

Credit Risk Transfer: Implications for Financial Efficiency and Stability

Darrell Duffie

Stanford University and Swiss Finance Institute

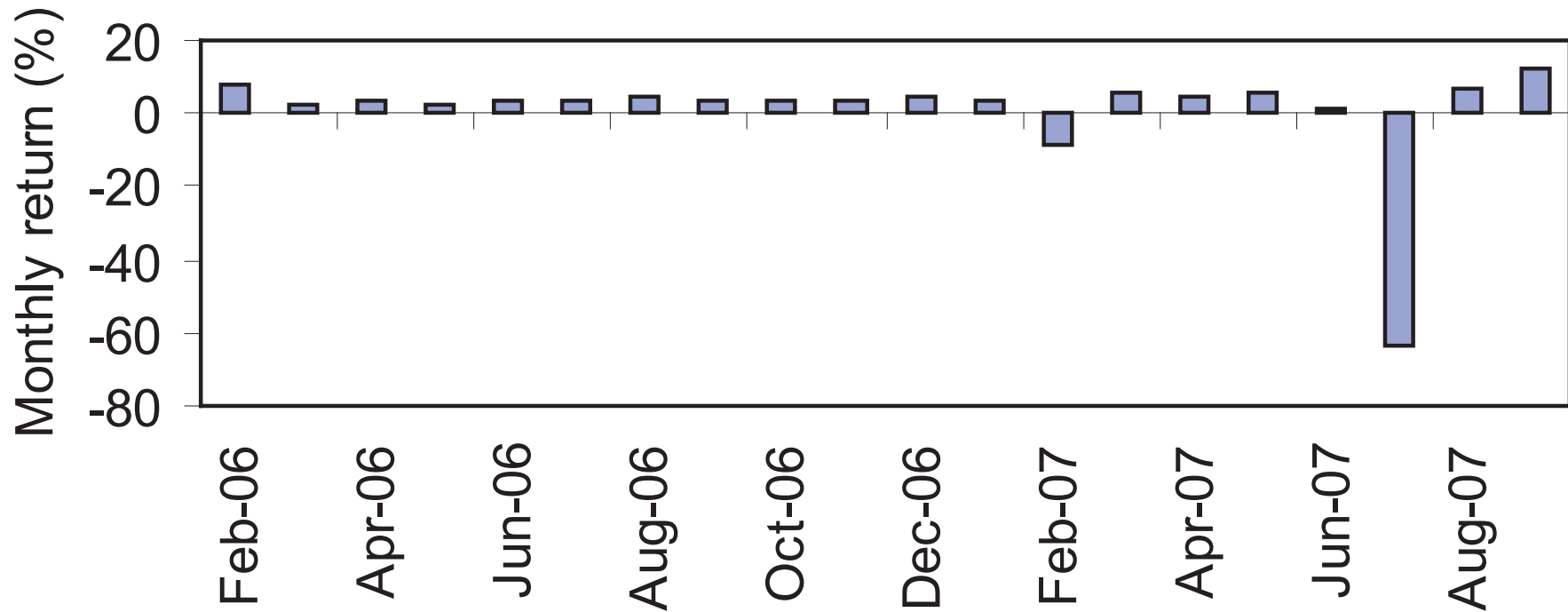
Basel Committee on Banking Supervision and De Nederlandsche Bank

Amsterdam, March 7, 2008

Drawing from research with Andreas Eckner, Guillaume Horel, and Leandro Saita.

Research assistance from Cliff Gray

Monthly returns on a hypothetical portfolio of sub-prime mortgage credit default swaps



Source: Bank of England

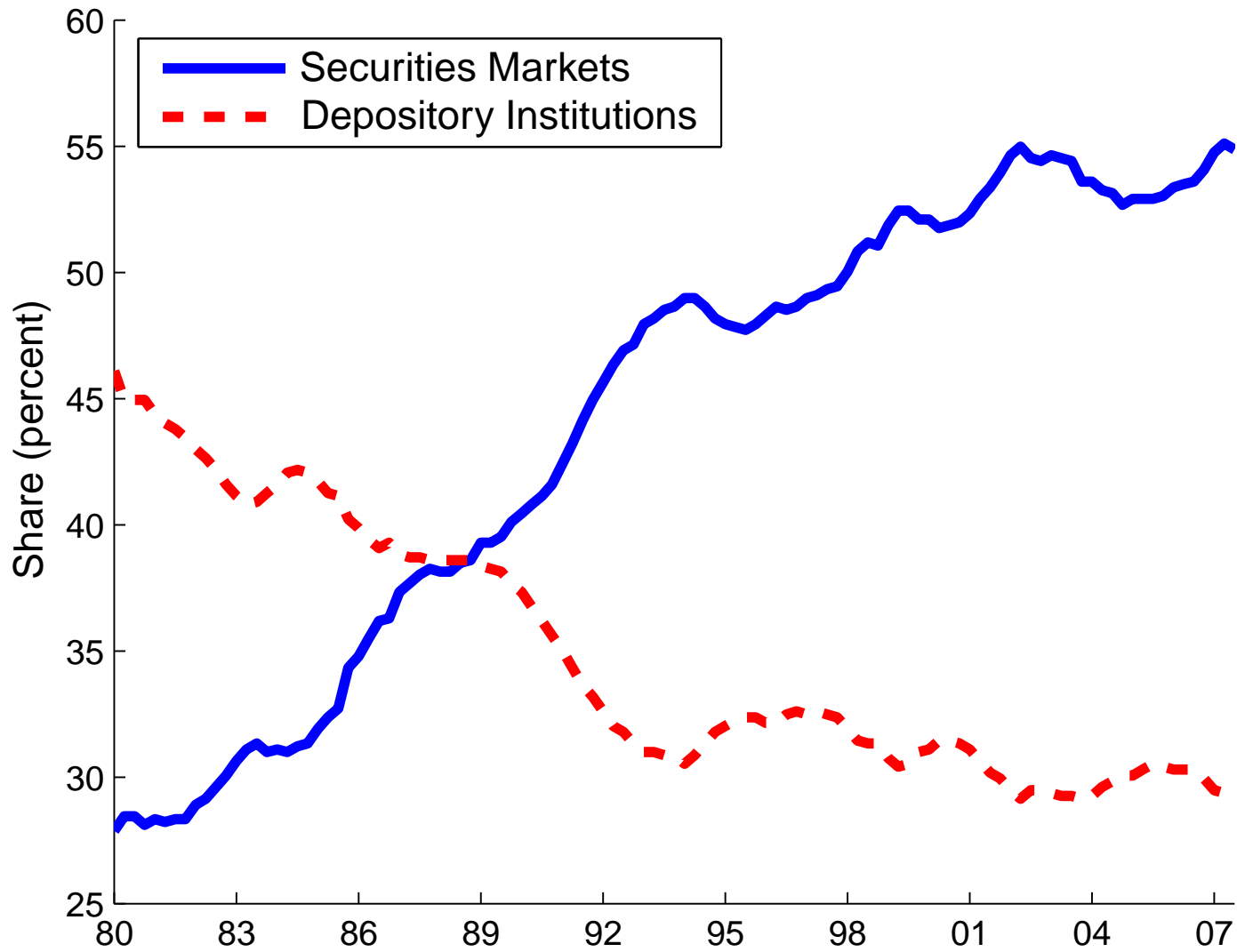
Outline

- What is credit risk transfer all about?
- How is it changing financial markets?
- Implications for financial efficiency and stability?

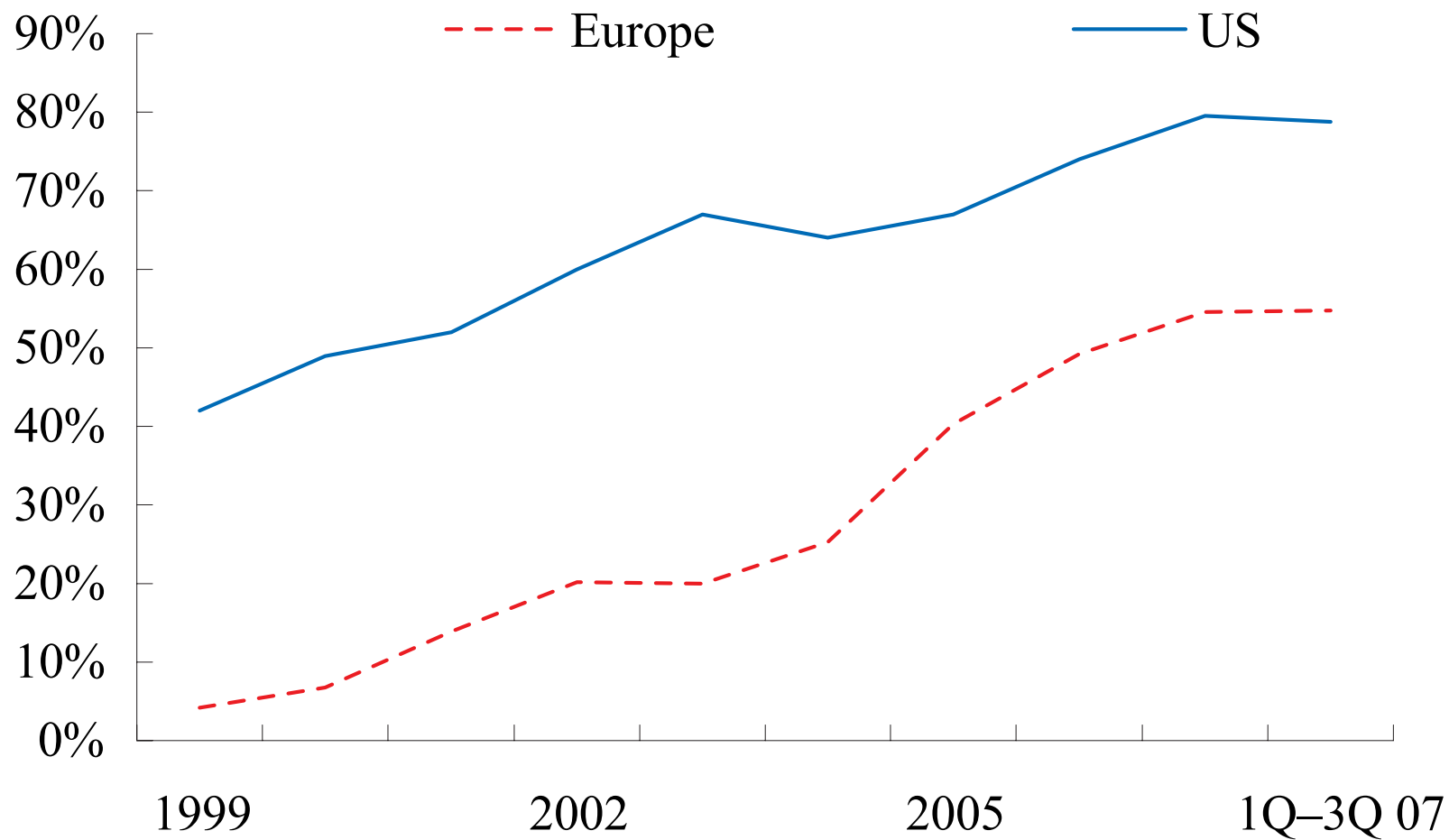
Key Forms of Credit Risk Transfer

- Disintermediation.
- Loan sales and syndication.
- Default swap protection (CDS).
- Asset-backed commercial paper (ABCP) conduits.
- Collateralized debt obligations (CDOs).
- Credit derivative product companies (CDPCs).
- Structured investment vehicles (SIVs) and SIV-Lites.
- Other specialty finance companies.

Figure 1: [Share of Private Nonfinancial Debt Outstanding](#). Source: Morgan Stanley from Federal Reserve Flow of Funds Data.



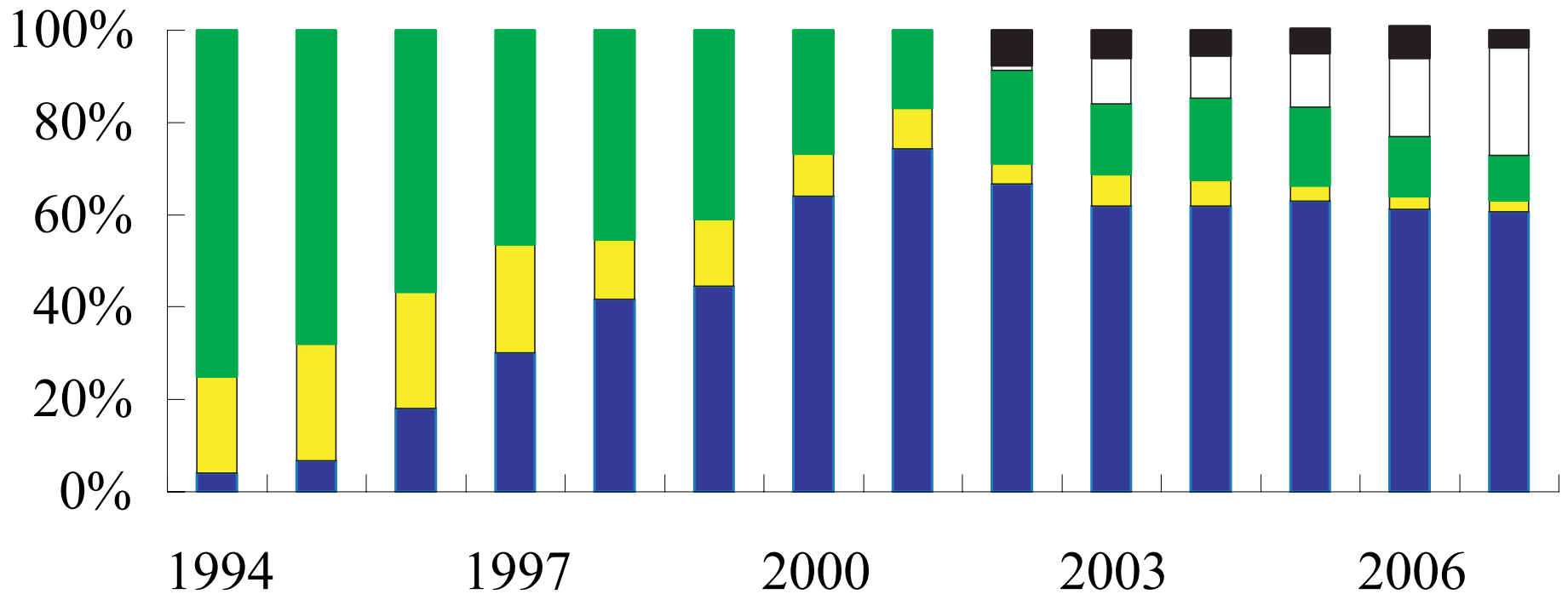
Institutional Investor Share of Primary Leveraged Loan Market



Source: Citibank

US Leveraged Loan Buyers

- Hedge, Distressed & High-Yield Funds
- Prime Rate Fund
- Insurance Company
- Finance Co.
- CLO



Source: Citibank

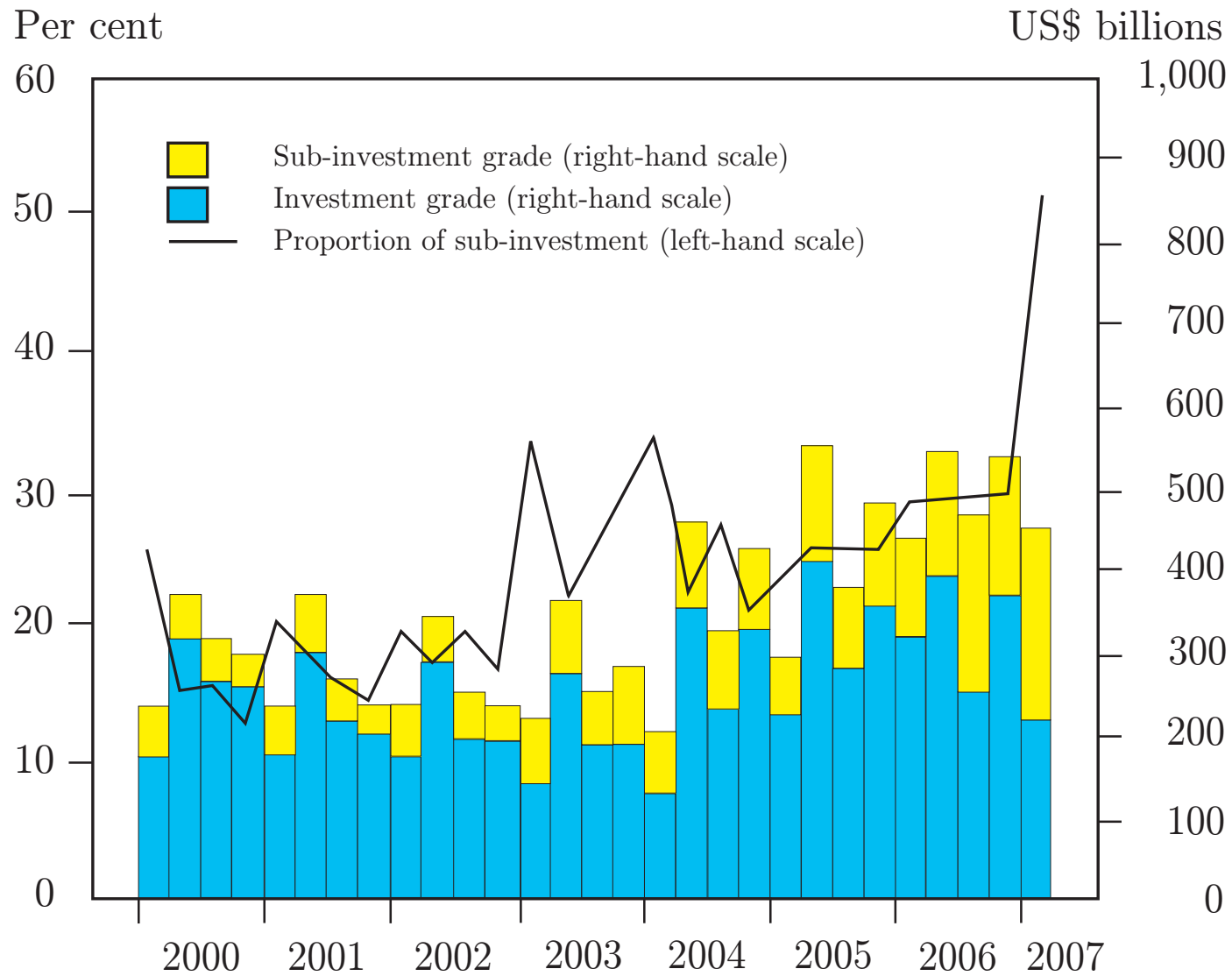


Figure 2: Syndicated loan issuance. Source: Bank of England (2007).

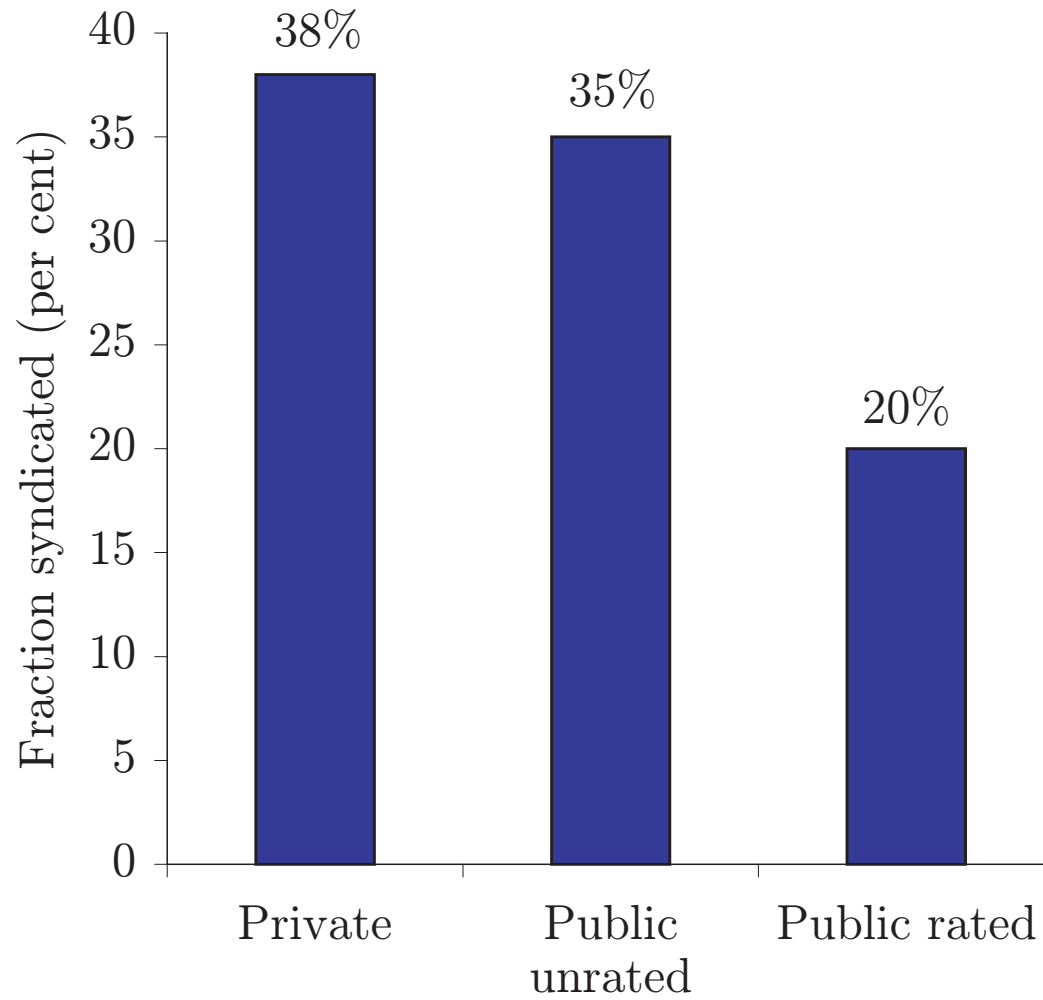


Figure 3: Estimates by Sufi (2007) of syndicated loan retention by lead arranger.

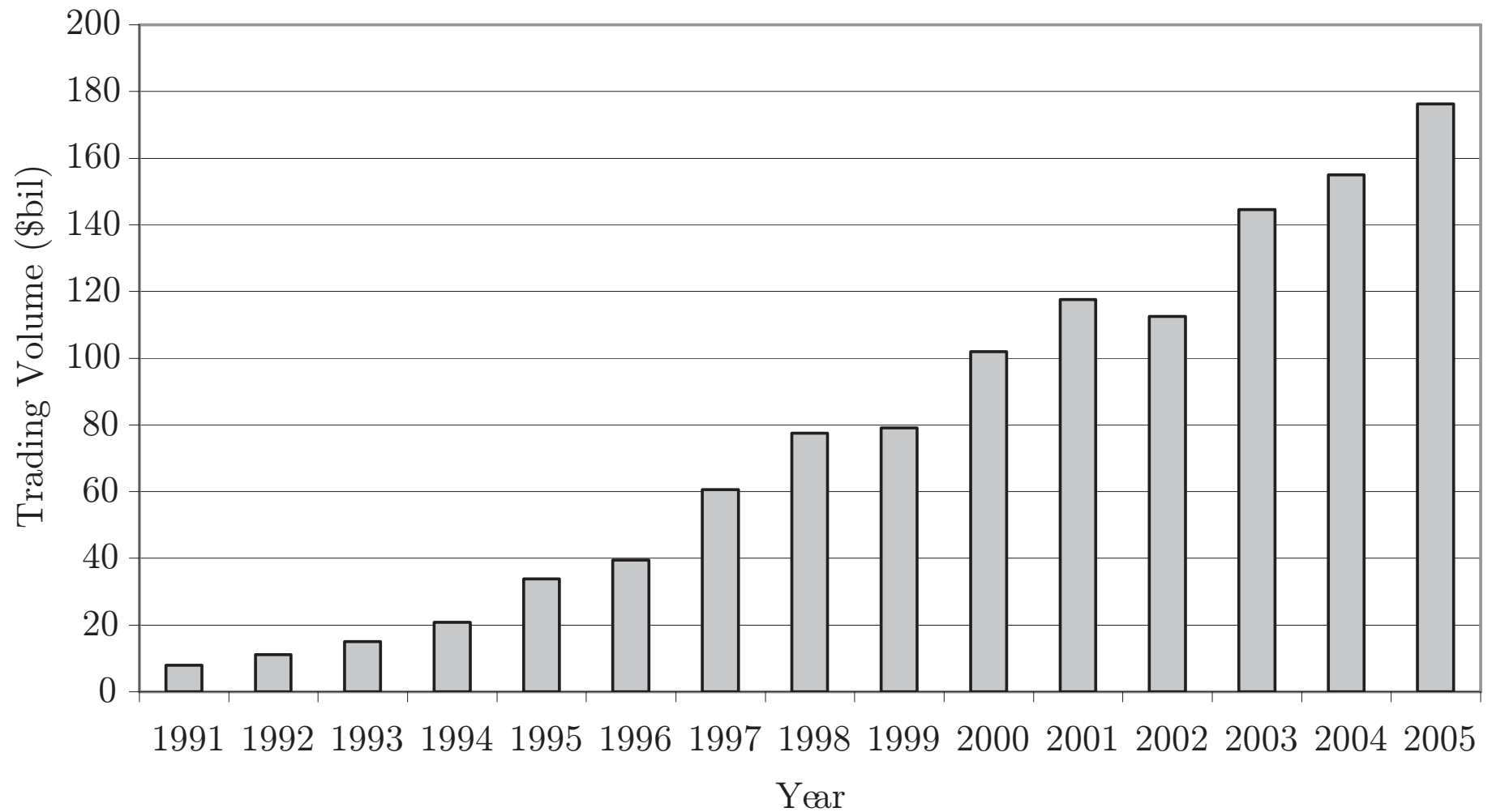


Figure 4: Secondary-market loan sales (more covenant restrictions increases the likelihood of a loan sale; loan sales increase credit access to borrowers). Source: Drucker and Puri (2006).

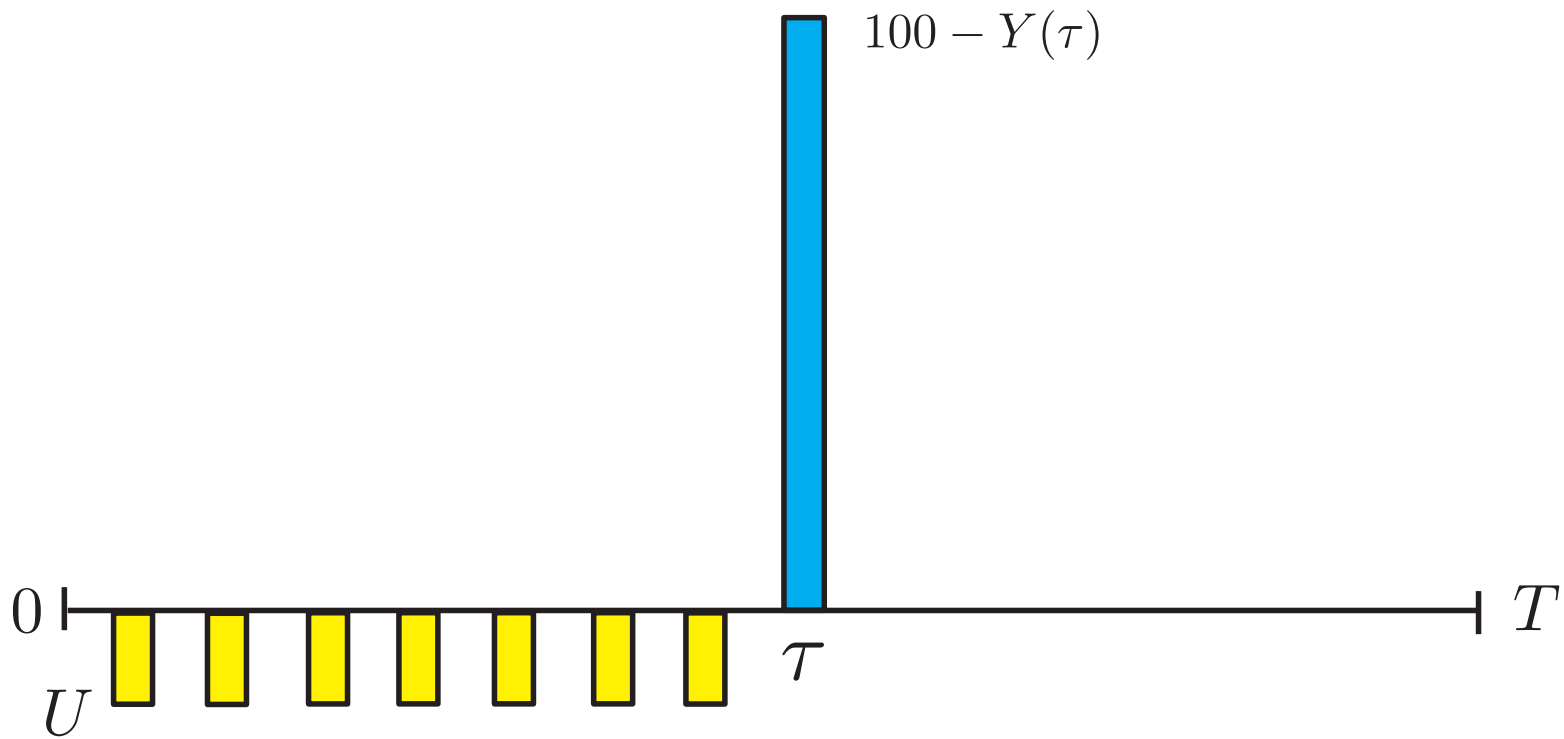
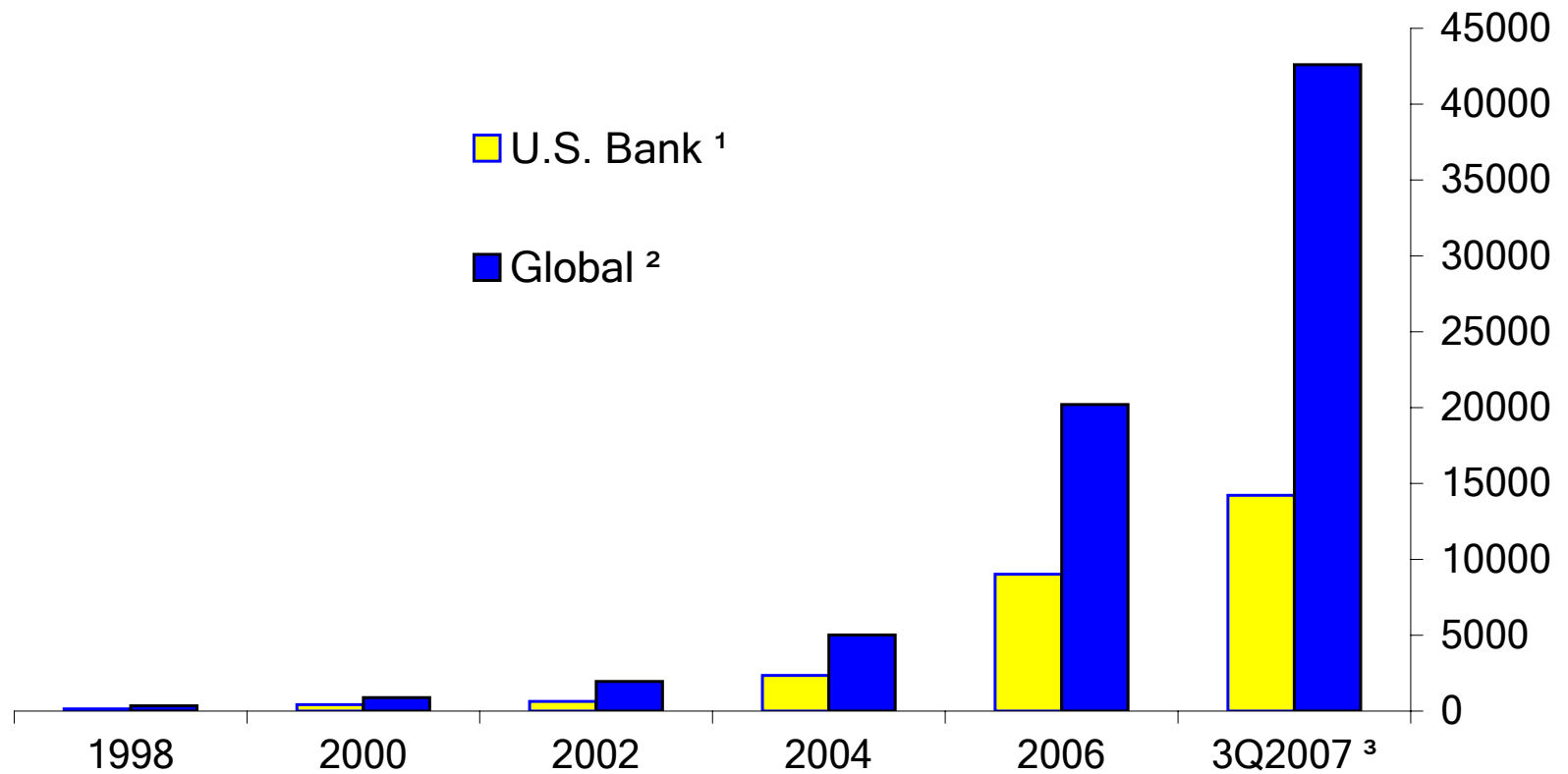


Figure 5: Buyer of protection pays coupons until default at τ . Recovery of $Y(\tau)$ implies a loss-given-default settlement of $100 - Y(\tau)$.

U.S. Bank Share of Credit Derivatives Volume



¹ U.S. Commercial banks, credit derivatives notional outstanding, billions of US dollars. Source: Office of the Comptroller of the Currency.

² Global credit derivatives notional outstanding, billions of US dollars.
Source: British Bankers Association.

³Third quarter of 2007 data for the U.S. is from the Federal Reserve Bank of Chicago. Third quarter of 2007 global data is provided by the Bank for International Settlements.

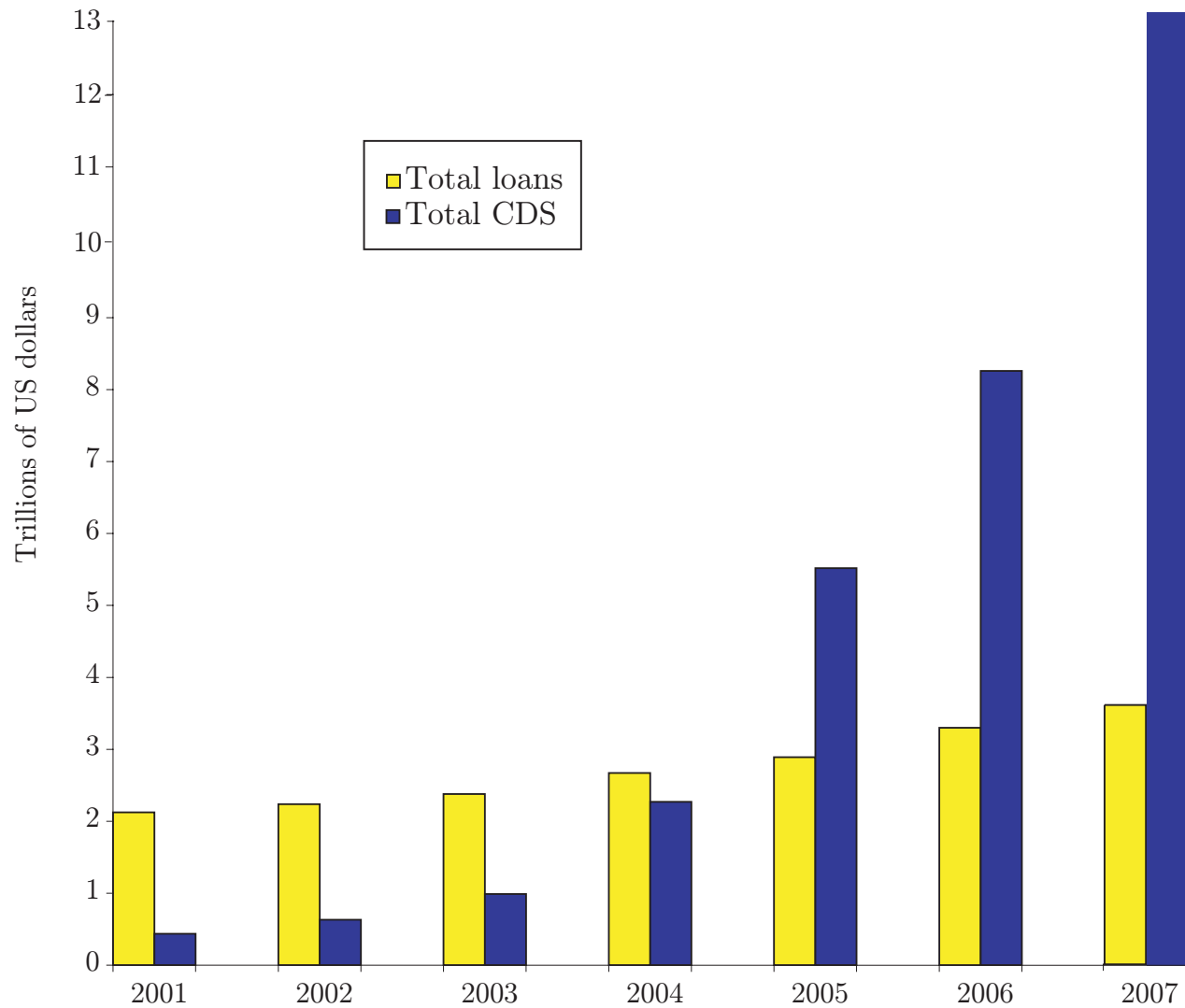


Figure 6: Aggregate U.S. Large-Bank Loans and CDS positions Data: Federal Reserve Bank of Chicago.

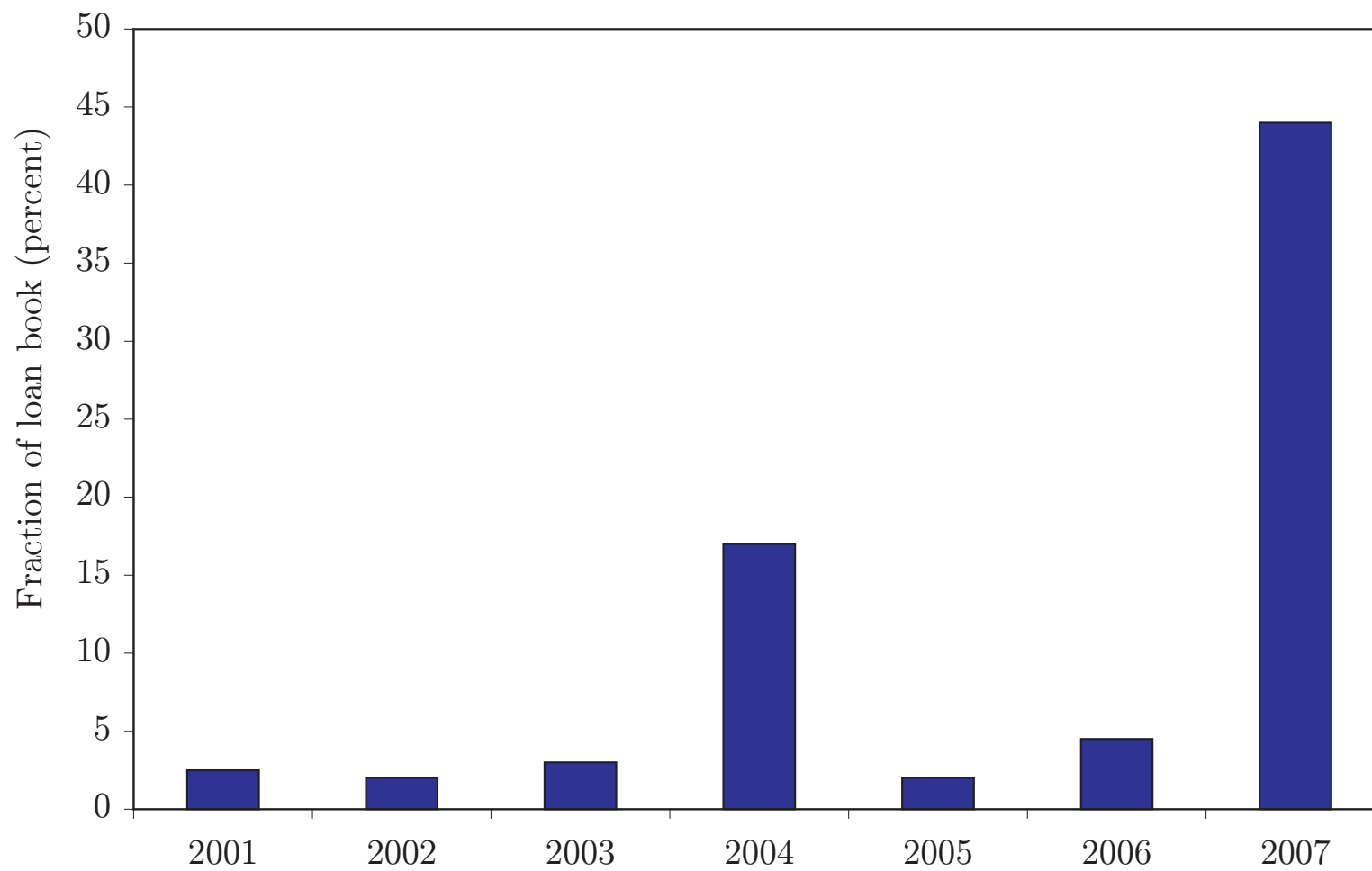
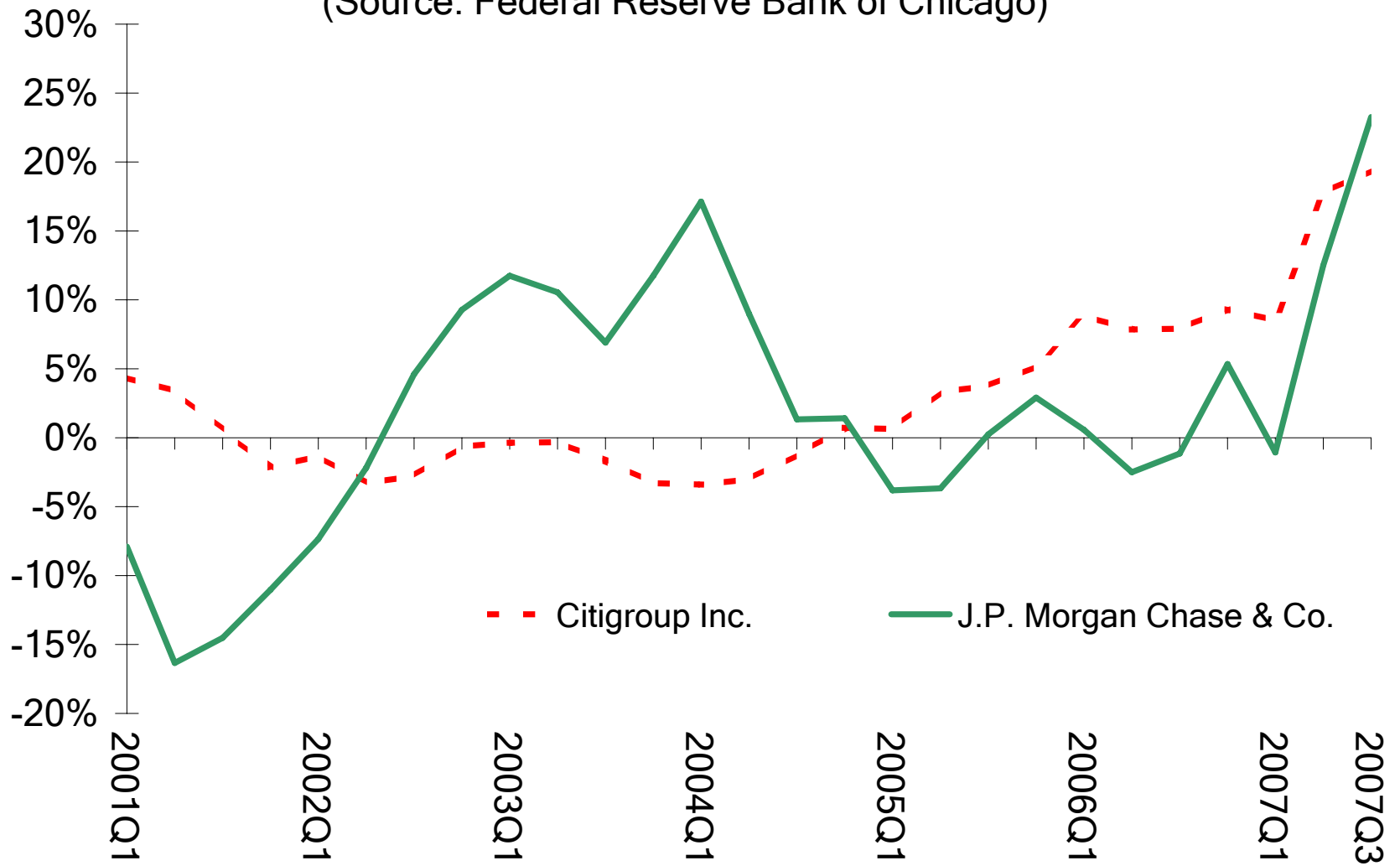
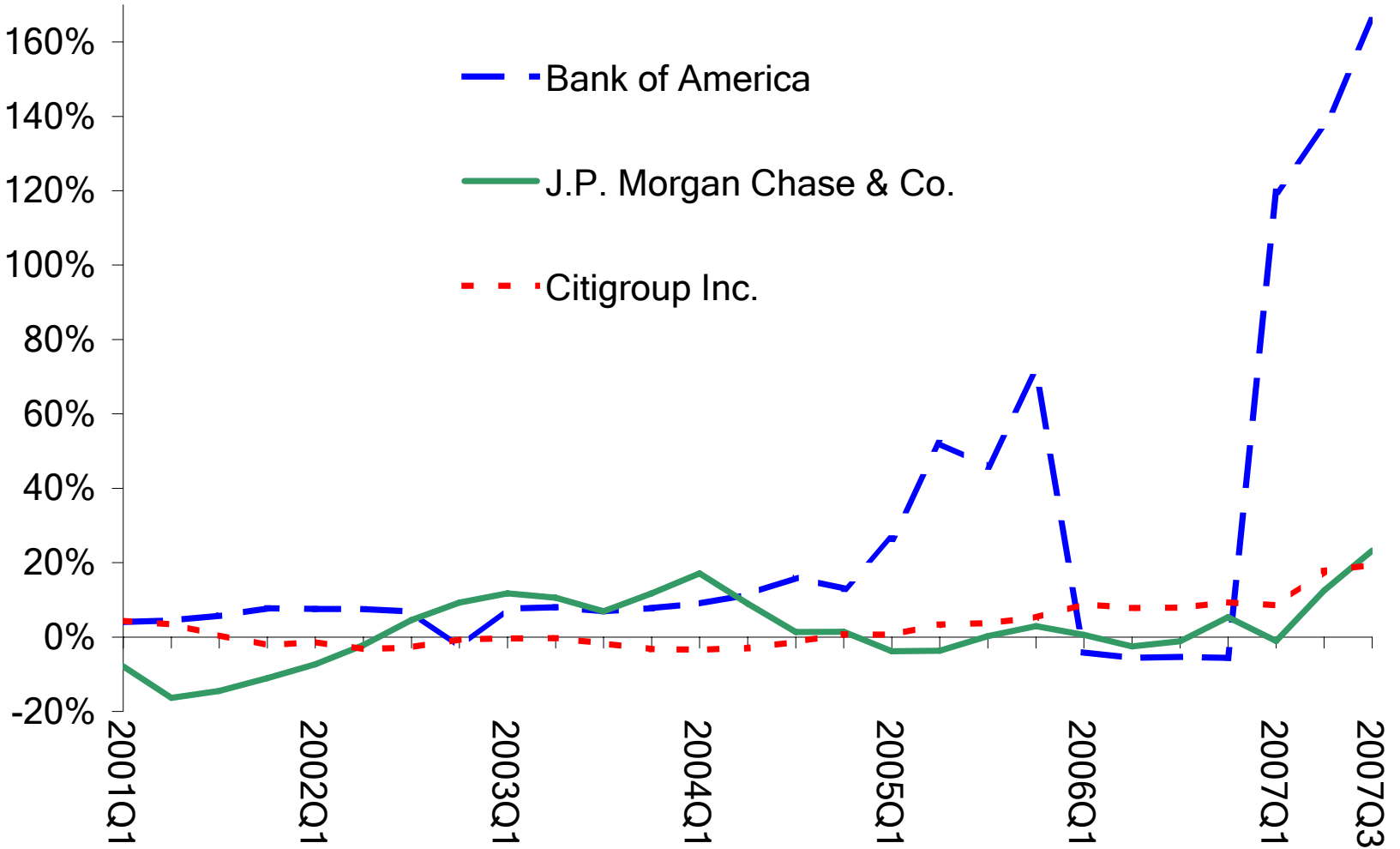


Figure 7: Net CDS protection bought as a fraction of loan book.

Net CDS Protection Purchased as a Fraction of Loan Book
(Source: Federal Reserve Bank of Chicago)



Net CDS Protection Purchased as a Fraction of Loan Book
(Source: Federal Reserve Bank of Chicago)



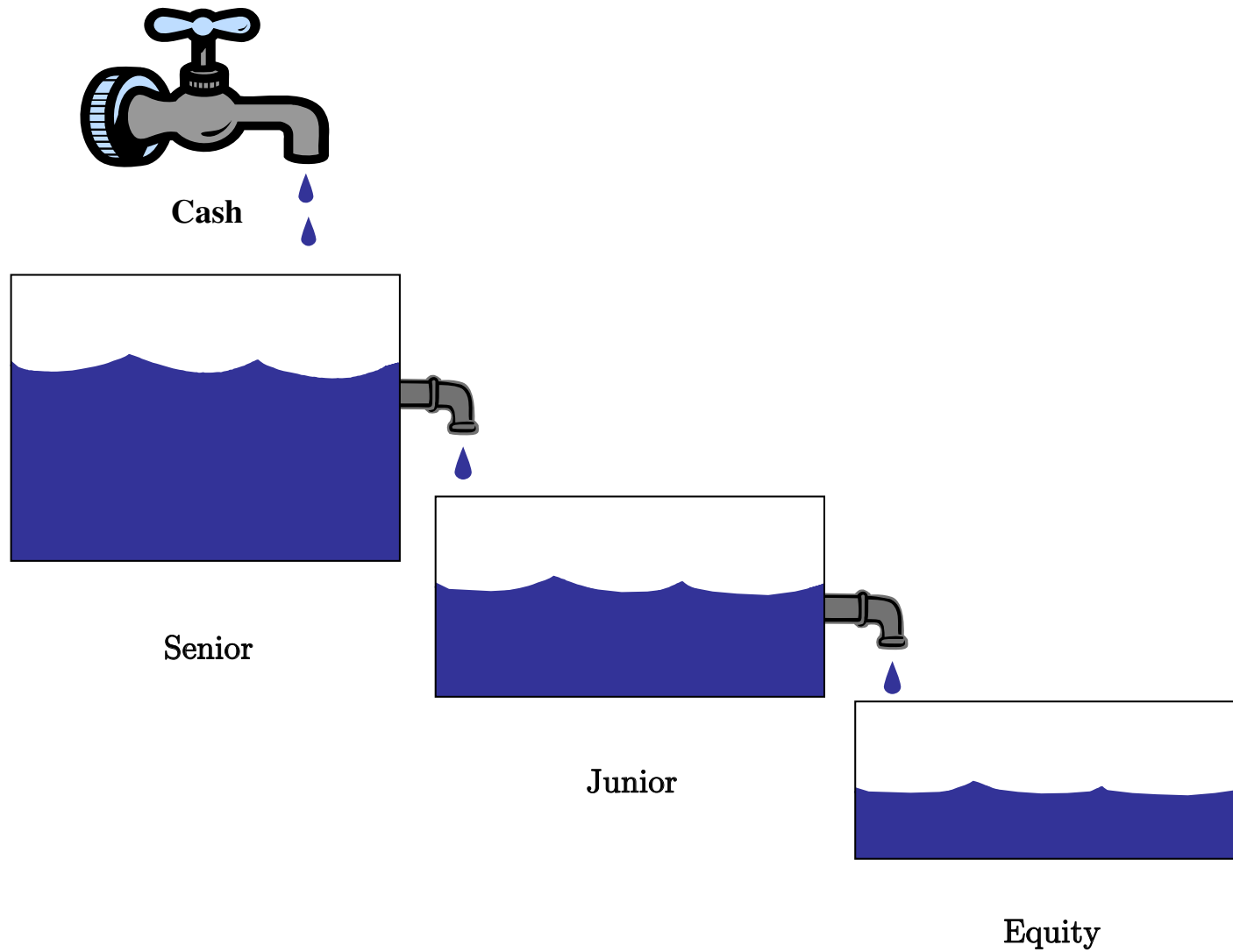


Figure 8: "Waterfall" of a collateralized debt obligation.

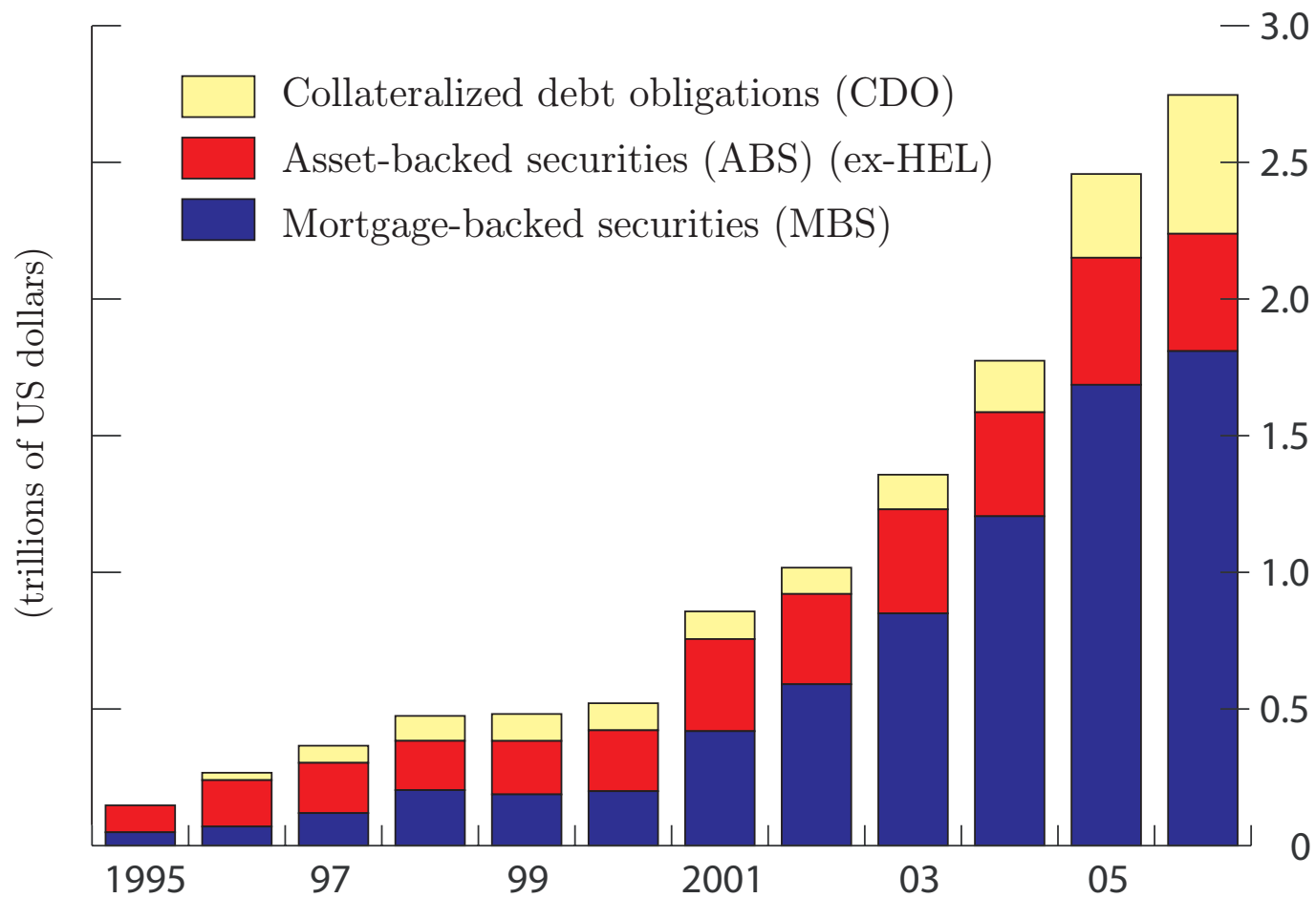


Figure 9: Securitization of bank credit risk. Source: IMF

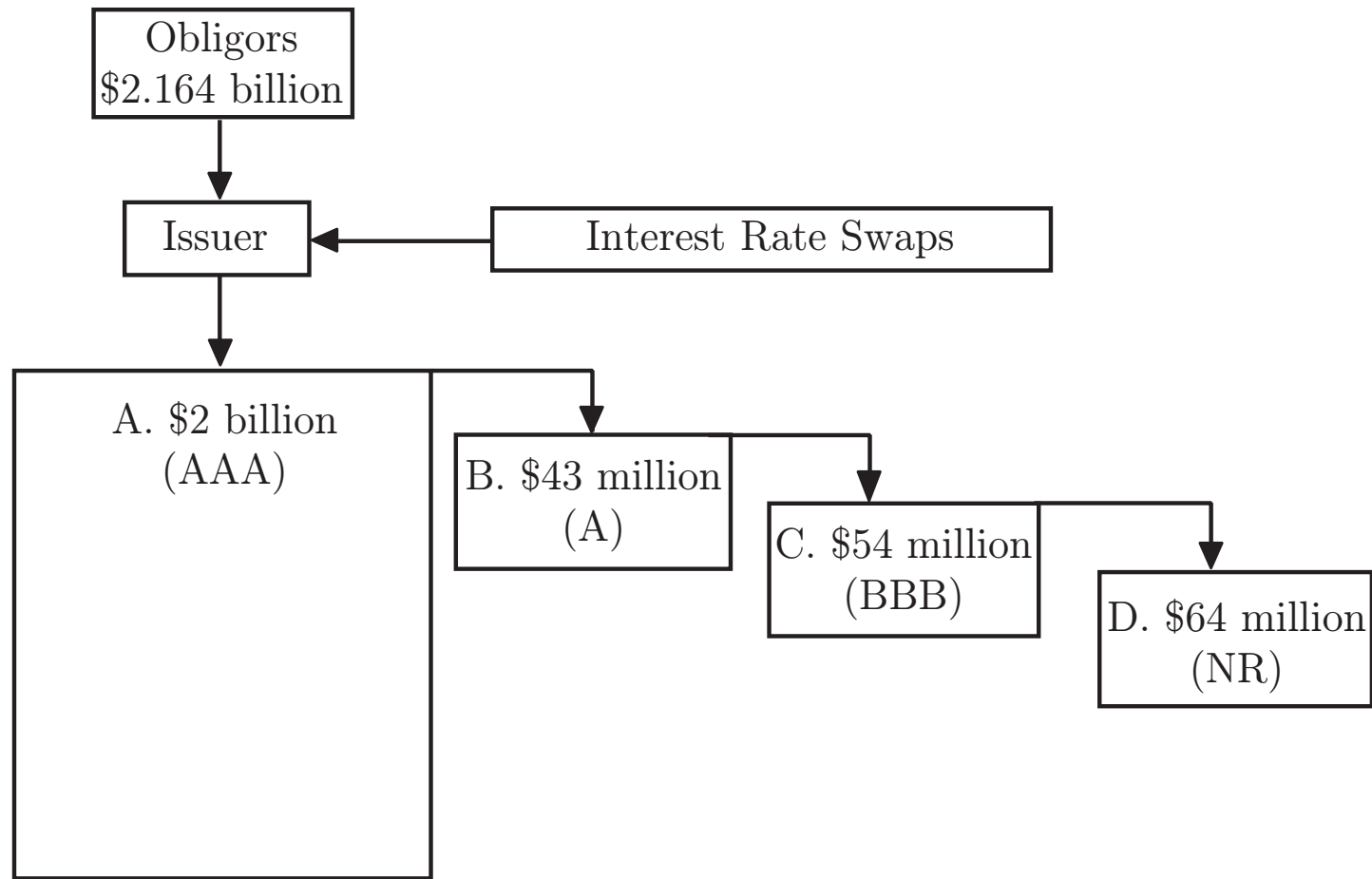


Figure 10: NationsBank 1997-1 CLO tranches (Source: Fitch)

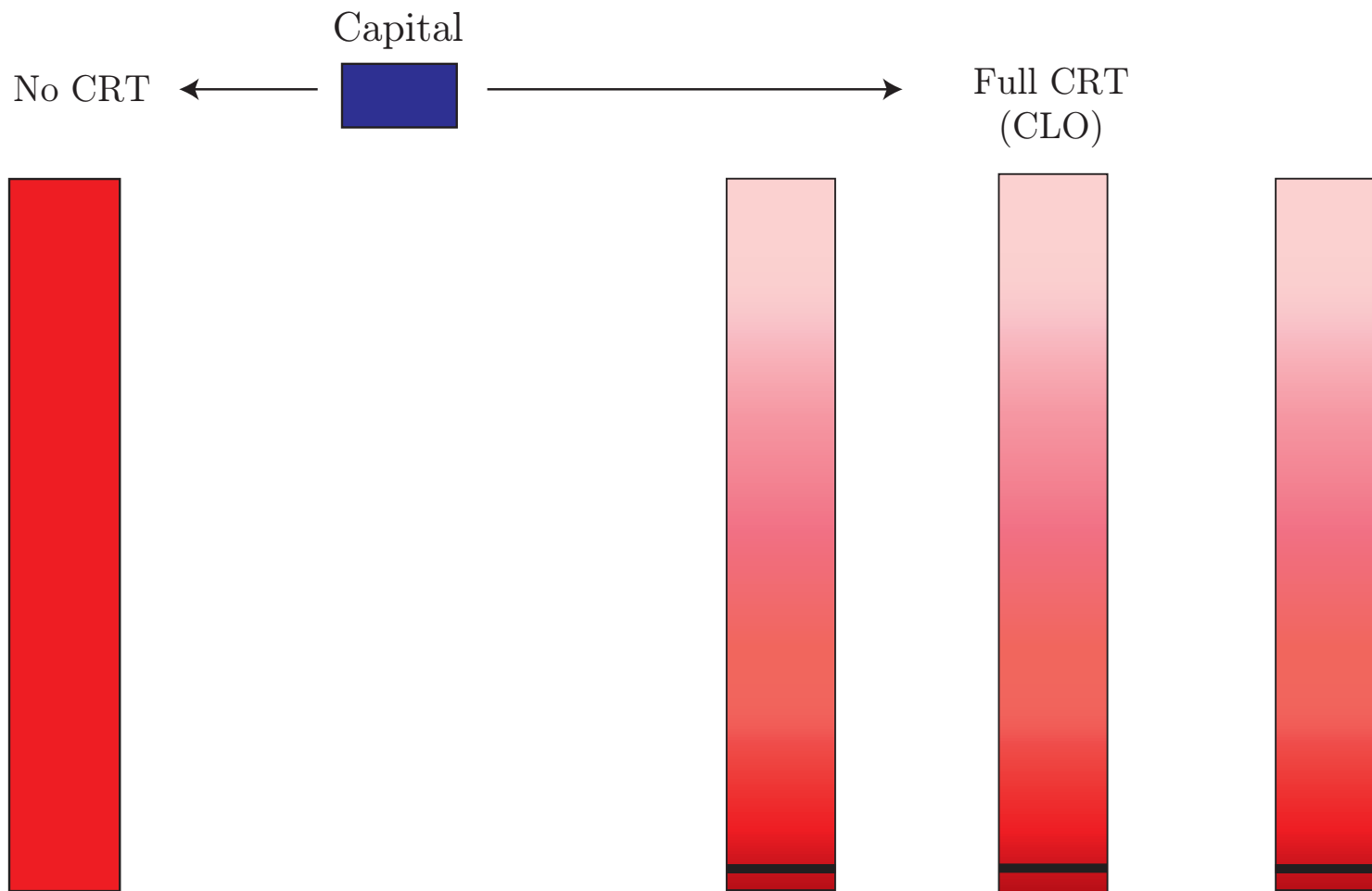
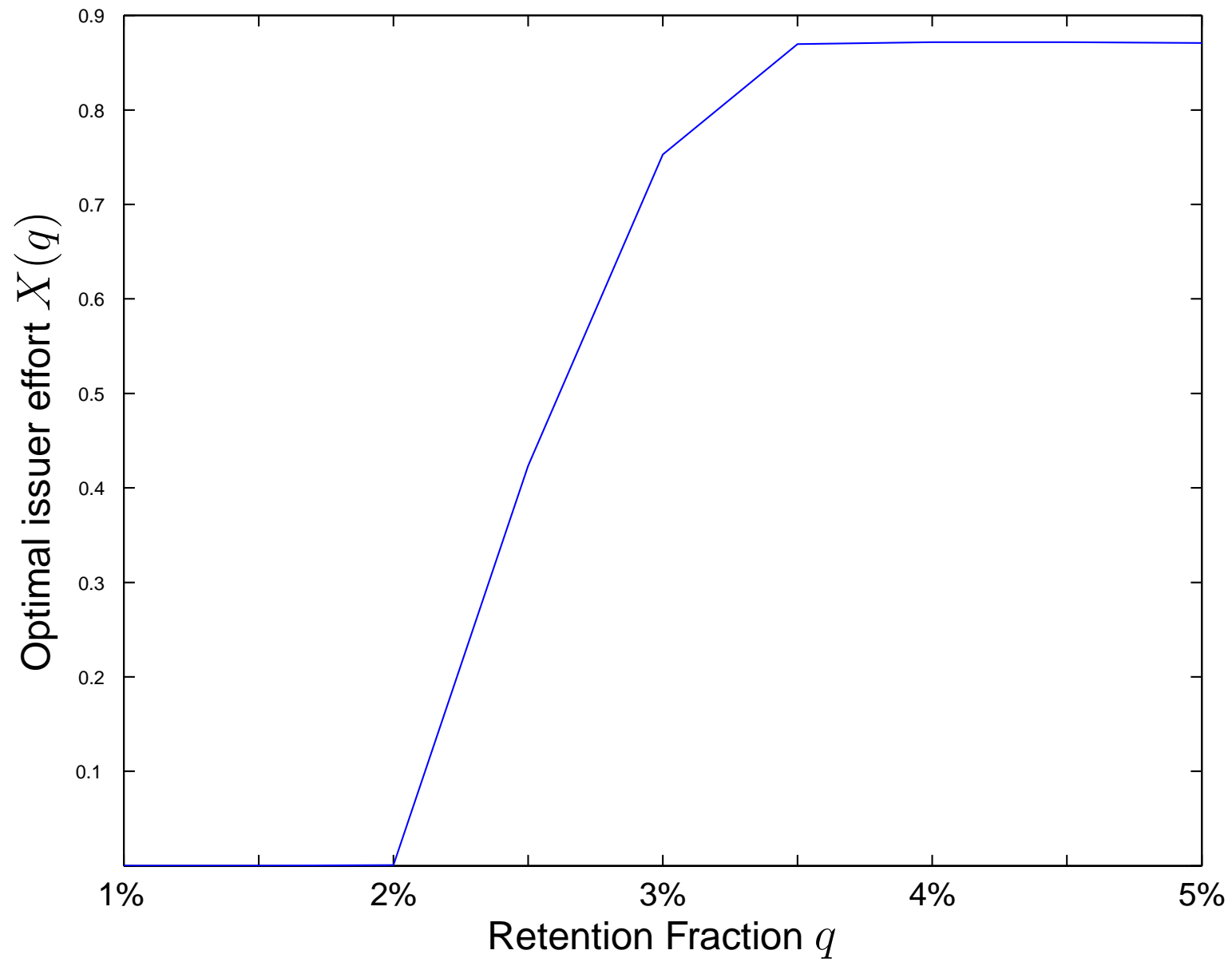
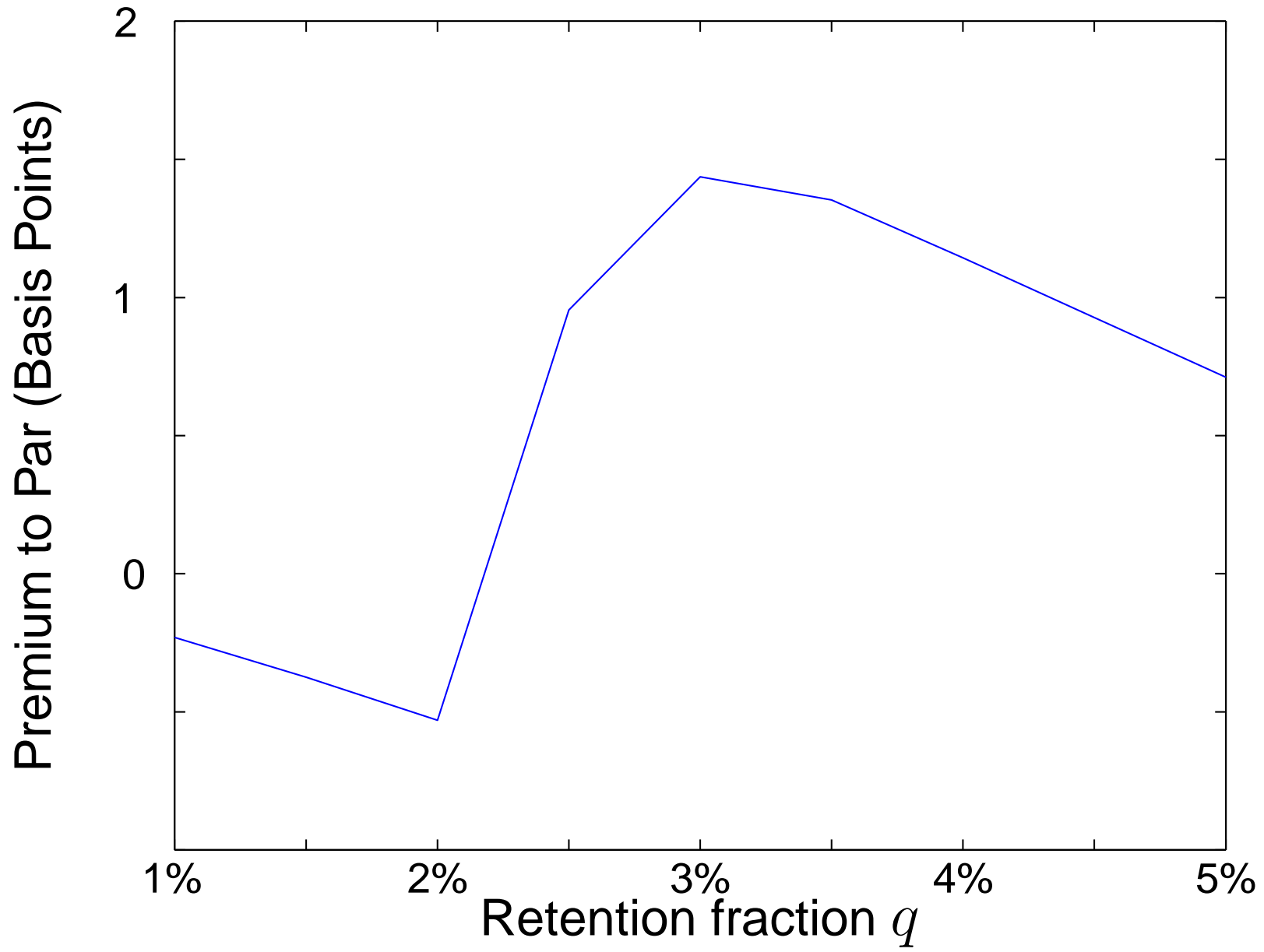
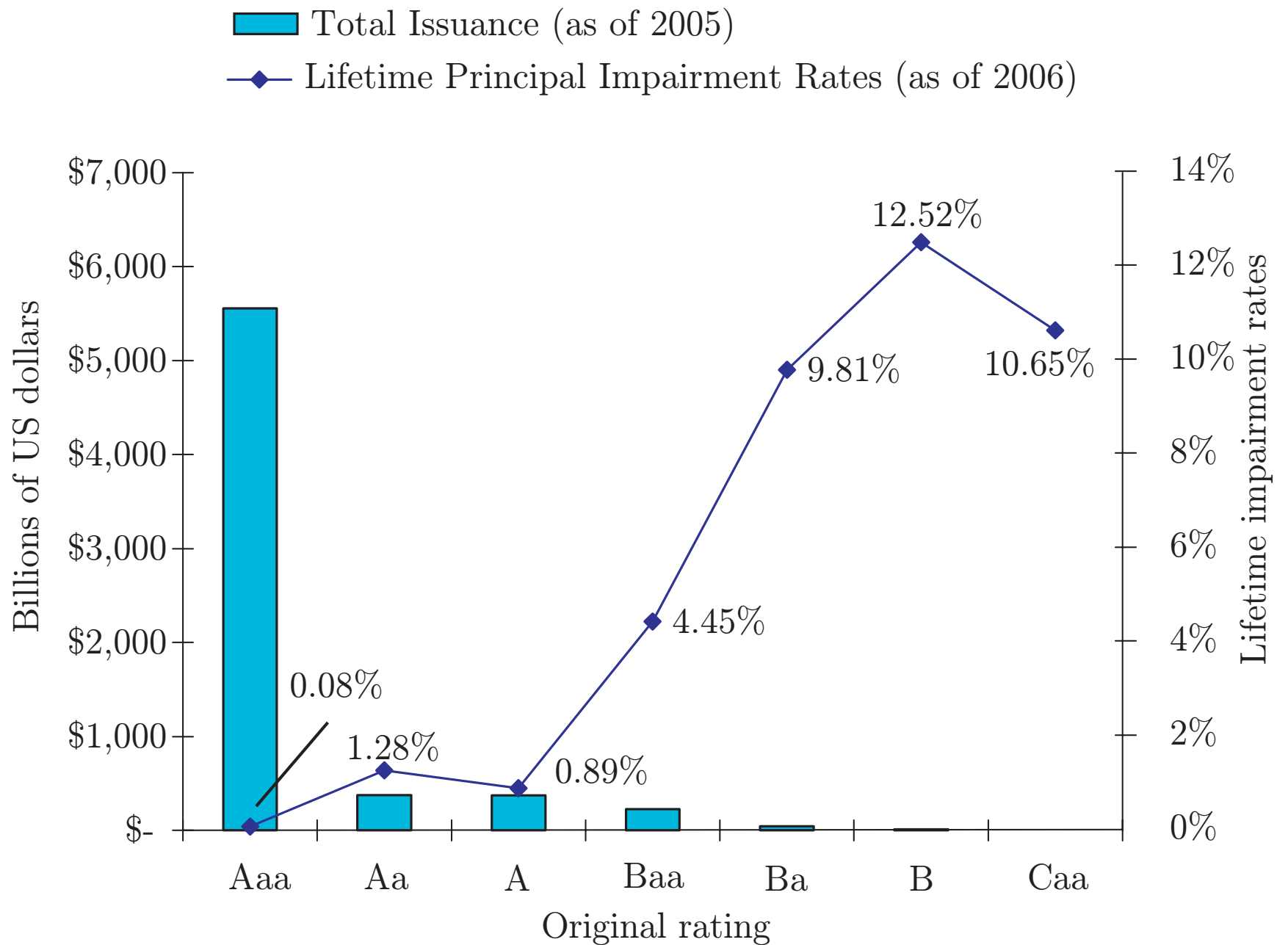


Figure 11: Retention of toxic waste at low leverage.







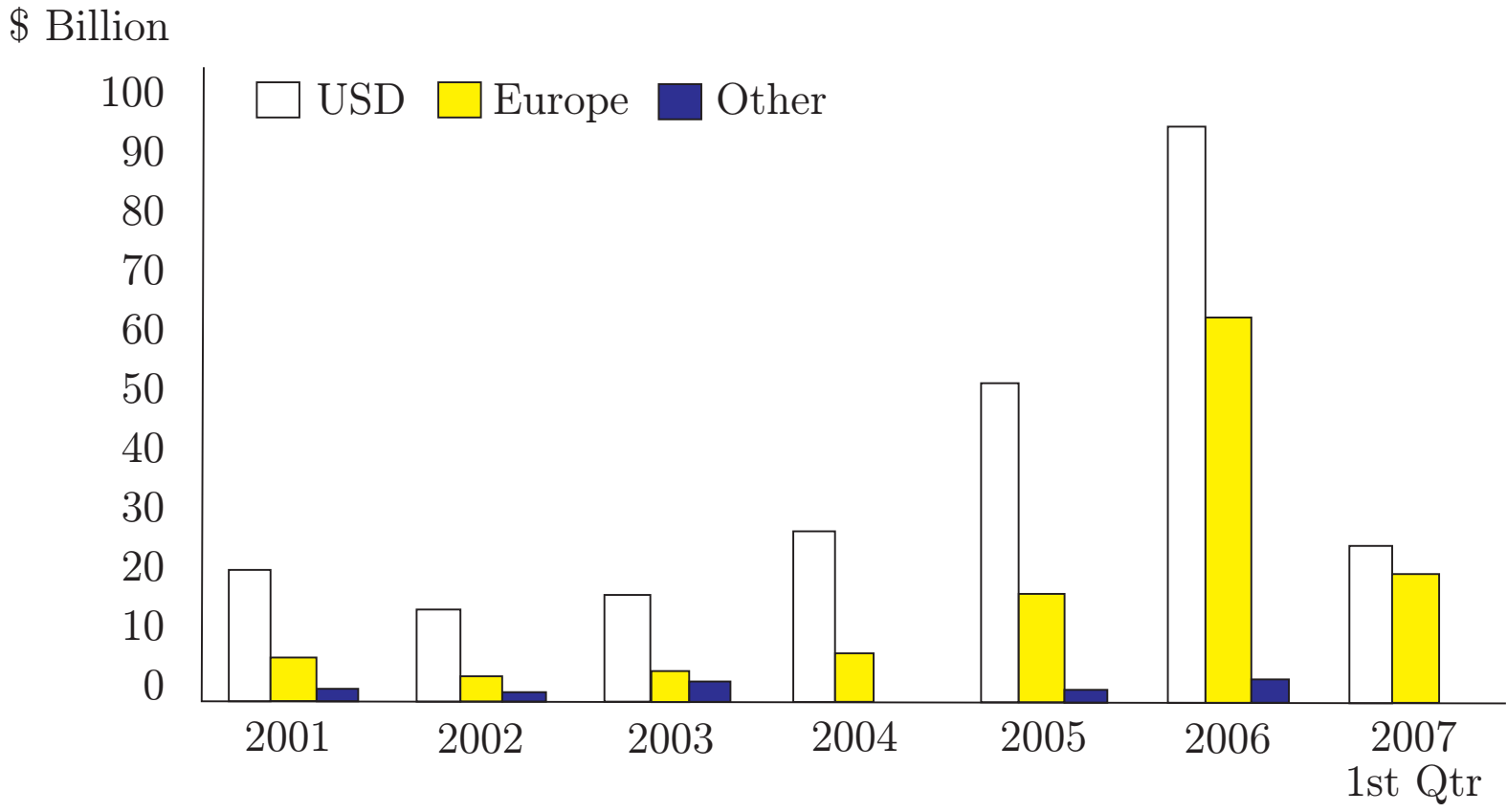
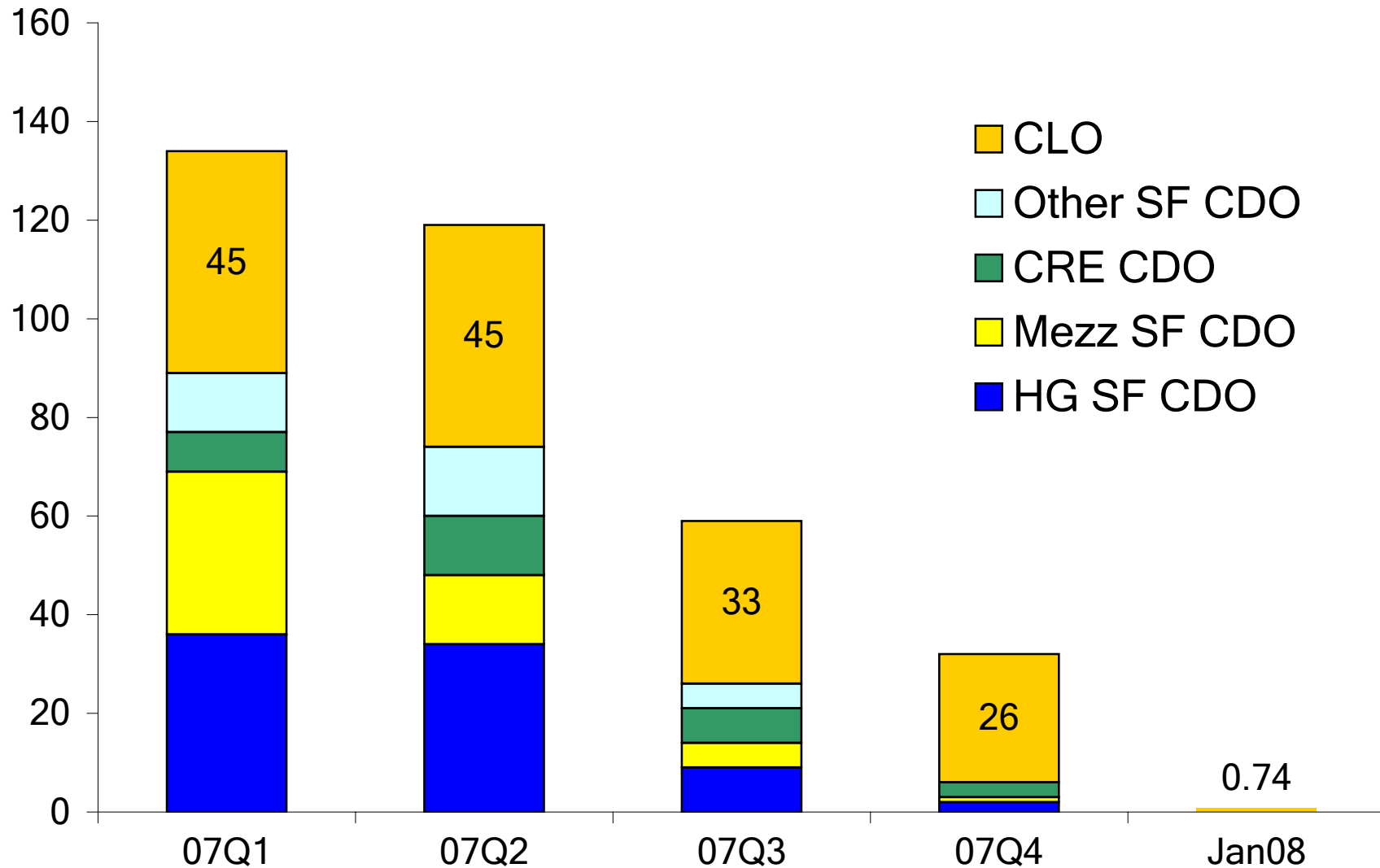


Figure 12: Issuance of CLOs by year and region. Source: Morgan Stanley.

Table 1: **Assets to CDOs** (trillions of \$ U.S.). Source: Bank of England, 2007, *Financial Stability Report*.

Collateral type	Outstanding Stock (end-2006)	Issuance in 2006	
		Total	Referenced by CDOs
Asset-backed securities	10.68	2.58	0.39
Investment-grade bonds	10.20	2.18	0.54
High-yield bonds	0.78	0.17	0.01
Leveraged loans	0.52	0.63	0.33

2007-08 Quarterly CLO and Structured Finance CDO Issuance (\$ Billion, Source: Morgan Stanley)



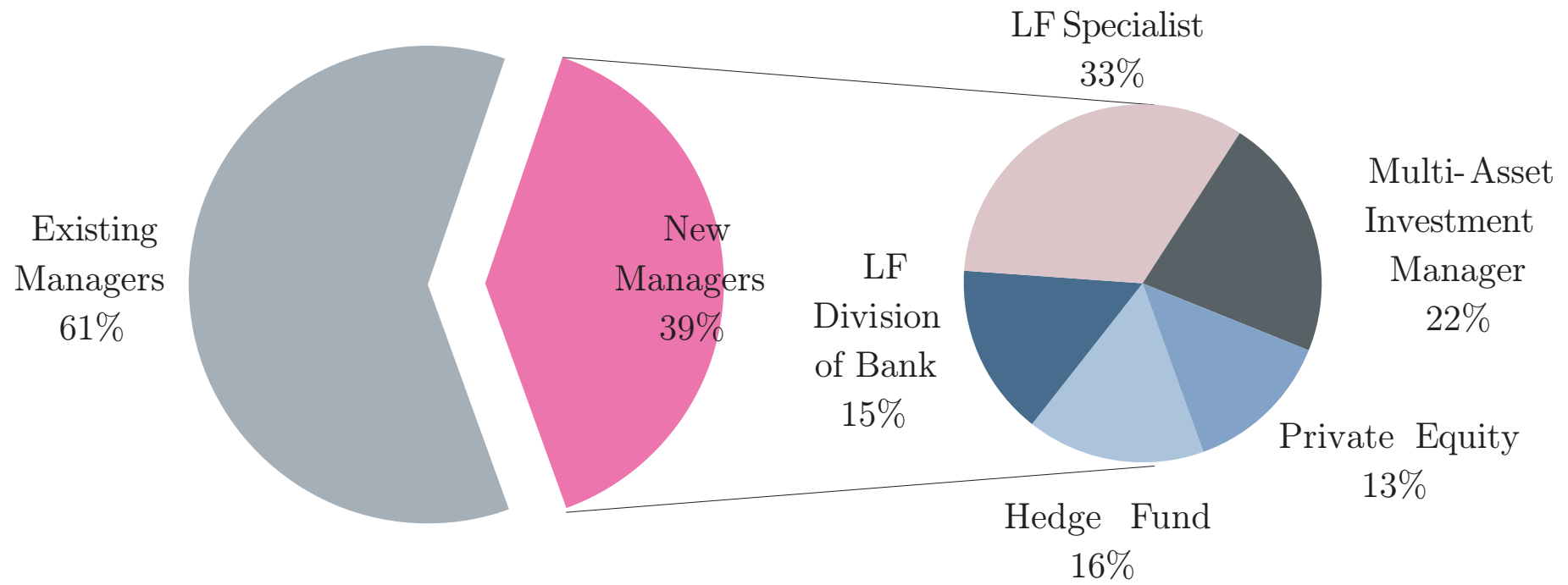


Figure 13: New European CLO issuers in 2006. Source: Fitch.

Benefits of credit risk transfer

1. Releases lender's capital for new credit intermediation, improving the efficiency of credit markets.
2. Provides diversification to lenders.
3. Distributes risk to investors that are less critical to the provision of liquidity to the financial system.
4. Provides an improved menu and supply of assets and hedging opportunities to asset managers.

Direct costs of credit risk transfer

1. The lemon's premium that the investor charges because of the lender's inside information regarding the borrower's credit risk.
2. Moral hazard: inefficient control by the lender of borrowers' default risks.
3. Decoupling of control rights (Black and Hu, *U. Penn. Law Review*, 2008).
4. Legal, marketing, and other arrangement costs.

Systemic Risks of Credit Risk Transfer

1. Credit squeeze: Hoarding of credit.
2. Interference with central-bank monetary policy.
3. Bank runs (eg Northern Rock, Florida Pool).
4. Too-big-to-fail adverse incentives.
5. Spillover to other credit markets (e.g. muni bonds).
6. Lost credibility of CRT products.

Key Concerns Going Forward

1. Even specialists in CDOs are ill equipped to measure the risks and fair valuation of tranches that are sensitive to default correlation.
2. Credit risk transfer has reduced the degree to which credit is intermediated by banks, relative to hedge funds, credit derivative product companies, and specialty finance companies. This reduces the ability of banks to be sources of liquidity in systemic crises.

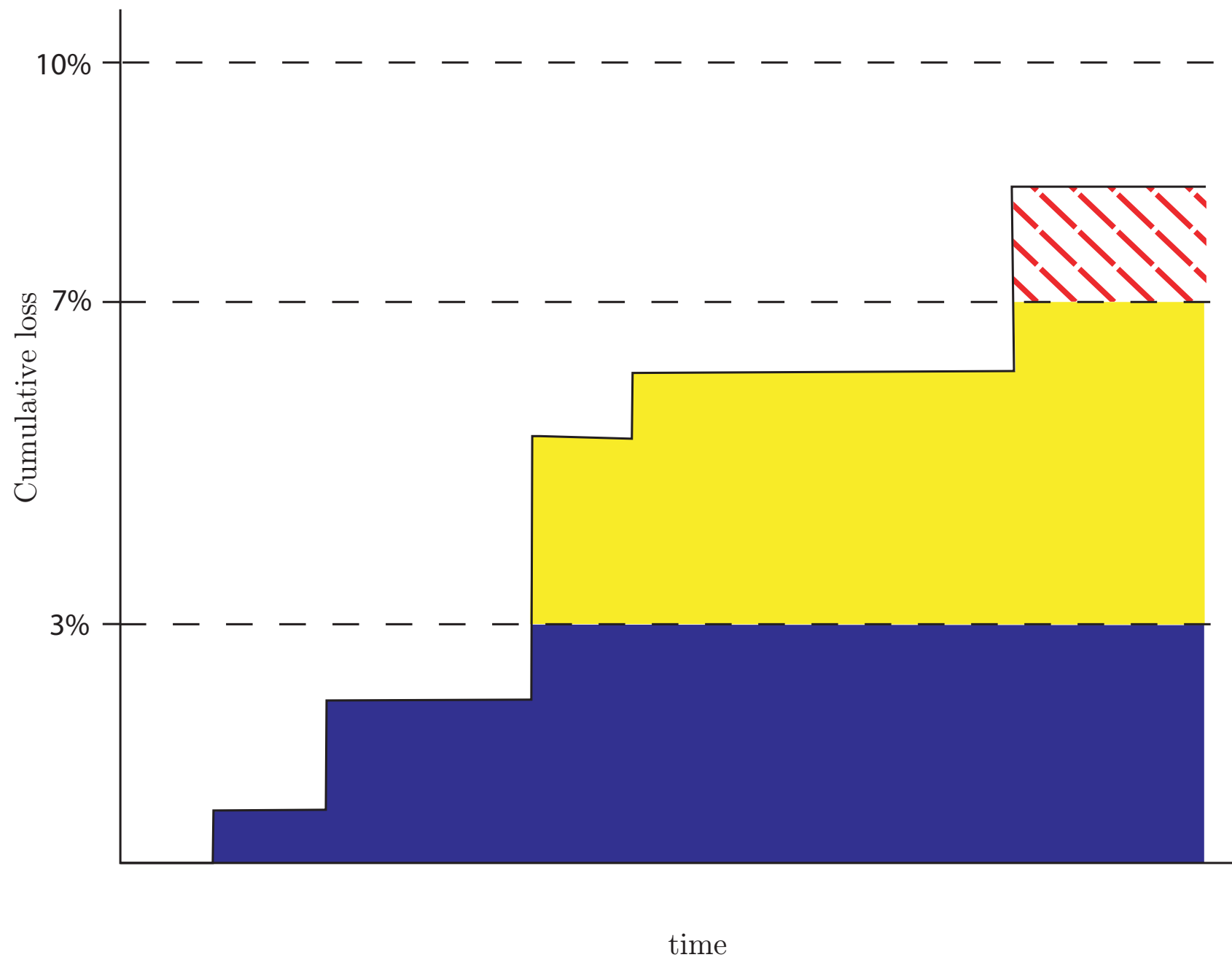


Table 2: **CDX NA IG 5-year Series 7 tranche premia, Feb. 19, 2007.**

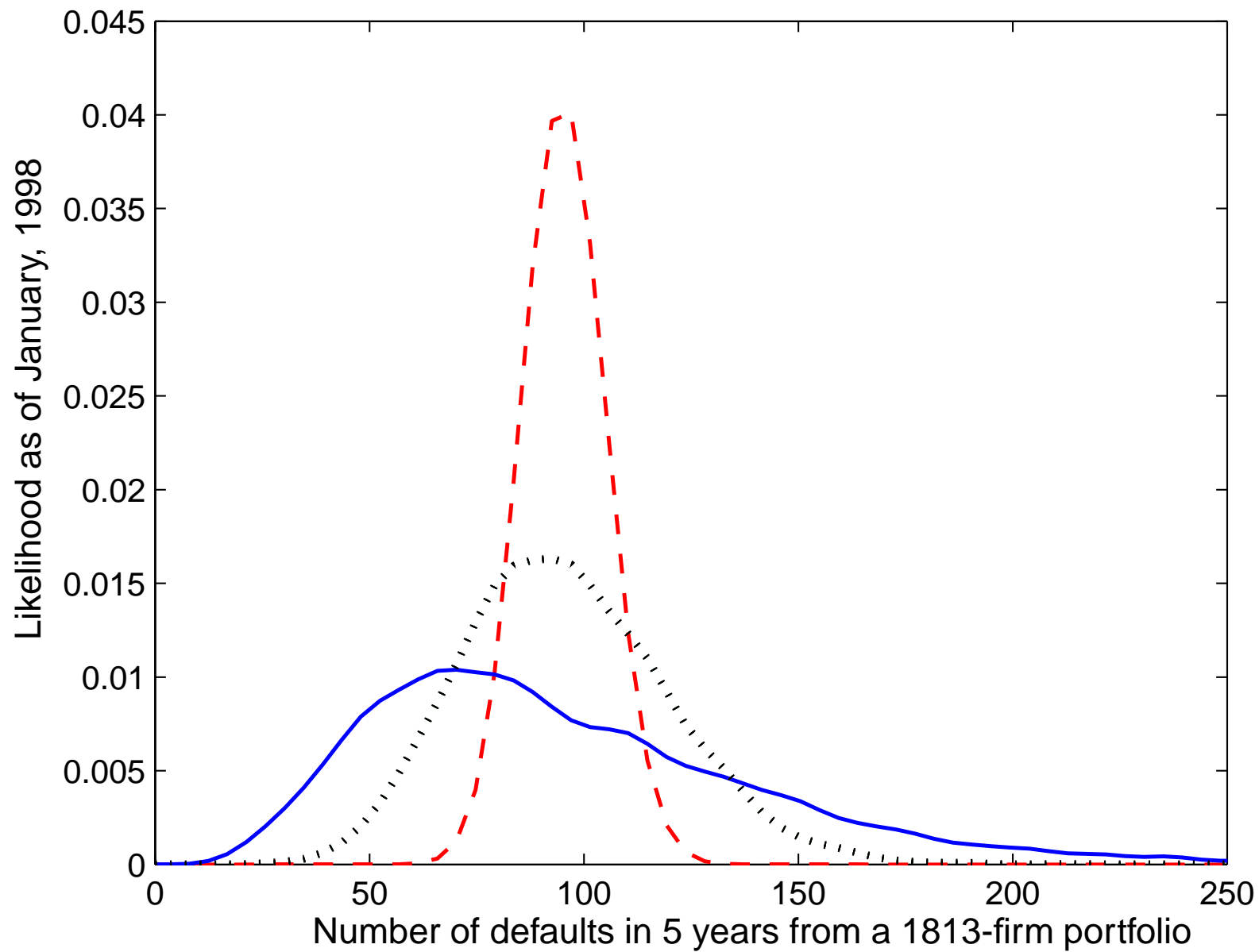
(Source: Morgan Stanley.)

Tranche	Up-front fee (%)	Running spread (b.p.)	Premium Allocation	“hedge” (Δ)	Base corr.
0-3%	19.25	500	84.9%	23.8	14%
3-7%	0	64	8.2%	4.6	27%
7-10%	0	12	1.2%	1.1	35%
10-15%	0	5	0.9%	0.5	46%
15-30%	0	2	1.8%	0.2	71%
30-100%	0	1	3.1%	0.1	na
CDX	0	31.0	100.0%	1.0	na

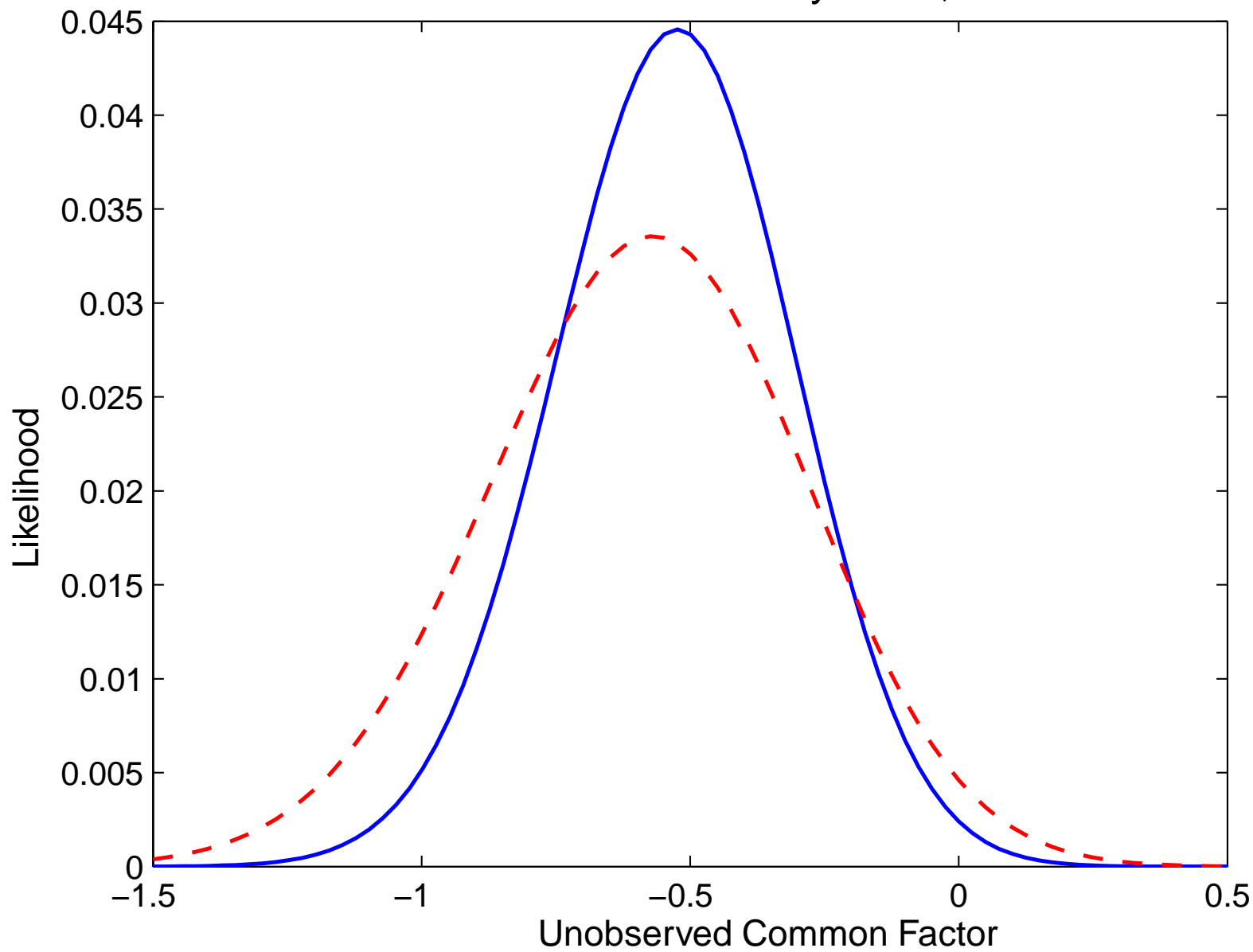
Table 3: **CDX NA IG 5-year Series 9 tranche premia, Feb. 25, 2008.**

(Source: Morgan Stanley.)

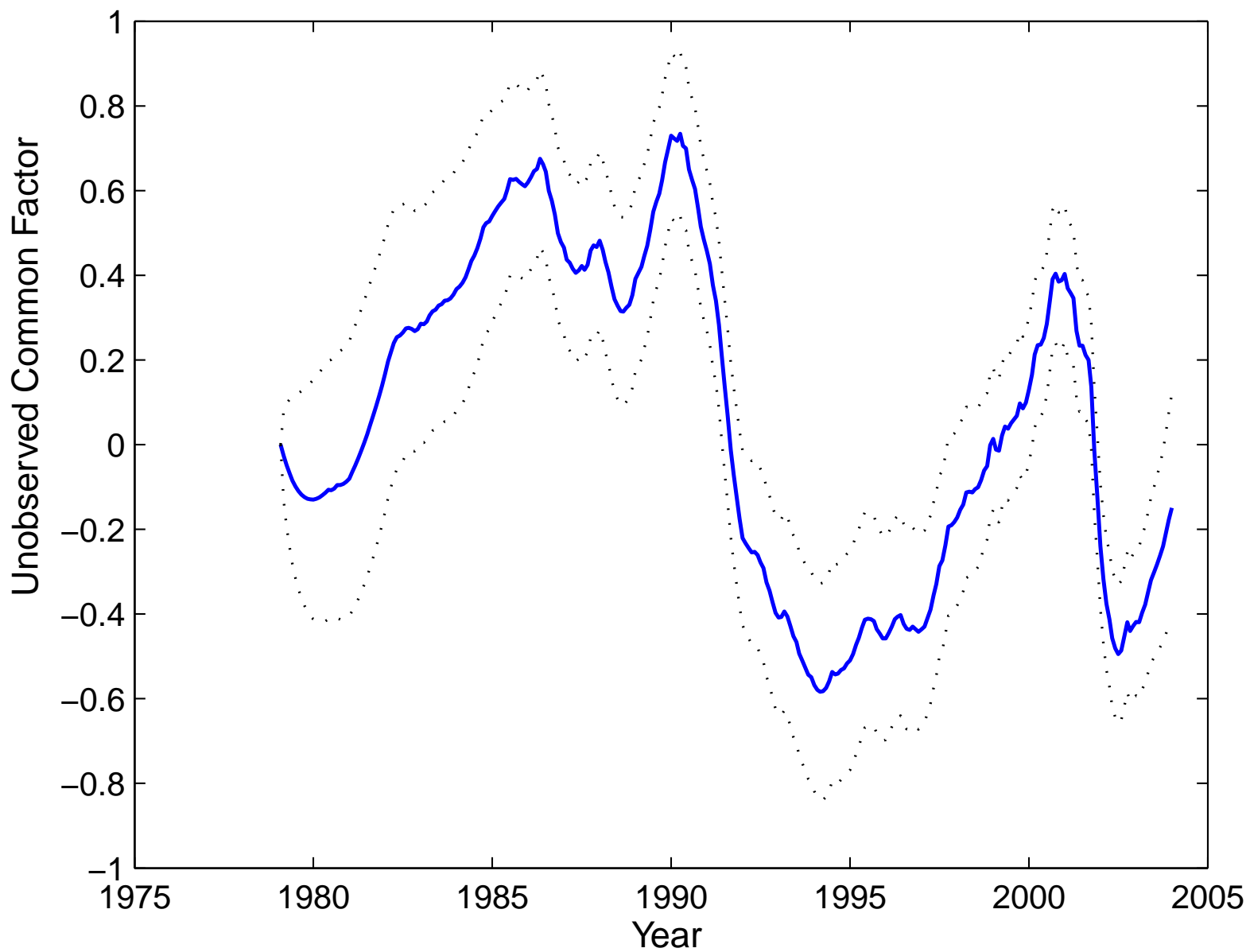
Tranche	Up-front fee (%)	Running spread (b.p.)	Premium Allocation	“hedge” (Δ)	Base corr.
0-3%	54.5	500	30.2%	3.5	47%
3-7%	0	528	12.9%	2.5	71%
7-10%	0	310	6.0%	1.5	80%
10-15%	0	232	7.6%	1.2	89%
15-30%	0	123	18.5%	0.9	109%
30-100%	0	68	24.8%	0.7	na
CDX	0	157.0	100%	1.0	na

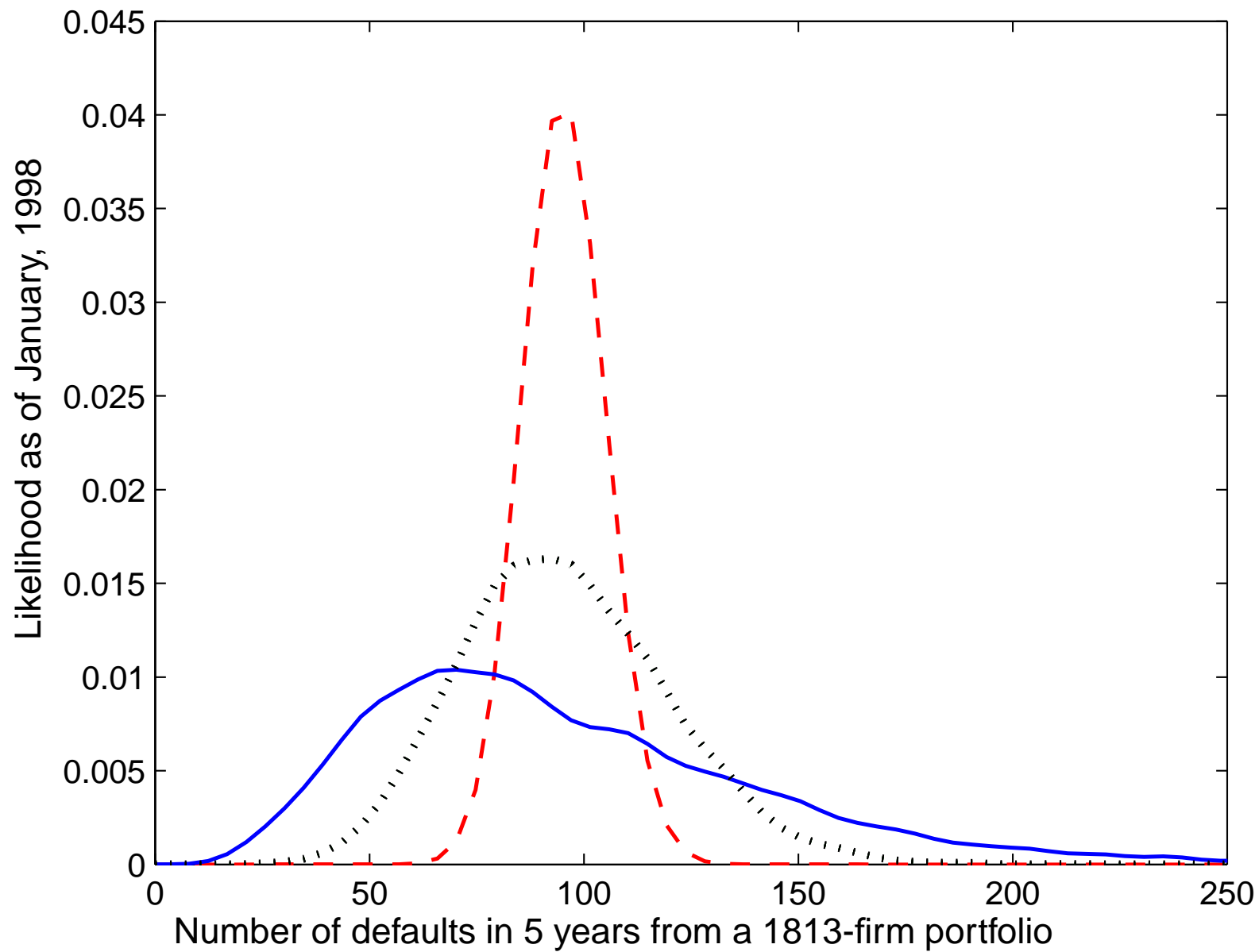


Unobserved Common Risk in January 1998, “then and now.”



Unobserved Common Factor: mean and two- σ band





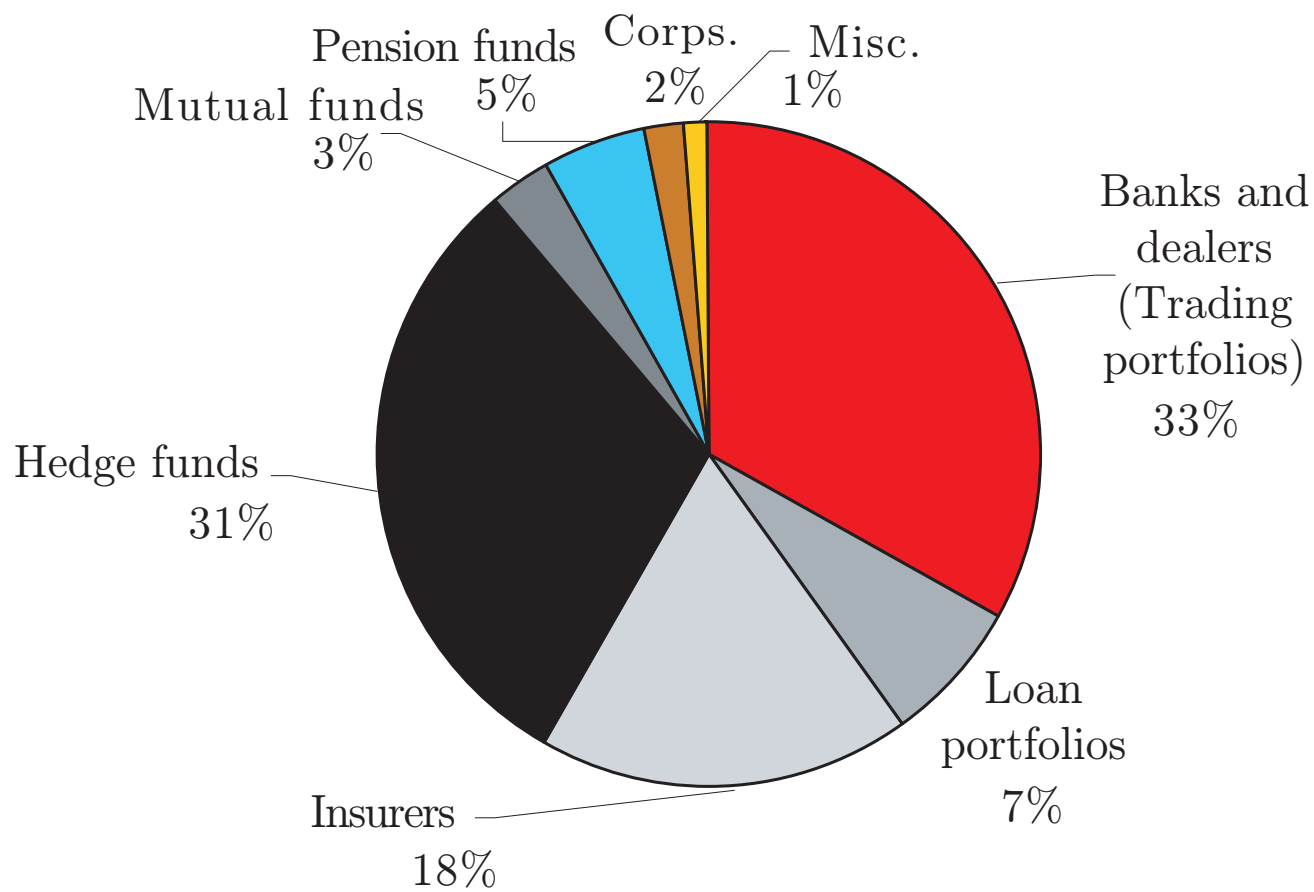


Figure 15: CDS buyers of protection. Source: B of A, March 2007.

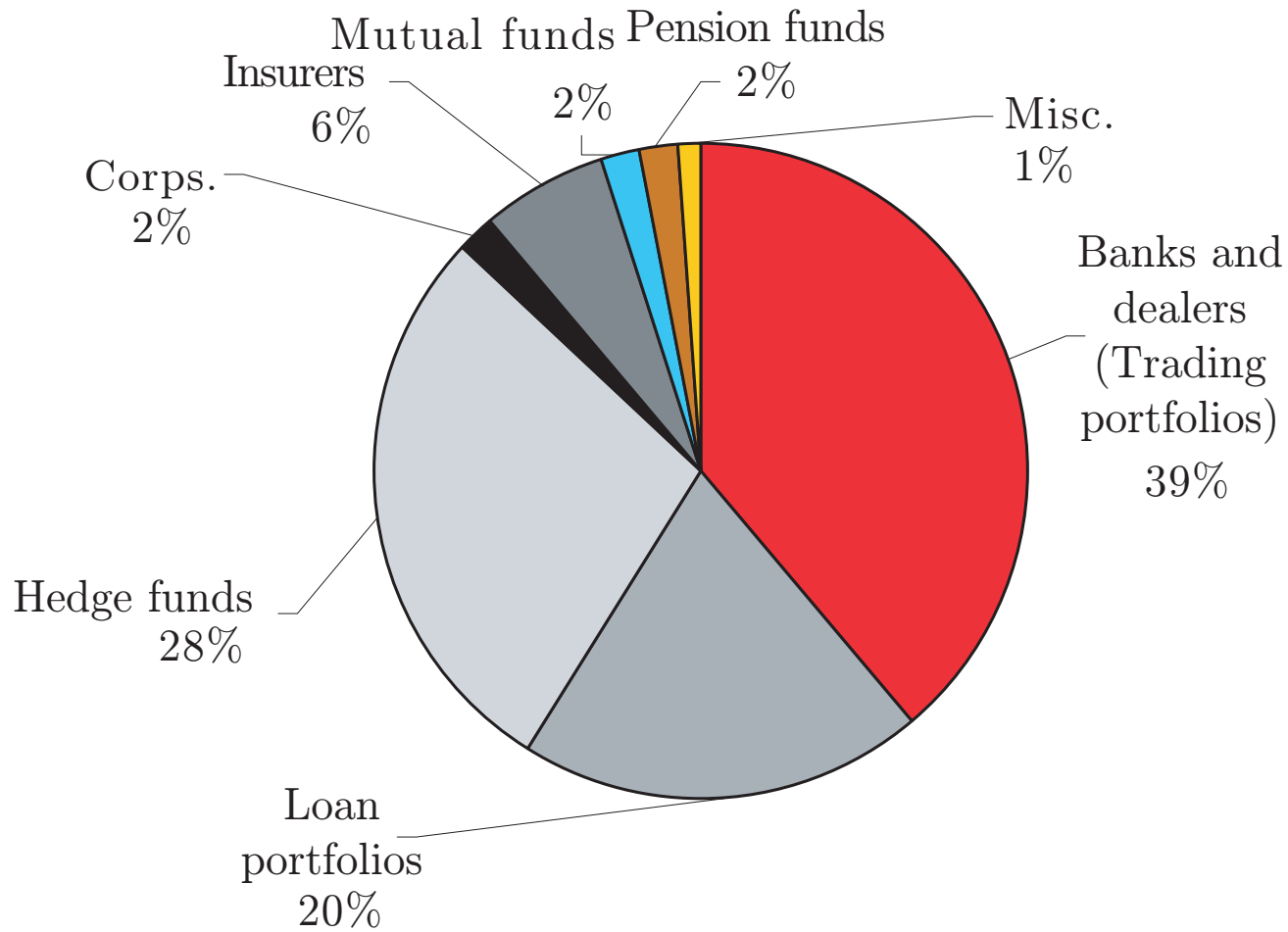
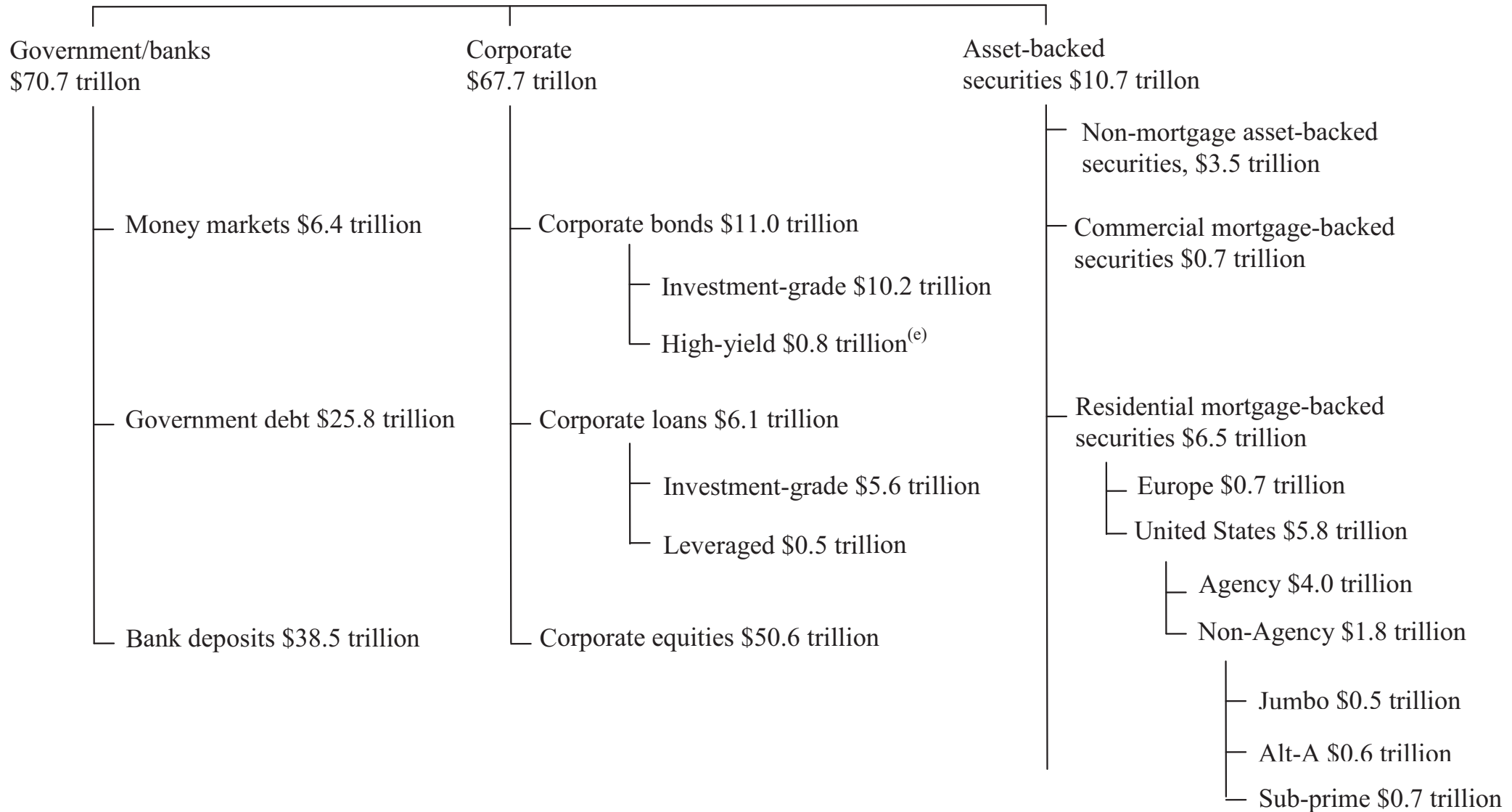


Figure 16: CDS sellers of protection. Source: B of A, March 2007.

Size of global securities markets



Source: Bank of England, 2007, from various data sources.

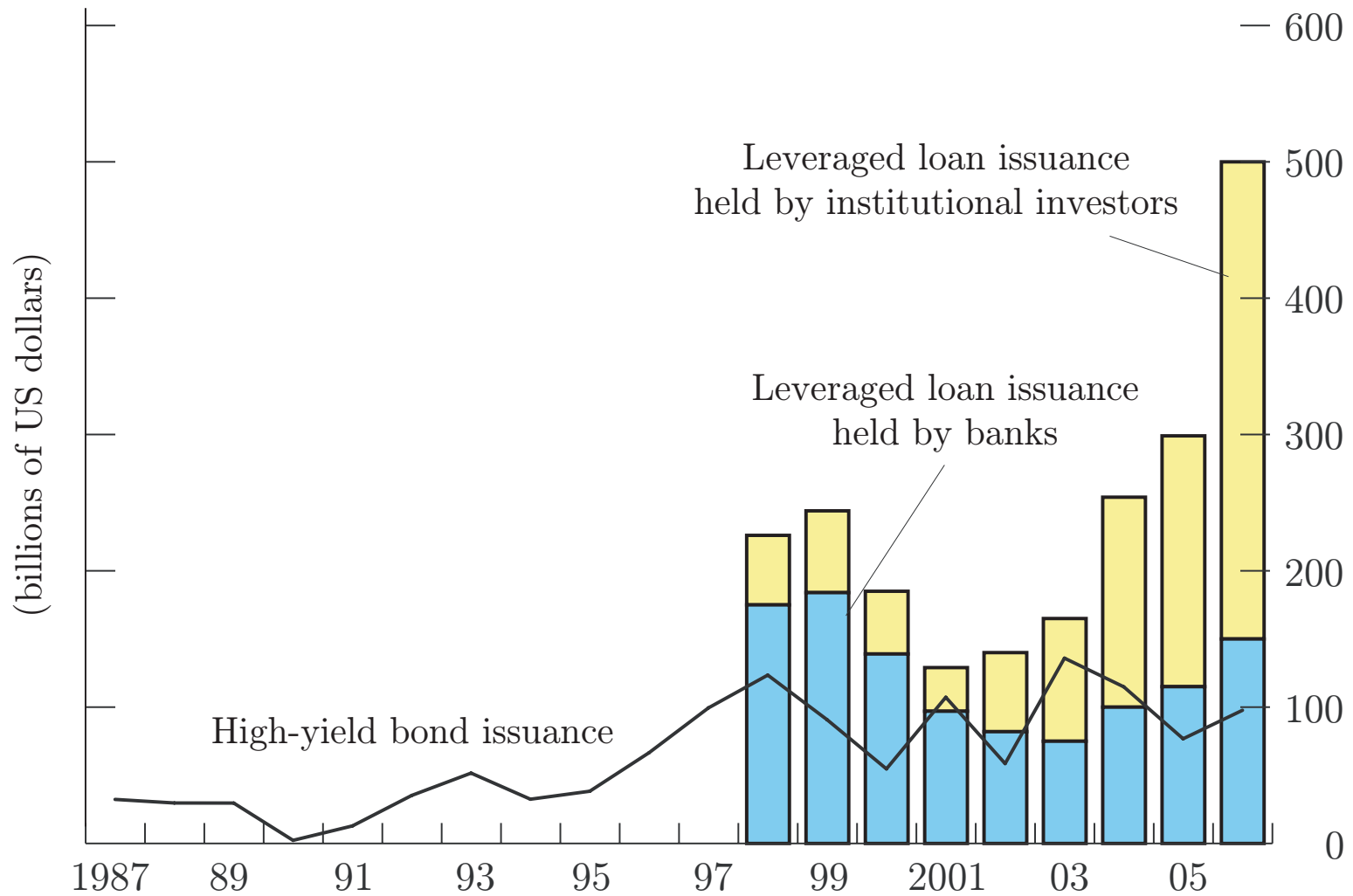


Figure 17: Bank and non-bank investment in leveraged loans. Source: IMF.

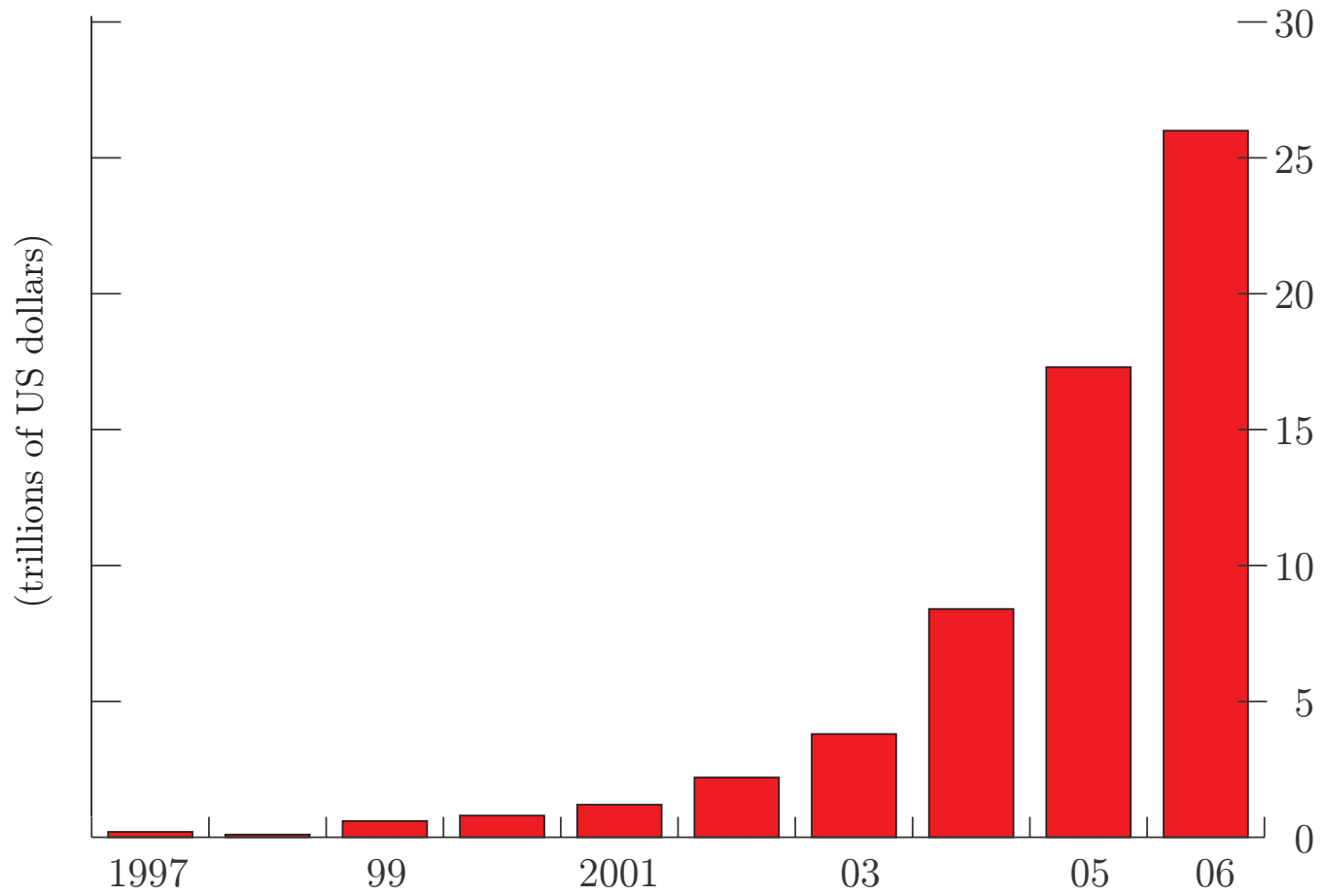


Figure 18: Outstanding notional amount of default swaps. Source: BBA.

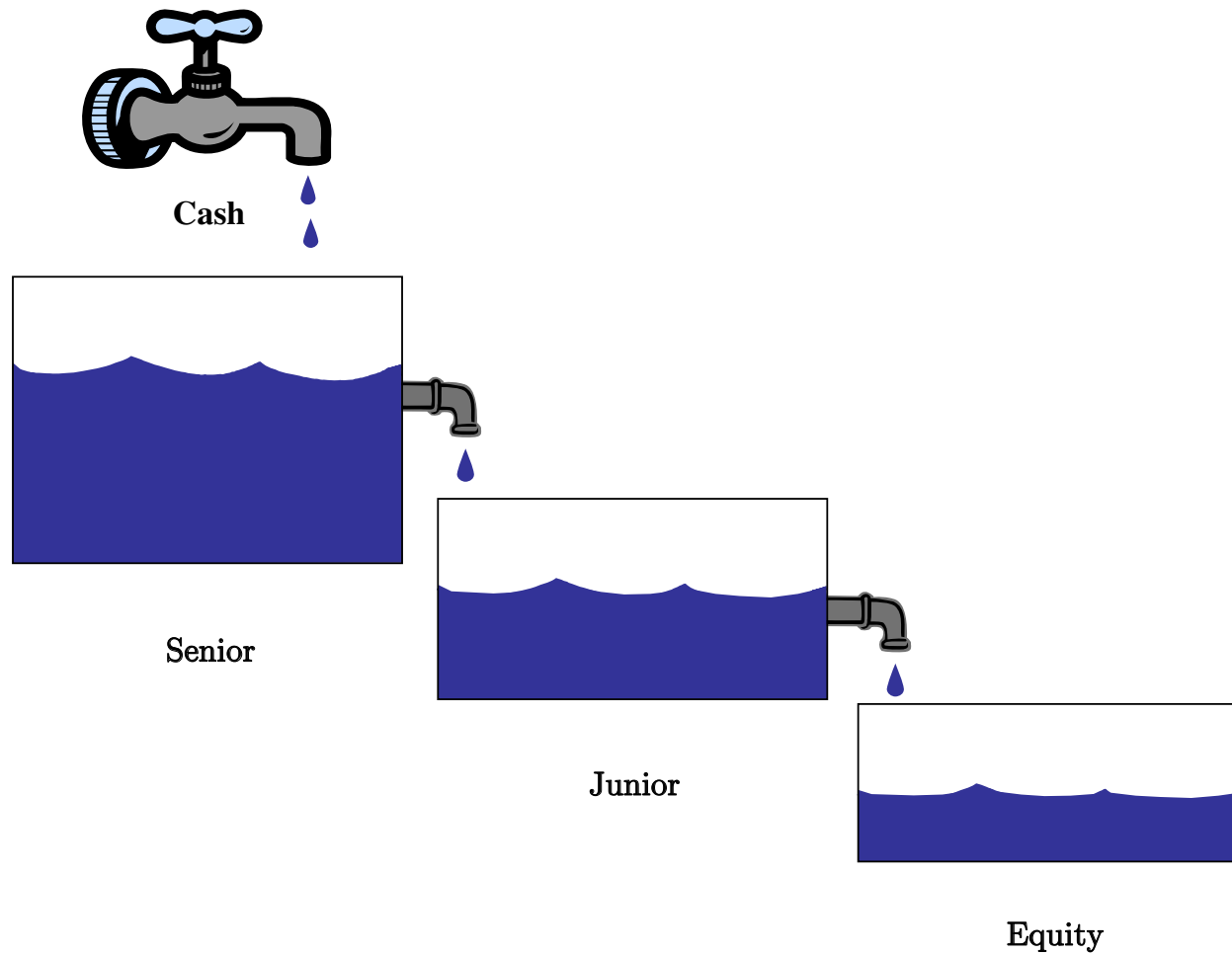


Figure 19: “Waterfall” of a collateralized debt obligation.

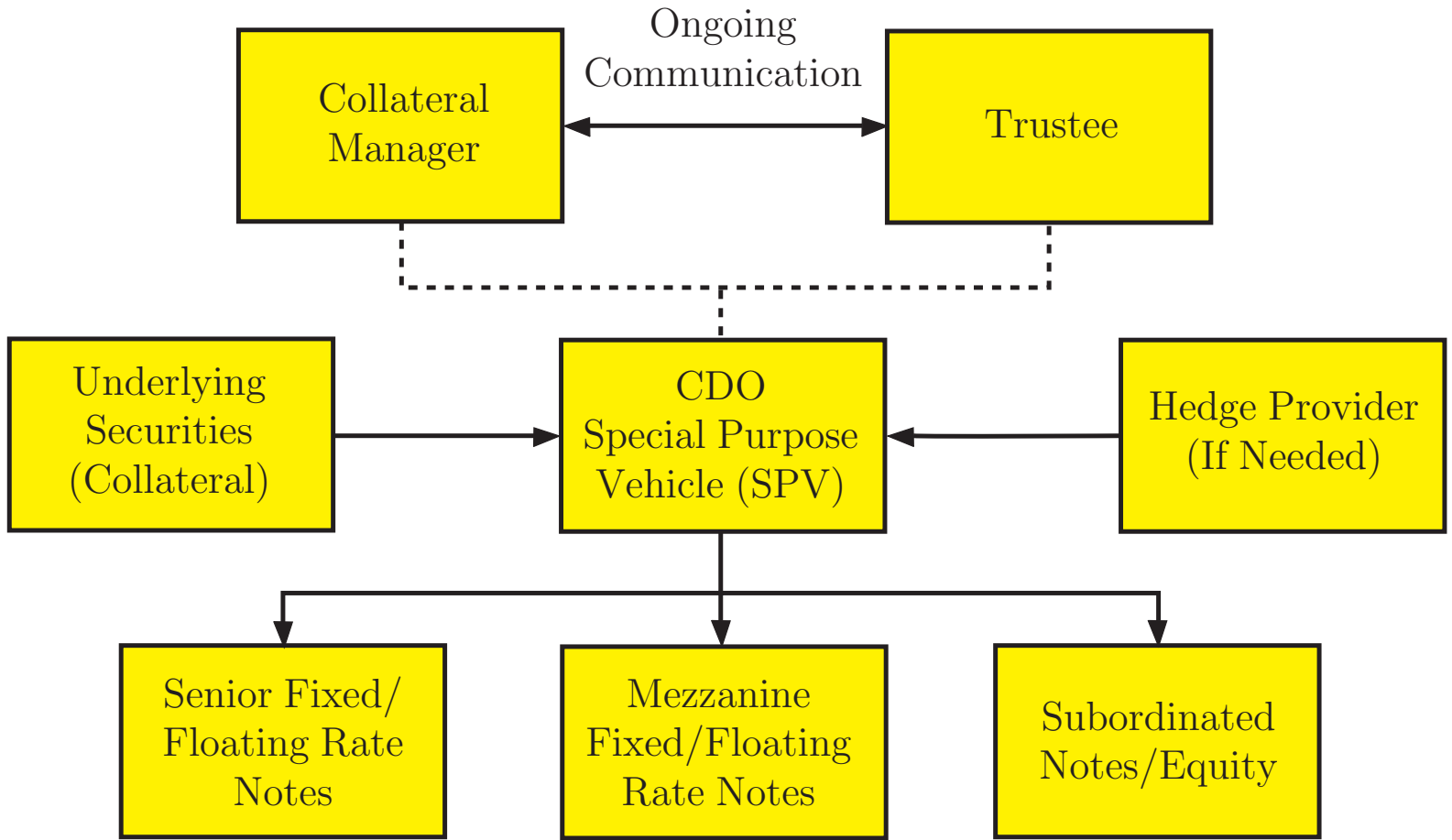


Figure 20: Typical CDO contractual relationships.

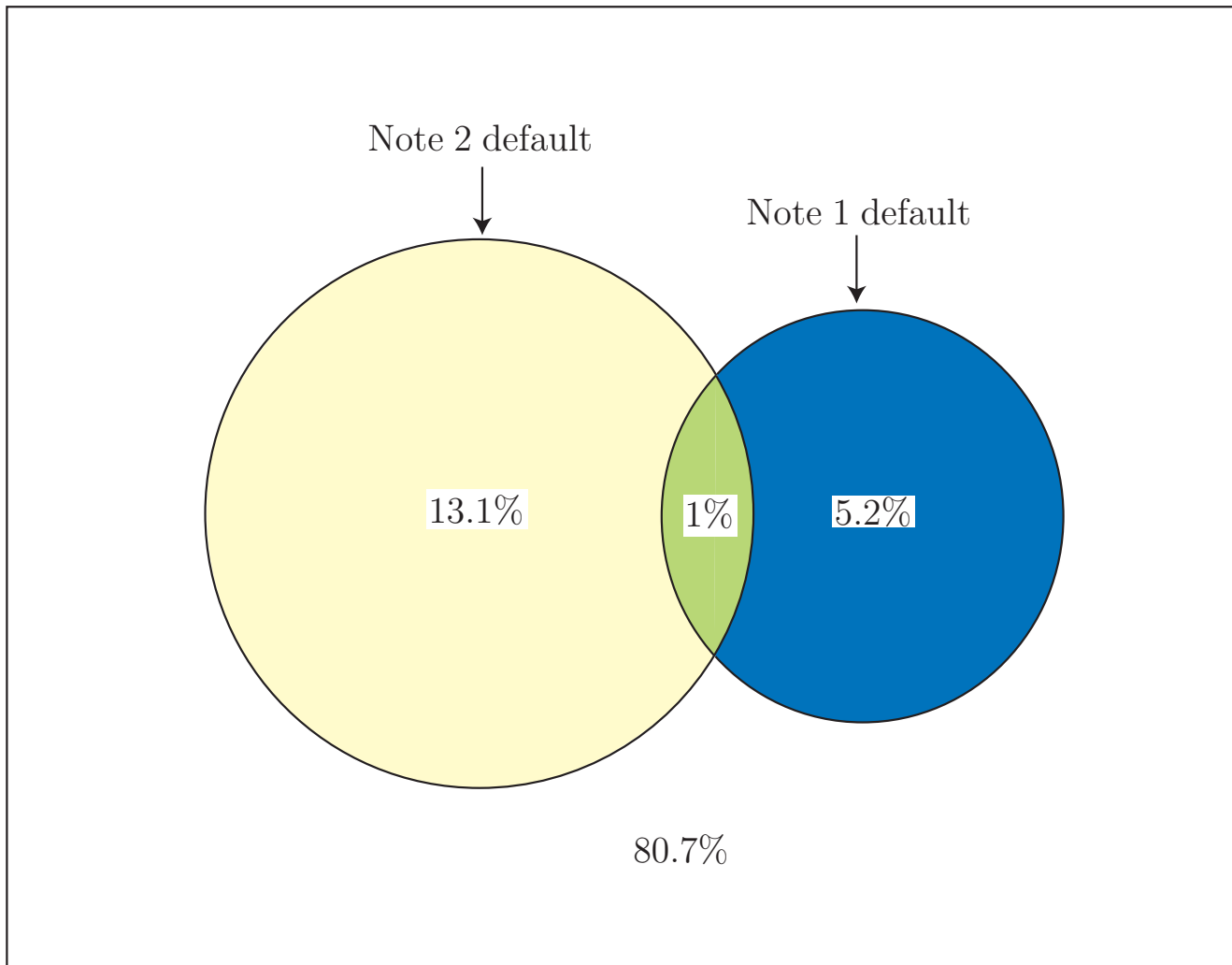


Figure 21: Venn diagram for obligors with a default correlation of 4.3%.