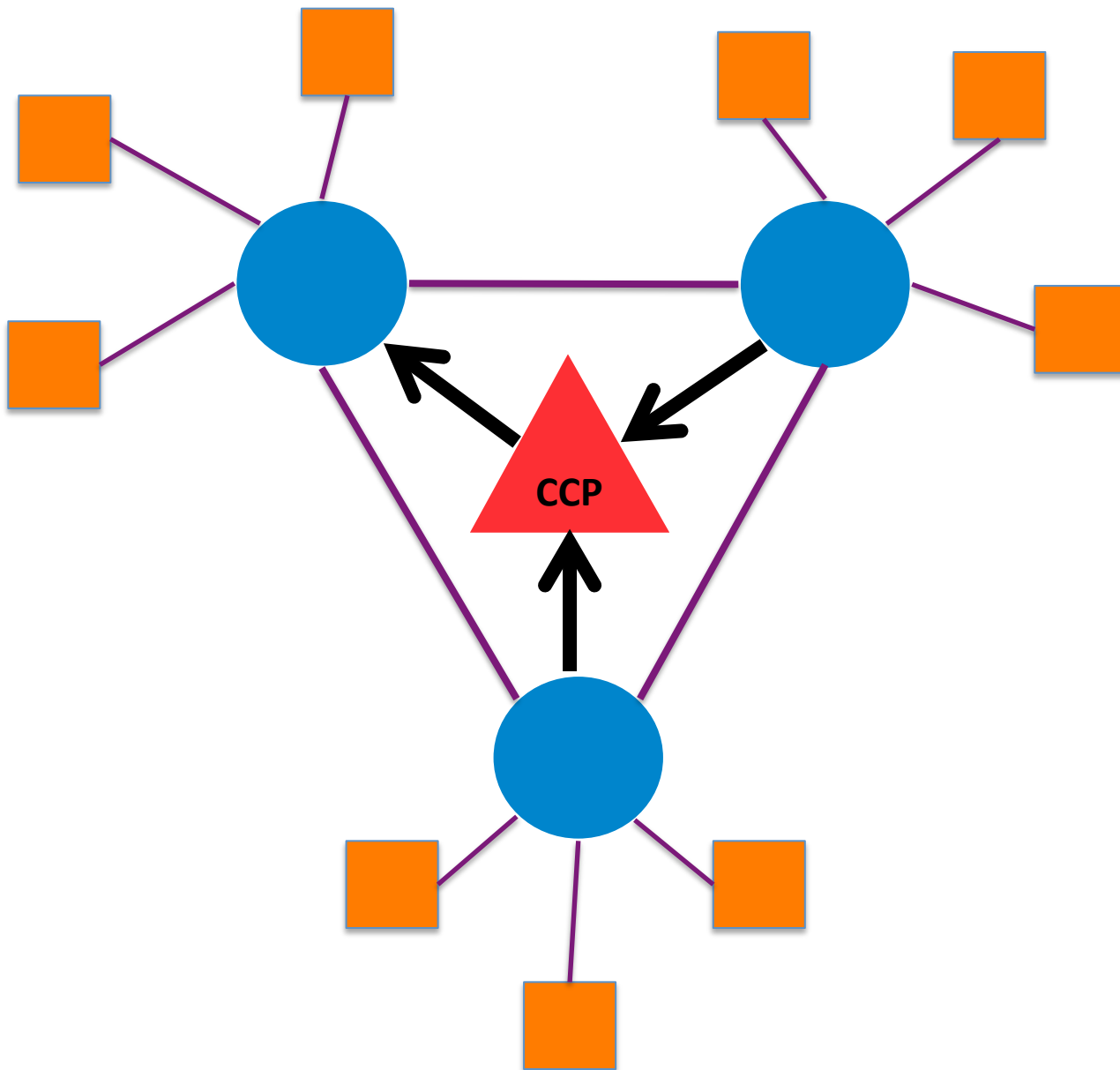


agency intermediation

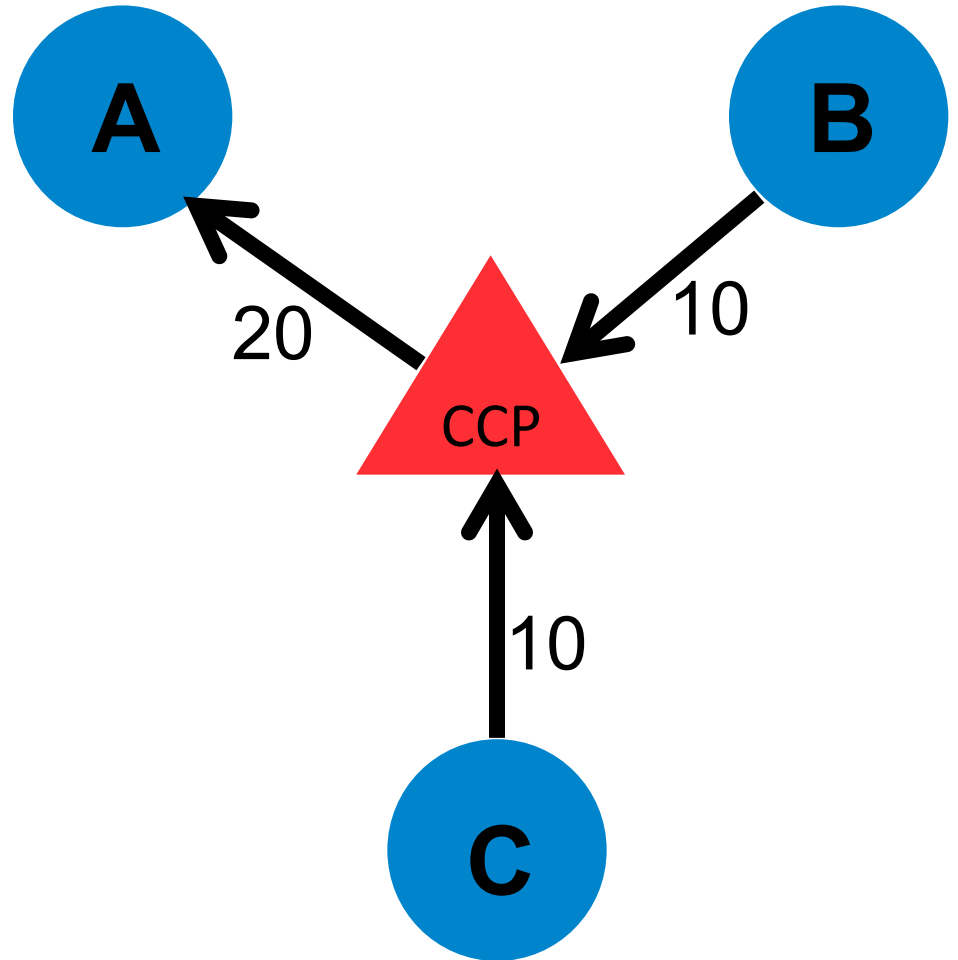
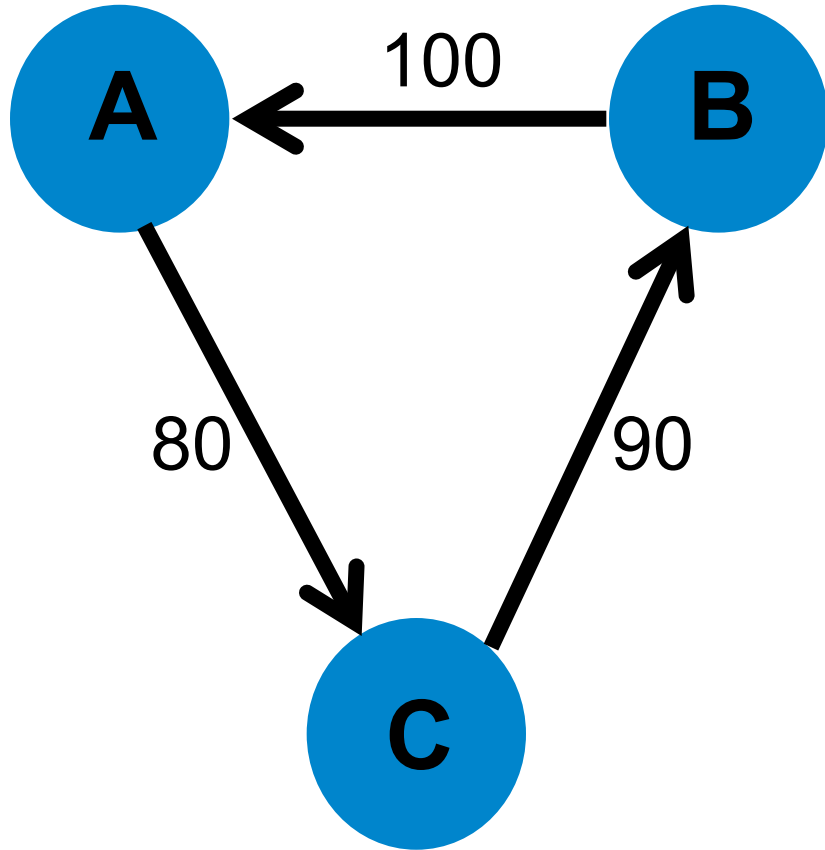
Hybrid OTC Market Approaches

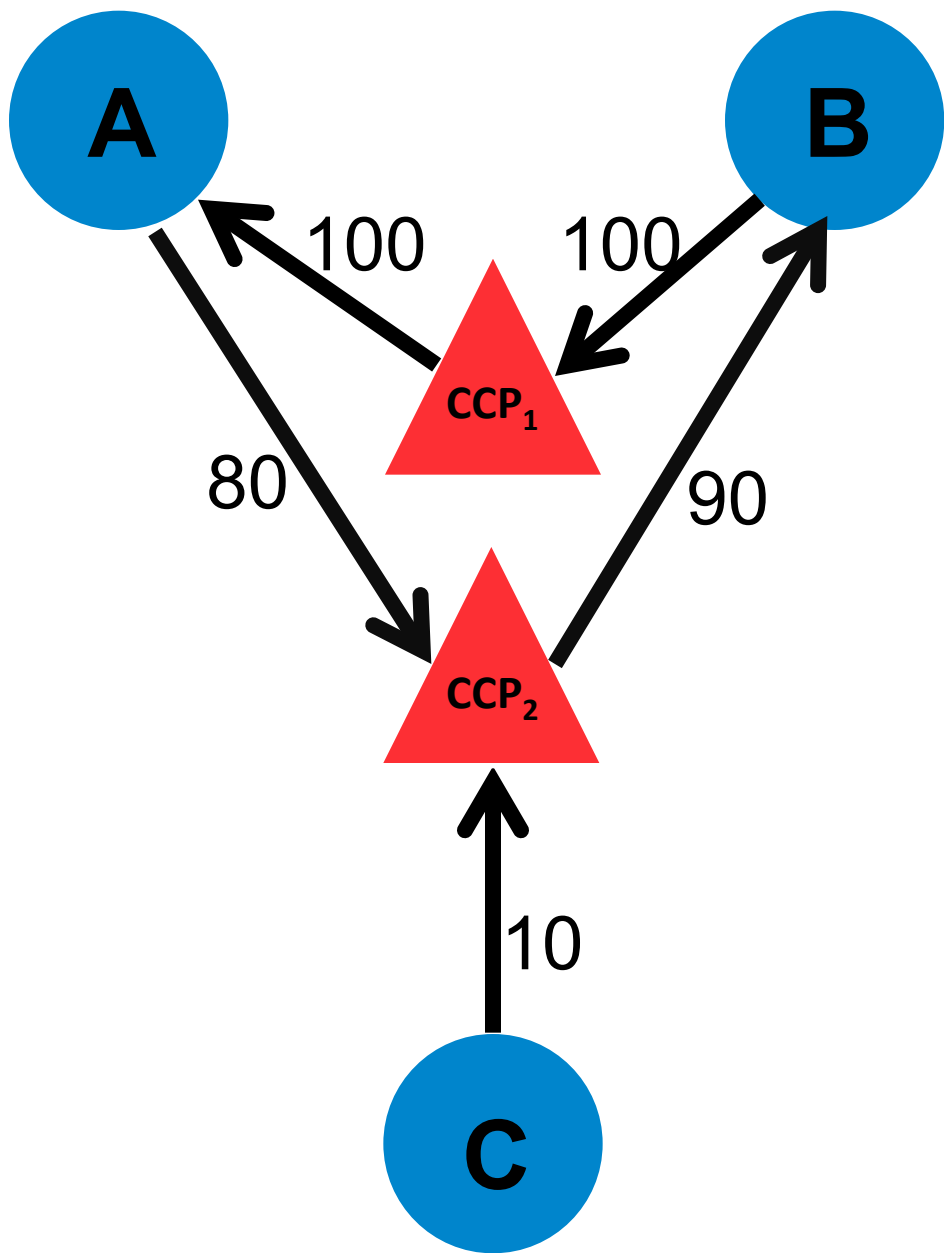
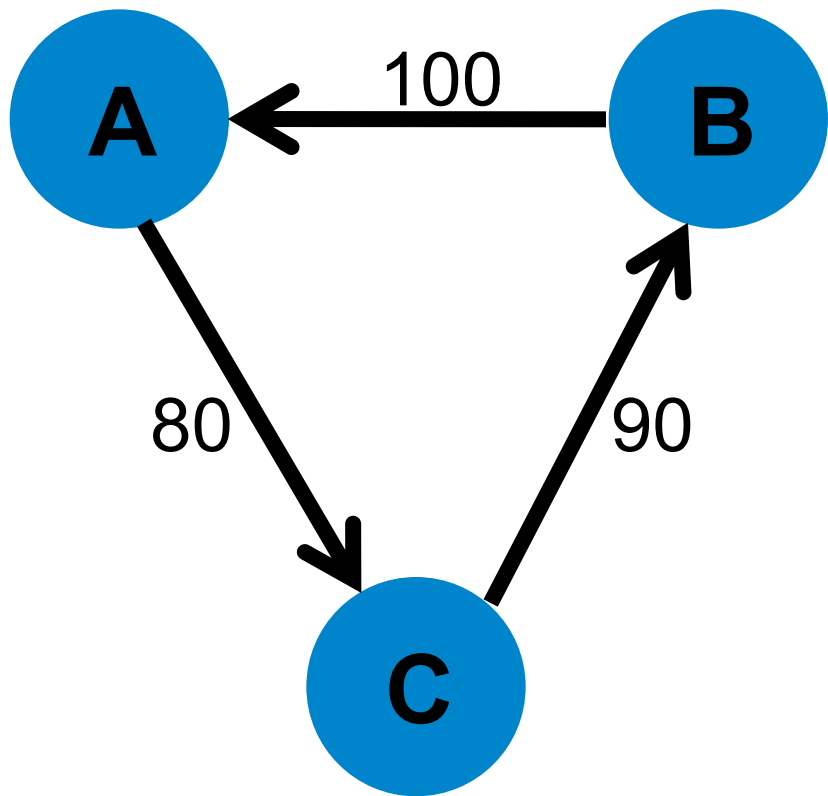


**OTC multilateral trading facilities
(swap execution facility, bond trading platform)**

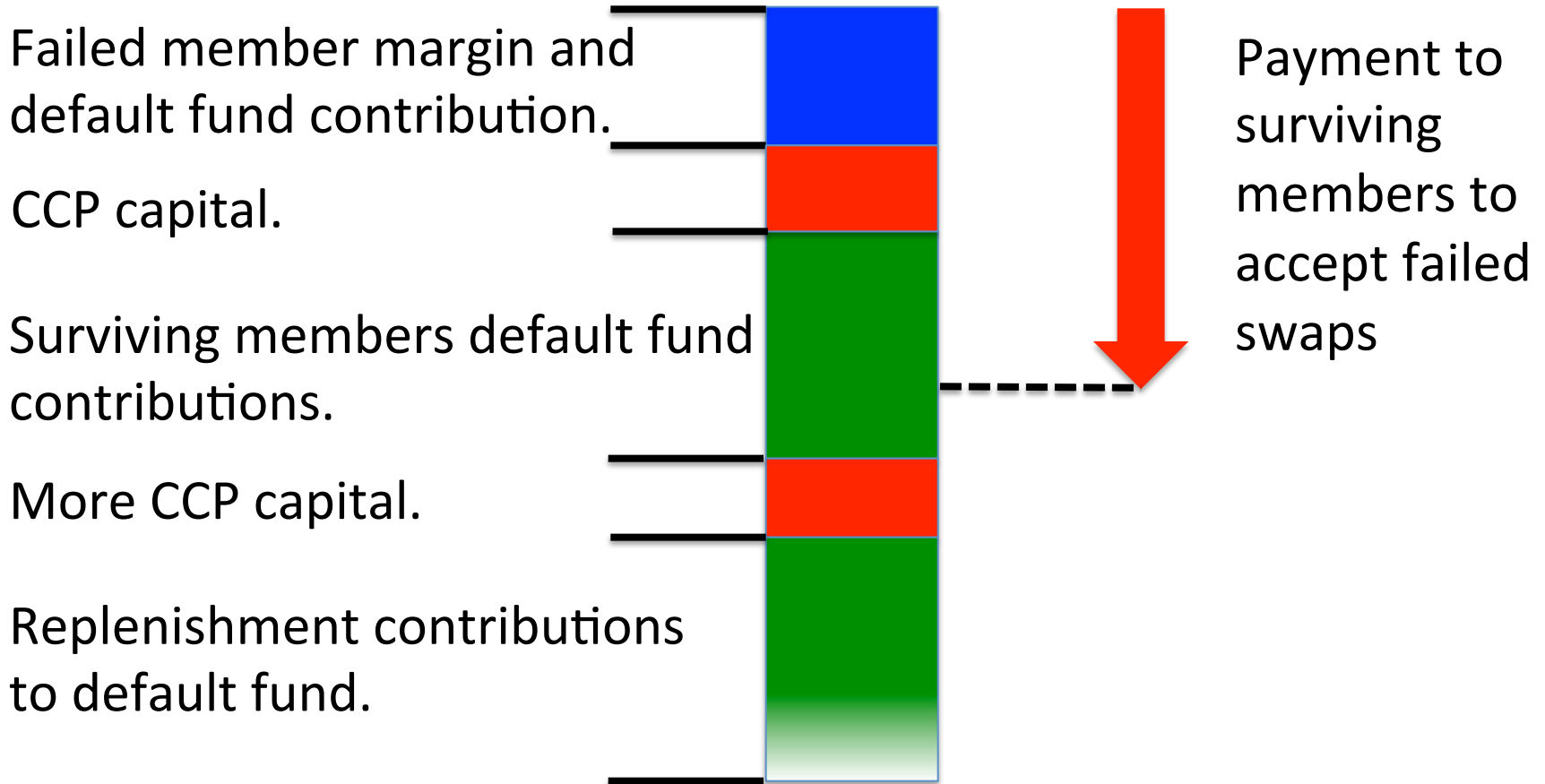


Central Clearing





CCP Default Management Waterfall



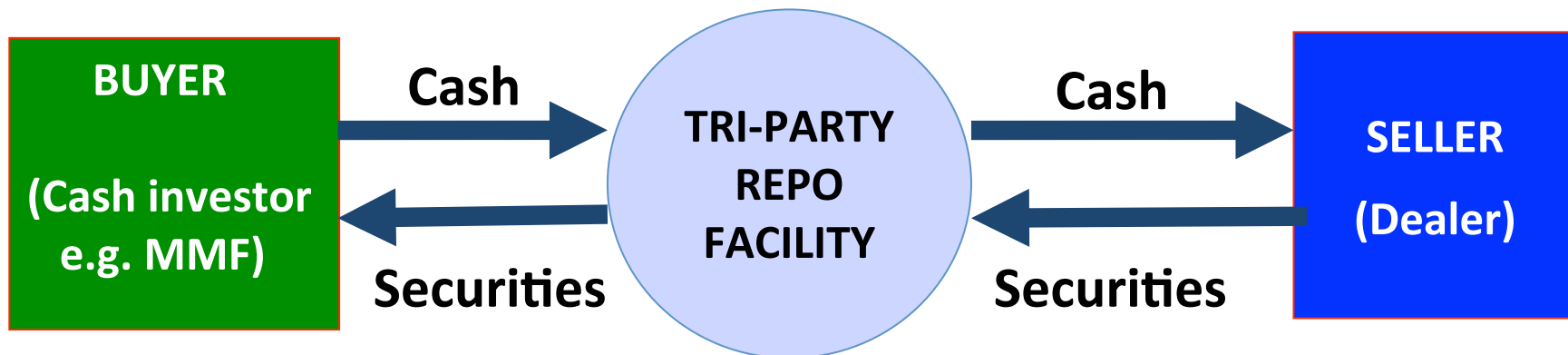
Selected Sources

- The Clearing House, “Central Counterparties: Recommendations to Promote Financial Stability and Resilience,” December 2012.
- CDS Default Management Working Group, “Principles and Best Practices for Managing a Defaulting Clearing Member’s Remaining Portfolio and Shortfall in Available Funds,” January, 2011.
- Committee on Payment and Settlement Systems, Board of the International Organization of Securities Commissions, “Recovery and Resolution of Financial Market Infrastructures,” Consultative Report, July 2012.
- Duffie, Darrell and David A. Skeel (2012) [A Dialogue on the Costs and Benefits of Automatic Stays for Derivatives and Repurchase Agreements.](#)
- Elliott, David “Central Counterparty Loss-Allocation Rules,” Bank of England, Financial Stability Paper Number 20, April 2013.

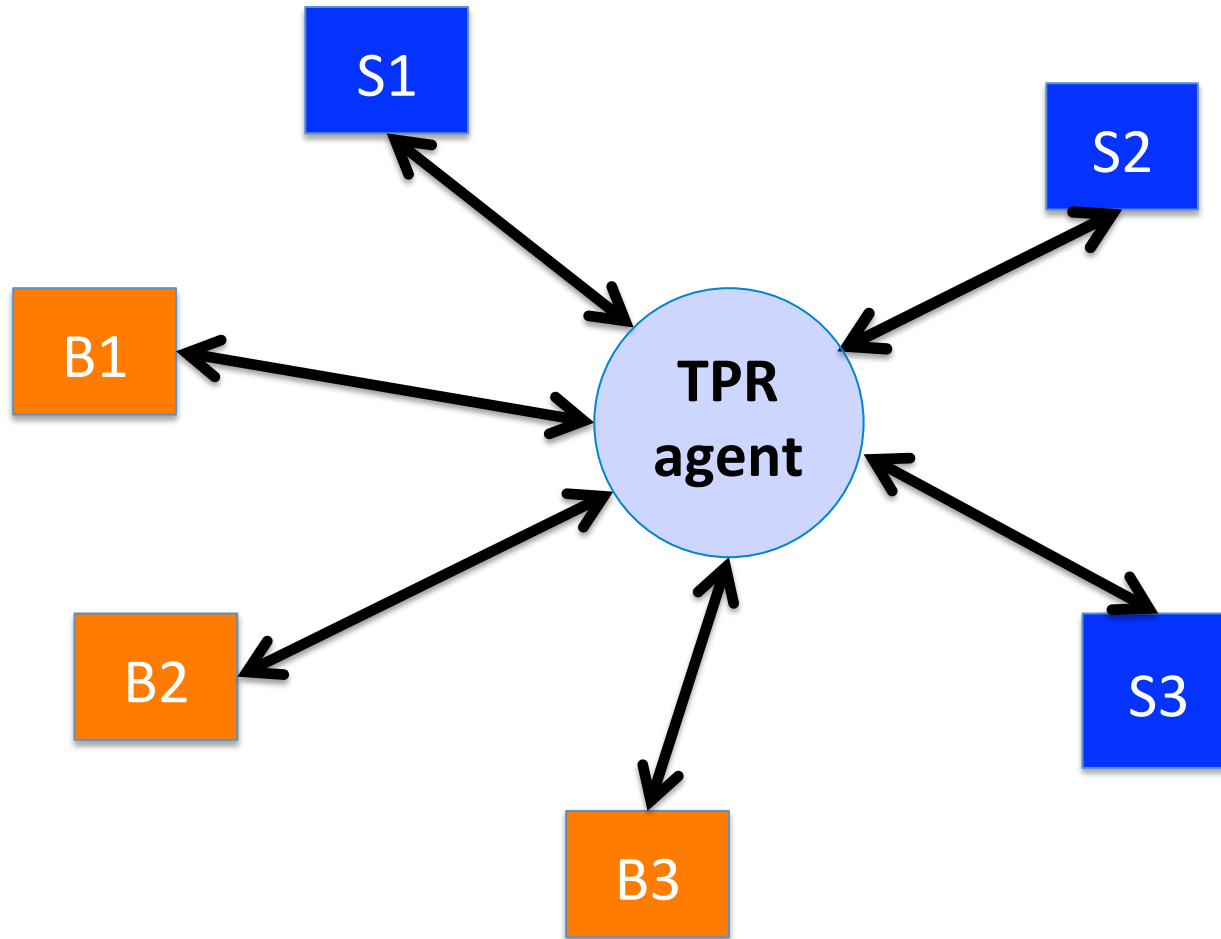
Selected Sources, continued

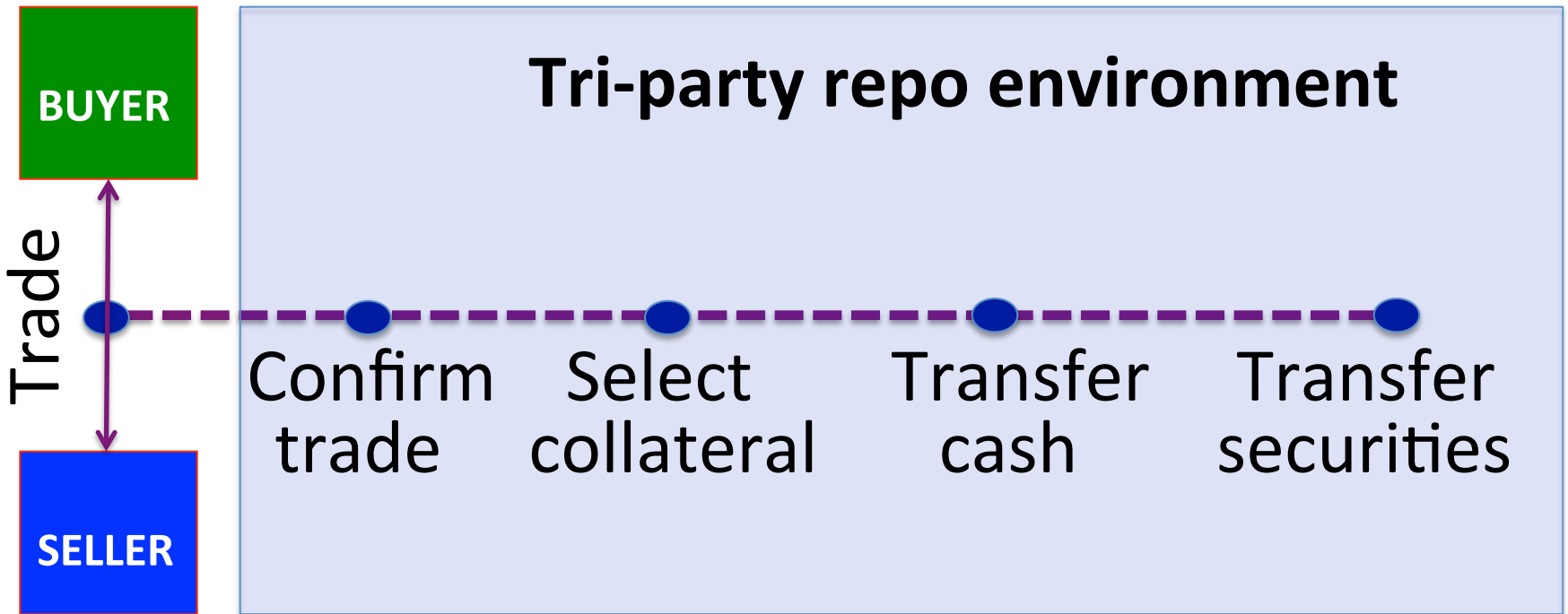
- “Application of the Key Attributes of Effective Resolution Regimes to Non-Bank Financial Institutions,” Consultative Document, Financial Stability Board, August 2013.
- Committee on Payment and Settlement Systems, Board of the International Organization of Securities Commissions, “Recovery of Financial Market Infrastructures,” Consultative Report, August, 2013.
- ISDA, David “CCP Loss Allocation at the End of the Waterfall,” August, 2013.
- Consultation on a possible recovery and resolution framework for financial institutions other than banks, EU Consultation Document, October 2012.
- DIRECTIVE 2014/59/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 15 May 2014, establishing a framework for the recovery and resolution of credit institutions and investment firms, Official Journal of the European Union, June 12, 2014.

Tri-Party Repo



Tri-party Repo Clearing





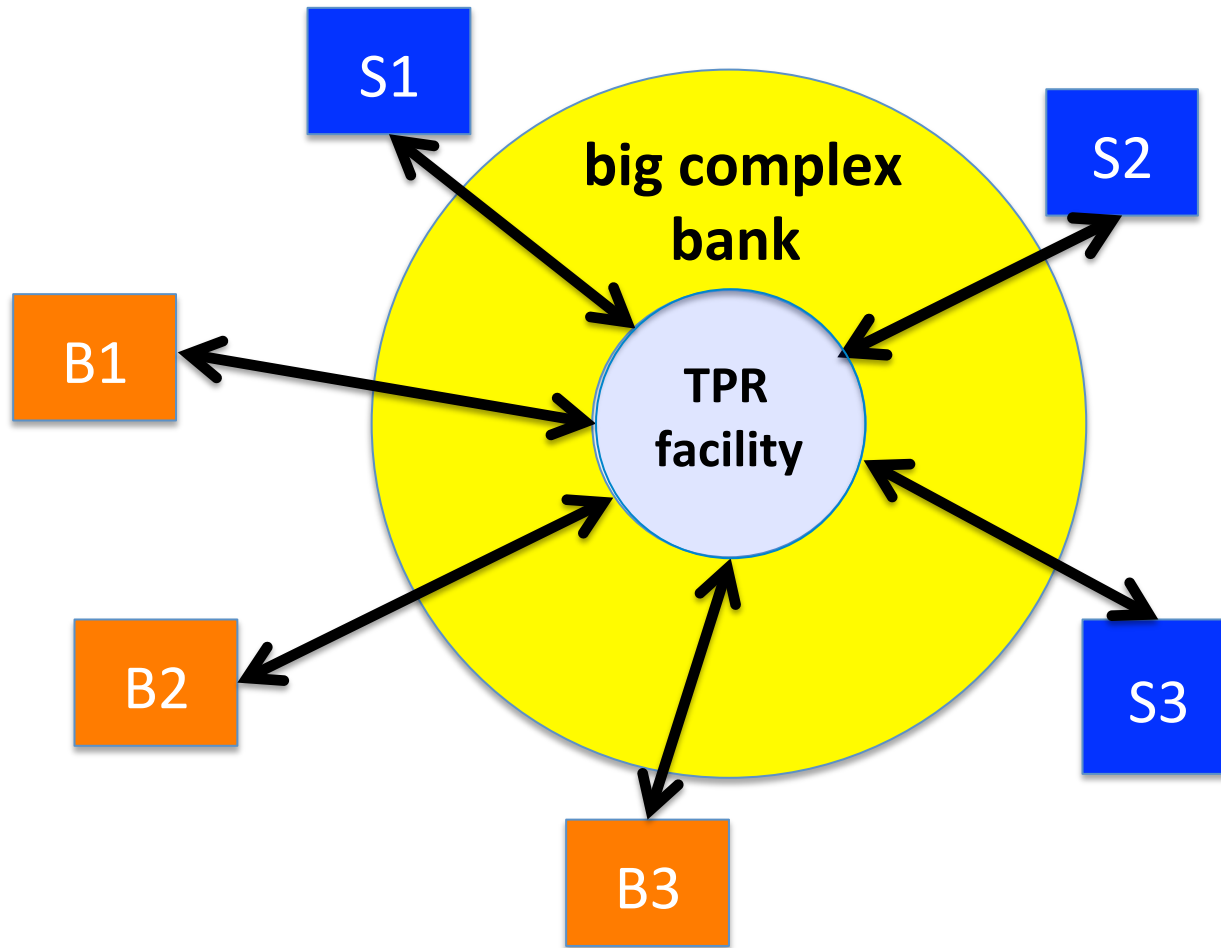
Tri-party environment

Cash Investor Accounts

Dealer Accounts



A systemic flaw



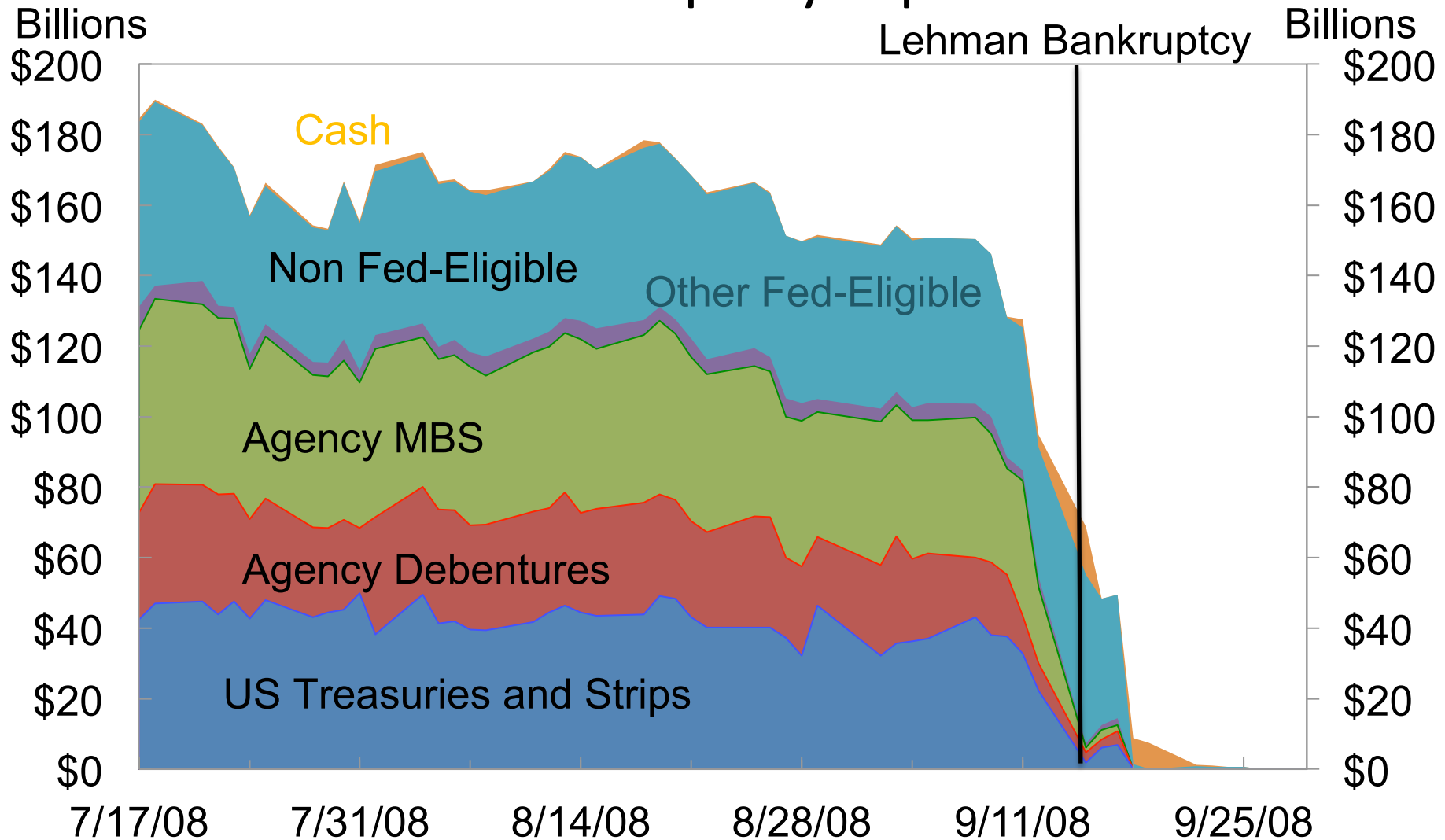
CPSS-IOSCO FMI Principle 9

“An FMI should conduct its money settlements in central-bank money where practical and available.

If central bank money is not used, an FMI should minimize and strictly control the credit and liquidity risk arising from the use of commercial bank money.”

“One way an FMI could minimize these risks is to limit its activities and operations to clearing and settlement and closely related processes.” (CHIPS)

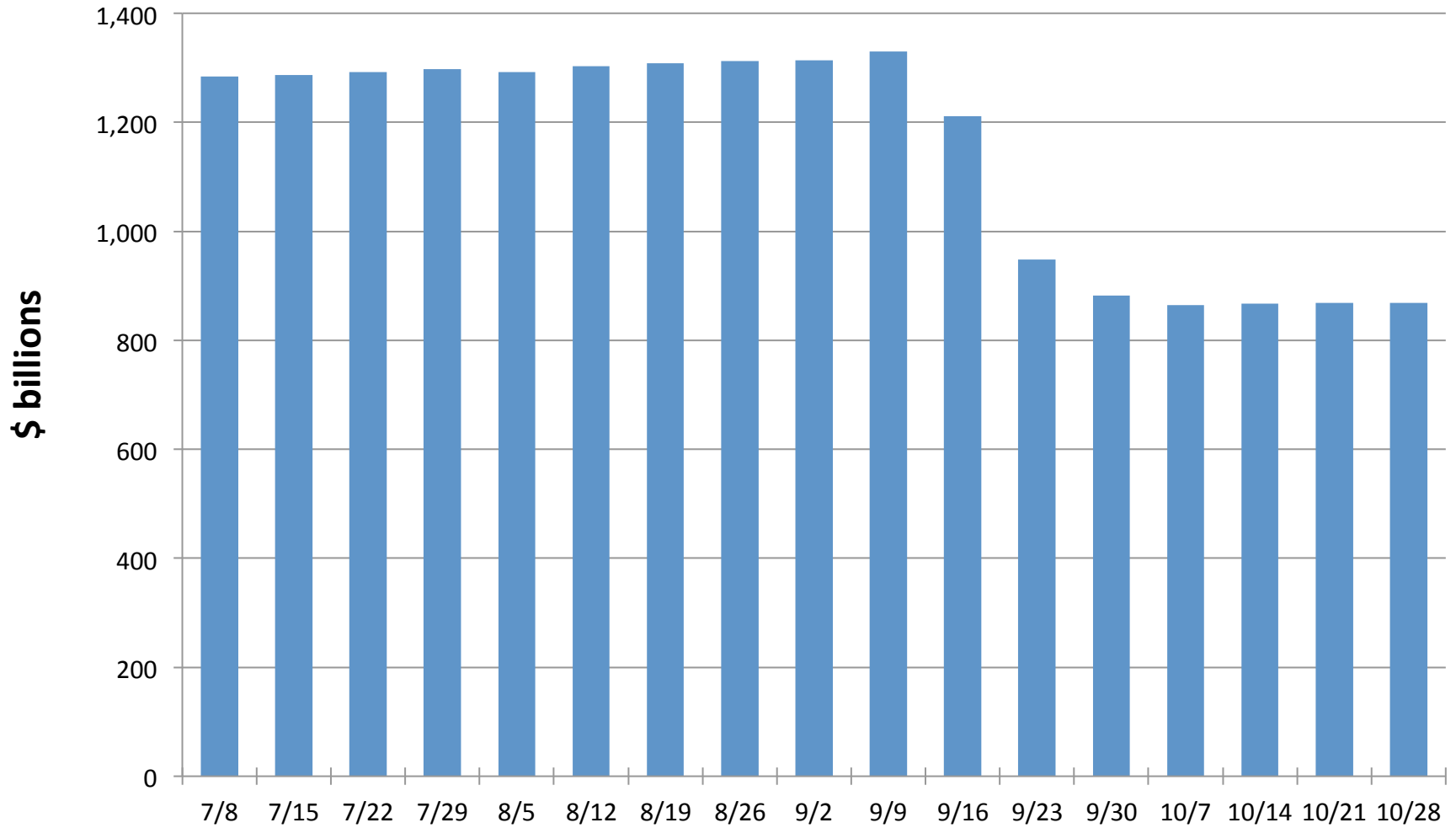
Lehman's tri-party repo book



Source: Copeland, Martin, Walker (2011) FRBNY

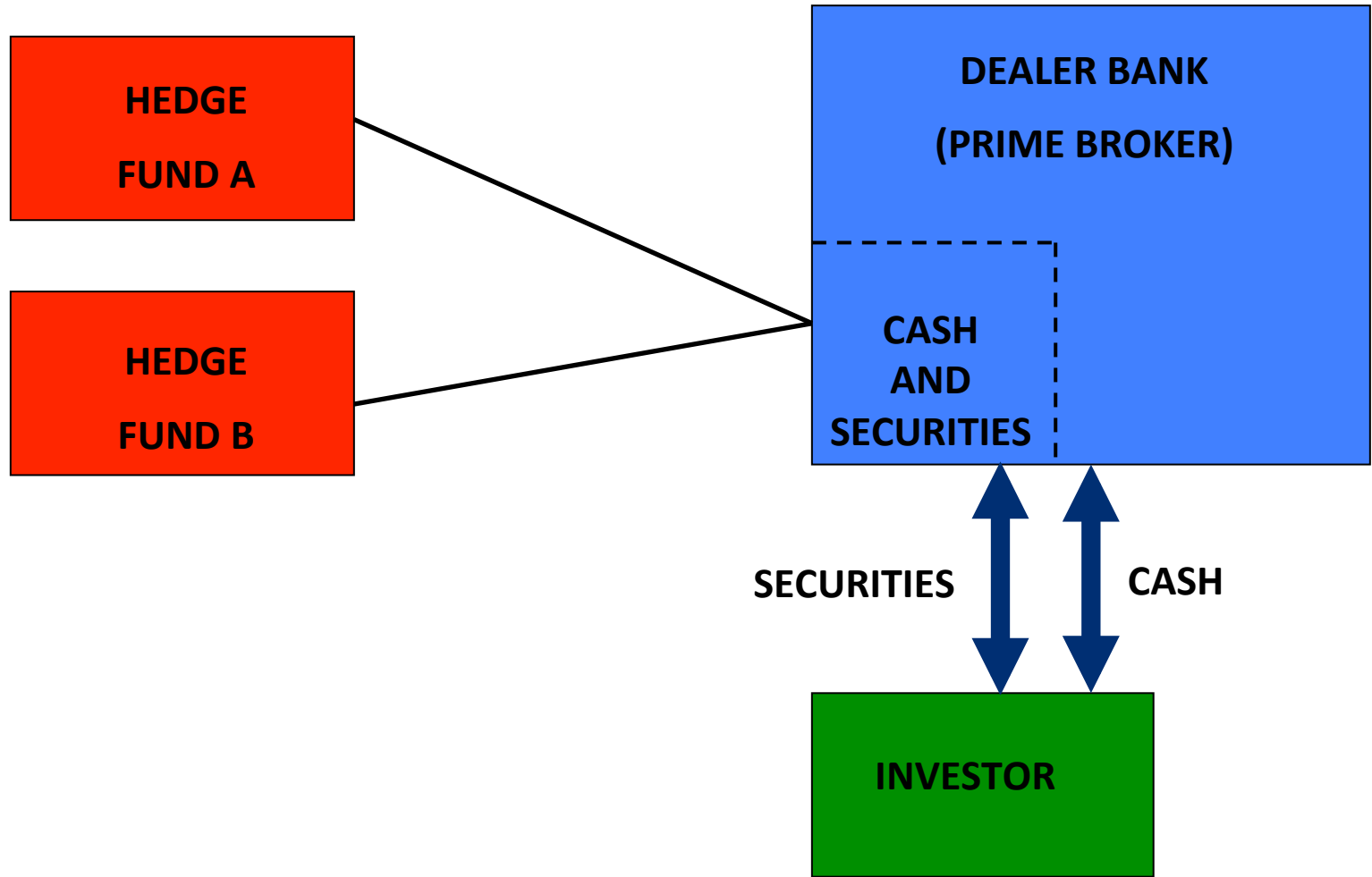
September 2008 Run on Money Market Funds

Institutional investment in prime money market mutual funds

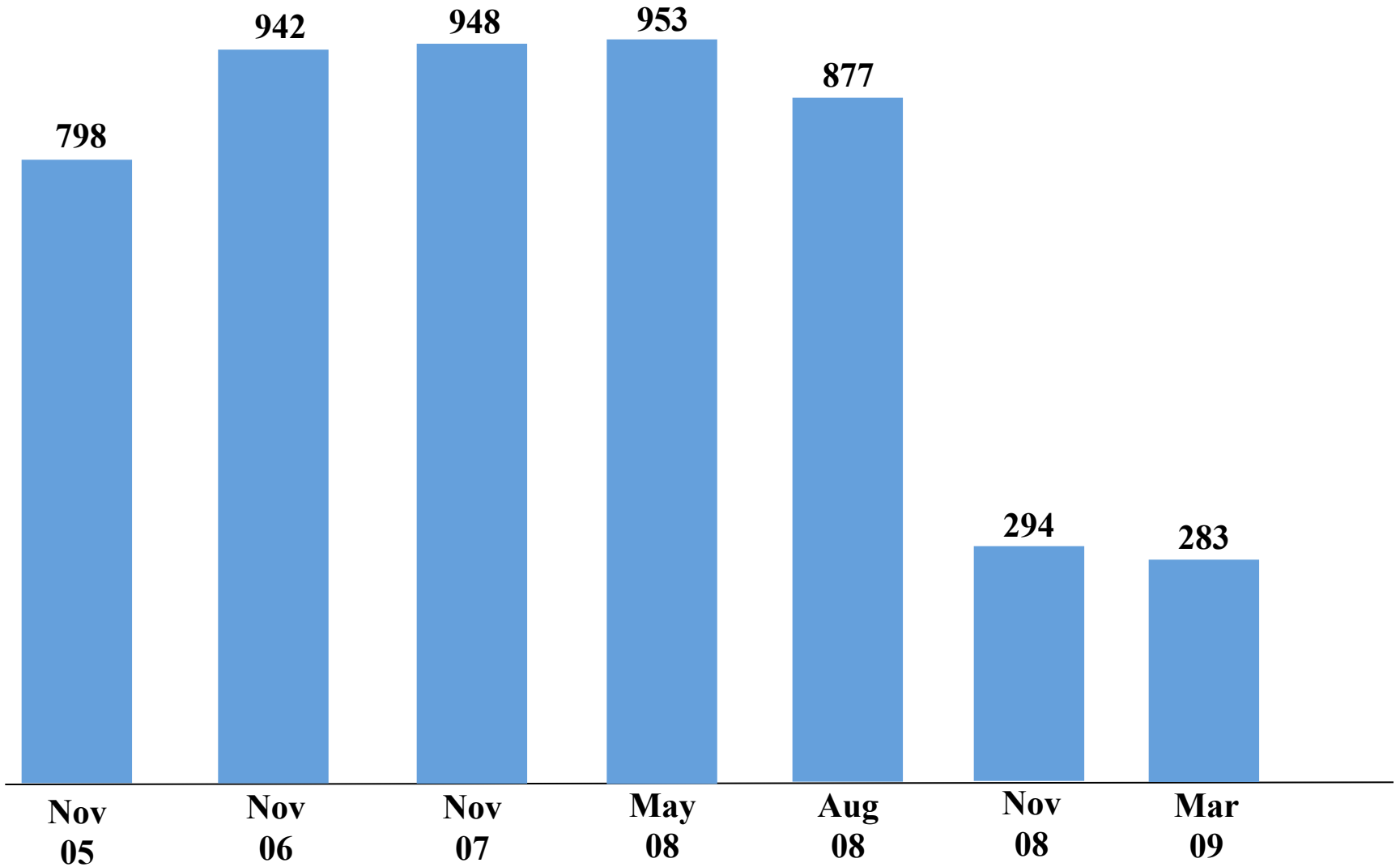


Source: Duffie (2012)

Prime-Brokerage

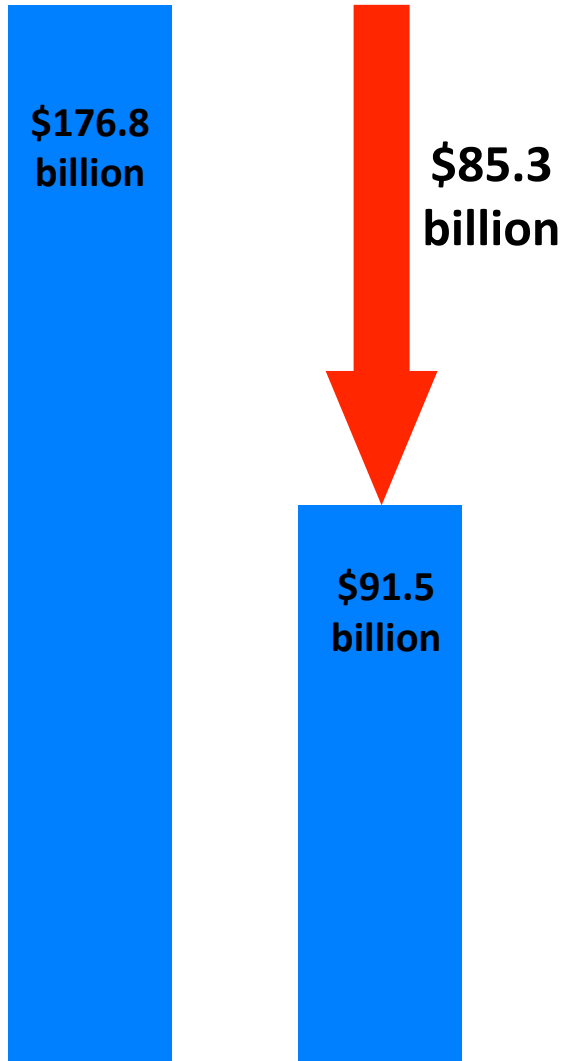


Morgan Stanley collateral received that can be pledged (\$ billions)

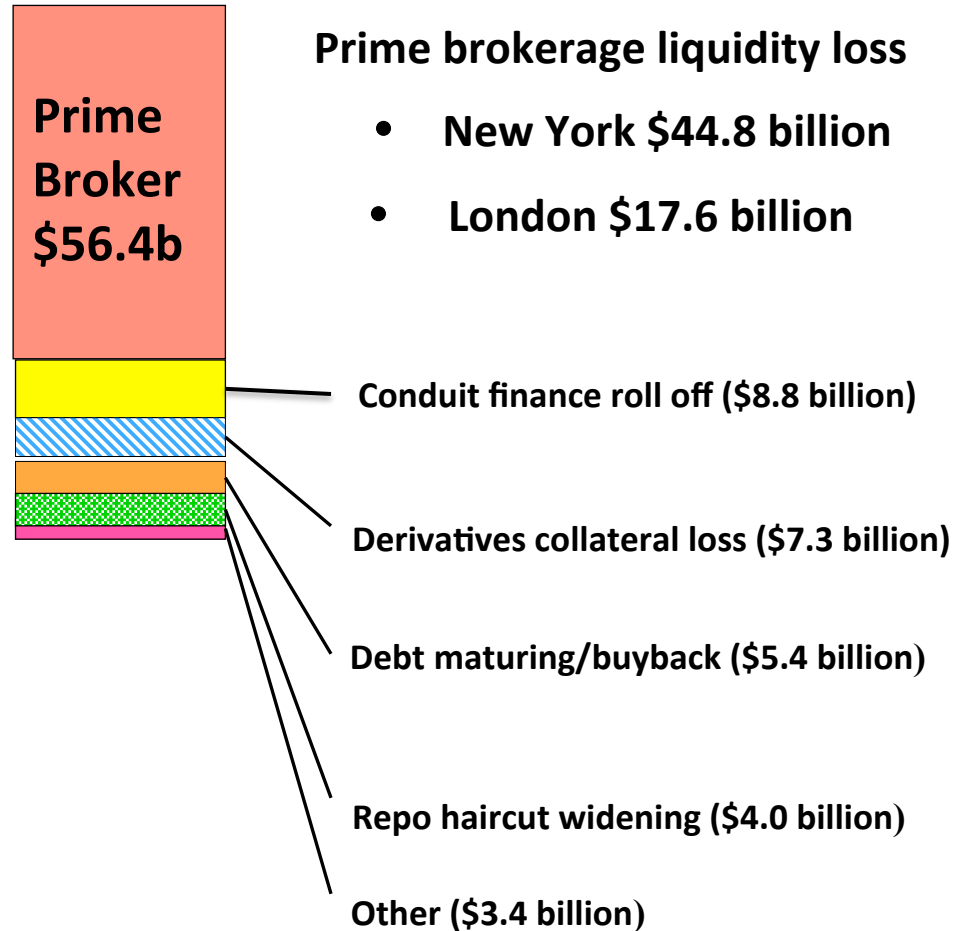


Data Source: Singh (2009)

Morgan Stanley's Liquidity Loss Sept. 12-22, 2008

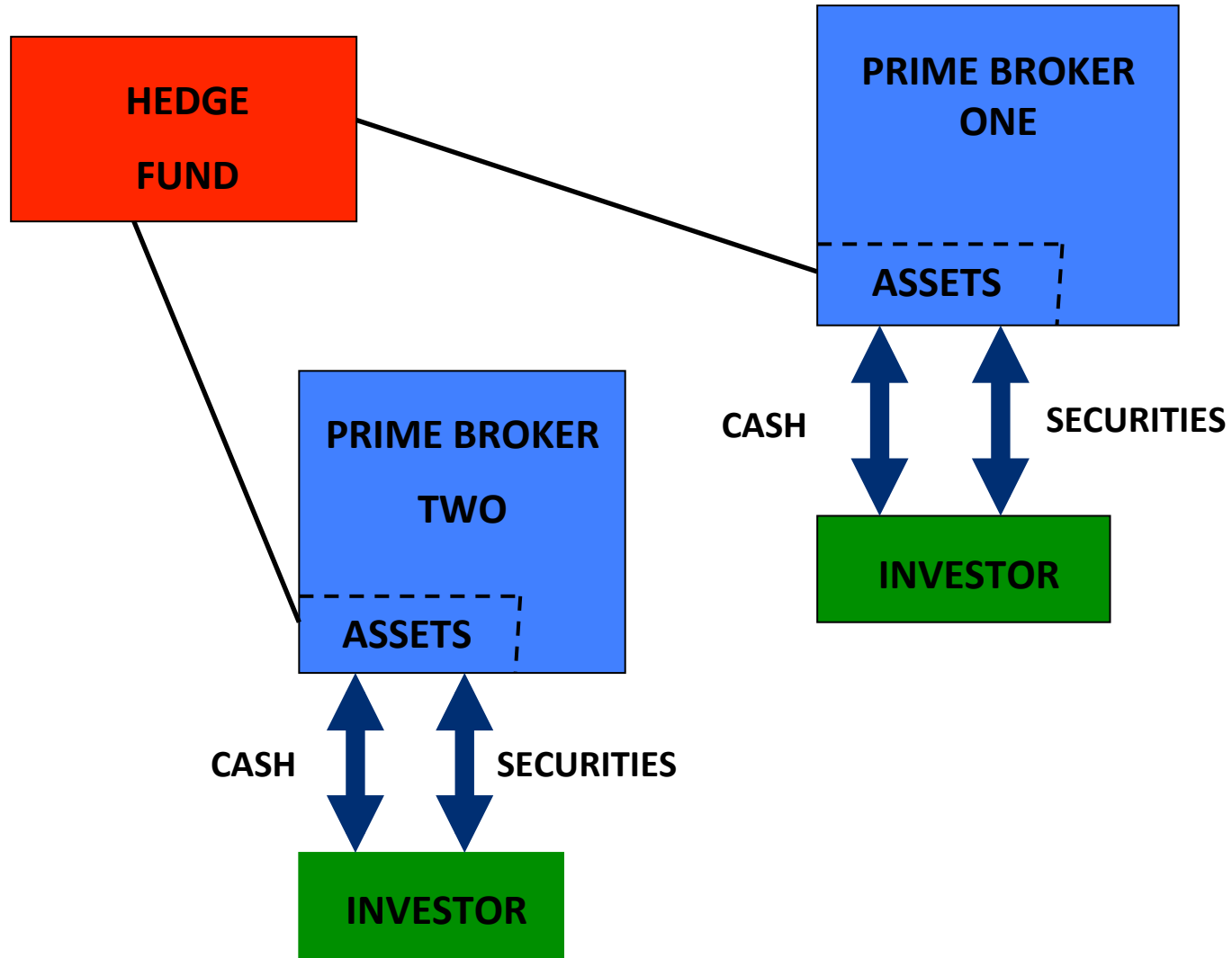


Duffie (2011)

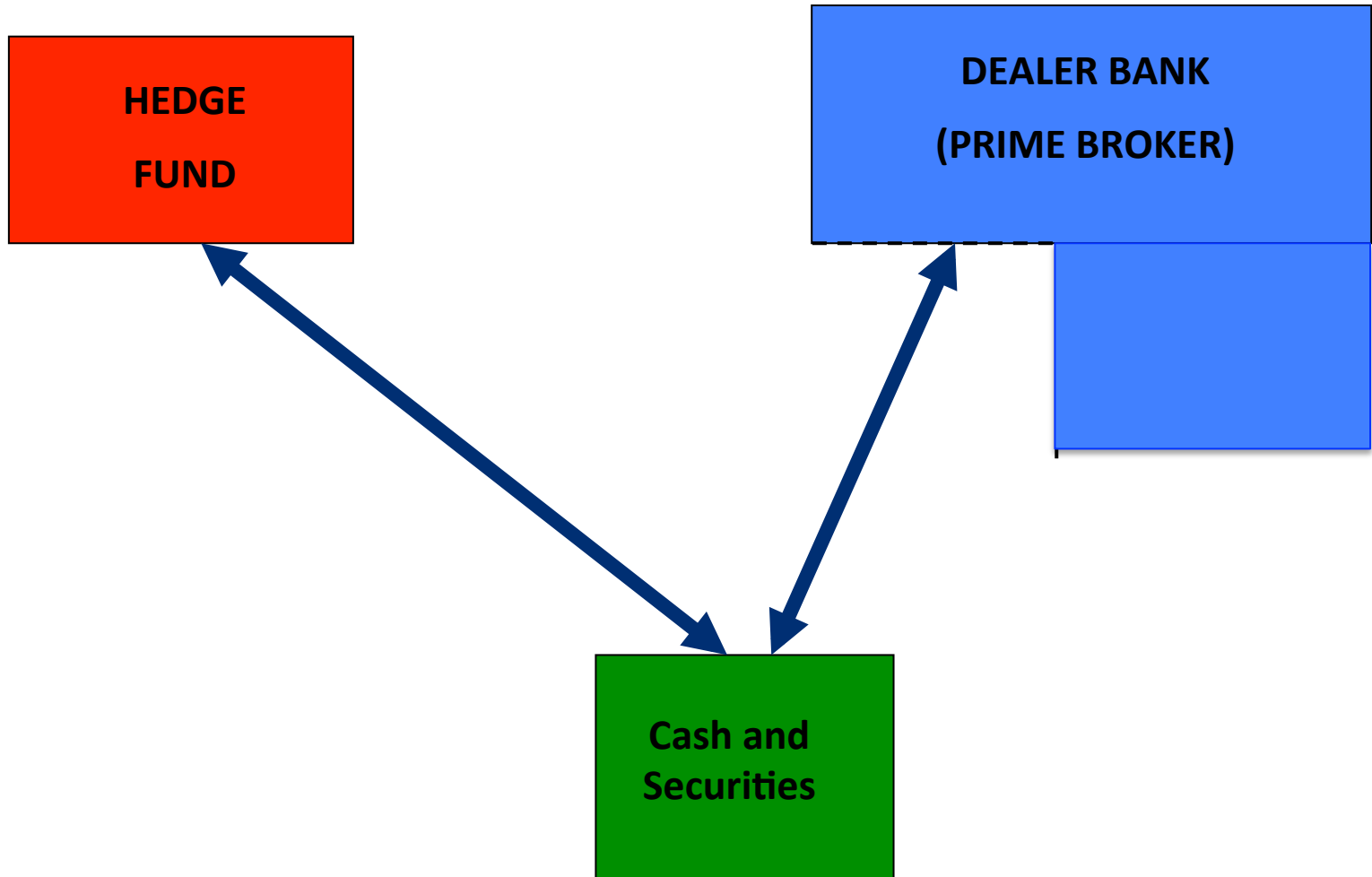


Data source: Morgan Stanley-FRBNY FCIC disclosure

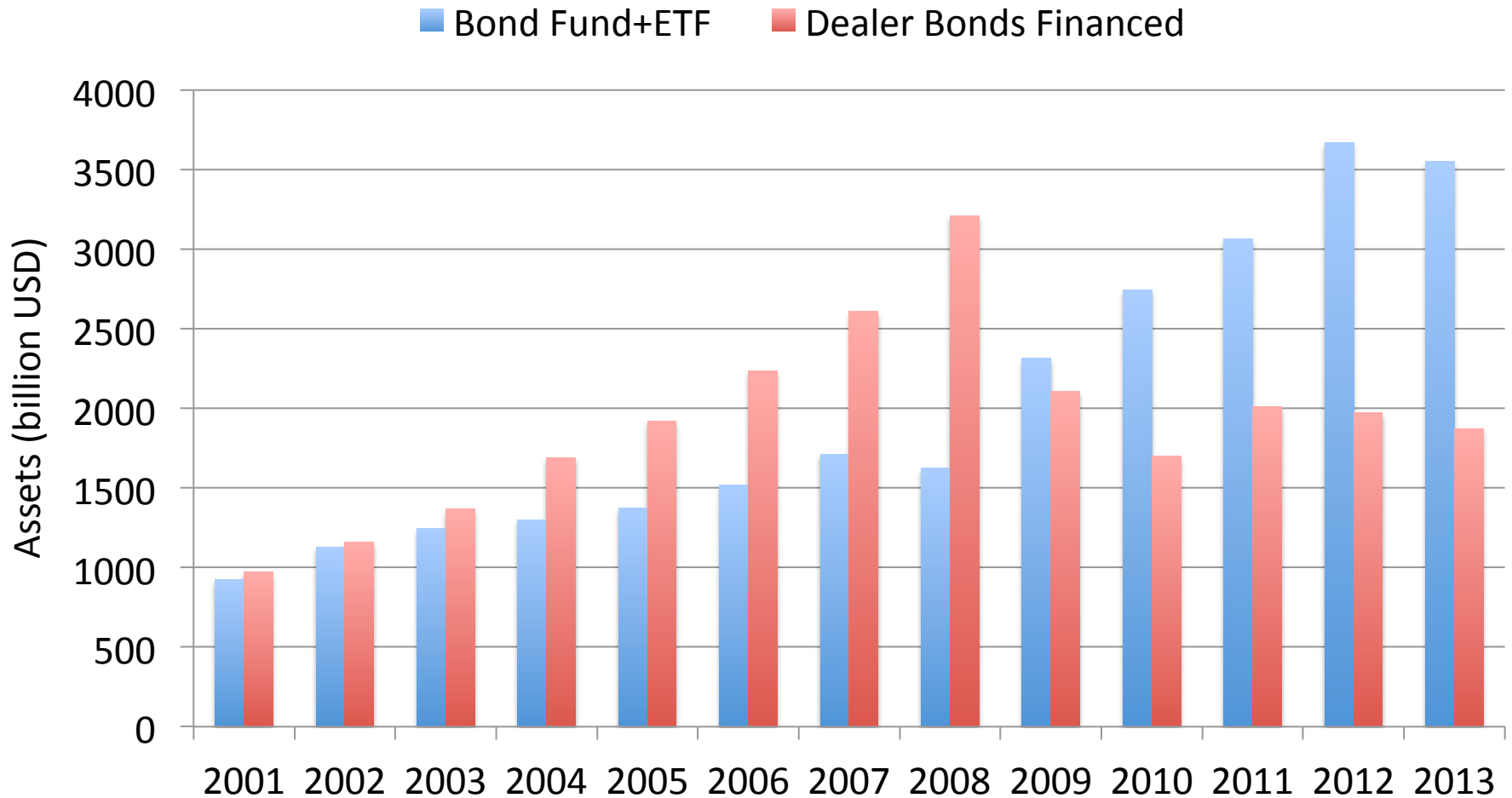
Multiple prime brokers



Prime-Brokerage Custodian



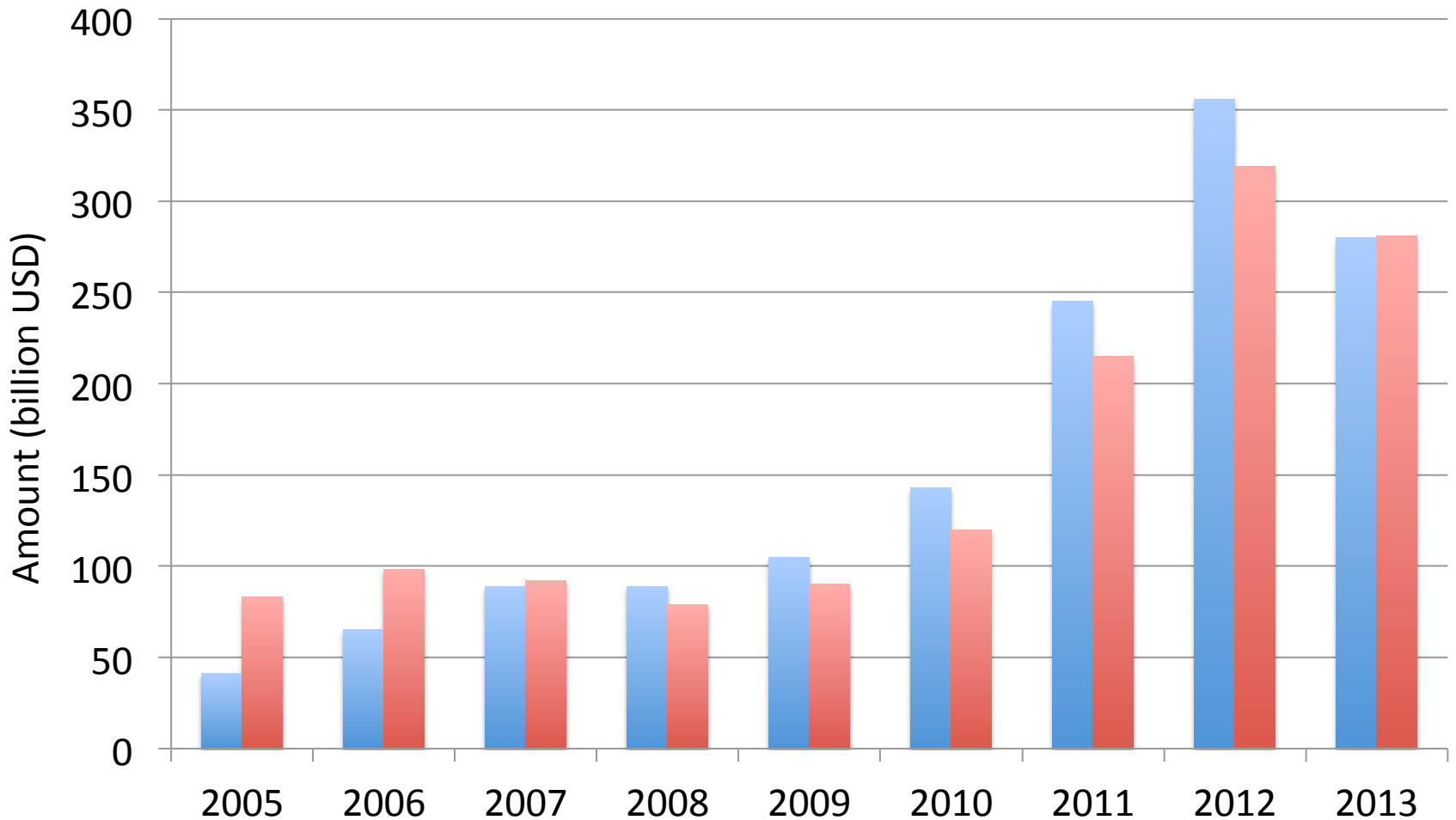
Who handles the bonds?



Data sources. ICI: AUM, bond mutual funds + ETFs. FRBNY: primary dealer daily financing (securities out) of UST + agencies + MBS + corporate bonds (first quarter).

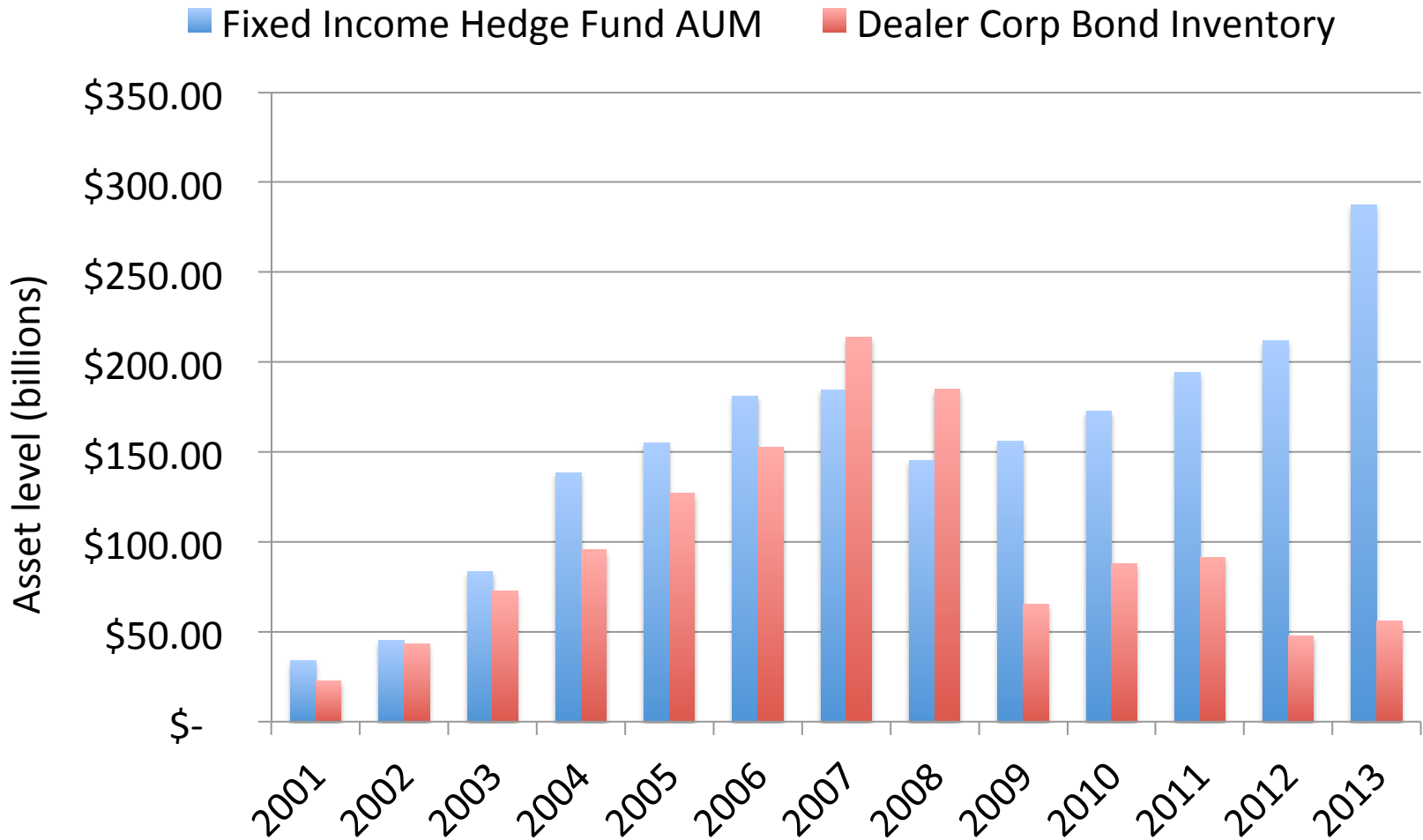
How are REIT assets growing?

■ Agency assets ■ Repo liabilities



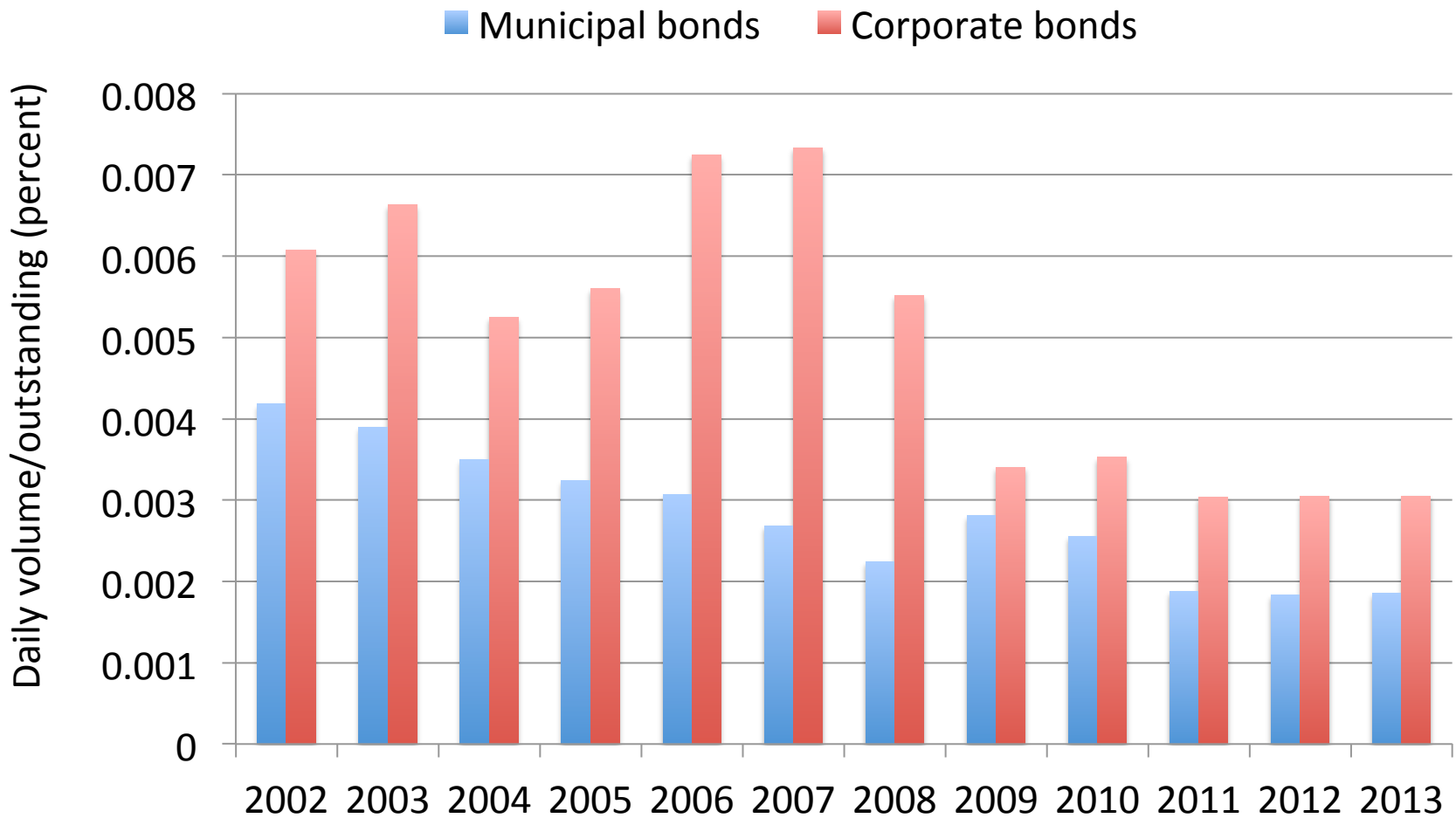
Data source: Flow of Funds L127

Dealers and Hedge Funds



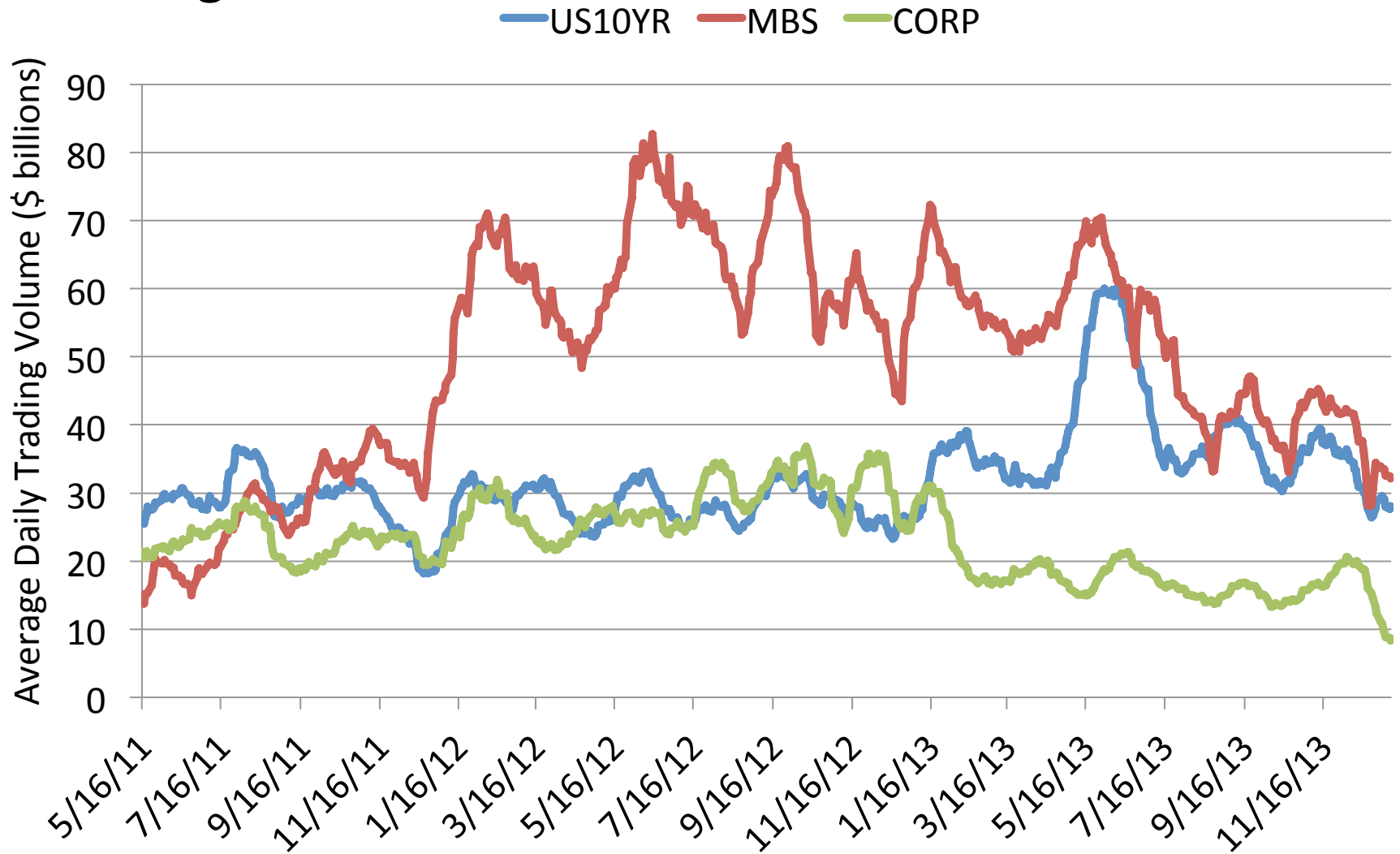
Data sources. Dealer inventories: FRBNY (March). Fixed income hedge funds AUM (Barclay)

Average daily bond market turnover



Data source: SIFMA

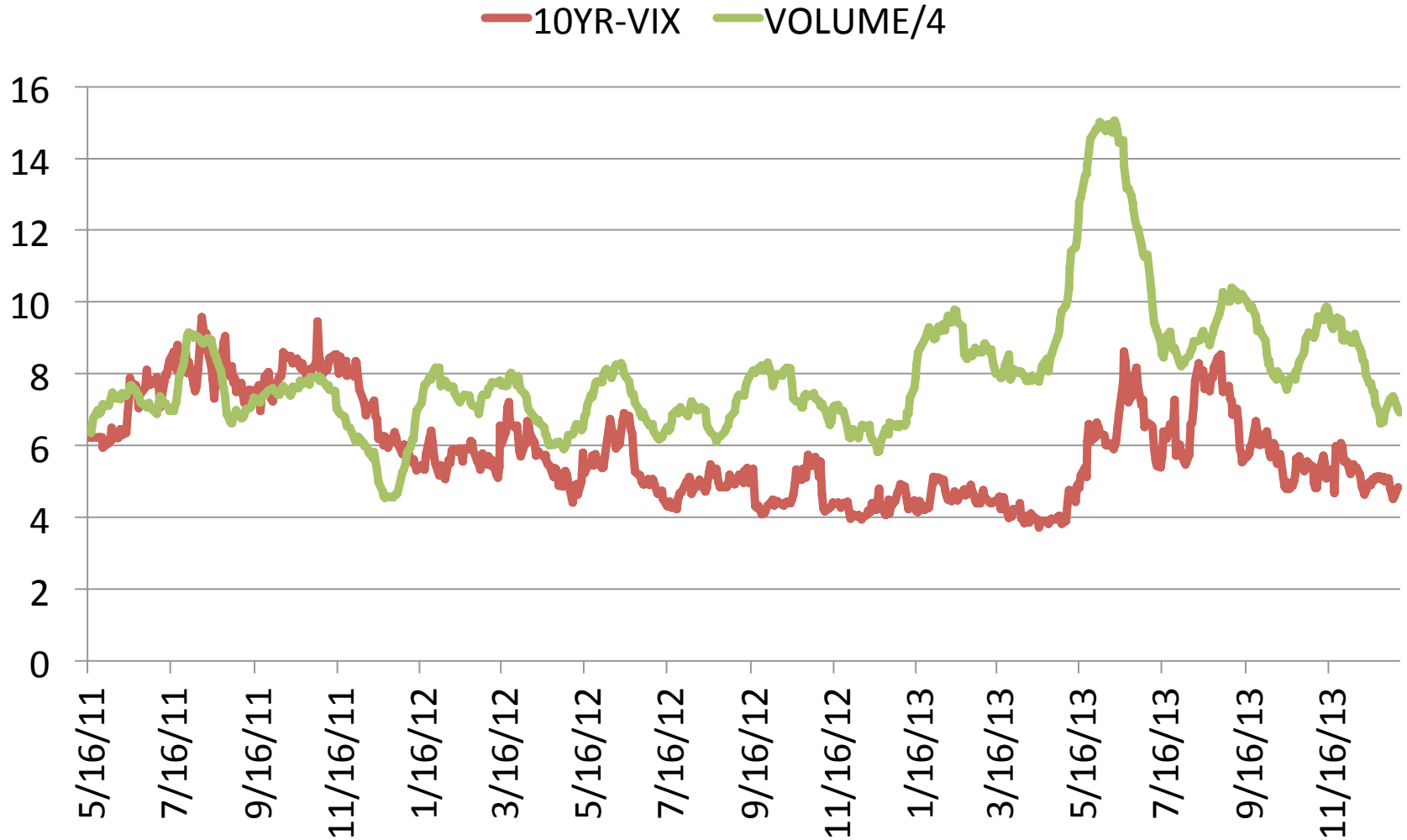
Trading volume



Data Source: Campbell, Li, Im (2014)

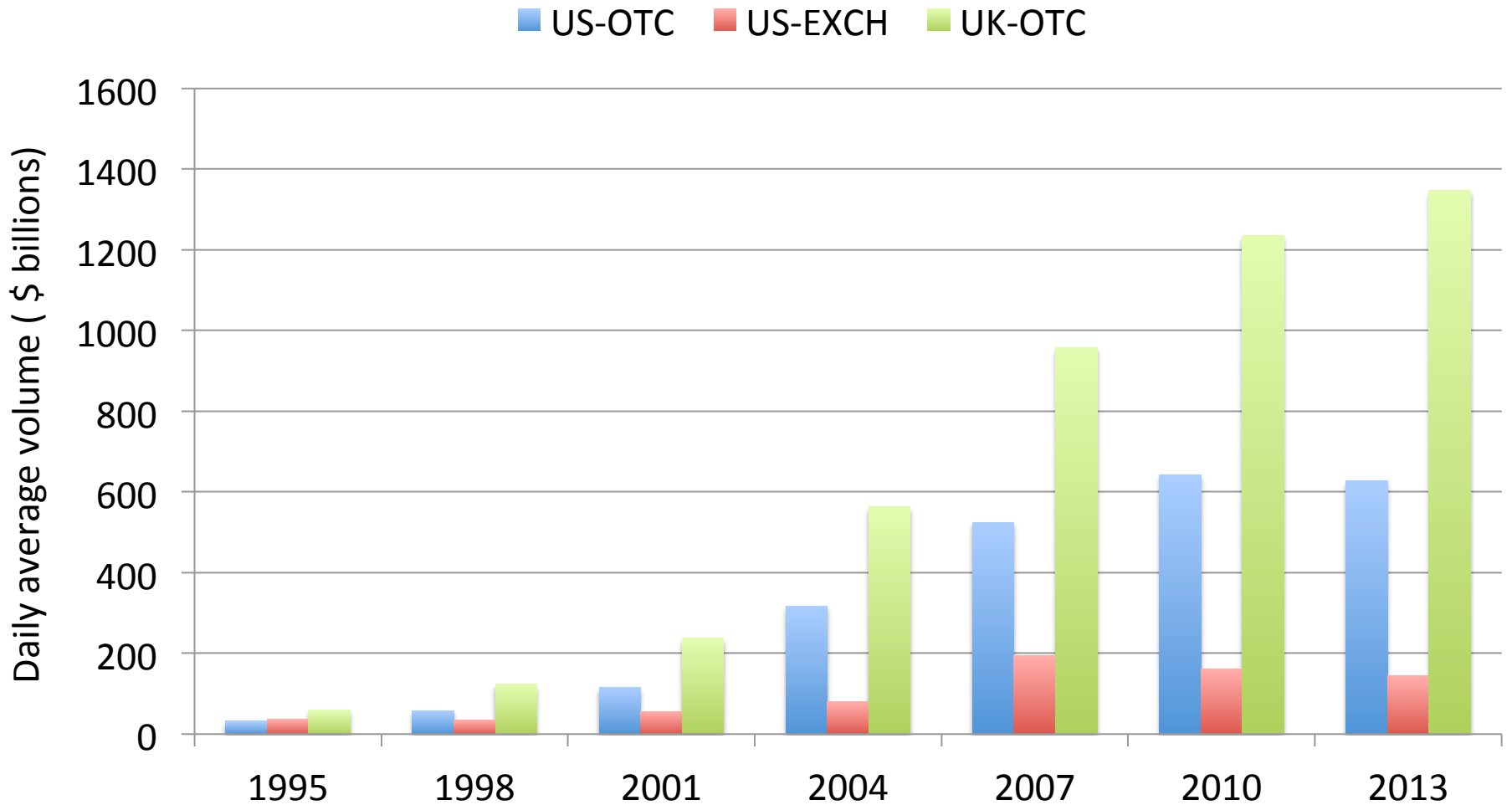
BrokerTec: US10YR. TRACE: MBS 30yr FNMA TBA 3%, 3.5%, 4%. CORP 100 most traded IG.

UST10yr: Volume and Volatility



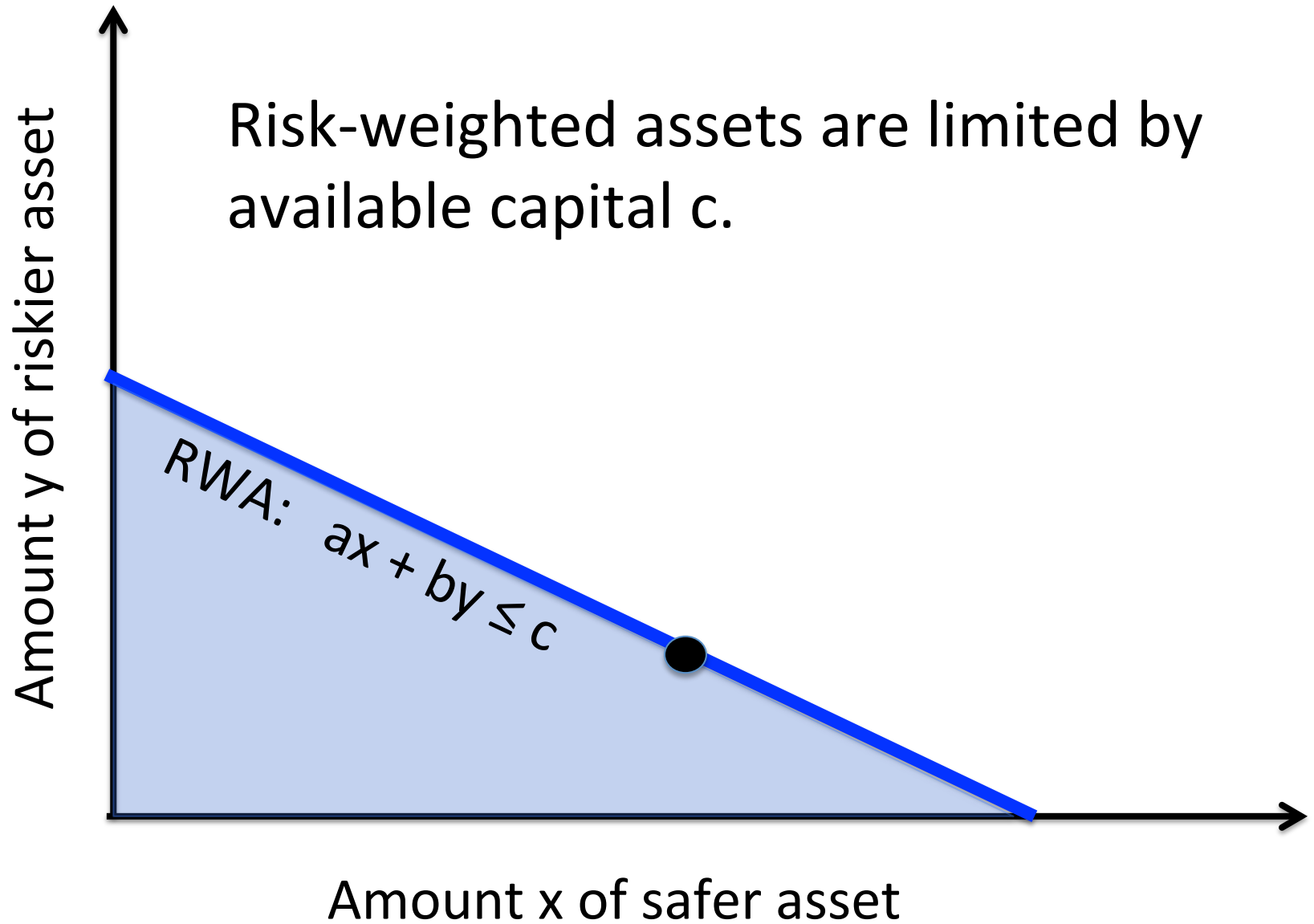
Data sources: CME: UST10yr-VIX. BrokerTec: UST10yr daily volume (\$ billions).

Daily Average Volume: Interest Rate Derivatives



Data sources. BIS: OTC Triennial (April), U.S. exchanges Table 23A (March).

Risk-weighted assets are limited by available capital c .



The leverage rule could be distortionary, by penalizing safe assets relative to risky assets.

