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# THE FINANCIAL CRISIS: WHAT CAUSED IT?

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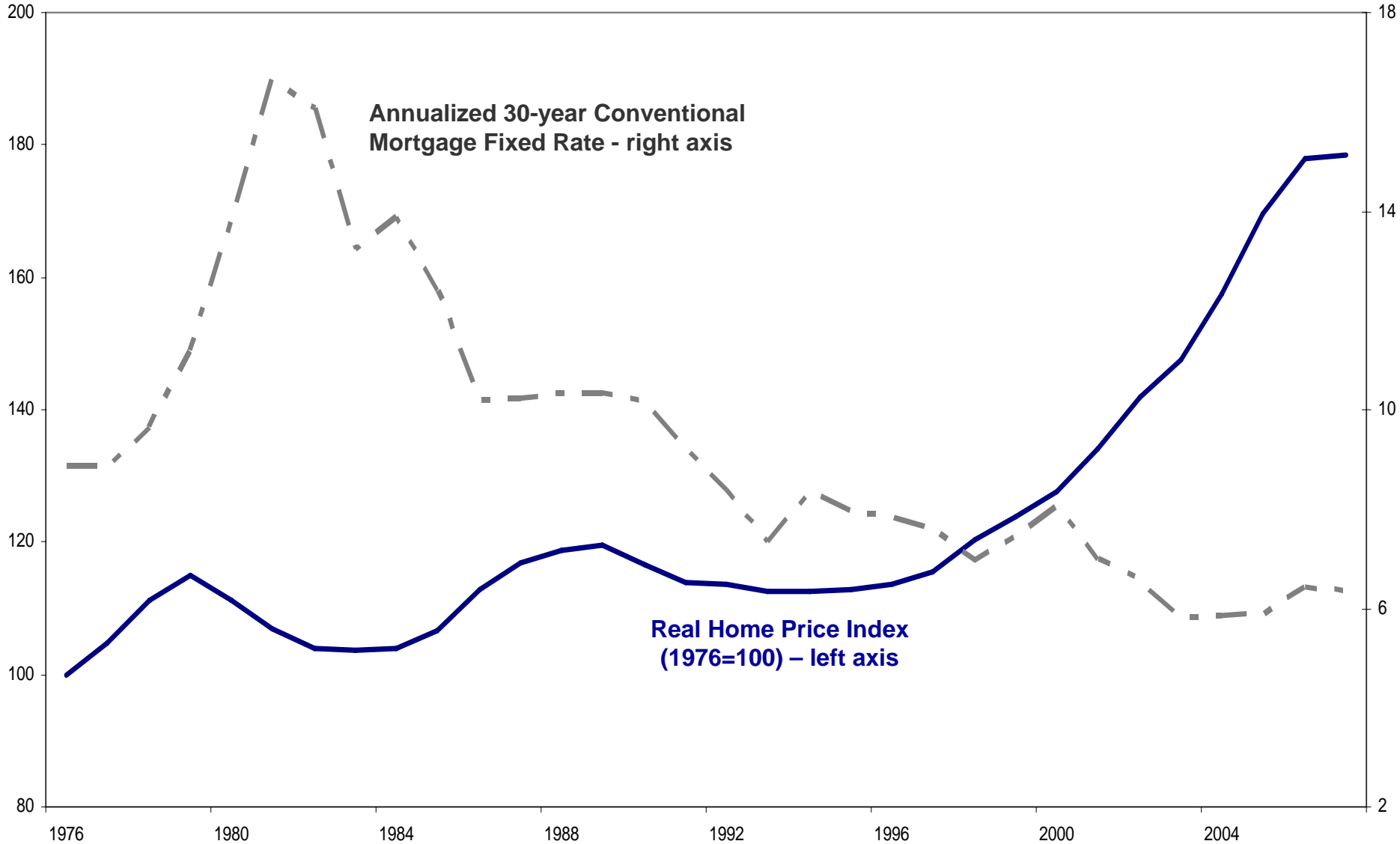
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# Summary

- The rapid and sustained rise in home prices made real estate investment seem like a sure thing.
- A self-reinforcing cycle developed in which money flowed into mortgages and mortgage-backed securities, adding to housing demand and driving up prices.
- Securitization has been around for a long time, but new complex securities both added to the supply of funds and masked the real risks. Rating agencies did not provide adequate or accurate guidance.
- Some financial institutions were borrowing at low very-short-term rates to buy riskier longer term securities.
- Mortgage lending standards were weakened to keep the cycle going. In part, this was to expand lending to families without strong income or credit histories, but largely it was to allow formerly-prime-borrowers to take cash out or to buy larger homes. Regulators did not act to prevent this from happening.
- Default rates started to rise and some financial institutions reported heavy losses in the spring of 2007. In the summer of 2007 there was a tipping point and the risk premium spiked up. Financial institutions were no longer able to roll over their borrowing except at much higher interest rates. The prices of mortgage-backed securities tumbled and/or they became illiquid.
- Financial institutions that were required to mark their assets to market reported very large losses and in some cases became insolvent.
- The Federal Reserve has acted aggressively and correctly 1. to sustain aggregate demand, 2. to provide increased liquidity, and 3. to deal with insolvent institutions.
- The real economy has been adversely affected by the large drop in residential construction. Given the policy response, there is a good chance of avoiding a deep recession. However the threat is substantial for further financial turmoil, a large reduction of business and consumer lending and a sharp drop in non-residential investment and consumption.

# Declining Mortgage Interest Rates Fueled Strong Housing Demand. After the Dot-Com Bust, Real Estate was seen as a “Sure Thing.”

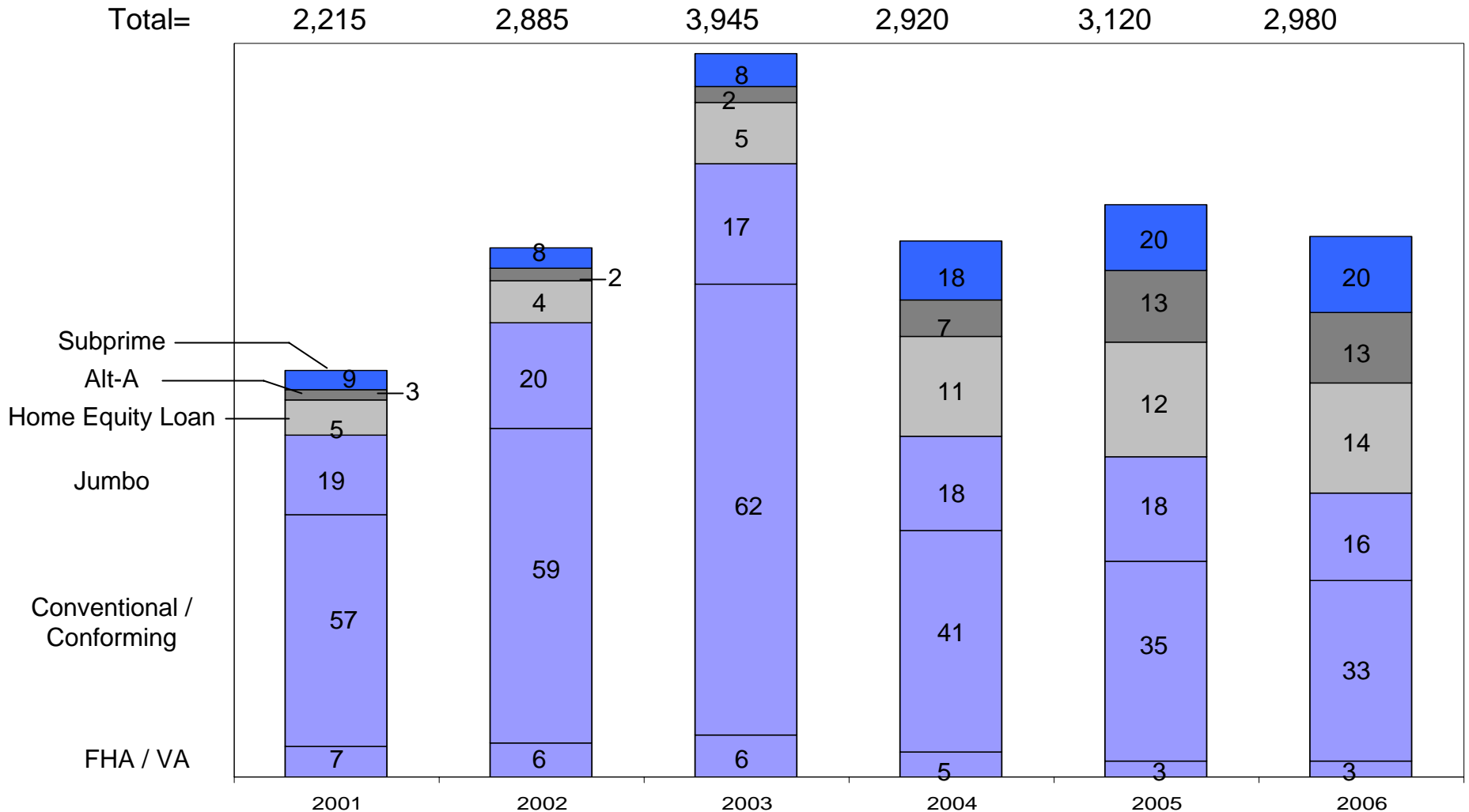
Nominal Home Prices from OHFEO deflated by CPI less shelter; 30 year Mortgage Rate



# The Expansion of Mortgage Lending and Mortgage-Backed Securities

# Conventional Mortgage Lending Grew Rapidly 2001-2003. Subprime and Home Equity Lending Exploded 2003-2006

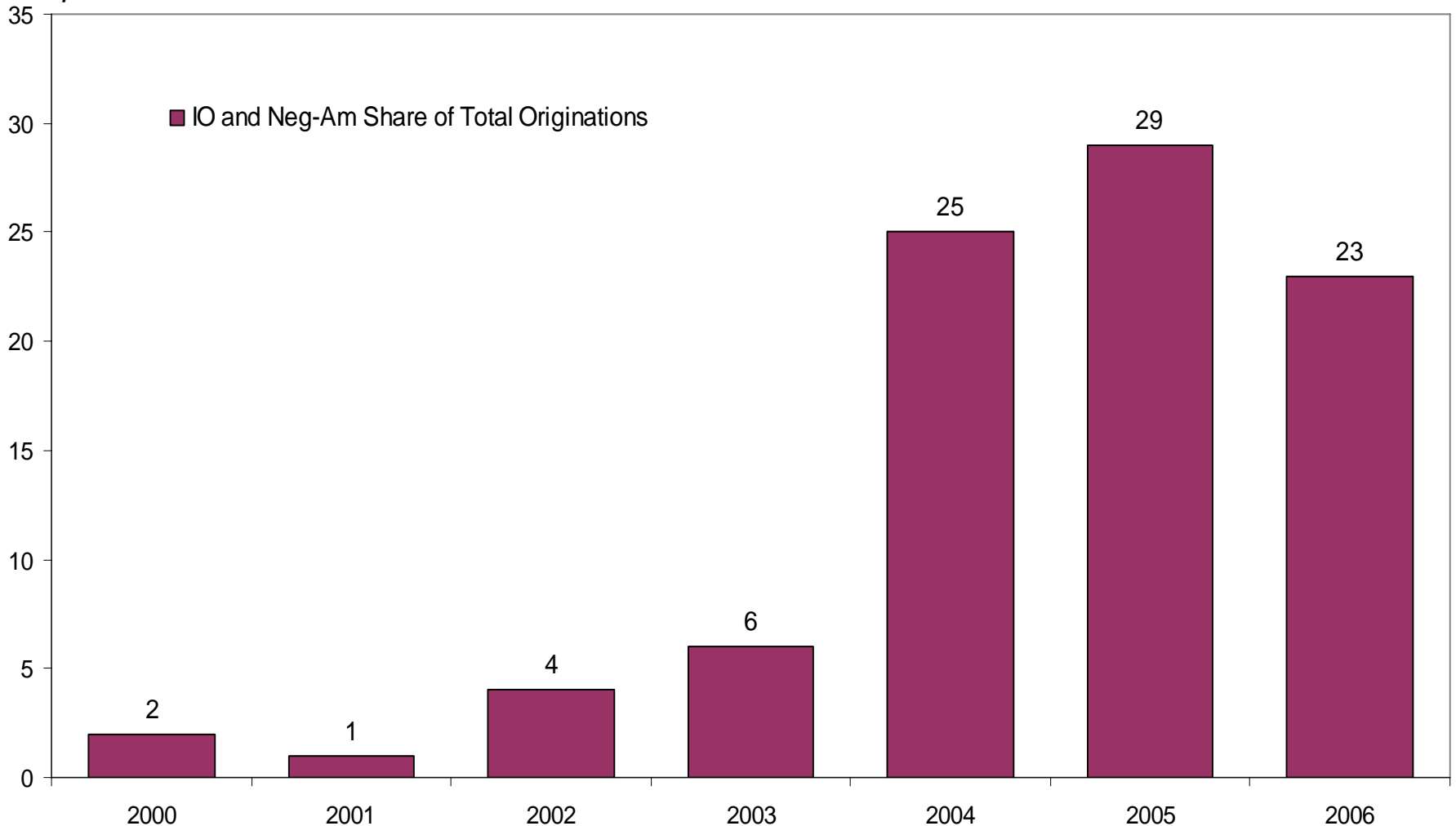
Total mortgage originations by type; with share of total originations by product: in Percent; billions US\$



Source: Inside Mortgage Finance

# Starting in 2004 Lenders moved into Riskier Lending by Making Interest Only and Negative Amortization Loans. Much of the Lending was Made not to Low-Income Borrowers, but to those Seeking Cash for Other Spending, or Wanting More Expensive Houses

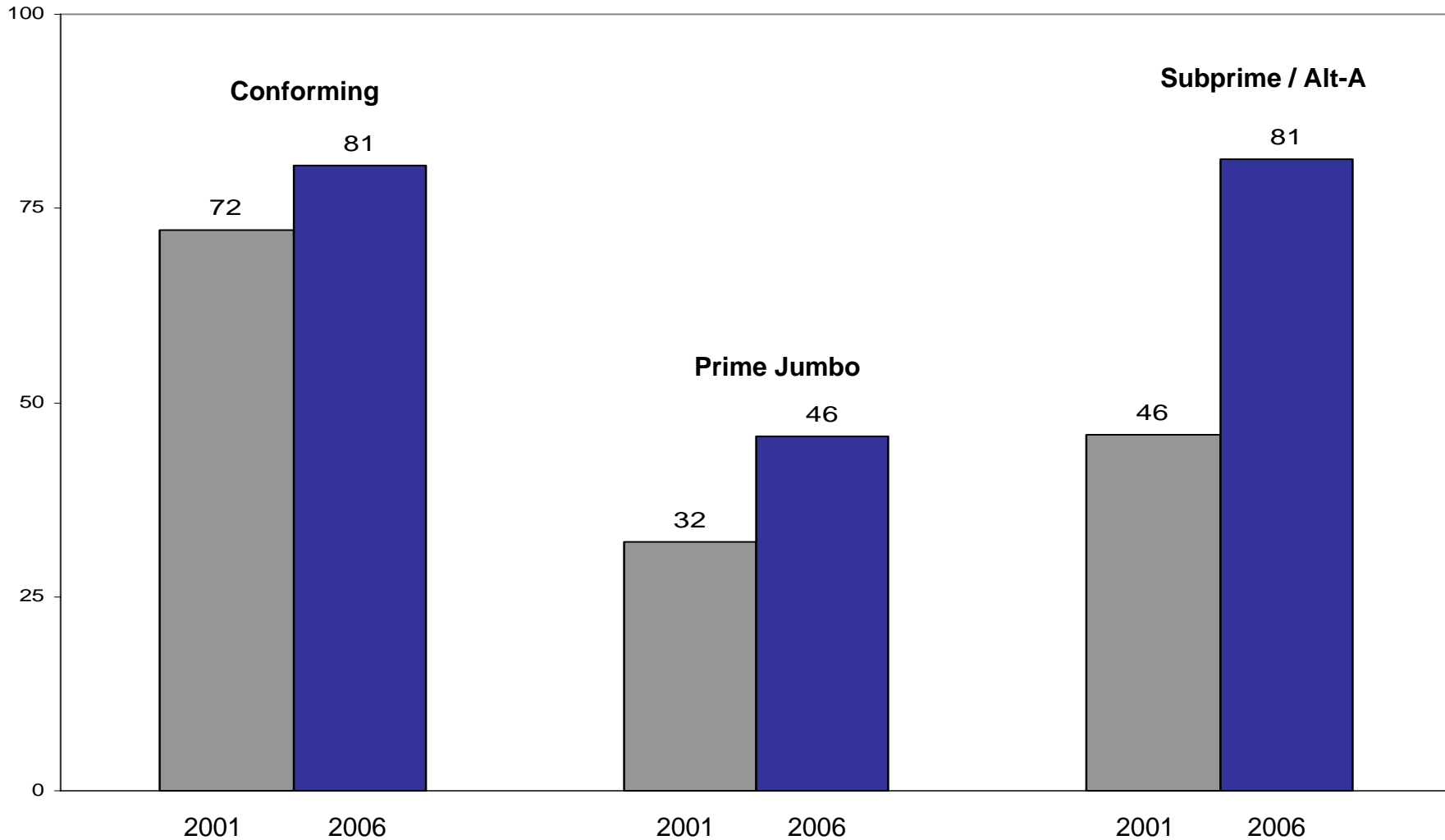
*Interest-Only and Negative Amortization Share of Total Purchase Mortgage Originations: 2000-2006; percent*



Source: Credit Suisse; LoanPerformance

# Securitization was Important in Expanding the Supply of Higher-Risk (Non-Conforming) Loans

*Securitization Rates, percent. 2001 and 2006, by type of mortgage loan*



Source: Inside Mortgage Finance

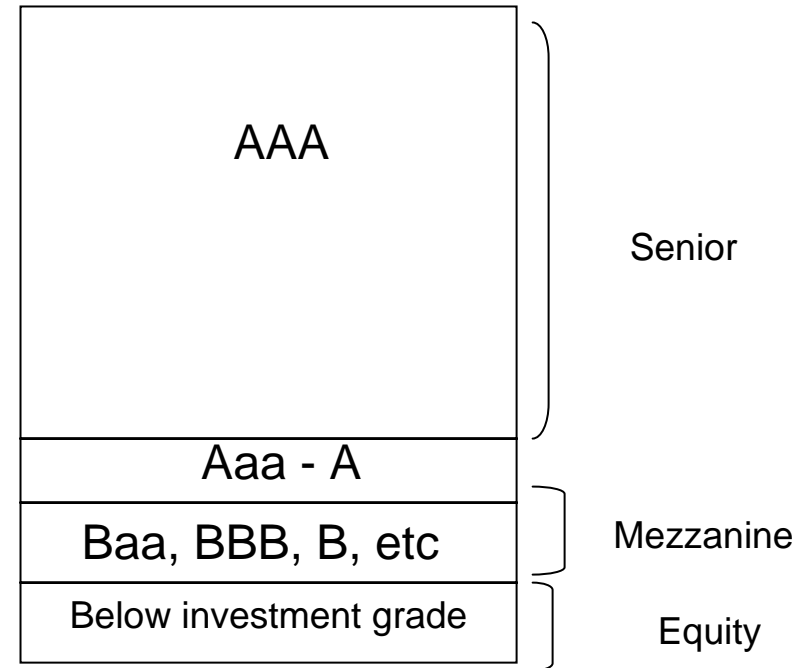
# Residential Mortgage-Backed Securities (RMBS) Are Divided into Tranches with Different Credit Ratings

An RMBS is a securitized pool of up to thousands of mortgage loans, typically dispersed throughout the country in an effort to create geographic diversification

Different mortgage loans



Regardless of the quality of the underlying loans, each MBS can be separated into “tranches” based on risk and order of payment. AAA is paid first, and equity tranche is paid last. A typical MBS is usually broken down as 90 percent senior and 10 percent below AAA (source: Mason and Rosner). AAA are the safest, and thus pay the lowest yield to the investor. Equity are the riskiest and pay the highest yield.



Some MBS are made up exclusively of prime mortgages, others only of subprime, or Alt-A, etc.



## **Structured Investment Vehicles (SIVs) and Collateralized Debt Obligations (CDOs) Added Further to Supply and Masked Risk**

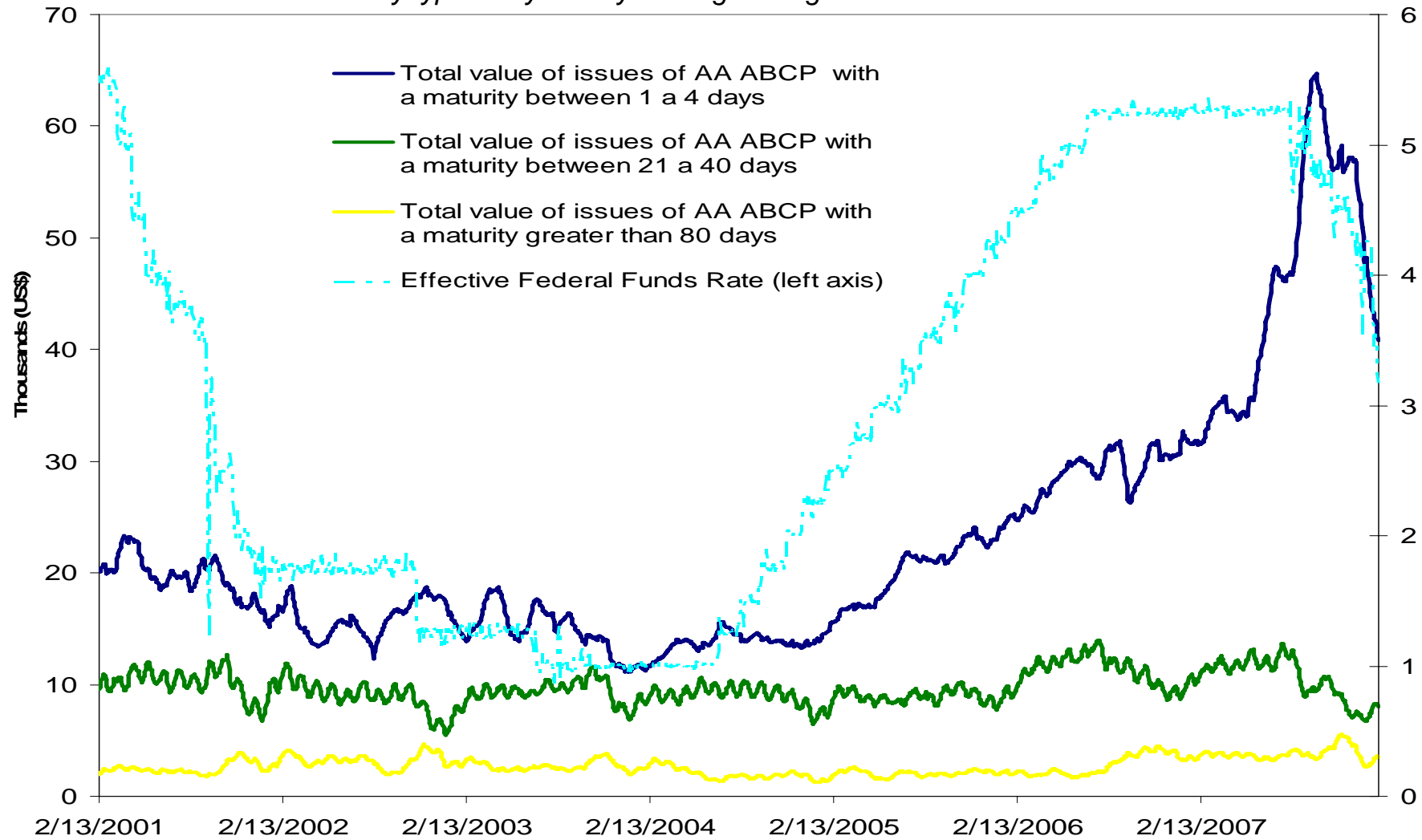
- CDOs represented a further step in securitization. CDO issuers bought different tranches of RMBS and pooled them together with bonds, credit card debt and other asset-backed securities. Working with advisors from the rating agencies, they created a new set of tranches with varying credit ratings. The tranching and re-tranching of the assets contributed to the lack of transparency.
- SIVs held RMBS, CDOs and other institutional debt. Their liabilities were asset backed commercial paper (ABCP) and medium term notes. They earned profits from the spread between their short-term liabilities and long-term debts—as long as they could borrow at low short term interest rates with low risk premia and the default rate on the long term assets they held stayed relatively low.
- Issuers would purchase credit default swaps (CDS) or mortgage insurance to shield themselves from the default risk of these assets and to raise ratings on the securities they issued. When the crisis hit, the value of this insurance declined because of concerns about the ability to collect on it.
- CDO issuance was around \$300 billion in both 2006 and 2007. SIV assets peaked at \$400 billion in July 2007.

# **Low Perceived Risk Drove a Bubble of Rising Prices and a Lowering of Lending Standards**

- The perceived risk in real estate-backed assets fell, prices rose and investment banks increased their leverage.
- There was a feedback loop as rising asset prices created stronger balance sheets, which increased target leverage among banks, which increased demand for more assets, which drove prices up even more.
- Regulation specified capital requirements. In order to increase leverage, off-balance sheet entities were created that held the Structured Investment Vehicles (SIVs).
- A key step in the crisis was the lowering of lending standards. Originators were able to pass the risks down the line. Regulators should have acted but did not.

# Complex Financial Instruments were Increasingly Funded by Very Short Term Borrowing, with Maturities of One to Four Days. High Reliance on Short Term Borrowing Creates Vulnerability to Liquidity Risk, but until Summer 2007 this risk was not perceived to be a problem.

Value of issues of ABCP by type: daily 30 day moving average since Feb 2001

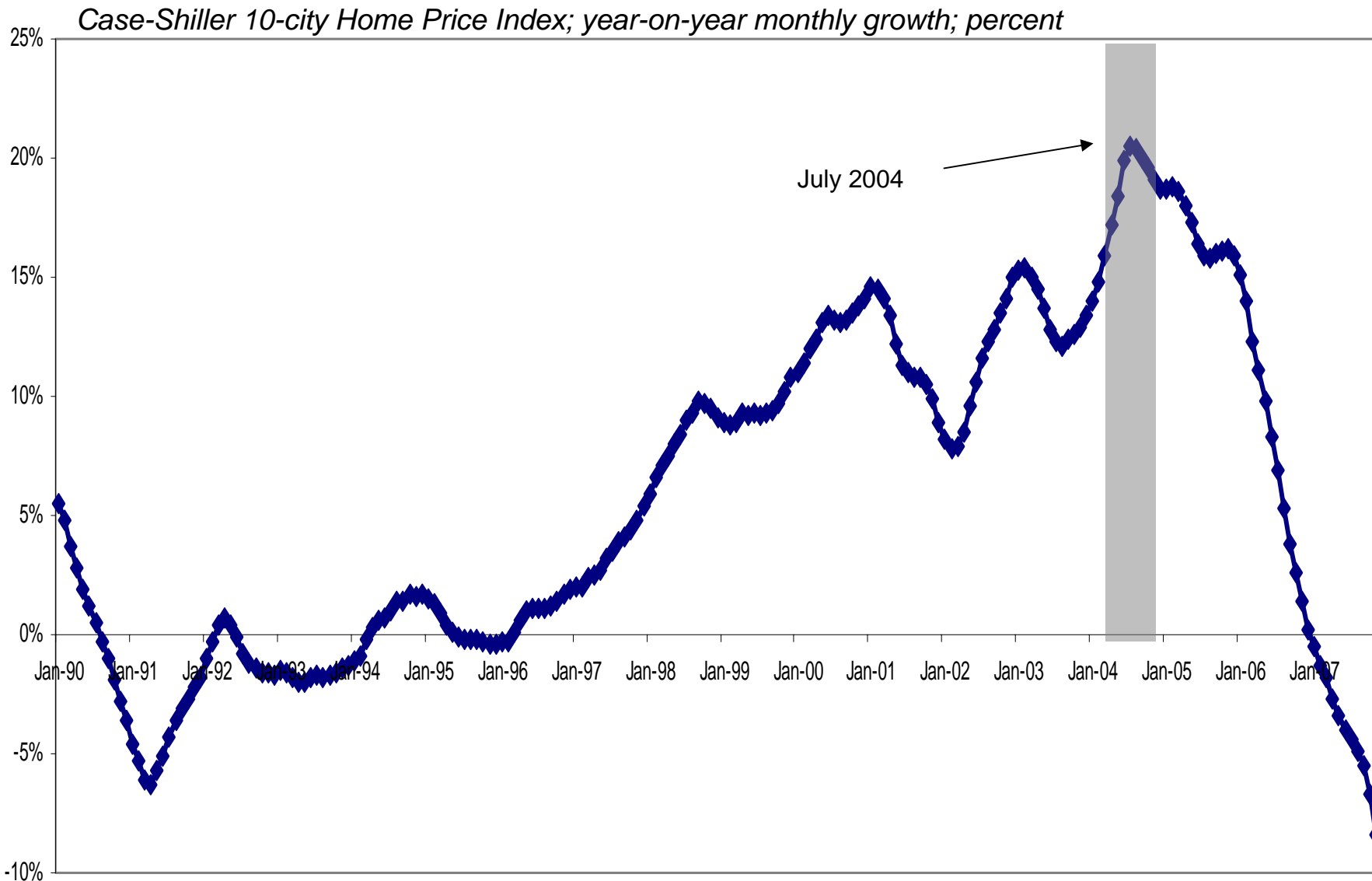


## The Impact of Ratings Agencies

- The lack of transparency of CDOs made the market reliant on the grades of ratings agencies as a signal of the risk of CDO assets.. Furthermore, CDOs are such complex instruments themselves that independent judgment of risk is very difficult.
- Unlike in corporate bond markets, ratings agencies did not passively rate the risk of a given asset; rather, they played an active, instrumental role in structuring the tranches and advised the CDO managers how to maximize the share of AAA and other highly-rated tranches. This created a potential conflict of interest.
- CDO managers want the share of AAA-graded securities in a given CDO to be as high as possible because they are the cheapest source of funding.
- CDO's are inherently more risky than MBS / ABS, as they typically hold the equity tranches of MBS and ABS. With high credit ratings and high yields, the demand for these assets was very strong. In practice, different assets with very different default probabilities were sometimes all given AAA ratings—inconsistency in ratings.

Once Housing Price Increases  
Slowed, Defaults Started to  
Rise and the Bubble Burst

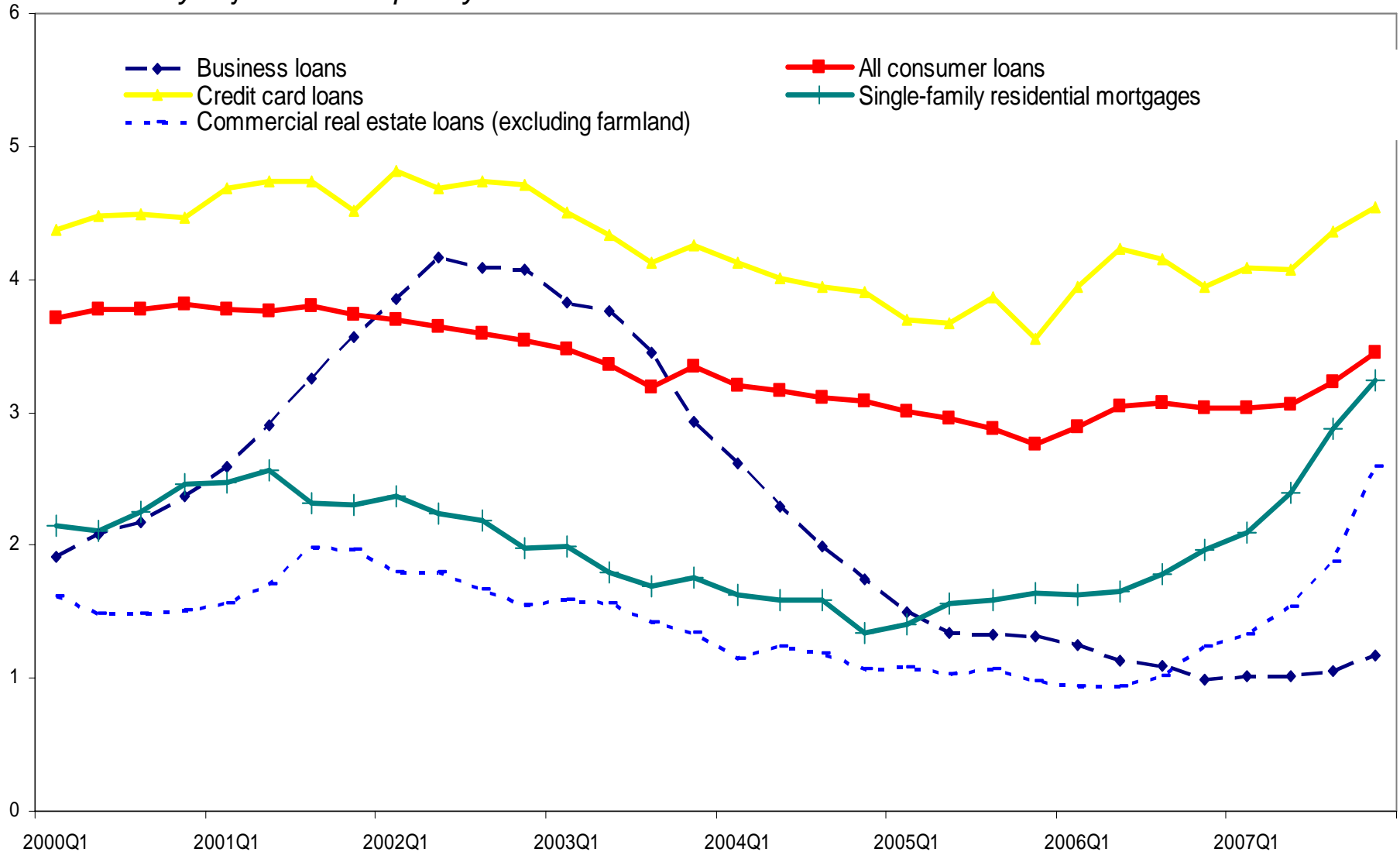
# The Rate of Growth of House Prices Began to Decline Starting in Mid-2004. Prices Began to Decline in 2007 as the Price Bubble Burst



Source: S&P / Case-Shiller Index

# Delinquency Rates Started to Rise for Mortgages starting in 2004Q4 – immediately after house prices increases slowed. Delinquencies on most other financial assets also began to rise also.

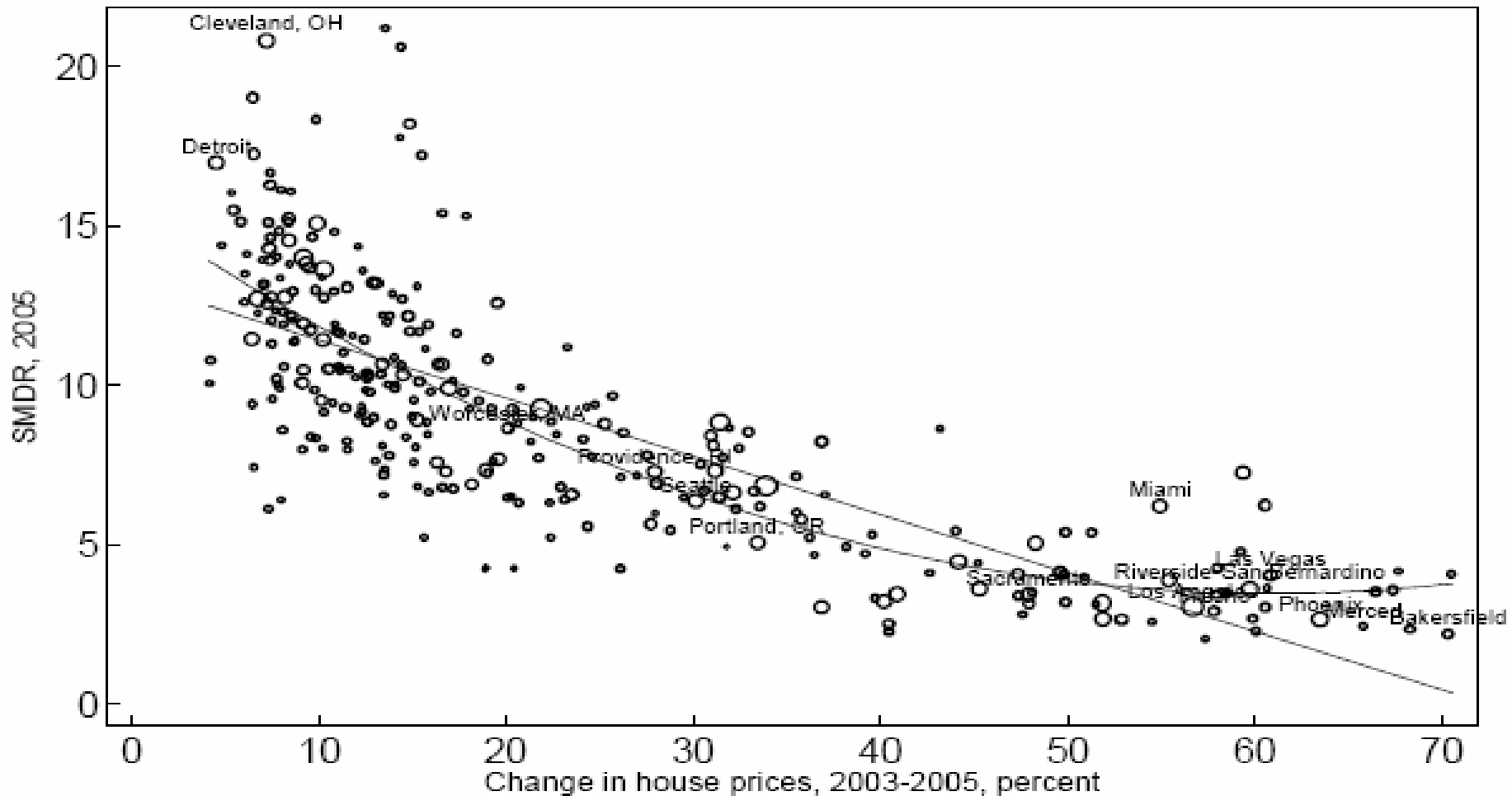
Seasonally adjusted Delinquency Rates on Loans at all Commercial Banks



Source: Federal Reserve Board of Governors

**Low or Negative house price appreciation made default a financially attractive option, especially among risky borrowers with negative equity. There is a strong negative correlation between sub-prime delinquency rates and house price appreciation.**

**Figure 4: Changes in House Prices and SMDRs in 2005**



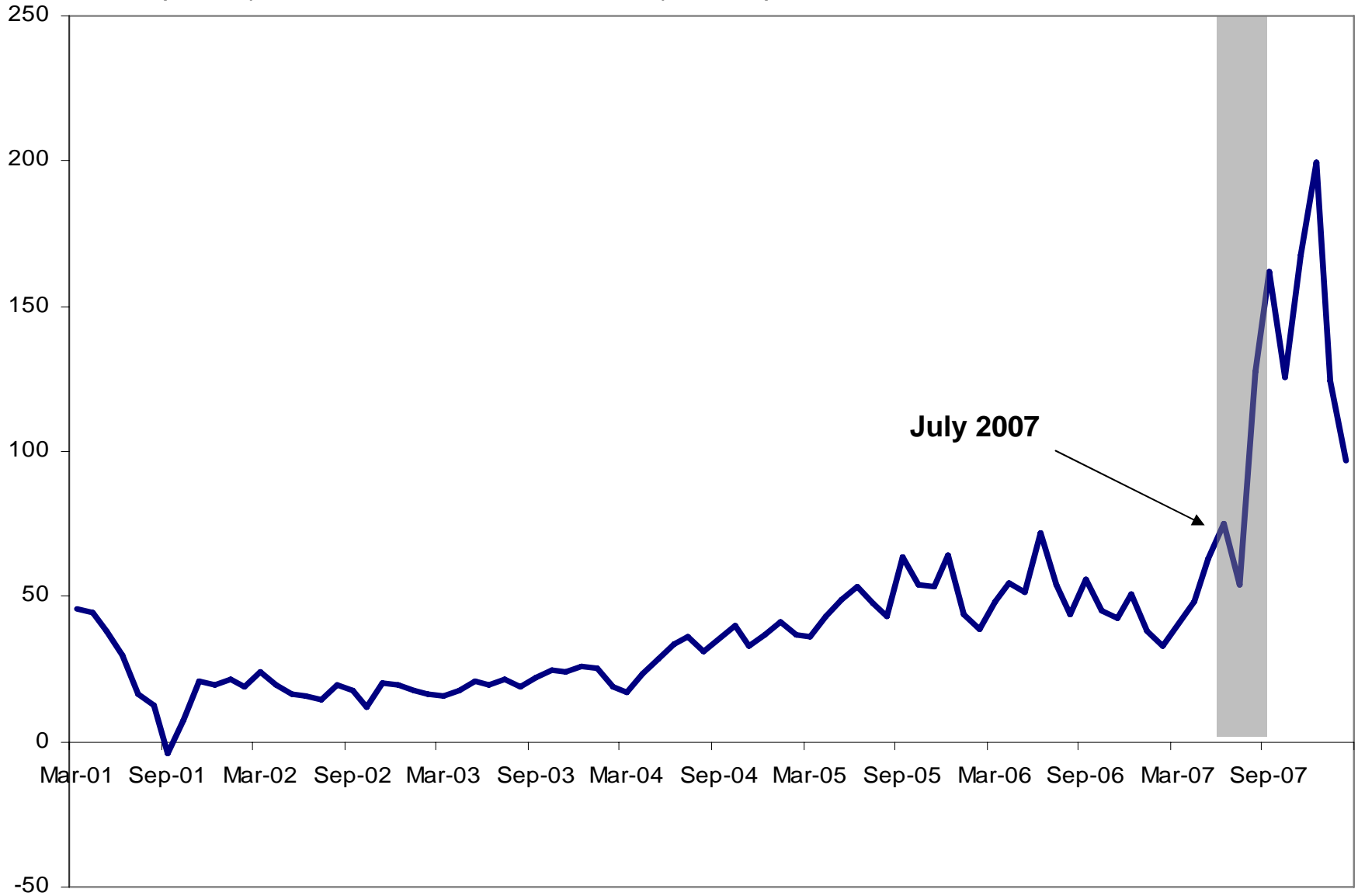
Notes: The size of the markers are proportional to the square root of the population. The data are at the MSA level and come from calculations using the OFHEO house price data and the Loan Performance delinquency data.

Source: Doms, Furlong and Kraimer (2007). "Subprime Mortgage Delinquency Rates." Federal Reserve Bank of San Francisco; November.



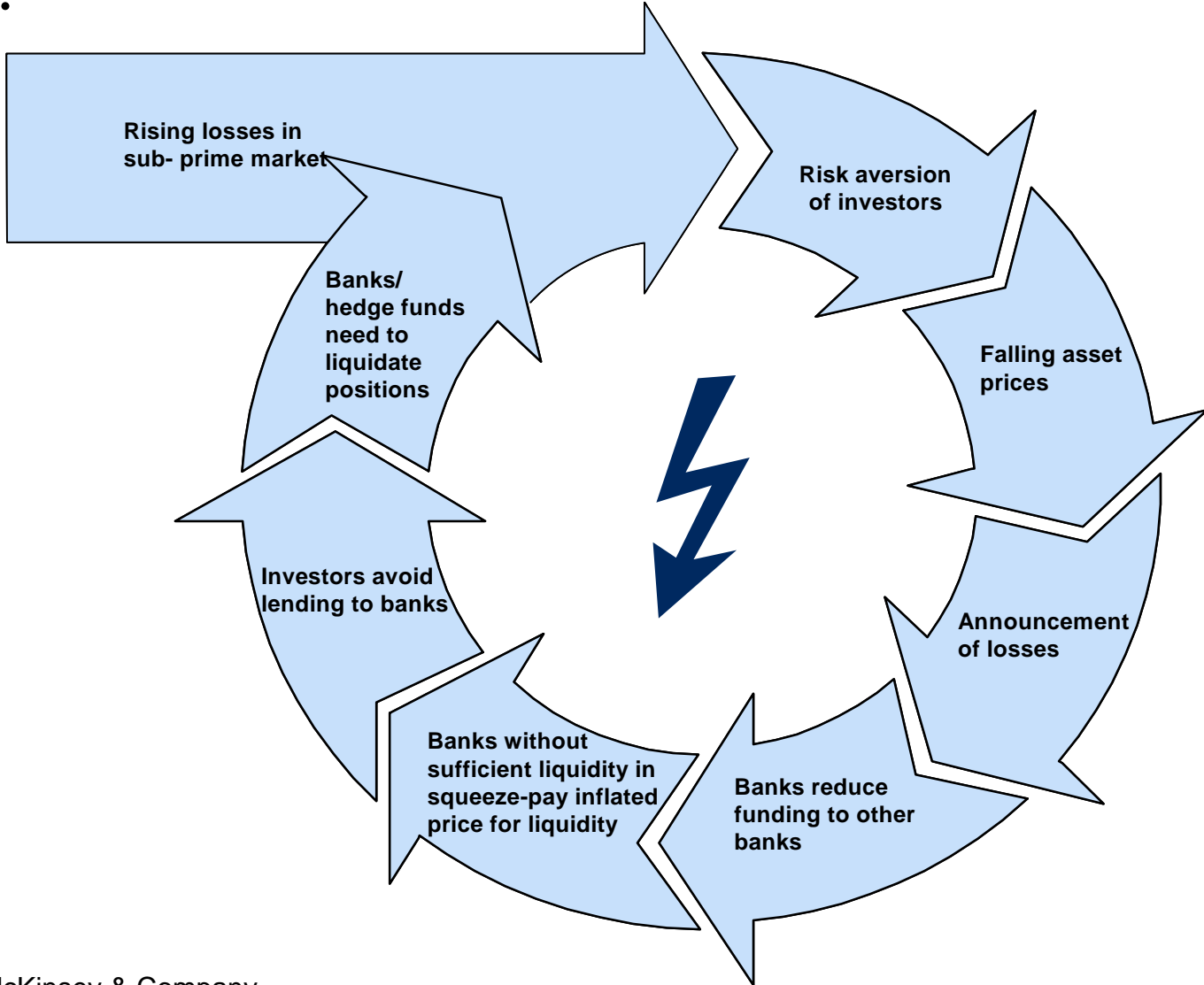
# The Risk Premium Spiked Up in the Summer of 2007

*TED Spread (3-month LIBOR - 3-month T-Bill); basis points*



Source: Federal Reserve; British Bankers Association (BBA)

**When the defaults started, this made financial institutions reluctant to lend to each other. Intermediaries could not roll over their borrowing. Markets started to freeze up world-wide. There was a vicious cycle, which drove further illiquidity.**



# Loan Defaults Triggered the Crisis. How Large are the Losses?

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- Rules forcing institutions to mark to market are causing very large write-downs. *Goldman-Sachs* estimates that \$460 billion will be taken in write-downs.
- It is not clear how much of this is the result of a breakdown of normal market pricing and how much reflects loss of underlying value. AAA tranches are now priced at 50-60 cents on the dollar. BBB- tranches at around 10 cents (Markit ABX.HE Indices).
- *Macroeconomic Advisers* has made a rule-of-thumb estimate of the actual losses under a “worst case” scenario. There are \$1.12 trillion of sub-prime mortgages out there. If 50 percent default and there is a recovery rate of 50 percent (from the value of the collateral), then the value of sub-prime mortgages has been reduced by \$280 billion.
- Not all of the mortgage-backed securities are held in the US. 25 to 50 percent are held overseas. So the loss to the US economy is \$140 to 210 billion. Not so large.
- There is a risk, however, that even losses at this level might result in a large reduction of lending--an average leverage ratio of 10:1 among banks suggests that sub-prime losses of \$140 to 210 billion could result in a contraction in lending of up to \$1.4 to 2.1 trillion.

# The Bear Stearns Case

# From \$170 to \$2: A Closer Look at What Happened to Bear Stearns



•BSN's increase in exposure to subprime mortgage securities surpassed that of other investment banks from 2001 to the present (see chart): Its business was less diversified than its competitors', who were better able to weather the storm once mortgage-related losses hit. Roughly one-sixth of BSN's income came from packing and selling mortgage bonds and securities\*.

<b>Subprime MBS Issuance (in millions)</b>	<b>2000</b>	<b>2005</b>	<b><u>CAGR</u></b>
Bear Stearns	536	20,882	<b>108.03%</b>
Total subprime MBS Issued	55945	507,648	<b>55.44%</b>
BSN's market share	1.36%	4.10%	
BSN's place in top 25 issuers	not in top 25	7th	

Source: Inside Mortgage Finance

•Sources say that BSN was the most reliant of all the investment banks on short-term borrowing such as repurchase agreements and short-term ABCP to fund its transactions, leaving BSN especially vulnerable when the liquidity crisis hit in Summer 2007.

•BSN was the biggest financier of the hedge fund industry among the big investment banks\*. While BSN may have insured some of this financing with credit-default swaps, hedge funds' high exposure to risky CDOs\*\* led to substantial losses and falling asset prices.

\*Bloomberg: "Bear Stearns Gets Emergency Funding from JP Morgan, the Fed" (March 14, 2008)

\*\*According to the IMF's *Global Finance Stability Report* of October 2007, Hedge Funds on average bought nearly 50 percent of ABS CDO securities that were issued in recent years.

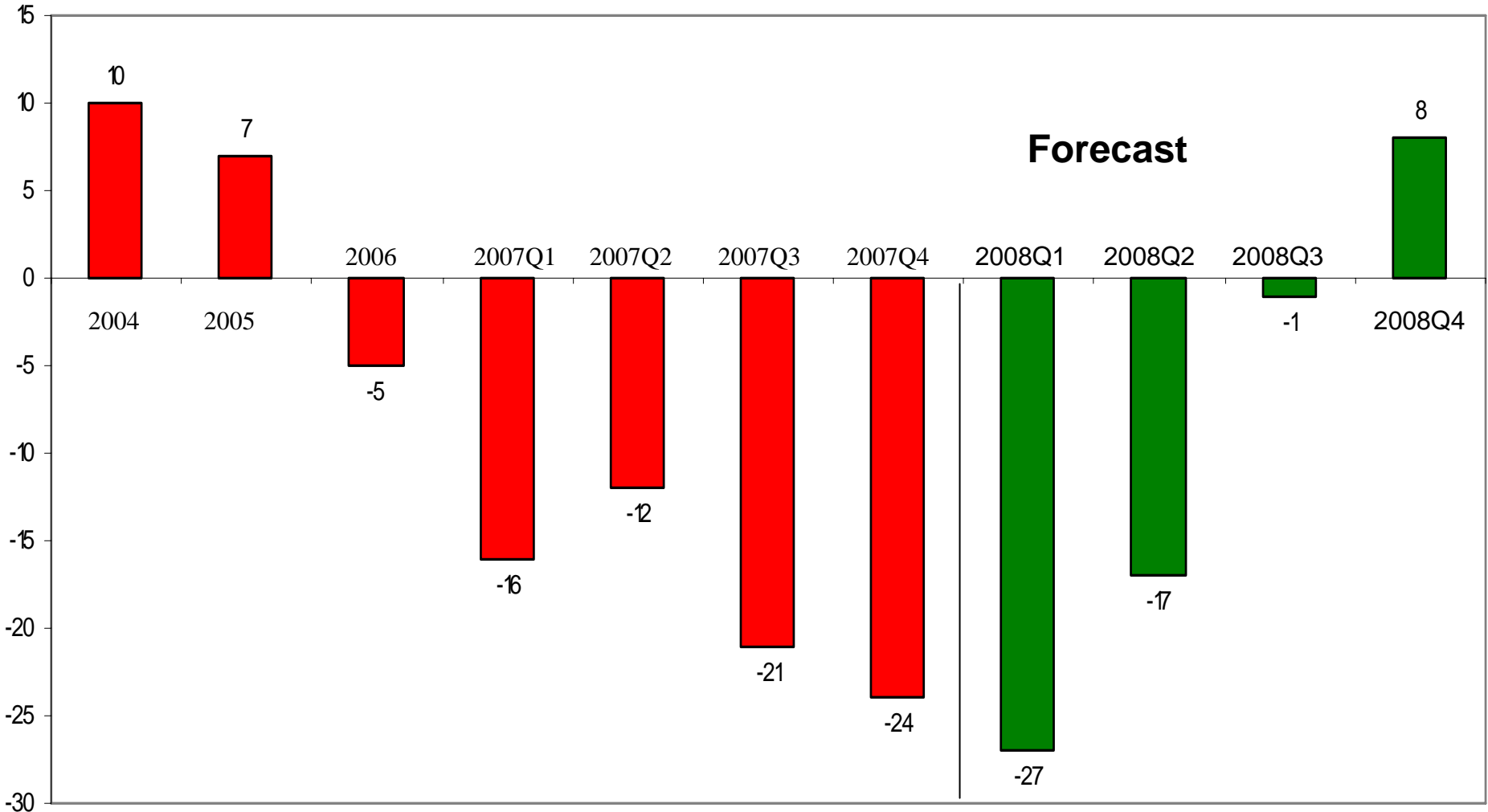
## **Bear Stearns (cont'd): The collapse in July of two BSN hedge funds, the “High-Grade Structured Credit Fund” and “High-Grade Structured Credit Enhanced Leverage Fund, was the beginning of the end.**

- The two funds, leveraged 10-to-1 and 17-to-1 respectively, were both heavily invested in CDOs and sub-prime MBS. Because both funds were created so late in the game (especially the “Enhanced Fund,” created in summer 2006), they were both particularly exposed to mortgages originated after 2004, which is where the highest defaults and largest losses were
- A July 31, 2007 letter to investors said each fund had lost virtually all of its value. The funds tried to liquefy their assets to meet the demands of margin calls and lenders who demanded their money back, but their efforts were in vain as they either sold the assets at a dramatically reduced price or could not sell them at all. In June, BSN attempted to bail out the two funds by injecting \$1.6 billion into them in order to restore confidence, but it was not enough. The funds filed for bankruptcy on July 31, 2007.
- In the following months BSN’s asset values continued to plummet, and BSN faced similar problems on its book as its hedge funds faced in the summer. Wary creditors demanded more collateral and clients seized their money: clients withdrew a total of \$17 billion in the first two weeks of March 2008. BSN did not have enough capital to continue to meet these demands; overnight borrowing, which they had previously relied upon, was no longer an option, and other investment banks refused to lend to them. Unable to liquefy its mortgage-related assets to a dry market, BSN had no options left.
- With a notional value of \$10 trillion standing in credit-default and interest-rate swaps, BSN’s collapse would send reverberations throughout the entire financial sector. The Fed stepped in with JP Morgan on March 16.
- Unlike the rest of the top five investment banks, BSN did not have access to the Fed’s lending window because it was not a depository institution. Some speculate that if BSN had had access to this window, its collapse could have been prevented.

# The Impact on the Real Economy

# The Main Impact of the Crisis on the Real Economy, so far, Has been the Collapse of Residential Construction. Not Certain When This Will Turn. Freddie Mac Estimates Excess Inventory of 900,000, Q4 2007

*Residential Fixed Investment, Annual or quarterly change at annual rate, percent*

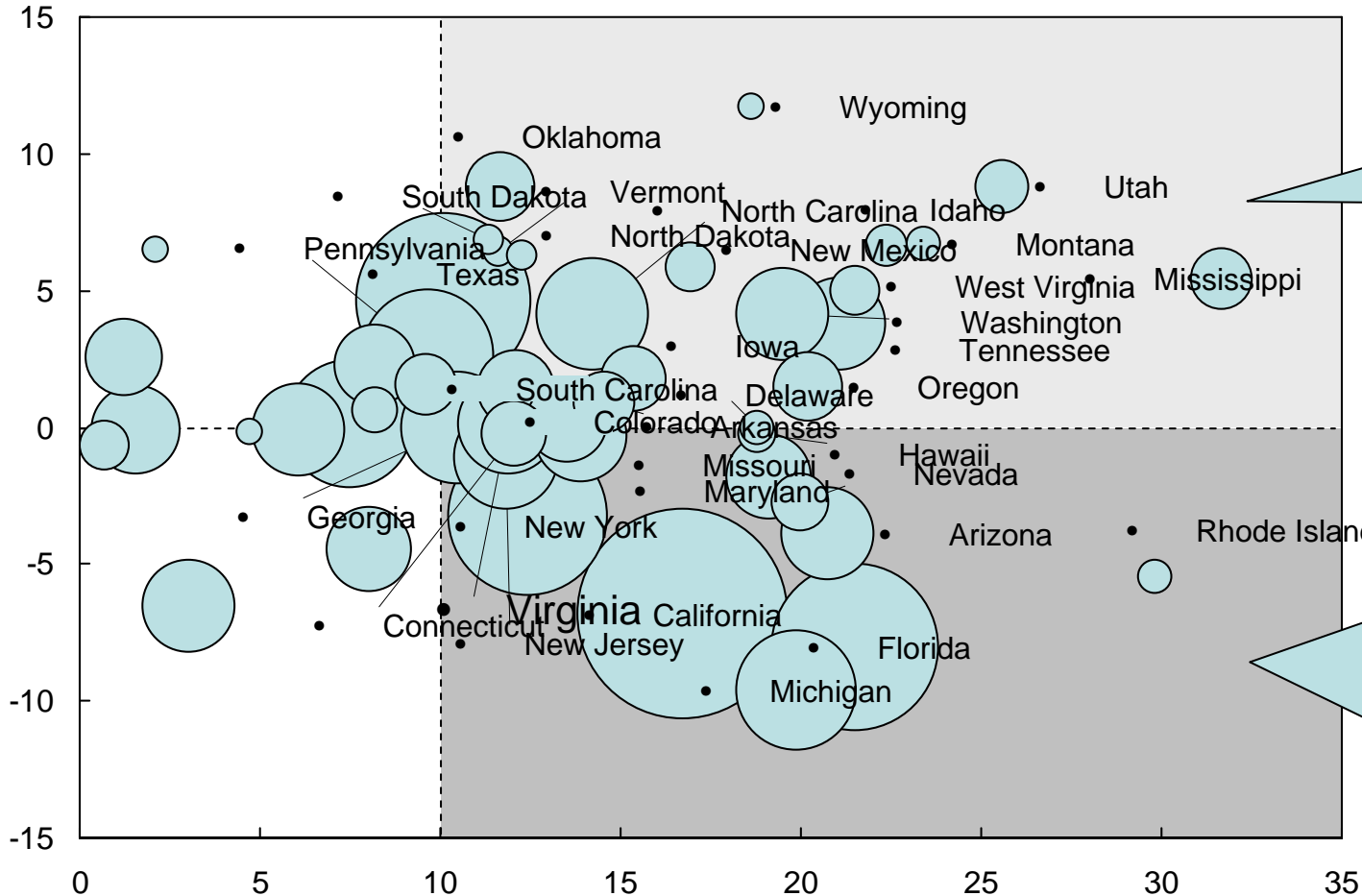


Source: Bureau of Economic Analysis, Author's Forecasts based on Macroeconomic Advisers



# Regional Variations: States with Large Price Declines and Where Construction is a Large Share of Job Growth Face Special Challenges

- Home prices change, Q2-Q3 2007
- HPI\* percent change, annualized, seasonally adjusted



Economic weakness could drive home values in these states to fall in 2008

States that are facing highest real estate depreciation and where construction contributed the most to job growth will face a "perfect storm" with falling home asset values and challenging outlooks for the regional economy

• Real estate/ construction share of job growth\*\*, 2004-2007

\* Home Price Index is published by the Office of Federal Housing Enterprise Oversight

\*\* Job growth in non-agricultural sector between Q1 2004 and Q1 2007

• Percent

Note: Louisiana, New Hampshire and Ohio are not shown on this page

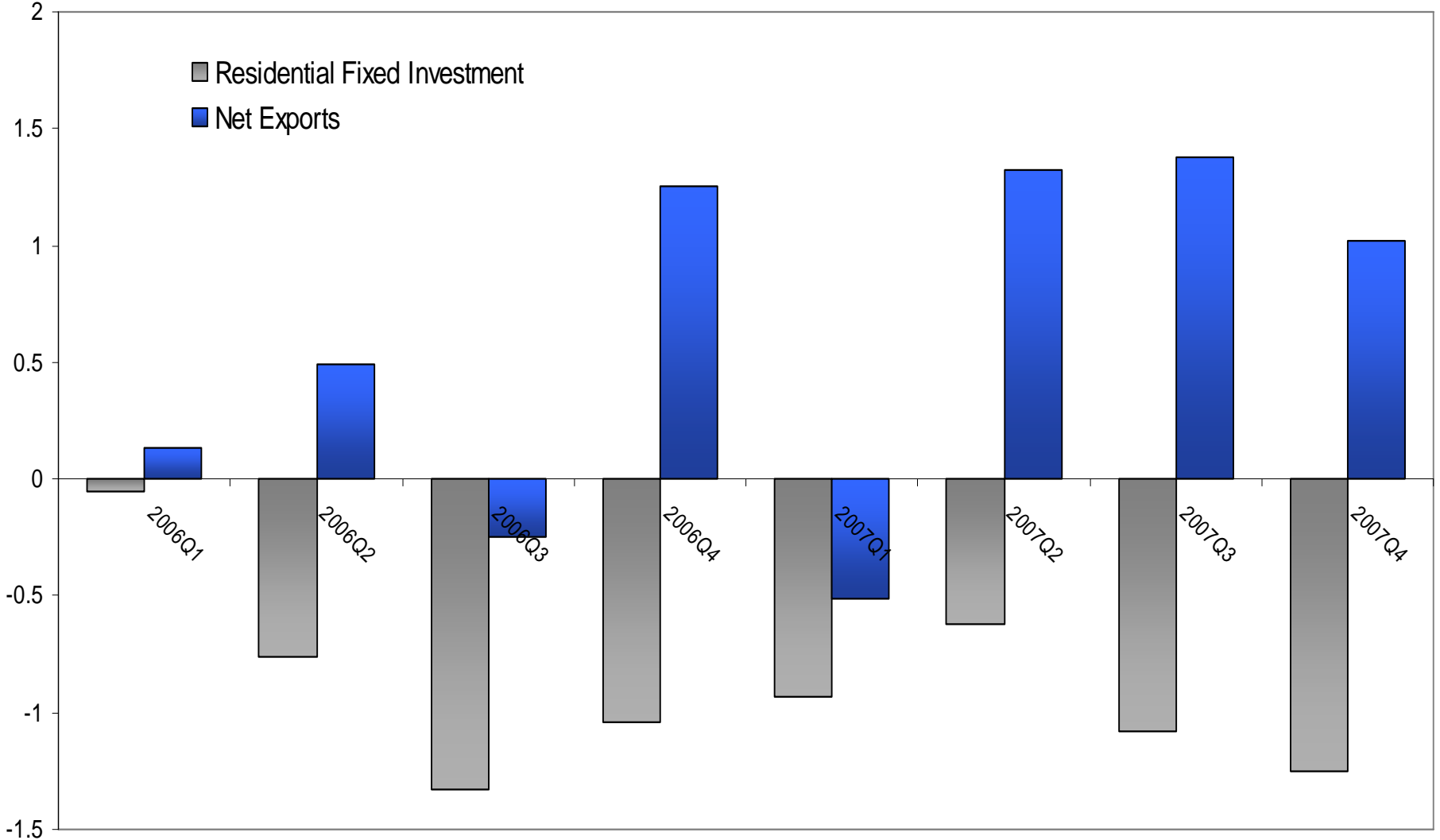
Source: OFHEO; Freddie Mac; Fannie Mae; BLS; BEA; BOC; CBP; U.S. Census Bureau; Moody's Economy.com; McKinsey analysis

Source: McKinsey & Company

# The Downtraft from Housing is Being Offset by Net Exports, Helped by the Decline in the Dollar.

A Silver Lining to the Crisis—the US External Imbalance is Declining with Lower Domestic Consumption, Higher Net Exports.

*Contributions to GDP growth; Residential Fixed Investment and Net Exports; percents*



# There are Two Scenarios for a Deeper Recession—Or a Combination of the Two

- Whether or not it meets the NBER criteria ex post, the economy is in a recession now. Probably this will be mild from a GDP perspective, but the risk of a deeper recession is substantial.
- First Scenario: Consumers could reduce spending because of concerns about potential job loss and because of a loss of housing wealth (estimated 20 price decline, representing a \$4 trillion loss).
- Offsetting this is the fact that housing prices and housing wealth are still very high. Price declines will play out slowly.
- Second Scenario: Another round in the financial crisis. Bond insurers are in trouble and ratings are being lowered. This could lead to another wave of write-downs and trigger a more serious credit crunch that limits business and consumer borrowing. There are rumors floating around that one or more of the largest financial institutions are on the edge of insolvency.
- Offsetting this is that most financial institutions went into this crisis with big reserves. The Fed is lowering rates and increasing liquidity. It acted forcefully to deal with Bear Stearns.
- The fiscal stimulus will help sustain demand in the short run.
- One reason for concern is that ARMs are being re-set, which may push more borrowers into default.

# Lessons from the Diagnosis: Immediate Steps

- The weakness in aggregate demand is being addressed correctly by monetary and fiscal policy.
- The Fed is acting correctly to ease the liquidity shortage and to resolve actual or threatened bankruptcies.
- It is worthwhile to use government funds to avoid a breakdown of the financial system. Asset holders are facing large losses so that the moral hazard problem is mild.
- Because of the complexity of the assets and the existence of second and third mortgages, the working out of the delinquencies is very hard. See Elmendorf discussion.

# Lessons from the Diagnosis: Longer Term Steps

- Regulators had advance warning that lending standards were being relaxed (Gramlich, for example). They should have acted to curb excessively risky and abusive lending practices. Regulators should have used the powers they already had and not left everything to the market in situations where some market participants lack knowledge and skills.
- Rating agencies failed to assess risks correctly. Having advisory subsidiaries created at least the appearance of conflict of interest.
- Securitization is important and here to stay. However, the way it was carried out contributed to the boom in risky sub-prime lending by allowing loan originators and security issuers to pass on to others the risks of the mortgages they held. This undermined the incentives to fully assess loan quality.
- A review of financial market regulation is underway. The diagnosis of what happened shows the problems that are created by the lack of transparency and the misperceptions of actual risk. (See the Treasury proposal and ongoing work by Robert Litan).
- Financial crises happen often and seem to be the inevitable consequence of a dynamic and innovative financial sector. Important to avoid excessive re-regulation. This crisis is worse than most and may seem worse because the US economy was slowing and oil is at \$100 a barrel.