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

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# Motivation

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

Often associated with expansions in the amount of mortgage debt

$\rightarrow$ 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)

# How Should We Model Credit Cycles?

**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

Adelino et al. (2016, 2017), Foote & Willen (2018), Albanesi et al. (2019)

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

*This paper:* **Did LTV constraints relax?**

# Preview of Results

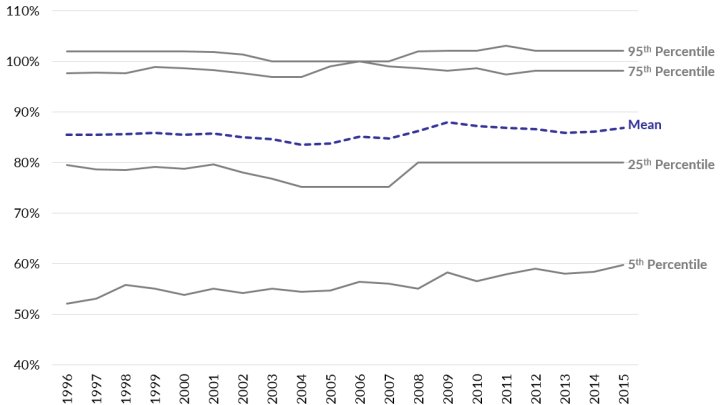
1. **Stable distribution of CLTVs** for purchase loans over the cycle.
   - Private sector **displaced FHA/VA** in the provision of high-CLTV loans.

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

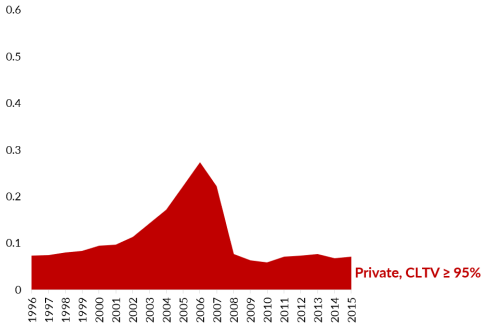
CoreLogic deeds data: Purchase mortgages, including 1st, 2nd, and 3rd liens.




Data | Value Weighted | CDFs

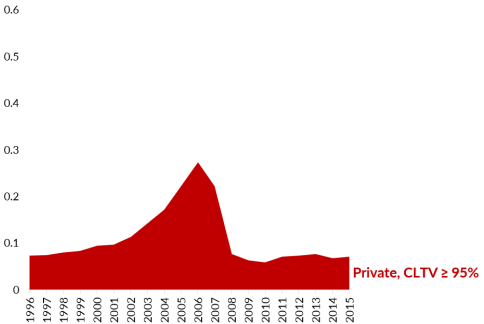
# Share of High-CLTV Purchase Loans by Year

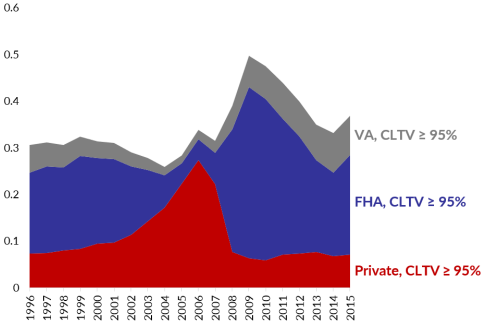
## Important to Include Government-Guaranteed Loans



# Share of High-CLTV Purchase Loans by Year

## Important to Include Government-Guaranteed Loans




Gov Loan Defn | Gov Loan Breakdown | Subprime Lenders

# Composition of High-CLTV Borrowers

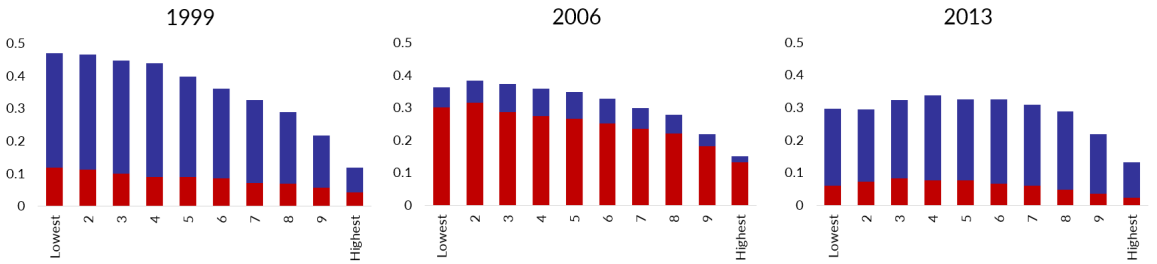
1. Are there **compositional** changes in who accessed high-CLTV loans?
   No, strong correlations within ZIP codes, properties, and borrowers

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

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

**50.0%** higher and **37.5%** higher, respectively.

# Repeat-Sales Methodolgy

## **Household**-Level, North Carolina CoreLogic Deeds Data

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

**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)

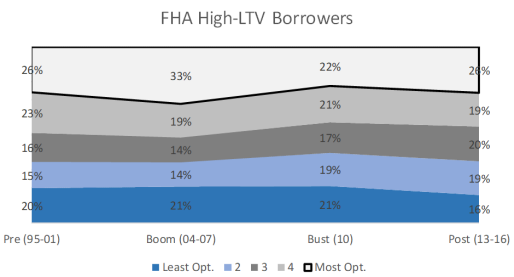
We measure optimism based on self-assessed life expectancy from the Survey of Consumer Finances. Puri & Robinson (2007), Heimer, Myrseth, & Schoenle (2019)

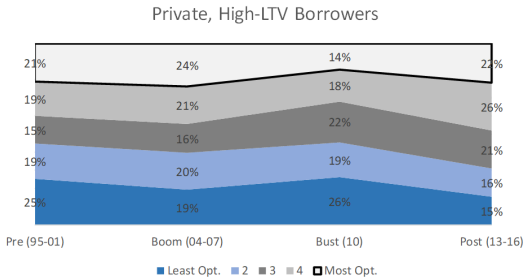
- This measure is correlated with expectations about the economy.

**No change in the allocation** of optimists/pessimists to high-CLTV loans.

# Do Optimists Switch Within High-LTV Loan Types?

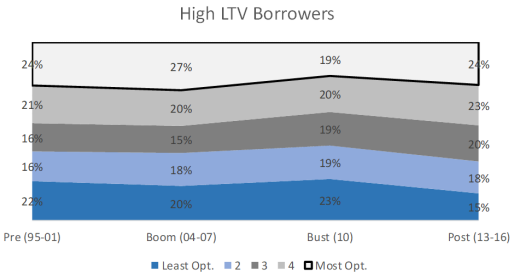
## Survey of Consumer Finances

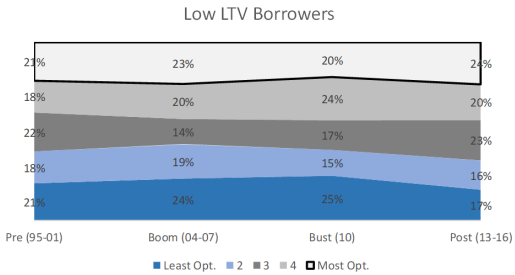


# Do Optimists Choose Higher LTV Loans?

## Survey of Consumer Finances



# Other Compositional Tests

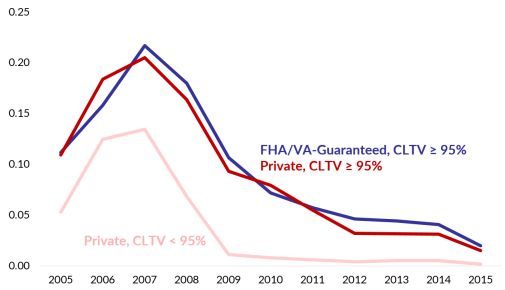
**No reallocation of high-CLTV loans**

- All five-digit ZIP codes, zips
- High vs low HP growth ZIP codes, hp growth
- Recourse vs non-recourse states, recourse
- Property characteristics: Home age and square feet, chars
- Repeat-sales index of CLTVs, cltv index
- Borrower debt-to-income ratio, dti

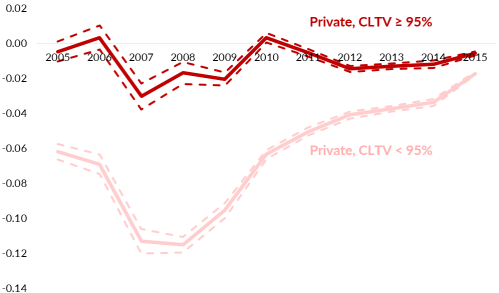
# Share 90+ Days Delinquent Within 3 Years of Origination

McDash Data

## Unconditional Delinquency Rates




## Within County-by-Year Delinquency Rates



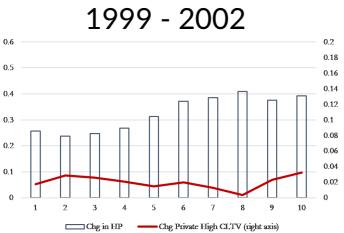
# Timing of the High-CLTV Cycle

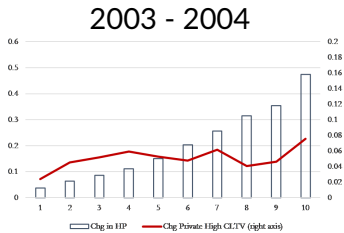
Did the switch from FHA to private drive up house prices? **No**

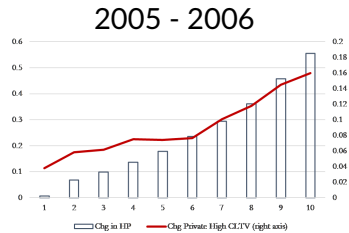
1. The switch to high-CLTV private loans **followed** house price growth
   - 1999-2004: High-CLTV loans went up across all HP growth bins
   - 2005-2006: Private high-CLTV loans sort within bins

2. HP instrument from Palmer (2016) and Guren et al. (2019)

# Changes in Private High-CLTV Share by House Price Change



# 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.

Share of Loan Types by Lenders Within County-by-Lender Repeat Sales CLTV Index

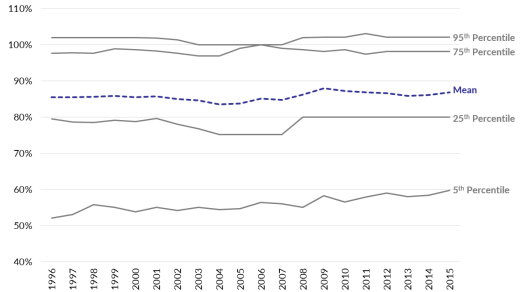
# One-Slide Summary

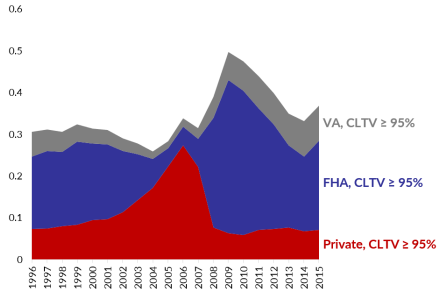
What? - **Stable distribution of CLTVs** for purchase loans over the cycle.
- Private sector **displaced FHA/VA** in the provision of high-CLTV loans.

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!


110%
100%
90%
80%
70%
60%
50%
40%
95th Percentile
75th Percentile
Mean
25th Percentile
5th Percentile
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015


0.6
0.5
0.4
0.3
0.2
0.1
0
VA, CLTV ≥ 95%
FHA, CLTV ≥ 95%
Private, CLTV ≥ 95%
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015

# Overview of the Data

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

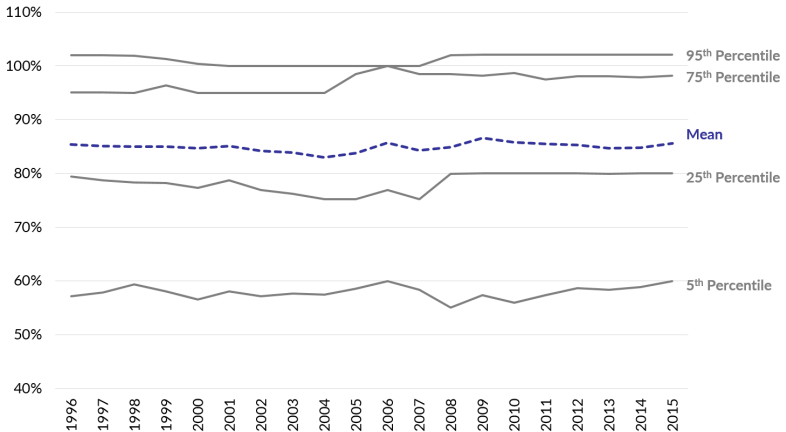
2. McDash: Mortgage Performance Data

3. SCF: Fed-administered household finances survey

back

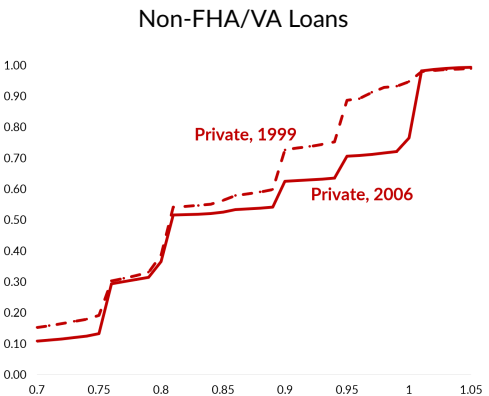
# CLTV Distribution

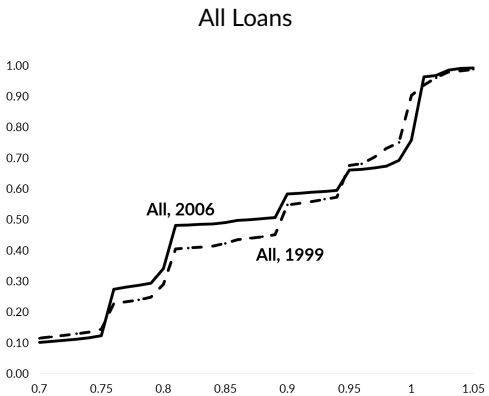
## Weighted by Loan Amount




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# Cumulative Distribution Functions of Purchase Mortgage CLTVs




back

# Government-Guaranteed Loans

## A Quick Definition




**Nature of Program:** Ginnie Mae guarantees investors (security holders) the timely payment of principal and interest on securities issued by private lenders that are backed by pools of Federal Housing Administration (FHA), Veterans Affairs (VA), Rural Housing Service (RHS), and Public and Indian Housing (PIH) mortgage loans. The full faith and credit guarantee of the U.S. Government that Ginnie Mae places on mortgage-backed securities lowers the cost of, and maintains the supply of, mortgage financing for government-backed loans.

Government approved lenders

Lenders create securities

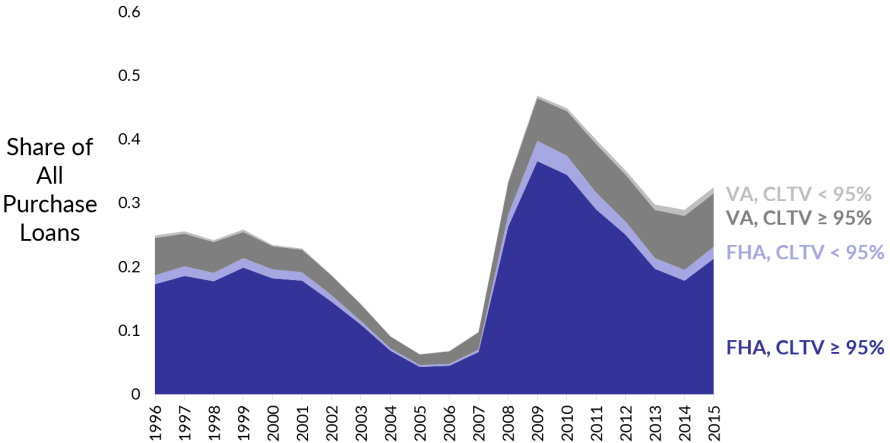
Ginnie Mae guarantees them

Goal: to **enable homeownership**

- Allow low down payments
- Allow low credit scores
- Borrowers pay insurance premia

back

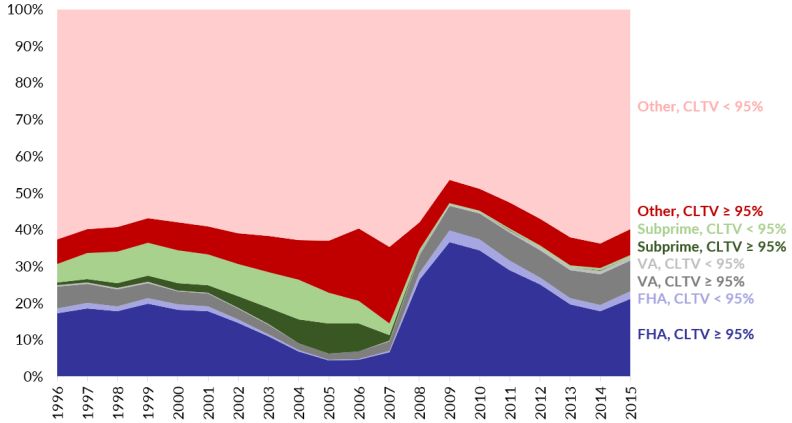
# A Changing Share of Government-Guaranteed Mortgages




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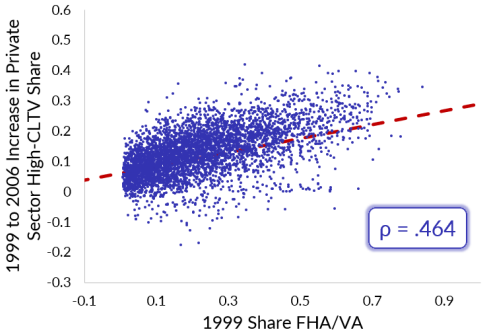
# What About Subprime Lenders?

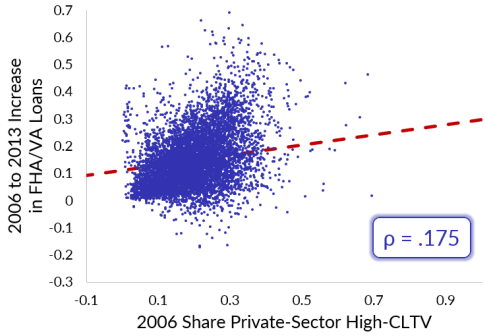
## HMDA Subprime Lender Tag




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# Change in Zip Code Level Share of Loan Types

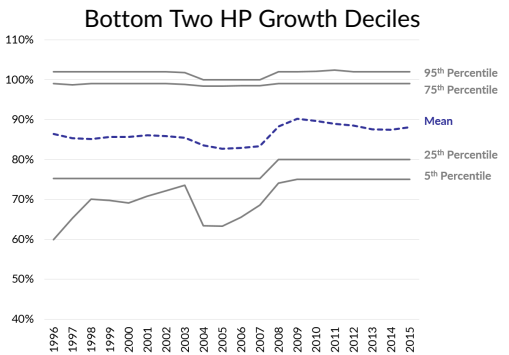


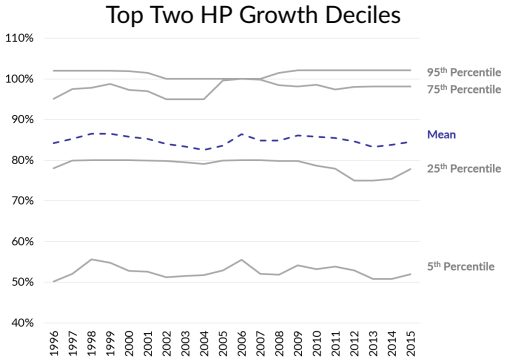




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# House Price Growth

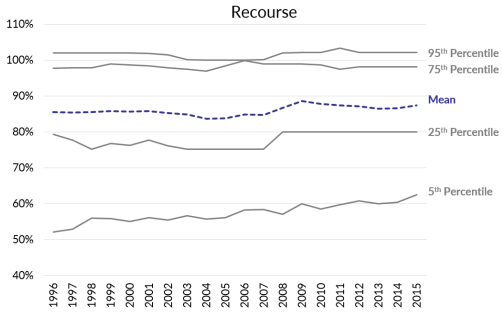
## CoreLogic Deeds + Assessor Data

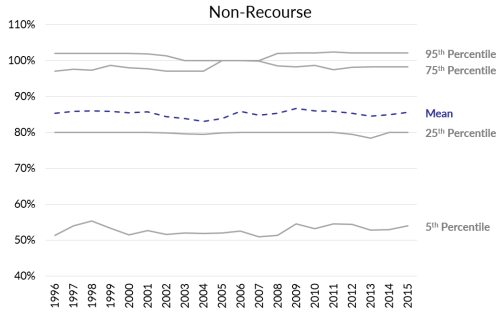



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# Recourse States versus Non-Recourse States

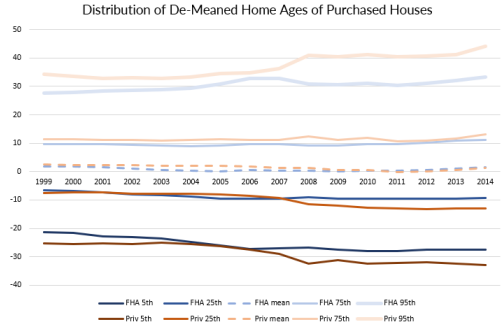


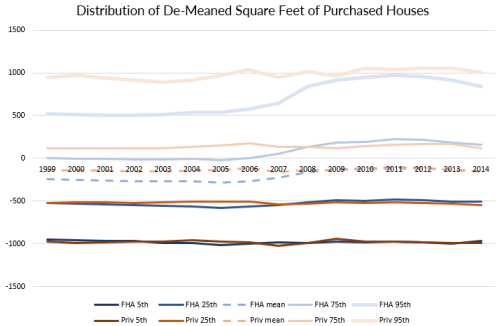




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# Property Characteristics

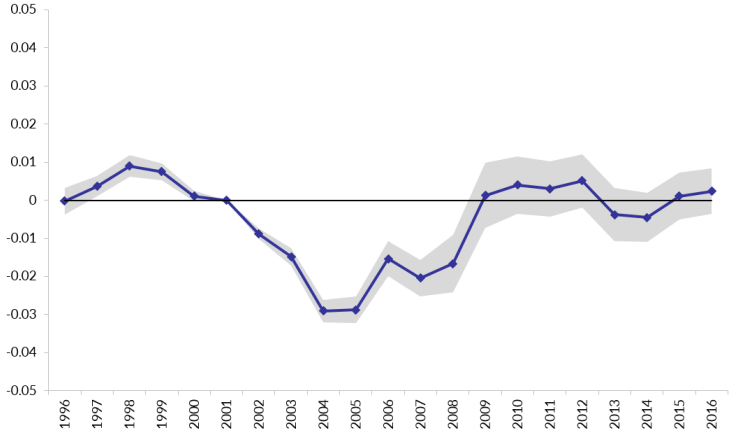
## CoreLogic Deeds + Assessor Data




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# Repeat Sales CLTV Index

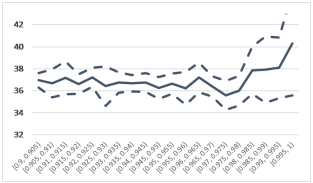



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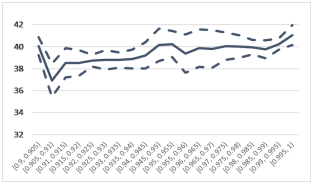
# Debt-to-Income by Loan-to-Value, 2005-2007

## McDash Data

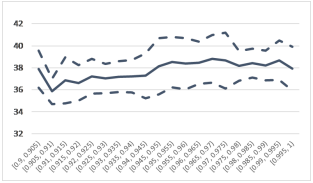
FHA loans



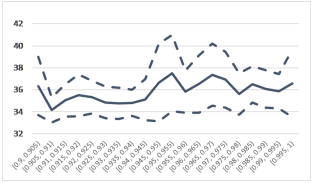

Non-FHA, FICO $\leq$ 660




Non-FHA, 660 < FICO $\leq$ 720



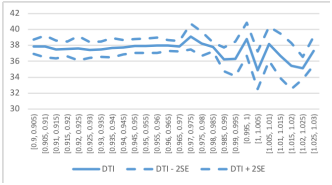

Non-FHA, FICO > 720



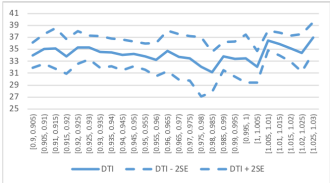
# Debt-to-Income by Loan-to-Value, 2011-2015

## McDash Data

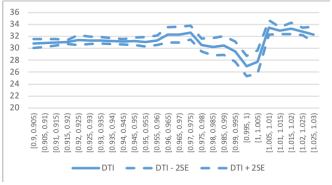
FHA loans



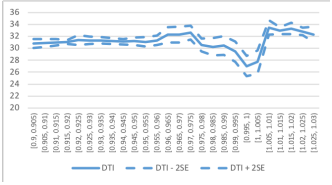

Non-FHA, FICO $\leq$ 660




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*

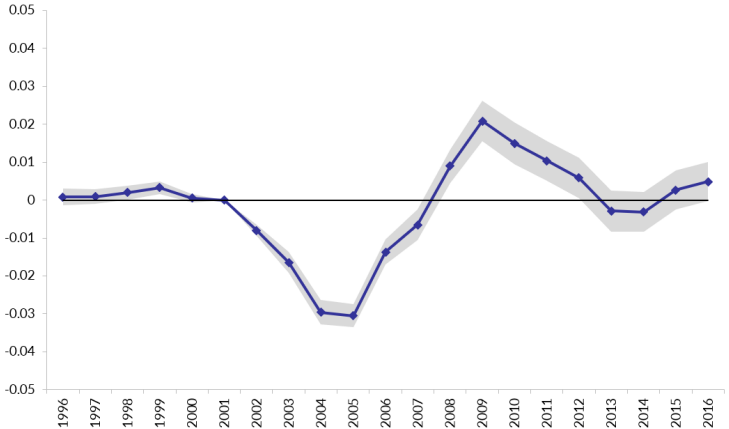
| Year | 5th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile |
|---|---|---|---|---|---|
| 2001 | 0.0% | 0.0% | 9.1% | 36.8% | 78.7% |
| 2002 | 0.0% | 0.0% | 6.5% | 30.9% | 68.9% |
| 2003 | 0.0% | 0.0% | 3.8% | 25.0% | 62.3% |
| 2004 | 0.0% | 0.0% | 2.3% | 17.8% | 53.9% |
| 2005 | 0.0% | 0.0% | 1.4% | 12.0% | 44.7% |
| 2006 | 0.0% | 0.0% | 1.0% | 11.9% | 45.2% |
| 2007 | 0.0% | 0.0% | 1.8% | 14.7% | 50.0% |

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

| Year | 5th Percentile | 25th Percentile | 50th Percentile | 75th Percentile | 95th Percentile |
|---|---|---|---|---|---|
| 2001 | 0.0% | 7.5% | 25.0% | 45.7% | 83.6% |
| 2002 | 0.0% | 7.9% | 24.1% | 42.9% | 76.0% |
| 2003 | 0.0% | 7.5% | 22.8% | 41.3% | 75.0% |
| 2004 | 0.0% | 7.8% | 22.1% | 38.2% | 70.0% |
| 2005 | 0.0% | 9.5% | 22.8% | 38.3% | 69.8% |
| 2006 | 0.0% | 13.6% | 29.2% | 45.3% | 75.0% |
| 2007 | 0.0% | 14.7% | 30.7% | 46.2% | 75.0% |

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