U.S. Subprime Mortgage Market Meltdown

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14th Dubrovnik Economic Conference
The Croatian National Bank
Dubrovnik, Croatia
June 25–28, 2008
“Any real-estate investment is a good investment … ”
“Any real-estate investment is a good investment … ”

… NOT!
Homeownership Rate Reaches Historic High in 2004

- 69.2% in September 2004
- 67.8% in March 2008

Source: U.S. Census Bureau.
Home Prices Peak in 2006

Sources: U.S. Office of Federal Housing Enterprise Oversight (OFEHO), Standard & Poor's, California Association of Realtors, Moody's Economy.com.
Home Price Appreciation Peaks in 2005

House-price indices, % change on a year earlier

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

Peaks in 2005

A Longer-Term Perspective on Home Prices

History Repeats Itself: Home Prices Don’t Just Go Up

Change in Home Prices in 100 plus years

Homes for Sale Take Off

Source: U.S. Census Bureau.
Single-family Home Sales Reach New High Before Plunging

Sources: U.S. Census, National Association of Realtors, Moody’s Economy.com.
Existing Home Sales Are Down Everywhere Over the Past Two Years

Percent change in existing home sales
Fourth-quarter 2005 through fourth-quarter 2007

Existing home sales nationwide down 29%

Source: Freddie Mac.
Median Existing Single-family Home Price: Too Good to Last

Sources: National Association of Realtors, Moody's Economy.com.
Forty-six States Had Falling Prices in the Fourth Quarter 2007

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

Source: Freddie Mac.
Sources: U.S. Census Bureau, Global Insight.
Single-family Building Hit a Record in 2005 But Was 53% Lower Two Years Later

Housing starts: Single-family privately owned

Source: U.S. Census Bureau.
Homes Sit Longer on the Market

Sources: National Association of Realtors, Moody’s Economy.com.
Home Prices and Credit Boom

Index, January 2000 = 100

S&P/Case-Shiller® home price index (L)

Total originations (R)

Subprime originations (R)

US$ billions

0 500 1,000 1,500 2,000 2,500 3,000 3,500 4,000 4,500

0 50 100 150 200 250 300 350 400

Interest Rates: Too Low Too Long?
*Fed Funds Rate vs. Rate on Long-term Government Bonds*

Sources: Federal Reserve, Global Insight.
Mortgage Rates: ARMs Appear Attractive to Many

Sources: Mortgage Banker’s Association, Moody’s Economy.com.
ARM Share of Mortgages

ARM Share of Mortgages

Percent of all loans

Source: Mortgage Bankers Association.
ARM Mortgage Share by Loan Type

Source: Mortgage Bankers Association.

Percent of loan type

- FHA
- Prime
- Subprime
# Prime and Subprime Home Mortgage Originations

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Originations (US$ Trillions)</th>
<th>Share of Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Prime Originations</td>
</tr>
<tr>
<td>1994</td>
<td>0.77</td>
<td>95.5</td>
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<tr>
<td>1995</td>
<td>0.64</td>
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<tr>
<td>1996</td>
<td>0.79</td>
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<tr>
<td>1997</td>
<td>0.86</td>
<td>85.5</td>
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<td>1998</td>
<td>1.45</td>
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<td>1999</td>
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<td>2000</td>
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<tr>
<td>2001</td>
<td>2.22</td>
<td>92.2</td>
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<tr>
<td>2002</td>
<td>2.89</td>
<td>92.6</td>
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<tr>
<td>2003</td>
<td>3.95</td>
<td>91.6</td>
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<tr>
<td>2004</td>
<td>2.92</td>
<td>81.8</td>
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<tr>
<td>2005</td>
<td>3.12</td>
<td>78.7</td>
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<tr>
<td>2006</td>
<td>2.98</td>
<td>79.9</td>
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<tr>
<td>2007</td>
<td>2.43</td>
<td>92.1</td>
</tr>
<tr>
<td>2008 Q1</td>
<td>0.48</td>
<td>97.9</td>
</tr>
</tbody>
</table>

Source: Inside Mortgage Finance.
Mortgage Originations by Product

Subprime and Alt A shares quadruple between 2001 and 2006, then fall in 2007.

Source: Inside Mortgage Finance.
2/28 ARMs Dominate Subprime Home-purchase Loan Originations in 2006

Source: Freddie Mac.
Subprime Mortgage Loans Outstanding

US$ billions

Source: Inside Mortgage Finance.
Distribution of Prime and Subprime Residential Mortgage Originations by FICO Score (2006)
Origin of “Securitization”

“But I don’t know any other word to describe what we are doing. You will have to use it (securitization).”

Lewis Ranieri

“The Origins of Securitization, Sources of Its Growth, and Its Future Potential,” A Primer on Securitization
Surge in Amount and Diversity of U.S. Asset-backed Securities Outstanding

U.S. Asset-backed Securities Outstanding

1999, Total = US$4,235 Billions

- Agency MBS: 54%
- Agency CMO: 16%
- Non-agency MBS: 9%
- Home Equity: 3%
- Credit Card: 6%
- Automobile: 3%
- Credit Card: 6%
- Other: 8%

2007, Total = US$9,682 Billions

- Agency MBS: 46%
- Agency CMO: 14%
- Non-agency MBS: 14%
- Home Equity: 6%
- Credit Card: 4%
- Automobile: 2%
- Credit Card: 4%
- Other: 11%

Home Mortgage Security Issuance

1985, Total = $110 Billion
- FNMA 21%
- GNMA 42%
- FHLMC 35%
- Non-Agency 2%

2006, Total = $2.1 Trillion
- FNMA 22%
- GNMA 4%
- FHLMC 18%
- Non-Agency 56%

2007, Total = $1.9 Trillion
- FNMA 33%
- GNMA 5%
- FHLMC 24%
- Non-Agency 38%

Non-Agency
Outstanding Home Mortgage Securities

1986, Total = $548 Billion
- Fannie Mae MBS 18%
- Freddie Mac PCs 31%
- Ginnie Mae MBS 48%
- Non-Agency MBS 3%

2006, Total = $5.7 Trillion
- Fannie Mae MBS 35%
- Freddie Mac PCs 26%
- Ginnie Mae MBS 7%
- Non-Agency MBS 32%

2007, Total = $6.6 Trillion
- Fannie Mae MBS 35%
- Freddie Mac PCs 26%
- Ginnie Mae MBS 7%
- Non-Agency MBS 32%
Private-label Mortgage-backed Security Issuance Has Fallen Sharply

Source: Inside Mortgage Finance.

- March 2007: $191 Billion
- June 2007: $181 Billion
- Sep. 2007: $137 Billion
- Dec. 2007: $109 Billion
- April 2008: $102 Billion

Dollar amount of Issuance, US$ billions

- Subprime & other
- Alt-A
- Prime Jumbo
- Freddie Mac & Fannie Mae
Origination Shares of Mortgage Brokers Account for Majority of Home Mortgage Originations

1987
Number of mortgage brokers: 7,000

- Brokers: 20%
- Others: 80%

2006
Number of mortgage brokers: 53,000

- Brokers: 58%
- Others: 42%

Monoline Insurers’ Financial Guarantees of Securities Increase, But What Happens If They Cannot Be Honored?

Net Par Outstanding = $3.5 Trillion
December 2006

- Public Finance, $1.3 Trillion, 38%
- Structured Finance, $2.2 Trillion, 62%

- 45% Mortgage-Backed Securities: U.S.
- 19% Other Asset-Backed Securities: U.S.
- 11% Mortgage-Backed Securities: International
- 6% Other Asset-Backed Securities: International
- 19% Other

Public Finance,
$1.3 Trillion,
38%

Other

Structured
Finance,
$2.2 Trillion,
62%

Public Finance,
$1.3 Trillion,
38%

Structured
Finance,
$2.2 Trillion,
62%

- 34% General Obligation
- 15% Utility Revenue
- 15% Tax-Backed Revenue
- 15% Transportation Revenue
- 8% Other

- General Obligation
- Utility Revenue
- Tax-Backed Revenue
- Transportation Revenue
- Other

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- General Obligation
- Utility Revenue
- Tax-Backed Revenue
- Transportation Revenue
- Other
Securitization: Originate to Distribute vs. Originate to Hold

- Saving Institutions
- Government-Sponsored Enterprises and Agencies
- Non-Agency Issuers
- Other
- Commercial Banks
Subprime Crisis Overview
December 2006–March 2008

Sources: BusinessWeek (March 31, 2008), Standard & Poor’s and Global Insight.

- Dec. 06: Ownit Mortgage, a subprime lender, files for bankruptcy
- Apr. 07: New Century, a mortgage broker, files for bankruptcy
- Feb. 07: HSBC says it set aside $10.6 billion for bad loans, incl. subprime
- Jul. 07: Two Bear Stearns hedge funds file for bankruptcy
- Aug. 07: Fed cuts discount rate to 5.75%
- Jan. 11, 08: BofA agrees to buy Countrywide
- Jan. 30, 08: Fed cuts discount rate to 3.5%
- Mar. 11, 08: Fed offers troubled banks as much as $200 billion
- Mar. 16, 08: JP Morgan offers to buy Bear Stearns
- Mar. 18, 08: Fed cuts discount rate to 2.4%; Fed funds rate to 2.25%
- Oct. 07: Merrill announces $7.9b in subprime write-downs, surpassing Citi’s $6.5 billion
Ratio of Median Home Price to Median Household Income Surges

Median Home Price/Median Household Income

'68 '70 '72 '74 '76 '78 '80 '82 '84 '86 '88 '90 '92 '94 '96 '98 '00 '02 '04 '06

2.5 3.0 3.5 4.0 4.5 5.0
Home Mortgage Share of Household Liabilities Reaches a New High in 2007

Source: Federal Reserve.
Leverage of U.S. Households has Increased Rapidly Since 1980

Home mortgage debts as % of disposable personal income

Percent

Sources: Federal Reserve and Moody's.
Sixty-day plus Home Mortgage Delinquency Rates Are on the Rise

Sources: First American Corelogic and LoanPerformance databases.
Subprime ARM Defaults Are 12 Times Those for Prime

Delinquent or In Foreclosure (Percent of Number)

- Subprime ARM, 26.09
- Subprime FRM, 9.82
- FHA & VA, 5.96
- Prime, 2.08
Subprime Loans Accounted for Over Half of Foreclosures Since 2006

Number of foreclosures started (Annualized rate in thousands)

Subprime: 13% of loans serviced (December)

Source: Mortgage Bankers Association National Delinquency Survey (data as of December 2007, number expanded to reflect 85% coverage).
Percent Change in Delinquency Rate of Subprime ARM Loans
Between 2005Q2 and 2007Q2

Sources: Mortgage Bankers Association, Milken Institute.
## National Subprime Foreclosure Rates by Origination Year*

<table>
<thead>
<tr>
<th>Foreclosure Rates in Origination Year and Subsequent Years</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>Year to July 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Originate year</td>
<td>1.30</td>
<td>1.50</td>
<td>1.85</td>
<td>1.07</td>
<td>0.82</td>
<td>0.86</td>
<td>0.97</td>
<td>2.56</td>
<td>3.01</td>
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<tr>
<td>1st year</td>
<td>6.33</td>
<td>6.86</td>
<td>7.17</td>
<td>5.51</td>
<td>4.14</td>
<td>3.93</td>
<td>6.38</td>
<td>7.69</td>
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<tr>
<td>2nd year</td>
<td>5.46</td>
<td>6.01</td>
<td>5.81</td>
<td>4.55</td>
<td>3.11</td>
<td>3.66</td>
<td>4.66</td>
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<tr>
<td>3rd year</td>
<td>4.85</td>
<td>3.35</td>
<td>4.23</td>
<td>2.37</td>
<td>2.23</td>
<td>1.85</td>
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<tr>
<td>4th year</td>
<td>2.29</td>
<td>2.49</td>
<td>1.88</td>
<td>1.56</td>
<td>0.83</td>
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<tr>
<td>5th year</td>
<td>2.05</td>
<td>1.19</td>
<td>1.17</td>
<td>0.59</td>
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<td>7th year</td>
<td>0.56</td>
<td>0.30</td>
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<td></td>
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<tr>
<td>8th year</td>
<td>0.24</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Total Number of Foreclosures From Origination through September 2007

<table>
<thead>
<tr>
<th></th>
<th>188,026</th>
<th>165,801</th>
<th>140,195</th>
<th>124,781</th>
<th>127,100</th>
<th>176,729</th>
<th>231,360</th>
<th>140,278</th>
<th>13,272</th>
</tr>
</thead>
</table>

### Total Number of Originations

<table>
<thead>
<tr>
<th></th>
<th>787,420</th>
<th>739,749</th>
<th>620,945</th>
<th>797,625</th>
<th>1,143,037</th>
<th>1,716,141</th>
<th>1,925,780</th>
<th>1,368,706</th>
<th>440,934</th>
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</table>

### Foreclosure Rate through September 2007

<table>
<thead>
<tr>
<th></th>
<th>23.88</th>
<th>22.41</th>
<th>22.58</th>
<th>15.64</th>
<th>11.12</th>
<th>10.30</th>
<th>12.01</th>
<th>10.25</th>
<th>3.01</th>
</tr>
</thead>
</table>

*Foreclosure rates are based on the number of loans starting foreclosure.*
# California Subprime Foreclosure Rates by Origination Year*

<table>
<thead>
<tr>
<th>Foreclosure Year</th>
<th>Foreclosure Rates in Origination Year and Subsequent Years</th>
<th>Origination Year</th>
<th>Year to July 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1999</td>
<td>2000</td>
<td>2001</td>
</tr>
<tr>
<td>Originate year</td>
<td>0.88</td>
<td>0.76</td>
<td>1.01</td>
</tr>
<tr>
<td>1st year</td>
<td>4.03</td>
<td>3.72</td>
<td>4.29</td>
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<tr>
<td>2nd year</td>
<td>3.01</td>
<td>2.99</td>
<td>2.74</td>
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<tr>
<td>3rd year</td>
<td>2.66</td>
<td>1.26</td>
<td>1.17</td>
</tr>
<tr>
<td>4th year</td>
<td>0.93</td>
<td>0.49</td>
<td>0.22</td>
</tr>
<tr>
<td>5th year</td>
<td>0.46</td>
<td>0.11</td>
<td>0.12</td>
</tr>
<tr>
<td>6th year</td>
<td>0.12</td>
<td>0.07</td>
<td>0.04</td>
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<tr>
<td>7th year</td>
<td>0.06</td>
<td>0.02</td>
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<tr>
<td>8th year</td>
<td>0.03</td>
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<table>
<thead>
<tr>
<th></th>
<th>Total Number of Foreclosures From Origination through September 2007</th>
<th>Total Number of Originations</th>
<th>Foreclosure Rate through September 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>9,160</td>
<td>8,389</td>
<td>9,528</td>
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<tr>
<td></td>
<td>75,224</td>
<td>88,915</td>
<td>99,412</td>
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</table>

*Foreclosure rates are based on the number of loans starting foreclosure.
## Determinants of Delinquency and Foreclosure Rates in CBSAs
### January 1999–December 2006

<table>
<thead>
<tr>
<th>Variables</th>
<th>60+ Days Delinquent and In Foreclosure</th>
<th>90+ Days Delinquent and In Foreclosure</th>
<th>In Foreclosure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C</td>
<td>-16.868***</td>
<td>-7.780***</td>
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<tr>
<td></td>
<td>ARM</td>
<td>21.771***</td>
<td>11.523***</td>
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<tr>
<td></td>
<td>FICO &lt; 620</td>
<td>9.757***</td>
<td>3.266***</td>
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<tr>
<td></td>
<td>LTV &gt; 80</td>
<td>53.410***</td>
<td>27.963***</td>
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<tr>
<td></td>
<td>LOWNODOC</td>
<td>17.031***</td>
<td>7.628***</td>
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<tr>
<td></td>
<td>Interaction of All Four Loan Characteristics</td>
<td>201.692***</td>
<td>118.785***</td>
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<tr>
<td></td>
<td>Population</td>
<td>1.688***</td>
<td>0.823**</td>
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<tr>
<td></td>
<td>Median Family Income Growth</td>
<td>-2.048***</td>
<td>-0.768**</td>
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<tr>
<td></td>
<td>Unemployment</td>
<td>1.340***</td>
<td>0.719***</td>
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<td></td>
<td>Average Loan Size</td>
<td>-0.049***</td>
<td>-0.028***</td>
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<td></td>
<td>Adjusted R-square</td>
<td>0.6466</td>
<td>0.6200</td>
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<td>Number of Observations</td>
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<tr>
<td></td>
<td>Number of CBSAs</td>
<td>360</td>
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</tr>
</tbody>
</table>

Note: ***, **, and * denote significance at 1, 5, and 10 percent levels, respectively. CBSA denotes core-based statistical area. Includes CBSA fixed effects.
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</tr>
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<tbody>
<tr>
<td>C</td>
<td>-20.594***</td>
<td>-14.972***</td>
<td>-11.168***</td>
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<td>ARM</td>
<td>23.762***</td>
<td>24.692***</td>
<td>11.056***</td>
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<td>FICO &lt; 620</td>
<td>10.678***</td>
<td>5.818***</td>
<td>6.731***</td>
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<td>LTV &gt; 80</td>
<td>60.163***</td>
<td>41.033***</td>
<td>27.730***</td>
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<td>LOWNODOC</td>
<td>12.880***</td>
<td>20.157***</td>
<td>7.556***</td>
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<tr>
<td>Interaction of All Four Loan Characteristics</td>
<td>307.380***</td>
<td>187.290***</td>
<td>128.897***</td>
</tr>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td>84.331***</td>
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<tr>
<td>Median Family Income Growth</td>
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<tr>
<td>Home Price Growth</td>
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<tr>
<td>Unemployment</td>
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<td>Average Loan Size</td>
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<tr>
<td>Adjusted R-square</td>
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<td>30036</td>
<td>30036</td>
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<tr>
<td>Number of CBSAs</td>
<td>360</td>
<td>360</td>
<td>360</td>
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</tbody>
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</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>-16.427***</td>
<td>-7.510***</td>
<td>-9.204***</td>
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<tr>
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<td>13.680***</td>
<td>12.423***</td>
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<td>FICO &lt; 620</td>
<td>1.228</td>
<td>-0.868</td>
<td>2.051***</td>
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<tr>
<td>LTV &gt; 80</td>
<td>61.173***</td>
<td>31.379***</td>
<td>28.574***</td>
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<tr>
<td>LOWNODOC</td>
<td>3.752***</td>
<td>1.451*</td>
<td>2.487***</td>
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<tr>
<td>Interaction of All Four Loan</td>
<td>521.907***</td>
<td>280.018***</td>
<td>237.738***</td>
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<td>Characteristics</td>
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</tr>
<tr>
<td>Population</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Family Income Growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home Price Growth</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Loan Size</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.6329</td>
<td>0.5987</td>
<td>0.6328</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>25848</td>
<td>25848</td>
<td>25848</td>
</tr>
<tr>
<td>Number of CBSAs</td>
<td>360</td>
<td>360</td>
<td>360</td>
</tr>
</tbody>
</table>

Note: ***, **, and * denote significance at 1, 5, and 10 percent levels, respectively. CBSA denotes core-based statistical area. Includes CBSA fixed effects.
The Mortgage Problem in Perspective

80 million houses  
25 million are paid off

55 million have mortgages  
51 million are paying on-time

4 million are behind  
(8% of 55 million with 2% in foreclosure)

This compares to 50% seriously delinquent in the 1930s

Source: U.S. Treasury Department.
“A billion here, a billion there, and pretty soon you’re talking real money.”

-- U.S. Senator Everett Dirksen, 1961
"A billion^here, a billion^there, and pretty soon you’re talking real money."

-- U.S. Senator Everett Dirksen, 1961
## Estimates of Losses From Subprime Crisis

<table>
<thead>
<tr>
<th>Date</th>
<th>Estimate</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/19/2007</td>
<td>$50-100 billion</td>
<td>Bernanke testimony before congress</td>
</tr>
<tr>
<td>10/17/2007</td>
<td>$100-200 billion</td>
<td>William C. Dudley, NY Fed</td>
</tr>
<tr>
<td>11/8/2007</td>
<td>$150 billion</td>
<td>Bernanke testimony before Congress</td>
</tr>
<tr>
<td>11/15/2007</td>
<td>$400 billion</td>
<td>Deutsche Bank</td>
</tr>
<tr>
<td>11/16/2007</td>
<td>$400 billion</td>
<td>Goldman Sachs</td>
</tr>
<tr>
<td>12/19/2007</td>
<td>$200-300 billion</td>
<td>The Economist</td>
</tr>
<tr>
<td>1/31/2008</td>
<td>$120 billion</td>
<td>Wall Street Journal</td>
</tr>
<tr>
<td>2/11/2008</td>
<td>$400 billion</td>
<td>German finance minister at G7 meeting</td>
</tr>
<tr>
<td>3/3/2008</td>
<td>$600 billion</td>
<td>Geraud Charpin, head of European credit strategy at UBS in London</td>
</tr>
<tr>
<td>3/10/2008</td>
<td>$215 billion</td>
<td>Head of Japan's financial regulator</td>
</tr>
<tr>
<td>3/13/2008</td>
<td>$285 billion</td>
<td>Standard and Poor’s</td>
</tr>
</tbody>
</table>
The collapse of credit markets in the United States, driven by the subprime loan crisis, has led to major losses for banks worldwide. Supbrime’s Biggest Losers

Losses/write-downs through May 27, 2008, US$ billions

- Citigroup: 42.9
- UBS: 38.2
- Merrill Lynch: 37.0
- HSBC: 19.5
- IKB Deutsche: 16.1
- Royal Bank of Scotland: 15.4
- Bank of America: 14.8
- Morgan Stanley: 12.6
- JPMorgan Chase: 9.8
- Credit Suisse: 9.7
- Credit Agricole: 9.1
- Deutsche Bank: 8.4
- Washington Mutual: 7.7
- Wachovia: 7.0

Source: Bloomberg.
### Recent Losses/Write-downs and Capital Raised by Financial Institutions

<table>
<thead>
<tr>
<th>Source</th>
<th>Loss/Write-down</th>
<th>Capital Raised</th>
<th>2Q 2008 (through May 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Citigroup, United States</td>
<td>42.9</td>
<td>44.1</td>
<td>0.0</td>
</tr>
<tr>
<td>UBS, Switzerland</td>
<td>38.2</td>
<td>28.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Merrill Lynch, United States</td>
<td>37.0</td>
<td>17.9</td>
<td>0.0</td>
</tr>
<tr>
<td>HSBC, United Kingdom</td>
<td>19.5</td>
<td>2.0</td>
<td>0.0</td>
</tr>
<tr>
<td>IKB Deutsche, Germany</td>
<td>16.1</td>
<td>13.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Royal Bank of Scotland, United Kingdom</td>
<td>15.4</td>
<td>23.8</td>
<td>0.0</td>
</tr>
<tr>
<td>Bank of America, United States</td>
<td>14.8</td>
<td>19.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Morgan Stanley, United States</td>
<td>12.6</td>
<td>5.6</td>
<td>0.0</td>
</tr>
<tr>
<td>JPMorgan Stanley, United States</td>
<td>9.8</td>
<td>708.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Credit Suisse, Switzerland</td>
<td>9.7</td>
<td>1.5</td>
<td>0.0</td>
</tr>
<tr>
<td><strong>World total (US$ billions)</strong></td>
<td><strong>382.8</strong></td>
<td><strong>269.9</strong></td>
<td><strong>0.9</strong></td>
</tr>
</tbody>
</table>

Source: Bloomberg.
Financial Stocks Take Big Hits in Subprime Crisis

Percentage change in price, December 2006–March 2008

-94% Bear Stearns
-87% Countrywide
-77% Washington Mutual
-63% Freddie Mac
-56% Merrill Lynch
-56% Fannie Mae
-53% Wachovia
-52% UBS
-52% Lehman Brothers
-40% AIG
-32% Morgan Stanley
-29% Bank of America
-18% Wells Fargo
-17% Goldman Sachs
-11% JP Morgan & Chase

Source: Bloomberg.
Leverage Ratios of Different Types of Financial Firms

2007

- **Government-sponsored enterprises**: 24.7
- **Brokers and hedge funds**: 31.6
- **Credit unions**: 8.4
- **Savings institutions**: 8.4
- **Commercial banks**: 9.8

Source: David Greenlaw, Jan Hatzius, Anil K Kashyap, Hyun Song Shin, 2008
Too Much Dependence on Debt?

Leverage Ratios At Biggest Investment Banks

Note: * the latest figure is as of December 2007

Sources: Bloomberg.
Banks Depend Less on Debt
Leverage Ratios At Bank Holding Companies

Total assets to total shareholder equity

- March 2001: Citigroup - 21, JP Morgan Chase - 17, Bank of America - 13

Sources: Bloomberg.
What Broke the Cycle?

- Fraud: by borrowers, brokers, appraisers, lenders.
- Cracks in most overheated markets (LA, Las Vegas, Miami) quickly spread everywhere.
- Most highly leveraged vehicles (CLOs) collapsed first
  - Followed by second most leveraged institutions – banks (not hedge funds).
- Difference this time: Primary losers are those who own AAA debt.

Downgrades in the Asset-Backed Securities Markets

AAA Downgrades In the Asset-Backed Securities Markets

Source: Moody's
Most New Securities Were Rated AAA by S&P in 2007

1,295 or 45% of new securities rated by S&P were rated AAA in 2007
When is a AAA not a AAA?

Multilayered structured credit products

**High-grade structured-finance CDO**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior AAA</td>
<td>88%</td>
</tr>
<tr>
<td>Junior AAA</td>
<td>5%</td>
</tr>
<tr>
<td>AA</td>
<td>3%</td>
</tr>
<tr>
<td>A</td>
<td>2%</td>
</tr>
<tr>
<td>BBB</td>
<td>1%</td>
</tr>
<tr>
<td>Unrated</td>
<td>1%</td>
</tr>
</tbody>
</table>

**Mortgage loans**

- AAA: 80%
- AA: 11%
- A: 4%
- BBB: 3%
- BB-unrated: 2%

**Mortgage bonds**

**Mezzanine structured-finance CDO**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior AAA</td>
<td>62%</td>
</tr>
<tr>
<td>Junior AAA</td>
<td>14%</td>
</tr>
<tr>
<td>AA</td>
<td>8%</td>
</tr>
<tr>
<td>A</td>
<td>6%</td>
</tr>
<tr>
<td>BBB</td>
<td>6%</td>
</tr>
<tr>
<td>Unrated</td>
<td>4%</td>
</tr>
</tbody>
</table>

**CDO-Squared**

<table>
<thead>
<tr>
<th>Rating</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior AAA</td>
<td>60%</td>
</tr>
<tr>
<td>Junior AAA</td>
<td>27%</td>
</tr>
<tr>
<td>AA</td>
<td>4%</td>
</tr>
<tr>
<td>A</td>
<td>3%</td>
</tr>
<tr>
<td>BBB</td>
<td>3%</td>
</tr>
<tr>
<td>Unrated</td>
<td>2%</td>
</tr>
</tbody>
</table>

*Source: International Monetary Fund.*
Most Texas Banks Were AAA in the 1980s

First RepublicBank Corporation
Foreclosures in Houston

Source: Harris County Foreclosure Listing Service.
Widening Spreads
Mortgage-backed and High-yield Bonds

Basis point spread above 10-year treasury bond

ML BBB Mortgage-Backed Securities Index

ML High-Yield Bond Index

Source: Bloomberg.
Widening Spreads

Municipal Bonds

Basis point spread over 10-year treasury bond

Source: Bloomberg.
Market for Liquidity Freezes

Thirty-Day AA Rated Commercial Paper Rates

Percent

May 07  Jun 07  Jul 07  Aug 07  Sep 07  Oct 07  Nov 07  Dec 07  Jan 08  Feb 08  Mar 08  Apr 08  May 08

Source: Federal Reserve.
Mortgage Loan Fraud Surges

Source: Financial Crimes Enforcement Network.
Dollar Losses in Reported Cases of Mortgage Fraud

Source: Federal Bureau of Investigation.
Tightened Standards For Real Estate Loans

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

Source: Federal Reserve.
Despite Federal Funds Rate Cuts, Mortgage Rates Remain Relatively Flat

**Sources**: Federal Reserve, Freddie Mac.
Is Adequate Information Disclosed to Consumers?

Percentage of people in a study who could not correctly identify various loan terms using current mortgage disclosure forms

- Annual percentage rate: 20%
- Monthly payment: $21
- Loan amount: $51
- Existence of prepayment penalty: 68%
- Total upfront cost: $87

Does this feel like the bottom of a downturn?

Yes: 27%

No: 73%

Economists say the economy isn’t at its low point yet, and house prices likely won’t get there until 2009

When will home prices hit bottom?

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

How Far Do Home Prices Have to Fall?

**History of Credit Disruptions: 1998–Today**

Recent credit disruption was preceded by 5 years of benign credit market conditions.

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment Grade Spread Widening</td>
<td>● Russian credit default</td>
<td>● Weak credit fundamentals</td>
<td>● Deteriorating housing/subprime market</td>
</tr>
<tr>
<td></td>
<td>● Long Term Capital</td>
<td>● Major corporate defaults and accounting scandals (Enron, WorldCom)</td>
<td>● Market de-leveraging</td>
</tr>
<tr>
<td>Investment Grade Spread Widening</td>
<td>● 70+ bps</td>
<td>● 80+ bps</td>
<td>● 1200+ bps</td>
</tr>
<tr>
<td>Key Issues</td>
<td>● Significant counterparty risk</td>
<td>● Corporate scandals and fraud</td>
<td>● Tremendous supply/demand imbalance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Recapitalization of financial institutions</td>
</tr>
</tbody>
</table>
What Went Wrong:

1960s
1980s
Today
2020s?
Enough Blame to Go Around

- Nonresident speculators
- Regulators/central bankers
- Brokers/other intermediaries
- Rating agencies
- Institutional investors
- Home buyers
- Appraisers
$1 Trillion Losses

- The “Nifty Fifty” stocks - early 1970s
- Sovereign debt: 1980s
- Texas banks/Southwest real estate: 1980s
- Japanese real estate/equities: 1980s-90s
- Technology: 2000
- Housing-related investments: 2007-8
Credit Issues

- Ratings consistency
- Real estate price fluctuation
- Interest rate volatility
- Sovereign debt risk
- Leverage
- Business volatility
- Liquidity risk
- Counterparty risk
- Currency risk
- Unexpected regulatory requirements
- Complexity
1974: The most important year in financial history since World War II.
1974:

- Interest rates double in one year; highest level in recent recorded U.S. history
- Regulation restricts lending
- Energy prices skyrocket
- U.S. stock market plunges 50%
1974:

RESULT

Companies with the highest returns on capital, fastest rates of market share and employment growth, greatest contributions to technological and new-product innovation were denied access to equity and debt capital.
For 1975 through 1976, the return on investment non-investment debt-grade portfolios to investors was 100% unleveraged.

Fewer than 1 percent of those companies projected to be candidates for bankruptcies actually defaulted.
“I’ll Never Own a Stock Again”
Dow Jones Industrial Average

Index
1,100
1,000
900
800
700
600
500

1052 on 11 Jan. 1973
578 on 6 Dec. 1974
“I’ll Never Own a Stock Again”
Dow Jones Industrial Average

Index
1,100

1,000

900

800

700

600

500


1052 on 11 Jan. 1973

578 on 6 Dec. 1974
The $55 Billion Misunderstanding
Investing in the Nifty Fifty
12/31/72 – 12/31/81

90% of the “Nifty Fifty” showed a negative return over nine years. The average inflation-adjusted rate of return was -46%.
The $55 Billion Misunderstanding
Investing in the Nifty Fifty
12/31/72 – 12/31/81

The average P/E ratio of these 16 companies dropped from 66 to 11.

<table>
<thead>
<tr>
<th>Avon</th>
<th>ADP</th>
<th>Coke</th>
<th>Disney</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Pepper</td>
<td>Kodak</td>
<td>H-P</td>
<td>J&amp;J</td>
</tr>
<tr>
<td>Eli Lilly</td>
<td>Marriott</td>
<td>McDonald’s</td>
<td>Merck</td>
</tr>
<tr>
<td>Polaroid</td>
<td>Rite-Aid</td>
<td>Wal-Mart</td>
<td>Xerox</td>
</tr>
</tbody>
</table>
Imperial Palace (Tokyo)  

2006  
US$1.7 trillion

Residential Property (California)  

2006  
US$6.5 trillion
“Real estate prices collapsed, credit dried up, house building stopped ...
“Real estate prices collapsed, credit dried up, house building stopped ... in 1792.”