The role of government and private institutions in credit cycles in the U.S. mortgage market

Manuel Adelino  
Duke & NBER

W. Ben McCartney  
Purdue

Antoinette Schoar  
MIT & NBER

NBER Corporate Finance Meeting  
July 7, 2020
Motivation

Housing markets are marked by *recurring boom and bust cycles*.

*Often associated with expansions in the amount of mortgage debt*.

→ A large literature connects relaxed credit standards to housing cycles.

Mortgage credit is typically *constrained* across two dimensions:

1. Debt-to-income (DTI) constraints account for borrower’s *ability to repay*.
2. Loan-to-value (LTV) constraints account for lender’s *limited enforcement*.

It’s important to understand *how* credit access was relaxed. Greenwald (2018)
Credit cycle models rely on changes in collateral values and assume constant LTV levels over the cycle. Bernanke & Gertler (1989), Kiyotaki & Moore (1997)

Leverage cycle models assume LTVs vary pro-cyclically. Geanakoplos (1997, 2010)

Several models use changes in the LTV constraint as a modelling device for credit expansion. Corbae & Quinton (2015), Favilukis et al. (2017), Landvoigt et al. (2015)
This Paper’s Research Question

Features of the 2000’s cycle

1. **Increased mortgage debt** across all income groups
2. **Relaxed DTI constraints**
3. No shift in credit allocation towards marginal or subprime borrowers


Often assumed that LTV constraints relaxed hand in hand with DTI constraints

*This paper:* Did LTV constraints relax?
Preview of Results

1. **Stable distribution of CLTVs** for purchase loans over the cycle.
   - Private sector **displaced FHA/VA** in the provision of high-CLTV loans.

2. **No change in the composition** of high-CLTV borrowers.
   - High-CLTV loans used by the **same people and places** over the cycle.
   - No reallocation from pessimists to optimists.
   - Similar delinquency rates for FHA/VA and high-CLTV, private sector.

3. Switch from FHA to private-sector **followed** house price growth.
   - Not a driver of house price increases.
Stable Distribution of CLTVs
CoreLogic deeds data: Purchase mortgages, including 1st, 2nd, and 3rd liens.
Share of High-CLTV Purchase Loans by Year

Important to Include Government-Guaranteed Loans
Share of High-CLTV Purchase Loans by Year

Important to Include Government-Guaranteed Loans
Composition of High-CLTV Borrowers

1. Are there compositional changes in who accessed high-CLTV loans?
   No, strong correlations within ZIP codes, properties, and borrowers

2. What role did optimism play?
   Similar use of high-CLTV loans by optimists over the cycle

3. Are there unobserved differences in FHA/VA vs. private, high-CLTV borrowers?
   No significant differences in performance between FHA and private
Government-Guaranteed vs Private Sector Across Incomes

Deeds Data + IRS Zip Code Income Data

Share of Purchase Loans Guaranteed by FHA/VA
Share of Purchase Loans Private, CLTV ≥ 95%
### Repeat-Sales Methodology

**Property-Level, CoreLogic Deeds Data**

<table>
<thead>
<tr>
<th>Sample:</th>
<th>Properties with 1 purchase in 96-03 and 1 purchase in 04-07</th>
<th>Properties with 1 purchase in 04-07 and 1 purchase in 08-15</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variable:</strong></td>
<td>04-07 Loan is Private with CLTV $\geq$ 95%</td>
<td>08-15 Loan is FHA/VA</td>
</tr>
<tr>
<td>96-03 Loan FHA or VA</td>
<td>0.114*** (0.007)</td>
<td></td>
</tr>
<tr>
<td>04-07 Loan Private with CLTV $\geq$ 95%</td>
<td></td>
<td>0.0941*** (0.006)</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>County</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year of First Loan</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year of Second Loan</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td>2,362,748</td>
<td>634,495</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.098</td>
<td>0.088</td>
</tr>
</tbody>
</table>

50.0% higher and 37.5% higher, respectively.
Repeat-Sales Methodology
Household-Level, North Carolina CoreLogic Deeds Data

<table>
<thead>
<tr>
<th>Sample:</th>
<th>households with 1 purchase in 96-03 and 1 purchase in 04-07</th>
<th>households with 1 purchase in 04-07 and 1 purchase in 08-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent Variable:</td>
<td>04-07 Loan is Private with CLTV &gt; 95%</td>
<td>08-15 Loan is FHA/VA</td>
</tr>
<tr>
<td>96-03 Loan FHA or VA</td>
<td>0.113*** (0.014)</td>
<td></td>
</tr>
<tr>
<td>04-07 Loan Private with CLTV &gt;= 95%</td>
<td></td>
<td>0.0674*** (0.011)</td>
</tr>
<tr>
<td>Fixed Effects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>County</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year of First Loan</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Year of Second Loan</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>N</td>
<td>7,660</td>
<td>11,858</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.031</td>
<td>0.054</td>
</tr>
</tbody>
</table>

66.0% higher and 34.7% higher, respectively.
Did Optimistic Borrowers Sort into Private, High-CLTV Loans?

Hypothesis: Buyers that value assets more bid up prices when they have access to more leverage. Geanakoplos (2010)


- This measure is correlated with expectations about the economy.

No change in the allocation of optimists/pessimists to high-CLTV loans.
Do Optimists Switch Within High-LTV Loan Types?

Survey of Consumer Finances

FHA High-LTV Borrowers

Private, High-LTV Borrowers
Do Optimists Choose Higher LTV Loans?

Survey of Consumer Finances

High LTV Borrowers

Low LTV Borrowers
Other Compositional Tests

No reallocation of high-CLTV loans

- All five-digit ZIP codes, \( \text{zips} \)
- High vs low HP growth ZIP codes, \( \text{hp growth} \)
- Recourse vs non-recourse states, \( \text{recourse} \)
- Property characteristics: Home age and square feet, \( \text{chars} \)
- Repeat-sales index of CLTVs, \( \text{cltv index} \)
- Borrower debt-to-income ratio, \( \text{dti} \)
Share 90+ Days Delinquent Within 3 Years of Origination

McDash Data

Unconditional Delinquency Rates

Within County-by-Year Delinquency Rates

FHA/VA-Guaranteed, CLTV ≥ 95%
Private, CLTV ≥ 95%
Private, CLTV < 95%
Timing of the High-CLTV Cycle

Did the switch from FHA to private drive up house prices? No

1. The switch to high-CLTV private loans followed house price growth
   1999-2004: High-CLTV loans went up across all HP growth bins
   2005-2006: Private high-CLTV loans sort within bins

2. HP instrument from Palmer (2016) and Guren et al. (2019)
Changes in Private High-CLTV Share by House Price Change

1999 - 2002

2003 - 2004

2005 - 2006
Why the Switch from FHA to Private-Sector?

1. Demand side: Ease of obtaining private high-CLTV loans, quicker time to close, less documentation. LaCour-Little (2007)

2. Supply side: Higher origination fees, lower administrative burden.

Note: the majority of the switch happened within existing lenders.
One-Slide Summary

What?  - Stable distribution of CLTVs for purchase loans over the cycle.
       - Private sector displaced FHA/VA in the provision of high-CLTV loans.

And?  - Steady composition of high-CLTV loans over the cycle.
       - Shift to private high-CLTV loans followed house price appreciation.

So?  - Supports credit cycle models and a role for broad-based changes in HP expectations
       - Whether loans are guaranteed explicitly (or implicitly) by the government may have implications for financial stability.
Thank You!
Overview of the Data

1. CoreLogic: Deeds Data
   - Includes piggyback loans
   - Includes sales prices
   - Universe of mortgages
   - Tags FHA/VA (government guaranteed)

2. McDash: Mortgage Performance Data

3. SCF: Fed-administered household finances survey
CLTV Distribution

Weighted by Loan Amount

- 95th Percentile
- 75th Percentile
- Mean
- 25th Percentile
- 5th Percentile

Cumulative Distribution Functions of Purchase Mortgage CLTVs

Non-FHA/VA Loans

All Loans

Private, 1999

Private, 2006

All, 2006

All, 1999
Government-Guaranteed Loans

A Quick Definition

Government approved lenders
Lenders create securities
Ginnie Mae guarantees them

Goal: to enable homeownership
- Allow low down payments
- Allow low credit scores
- Borrowers pay insurance premia
What About Subprime Lenders?

HMDA Subprime Lender Tag

Other, CLTV < 95%
Subprime, CLTV ≥ 95%
VA, CLTV < 95%
VA, CLTV ≥ 95%
FHA, CLTV < 95%
FHA, CLTV ≥ 95%
Change in Zip Code Level Share of Loan Types

1999 to 2006 Increase in Private Sector High-CLTV Share

1999 Share FHA/VA

\( \rho = 0.464 \)

2006 to 2013 Increase in FHA/VA Loans

2006 Share Private-Sector High-CLTV

\( \rho = 0.175 \)
House Price Growth
CoreLogic Deeds + Assessor Data

Bottom Two HP Growth Deciles

Top Two HP Growth Deciles

Adelino, McCartney, Schoar

CLTVs
Recourse States versus Non-Recourse States
Property Characteristics
CoreLogic Deeds + Assessor Data

Distribution of De-Meared Home Ages of Purchased Houses

Distribution of De-Meared Square Feet of Purchased Houses
Repeat Sales CLTV Index
Debt-to-Income by Loan-to-Value, 2005-2007

McDash Data

FHA loans

Non-FHA, FICO ≤ 660

Non-FHA, 660 < FICO ≤ 720

Non-FHA, FICO > 720
Debt-to-Income by Loan-to-Value, 2011-2015

McDash Data

FHA loans

Non-FHA, FICO \leq 660

Non-FHA, 660 < FICO \leq 720

Non-FHA, FICO > 720
## Distributions in the Share of Loan Types by Lenders

### CoreLogic Deeds Data

#### Panel A: Distributions of the Fraction of Loans Each Lender Makes that are FHA or VA

<table>
<thead>
<tr>
<th>Year</th>
<th>5th Percentile</th>
<th>25th Percentile</th>
<th>50th Percentile</th>
<th>75th Percentile</th>
<th>95th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0.0%</td>
<td>0.0%</td>
<td>9.1%</td>
<td>36.8%</td>
<td>78.7%</td>
</tr>
<tr>
<td>2002</td>
<td>0.0%</td>
<td>0.0%</td>
<td>6.5%</td>
<td>30.9%</td>
<td>68.9%</td>
</tr>
<tr>
<td>2003</td>
<td>0.0%</td>
<td>0.0%</td>
<td>3.8%</td>
<td>25.0%</td>
<td>62.3%</td>
</tr>
<tr>
<td>2004</td>
<td>0.0%</td>
<td>0.0%</td>
<td>2.3%</td>
<td>17.8%</td>
<td>53.9%</td>
</tr>
<tr>
<td>2005</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.4%</td>
<td>12.0%</td>
<td>44.7%</td>
</tr>
<tr>
<td>2006</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.0%</td>
<td>11.9%</td>
<td>45.2%</td>
</tr>
<tr>
<td>2007</td>
<td>0.0%</td>
<td>0.0%</td>
<td>1.8%</td>
<td>14.7%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>

#### Panel B: Distributions of the Fraction of Loans Each Lender Makes that have CLTVs > 95%

<table>
<thead>
<tr>
<th>Year</th>
<th>5th Percentile</th>
<th>25th Percentile</th>
<th>50th Percentile</th>
<th>75th Percentile</th>
<th>95th Percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>0.0%</td>
<td>7.5%</td>
<td>25.0%</td>
<td>45.7%</td>
<td>83.6%</td>
</tr>
<tr>
<td>2002</td>
<td>0.0%</td>
<td>7.9%</td>
<td>24.1%</td>
<td>42.9%</td>
<td>76.0%</td>
</tr>
<tr>
<td>2003</td>
<td>0.0%</td>
<td>7.5%</td>
<td>22.8%</td>
<td>41.3%</td>
<td>75.0%</td>
</tr>
<tr>
<td>2004</td>
<td>0.0%</td>
<td>7.8%</td>
<td>22.1%</td>
<td>38.2%</td>
<td>70.0%</td>
</tr>
<tr>
<td>2005</td>
<td>0.0%</td>
<td>9.5%</td>
<td>22.8%</td>
<td>38.3%</td>
<td>69.8%</td>
</tr>
<tr>
<td>2006</td>
<td>0.0%</td>
<td>13.6%</td>
<td>29.2%</td>
<td>45.3%</td>
<td>75.0%</td>
</tr>
<tr>
<td>2007</td>
<td>0.0%</td>
<td>14.7%</td>
<td>30.7%</td>
<td>46.2%</td>
<td>75.0%</td>
</tr>
</tbody>
</table>
Within County-By-Lender Repeat Sales Index