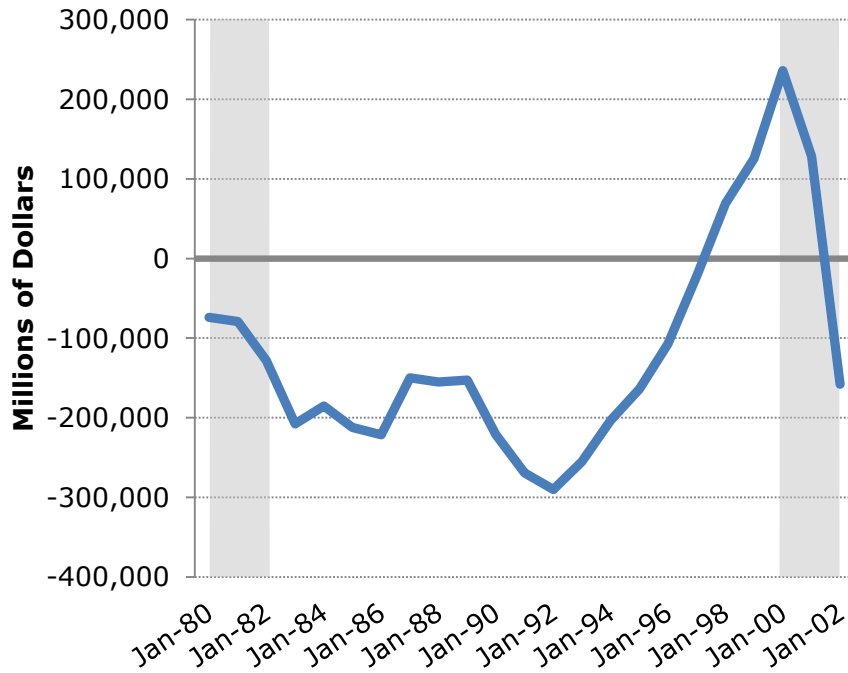




# Setting the stage:

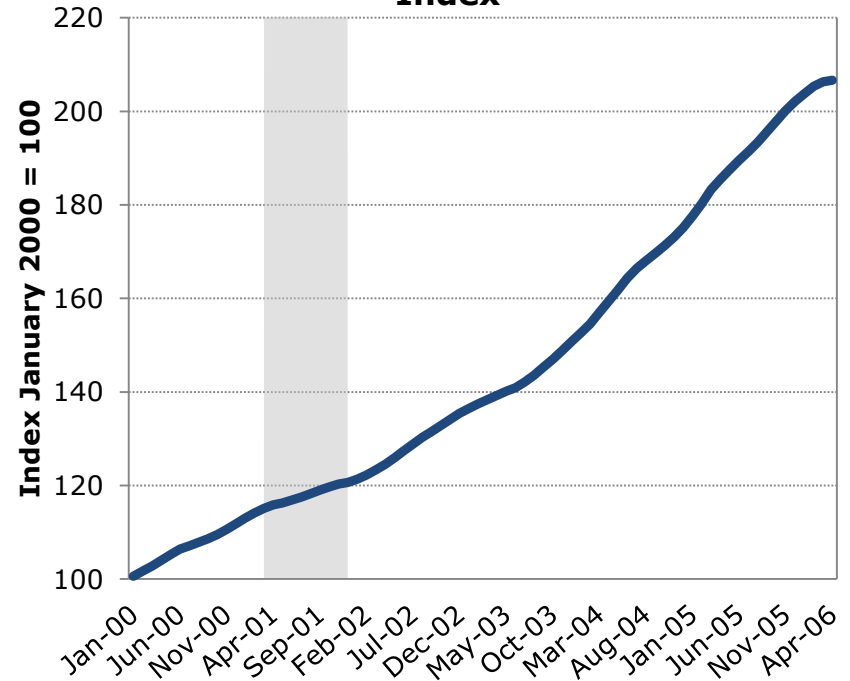
- Asian crisis 1997-98
- Saving glut
- Congress, GSEs and house ownership
- U.S. housing market takes off
- 30 year T-bond cancelled
- Rise of sovereign wealth funds

### Federal Surplus or Deficit



Source: The White House: Office of Management and Budget/FRED

### S&P Case-Shiller 20-City Home Price Index



Source: Standard and Poor's/FRED



# Mortgage Basics

<b>Attribute</b>	<b>Prime</b>	<b>Jumbo</b>	<b>Alt-A</b>	<b>Subprime</b>
<b>Lien Position</b>	1 <sup>st</sup> Lien	1 <sup>st</sup> Lien	1 <sup>st</sup> Lien	Over 90% 1 <sup>st</sup> Lien
<b>Weighted Average LTV</b>	Low 70s	Low 70s	Low 70s	Low 80s
<b>Borrower FICO</b>	700+ FICO	700+ FICO	640-730 FICO	500-660 FICO
<b>Borrower Credit History</b>	No credit derogatories	No credit derogatories	No credit derogatories	Credit derogatories
<b>Conforming to Agency Criteria?</b>	Conforming	Conforming by all standards but size	Non-conforming due to documentation or LTV	Non-conforming due to FICO, credit history, or documentation
<b>Loan-to-Value (LTV)</b>	65-80%	65-80%	70-100%	60-100%



# Mortgage Basics

Year	Historical Conventional Loan Limits					High Cost Area
	Single Family	Two Family	Three Family	Four Family	Second Loan	Single Family
2009	\$ 417,000	\$ 533,850	\$ 645,300	\$ 801,950	\$ 208,500	\$ 625,500
2008	\$ 417,000	\$ 533,850	\$ 645,300	\$ 801,950	\$ 208,500	\$ 625,500
2007	\$ 417,000	\$ 533,850	\$ 645,300	\$ 801,950	\$ 208,500	\$ 625,500
2006	\$ 417,000	\$ 533,850	\$ 645,300	\$ 801,950	\$ 208,500	\$ 625,500
2005	\$ 359,650	\$ 460,400	\$ 556,500	\$ 691,600	\$ 179,825	\$ 539,475
2004	\$ 333,700	\$ 427,150	\$ 516,300	\$ 641,650	\$ 166,850	\$ 500,550
2003	\$ 322,700	\$ 413,100	\$ 499,300	\$ 620,500	\$ 161,350	\$ 484,050
2002	\$ 300,700	\$ 384,900	\$ 465,200	\$ 578,150	\$ 150,350	\$ 451,050
2001	\$ 275,000	\$ 351,950	\$ 425,400	\$ 528,700	\$ 137,500	\$ 412,500
2000	\$ 252,700	\$ 323,400	\$ 390,900	\$ 485,800	\$ 126,350	\$ 379,050



# GSEs (Government Sponsored Enterprises)

- GSEs guarantee or directly issue mortgage backed securities
- Fannie Mae (FNMA – Federal National Mortgage Association)
  - founded in 1938, publicly traded since 1968.
  - In conservatorship since September 2008
  - Assets (2012): \$3.222 trillion
  - 2012 dividends: \$11.6 billion (to U.S. Treasury)
- Freddie Mac (FHLMC – Federal Home Loan Mortgage Corporation))
  - Created in 1970 to expand secondary markets for mortgages
  - In conservatorship since September 2008
  - Assets (2012): \$1.989 trillion
  - 2012 dividends: \$7 billion (to U.S. Treasury)

# Securitization

## Illustration of Securitization

\$400,000 average mortgage  
 5 thousand mortgages  
 \$2,000,000 K (mortgage pool)

Treasuries 3.00%  
 Mortgages 6.00%

## Pass through securitization (1970-80s)

Investment bank fee 0.50%  
 Servicing fee 0.50%  
 Bond yield 5.00%

## Tranches (2000s)

	<u>Balance %</u>	<u>Balance \$</u>	<u>Yield</u>	<u>Initial interest</u>
AAA	81%	1,620,000	4.5%	72,900
AA	8%	160,000	4.9%	7,840
A	4%	80,000	5.4%	4,320
BBB	3%	60,000	7.0%	4,200
BBB-	2%	40,000	9.0%	3,600
BB	1%	20,000	14.0%	2,800
NR, IO, etc.	1%	20,000	21.7%	4,340
	100%	2,000,000	5.0%	100,000

## Special purpose company

**Assets:**  
 Mortgages  
 purchased  
 from banks

**Liabilities:**  
 Bonds  
 (\$1000 each)  
 sold to  
 investors



## Special Purpose Company



Sell pools of mortgages



Lend to Borrowers



GSEs  
 Government  
 Sponsored  
 Enterprises





# Subprime Securitization

## Universe of borrowers

Down payment	Low	Moderate risk	High risk (Subprime)
	High	Low risk	Moderate risk
		High (good)	Low
		Credit score	

# Securitization: “innovation and improvements”

## Universe of borrowers

Down payment	Low	Moderate risk	High risk (Subprime)
	High	Low risk	Moderate risk
		High (good)	Low
		Credit score	

Banks, mortgage companies – provide pools of mortgages

Investment– package deals and sell them to investors  
Bear Stearns, Lehman Brothers, Merrill Lynch, etc.

Subprime mortgage backed bonds

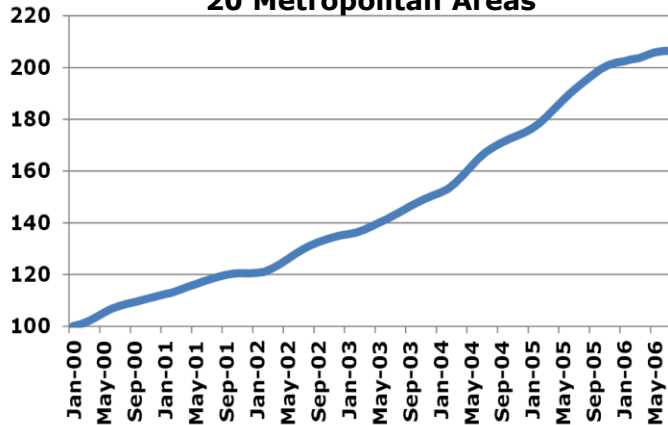
AAA	81%
AA	11%
A	4%
BBB	3%
BB, NR	1%

Investors  
Sovereign investment funds, European banks, retirement funds, insurance companies, and other U.S. banks

Rating Agencies – provide investment ratings  
S&P  
Moody's

Insurance companies – provide insurance against potential losses (CDS – credit default swaps)  
AIG

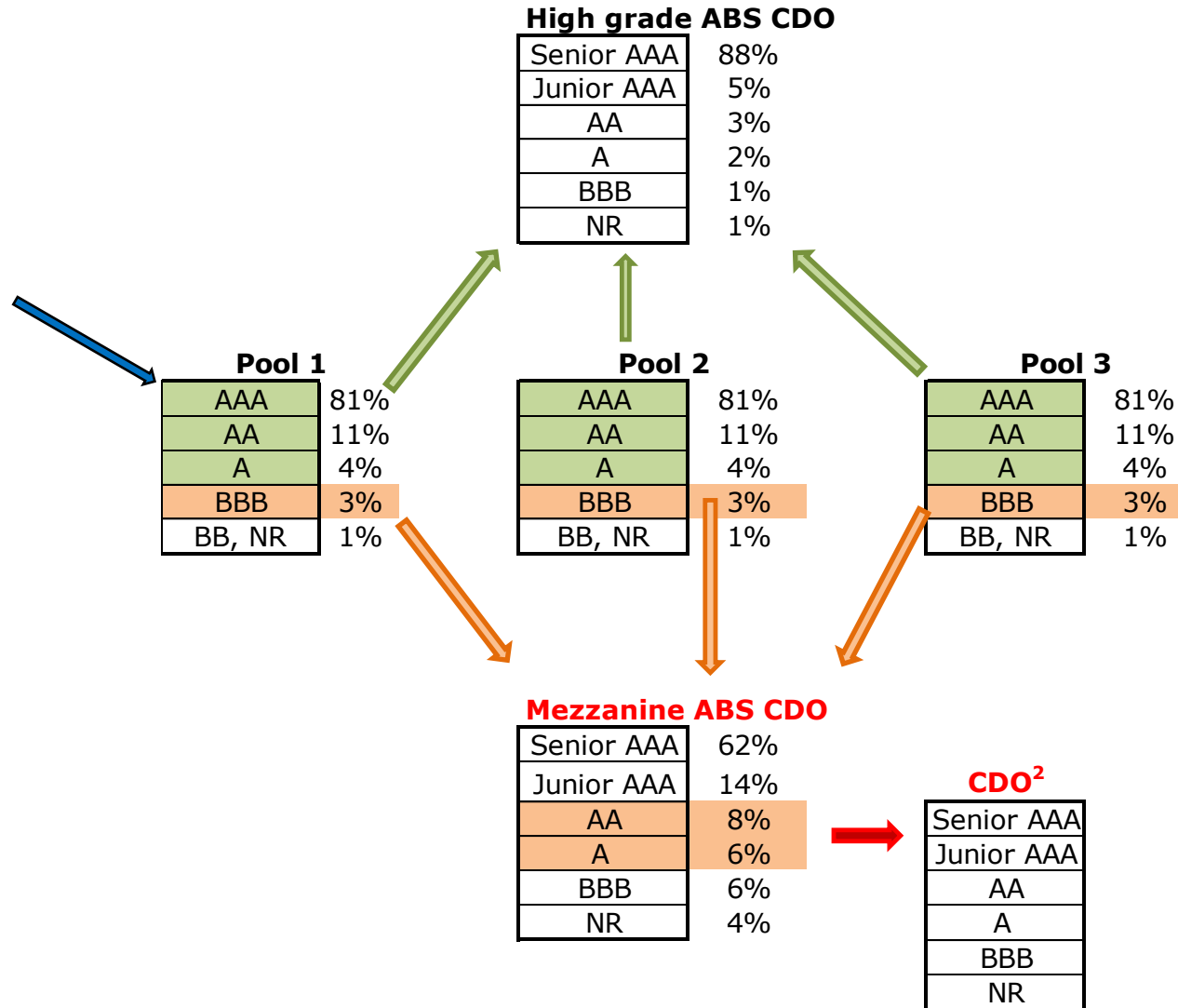
Case-Shiller House Price Index  
20 Metropolitan Areas



# Securitization

## Universe of borrowers

Down payment	Low	Moderate risk	High risk (Subprime)
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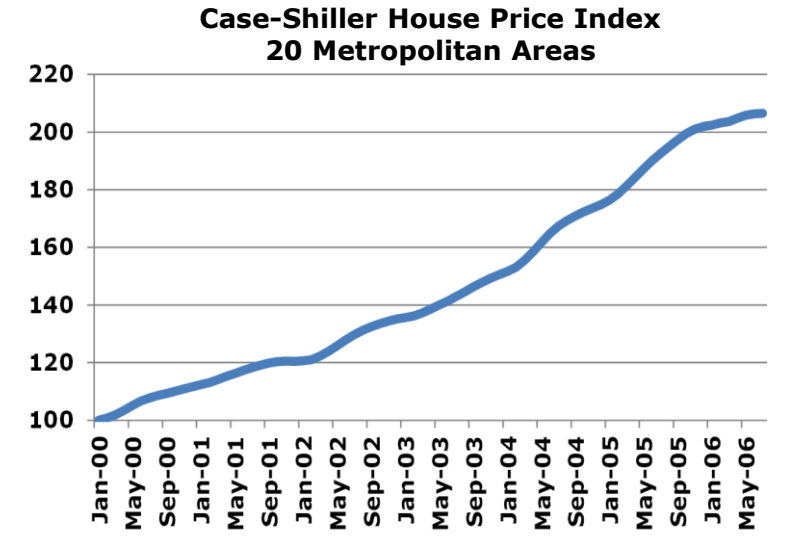




# How could those securities get AAA ratings?

## The Basic Building Blocks

$$\begin{aligned} &\text{Probability of Default (PD)} \\ &\quad \times \\ &\text{Exposure at Default (EAD)} \\ &\quad \times \\ &\text{Loss Given Default (LGD)} \quad \longrightarrow \\ &\quad = \\ &\text{Expected Loss} \end{aligned}$$

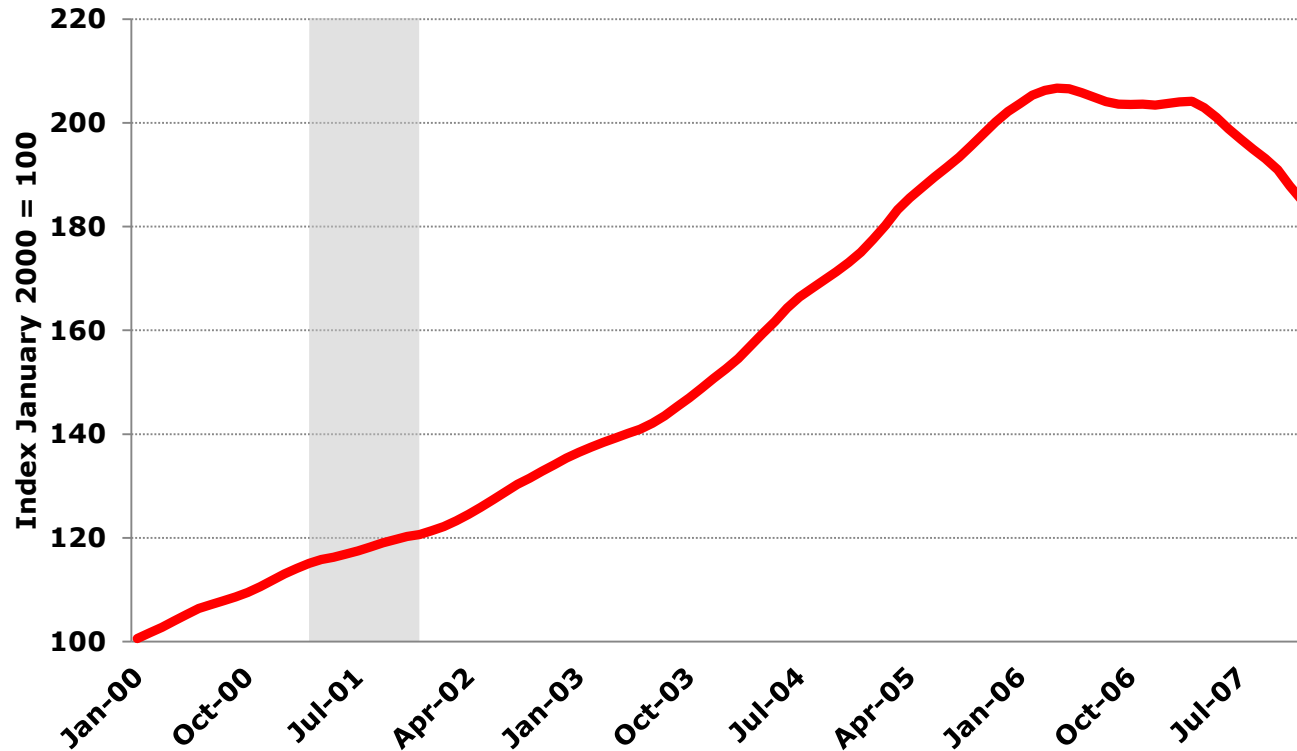


**LGD was low as long as house prices continued to increase**



# U.S. House Prices

## S&P Case-Shiller 20-City Home Price Index

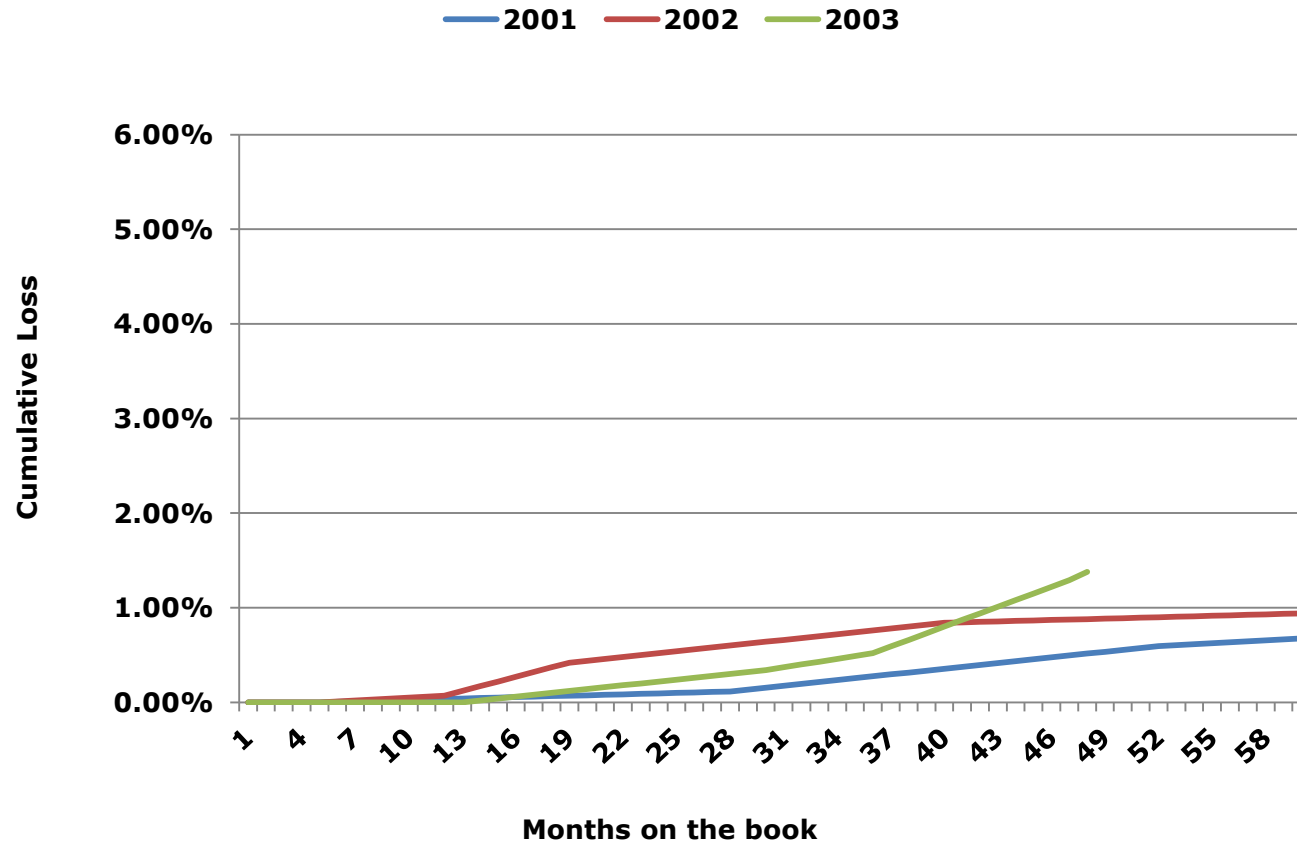


Source: Standard and Poor's/FRED



# What did the analysts know?

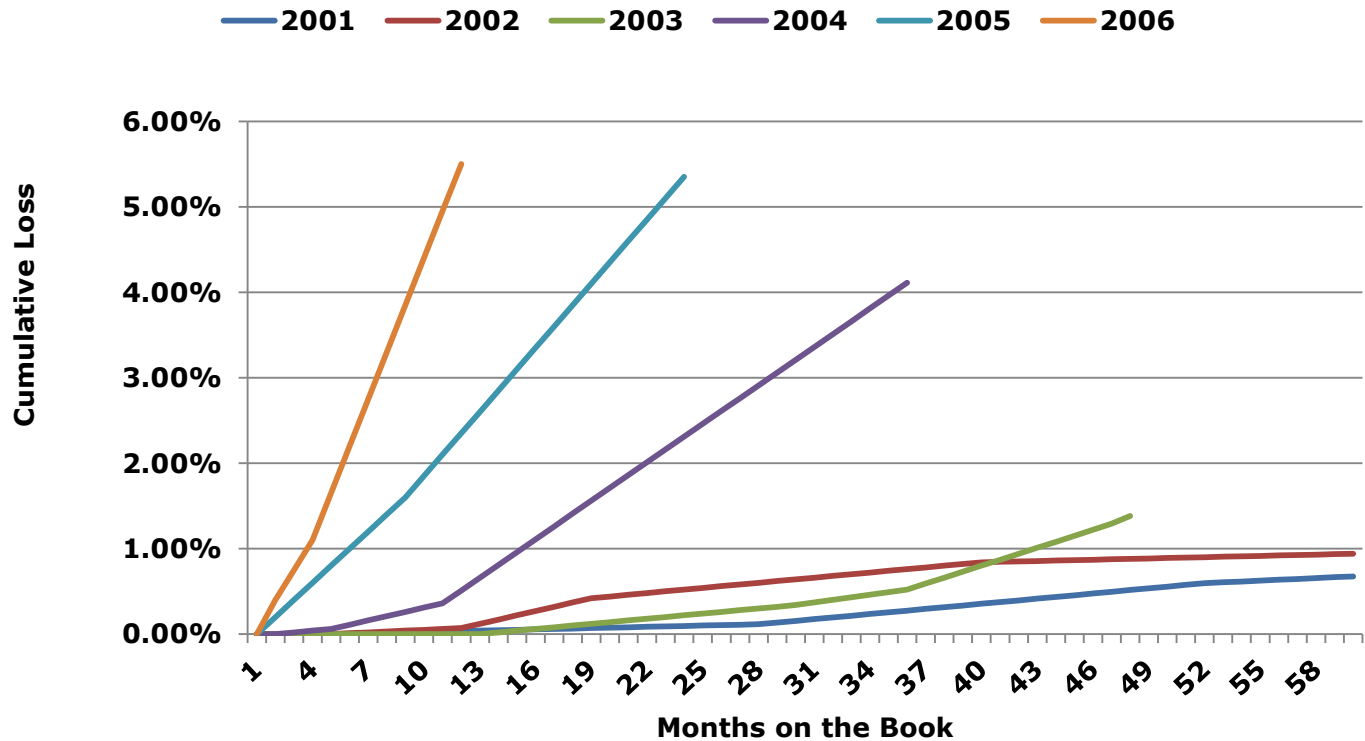
## Vintage Analysis (illustration)





# Analysis

## Vintage Analysis (illustration)

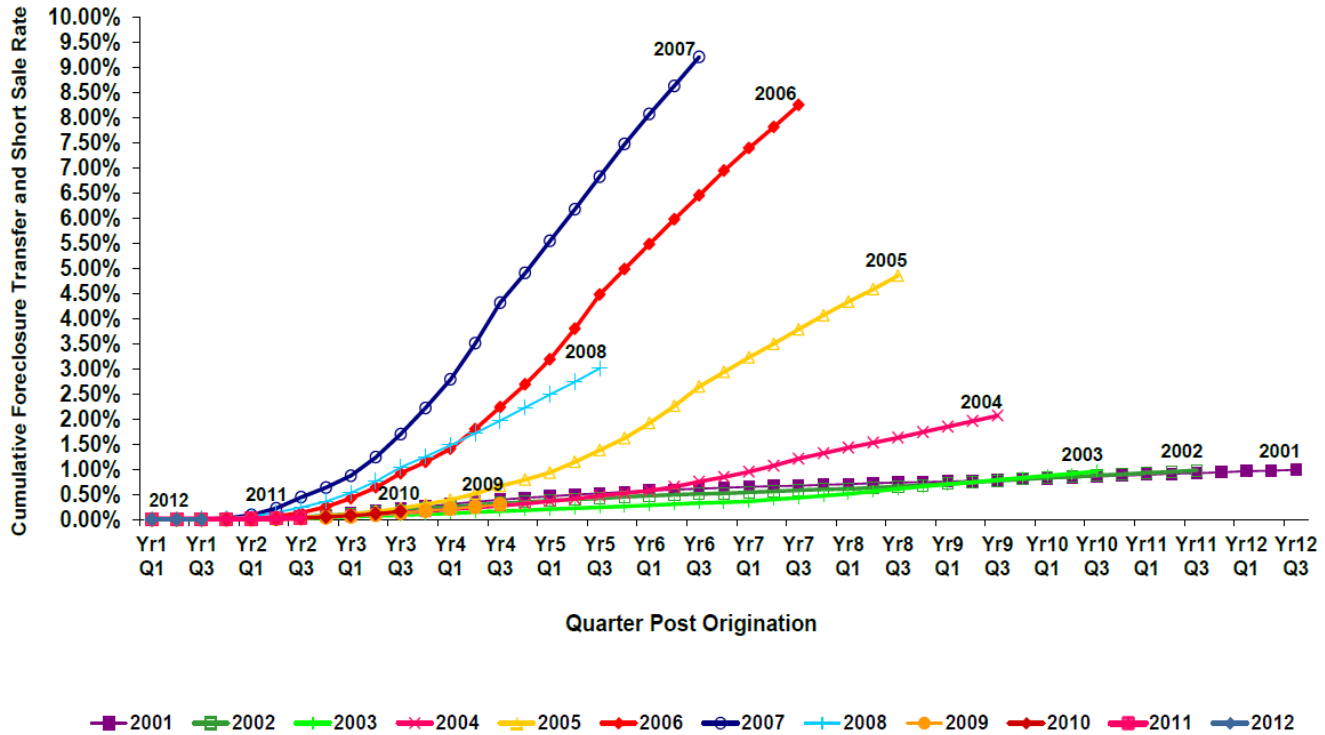




# Analysis

(not an illustration)

## Single-family cumulative foreclosure transfer and short sale rates<sup>1</sup> by book year

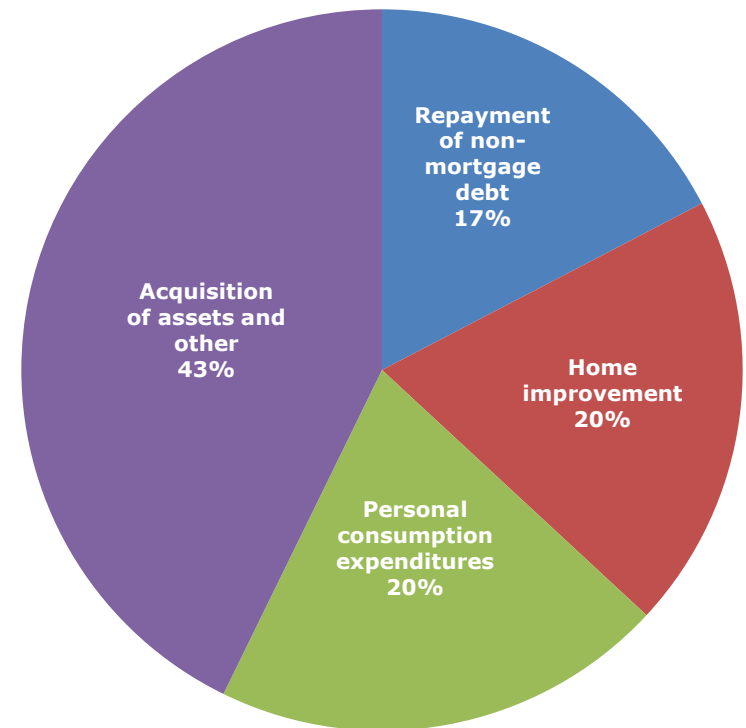
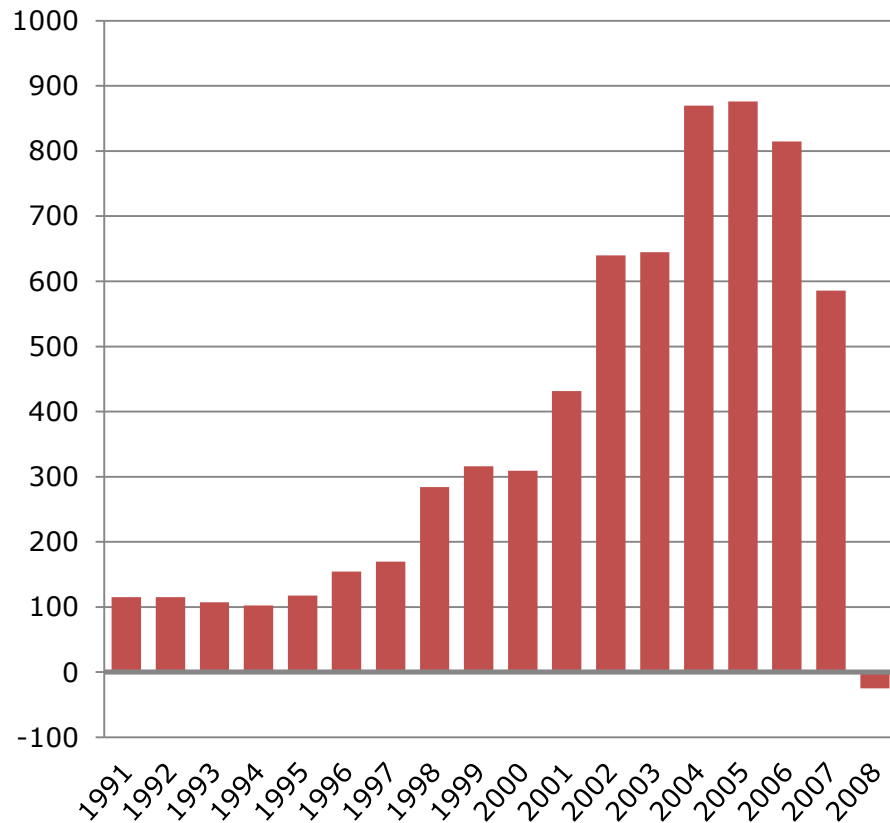


<sup>1</sup> Rates are calculated for each year of origination as the number of loans that have proceeded to foreclosure transfer or short sale and resulted in a credit loss, excluding any subsequent recoveries, divided by the number of loans originated in that year that were acquired in the company's single-family credit guarantee portfolio. Includes Other Guarantee Transactions where loan characteristic data is available.

# Home Equity Extraction

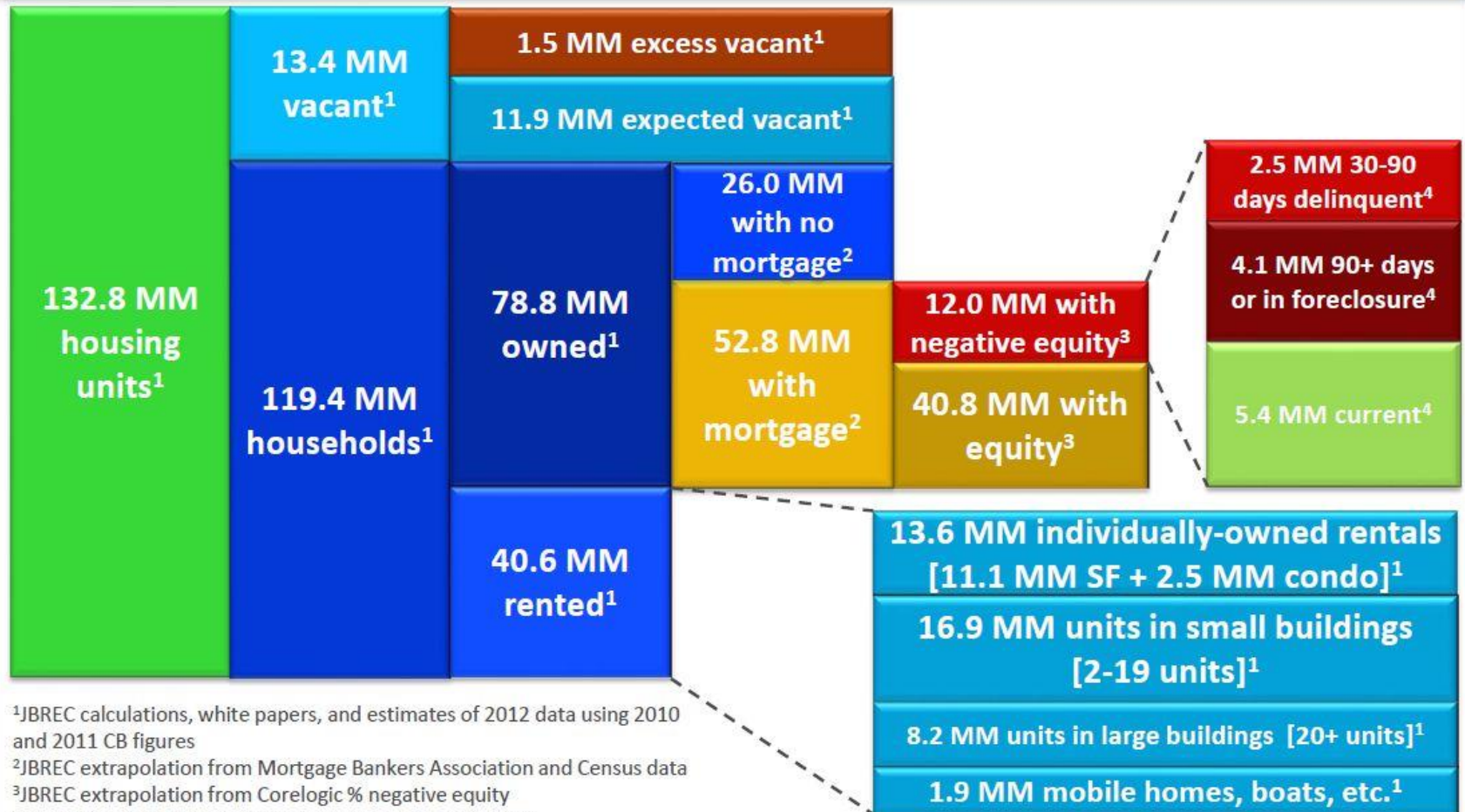
## Home Equity Extraction

\$Billions



Source: Alan Greenspan and James Kennedy. Estimates of Home Mortgage Originations, Repayments, and Debt On One-to-Four-Family Residences. 2005 and updates through 2008.

# U.S. Housing Summary 2012



<sup>1</sup>JBREC calculations, white papers, and estimates of 2012 data using 2010 and 2011 CB figures

<sup>2</sup>JBREC extrapolation from Mortgage Bankers Association and Census data

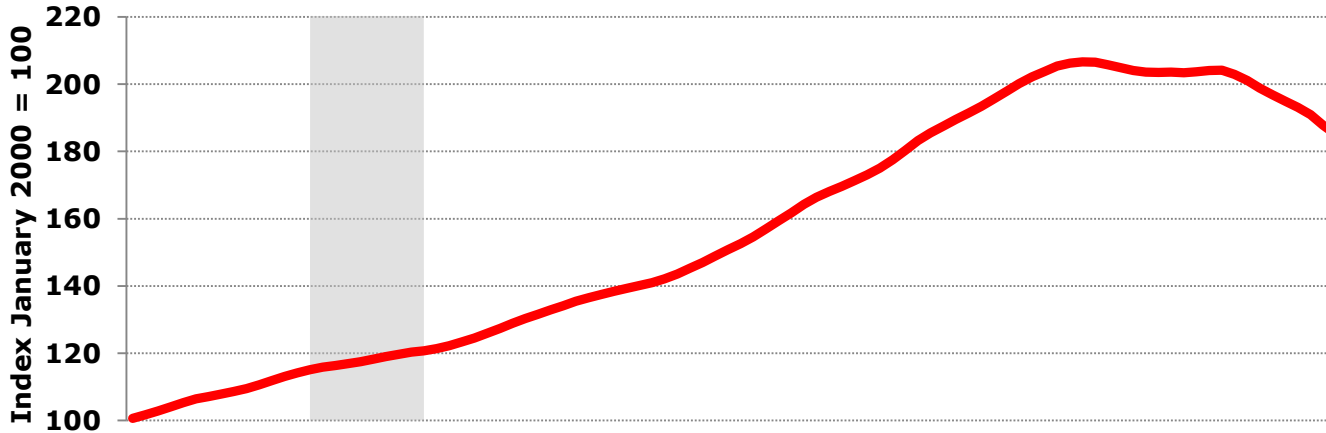
<sup>3</sup>JBREC extrapolation from Corelogic % negative equity

<sup>4</sup>Assuming all delinquent borrowers have negative equity



# Is the market efficient?

**S&P Case-Shiller 20-City Home Price Index**



**Dow Jones Industrial Average**

