Demystifying the Mortgage Meltdown: What It Means for Main Street, Wall Street and the U.S. Financial System

James R. Barth
Senior Fellow

Glenn Yago
Director of Capital Studies

Milken Institute
October 2, 2008
“I have great, great confidence in our capital markets and in our financial institutions. Our financial institutions, banks and investment banks are strong.”

Treasury Secretary Henry Paulson
March 16, 2008
CNN
… but just six months later…

“The financial security of all Americans ... depends on our ability to restore our financial institutions to a sound footing.”

Treasury Secretary Henry Paulson
September 19, 2008
Press release
“Any real estate investment is a good investment … ”
“Any real estate investment is a good investment …”

… Really?!
Subprime mortgage meltdown timeline
December 2006–September 2008

Dow Jones U.S. Financial Index

Feb. 2007: HSBC sets aside $10.6 billion for bad loans, including subprime.
July 31, 2007: Two Bear Stearns hedge funds file for bankruptcy.
Oct. 24, 2007: Merrill announces $7.9 billion in subprime write-downs, surpassing Citi’s $6.5 billion.
Nov. 11, 2007: Fed offers troubled banks as much as $200 billion in loans; Fed introduces Term Securities Lending Facility.
Feb. 12, 2008: President Bush introduces tax rebate stimulus program of $168 billion.
Mar. 11, 2008: JP Morgan Chase offers to buy Bear Stearns; Fed introduces Primary Dealer Credit Facility.
Mar. 16, 2008: Fed cuts discount rate to 2.4%; Fed funds rate to 2.25%.
Mar. 18, 2008: Lehman mortgages its credit standards.
Sept. 23, 2008: Washington Mutual is seized by FDIC.
Sept. 29, 2008: Citigroup agrees to buy Wachovia bank.
Feb. 13, 2008: President Bush signs a housing rescue law.
July 30, 2008: President Bush signs a housing rescue law.
July 30, 2008: President Bush signs a housing rescue law.
Sept. 23, 2008: Washington Mutual is seized by FDIC.
Sept. 29, 2008: Citigroup agrees to buy Wachovia bank.
Overview
Home mortgages: Who borrows, how much has been borrowed, and who funds them?

Total value of housing stock = $19.3 trillion

- Mortgage debt: $10.6 trillion
  - Subprime: 8.4%
  - Prime: 91.6%

- Equity in housing stock: $8.7 trillion

- Securitized: 58%
  - Government-controlled: 46%
  - Private sector-controlled: 54%

- Non-securitized: 42%

Note: total residential and commercial mortgages = $14.7 trillion; 5 percent = $700 billion

Sources: Federal Reserve, Milken Institute.
The mortgage problem in perspective

80 million houses
27 million are paid off

53 million have mortgages
48 million are paying on time

5 million are behind
(9.2% of 53 million with 2.8% in foreclosure)

This compares to 50% seriously delinquent in the 1930s.

Sources: U.S. Treasury, Milken Institute.
I. Low interest rates and a lending boom
Did the Fed lower interest rates too much and for too long?

Federal funds rate vs. rates on FRMs and ARMs

30-year FRM rate
1-year ARM rate
Target federal funds rate

Record low from June 25, 2003, to June 30, 2004: 1%

Sources: Federal Reserve, Mortgage Bankers Association, Moody’s Economy.com, Milken Institute.
Low interest rates and credit boom

1-Year ARM rate (right axis)

Home mortgage origination (left axis)

Home price bubble and credit boom

S&P/Case-Shiller National Home Price Index (right axis)

Home mortgage origination (left axis)

II. Homeownership, prices, starts and sales take off
Credit boom pushes homeownership rate to historic high

Q2 2004: 69.2%
Q2 2008: 68.1%
Average, 1965–Q2 2008: 65.2%

Home price bubble peaks in 2006

Index, January 1987 = 100
S&P/Case-Shiller National Home Price Index
OFHEO Home Price Index

California and national home prices reach record highs

California median home price
California average 1987-2008 $229,748
U.S. median home price
U.S. average, 1987-2008: $121,280

Sources: U.S. Census Bureau, OFHEO, Moody’s Economy.com, S&P/Case-Shiller, California Association of Realtors, Milken Institute.
Housing starts hit a record in 2005

Housing units, millions

1.8 million

January 2006: 1.8 million

Average starts, 1998–2008: 1.1 million

July 2008: 641,000

Homes for sale

Existing homes for sale (left axis)

New homes for sale (right axis)

Millions

Homes sales reach a new high

Existing home sales (left axis)

New home sales (right axis)

Millions

Sources: U.S. Census Bureau, OFHEO, Moody’s Economy.com, Milken Institute.
III. Subprime borrowers and subprime mortgages
Who is a subprime borrower?

National FICO scores display wide distribution

Percentage of population

Prime = 79%
Subprime = 21%

Amounts owed 30%
Payment history 35%
Length of credit history 15%
Types of credit in use

New credit 10%

Source: myFICO.com, Milken Institute.
Prime and subprime mortgage originations by FICO score reveal substantial overlaps

Percent of total originations

FICO below 620
- Prime: 6.6%
- Subprime: 45.2%

FICO above 620
- Prime: 93.4%
- Subprime: 54.8%

Sources: LoanPerformance, Milken Institute.
ARMs look attractive to many borrowers

Sources: Mortgage Bankers Association, Moody’s Economy.com, Milken Institute.
ARM share grows, following low interest rates

Percent of all outstanding home mortgages

Sources: Mortgage Bankers Association, Moody’s Economy.com, Milken Institute.
Largest share of ARMs go to subprime borrowers

Sources: Mortgage Bankers Association, Moody’s Economy.com, Milken Institute.
Subprimes take an increasing share of all home mortgage originations

Sources: Inside Mortgage Finance, Milken Institute.
Subprime mortgages increase rapidly before big decline

**Originations**

<table>
<thead>
<tr>
<th>Year</th>
<th>US$ billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>160</td>
</tr>
<tr>
<td>2002</td>
<td>200</td>
</tr>
<tr>
<td>2003</td>
<td>310</td>
</tr>
<tr>
<td>2004</td>
<td>540</td>
</tr>
<tr>
<td>2005</td>
<td>625</td>
</tr>
<tr>
<td>2006</td>
<td>600</td>
</tr>
<tr>
<td>2007</td>
<td>191</td>
</tr>
<tr>
<td>H2</td>
<td>14</td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
</tbody>
</table>

**Outstandings**

<table>
<thead>
<tr>
<th>Year</th>
<th>US$ billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>479</td>
</tr>
<tr>
<td>2002</td>
<td>574</td>
</tr>
<tr>
<td>2003</td>
<td>699</td>
</tr>
<tr>
<td>2004</td>
<td>973</td>
</tr>
<tr>
<td>2005</td>
<td>1,200</td>
</tr>
<tr>
<td>2006</td>
<td>1,240</td>
</tr>
<tr>
<td>2007</td>
<td>940</td>
</tr>
<tr>
<td>Q1</td>
<td>895</td>
</tr>
</tbody>
</table>

Average annual growth rates:

- 1995–2006: 14%
- 2006–Q1 2008: -23%

Sources: Inside Mortgage Finance, Milken Institute.
IV. Mortgage product innovation
Subprime and Alt-A shares quadruple between 2001 and 2006, then fall in 2007

Sources: Inside Mortgage Finance, Milken Institute.
ARM hybrids dominate subprime originations (2006)

Prime conventional
- ARM hybrids: 23%
- Other ARM: 7%
- Fixed: 70%
- ARM: 31%

Alt-A
- ARM hybrids: 46%
- Other ARM: 23%
- Fixed: 9%
- ARM: 31%

Subprime
- ARM hybrids: 46%
- Other ARM: 4%
- 30-year ARM balloon with 40- to 50-year amortization: 26%
- 2- and 3-year hybrids: 61%

Sources: Freddie Mac, Milken Institute.
V. Securitization
The mortgage model switches from originate-to-hold to originate-to-distribute

Residential mortgage loans
1980: Total = $958 billion
- Held in portfolio: 84.4%
- Securitized: 15.6%

Residential mortgage loans
Q2 2008: Total = $11.3 trillion
- Held in portfolio: 41%
- Securitized: 59%

Sources: Federal Reserve, Milken Institute.
Securitization becomes the dominant funding source for subprime mortgages

Percent of all subprime mortgages securitized since 1994

Sources: Inside Mortgage Finance, Milken Institute.
The rise and fall of private-label securitizers

New securities issuance

1985
Total = $110B

21%
Ginnie Mae

42%
Freddie Mac

35%
Fannie Mae

2%
Private-label

2001
Total = $1.3T

20%
Ginnie Mae

13%
Freddie Mac

29%
Fannie Mae

4%
Private-label

2006
Total = $2.0T

56%
Ginnie Mae

18%
Freddie Mac

22%
Fannie Mae

4%
Private-label

First half 2008
Total = $734B

15%
Ginnie Mae

6%
Freddie Mac

33%
Fannie Mae

46%
Private-label

Sources: Inside Mortgage Finance, Milken Institute.
The rise and fall of private-label securitizers

Outstanding securities

- 1985 Total = $390B
  - Ginnie Mae: 13%
  - Freddie Mac: 55%
  - Fannie Mae: 26%
  - Private-label: 6%

- 2001 Total = $3.3T
  - Ginnie Mae: 39%
  - Freddie Mac: 14%
  - Fannie Mae: 18%
  - Private-label: 13%

- 2006 Total = $5.9T
  - Ginnie Mae: 29%
  - Freddie Mac: 35%
  - Fannie Mae: 7%
  - Private-label: 27%

- First half 2008 Total = $6.8T
  - Ginnie Mae: 33%
  - Freddie Mac: 30%
  - Fannie Mae: 7%
  - Private-label: 26%

Sources: Inside Mortgage Finance, Milken Institute.
VI. Affordability
Ratio of home price to household income surges

Median home price/median household income

Average, 1967–2007: 3.38

2005: 4.69

2007: 4.29

Debt-to-income ratio of households has increased rapidly

Home mortgage debt/disposable personal income

Q4 2007: 139.5%

Average, 1957–2007: 79.7%

Home mortgage share of household debts reaches a new high in 2007

Percent

Q2 2007: 73.7%

Q2 2008: 73.4%

Average, 1952–2008: 64.2%

Sources: U.S. Census Bureau, OFHEO, Federal Reserve, Moody’s Economy.com, Milken Institute.
VII. Collapse
The recent run-up of home prices was extraordinary. The graph illustrates the annualized growth rate of nominal home index, which is 3.4%. The long-term trend line shows significant increases during World War II, the Great Depression, the 1970’s boom, the 1980’s boom, and the current boom. Sources: Robert Shiller, Milken Institute.
Home prices don’t go up forever

Change in home prices in 100 plus years

Percentage change in nominal home price, year ago

-20 -15 -10 -5 0 5 10 15 20 25 30


World War I Great Depression World War II 1970’s Boom 1980’s Boom Current Boom

Average, 1890–2007: 3.7%

+/- one standard deviation

Sources: Robert Shiller, Milken Institute.
2005: The collapse begins

Home price indices, percent change on a year earlier

S&P/Case-Shiller
S&P/Case-Shiller 10 city
S&P/Case-Shiller national
OFHEO

Sources: S&P/Case-Shiller, OFHEO, Moody's Economy.com, Milken Institute.
Forty-six states had falling prices in the fourth quarter 2007

United States: -9.3% (fourth-quarter annualized growth)

Source: Freddie Mac.
If you bought your house...

One year ago...

<table>
<thead>
<tr>
<th>City</th>
<th>% Change in Price, June 07-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charlotte</td>
<td>-1.0</td>
</tr>
<tr>
<td>Dallas</td>
<td>-3.2</td>
</tr>
<tr>
<td>Denver</td>
<td>-4.7</td>
</tr>
<tr>
<td>Houston</td>
<td>-5.2</td>
</tr>
<tr>
<td>Portland</td>
<td>-5.8</td>
</tr>
<tr>
<td>Seattle</td>
<td>-7.1</td>
</tr>
<tr>
<td>New York</td>
<td>-7.3</td>
</tr>
<tr>
<td>Cleveland</td>
<td>-7.3</td>
</tr>
<tr>
<td>Atlanta</td>
<td>-8.1</td>
</tr>
<tr>
<td>Chicago</td>
<td>-9.5</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>-13.9</td>
</tr>
<tr>
<td>Washington</td>
<td>-15.7</td>
</tr>
<tr>
<td>Composite 20</td>
<td>-15.9</td>
</tr>
<tr>
<td>Detroit</td>
<td>-16.3</td>
</tr>
<tr>
<td>Composite 10</td>
<td>-17.0</td>
</tr>
<tr>
<td>Tampa</td>
<td>-20.1</td>
</tr>
<tr>
<td>San Francisco</td>
<td>-23.7</td>
</tr>
<tr>
<td>San Diego</td>
<td>-24.2</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>-27.9</td>
</tr>
<tr>
<td>Phoenix</td>
<td>-28.6</td>
</tr>
<tr>
<td>Miami</td>
<td>-28.6</td>
</tr>
<tr>
<td>Las Vegas</td>
<td>-28.6</td>
</tr>
</tbody>
</table>

Five years ago...

<table>
<thead>
<tr>
<th>City</th>
<th>% Change in Price, June 03-08</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seattle</td>
<td>48.4</td>
</tr>
<tr>
<td>Portland</td>
<td>48.0</td>
</tr>
<tr>
<td>Washington</td>
<td>28.2</td>
</tr>
<tr>
<td>New York</td>
<td>27.9</td>
</tr>
<tr>
<td>Phoenix</td>
<td>26.8</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>26.3</td>
</tr>
<tr>
<td>Tampa</td>
<td>26.3</td>
</tr>
<tr>
<td>Miami</td>
<td>26.0</td>
</tr>
<tr>
<td>Las Vegas</td>
<td>24.4</td>
</tr>
<tr>
<td>Charlotte</td>
<td>22.9</td>
</tr>
<tr>
<td>Composite 10</td>
<td>20.5</td>
</tr>
<tr>
<td>Composite 20</td>
<td>18.6</td>
</tr>
<tr>
<td>Chicago</td>
<td>14.3</td>
</tr>
<tr>
<td>San Francisco</td>
<td>9.1</td>
</tr>
<tr>
<td>Atlanta</td>
<td>6.6</td>
</tr>
<tr>
<td>Dallas</td>
<td>6.5</td>
</tr>
<tr>
<td>San Diego</td>
<td>6.1</td>
</tr>
<tr>
<td>Boston</td>
<td>5.9</td>
</tr>
<tr>
<td>Denver</td>
<td>4.8</td>
</tr>
<tr>
<td>Minneapolis</td>
<td>-0.7</td>
</tr>
<tr>
<td>Cleveland</td>
<td>-3.8</td>
</tr>
<tr>
<td>Detroit</td>
<td>-21.3</td>
</tr>
</tbody>
</table>

Sources: S&P/Case-Shiller, Milken Institute.
Housing starts sharply decline

Homes sit longer on the market …

… as home appreciation slows

Note: Shaded area represents fluctuation within one standard deviation from mean (1.28%) 

Sources: Mortgage Bankers Association, OFHEO, Moody’s Economy.com, Milken Institute.
VIII. Delinquencies and foreclosures
Foreclosures are nothing new, but …

Average 661,362 annual foreclosures from Q2 1999 to Q2 2006

Sources: Mortgage Bankers Association, Milken Institute.
… their numbers have doubled

Thousands of foreclosures per year

Average 1,316,220 annual foreclosures from Q3 2006 to Q2 2008

Average 661,362 annual foreclosures from Q2 1999 to Q2 2006

Sources: Mortgage Bankers Association, Milken Institute.
Subprime mortgages accounted for half or more of foreclosures since 2006

Number of home mortgage foreclosures started (annualized, in thousands)

Subprime: 12% of mortgages serviced (March 2008)

Sources: Inside Mortgage Finance, Milken Institute.
Subprime ARMs have the worst default record

Home mortgages delinquent or in foreclosure (percent of number)

- Q2 2008, Subprime ARM: 33.4%
- Subprime FRM: 11.8%
- FHA and VA: 5.8%
- Prime FRM: 3.0%

Sources: Mortgage Bankers Association, Milken Institute.
Percentage of homes purchased in Q2 2008 that now have negative equity

United States = 44.8%

Sources: Zillow.com, Milken Institute.
Percentage of homes sold for a loss (Q2 2008)

United States = 32.7%

Sources: Zillow.com, Milken Institute.
Percentage of homes sold that were in foreclosure (Q2 2008)

United States = 18.6%

Sources: Zillow.com, Milken Institute.
IX. Damages scorecard
Losses/write-downs, capital raised, and jobs cut by financial institutions worldwide

- Losses/write-downs, capital raised, and jobs cut by financial institutions worldwide.
- Note: Q3 data are through September 25, 2008.
- Sources: Bloomberg, Milken Institute.

Graph showing losses/write-downs, capital raised, and jobs cut over time from Prior quarters to Q3 2008.

- Losses/write-downs (left axis)
- Capital raised (left axis)
- Jobs cut (right axis)

Numbers and US$ billions represent the data for each quarter.
What is the cumulative damage?

Cumulative losses/write-downs, capital raised, and jobs cut by financial institutions worldwide

Note: Q3 data are through September 25, 2008.
Sources: Bloomberg, Milken Institute.
## Recent losses/write-downs and capital raised by selected financial institutions

<table>
<thead>
<tr>
<th>US$ billions, through September 25, 2008</th>
<th>Losses/write-downs</th>
<th>Capital raised</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citigroup, United States</td>
<td>55.1</td>
<td>49.1</td>
</tr>
<tr>
<td>Merrill Lynch, United States</td>
<td>52.2</td>
<td>29.9</td>
</tr>
<tr>
<td>UBS, Switzerland</td>
<td>44.2</td>
<td>28.2</td>
</tr>
<tr>
<td>HSBC, United Kingdom</td>
<td>27.4</td>
<td>5.1</td>
</tr>
<tr>
<td>Wachovia, United States</td>
<td>22.7</td>
<td>11.0</td>
</tr>
<tr>
<td>Bank of America, United States</td>
<td>21.2</td>
<td>20.7</td>
</tr>
<tr>
<td>Morgan Stanley, United States</td>
<td>15.7</td>
<td>5.6</td>
</tr>
<tr>
<td>IKB Deutsche, Germany</td>
<td>15.0</td>
<td>12.3</td>
</tr>
<tr>
<td>Washington Mutual, United States</td>
<td>14.8</td>
<td>12.1</td>
</tr>
<tr>
<td>Royal Bank of Scotland, United Kingdom</td>
<td>14.4</td>
<td>23.5</td>
</tr>
<tr>
<td>World total</td>
<td>521.9</td>
<td>379.2</td>
</tr>
</tbody>
</table>

Sources: Bloomberg, Milken Institute.
Financial stock prices take big hits

Percentage change in stock price, December 2006–September 2008

-99.8  Washington Mutual
-99.7  Lehman Brothers
-97.5  Freddie Mac
-97.4  Fannie Mae
-95.4  AIG
-94.3  Bear Stearns*
-93.9  Wachovia
-90.0  Countrywide**
-72.8  Merrill Lynch
-66.0  Morgan Stanley
-65.6  UBS Equity
-35.8  Goldman Sachs
-34.4  Bank of America
-3.3  JP Morgan & Chase
5.5  Wells Fargo

Note: * Bear Stearns stock price is to May 2008. ** Countrywide stock price is to June 2008.
Sources: Bloomberg, Milken Institute.
Financial market capitalization takes big hit

Total loss in market value: $728 billion, December 2006–September 2008


AIG
Wachovia
Bank of America
UBS Equity
Morgan Stanley
Fannie Mae
Merrill Lynch
Washington Mutual
Freddie Mac
Lehman Brothers
Goldman Sachs
Countrywide
Bear Stearns
Wells Fargo
JP Morgan & Chase

Note: * Bear Stearns stock price is to May 2008. ** Countrywide stock price is to June 2008.
Sources: Bloomberg, Milken Institute.
X. Credit crunch and liquidity freeze
Tightened standards for real estate loans

Net percentage of domestic respondents tightening standards for commercial real estate loans

Sources: Federal Reserve, Milken Institute.
Widening spreads between mortgage-backed and high-yield bonds

Basis points, spread over 10-year Treasury bond

Maximum spread: 08/29/2008: 955.8 bps

Merrill Lynch Mortgage-Backed Securities Index
Merrill Lynch High-Yield Bond Index

Sources: Merrill Lynch, Bloomberg, Milken Institute.
Liquidity freeze

Spread between 3-month LIBOR and T-bill rate

- September 18, 2008: 313 bps
- August 20, 2007: 240 bps
- Average since August 2007: 130 bps
- Average since 1985: 76 bps

Spread between 3-month LIBOR and overnight index swap rate

- September 19, 2008: 127.5 bps
- Average since August 2007: 69.8 bps
- Average since December 2001: 21.1 bps

Sources: Bloomberg, Milken Institute.
Counterparty risk increases

Note: Counterparty Risk index averages the market spreads of the credit default swaps (CDS) of fifteen major credit derivatives dealers, including ABN Amro, Bank of America, BNP Paribas, Barclays Bank, Citigroup, Credit Suisse, Deutsche Bank, Goldman Sachs Group, HSBC, Lehman Brothers, JPMorgan Chase, Merrill Lynch, Morgan Stanley, UBS, and Wachovia.

Sources: Datastream, Milken Institute.
Commercial paper issuance dries up

Quarterly change in outstanding amount, US$ billions

Sources: Federal Reserve, Milken Institute.
Federal Reserve responds by cutting Fed funds rate, but mortgage rates remain relatively flat.
Congress and White House responses

- HOPE NOW
- The Economic Stimulus Act of 2008
- Housing and Economic Recovery Act of 2008
- Conservatorship of Fannie Mae and Freddie Mac
- Temporary guaranty program for money market funds
- Temporary ban on short selling in selected companies
- Bailout package?
XI. When will we hit bottom?
Economists say the economy isn’t at its low point yet, and house prices likely won’t get there until 2009.

Does this feel like the bottom to a downturn?

- Yes: 27%
- No: 73%

When will home prices hit bottom?

- 1st half 2010: 6%
- 2nd half 2009: 29%
- 1st half 2009: 38%
- 2nd half 2008: 17%
- 1st half 2008: 4%

How far do home prices have to fall?

Annual rents as percent of home prices

Q2 1971: 6.08%
Average, 1960–Q1 2008: 5.04%
Average, 2000–Q1 2008: 4.06%
Q1 2008: 3.93%
Q4 2006: 3.48%

Sources: Davisa, Lehnertb, Martin (2007), Milken Institute.
Combinations of rental price growth rates and rent-to-price ratios to get home prices back to their Q4 2006 value

<table>
<thead>
<tr>
<th>Rent-to-price ratio</th>
<th>Annual home price decline required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-2.0%</td>
</tr>
<tr>
<td>3.80%</td>
<td>2010 Q3</td>
</tr>
<tr>
<td>4.00%</td>
<td>2013 Q1</td>
</tr>
<tr>
<td>5.00%</td>
<td>2024 Q1</td>
</tr>
<tr>
<td>5.04% average</td>
<td>2024 Q3</td>
</tr>
<tr>
<td>6.00%</td>
<td>2026 Q4</td>
</tr>
</tbody>
</table>

Sources: Davisa, Lehnerb, Martin (2007), Milken Institute.
Alternative measures of the affordability of mortgage debt for California

Mortgage payment assumptions: Every month, a home is purchased at median price, buyer takes out a 30-year conforming, fixed-rate loan with 80% LTV. Payment also includes 1% property tax per year, 0.1% property insurance.

Maximum affordability limit is 38% of median household

Sources: Moody’s Economy.com, Milken Institute.
XII. What went wrong
The importance of Fannie Mae and Freddie Mac

<table>
<thead>
<tr>
<th>Category</th>
<th>US$ billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fannie Mae: total assets</td>
<td>886</td>
</tr>
<tr>
<td>Fannie Mae: total MBS outstanding</td>
<td>2,443</td>
</tr>
<tr>
<td>Freddie Mac: total assets</td>
<td>879</td>
</tr>
<tr>
<td>Freddie Mac: total MBS outstanding</td>
<td>1,410</td>
</tr>
<tr>
<td>Commercial banks: total residential real estate assets</td>
<td>2,067</td>
</tr>
<tr>
<td>Savings institutions: total residential real estate assets</td>
<td>944</td>
</tr>
</tbody>
</table>

Sources: Freddie Mac, Fannie Mae, FDIC, Milken Institute.
Fannie Mae and Freddie Mac: Too big with too little capital?

Sources: Freddie Mac, Fannie Mae, Milken Institute.

<table>
<thead>
<tr>
<th>Year</th>
<th>Fannie Mae Assets</th>
<th>Fannie Mae MBS</th>
<th>Freddie Mac Assets</th>
<th>Freddie Mac MBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>133</td>
<td>41</td>
<td>316</td>
<td>316</td>
</tr>
<tr>
<td>2000</td>
<td>803</td>
<td>752</td>
<td>805</td>
<td>805</td>
</tr>
<tr>
<td>2001</td>
<td>1,022</td>
<td>1,301</td>
<td>1,123</td>
<td>1,123</td>
</tr>
<tr>
<td>2002</td>
<td>844</td>
<td>1,778</td>
<td>886</td>
<td>2,443</td>
</tr>
<tr>
<td>2003</td>
<td>805</td>
<td>1,123</td>
<td>879</td>
<td>1,410</td>
</tr>
</tbody>
</table>

US$ billions

- Total assets
- Total MBS outstanding
Fannie Mae and Freddie Mac are highly leveraged

Sources: Freddie Mac, Fannie Mae, FDIC, Milken Institute.
Freddie Mac’s and Fannie Mae's retained private-label portfolios

<table>
<thead>
<tr>
<th></th>
<th>Subprime</th>
<th>Alt-A</th>
<th>All others</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Freddie Mac, 2006</strong></td>
<td>61.2%</td>
<td>25.0%</td>
<td>13.8%</td>
</tr>
<tr>
<td><strong>Freddie Mac, 2007</strong></td>
<td>57.4%</td>
<td>13.1%</td>
<td>29.5%</td>
</tr>
<tr>
<td><strong>Fannie Mae, 2005</strong></td>
<td>32.1%</td>
<td>37.4%</td>
<td>30.5%</td>
</tr>
<tr>
<td><strong>Fannie Mae, 2006</strong></td>
<td>46.4%</td>
<td>36.1%</td>
<td>17.5%</td>
</tr>
<tr>
<td><strong>Fannie Mae, 2007</strong></td>
<td>33.8%</td>
<td>4.3%</td>
<td>32.0%</td>
</tr>
</tbody>
</table>

Sources: Freddie Mac, Fannie Mae, FDIC, Milken Institute.
Leverage ratios of different types of financial firms (June 2008)

Leverage ratio, total assets/common equity

- Freddie Mac: 67.9
- Fannie Mae: 21.5
- Federal Home Loan Banks: 23.7
- Brokers/hedge funds: 31.6
- Savings institutions: 9.4
- Commercial banks: 9.8
- Credit unions: 9.1

Sources: Federal Deposit Insurance Corporation, Office of Federal Housing Enterprise Oversight, National Credit Union Administration, Bloomberg, Google Finance, Milken Institute.
Too much dependence on debt?
Leverage ratios at biggest investment banks

Total assets/total shareholder equity

Sources: Bloomberg, FDIC, Milken Institute.
Most new securities issued in 2007 were rated AAA by S&P

4,090, or 51%, of new securities rated by S&P were rated AAA

56 percent of MBS issued from 2005 to 2007 were eventually downgraded

<table>
<thead>
<tr>
<th>S&amp;P</th>
<th>Total</th>
<th>Downgraded</th>
<th>Downgraded / Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>1,032</td>
<td>156</td>
<td>15.1%</td>
</tr>
<tr>
<td>AA(+-)</td>
<td>3,495</td>
<td>1,330</td>
<td>38.1%</td>
</tr>
<tr>
<td>A(+-)</td>
<td>2,983</td>
<td>1,886</td>
<td>63.2%</td>
</tr>
<tr>
<td>BBB(+-)</td>
<td>2,954</td>
<td>2,248</td>
<td>76.1%</td>
</tr>
<tr>
<td>BB(+-)</td>
<td>789</td>
<td>683</td>
<td>86.6%</td>
</tr>
<tr>
<td>B(+-)</td>
<td>8</td>
<td>7</td>
<td>87.5%</td>
</tr>
<tr>
<td>Total</td>
<td>11,261</td>
<td>6,310</td>
<td>56.0%</td>
</tr>
</tbody>
</table>

Note: A bond is considered investment grade if its credit rating is BBB- or higher by S&P

Sources: Bloomberg, Inside Mortgage Finance, Milken Institute.
When is a AAA not a AAA?

Multilayered mortgage products

Origination of mortgage loans

Pool of mortgage loans: prime or subprime

Mortgage bonds:

<table>
<thead>
<tr>
<th>AAA</th>
<th>80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>AA</td>
<td>11%</td>
</tr>
<tr>
<td>A</td>
<td>4%</td>
</tr>
<tr>
<td>BBB</td>
<td>3%</td>
</tr>
<tr>
<td>BB-unrated</td>
<td>2%</td>
</tr>
</tbody>
</table>

High-grade CDO:

| Senior AAA | 88% |
| Junior AAA | 5%  |
| AA         | 3%  |
| A          | 2%  |
| BBB        | 1%  |
| Unrated    | 1%  |

Mezzanine CDO:

| Senior AAA | 62% |
| Junior AAA | 14% |
| AA         | 8%  |
| A          | 6%  |
| BBB        | 6%  |
| Unrated    | 2%  |

CDO-squared:

| Senior AAA | 60% |
| Junior AAA | 27% |
| AA         | 4%  |
| A          | 3%  |
| BBB        | 3%  |
| Unrated    | 2%  |

Sources: International Monetary Fund, Milken Institute.
Mortgage loan fraud surges

Number of cases reported, thousands

US$ millions

Sources: Financial Crimes Enforcement Network, Federal Bureau of Investigation, Milken Institute.
Is adequate information disclosed to consumers?

Percent of respondents who could not correctly identify various loan costs using current disclosure forms:

- Prepayment penalty amount: 95%
- Total up-front cost amount: 87%
- Property tax and homeowner’s insurance cost amount: 84%
- Reason why the interest rate and APR sometimes differ: 79%
- Presence of charges for optional credit insurance: 74%
- Presence of prepayment penalty for refinance in two years: 68%
- Loan amount: 51%
- Which loan was less expensive: 37%
- Whether loan amount included finances settlement charges: 33%
- Interest rate amount: 32%
- Balloon payment (presence and amount): 30%
- Settlement charges amount: 23%
- Monthly payment (including whether it includes taxes and insurance): 21%
- Cash due at closing amount: 20%
- APR amount: 20%

Sources: Federal Trade Commission, Milken Institute.
Drivers of foreclosures: Strong appreciation or weak economies?

Foreclosures per 1,000 homes

Weak economies

Housing bubbles

Sources: U.S. Treasury Department, RealtyTrac, Office of Federal Housing Enterprise Oversight, Milken Institute.
After housing bubble burst in 2007: Foreclosures highest for areas with biggest price declines

Sources: RealtyTrac, Office of Federal Housing Enterprise Oversight, Milken Institute.
XIII. Where do we go from here?
The U.S. regulatory regime: In need of reform?

Financial, bank and thrift holding companies
- Fed
- OTS

Fannie Mae, Freddie Mac, and Federal Home Loan Banks
- Federal Housing Finance Agency

Fed is the umbrella or consolidated regulator

National banks
- OCC
- FDIC

State commercial and savings banks
- State bank regulators
- FDIC
- Fed–state member commercial banks

Federal savings banks
- OTS
- FDIC

Federal branch
- OCC
- Host county regulator

Foreign branch
- Fed
- Host county regulator

Limited foreign branch
- OTS
- Host county regulator

50 State insurance regulators plus District of Columbia and Puerto Rico

Securities brokers/dealers
- FINRA
- SEC
- CFTC
- State securities regulators

Other financial companies, including mortgage companies and brokers
- Fed
- State licensing (if needed)
- U.S. Treasury for some products

Notes:
Justice Department: Assesses effects of mergers and acquisitions on competition
Federal Courts: Ultimate decider of banking, securities, and insurance products
CFTC: Commodity Futures Trading Commission
FDIC: Federal Deposit Insurance Corporation
Fed: Federal Reserve
FINRA: Financial Industry Regulatory Authority
GSEs: Government Sponsored Enterprises
OCC: Comptroller of the Currency
OTS: Office of Thrift Supervision
SEC: Securities and Exchange Commission

Many different options and innovations...

- Covered Bonds
- Alternative Mortgage Products
- Shared Equity Mortgages
- Real Estate Derivatives
- Classical Insurance Products
- Others
Demystifying the Mortgage Meltdown: What It Means for Main Street, Wall Street and the U.S. Financial System

James R. Barth
Senior Fellow

Glenn Yago
Director of Capital Studies

Milken Institute
October 2, 2008