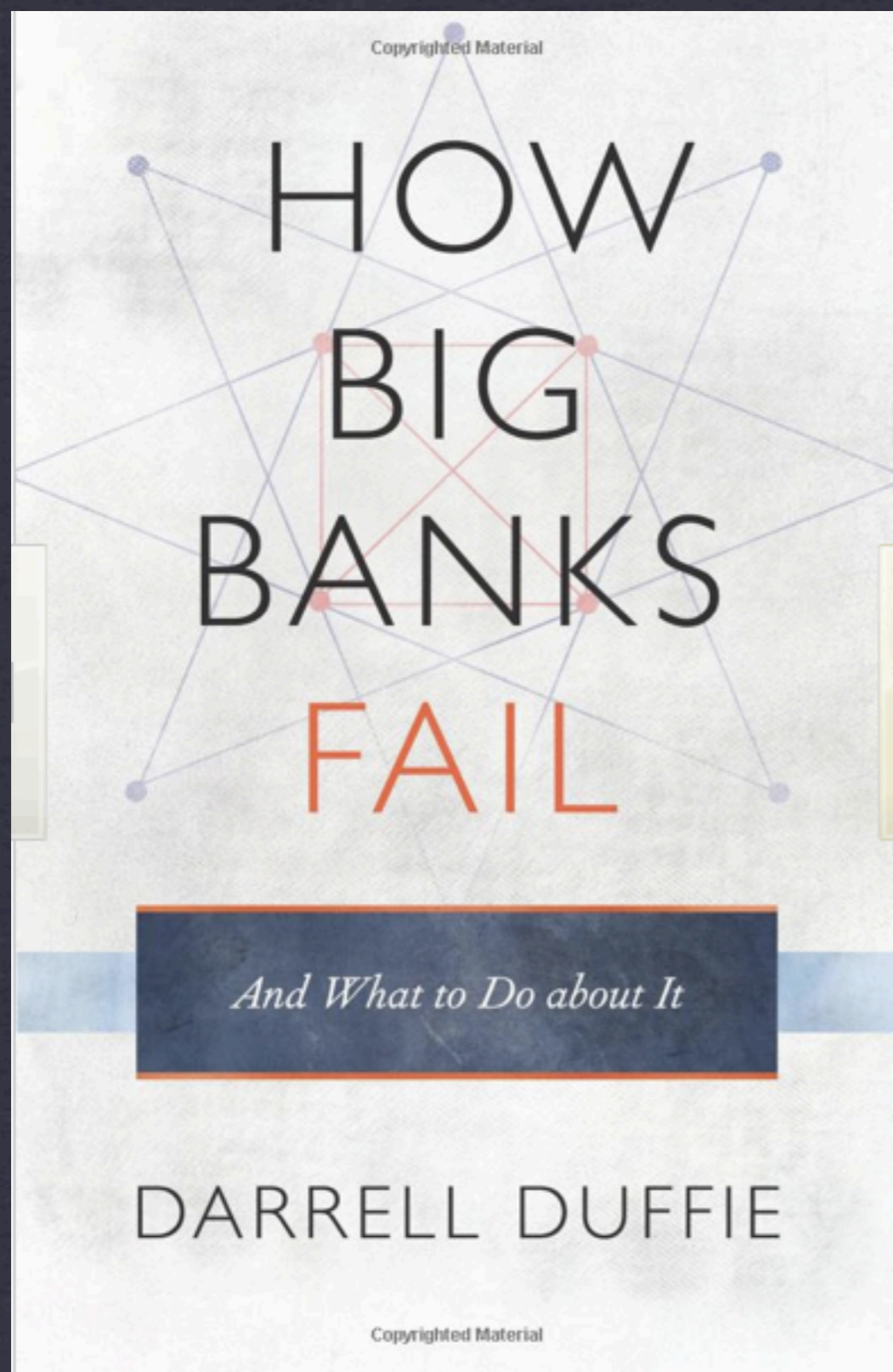


The Failure Mechanics of Dealer Banks

Darrel Duffie



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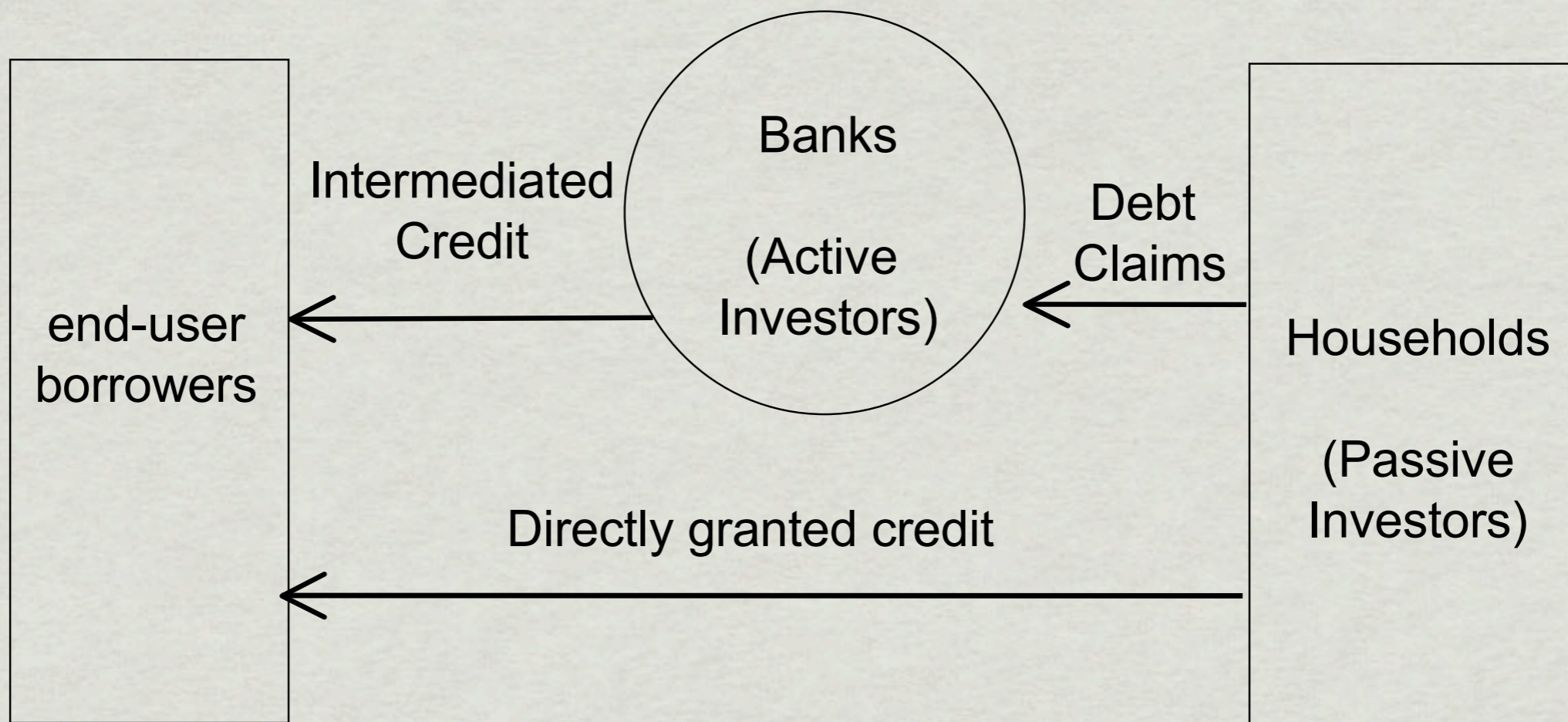
A bank is conventionally viewed as an intermediary between depositors, who desire short-term liquidity, and borrowers, who seek project financing. Occasionally, perhaps from an unexpected surge in the cash withdrawals of depositors or from a shock to the ability of borrowers to repay their loans, depositors may become concerned over the bank's solvency. Depositors may then "run," accelerating or worsening the bank's failure. The standard policy tools for treating the social costs of bank failures include regulatory supervision and risk-based capital requirements to reduce the chance of a solvency threatening loss of capital; deposit insurance to reduce the incentives of individual depositors to trigger cash insolvency by racing each other to withdraw their deposits; and regulatory resolution mechanisms, which give authorities the power to efficiently restructure or liquidate a bank.

During the recent financial crisis, major dealer banks—that is, banks that intermediate markets for securities and derivatives—suffered from new forms of bank runs. The most vivid examples are the 2008 failures of Bear Stearns and Lehman Brothers. Dealer banks are often parts of large complex financial organizations whose failures can damage the economy significantly. As a result, they are sometimes considered "too big to fail." The mechanics by which dealer banks can fail and the policies available to treat the systemic risk of their failures differ markedly from the case of conventional commercial bank runs. These failure mechanics are the focus of this article.

As an illustration, consider a protagonist dealer bank, whom we shall call Alpha Bank, whose capital position has just been severely weakened by trading losses. The

■ *Darrell Duffie is Dean Witter Distinguished Professor of Finance, Graduate School of Business, Stanford University, Stanford, California. His e-mail address is (duffie@stanford.edu). doi=10.1257/jep.24.1.51*

Banks in Conventional View



Banks are essentially susceptible to runs in the sense of Diamond-Dybvig (83).

→ Now standard policies such as capital requirement & deposit insurance.

More Relevant “Dealer Banks”

Table 1

**Dealers Invited to an April 1, 2009,
Meeting on Over-the-Counter
Derivatives, Hosted by the
New York Federal Reserve Bank**

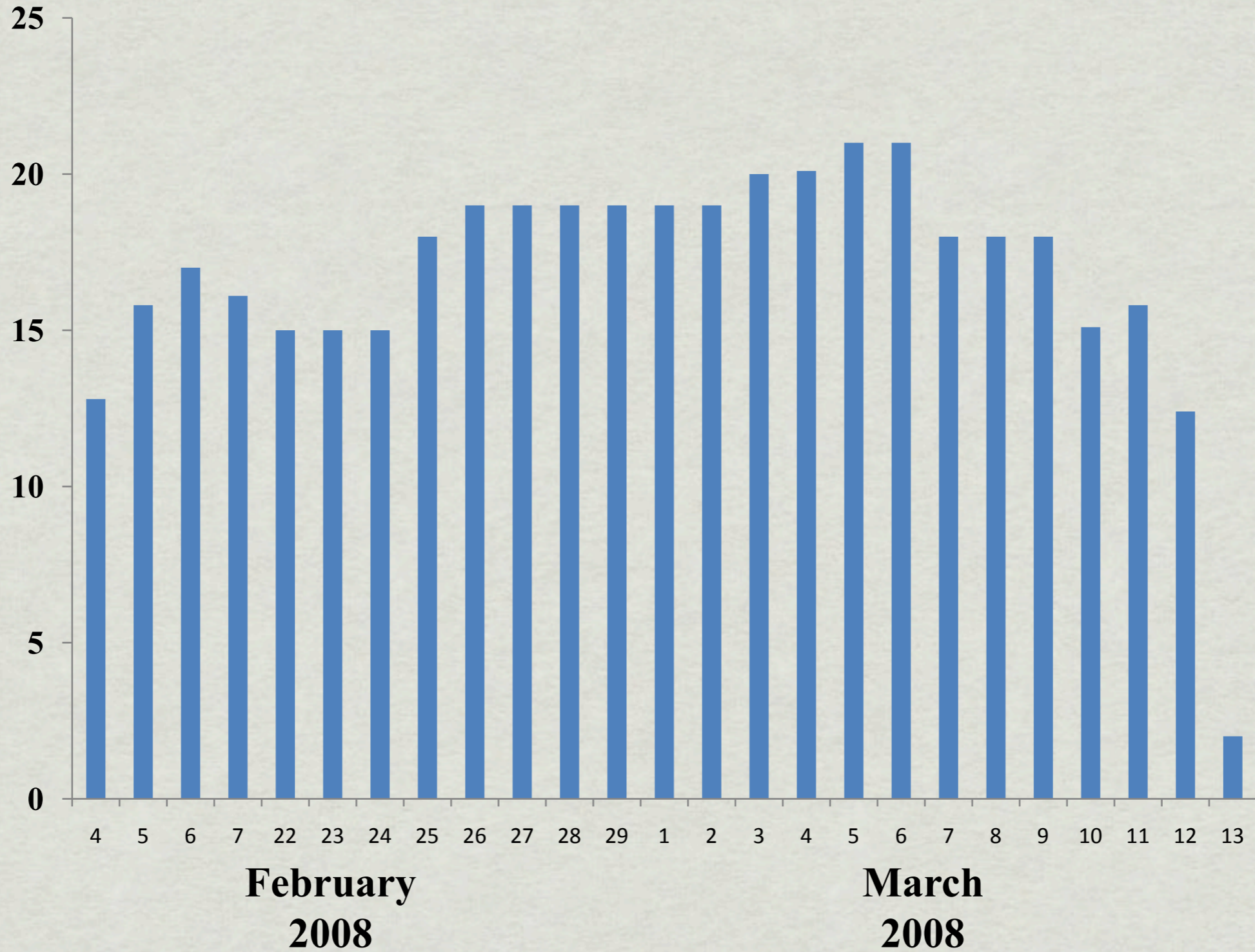
Bank of America, N.A.
Barclays Capital
BNP Paribas
Citigroup
Credit Suisse
Deutsche Bank AG
Dresdner Kleinwort
Goldman, Sachs & Co.
HSBC Group
JPMorgan
Chase Morgan Stanley
The Royal Bank of Scotland
Group Société Générale
UBS AG
Wachovia Bank N.A., A Wells Fargo Company

Source: New York Federal Reserve Bank.

A Large Bank Holding Group's Lines of Business

- ▶ Commercial banking (lending, deposit taking).
- ▶ Securities dealing (including securities lending and repo).
- ▶ Over-the-counter derivatives dealing.
- ▶ Proprietary trading (securities, derivatives).
- ▶ Prime brokerage.
- ▶ Asset management, including internal hedge funds.
- ▶ Merchant banking (oil, metals, foodstuffs, ...).
- ▶ Investment banking (underwriting, merger-acquisition, ...).

Bear Stearns' Liquidity Pool Over its Last Days (\$ billions)



Data Source: Cox (2008)

A Tale of a Dealer Bank

Consider a DB whose capital position has just been severely weakened by trading loss.

The DB seeks new equity capital to shore up the value of its business, but potential providers of new equity question whether their capital infusions would do much more than improve the position of the DB's creditors.

They also feel too uninformed about the value of the DB's assets and business opportunities to offer a price for new shares that the DB is willing to accept.

A Tale of a DB: Prime Brokerage

As the cracks in the DB's finances become more apparent, those who deal with the DB begin to draw back.

In particular, the DB has been operating a prime brokerage business, offering hedge funds such services as IT, trade execution, accounting reports, &—more importantly—holding the HFs' cash & securities.

These HFs begin to shift their assets to other banks. Because the DB had relied on its clients' cash and securities to finance its own business, these departures reduce the DB's financial flexibility.

A Tale of a DB: (OTC) Derivative Business

The DB notices that its derivatives counterparties have begun to lower their exposures to the DB.

In addition, other DBs are increasingly being asked to enter b/w the DB and its original counterparties (“novation”), insulating those counterparties from the DB’s default risk.

As those DBs notice this trend, they begin to refuse novations that would expose them to the DB’s default risk.

Further, the cash collateral placed with the DB by its derivatives counterparties, which had been an extra source of financing to the DB, is rapidly dwindling.

A Tale of a DB: Repo

The DB's short-term creditors see no good reason to renew their loans to the DB.

Potentially, they could get caught up in the administrative mess with the DB's default.

A large fraction of these short-term loans are "repos." The majority of these repos have a term of one day.

Thus, on short notice, the DB needs to find new financing or to conduct fire sales of its assets.

A Tale of a DB: Bankruptcy

The DB's liquidity position is now grave. In the normal course of business, the DB's clearing bank allows the DB and the flexibility of "daylight overdrafts" of cash for the intra-day financing of trades.

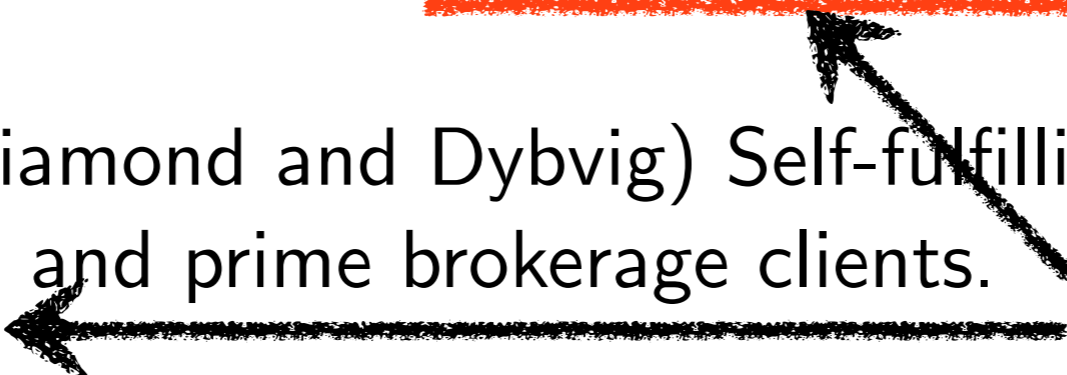
However, the DB receives word that its clearing bank has exercised its right to stop processing the DB's cash & securities transaction.

Unable to execute trades or to meet its obligations, the DB declares bankruptcy.

Short-Run Failure Accelerators

- ▶ Exit of prime brokerage clients.
- ▶ Run by over-the-counter (OTC) derivatives counterparties.
- ▶ Run by short-term creditors, especially repo.
- ▶ Lost access to clearing and settlement, including daylight overdraft privileges.

Distress Incentives

- ▶ **Asset Substitution:** (Jensen and Meckling)
 - Leverage.
 - Maturity transformation and credit risk retention.
 - Voluntary compensation of clients to protect franchise value.
 - ▶ **Debt overhang:** (Myers) Reducing the present value of distress costs is a positive NPV project, but new capital will not be offered because it will go instead to improving the position of creditors.
 - ▶ **Adverse selection:** (Akerlof) Providers of equity and debt financing charge a lemon's premium against balance-sheet opaqueness.
 - ▶ **Bank run:** (Diamond and Dybvig) Self-fulfilling run by creditors, counterparties, and prime brokerage clients.
- Unique features?
- 

Contents

What do large dealer banks do?

What is the failure mechanics for them?

Some policy implications?

A Large Bank Holding Group's Lines of Business

- ▶ Commercial banking (lending, deposit taking).
- ▶ Securities dealing (including securities lending and repo).
- ▶ Over-the-counter derivatives dealing.
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- ▶ Investment banking (underwriting, merger-acquisition, ...).

Digression

Some of the risk-management failures discovered during the crisis may be associated with **dis**economies of scope in risk-management & corporate governance.

Yes: Boot et al.(99) does **not** find a strong case for the net benefit of forming diversified financial conglomerates.

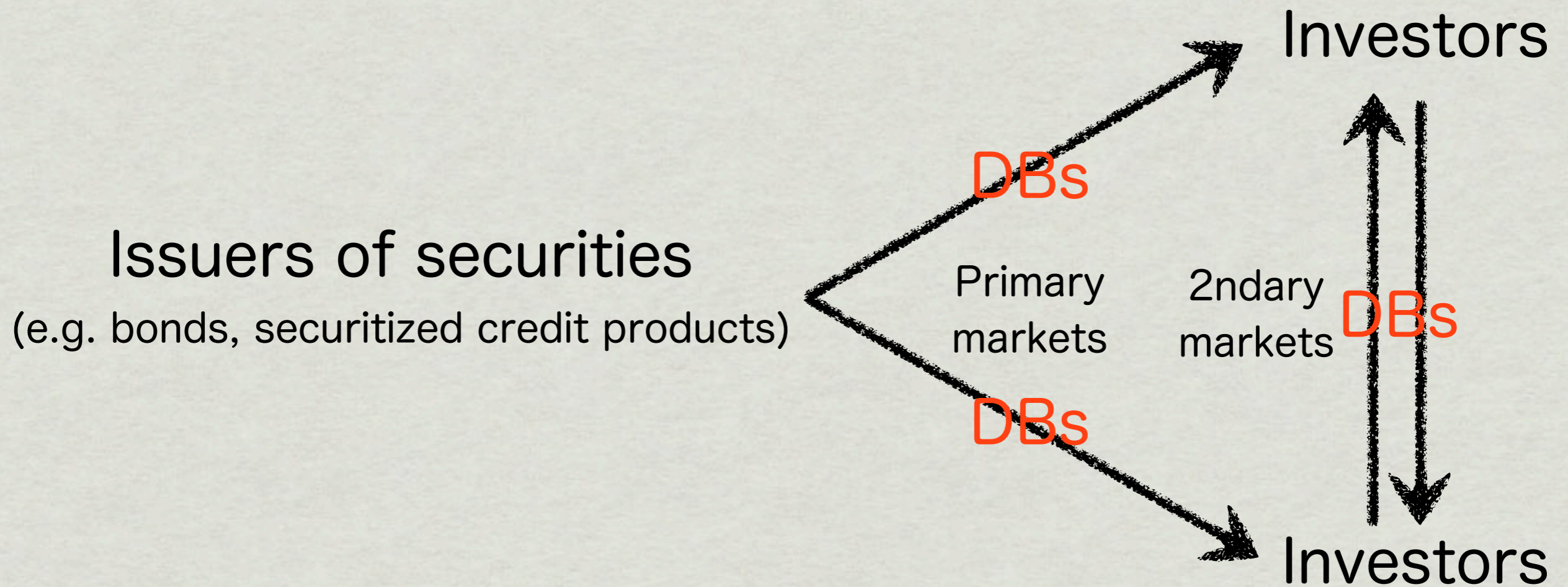
No: Kanatas-Qi(03) advocate potential synergies between commercial & investment banking.

Remark

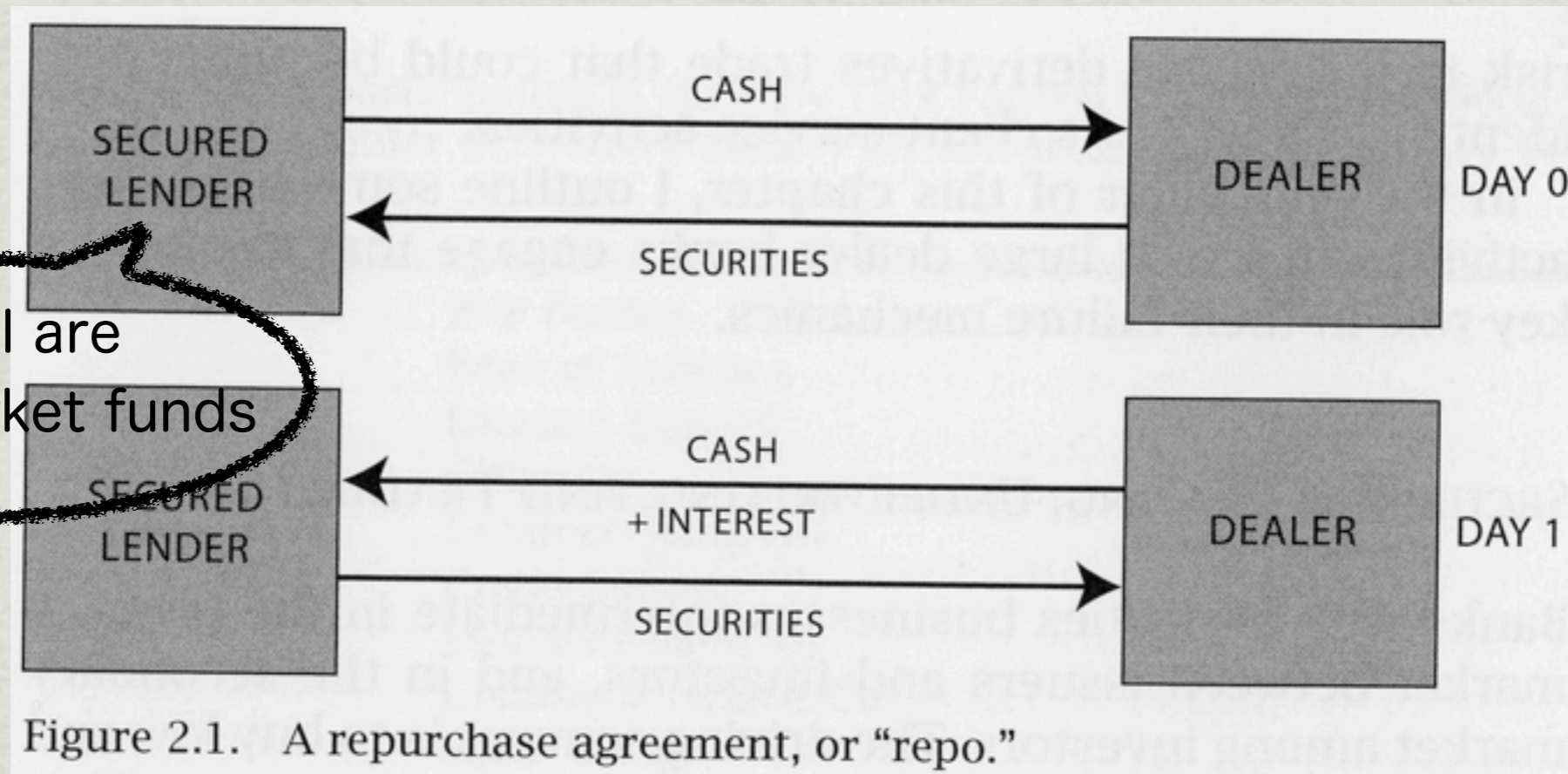
Unlike insured depositors at a commercial banks,
many of clients & counterparties of a DB

- have **no default insurance** &
- even if they have insurance,
they dislike to bear **the friction costs**
involved in the failure process.

1. Securities Business (Dealing, Underwriting, & Trading)



1. Securities Business (Ctd.)



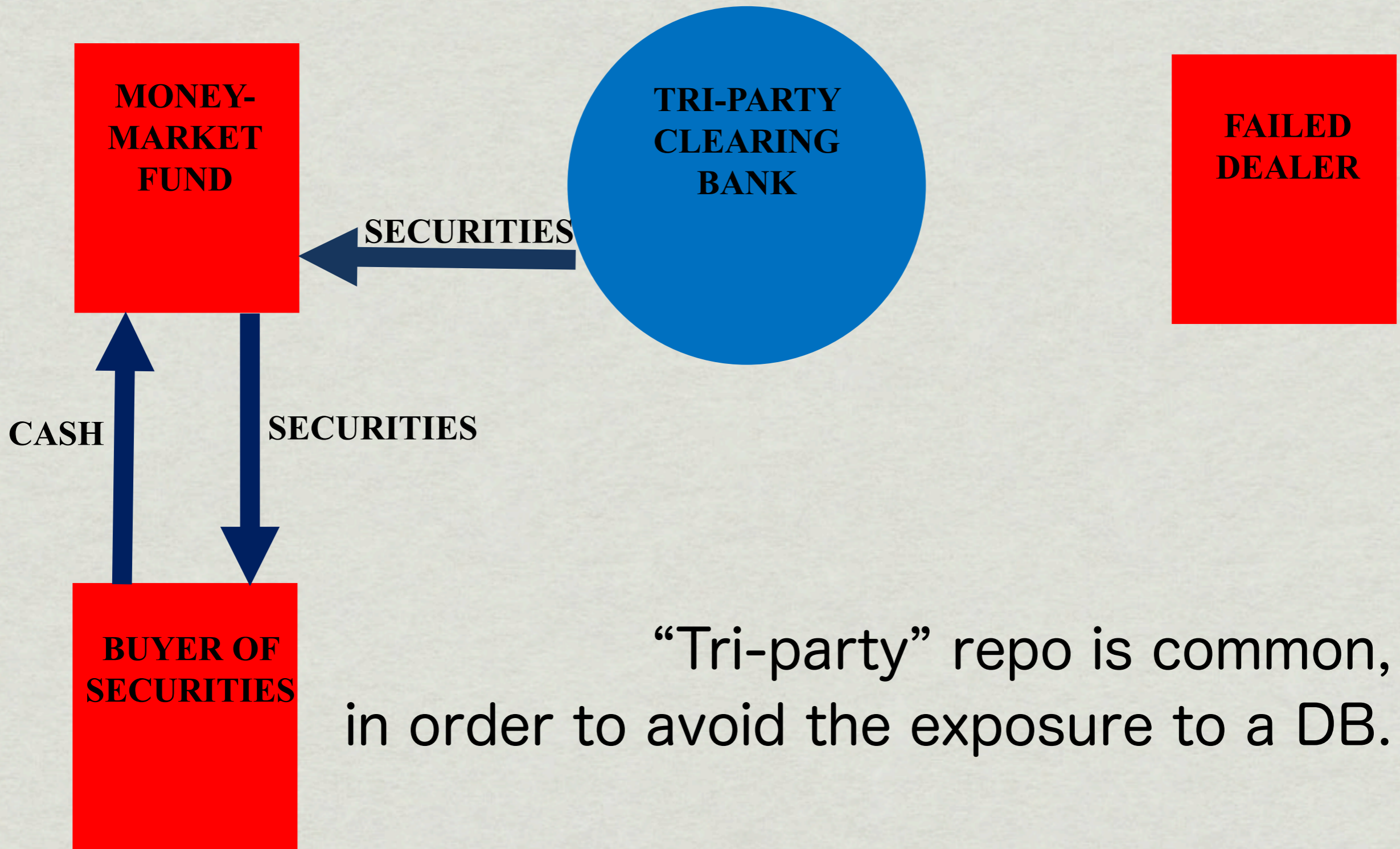
DBs are especially dominant in **repo** markets.
Increasing over recent years,
DBs have financed their business with them,
especially "**over-night**" repos.

1. Securities Business (Ctd.)



“Tri-party” repo is common, in order to avoid the exposure to a DB.

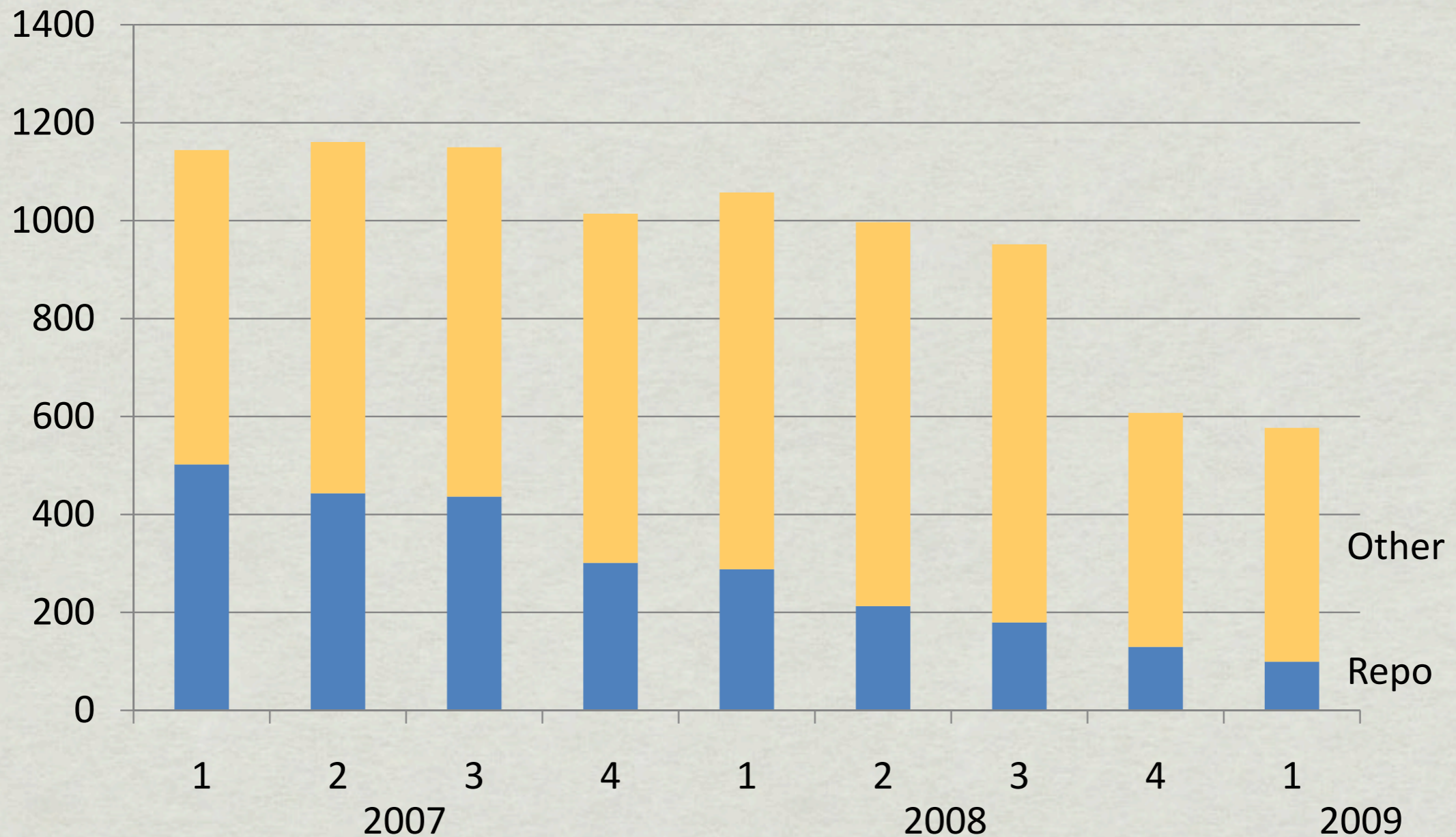
1. Securities Business (Ctd.)



“Tri-party” repo is common, in order to avoid the exposure to a DB.

However...

Morgan Stanley's Total Liabilities and "Repo" Portion
(\$ billions)



1. Repo Runs

Counterparties have **no** incentive to renew repos in the face of concerns over a DB's solvency.



This incentive structure caused **huge rises of haircuts** in the crisis & associated “death spiral” of fire sales of assets.

For example?

1. Repo Runs (Ctd.)

TABLE 3.2
Variation in repo haircuts.

Typical haircut on term securities financing transactions (percent)

	June 2007			June 2009		
	Prime ^a	Non-prime ^b	Unrated ^c	Prime ^a	Non-prime ^b	Unrated ^c
G7 government bonds						
Short-term	0	0	0.5	0.5	1	2
Medium-term	0	0	0.5	1	2	3
U.S. agencies						
Short-term	1	2	3	1	2	3
Medium-term	1	2	3	2	5	7
Pfandbrief	0	0	1	1	2	8
Prime MBS						
AAA-rated	4	6	10	10	20	30-100
AA-rated and A-rated	8	12	25	100	100	100
Asset-backed securities	10	20	20	25	50	100

Notes: ^aPrime counterparty. ^bNon-prime counterparty. ^cHedge funds and other unrated counterparties.

1. Repo Runs (Ctd.)

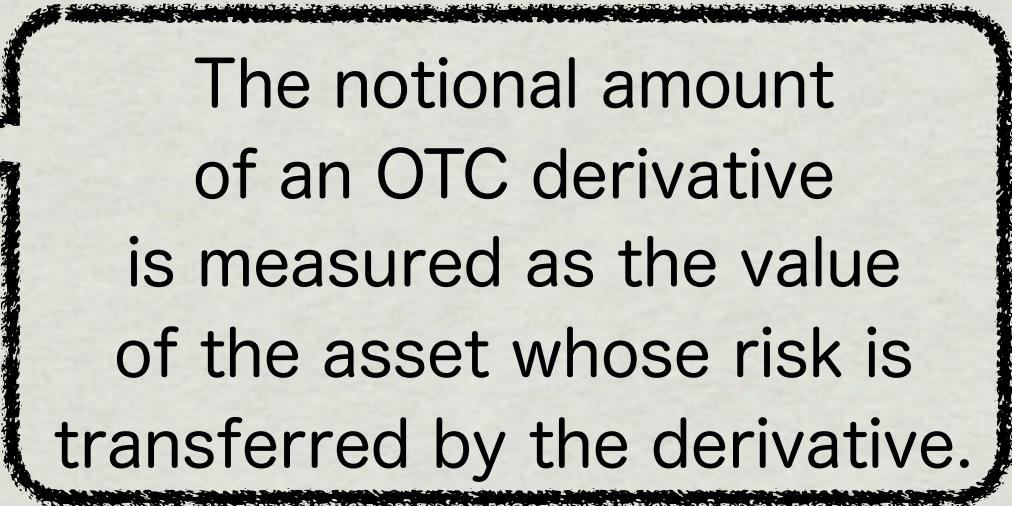
Typical haircut on term securities financing transactions (percent)						
	June 2007			June 2009		
	Prime ^a	Non-prime ^b	Unrated ^c	Prime ^a	Non-prime ^b	Unrated ^c
Structured products (AAA)	10	15	20	100	100	100
Investment grade bonds						
AAA- and AA-rated	1	2	5	8	12	15
A-rated and BBB-rated	4	7	10	10	15	20
High-yield bonds	8	12	20	15	20	40
Equities						
G7 countries	10	12	20	15	20	25
Emerging economies	15	20	35	20	25	40

Notes: ^aPrime counterparty. ^bNon-prime counterparty. ^cHedge funds and other unrated counterparties.

2. Over-the-Counter Derivatives

As in their securities businesses, DBs also conduct proprietary business in OTC derivatives markets, especially interest-rate swaps & CDSs.

The total notional amount of OTC derivatives outstanding is roughly \$600 trillion.



The notional amount of an OTC derivative is measured as the value of the asset whose risk is transferred by the derivative.

In notional terms, exchange-traded derivatives positions total to approximately \$400 trillion.

2. Over-the-Counter Derivatives (Ctd.)

Table 2

**Exposures of Dealers in Over-the-Counter
Derivatives Markets by Asset Class, as of June 2009**
(net exposures do not include non-U.S. credit default swaps)

<i>Asset class</i>	<i>Exposure (\$ billions)</i>
Credit default swap	2,987
Interest rate	15,478
Equity linked	879
Foreign exchange	2,470
Commodity	689
Unallocated	2,868
Total	25,372
Total after netting	3,744

Source: Bank for International Settlements, November, 2009.

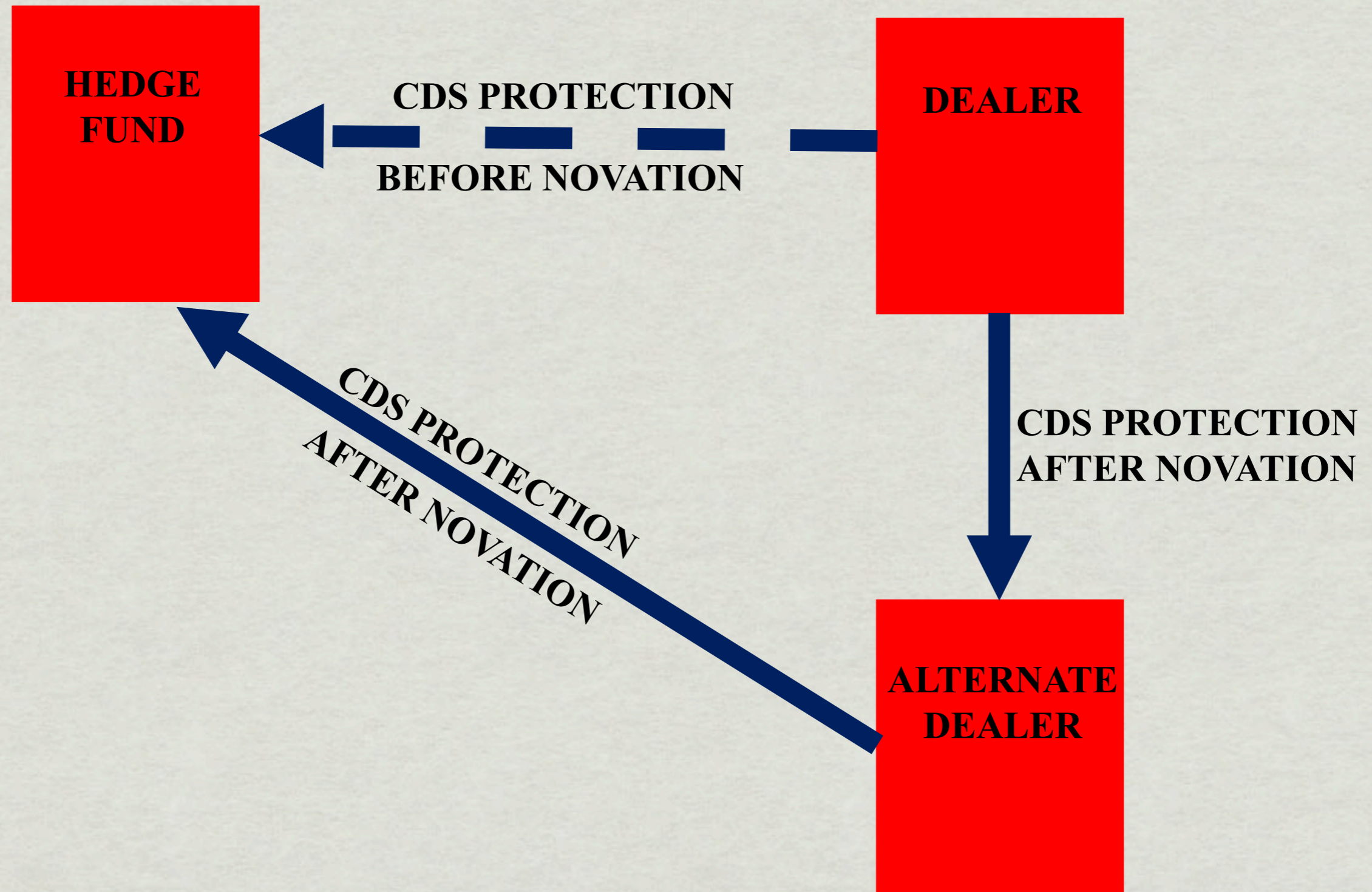
The above inequality is due to the netting given that **both counterparties are often DBs.**
This is particularly the case for CDSs.

2. Run by OTCD Counterparties

If a DB is perceived to have a solvency risk, an OTCD counterparty would like to reduce the exposure to the DB.

- ▶ Novation (asking a different dealer to stand in between the counterparty and distressed dealer) causes cash collateral to depart from prime broker's control.
- ▶ IMF data: Citibank's OTC derivatives payable exposure (after netting and collateral) decreased from \$126 billion in March 2008 to \$17 billion as of end-March 2009. Compare to Goldman's estimated drawdown, from \$100 billion to \$91 billion.
- ▶ Collateral on downgrade. Example: Morgan Stanley, approximately \$1 billion per notch.

2. Run by OTCD Counterparties (Ctd.)



2. Run by OTCD Counterparties (Ctd.)

OTCD trades b/t counterparties are legally combined under a “master swap agreement” b/w them by International Swaps & Derivatives Association.
e.g. Collateral requirement,
obligations when one of them cannot perform

By 2008, over 80% of collateral for the above agreement was cash.

Also, the total amount of collateral nearly doubled from 2007 (\$2 trillion) to 2008 (\$4 trillion).

3. Prime Brokerage & Asset Management

DBs provide institutional & individual investors & hedge funds with “prime brokerage” services such as

- Holding & lending of securities & money
 - Security clearing
 - Accounting & consulting

& asset management services such as

- Alternative investment vehicle
e.g. “Internal hedge funds”

3. Prime Brokerage & Asset Management (Ctd.)

Prime brokers can also finance themselves with the cash & securities that clients leave. Always in the U.K. Often in the U.S.

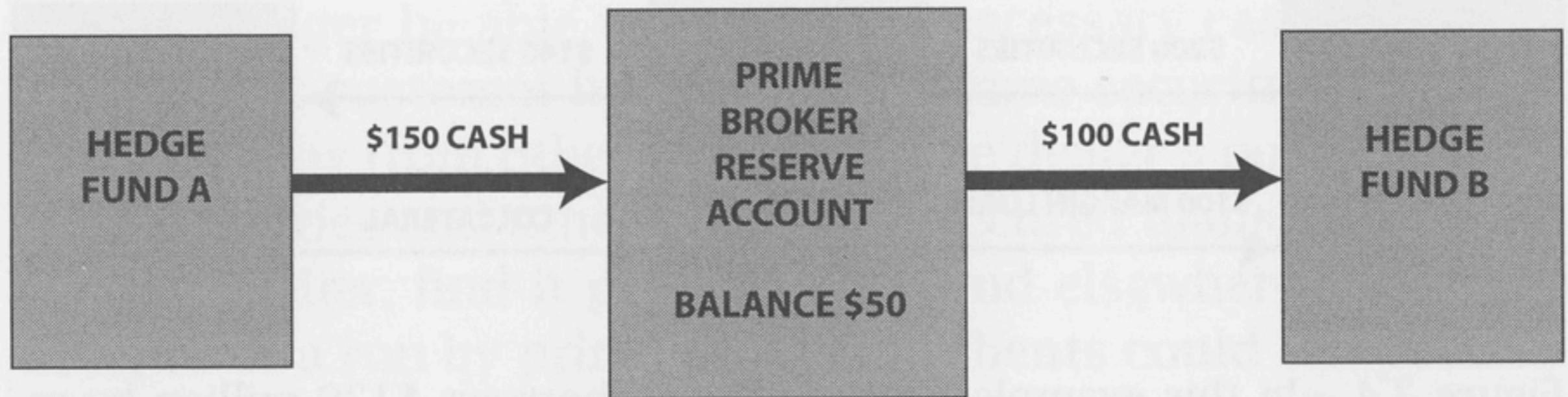
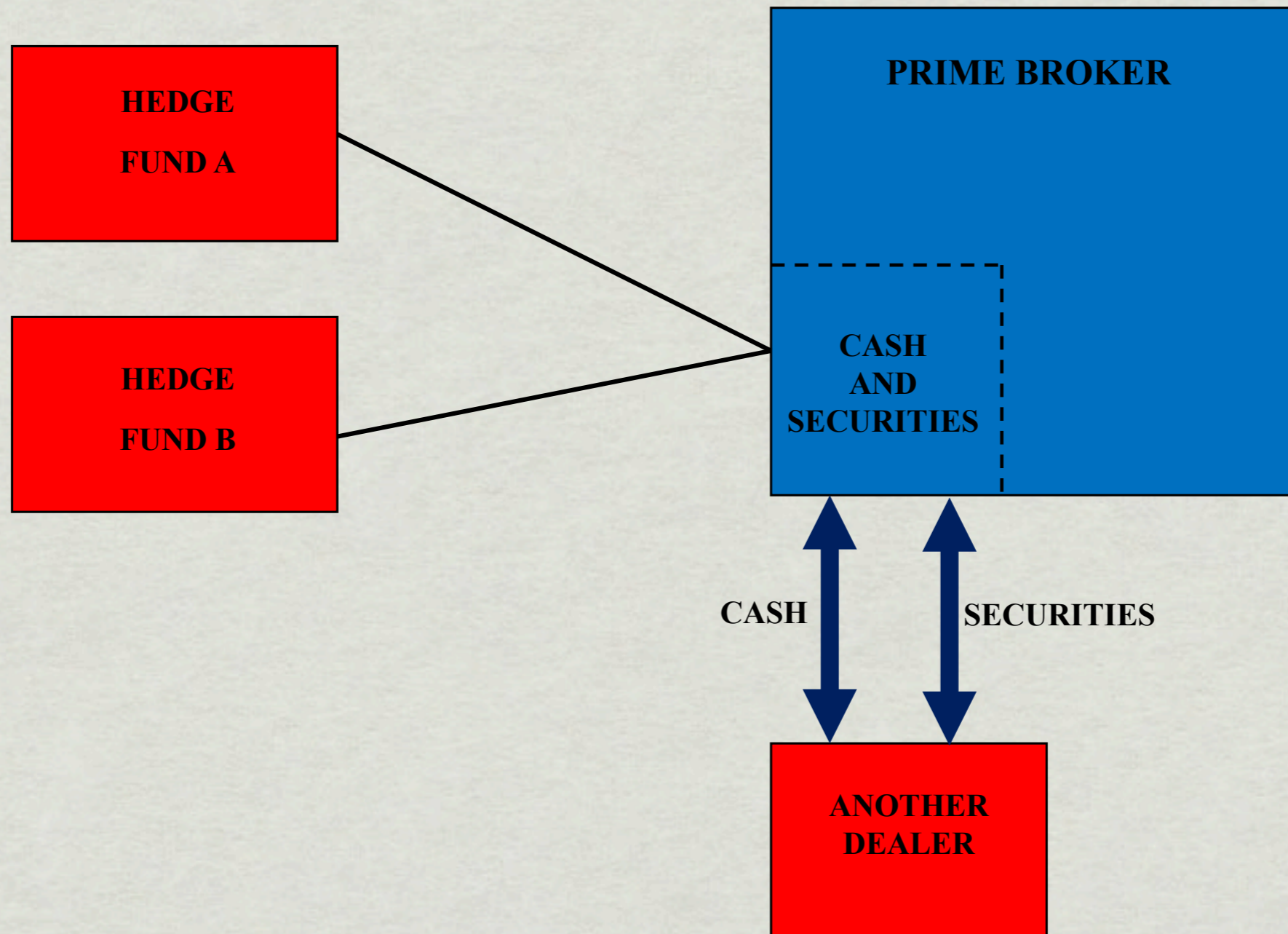


Figure 3.3. A prime broker lends \$100 million to Hedge Fund B from funds deposited by Hedge Fund A.

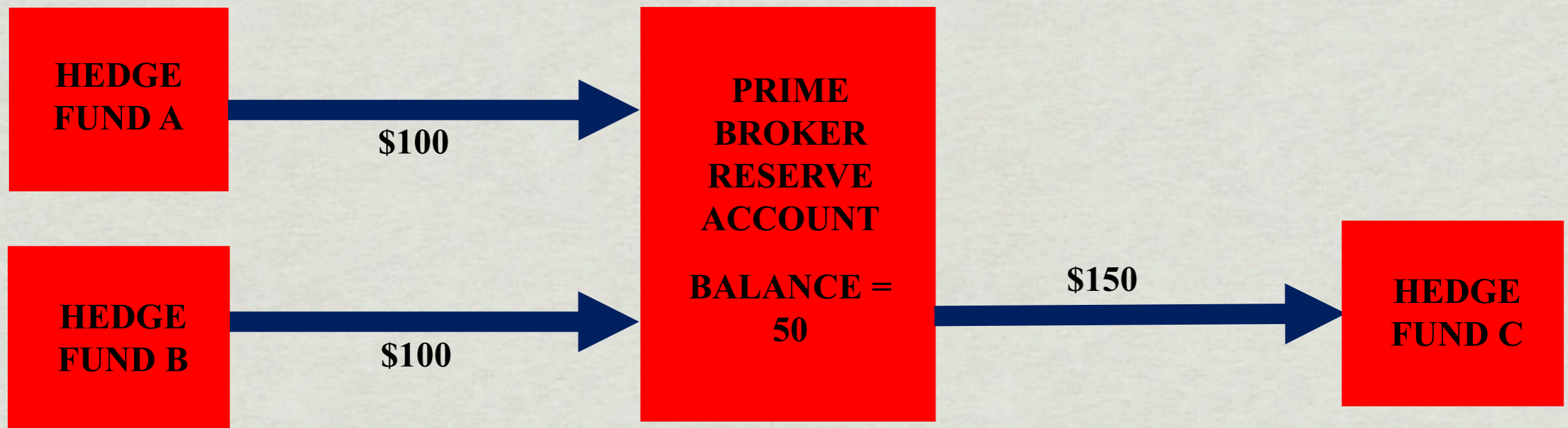
3. Prime Brokerage & Asset Management (Ctd.)

“Rehypothecation” is also common.



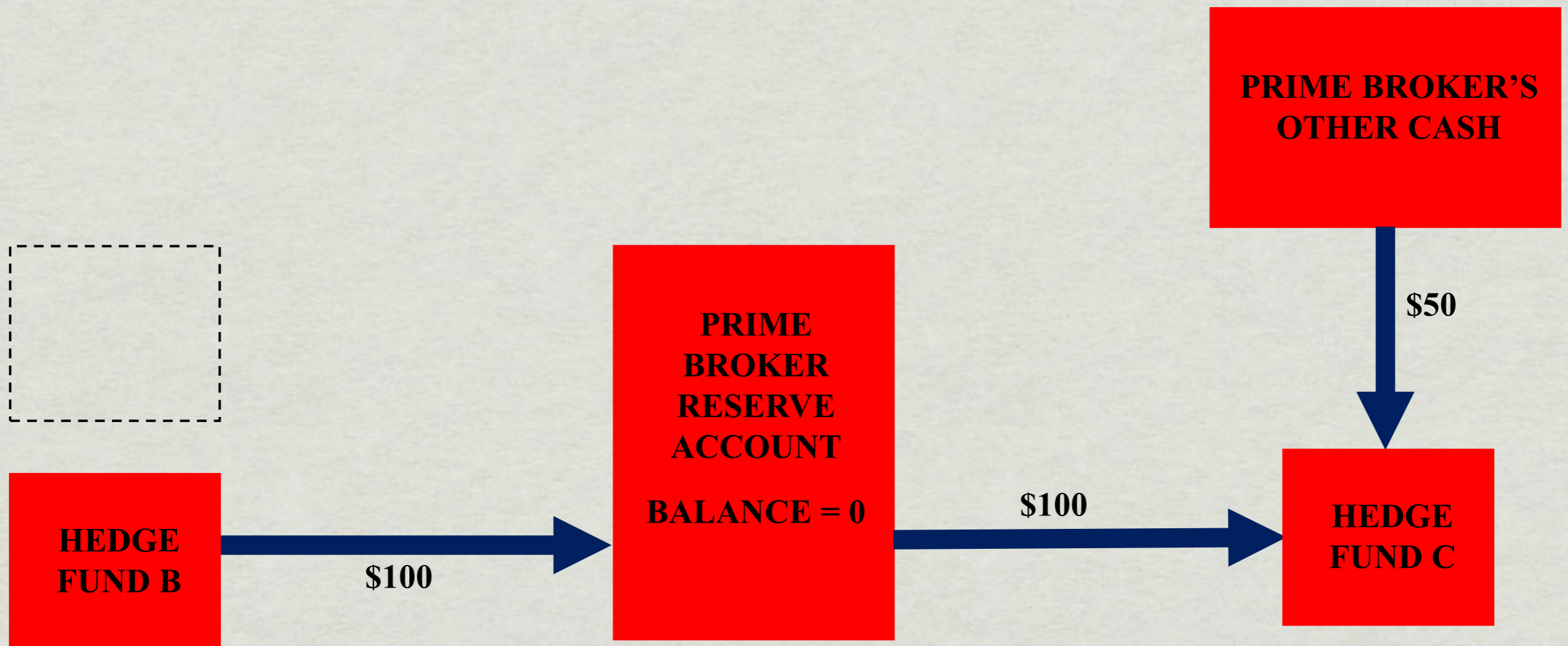
3. Run by Prime Brokerage Clients

When a DB's financial position is weakened, hedge funds may move their prime brokerage accounts elsewhere.



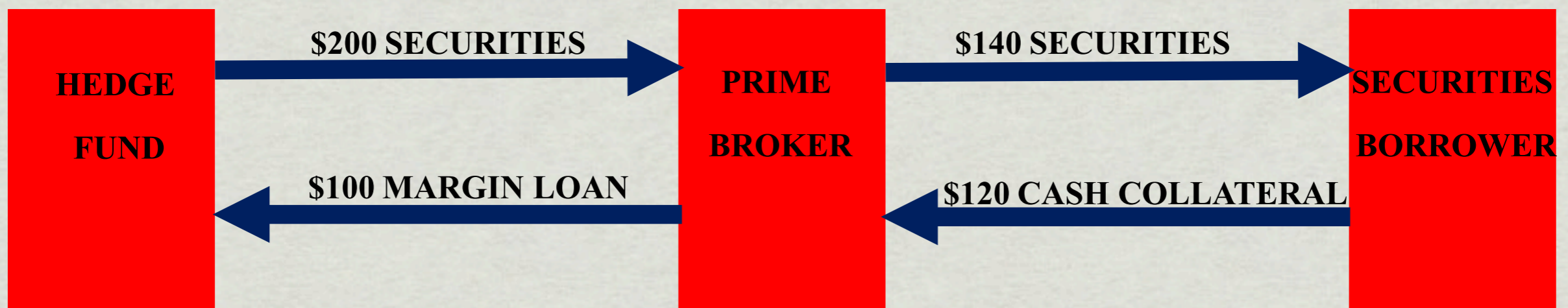
3. Run by Prime Brokerage Clients (Ctd.)

When a DB's financial position is weakened, hedge funds may move their prime brokerage accounts elsewhere.



3. Run by Prime Brokerage Clients (Ctd.)

Moreover, in the U.S., a DB's liquidity problems can be exacerbated by the “margin loans” problem regardless of whether or not clients run.

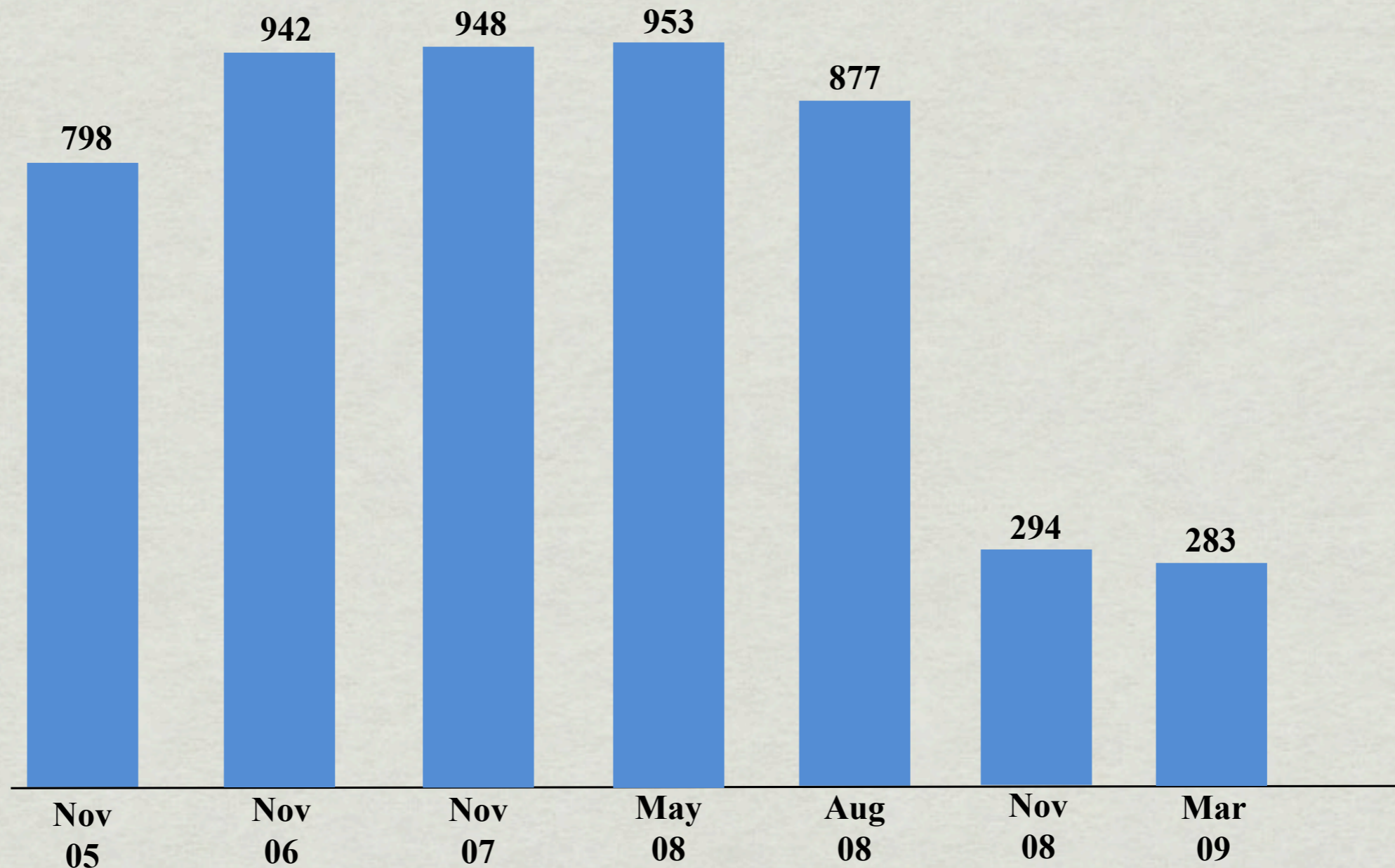


A DB could have an incentive to “fire” a client to avoid providing margin loan to the client!

3. Run by Prime Brokerage Clients (Ctd.)

Value of Collateral Received that Can be Pledged

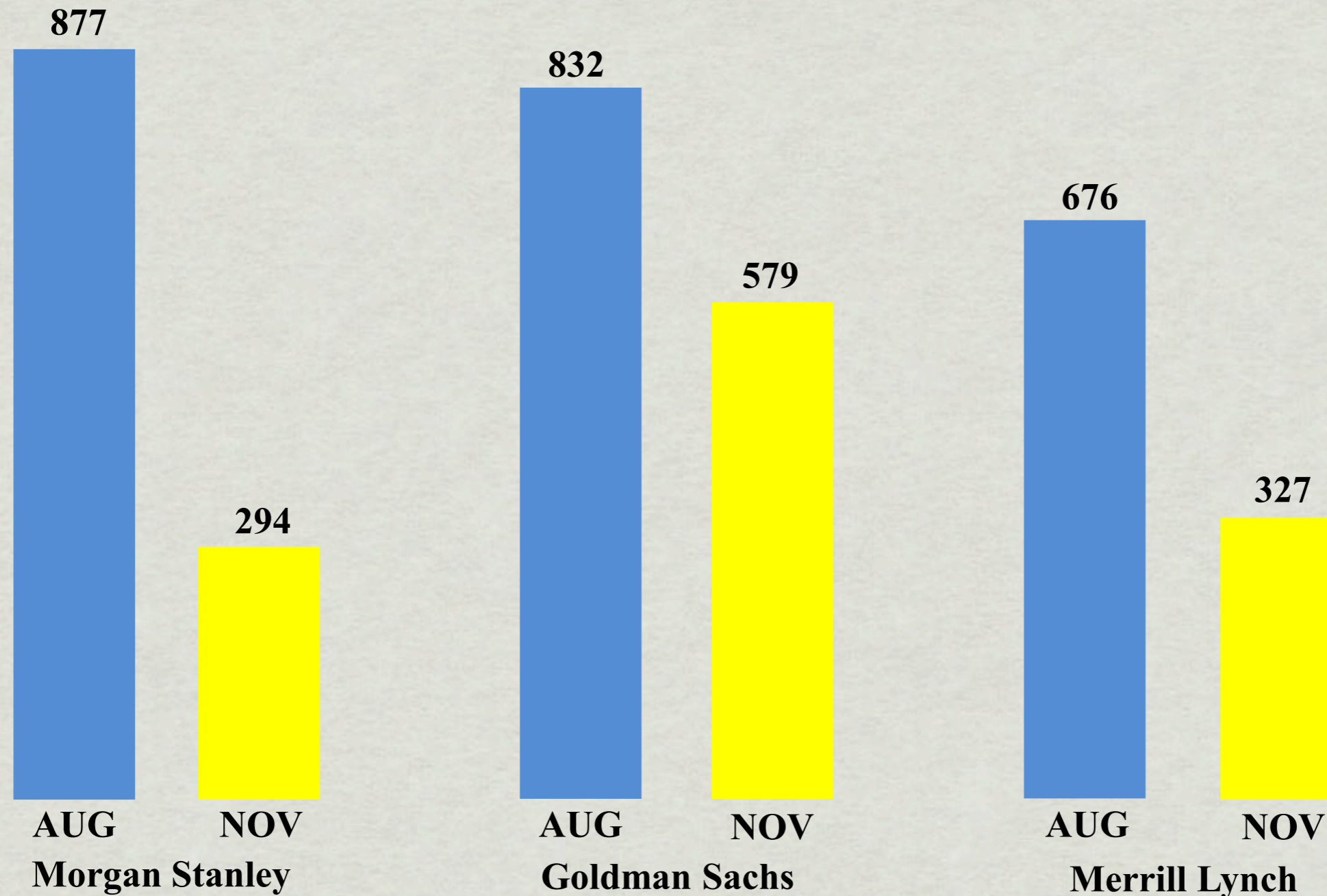
Morgan Stanley



Data Source: Singh (2009)

3. Run by Prime Brokerage Clients (Ctd.)

Months Spanning Lehman's Default



Data Source: Singh (2009)

Loss of Cash Settlement Privileges

In the normal course of business,
a clearing bank would extend
“daylight overdraft privileges” to its clients.

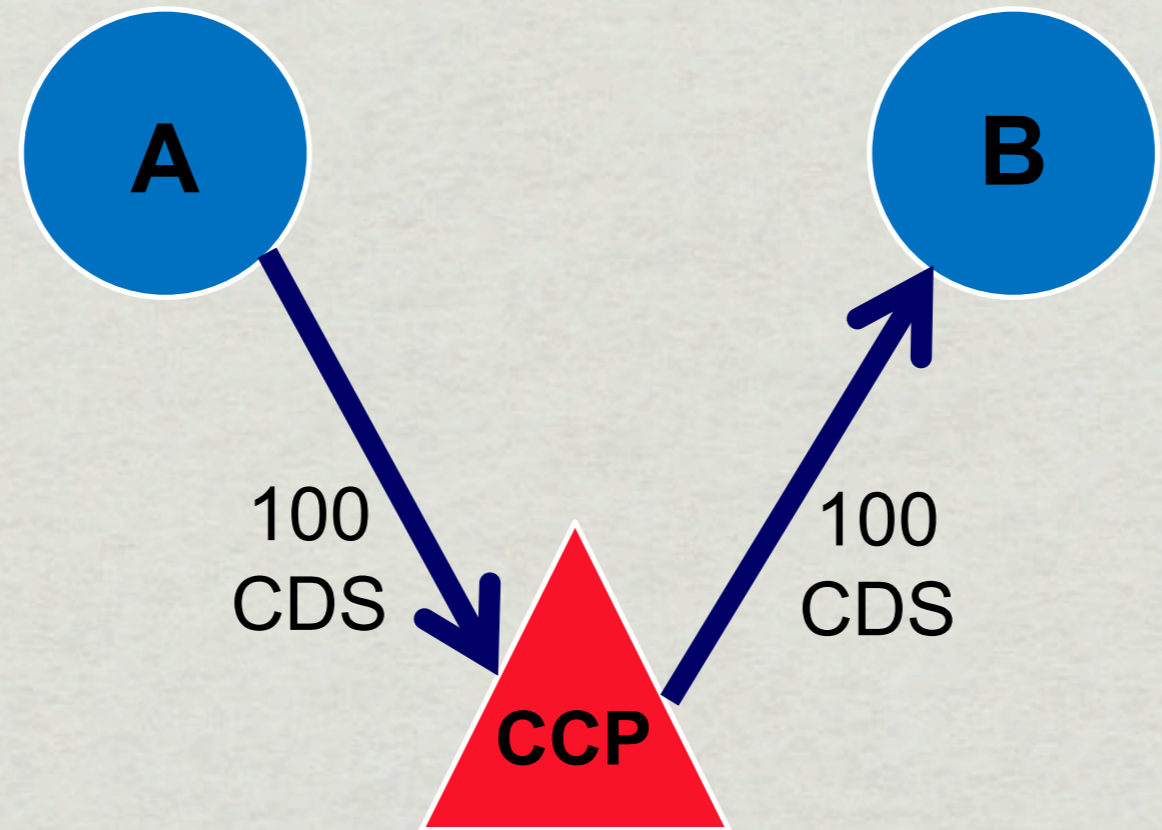
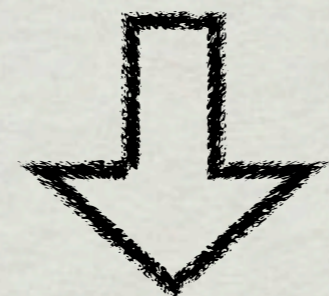
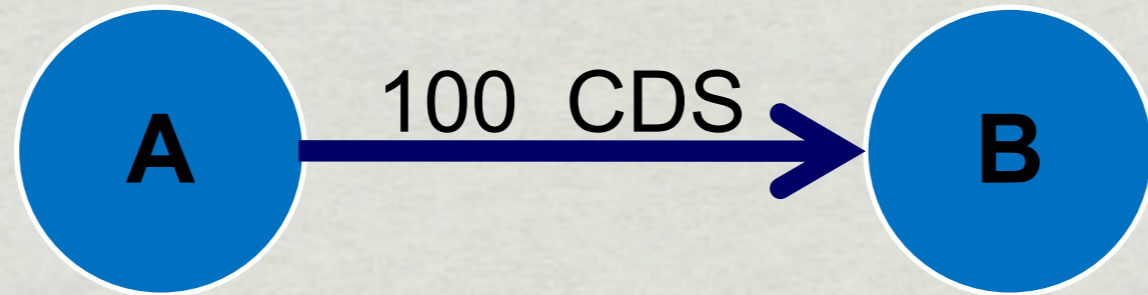
When a DB’s cash liquidity comes into doubt,
a clearing bank has a “right to offset” the privileges.

e.g. In the case of Lehman, its clearing bank
(JPMorgan Chase) invoked this right.

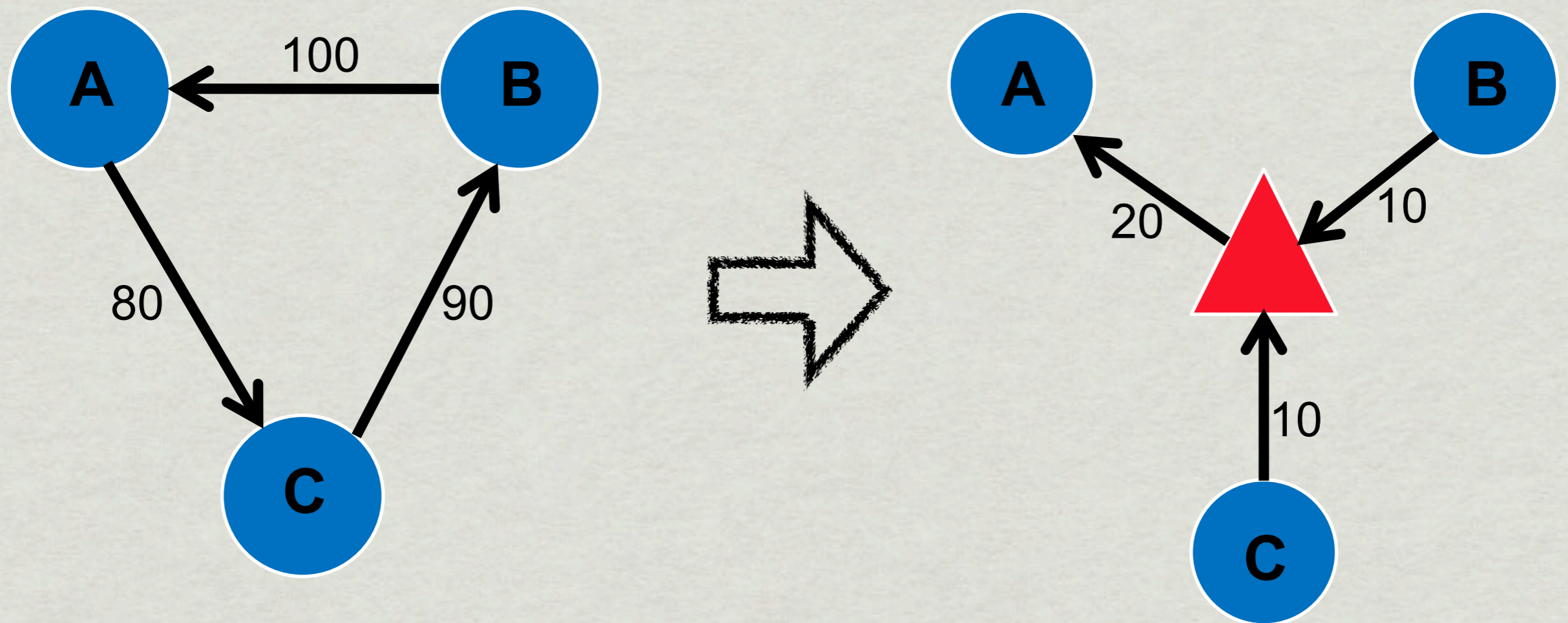
Policy Implications

- ▶ New resolution mechanisms to mitigate disruptive firesales.
 - Powers of receiver and conservator apply only to regulated banks.
 - Automatic stays do not apply to executory contracts (swaps, repo).
 - Firesales would be immediate if repo counterparties fail to renew financing.
- ▶ Lender of last resort for a wide range of collateral (Tucker).
- ▶ Effective central clearing of OTC derivatives (Duffie and Zhu).
- ▶ Dedicated repo “utilities” (Bernanke) or other repo market infrastructure measures (BONY).
- ▶ Distress-contingent convertible debt (Flannery, Squam Lake Group).
- ▶ Dependence of capital requirements on liability maturity structure.

Central Clearing of OTC Derivatives

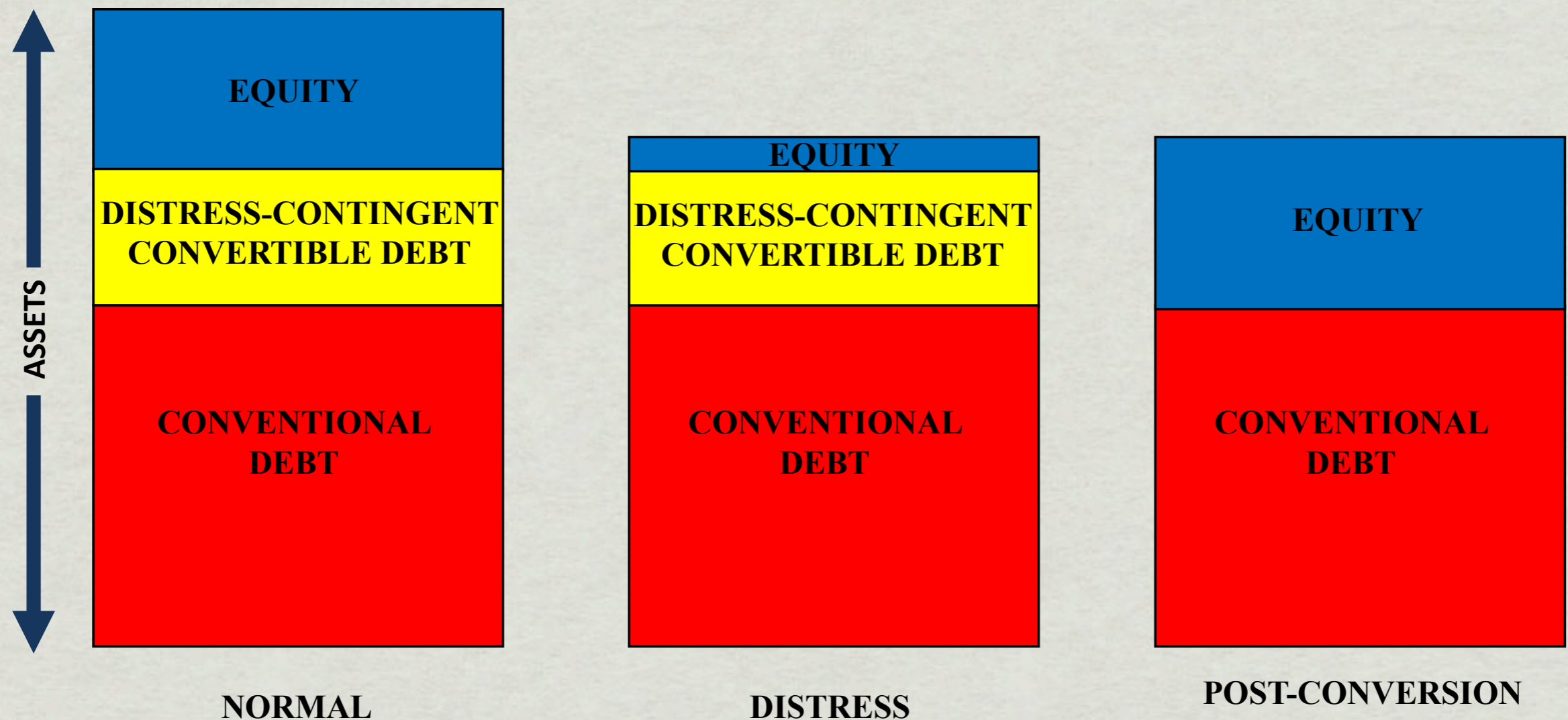


Central Clearing of OTCD (Ctd.)



may be able to avoid self-fulfilling run
by OTCD counterparties.

Distress-Contingent Convertible Debt



Additional Slides

TABLE 3.1

Quarter-end financing of broker-dealer financial instruments before the failures of Bear Stearns and Lehman (\$ billions).

	May-08 Morgan Stanley	May-08 Goldman Sachs	May-08 Lehman	June-08 Merrill Lynch	Feb-08 Bear Stearns	2nd Qtr Total
Financial instruments owned	390	411	269	289	141	1,501
pledged (and can be repledged)	140	37	43	27	23	271
pledged (and cannot be repledged)	54	121	80	53	54	362
not pledged at all	196	253	146	208	64	868
Fraction pledged	50%	39%	46%	28%	55%	42%

Source: King (2008).