

The Financial Turmoil in 2007 and 2008



Gerald P. Dwyer

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Caveats

- These views are mine and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System.
- I may know quite a bit more about the general developments than you do but I know less than I would like

Complicated

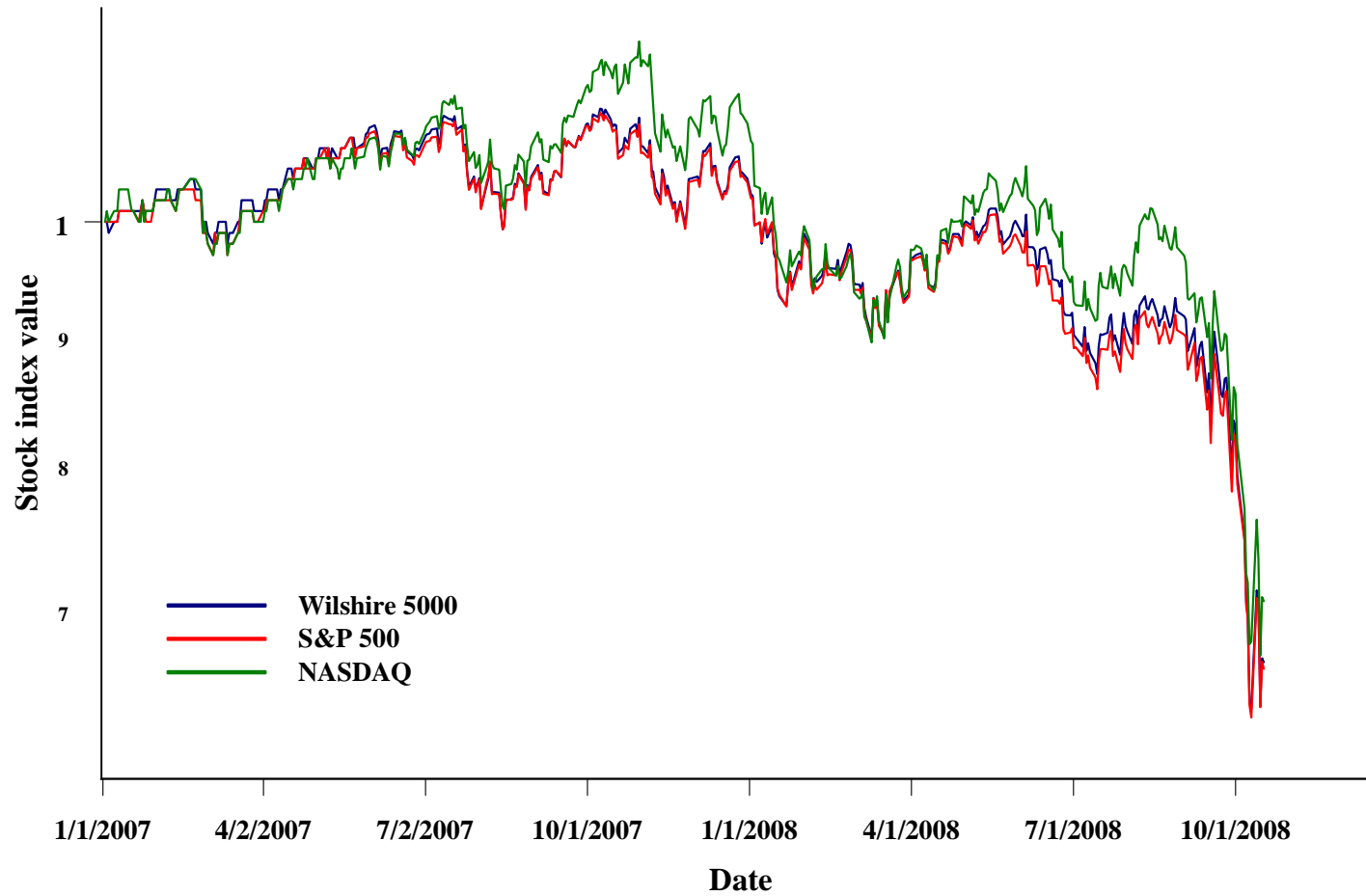
- Acronyms
 - ABS, ABCP, CDO, CDO squared, RMBS, SLABS, SIVs, PDCP, TARP
- Operators in markets
 - Monoline insurers
 - Financial institutions all over the world
- Markets
 - Money market funds
 - Asset-backed securities
 - Auction-rate securities market

Story Continues

- September 14 and 15, 2008
 - Lehman Brothers files for bankruptcy
- September 16
 - AIG loan up to \$85 billion authorized from Federal Reserve
 - Prime Reserve Fund net asset value falls below \$1
- Week of September 29
 - Congress passes Emergency Economic Stabilization Act to buy \$250-\$700 billion of assets
 - Ireland guarantees liabilities of Irish banks
- October 13
 - Federal government and nine large banks agree to Treasury purchase of preferred stock in the banks
- October 21
 - Federal Reserve sets up Money Market Investor Funding Facility

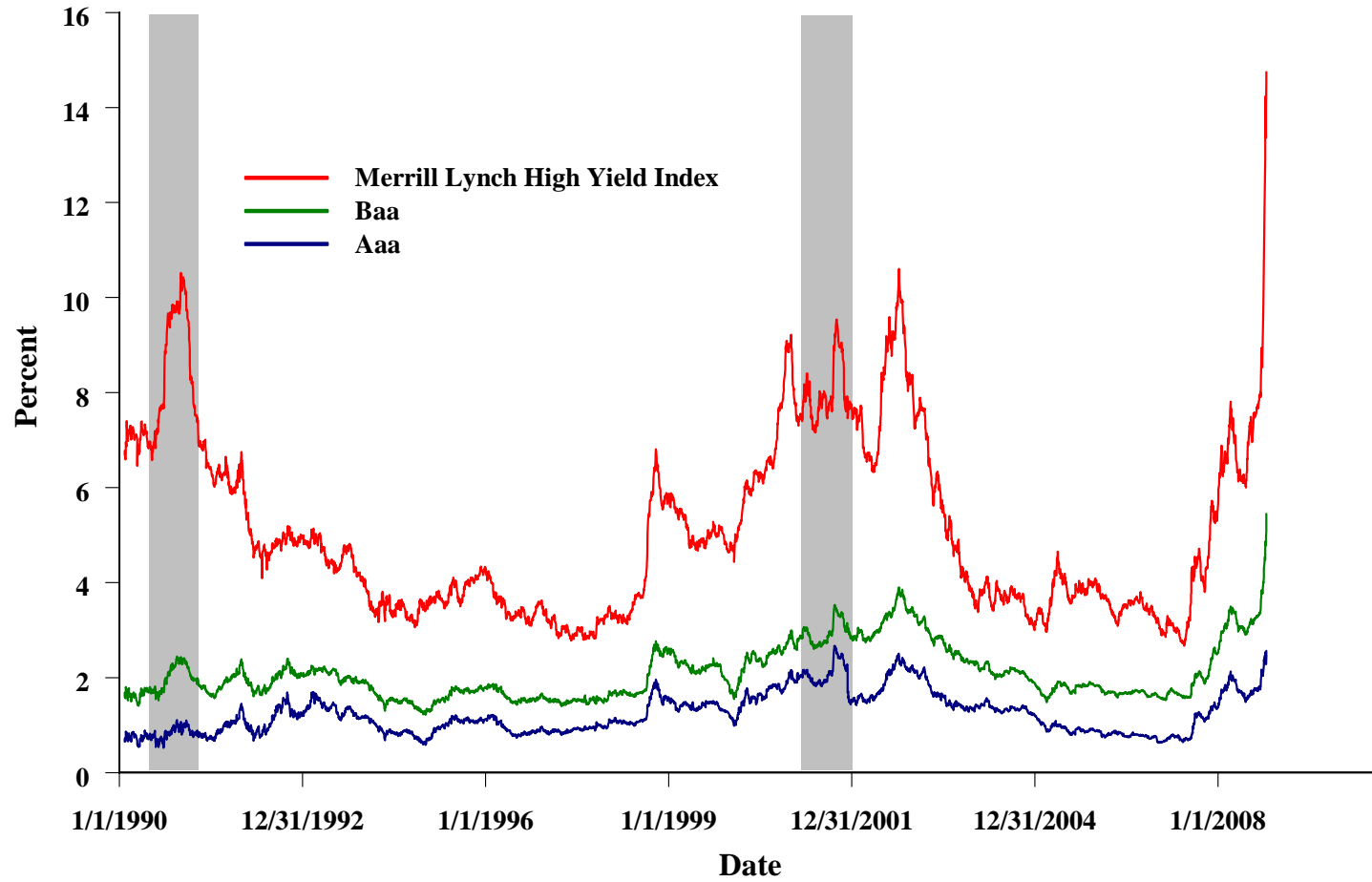
Stock Exchange Indexes

January 2, 2007 through October 17, 2008



Corporate Bond Spreads over Ten-Year Treasury Yield

February 1, 1990 through October 17, 2008



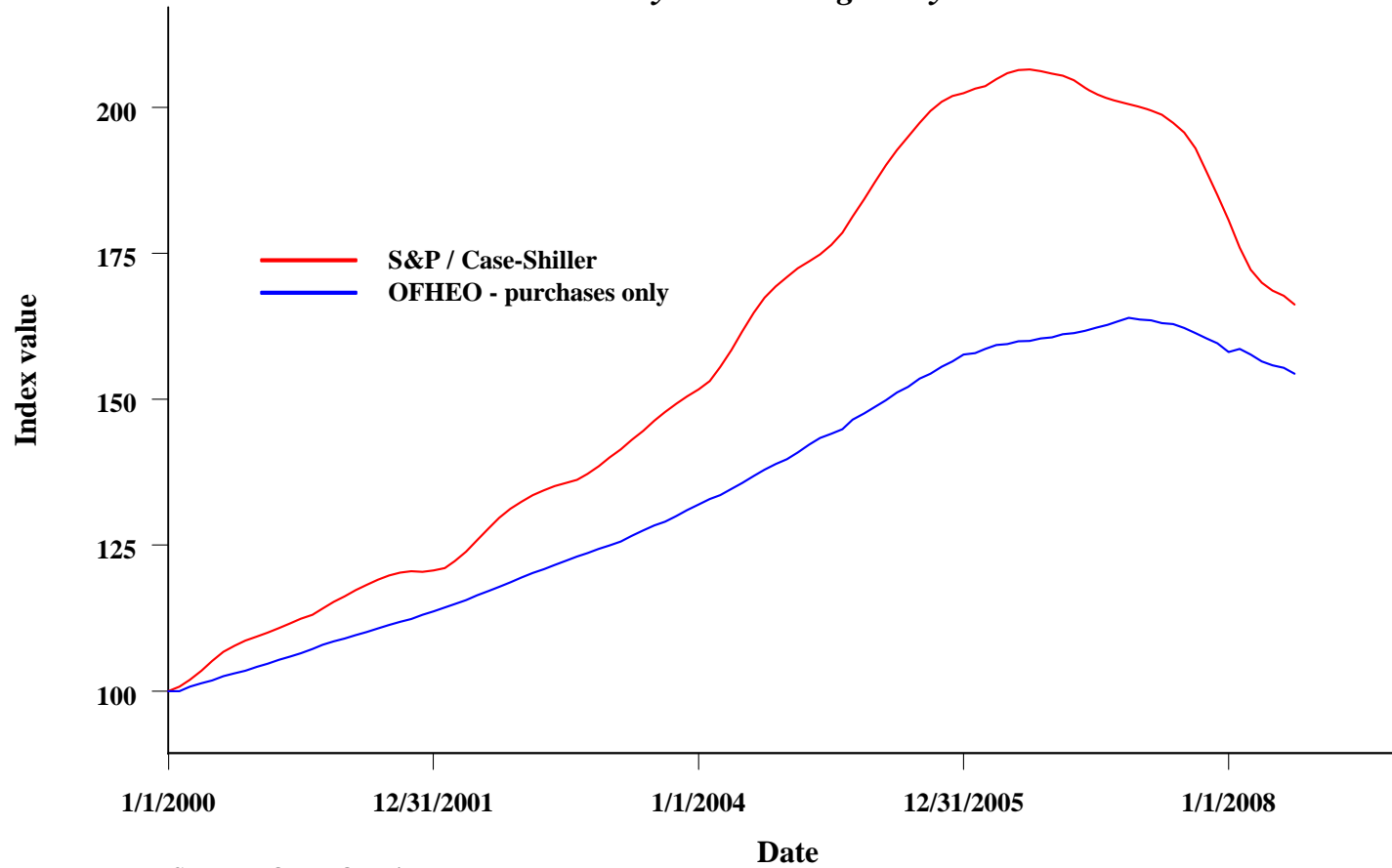
Shaded bars: NBER Business Cycle Contractions

Background

- Defaults on mortgages, especially subprime
 - More such loans than historically
 - Relatively low risk spreads
- How do we get from defaults on high-risk mortgages to all this widespread difficulty?

Housing Price Indices

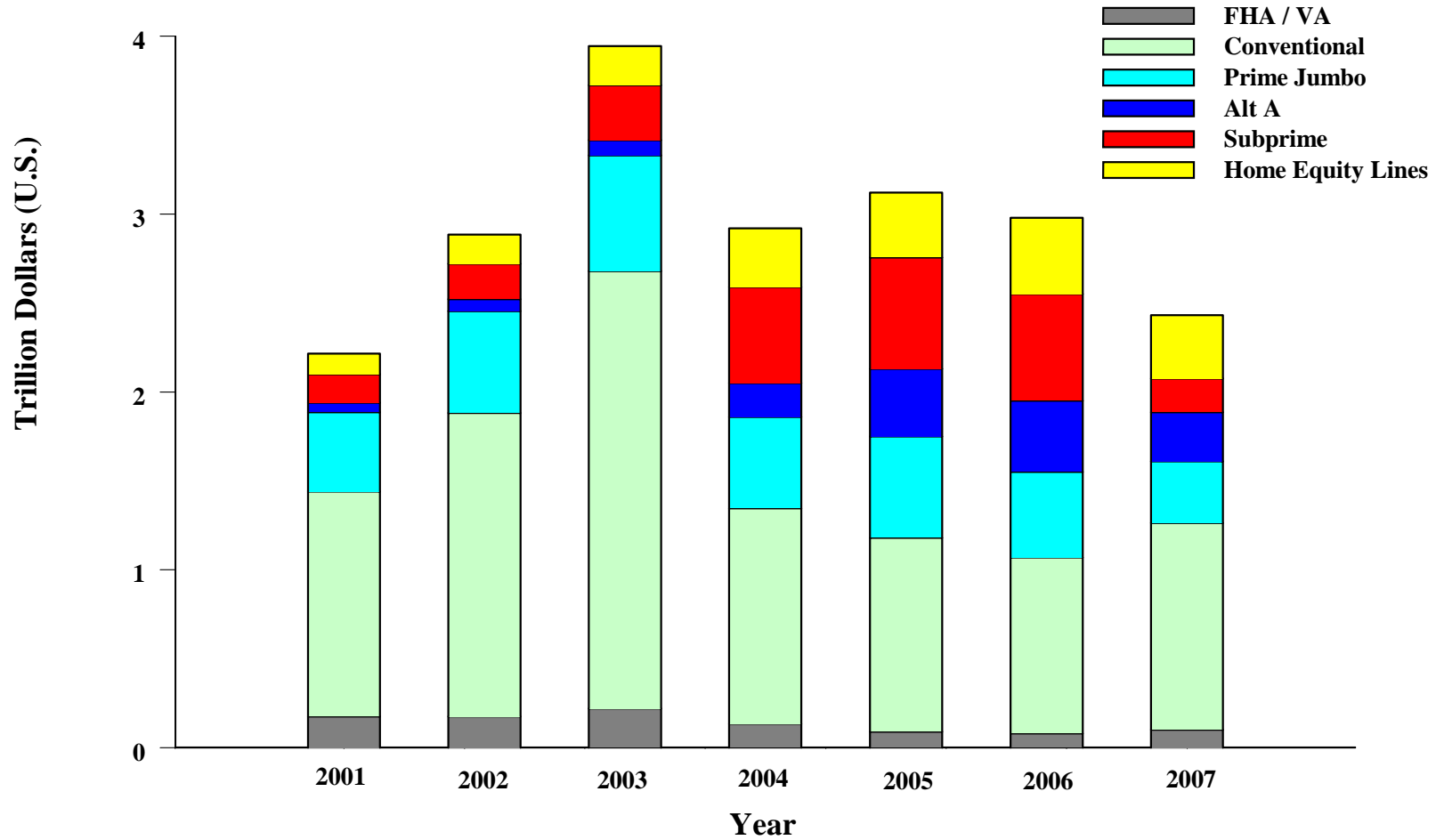
January 2000 through July 2008



Sources: OFHEO and Haver

U.S. Mortgage Originations by Type

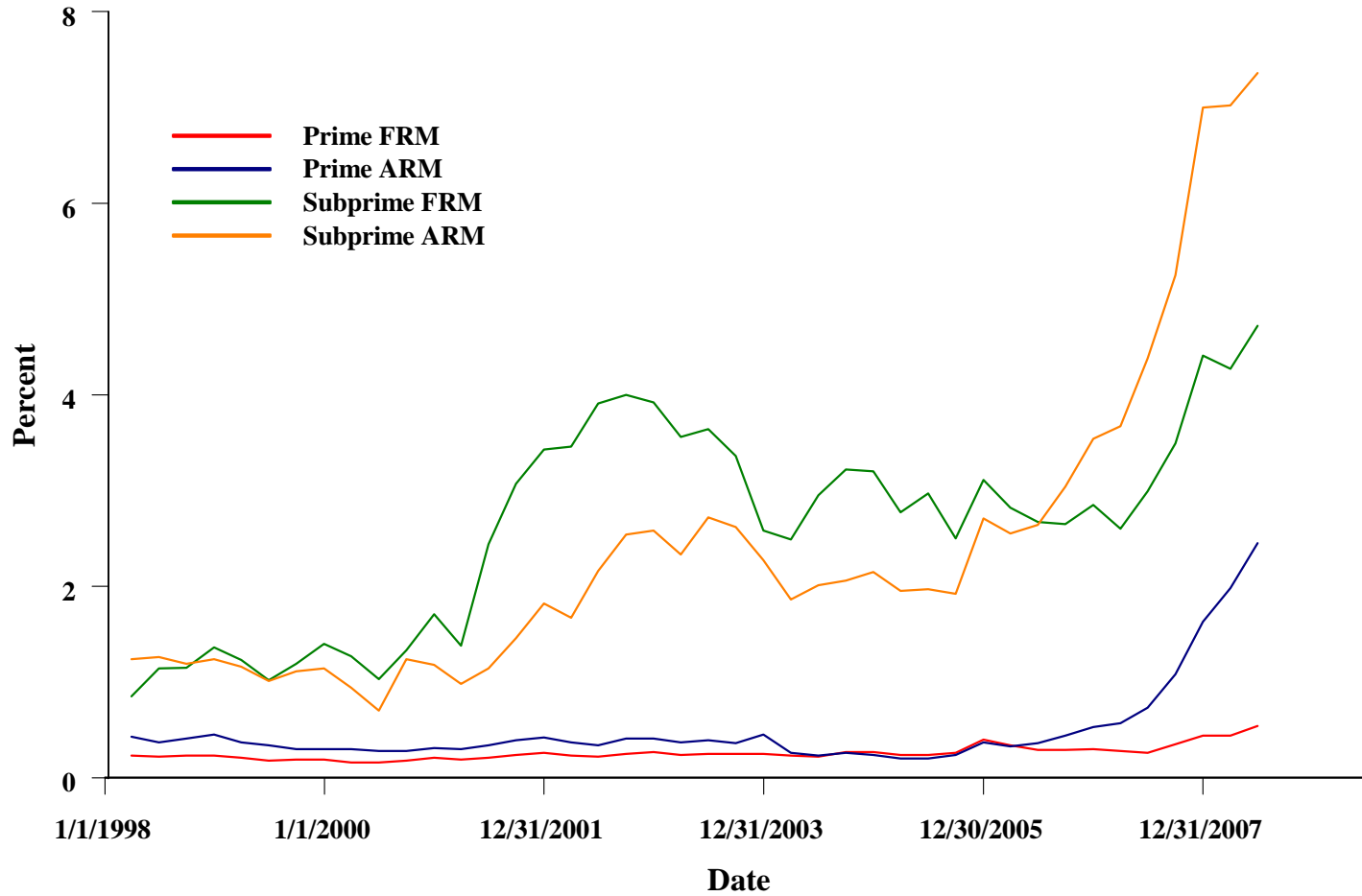
2001 through 2007



Source: Inside Mortgage Finance

U.S. Mortgage Delinquencies by Loan Type

First Quarter 1998 through Second Quarter 2008

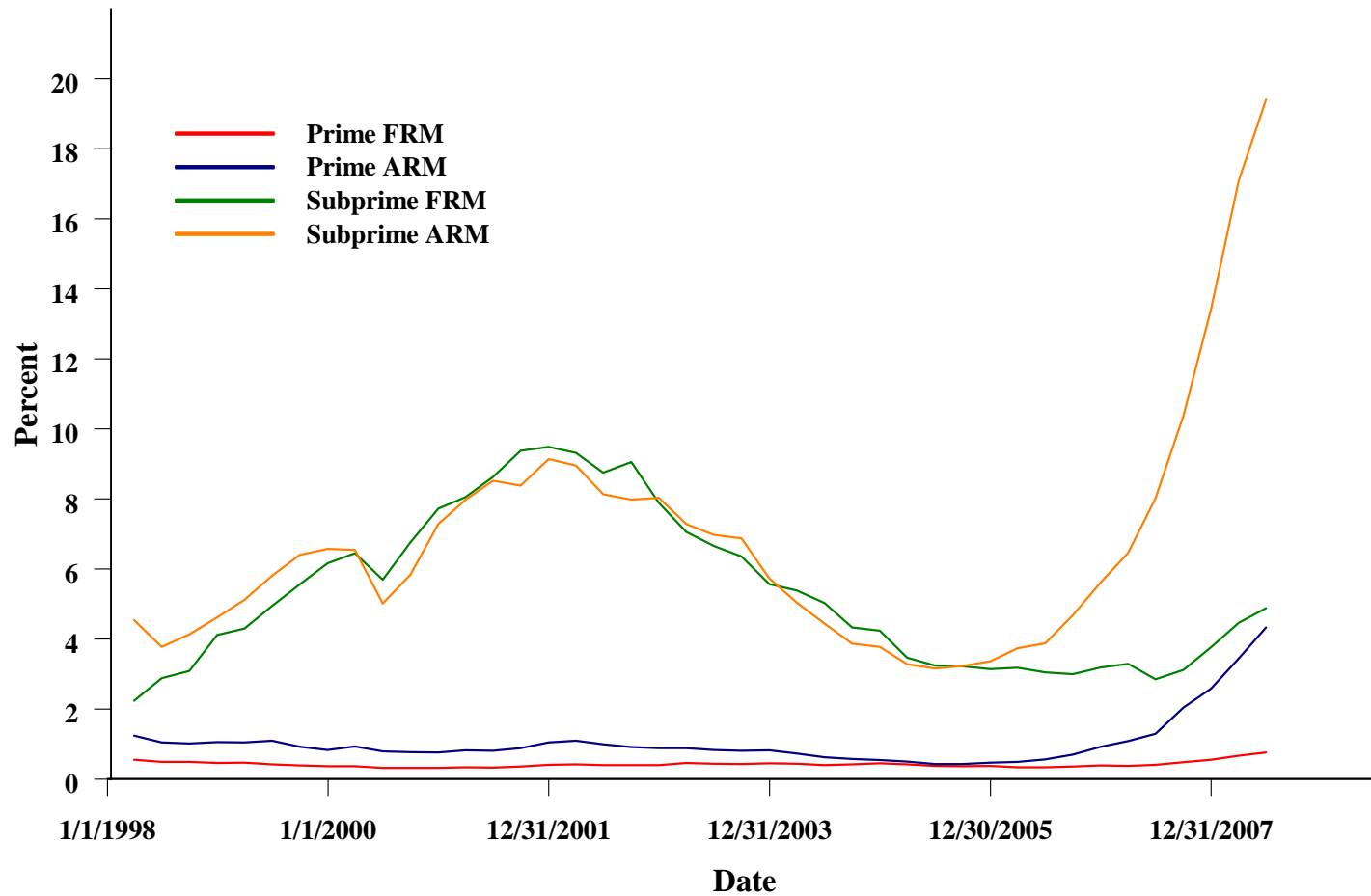


Note: Delinquent 90 days or more

Source: Mortgage Bankers Association

U.S. Mortgage Foreclosure Inventories by Loan Type

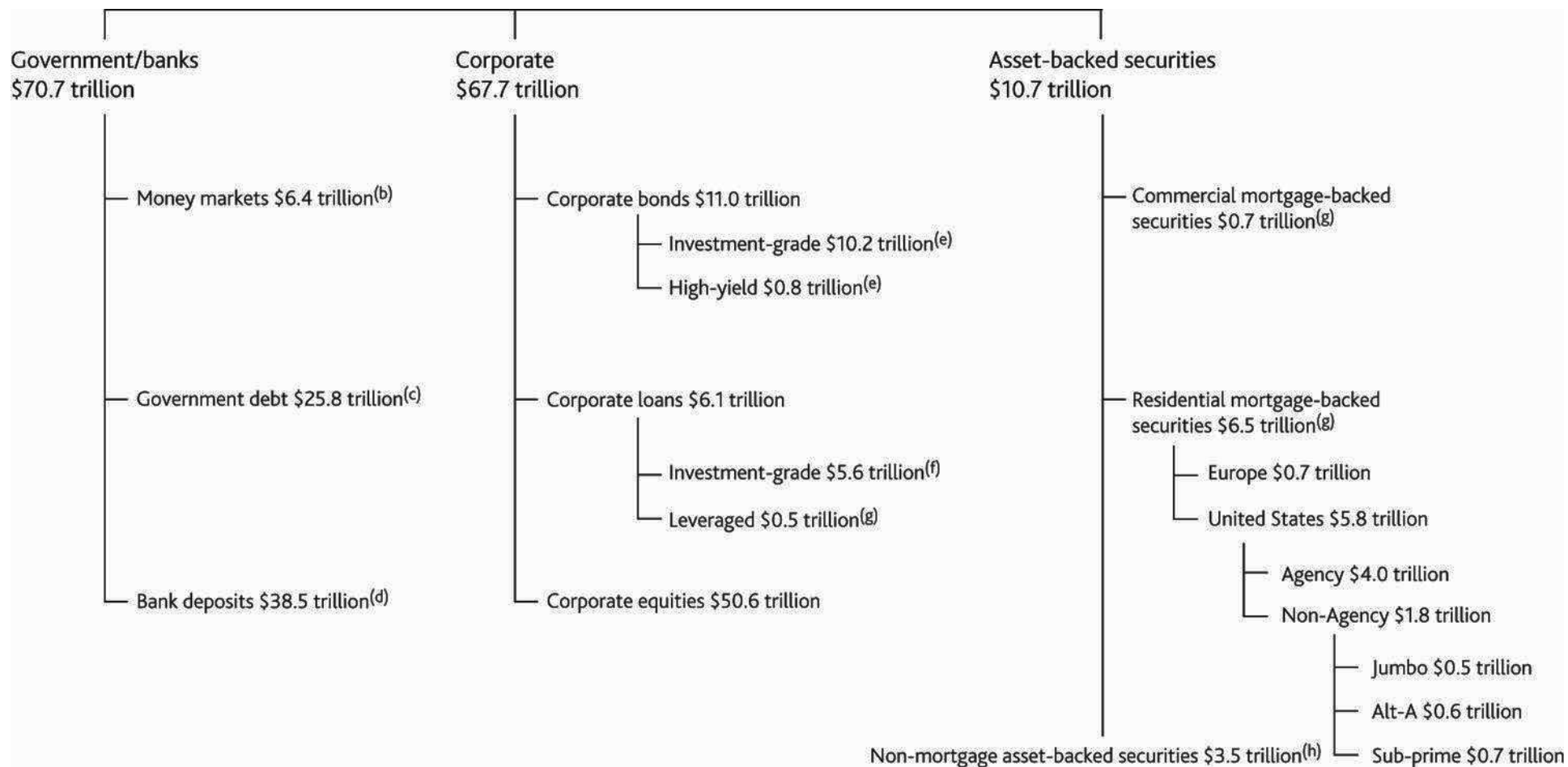
First Quarter 1998 through Second Quarter 2008



Note: Foreclosure Inventories

Source: Mortgage Bankers Association

Size of Financial Markets



Source: Bank of England Stability Report, 10/2007

Story

- A tiny part of securities markets has put asset markets around the world in a state of turmoil?
- How can that be?

Securitization of Mortgages

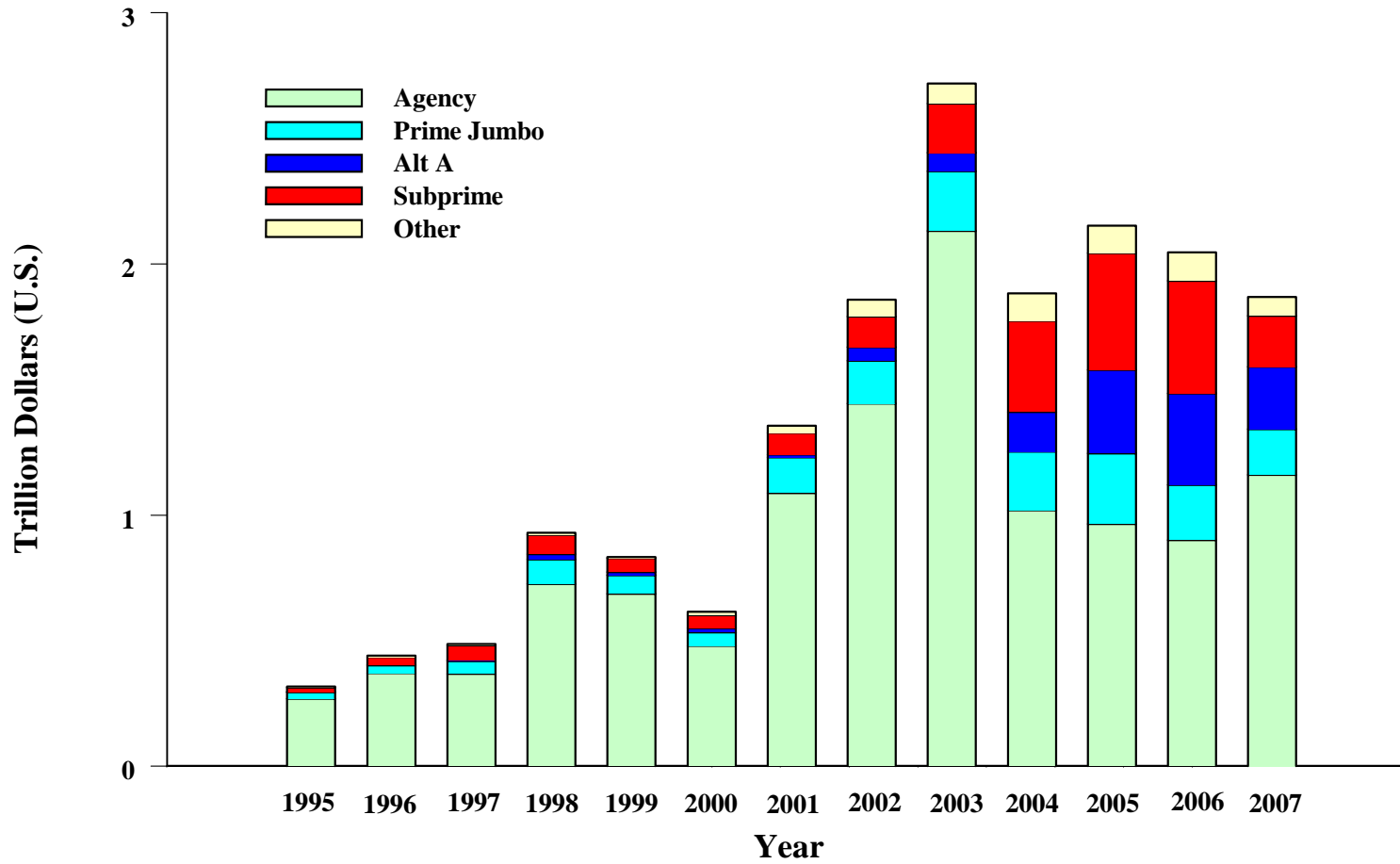
- Residential Mortgage Backed Securities (RMBS)
 - Mortgages are pooled together and sold on the open market
 - Agency securities
 - Others
- Collateralized debt obligations (CDO)
 - Credit instruments are pooled together (e.g. mortgages or mortgage backed securities), payments are divided into tranches and sold on the open market
 - A key difference is the division into tranches

Tranches on Securities

- Instead of one security (RMBS), several securities are issued (CDO)
 - Tranches
 - AAA (rated)
 - Mezzanine tranches (rated AA to BBB-)
 - Equity tranches (unrated)
 - Priority of paying determined by tranche
- Priority on a pool of mortgages, some paying, some not
 - Simple example (actually more involved)
 - Suppose that all mortgages paying but one
 - People who own AAA part get paid everything
 - People who own mezzanine part get paid everything
 - People who own equity part get paid everything except mortgage payment not made

U.S. Residential Mortgage-Backed Securities Issuance

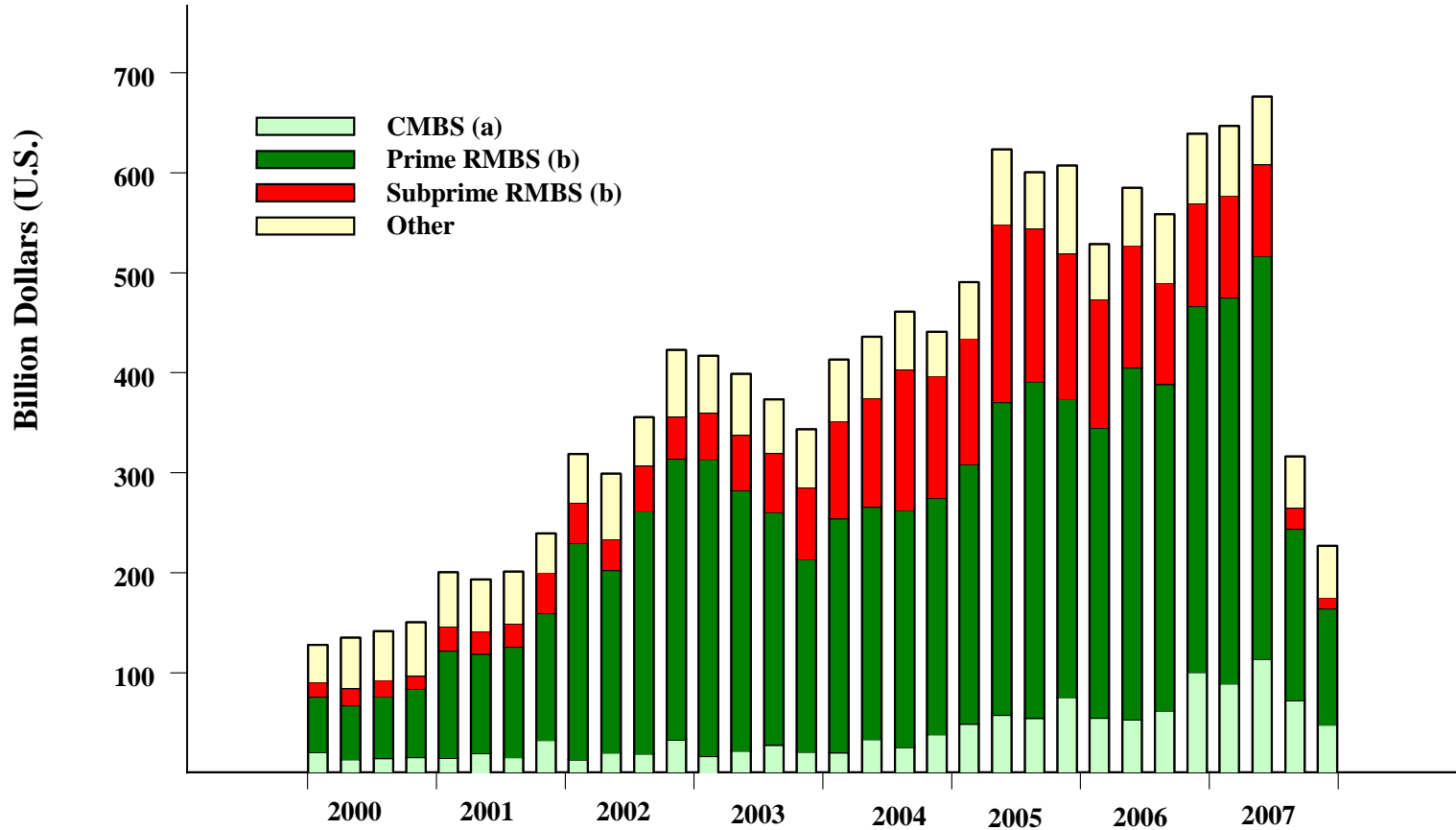
1995 through 2007



Source: Inside Mortgage Finance

Global Issuance of Asset-backed Securities

First Quarter 2000 through Fourth Quarter 2007



Source: Dealogic and Bank of England Financial Stability Report, April 2008

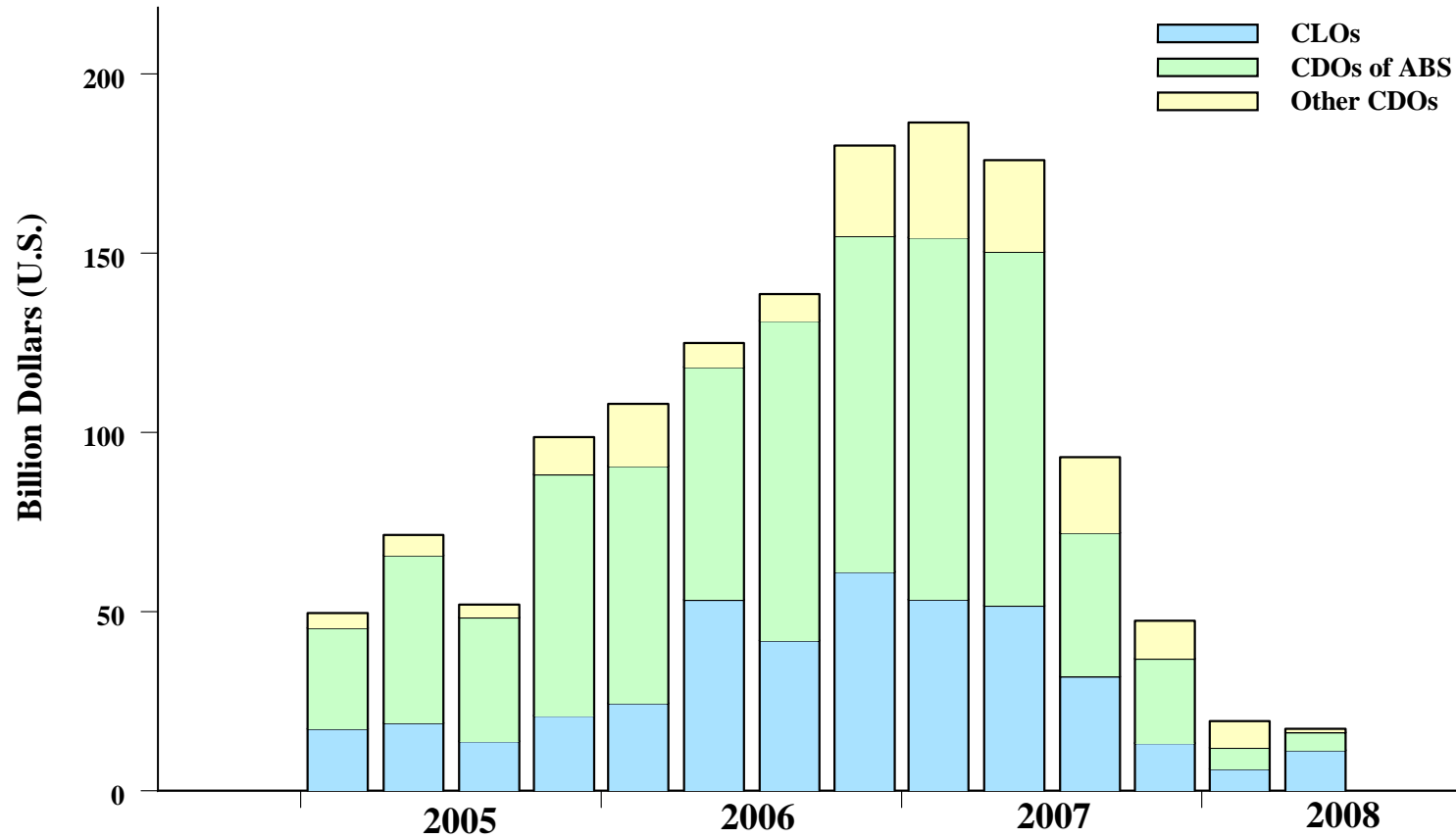
(a) Commercial mortgage-backed securities

(b) Residential mortgage-backed securities

(c) 'Other' includes auto, credit card and student loan ABS

Global Issuance of Collateralized Debt Obligations

First Quarter 2005 through Second Quarter 2008



Source: SIFMA

Market for CDOs

- CDOs are traded over the counter
 - Not on an organized exchange such as NYSE
 - Trade through brokers and dealers

CDOs

- CDOs are not identical
 - Standardized securities
 - The same provisions
 - The same developments determine the income received by the owner
 - Income received by each share is identical
 - Residential CDOs
 - Mortgage loans for houses
 - Each loan is likely to have idiosyncratic characteristics
 - Income received by AAA CDO owners not necessarily the same
 - Same for a particular deal (SPV)

Idiosyncratic Securities

- How are idiosyncrasies reduced in CDOs?
 - Portfolio of loans
 - Value tranches
 - AAA
 - Mezzanine
 - Equity
 - Idiosyncratic part most important for equity tranche

Securities and “Risk Sharing”

- CDOs were purchased by entities all over the world
- AAA rating made them seem like a fine purchase
 - AAA CDO is not a AAA corporate bond
 - CDO is based on a portfolio of loans
 - Behavior of cash flows in default is different
 - Ratings were conditioned on rising house prices

Two Developments Created Problems

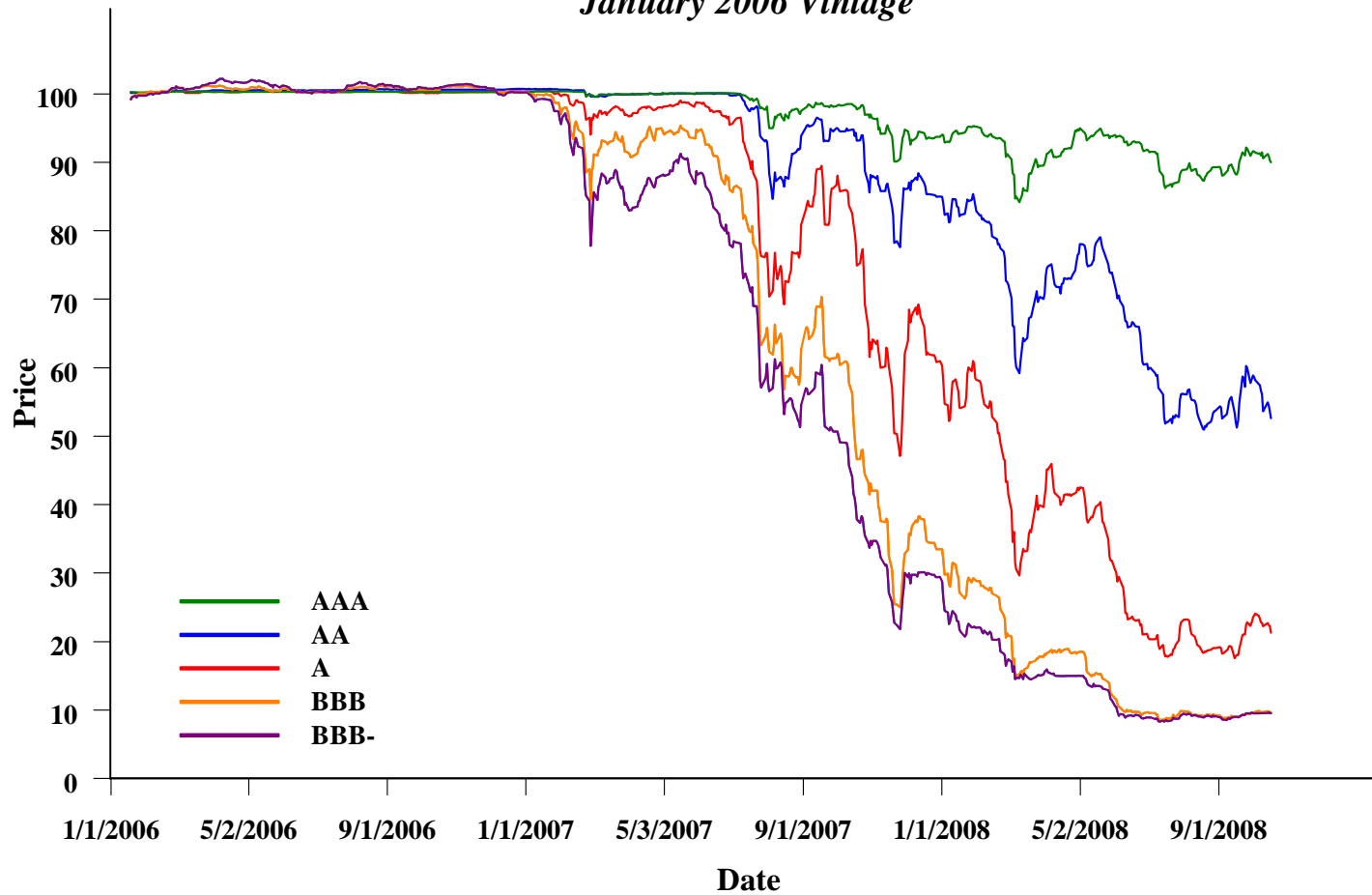
- Falling home prices increase probability of default
 - Loan-to-value matters
 - Date of issuance of mortgage
 - Location matters
 - Maybe issuer matters
- Rising delinquency rate due to problematic mortgages

Implications of Higher Probability of Default

- Correlation risk
 - By construction, portfolio of loans reduces idiosyncratic risk
 - A large common shock like falling home prices can make losses more highly correlated than anticipated
- Characteristics of specific loans become more important
 - Securities become more difficult to value
 - Tends to lower price
- Volume in over-the-counter market decreases
 - Tends to lower price

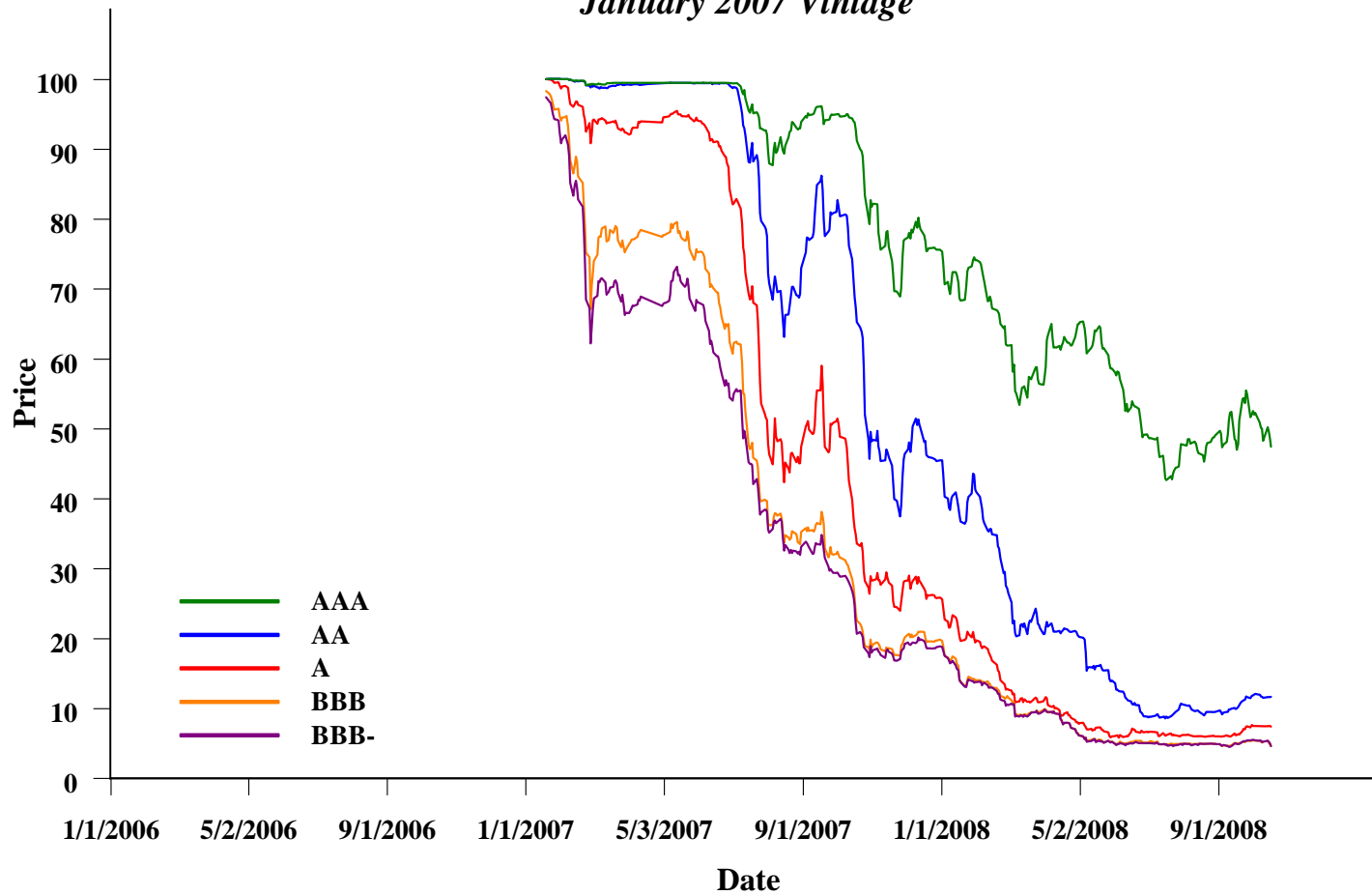
Index of CDO Prices

January 2006 Vintage

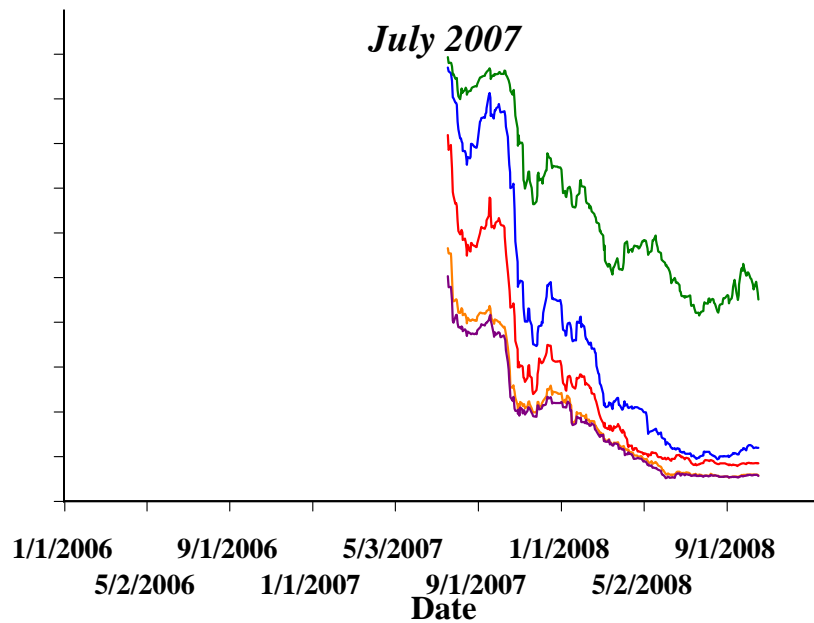
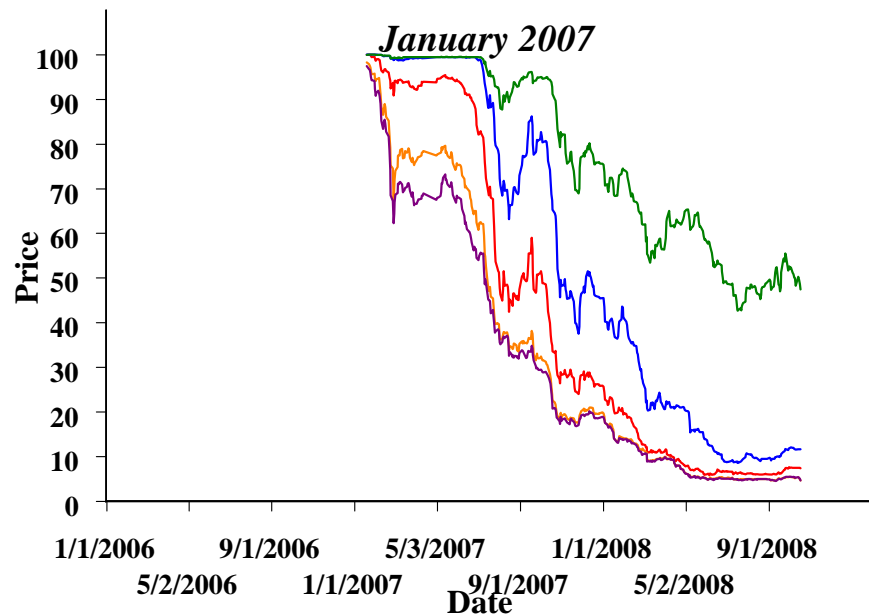
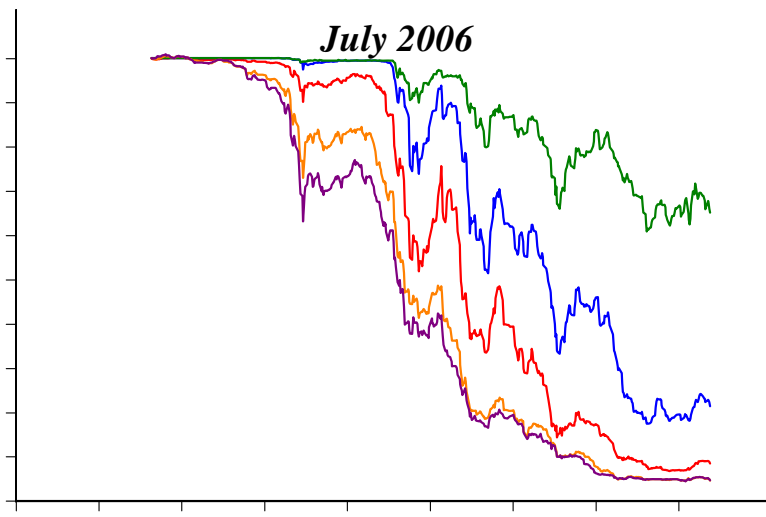
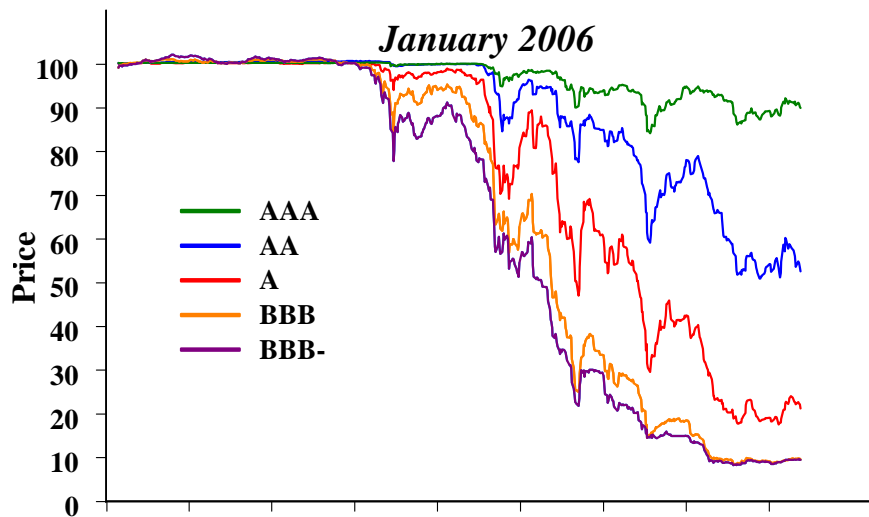


Index of CDO Prices

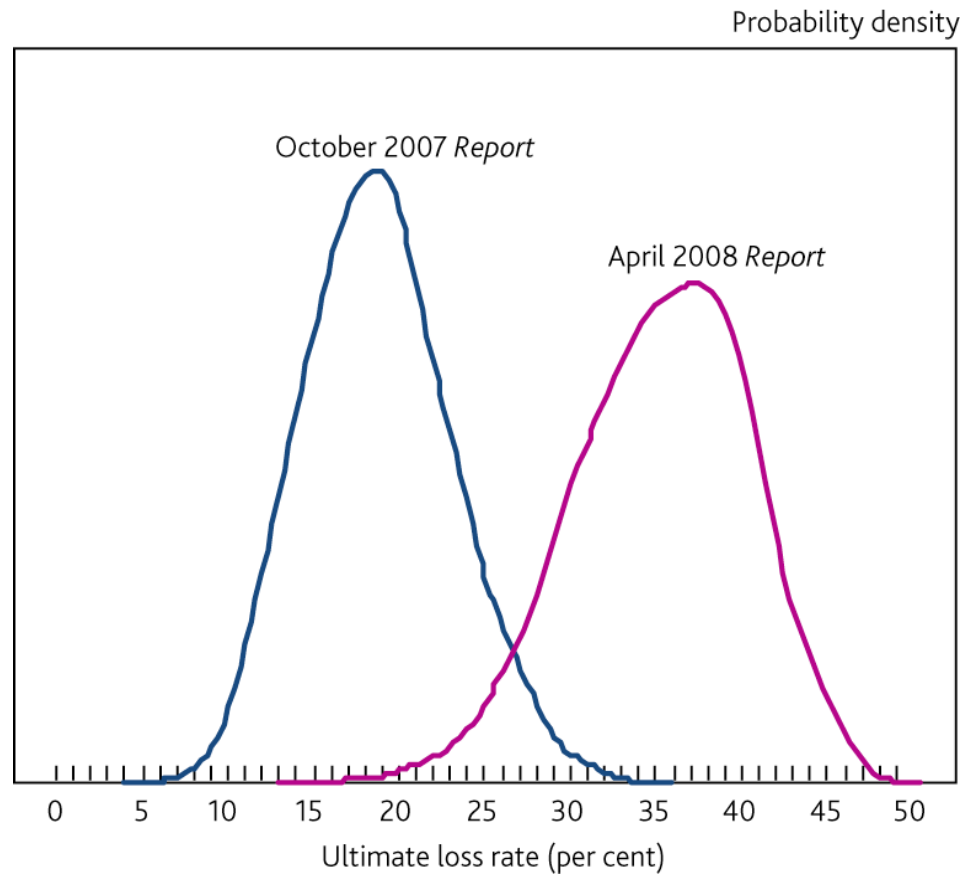
January 2007 Vintage



Indices of CDO Prices

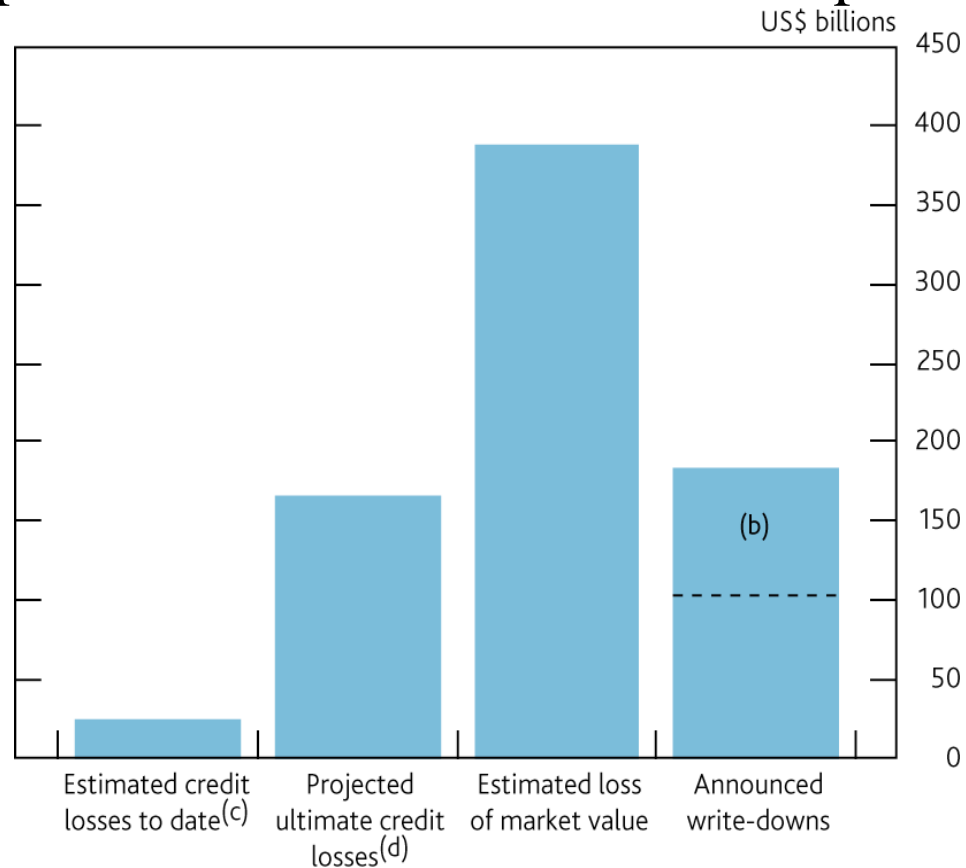


Market-implied Expectations of Ultimate Loss Rates on U.S. Subprime Mortgages



Source: Bank of England calculations using data from JPMorgan Chase & Co.

Estimated Losses on Subprime Asset-backed Securities April 2008



Sources: Banks' financial statements, Bank of America, BlackRock, Dealogic, JPMorgan Chase & Co., Moody's Investors Service, Standard and Poor's and Bank of England calculations.

(b) Area below dotted line shows net write-downs by major UK banks and LCFIs since the start of 2007 to 22 April 2008, while total height of bar shows an S&P estimate (published on 13 March 2008) of write-downs by all investors.

(c) This estimate is derived from data on actual delinquency rates on outstanding mortgages by vintage and an assumption about the transition from delinquency to default

(d) This estimate is derived in the same way as for estimated credit losses, but assuming that serious delinquency rates on different vintages continue to rise at their average rate to date until the mortgages are four years old, when they are assumed to be plateau.

Failures of Financial Institutions

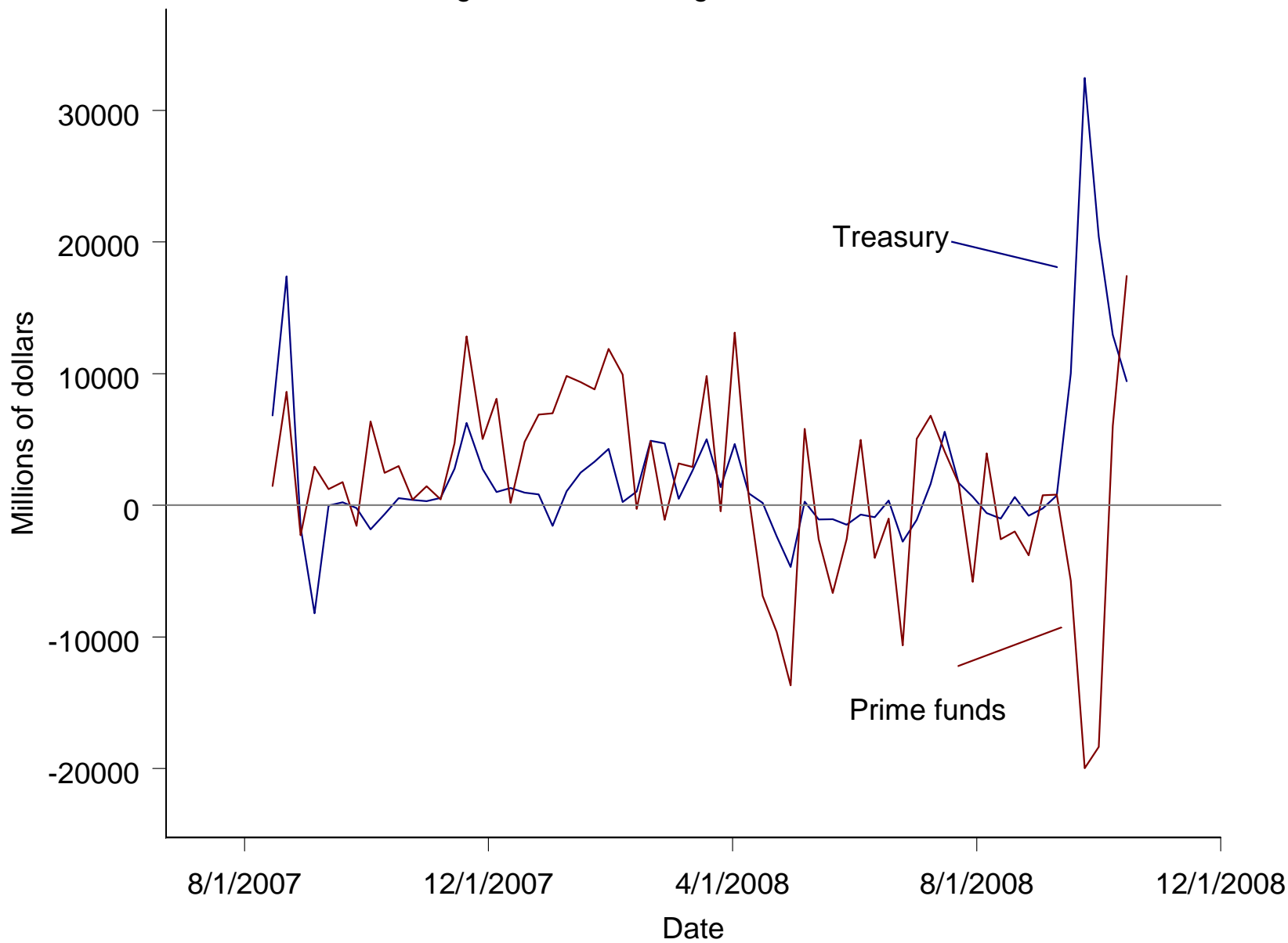
- Smaller banks
- Bear Sterns
- Fannie Mae and Freddie Mac
- Washington Mutual
- Lehman Brothers
- AIG
- More to follow

Run on Money Market Funds

- Lehman Brothers filed for bankruptcy on September 15
- Reserve Primary Fund held about 1 percent of its assets in Lehman Brothers commercial paper
- Reserve Primary Fund had large withdrawals
 - \$65 billion in early September
 - \$8.5 billion by September 22
- Prime Reserve Fund net asset value fell 3 percent on September 16

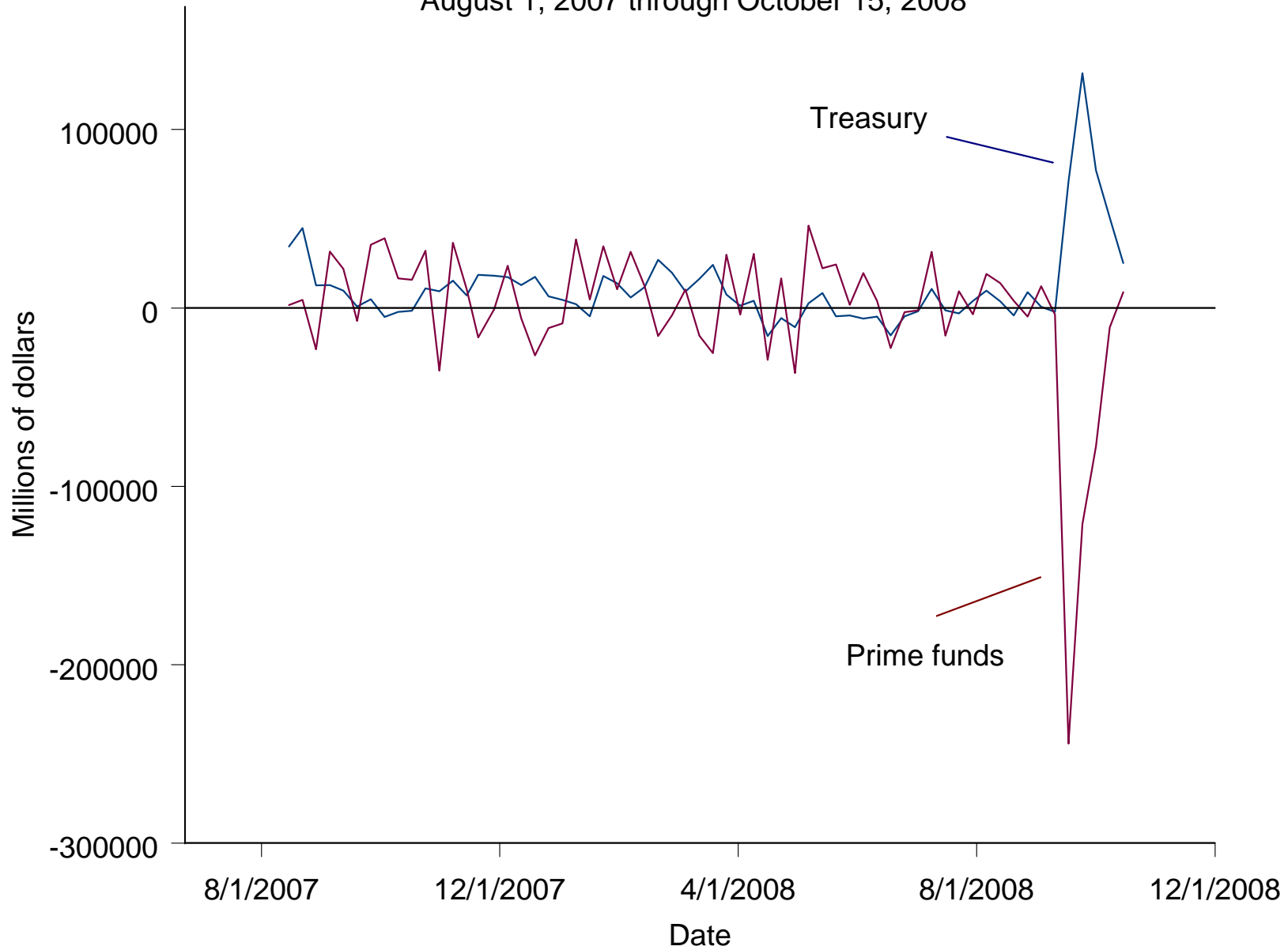
Net Changes in Retail Assets in Money Market Funds

August 1, 2007 through October 15, 2008



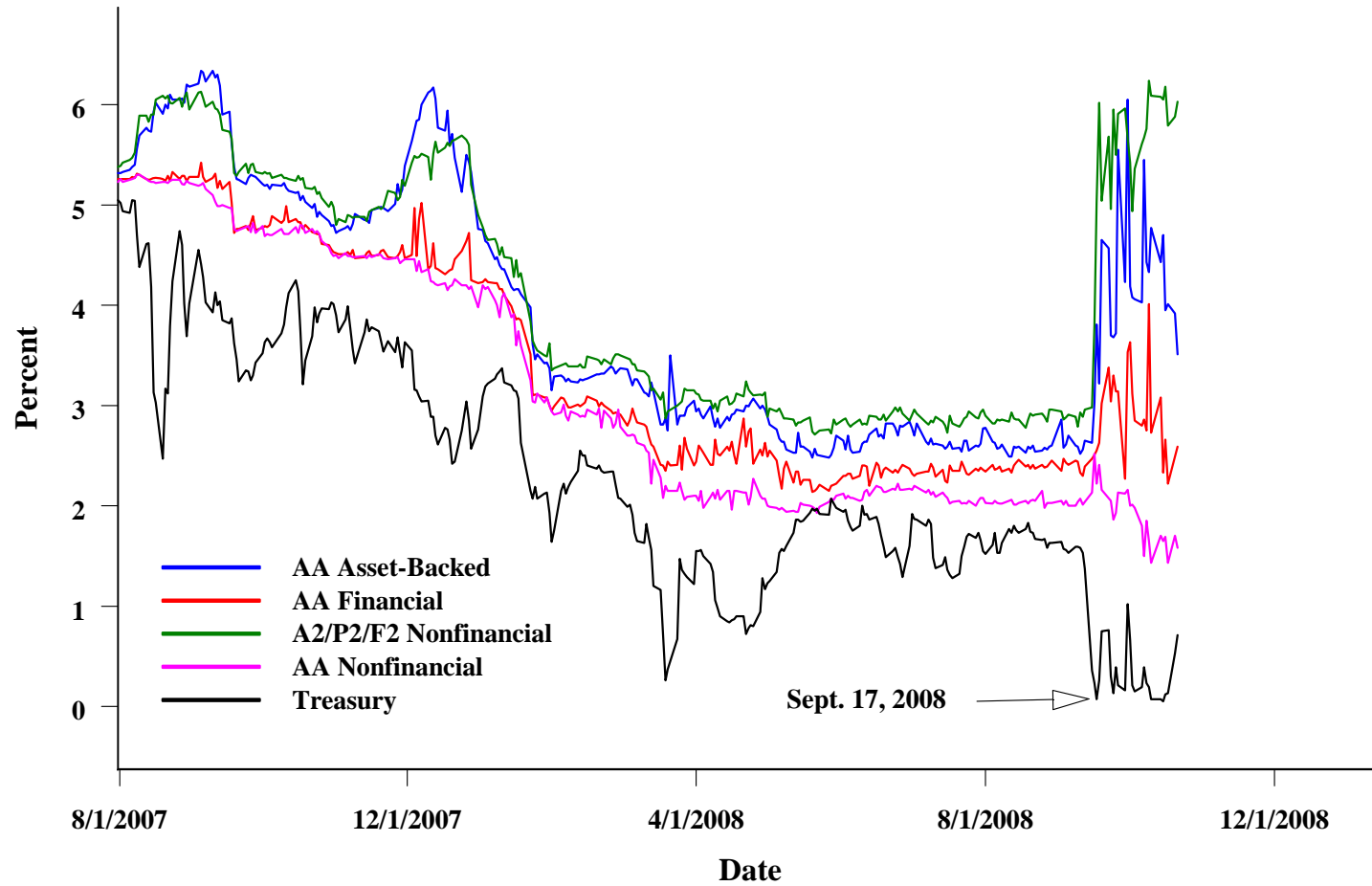
Net Change in Institutional Assets in Money Market Funds

August 1, 2007 through October 15, 2008



30 Day Commercial Paper and Treasury Rates

August 1, 2007 through October 21, 2008



Responses to Effects on Funds and Commercial Paper Market

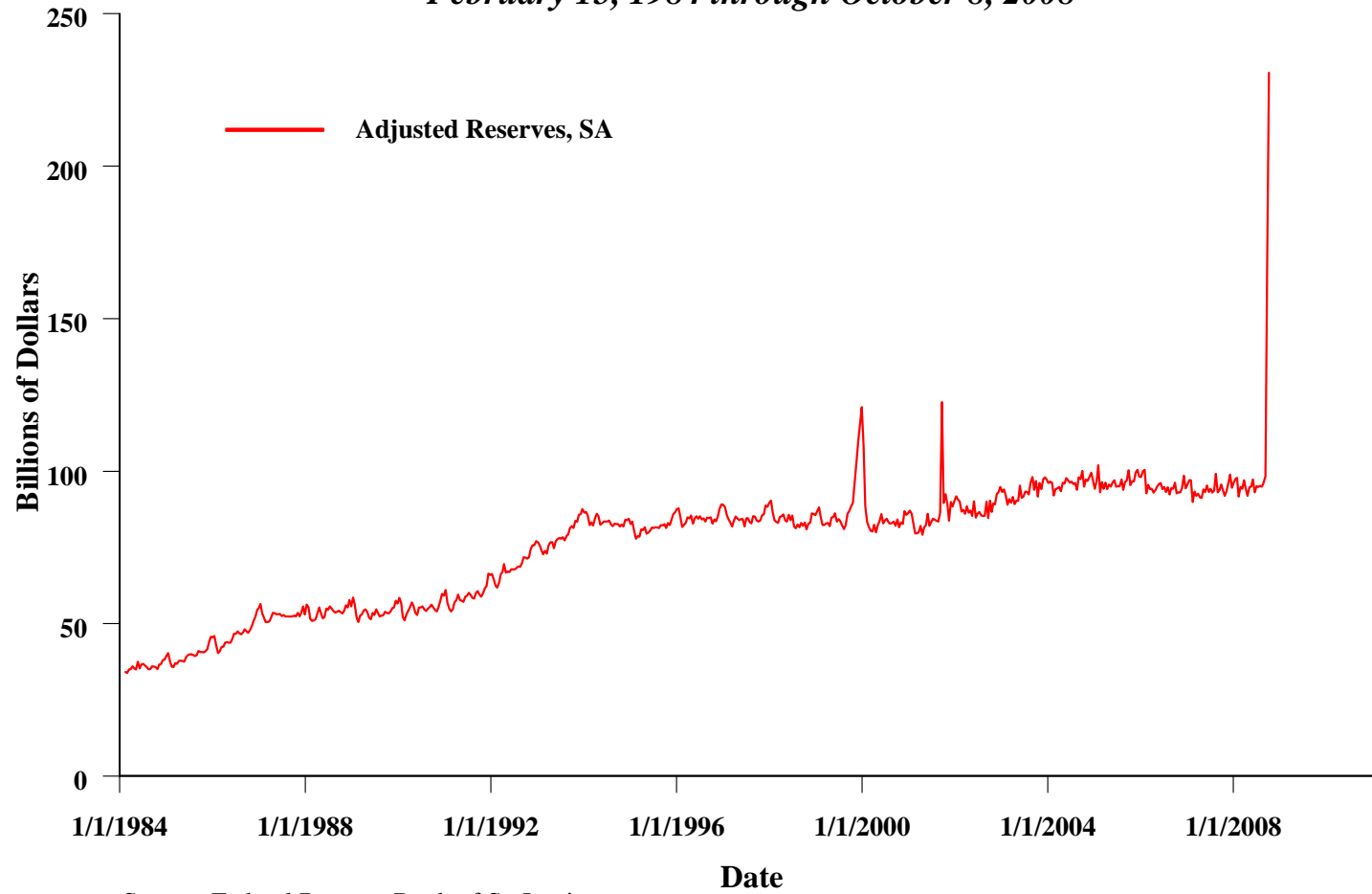
- Treasury set up insurance for investor's accounts at money market funds
- Federal Reserve buying commercial paper from some issuers
- Entities set up to buy commercial paper from money market funds

General Policy Measures

- Lower Fed Funds rate and borrowing rate
- Fed lending Treasury securities in exchange for a broad range of assets
- Fed providing investment banks access to Federal Reserve funds

Adjusted Reserves

February 15, 1984 through October 8, 2008



Source: Federal Reserve Bank of St. Louis

Government Intervention in Particular Institutions and Markets

- Mortgages
- Fannie Mae and Freddie Mac
- Bear Stearns, Lehman, AIG, Wachovia
- Economic Recovery Act

Foreign Governments

- Foreign central banks have been borrowing dollars from the Federal Reserve to lend to commercial banks in Europe
 - Probably more important than is commonly realized
 - Foreign commercial banks have substantial losses on U.S. dollar denominated assets such as CDOs
 - Falling real estate prices in Europe
- Resolution of failing firms
- Guarantees of deposits and other liabilities

Is It Over? No.

- Developments as a result of losses will continue
- More financial problems may surface
 - “You never know.”
- U.S. residential construction at a low level
 - Likely to continue for some time
- Flat to falling house prices

Financial Difficulties

- It's the truck you don't see that runs you down
- Financial innovation often associated with episodic difficulties
 - Much of history of U.S. financial system
 - U.S. 2005 or so to 2008

