No Job, No Money, No Refi:
Frictions to Refinancing in a Recession

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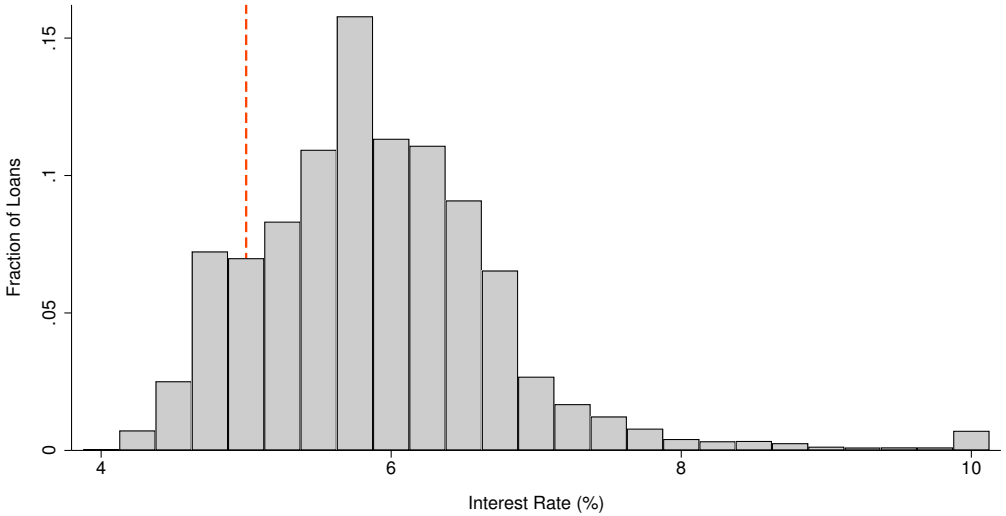
December 2018

Interest Rates on Outstanding Mortgages (January 2010)



Most borrowers paying rates above the average on new originations.

Why Aren't Households Refinancing and Why Should We Care?

Frictions that have been proposed

- Negative equity

  Caplin et al. (1997)

- Inadequate search/borrower inattention

  Campbell (2006), Keys et al. (2016), Andersen et al. (2017)

- Lack of competition

  Scharfstein & Sunderam (2016)

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Failure to refinance especially costly during recessions

- Inhibits pass-through of monetary policy

  Beraja et al. (2017)

- Limits access to debt relief

  Agarwal et al. (2017a,b), Piskorski & Seru (2018), Ehrlich and Perry (2017)

This Paper

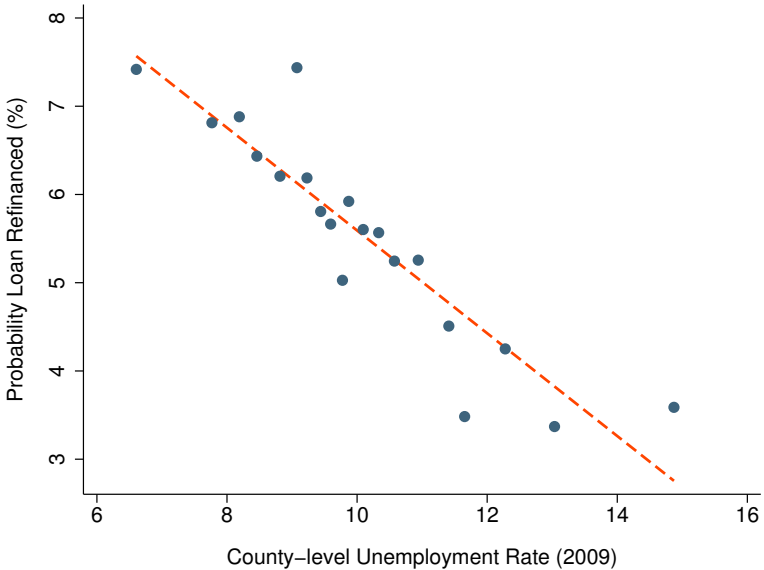
We study how two less-emphasized frictions constrain refinancing

- Income/employment requirements
- Upfront, out-of-pocket closing costs

Why these frictions?

- Counter-cyclical $\rightarrow$ bind more when benefits to refinancing are highest
- Distributional implications $\rightarrow$ limit refinancing for those who benefit most

Refinancing and Unemployment in 2009



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Empirical approach

- Exploit late-2009 changes to FHA "streamline refinance" program
  1. All borrowers must now document employment and income
  2. Some borrowers no longer permitted to finance upfront costs
- Changes were sudden and only affected the FHA market

Main Results

- What was the overall effect of the policy changes?
  - *Monthly FHA refinance probability ↓ by 0.7 ppt.*
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- How important was the change in upfront costs?
  - *Borrowers required to pay costs out-of-pocket ↓ refinancing by 0.5 ppt.*
  - *Evidence that this effect operates through liquidity constraints*

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  - *Borrowers required to pay costs out-of-pocket ↓ refinancing by 0.5 ppt.*
  - *Evidence that this effect operates through liquidity constraints*
- **Big picture:** These frictions are significant barriers to refinancing, especially for borrowers that may benefit the most.

Outline

1. Institutional background on FHA streamline refinances
2. Data and sample selection
3. Research design and results
   - Overall effect
   - Employment documentation
   - Upfront costs
4. Conclude

Institutional Background

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- Federal Housing Administration (FHA)
  - Created in 1934, regulated by HUD
  - Mission to support homeownership, especially for marginal borrowers
  - Provides default insurance to FHA lenders
  - Insurance (MIP) paid for by borrower upfront and through higher rate
  - Insured $\approx$ 20-40% of all purchases during our sample period
- FHA options for refinancing an FHA loan
  - Traditional refinance
  - Cash-out refinance
  - **Streamline Refinance (SLR)**

    $\approx$ 70% of FHA refis during the 2001-2003 refi boom

    $\approx$ 6% of *all* refis during our sample period by $ volume

Streamline Refinances Before the Policy Change

Important features

- Must have an FHA mortgage
- Refinance must lower payment or reduce term
- Negative equity is OK
- **No need to document employment**
- **Closing costs/fees can be rolled into new loan**

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Maximum SLR loan amounts

- Without appraisal
  (standard option)

$$\text{Max Loan} = min\big(\text{current balance} + \text{fees}, \text{original balance}\big)$$

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- With appraisal
  (if new loan > original balance)

$$\text{Max Loan} = min\big(\text{current balance} + \text{fees}, 97.75\% \times \text{house value}\big)$$

September 18, 2009

MORTGAGEE LETTER 2009-32

TO: ALL APPROVED MORTGAGEES

SUBJECT: Revised Streamline Refinance Transactions

This Mortgagee Letter provides (1) revised procedures; and (2) reaffirms existing procedures regarding Streamline Refinance transactions. This Mortgagee Letter is effective for new case numbers assigned on or after 60 days from the date of this letter.

Key Revisions:

- Seasoning
- Payment history
- Net tangible benefit for the borrower
- Maximum Combined Loan-to-Value
- New Maximum Mortgage Amount for Streamline Refinances WITHOUT an Appraisal
- Discounts Points no longer included in Existing Debt for Streamline Refinances WITH an Appraisal
- Verification of any assets needed to close
- Certification that borrower is employed and has income
- Elimination of abbreviated Uniform Residential Loan Application (URLA)

Streamline Refinances After the Policy Change

Important features

- Must have an FHA mortgage
- Refinance must lower payment
- Negative equity is OK
- ~~No need to document employment~~
- Closing costs/fees can be rolled into new loan $\rightarrow$ **for SLRs *with* appraisal**

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Two Main Implications of the Policy Change

1. Unemployed borrowers can no longer refinance
2. Borrowers in negative equity can no longer roll upfront costs into mortgage
   - High equity
     - Order appraisal, finance costs with equity
     - Pay costs out-of-pocket
   - Low equity
     - Pay cost out-of-pocket

“The Mortgage Reports” – November 2009

“Compared to the current Streamline Refi guidelines, it’s a ***landscape shifter*** *…Until now, the FHA’s refinance philosophy has been to help its homeowners however possible…So long as the homeowner had been paying the mortgage on-time, the FHA would just do the refinance – few questions asked.*

Effective next month, this changes…Underwriters for the new FHA Streamline Refinance program will be instructed to deny applications on the basis of employment, income, and assets.

No job? No money? No FHA loan*…*

Furthermore, because…homeowners won’t be able to roll in their closing costs without appraisal…people in highly-depreciated areas like Florida and Arizona may find streamline refis suddenly cost-prohibitive.”

Research Questions and Empirical Approach

Three questions:

- What was the overall effect of the policy changes?
- How important was employment documentation?
- How important was the change in upfront costs?

Empirical approach:

- Quantify the overall average effect
  - Event study around the policy change
  - Diff-in-diff using the conventional market as control
- Quantify the mechanisms using triple differences
  - Pre/post
  - FHA/conventional
  - High-/low-unemployment OR high-/low-equity

Data

Data

- **CoreLogic Loan-Level Market Analytics (LLMA)**
  - Loan-level covering $\approx$ 60% of all active first mortgages
  - Origination characteristics
  - Contract terms
  - Monthly performance
  - Anonymized link to CoreLogic deeds $\rightarrow$ **reason paid off**
- **Main sample restrictions**
  - 20% random sample with known payoff reason
  - Sufficient performance history between 2008–2010
  - Satisfy SLR performance/seasoning requirements
  - 30-year, fixed-rate, single-family, owner-occupied
- **Other data sources**
  - Zillow county-level house price indices
  - ACS county-level unemployment

Research Design and Results

Research Questions

- What was the overall effect of the policy changes?
- How important was employment documentation?
- How important was the change in upfront costs?

Research Questions

- What was the **overall effect** of the policy changes?
- How important was employment documentation?
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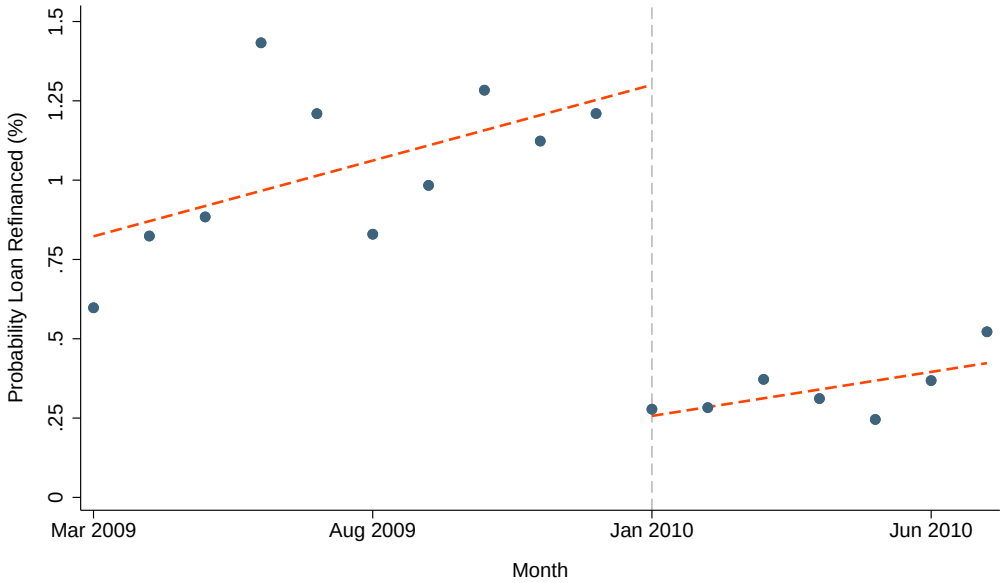
FHA Refinancing Rates by Month



Measuring the Overall Effect of the Policy Change: Event Study

- Estimate size of discontinuous drop in refinancing

$$Refinance_{it} = \alpha + X_{it}'\gamma + \beta_0 \cdot Post_t + \delta_0(t-\tau) + \delta_1(t-\tau) \cdot Post_t + \epsilon_{it}$$

  - $Post_t$: dummy for whether month t is after policy change
  - $\delta_0(t-\tau)$: linear pre-trend
  - $\delta_1(t-\tau) \cdot Post_t$: linear post-trend
  - X_{it}: loan/borrower characteristics

- Identifying assumption: FHA refinancing evolves smoothly in absence of policy

- Sample restriction: FHA loans only

Effect of SLR Policy Change on FHA Refinancing: Event Study

	(1)	(2)	(3)	(4)
Post	-1.041^{***}	-0.960^{***}	-1.026^{***}	-1.013^{***}
	(0.077)	(0.071)	(0.073)	(0.073)
Post News			-0.157^{***}	-0.112^{***}
			(0.039)	(0.040)
Time Trends	X	X	X	X
CBSA FEs	X	X	X	X
Loan Age FEs		X		X
Interest Rate FEs		X		X
LTV $\times$ FICO FEs		X		X
Equity FEs		X		X
Number of Observations	2,002,461	2,002,461	2,002,461	2,002,461

Effect of SLR Policy Change on FHA Refinancing: Event Study

But this does not control for aggregate shocks to refinancing...

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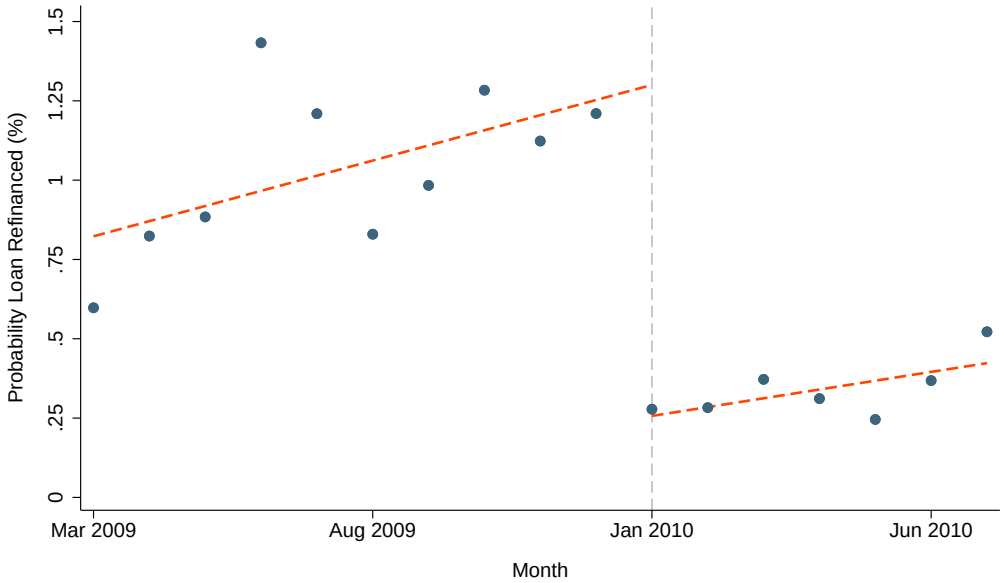
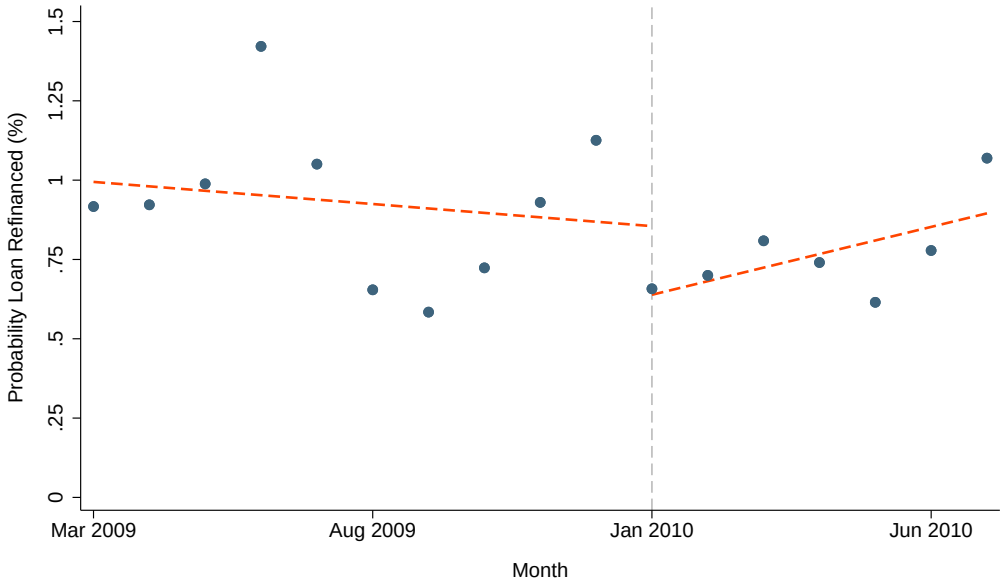


Conventional Refinancing Rates by Month



Measuring the Overall Effect of the Policy Change: Diff-in-Diff

- Compare FHA/conventional loans, pre/post SLR policy change

$$Refinance_{it} = \alpha + \delta_t + X_{it}'\gamma + \beta_0 \cdot FHA_i + \beta_1 \cdot FHA_i \times Post_t + \epsilon_{it}$$

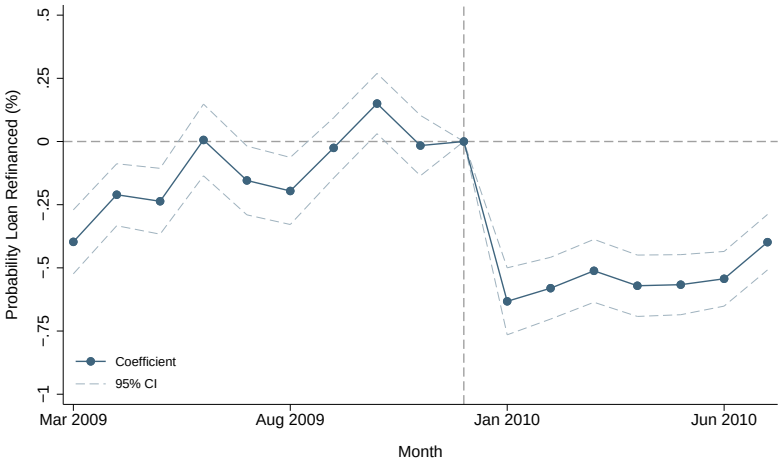
  - FHA_i: dummy for whether loan is FHA insured
  - $Post_t$: dummy for whether month t is after policy change
  - δ_t: month fixed-effects
  - X_{it}: loan characteristics + pre/post linear FHA trends

- Identifying assumption: parallel trends (conditional on X)

Effect of SLR Policy Change on FHA Refinancing: Diff-in-Diff

	(1)	(2)	(3)	(4)
FHA	0.511^{***}	0.827^{***}	0.813^{***}	2.041^{***}
	(0.062)	(0.062)	(0.055)	(0.315)
FHA $\times$ Post	-0.804^{***}	-0.727^{***}	-0.709^{***}	-0.708^{***}
	(0.065)	(0.062)	(0.049)	(0.045)
Month FEs	X	X	X	X
CBSA FEs	X	X	X	X
FHA Time Trends	X	X	X	X
Loan Age FEs		X	X	X
Interest Rate FEs		X	X	X
LTV $\times$ FICO FEs		X	X	X
Equity FEs		X	X	X
Controls $\times$ Post			X	X
Controls $\times$ FHA				X
Number of Observations	15,645,645	15,645,645	15,645,645	15,645,645

Flexible Difference in Differences Estimates



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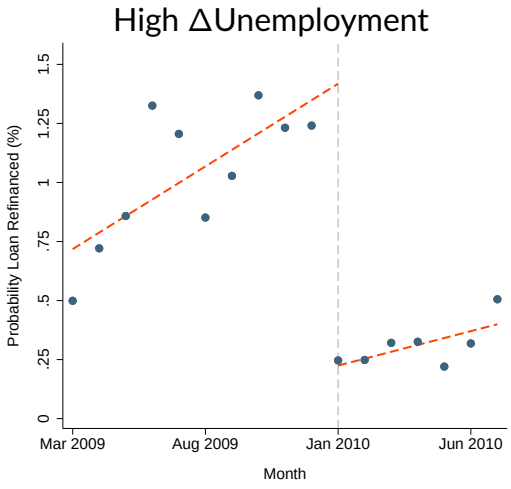
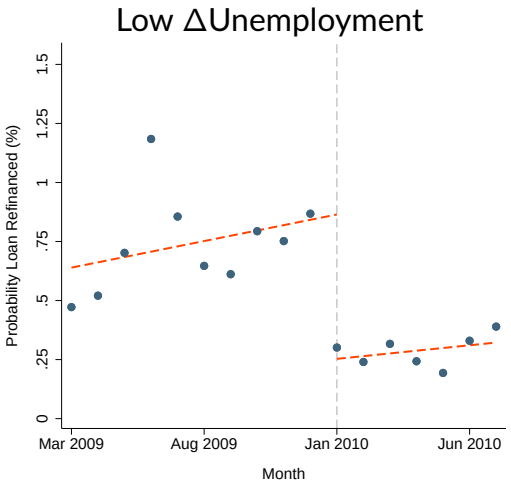
FHA Refis by County Unemployment Change (2006–2009)





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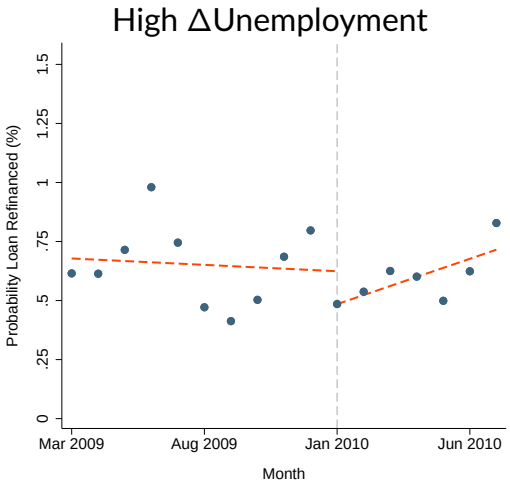

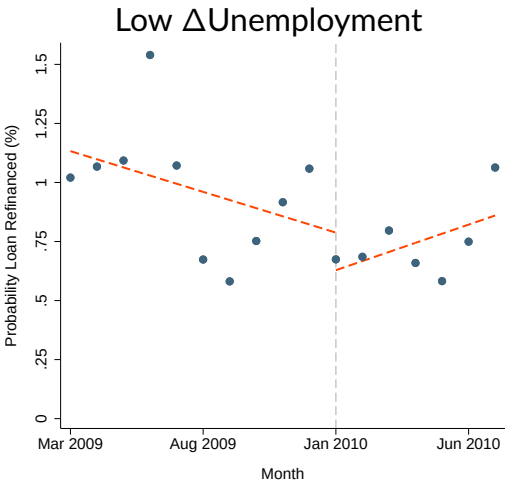

Measuring the Effect of Employment Documentation: Triple Diff

- Use additional difference in likelihood borrower is unemployed

$$\begin{aligned} Refinance_{it} = \alpha + \delta_t + X_{it}'\gamma + \beta_0 \cdot FHA_i + \beta_1 \cdot \Delta UR_i \\ + \beta_2 \cdot FHA_i \times Post_t + \beta_3 \cdot \Delta UR_i \times Post_t + \beta_4 \cdot FHA_i \times \Delta UR_i \\ + \beta_5 \cdot FHA_i \times \Delta UR_i \times Post_t + \epsilon_{it}. \end{aligned}$$

- Identifying assumption: parallel trends across exposure to unemployment
- Potential issues
  - Correlation b/t ΔUR and equity $\rightarrow$ correct with imputed equity
  - ΔUR loads more on FHA borrowers $\rightarrow$ rescale estimates

Effect of Employment Documentation on FHA Refinancing

	(1)	(2)	(3)	(4)	(5)
FHA	1.498^{***}	-0.054	0.353^{***}	1.321^{***}	1.208^{***}
	(0.356)	(0.055)	(0.065)	(0.355)	(0.349)
FHA $\times$ Post	-0.476^{***}	-0.280^{***}	-0.231^{***}	-0.315^{***}	-0.349^{***}
	(0.046)	(0.081)	(0.073)	(0.068)	(0.077)
FHA $\times$ ΔUR		0.046^{***}	0.042^{***}	0.047^{***}	0.047^{***}
		(0.011)	(0.012)	(0.012)	(0.012)
FHA $\times$ ΔUR $\times$ Post		-0.057^{***}	-0.047^{***}	-0.046^{***}	-0.047^{***}
		(0.015)	(0.013)	(0.014)	(0.014)
Month FEs	X	X	X	X	X
CBSA FEs	X	X	X	X	X
FHA Time Trends	X	X	X	X	X
Loan Age FEs	X		X	X	X
Interest Rate FEs	X		X	X	X
LTV $\times$ FICO FEs	X		X	X	X
Equity FEs	X		X	X	X
Controls $\times$ Post	X			X	X
Controls $\times$ FHA	X			X	X
Equity FEs $\times$ FHA $\times$ Post					X
Number of Observations	13,250,266	13,250,266	13,250,266	13,250,266	13,250,266

Interpreting the Magnitude (Simplified)

- **Pre/post differences**

  FHA borrowers:

$$P(R_{FHA,Pre}) = r_U \times UR + r_E \times (1 - UR)$$
$$P(R_{FHA,Post}) = r_E \times (1 - UR)$$

Interpreting the Magnitude (Simplified)

- **Pre/post differences**

  FHA borrowers:

$$P(R_{FHA,Post}) - P(R_{FHA,Pre}) = -r_U \times UR$$

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  Conventional borrowers:

$$P(R_{Conv,Pre}) = r_E \times (1 - UR)$$
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- **Difference in Differences (FHA − Conventional)**

$$\Big[P(R_{FHA,Post}) - P(R_{FHA,Pre})\Big] - \Big[P(R_{Conv,Post}) - P(R_{Conv,Pre})\Big] = -r_U \times UR$$

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$$\Big[P(R_{FHA,Post}) - P(R_{FHA,Pre})\Big] - \Big[P(R_{Conv,Post}) - P(R_{Conv,Pre})\Big] = -r_U \times UR$$

- **Third difference (differentiating and rescaling)**

$$\frac{\partial DiD}{\partial UR} = -r_U = \underbrace{-0.05}_{\text{our estimate}} \Rightarrow \boldsymbol{r_U = 5\%}$$

Interpreting the Magnitude (Simplified)

- Third difference (differentiating and rescaling)

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- But UR changes load more heavily on FHA borrowers...

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- But UR changes load more heavily on FHA borrowers...

- From 2007–2009 SCF panel:

$$\Delta UR_{FHA} = 7.8\text{ppt.}$$
$$\Delta UR_{Conv} = 6.2\text{ppt.}$$

- Scaling down our estimate by $6.2/7.8 = 0.8 \Rightarrow \boldsymbol{r_U = 4\%}$

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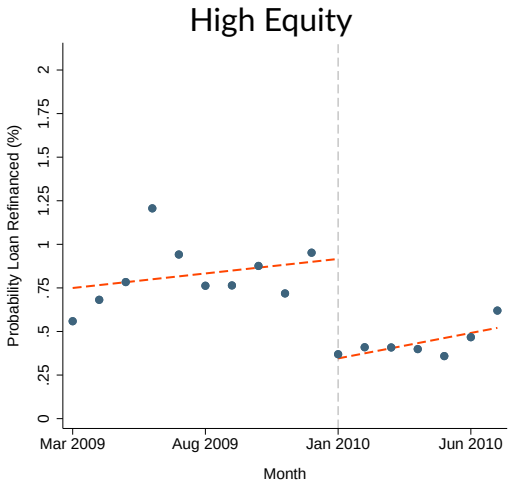
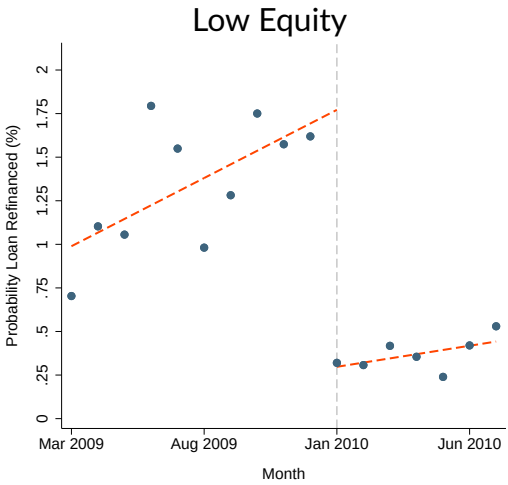
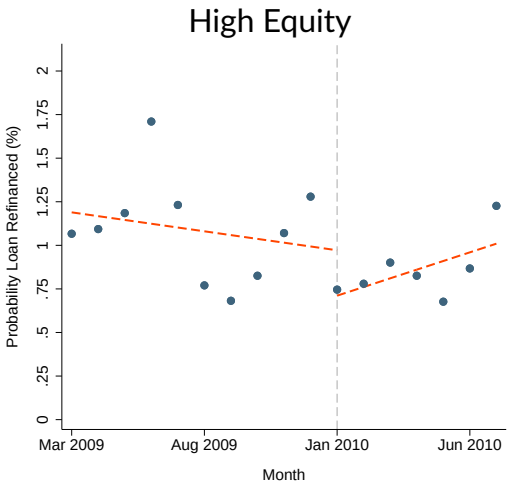
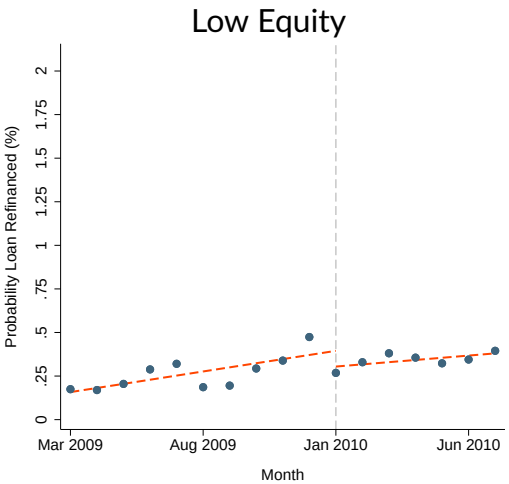
FHA Refis by Borrower Equity





Conventional Refis by Borrower Equity





Measuring the Effect of Upfront Costs: Triple Diff

- Use additional difference in likelihood borrower is low equity

$$\begin{aligned} Refinance_{it} = \alpha + \delta_t + X_{it}'\gamma + \beta_0 \cdot FHA_i + \beta_1 \cdot LowEquity_{it} \\ + \beta_2 \cdot FHA_i \times Post_t + \beta_3 \cdot \Delta LowEquity_{it} \times Post_t + \beta_4 \cdot FHA_i \times LowEquity_{it} \\ + \beta_5 \cdot FHA_i \times LowEquity_{it} \times Post_t + \epsilon_{it}. \end{aligned}$$

- $LowEquity_{it}$: indicator for whether imputed equity < 0
- Will control for unemployment and condition on low unemployment

Effect of Upfront Costs on FHA Refinancing

	(1)	(2)	(3)	(4)	(5)	(6)
FHA	0.627	0.060	0.299***	0.650	0.522	1.246**
	(0.432)	(0.044)	(0.055)	(0.423)	(0.436)	(0.618)
FHA × Post	−0.551***	−0.403***	−0.357***	−0.458***	−0.272***	−1.107***
	(0.059)	(0.066)	(0.061)	(0.050)	(0.067)	(0.270)
FHA × Low Equity		1.089***	0.969***	0.899***	0.869***	1.076***
		(0.165)	(0.187)	(0.187)	(0.187)	(0.283)
FHA × Low Equity × Post		−0.800***	−0.746***	−0.560***	−0.510***	−0.801***
		(0.127)	(0.132)	(0.130)	(0.127)	(0.258)
Month FEs	X	X	X	X	X	X
CBSA FEs	X	X	X	X	X	X
FHA Time Trends	X	X	X	X	X	X
Loan Age FEs	X		X	X	X	X
Interest Rate FEs	X		X	X	X	X
LTV × Fico FEs	X		X	X	X	X
ΔUR FEs	X		X	X	X	X
Controls × Post	X			X	X	X
Controls × FHA	X			X	X	X
ΔUR FEs × FHA × Post					X	X
Optimal Refi Subsample						X
Number of Observations	5,441,498	5,441,498	5,441,498	5,441,498	5,441,498	884,809

Research Questions

- What was the overall effect of the policy changes?
  - *Monthly FHA refinance probability ↓ by 0.7 ppt*
  - *50% fall relative to baseline*
- How important was employment documentation?
  - *Raising unemployment rate by 1 ppt. ↓ refinancing by 0.05 ppt.*
  - *Implies unemployed would refinance at very high rates (4-5%) if able*
- How important was the change in **upfront costs**?
  - ***Borrowers required to pay costs out-of-pocket ↓ refinancing by 0.5 ppt.***
  - ***Evidence that this effect operates through liquidity constraints***

Conclusion

- We study how two pervasive but overlooked frictions constrain refinancing
  1. The need to document employment
  2. The need to pay for upfront closing costs
- Evidence from large FHA policy change $\Rightarrow$ these frictions are economically important
- Results have potential implications for
  - Efficacy of monetary policy
  - Design of ex-post mortgage debt relief programs
  - Distributional costs of recessions

In the News

Fannie Mae

Business Partners Homeowners & Renters

Fannie Mae Announces New Streamlined Refinance Program for High Loan-to-Value Borrowers to be Available in October 2017

August 26, 2016

As recently announced by the Federal Housing Finance Agency (FHFA), the Home Affordable Refinance Program (HARP) will be extended to September 30, 2017, continuing to provide liquidity to support eligible borrowers.

Corresponding to the conclusion of HARP, Fannie Mae, in coordination with Freddie Mac, will introduce new high loan-to-value (LTV) ratio same-investor refinance options, scheduled to be available in October 2017. The new options will be for existing loans with LTV ratios exceeding the maximum otherwise allowed, supporting borrowers who are making their payments but are constrained by a high LTV from refinancing. Under the new options, as with HARP, the

GSEs are rolled out new streamline programs for future use.

Thanks!

Agarwal, Driscoll, & Laibson (2013) Calibration

- Model gives potential rate r^* at which it would be optimal to refinance
- Inputs into model:
  - Current rate and balance: taken from data
  - Discount rate: 5%
  - Inflation: 3%
  - Marginal tax rate: 28%
  - Standard deviation of annual mortgage rates: 1.1%
  - New loan-type: 30-year fixed rate
  - Probability of moving: every 10 years on average
  - Closing costs
- Closing cost scenarios
  - \$2,000 + 1% of balance upfront $\Rightarrow r^*_{upfront}$
  - All but \$500 rolled into new loan $\Rightarrow r^*_{financed}$
- Estimate actual r^* from observed refis within $FICO \times LTV \times State \times Month \times FHA$ bins
- Keep only borrowers for whom both $r^*_{upfront}$ and $r^*_{financed}$ are $> r^*$