FAR MEETING: RECONSIDERING THE EVIDENCE FROM THE FINANCIAL CRISIS

NEW YORK FED
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Causes and responses

• Credit boom and household leverage
  • Systemic leverage
  • Underwriting standards
  • Replacing the shadow banking system
• Counter party risk and contagion
• Internal risk management of banks
• Regulatory complexity
Credit Boom and House Price Increases

• **Common view**
  - Innovations and perverted incentives in credit supply led to distortions in the allocation of credit, especially to subprime sector and poorer households
  - Poor incentives undermined underwriting standards, led to fraudulent loan origination and liar loans (income overstatement)
  - Loose lending standards led to house price boom and defaults once lending stopped

• **Alternative view**
  - Credit expanded across the income distribution, systemic increase in household leverage; mortgage crisis was a middle class crisis
  - Credit demand and house price expectation important drivers of mortgage boom
  - House values increased and provided collateral for increased borrowing across the income distribution
  - Potential build-up of systemic risk prior to the crisis
Supporting evidence

- Credit expanded across the income distribution, not just the poor or subprime
  - Middle/high income households had a much larger contribution to overall mortgage debt before the crisis than the poor
  - Mortgage debt-to-income levels (DTI) in-line with prior years, no decoupling at origination

- Sharp increase in delinquencies for middle class and prime borrowers after 2007
  - Middle class and higher FICO score borrowers make up much larger share of defaults, especially in areas with high house price growth

- Incidence of overstatement is concentrated in a few neighborhoods.
  - LTV distribution stays stable across time.
Aggregate Mortgage Origination by Buyer Income (HMDA) Stayed Stable

Fraction of mortgage dollars originated per year by income quintile
Origination by FICO scores

<table>
<thead>
<tr>
<th>Year</th>
<th>FICO &lt; 660</th>
<th>660 ≤ FICO &lt; 720</th>
<th>FICO ≥ 720</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>17</td>
<td>28</td>
<td>55</td>
</tr>
<tr>
<td>2004</td>
<td>18</td>
<td>30</td>
<td>53</td>
</tr>
<tr>
<td>2005</td>
<td>17</td>
<td>30</td>
<td>53</td>
</tr>
<tr>
<td>2006</td>
<td>18</td>
<td>29</td>
<td>53</td>
</tr>
</tbody>
</table>
Share of Delinquent Mortgage Debt 3 Years Out by Buyer Income (LPS) – Value Weighted
Share of Delinquent Mortgages 3 Yrs Out by FICO and Cohort (LPS) – Value Weighted

- 2003: 71% (FICO < 660) / 20% (660 ≤ FICO < 720) / 9% (FICO ≥ 720)
- 2004: 63% (FICO < 660) / 25% (660 ≤ FICO < 720) / 12% (FICO ≥ 720)
- 2005: 47% (FICO < 660) / 34% (660 ≤ FICO < 720) / 18% (FICO ≥ 720)
- 2006: 39% (FICO < 660) / 38% (660 ≤ FICO < 720) / 23% (FICO ≥ 720)
Share of Delinquency 3 Years Out by HP Growth and FICO – Value Weighted

2003 Cohort

- Low HP Growth 02-06: 26 (8%) FICO < 660, 15 (6%) FICO > 660
- Q2: 7 (7%) FICO < 660, 7 (7%) FICO > 660
- Q3: 7 (7%) FICO < 660, 7 (7%) FICO > 660
- High HP Growth 02-06: 4 (6%) FICO < 660, 6 (7%) FICO > 660

2006 Cohort

- Low HP Growth 02-06: 20 (7%) FICO < 660, 14 (37%) FICO > 660
- Q2: 7 (6%) FICO < 660, 7 (7%) FICO > 660
- Q3: 7 (7%) FICO < 660, 20 (37%) FICO > 660
- High HP Growth 02-06: 37 FICO > 660

Legend:
- □ FICO < 660
- ■ FICO > 660
Differences to prior results

Prior results rely on **zip code level** analysis (Mian and Sufi, 2009):

\[ \Delta \text{Mortgage}_{i,2006-02} = \beta_1 \Delta \text{IRSIncome}_{i,2002-06} + c_{\text{county}} + \epsilon_i \]

- Decompose total mortgage origination into
  - growth in individual mortgage size
  - growth in number of mortgages in a zip code
- County fixed effects only pick up *relative* changes within county
  - This is equivalent of assuming house prices change at the county level
- Per capita income growth with IRS data combines residents and home buyer income
  - If composition of buyers changes, IRS data worse reflection of buyers
  - Account for potential misreporting during this period.
# Decomposition of Total Mortgage Growth

<table>
<thead>
<tr>
<th></th>
<th>Growth in Total Mortgage Origination</th>
<th>Growth in Average Mortgage Size</th>
<th>Growth in Number of Mortgage</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRS income growth</td>
<td>-0.182**</td>
<td>0.239***</td>
<td>-0.402***</td>
</tr>
<tr>
<td></td>
<td>(0.090)</td>
<td>(0.026)</td>
<td>(0.075)</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Number of observations</td>
<td>8,619</td>
<td>8,619</td>
<td>8,619</td>
</tr>
<tr>
<td>R2</td>
<td>0.33</td>
<td>0.68</td>
<td>0.31</td>
</tr>
</tbody>
</table>
How Did Household Leverage Build Up?

Increased Speed of Home Sales
Important Policy Implications

- More focus on macro-prudential implications
  - A lot of regulation after the crisis focuses on micro-prudential regulation, for example screening of marginal borrowers
  - Systemic build up of risk can lead to losses across the financial system, e.g. strategic responses to house price drops

- Protect functioning of financial system when crisis occurs
  - How to build provisions against losses across financial institutions?
  - How to absorb or distribute losses once a crisis occurs?
Liar Loans and underwriting standards

Loan Origination and MS 2015 Measure of Overstatement (All HMDA)

[Diagram showing HMDA/IRS income and Fraction of Total Origination in 2005 for All HMDA zip codes.]

Legend:
- Green bars: Total Loan Amount (bil)
- Red line: HMDA/IRS income
## Test in Subsample (Average Mortgage Size)

<table>
<thead>
<tr>
<th>Growth in Average Mortgage Size</th>
<th>High GSE Fraction</th>
<th>Med GSE Fraction</th>
<th>Low GSE Fraction</th>
<th>High Subp Fraction</th>
<th>Med Subp Fraction</th>
<th>Low Subp Fraction</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRS income growth</td>
<td>0.150***</td>
<td>0.217***</td>
<td>0.231***</td>
<td>0.179***</td>
<td>0.202***</td>
<td>0.161***</td>
</tr>
<tr>
<td></td>
<td>(0.047)</td>
<td>(0.029)</td>
<td>(0.045)</td>
<td>(0.051)</td>
<td>(0.032)</td>
<td>(0.030)</td>
</tr>
<tr>
<td>Buyer income growth</td>
<td>0.330***</td>
<td>0.279***</td>
<td>0.237***</td>
<td>0.169***</td>
<td>0.283***</td>
<td>0.383***</td>
</tr>
<tr>
<td></td>
<td>(0.025)</td>
<td>(0.021)</td>
<td>(0.026)</td>
<td>(0.027)</td>
<td>(0.019)</td>
<td>(0.027)</td>
</tr>
<tr>
<td>County FE</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Number of observations</td>
<td>2,203</td>
<td>4,355</td>
<td>2,061</td>
<td>2,119</td>
<td>4,326</td>
<td>2,174</td>
</tr>
<tr>
<td>R2</td>
<td>0.23</td>
<td>0.20</td>
<td>0.18</td>
<td>0.09</td>
<td>0.21</td>
<td>0.30</td>
</tr>
</tbody>
</table>

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**Note:**
- **Y** indicates the presence of County FE.
- **R2** represents the coefficient of determination.
Combined Loan to Value Evolution

The graph shows the evolution of loan to value ratios over the years 1996 to 2012. The x-axis represents the years, while the y-axis indicates the loan to value ratio. The graph includes lines representing different percentiles (p10, p25, p50, p75, p90) for each year, illustrating how the distribution of loan to value ratios has changed over time.
Fannie and Freddie as the new shadow banking system

U.S. Agency and Private-label Residential Mortgage Securities Issuance
1990 – 2014

[Graph showing issuance from 1990 to 2014 with bars for Agency and Private-label]

Note:
[1] Agency securities are securities issued by either Ginnie Mae, Fannie Mae or Freddie Mac.

Sources:
Comparison to non-mortgage ABS

U.S. Non-Mortgage Asset-Backed Securities Issuance
1985 - 2014

Note:
[1] "Other" comprises cell tower leases, consumer, franchise, Small Business Association, structured settlements, timeshare, utility/stranded costs, housing rental, and servicing advances.
Source:
Importance of counter party risk

• **Common View**
  • Due to counter party risk, many markets froze and engaged in liquidity hoarding
  • Example: Common perception that Fedfund market froze after Lehman bankruptcy

• **Alternative view**
  • No market wide contagion but heterogeneous response
  • Lenders become more sensitive to counter party risk
  • Adjustment through rationing, not pricing
  • No evidence that better quality borrowers were forced to discount window
Fed funds market activity

Decline in the amount of Fed funds began after IOR, not immediately after Lehman’s bankruptcy
Fed funds market activity near Lehman

Value remains stable throughout the period

Stressed, not Frozen: The Federal Funds Market in the Financial Crisis
Decline in number of lenders after Lehman’s bankruptcy, and even more after IOR
Fed funds participants near Lehman

Number of lenders fall after Lehman’s bankruptcy
Fed funds rates near Lehman

Stressed, not Frozen: The Federal Funds Market in the Financial Crisis
Fed funds rates near Lehman II

Large heterogeneity across banks with different ROA levels
Risk Management of Banks

• Common View
  • Weaknesses in the risk-management practices of many financial firms, together with insufficient buffers of capital and liquidity aggravated crisis

• Regulatory response
  • Ensure that large, systemically critical financial institutions hold more and higher-quality capital, improve their risk-management practices, have more robust liquidity management
  • Implementation: Dodd Frank, Basel III and Stress
Regulatory Complexity

Caught in the web
Who can do what to whom

Financial agencies:
- Old
- New
- Old with new powers

Lines of reporting:
- Can request information
- Has authority to examine

OFAC/FinCEN
Financial Stability Oversight Council
State Regulatory Authorities and AG’s

SEC
CFTC
Office of the Comptroller of the Currency
Federal Reserve
Office of Financial Research
FDIC

FINRA

Investment advisory
Derivatives
Consumer lending
Commercial lending
Broker-dealer
Retail banking
Alternative investments
Investment banking
Payment and clearing systems

Source: JPMorgan Chase