LOAN ORIGINATIONS AND DEFAULTS IN THE MORTGAGE CRISIS: THE ROLE OF THE MIDDLE CLASS

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Motivation

- A common view of the ‘07 mortgage crisis is that innovations and perverted incentives in credit supply led to distortions in the allocation of credit, especially to poorer households
  - Financial sector provided mortgages at unsustainable debt-to-income levels, in particular to low income and low-FICO borrowers.
  - Hence the label “sub-prime crisis”

- As a results, significant emphasis on understanding the role of the low-income and subprime borrowers for the crisis.
  - Evidence for the credit supply view relies on negative correlation between mortgage growth and per capita income growth at the zip code level

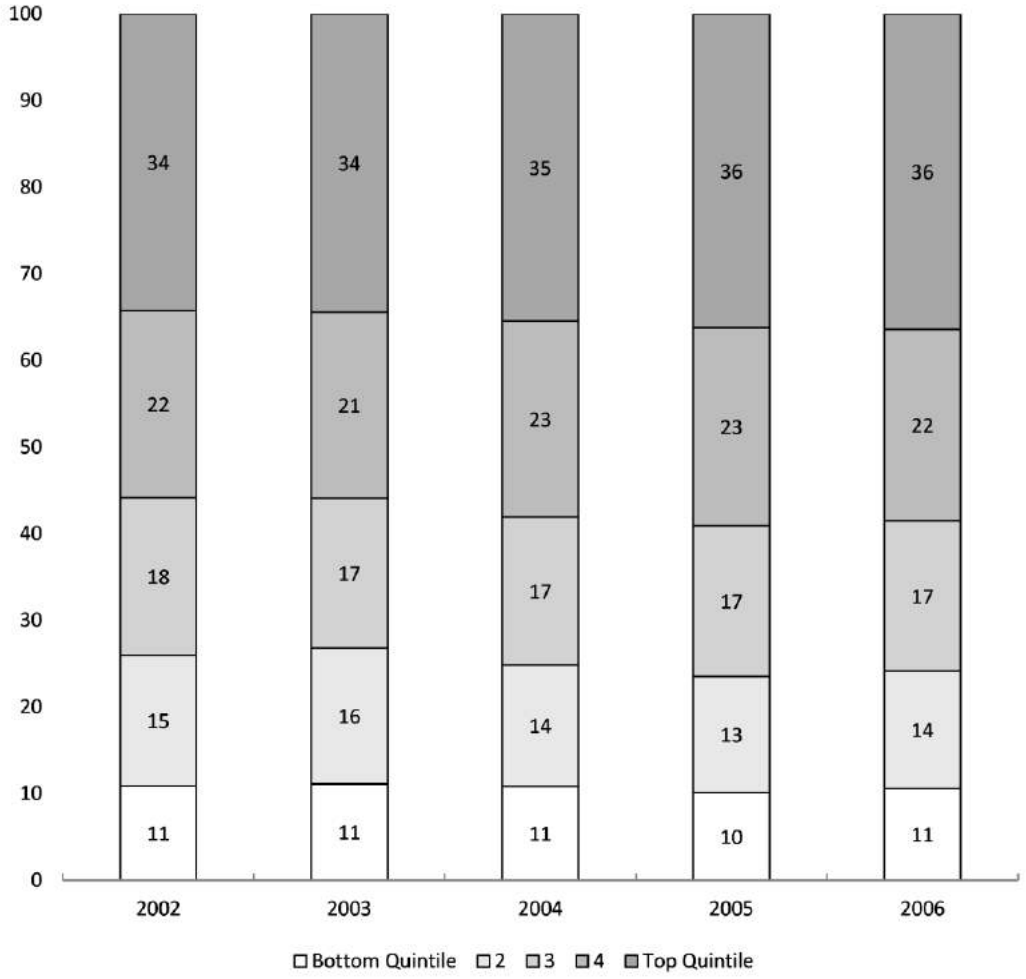
This Paper

- Credit expanded across the income distribution, not just poor or low FICO borrowers
  - Middle/high income households had a much larger contribution to overall mortgage debt before the crisis than poor or low FICO borrowers
  - Mortgage debt-to-income levels (DTI) saw 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
- Points to the importance of house prices for home buying and lending decisions
  - Increase in debt due to faster turnover and cash- out refinancing in the mortgage market (larger % of households had recent transactions)
  - Credit demand and house price expectation important drivers of credit
  - Potential build-up of systemic risk prior to the crisis

Data

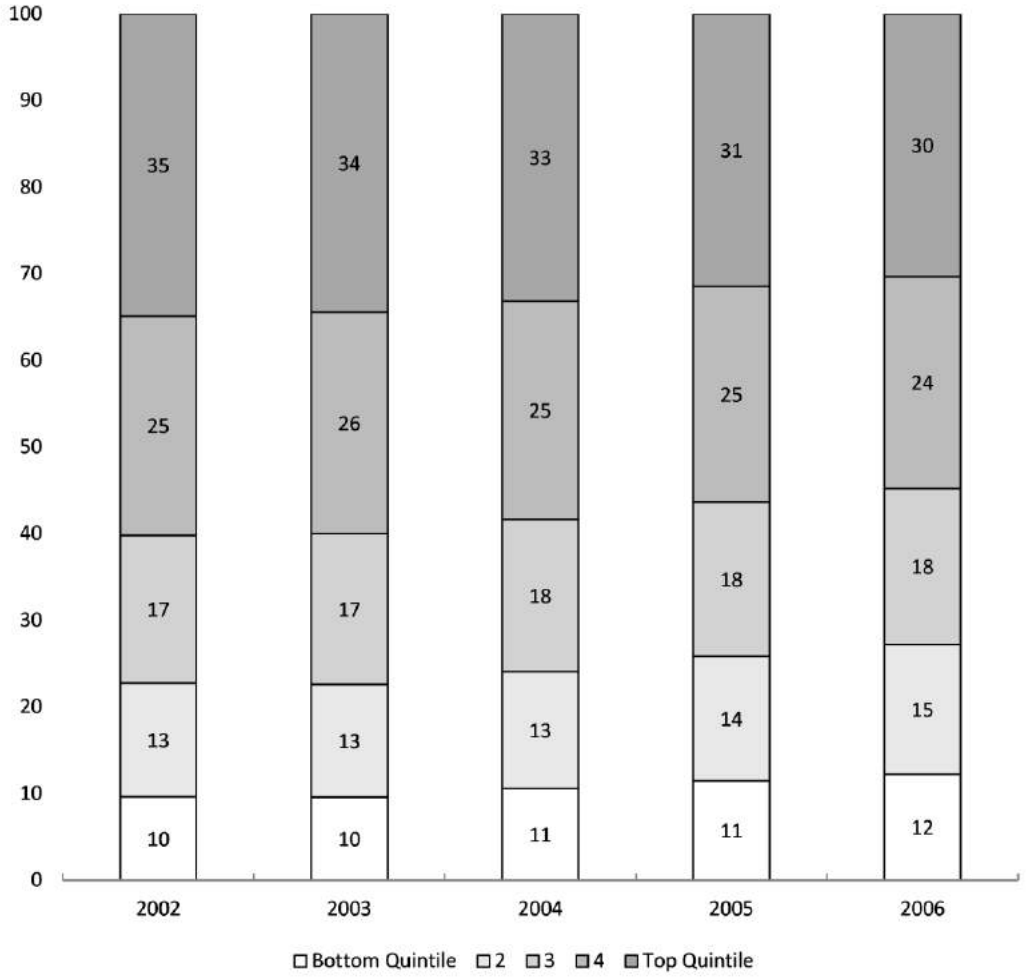
- Home Mortgage Disclosure Act data
  - Balance of individual mortgages originated in the US (2002-2006)
  - Mortgage type (purchase vs refinance)
  - Borrower income from mortgage application
- IRS income at the zip code level.
- House prices and house turn-over from Zillow.
- Mortgage size and performance from LPS: 5% random sample, Freddie Mac, Black Box Logic
- Household Debt (stock): Federal Reserve Board Survey of Consumer Finances

Aggregate Mortgage Origination by Buyer Income (HMDA) Stayed Stable



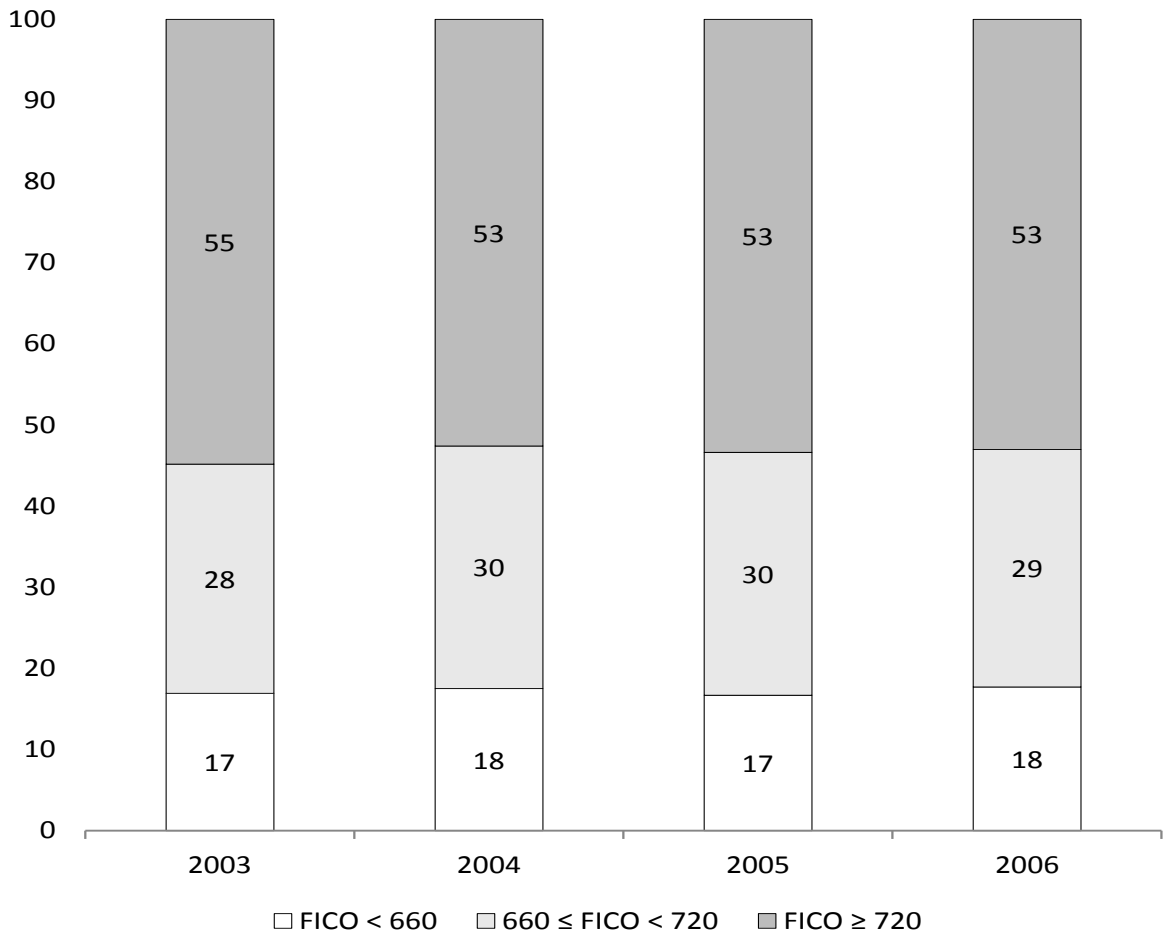
Fraction of mortgage dollars originated per year by income quintile

Aggregate Mortgage Origination by IRS Household Income. Stayed Stable

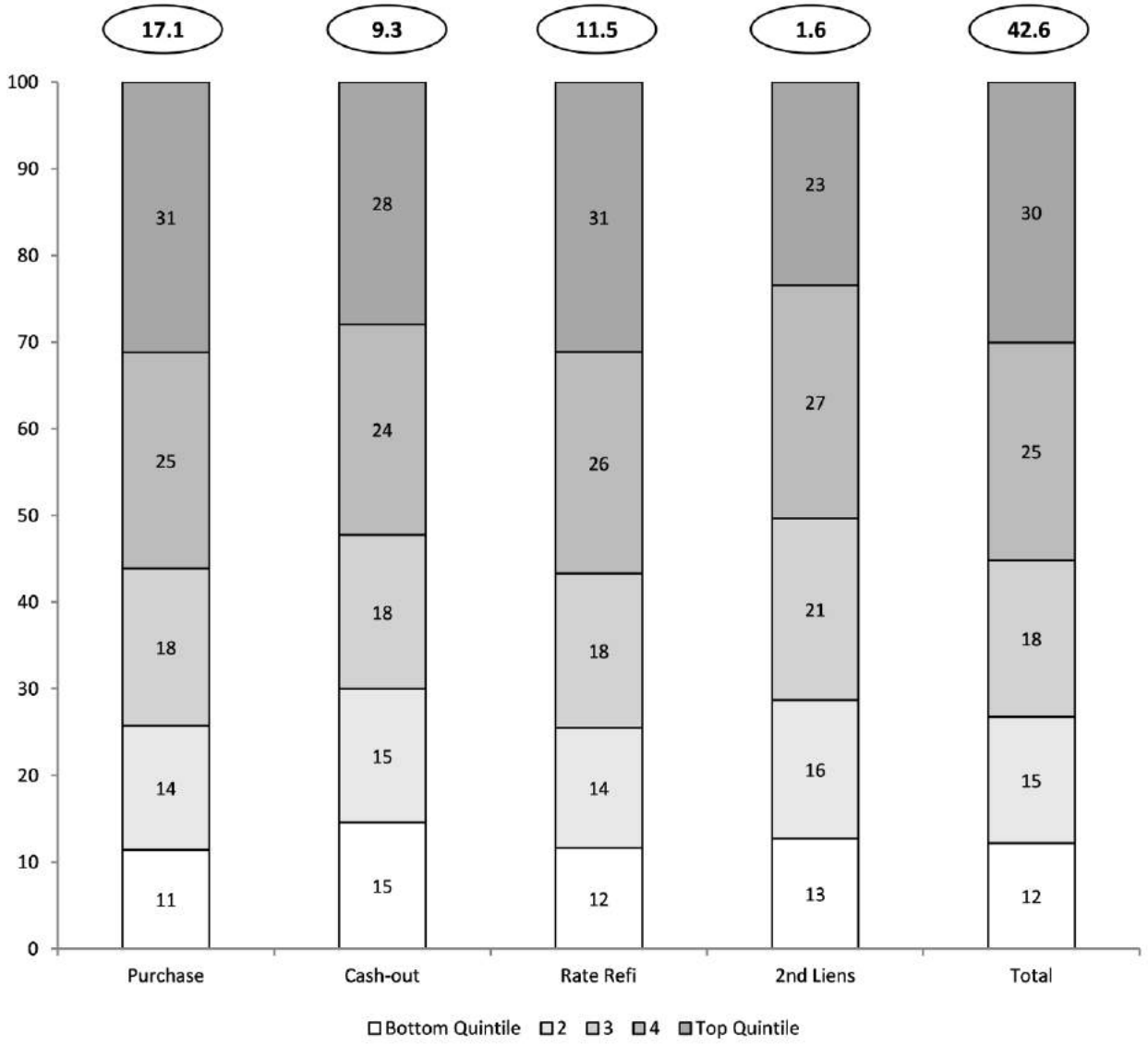


Fraction of mortgage dollars originated per year by income quintile

Origination by FICO scores



In %.. -


17.1
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Purchase
Cash-out
Rate Refi
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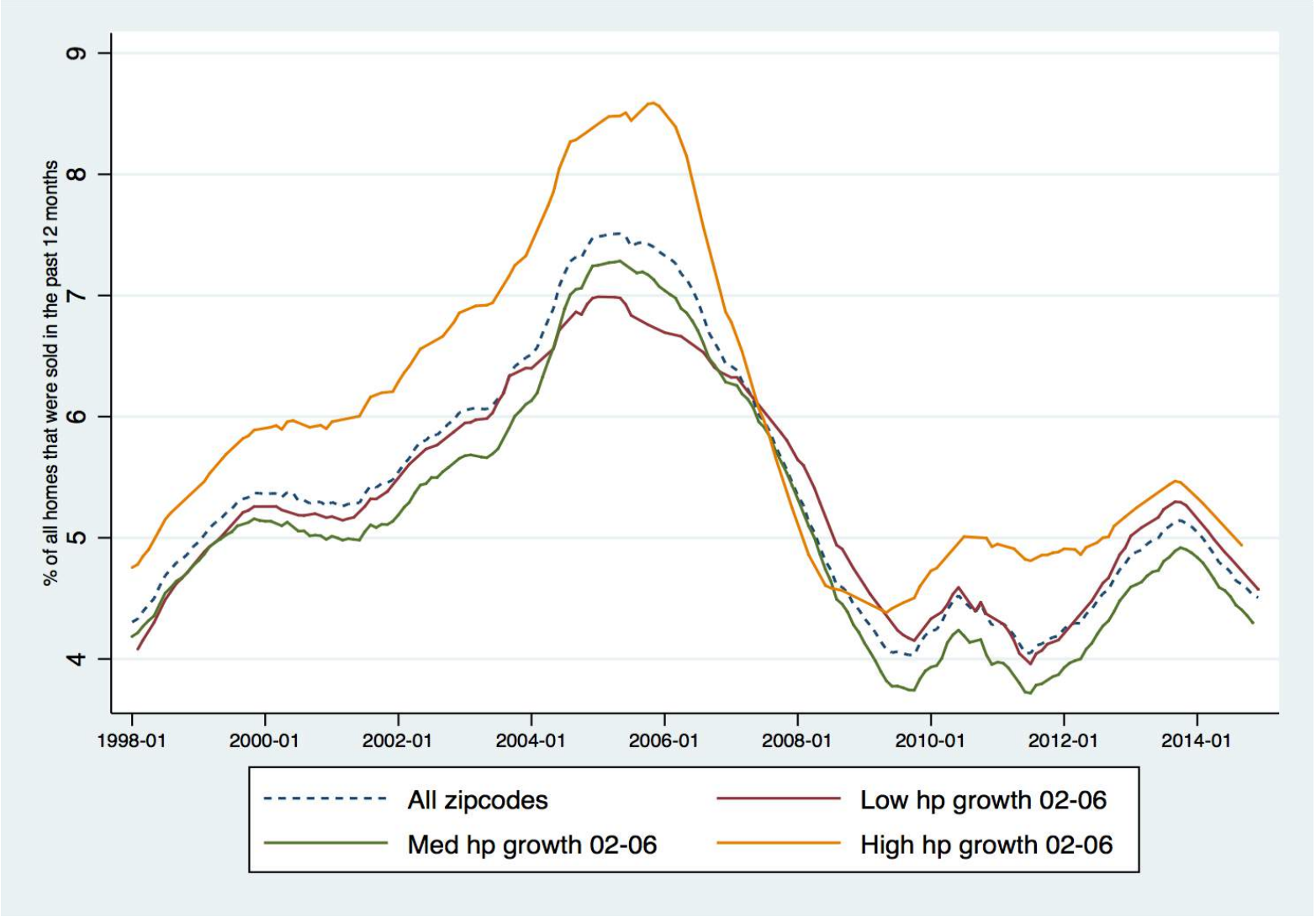
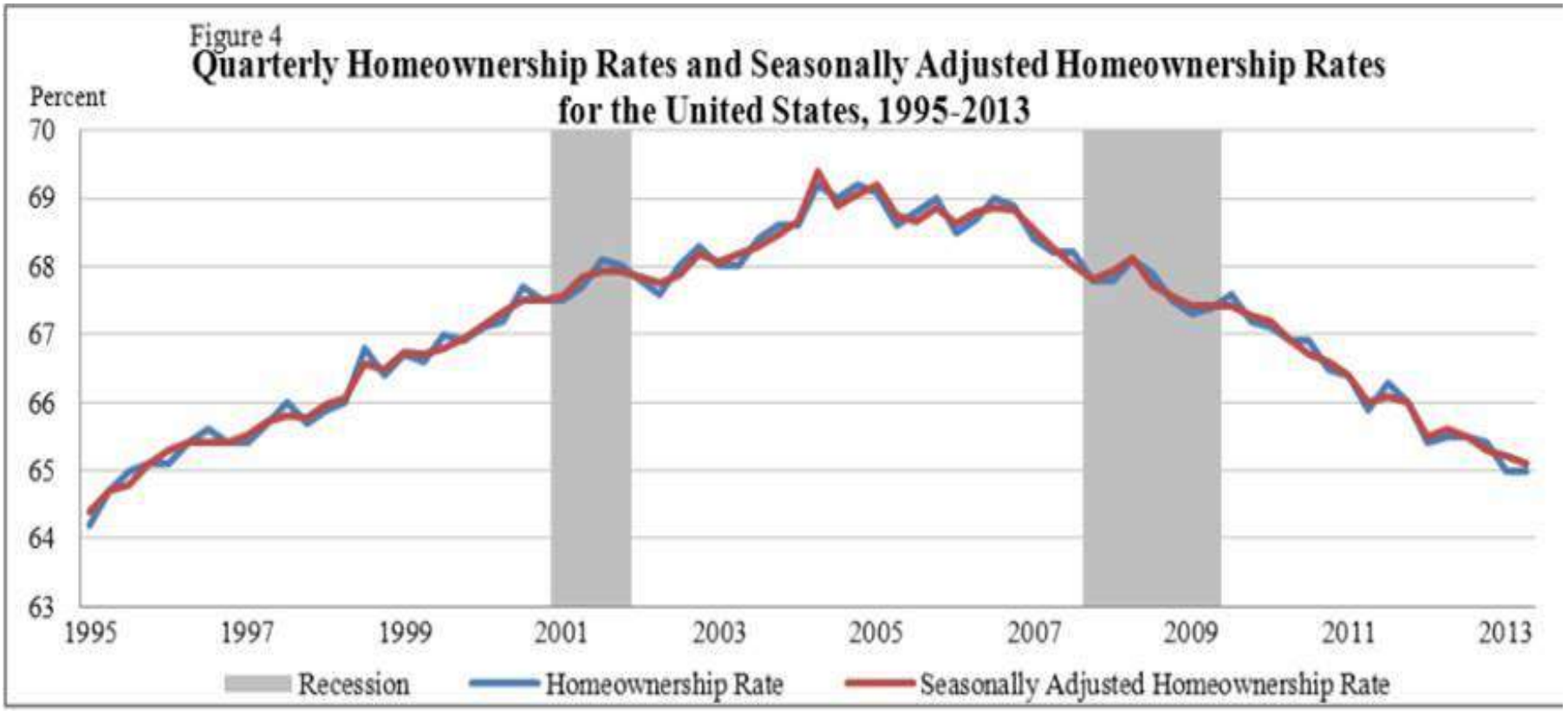
2
3
4
Top Quintile

How Did Household Leverage Build Up? Increased Speed of Home Sales



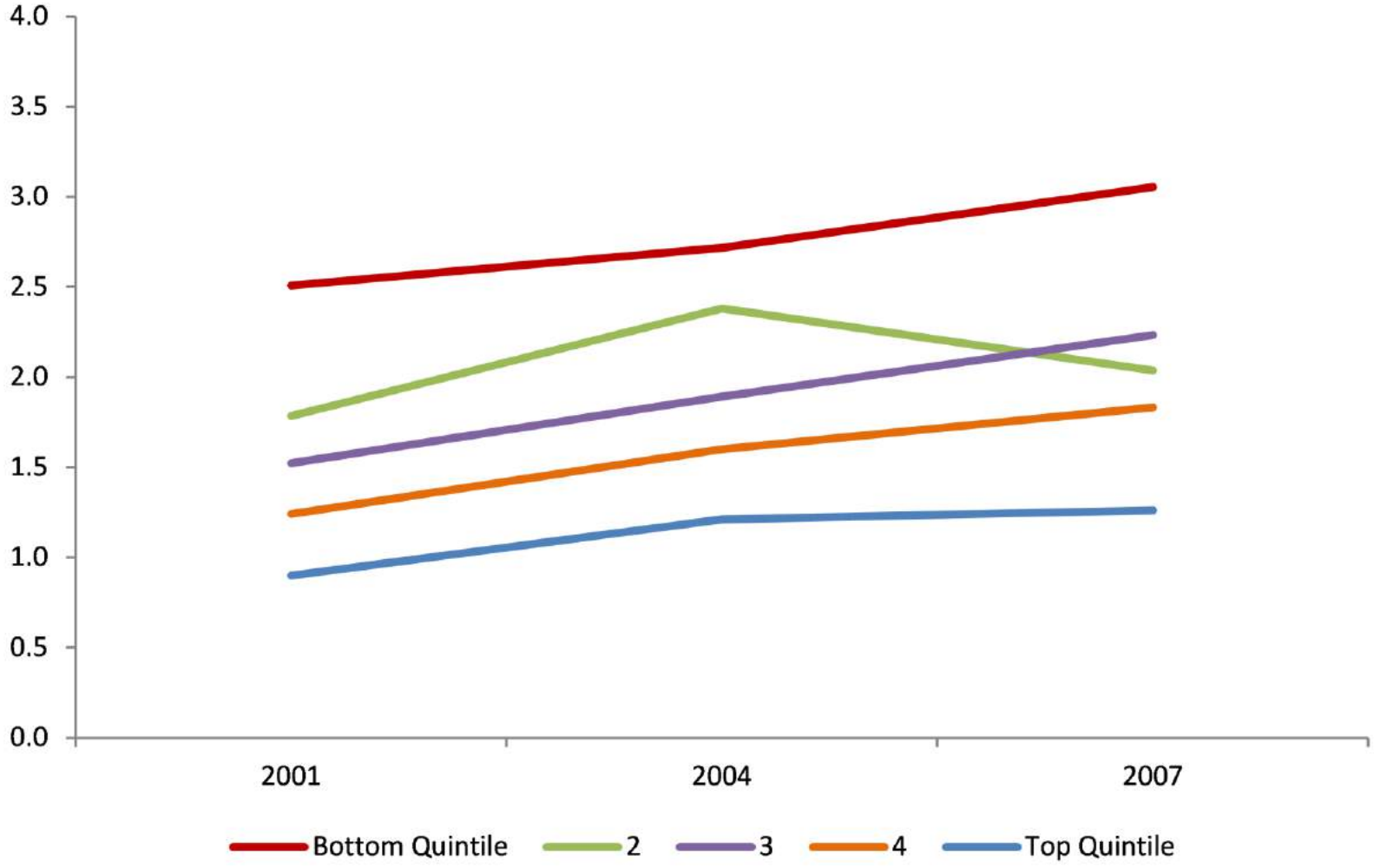
No expansion of ownership for marginal borrowers

Homeownership Rate Goes up 1% from 2002-06

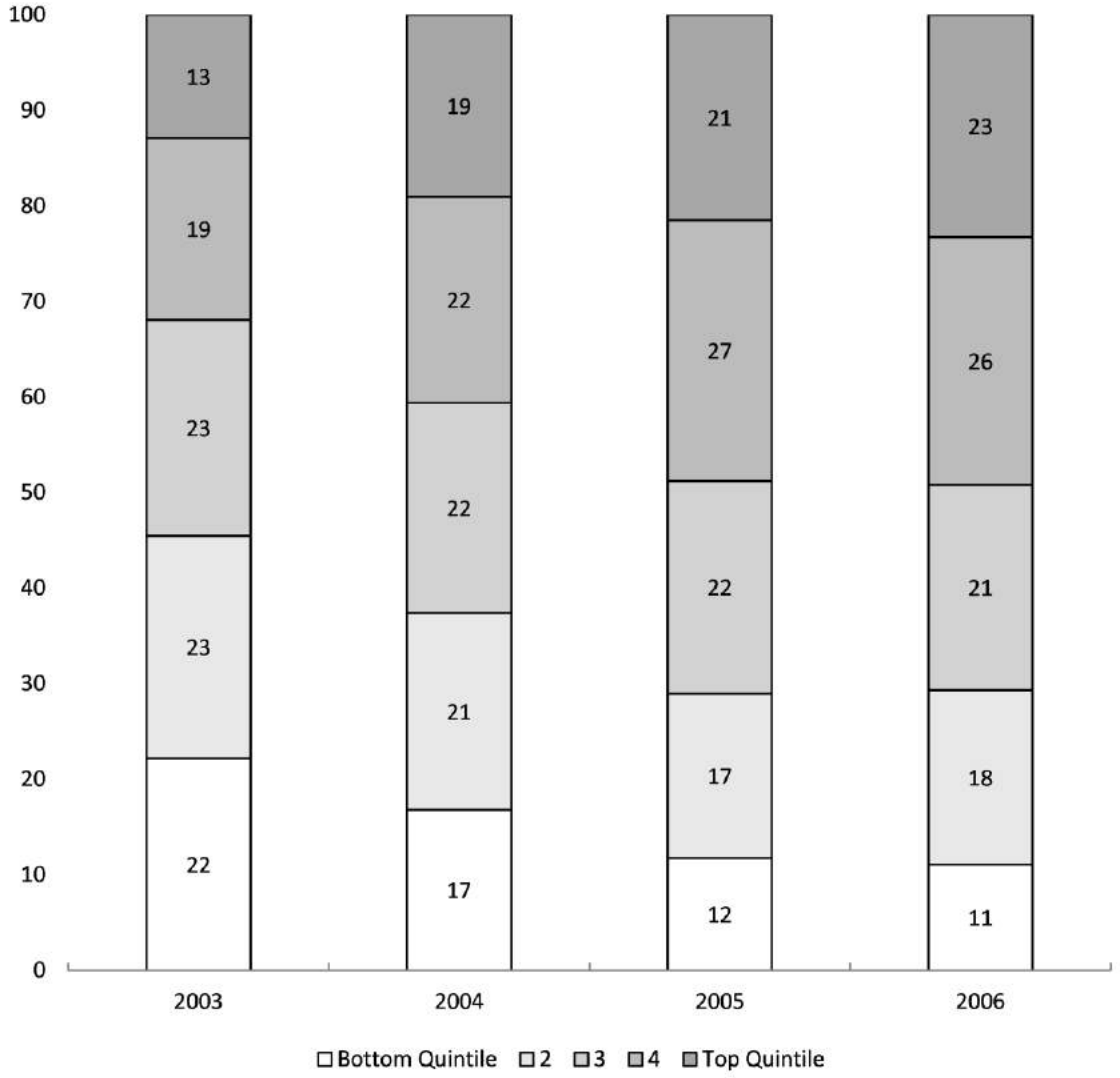


Current Population Survey/ Housing Vacancy Survey, 2014

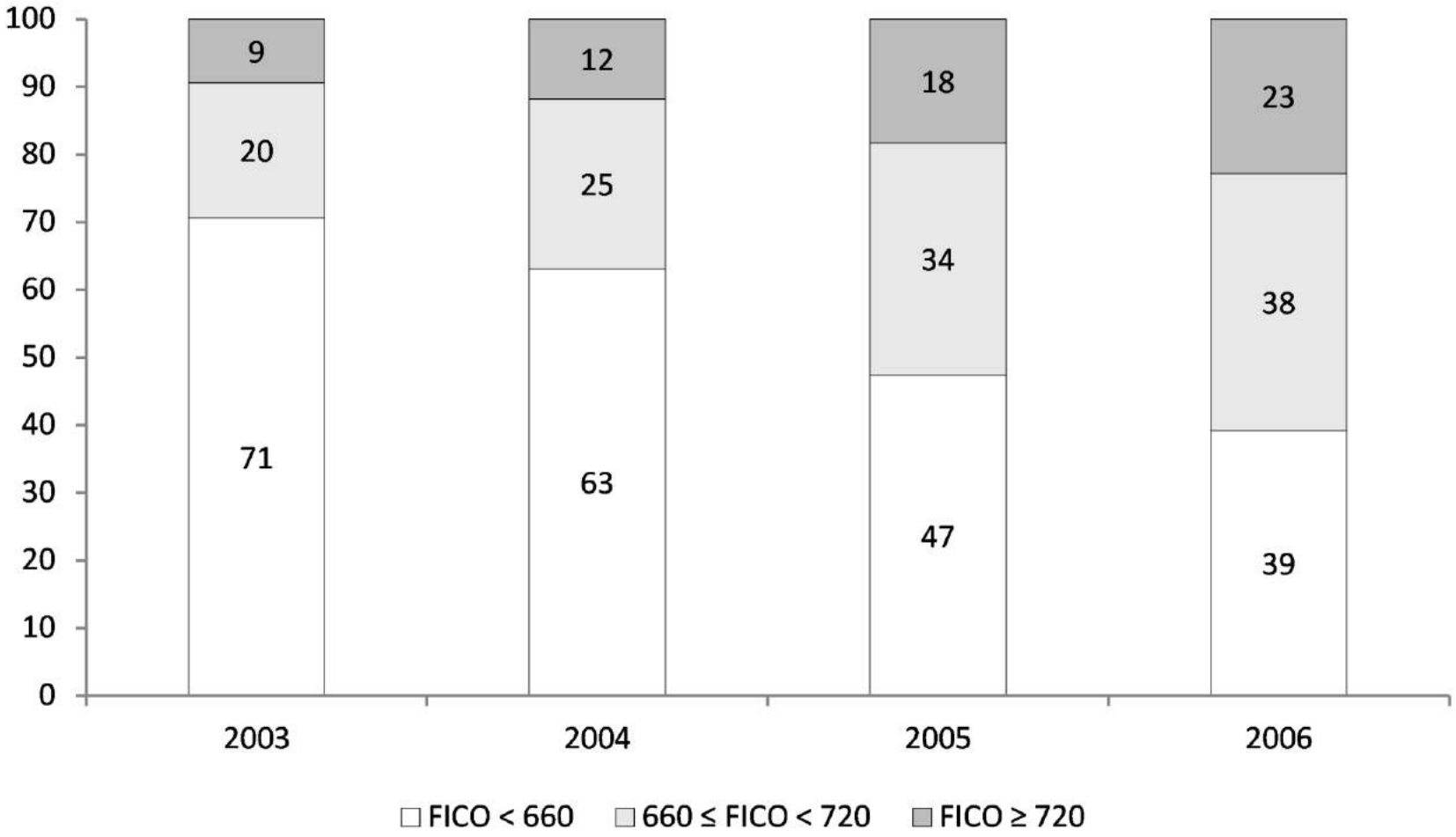
Effect on the Stock of Household Mortgage Debt (SCF)



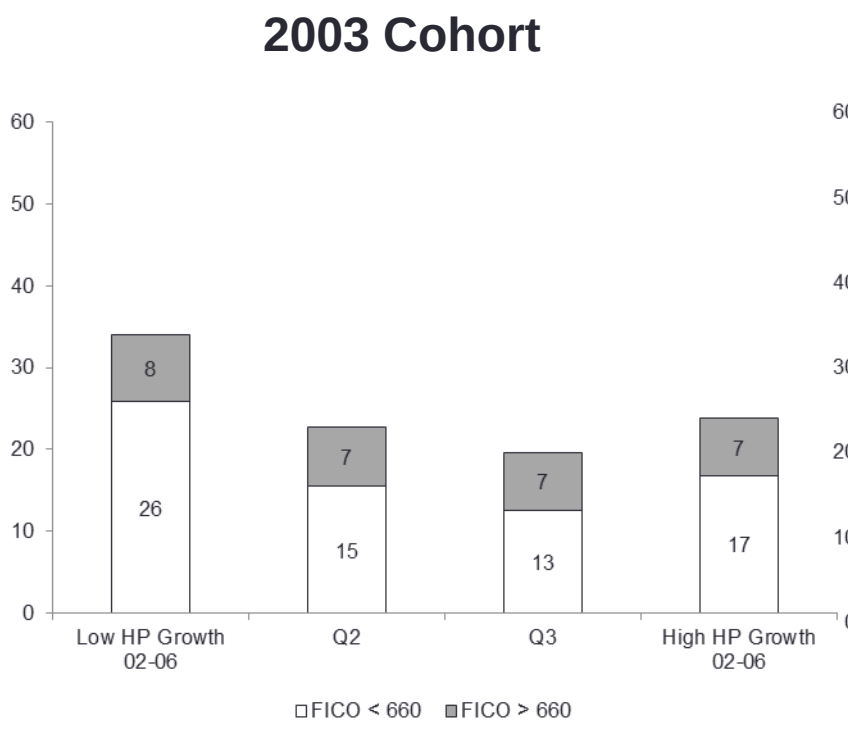
Share of Delinquent Mortgage Debt 3 Years Out by Buyer Income (LPS) – Value Weighted

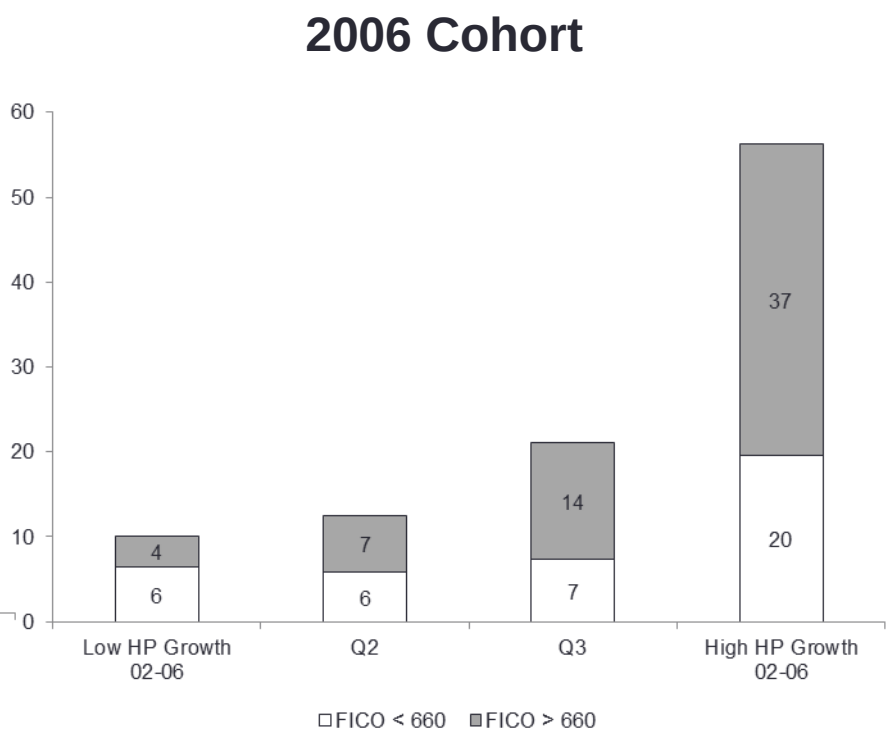


Share of Delinquent Mortgages 3 Yrs Out by FICO and Cohort (LPS) –Value Weighted



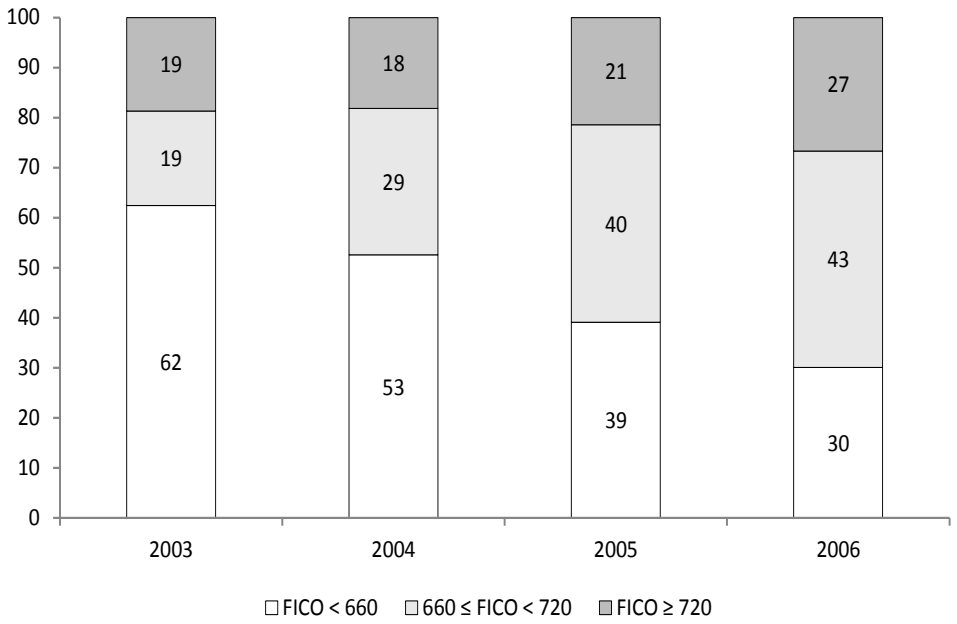
Share of Delinquency 3 Years Out by HP Growth and FICO – Value Weighted



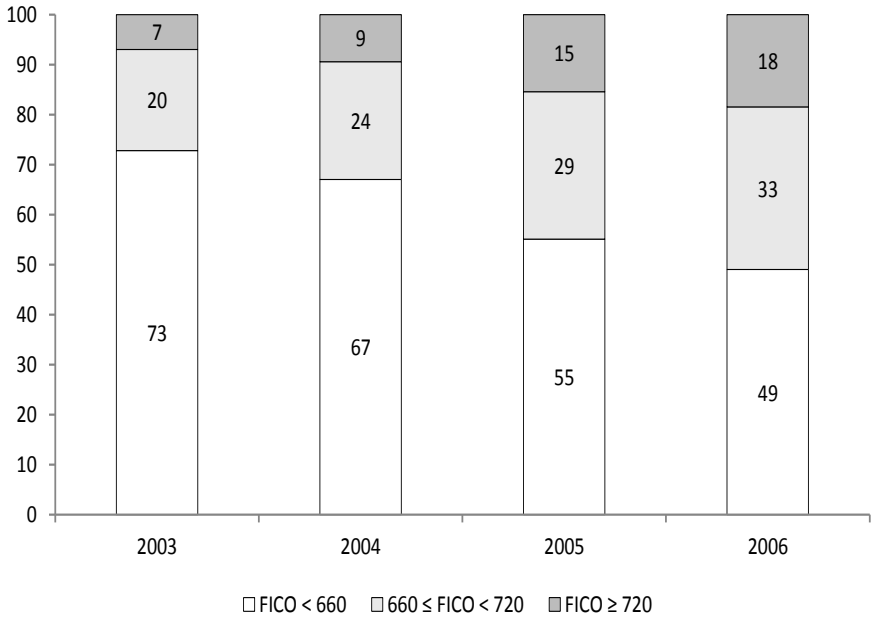


Recourse vs. Non-Recourse States

Non-Recourse States



Recourse States



Results Robust Across Different Data Sets

- Main dataset: LPS 5 % random sample of US mortgages

- **Same patterns with alternative datasets:**
- Freddie Mac, loan performance 50,000 loans per year single family homes
- Blackbox Logic, 90% of privately securitized loans
- Survey of Consumer Finance, household debt and income data from
- Federal Reserve Board Survey
- Paul Willen and Chris Foote have rerun our results using Equifax data

How to put this together?

- Credit expansion due to economy wide increase of leverage, not just poor or marginal borrowers
  - Homebuyers (and lenders) at all levels of the income distribution bought into the increasing house prices
  - DTI levels did not “decouple” across the income distribution
  - Homebuyers re-levered via quicker churn and more refinancing

- Consistent with a view that systemic build-up in risk led to defaults once the economy slowed down
  - Dollars in default increased most in the middle/high income groups and for high FICO scores
  - Defaults increase in areas with sharpest home price movements
  - Cannot rule our credit demand or house price expectation as important drivers of credit expansion and crisis

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?

Thank you

The Mortgage Credit Channel of Macroeconomic Transmission

Daniel L. Greenwald (MIT Sloan)

GCFP Annual Conference

September 29, 2016

Introduction

- **Motivation**: despite importance of mortgage markets, much to learn about core mechanisms connecting credit, house prices, economic activity.
- **Main question**: if and how mortgage credit issuance amplifies and propagates fundamental shocks.
  - Mortgage credit channel of transmission.
- **Approach**: General equilibrium framework centered on two important but largely unstudied features of US mortgage markets:
  1. Size of new loans limited by payment-to-income (PTI) constraint, alongside loan-to-value (LTV) constraint. ▸ Underwriting
  2. Borrowers hold long-term, fixed-rate loans and can choose to prepay existing loans and replace with new ones. ▸ Prepay Data

Main Findings

Main Finding #1: When calibrated to US mortgage microdata, novel features amplify transmission from interest rates into debt, house prices, economic activity.

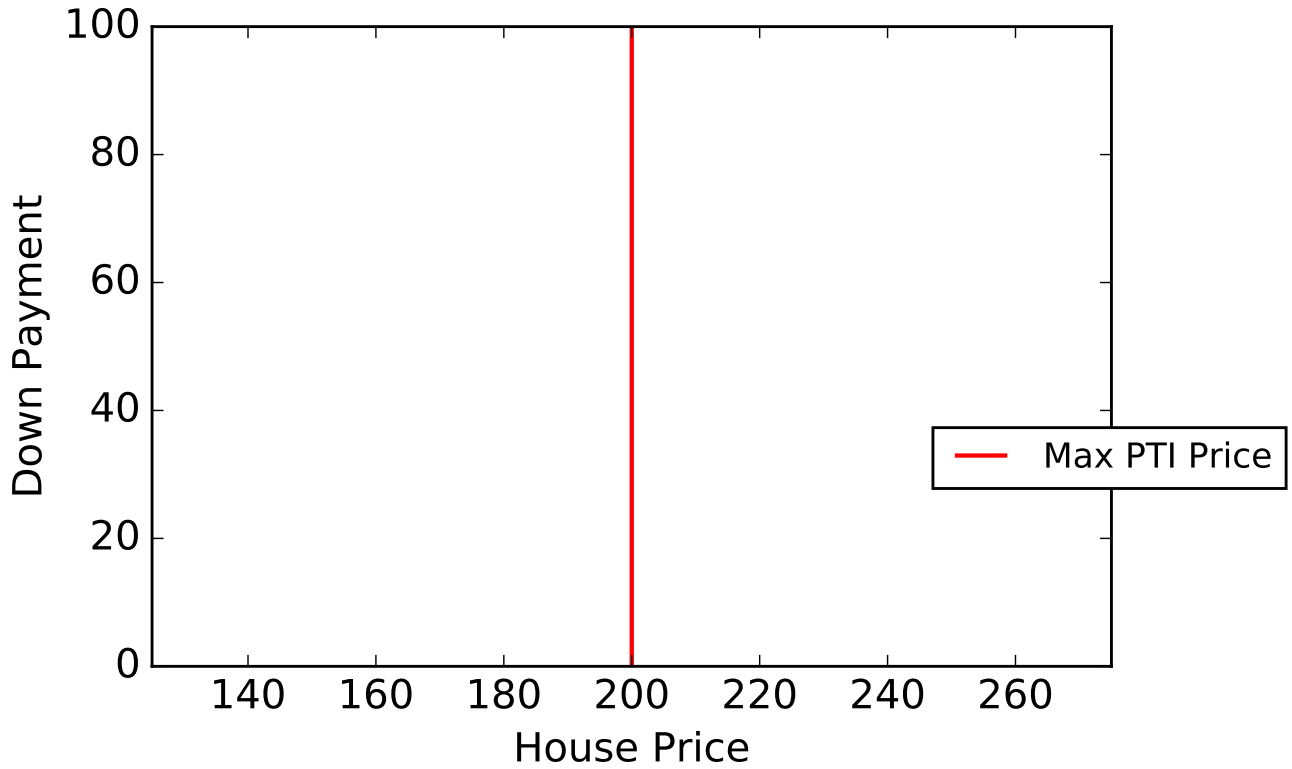
- Initial source: PTI limits are highly sensitive to nominal interest rates.
  - Change by $\sim$ 10% in response to 1% change in nominal rates.
- Key propagation mechanism: changes in which constraint is binding for borrowers move house prices (constraint switching effect).
  - Price-rent ratios rise up to 4% after persistent 1% fall in nominal rates.

Main Finding #2: PTI liberalization appears essential to boom-bust.

- Changes in LTV standards alone insufficient. PTI liberalization compelling theoretically and empirically.
- Quantitative impact: 38% of observed rise in price-rent ratios, 47% of the rise in debt-household income from PTI relaxation alone.

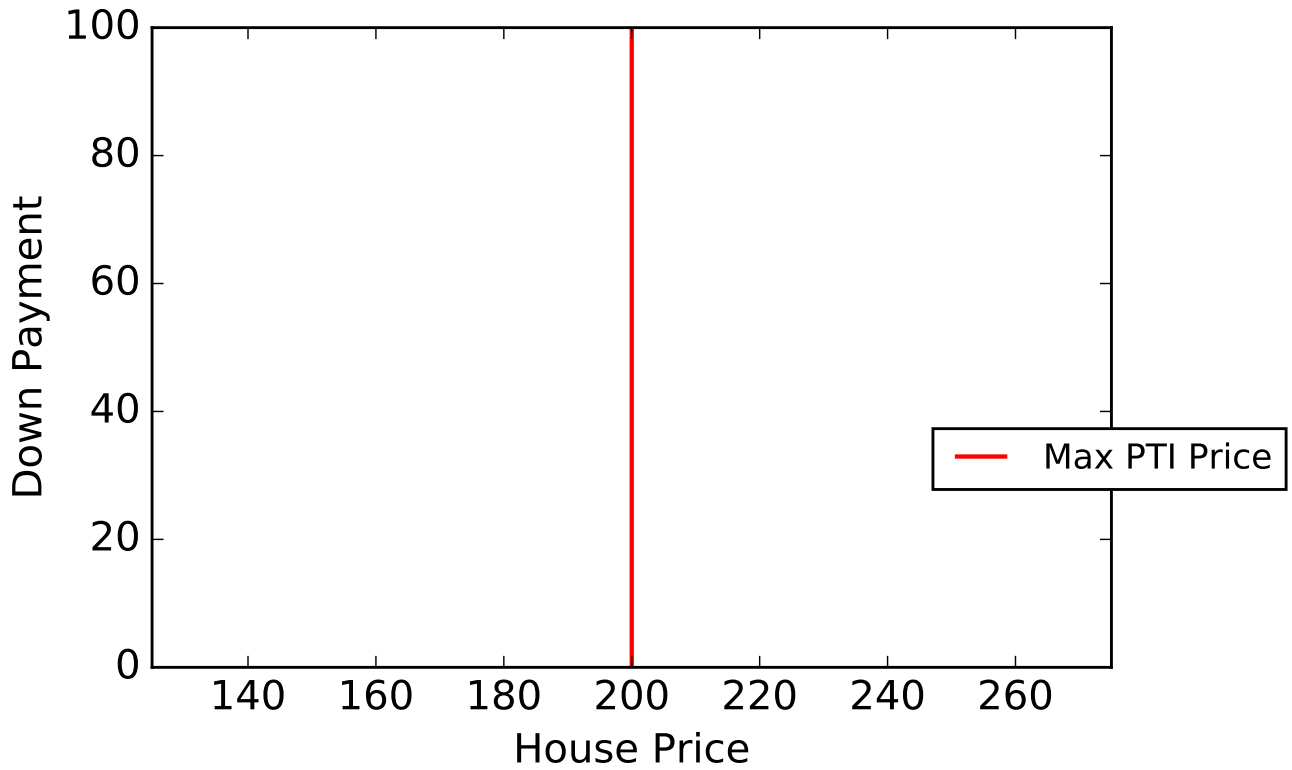
Simple Example

- Consider homebuyer who wants large house, minimal down payment. Faces PTI limit of 28%, LTV limit of 80%.



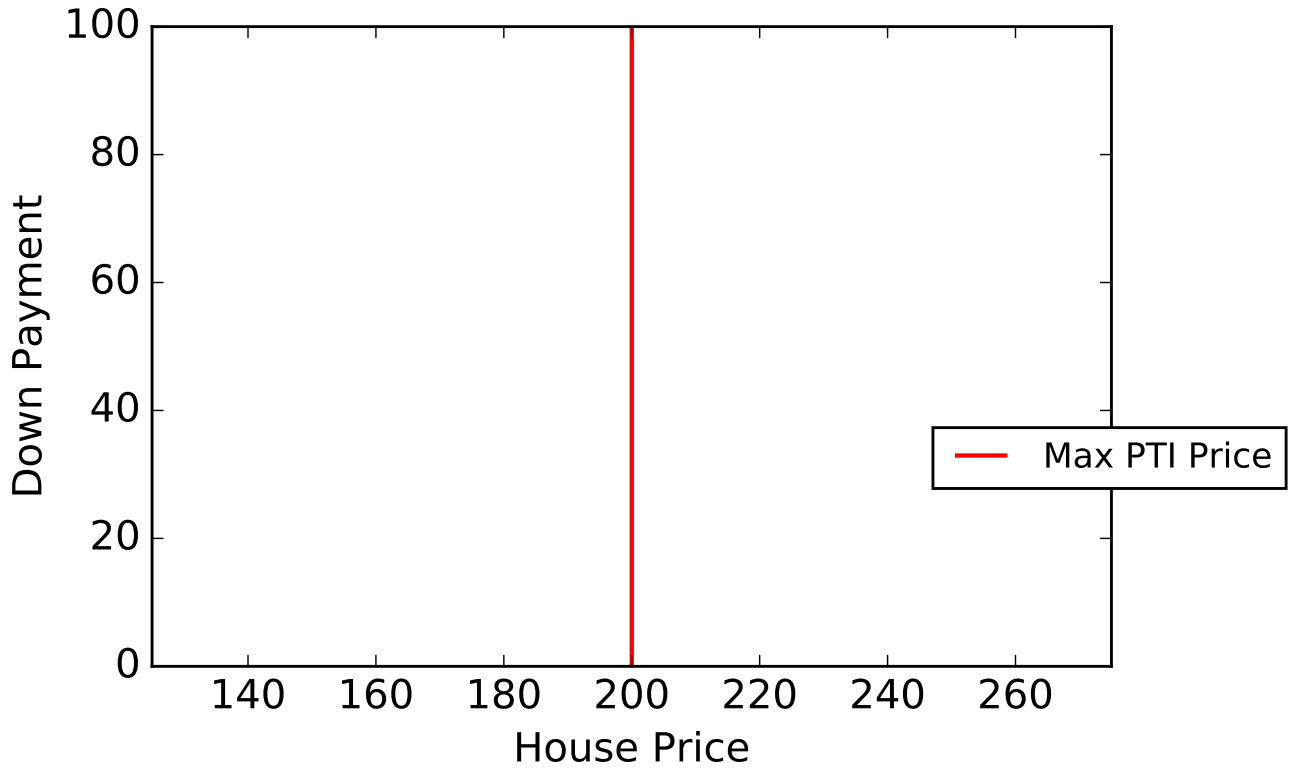
Simple Example

- At income of \$50k per year, 28% PTI limit $\Longrightarrow$ max monthly payment of $\sim$ \$1,200.



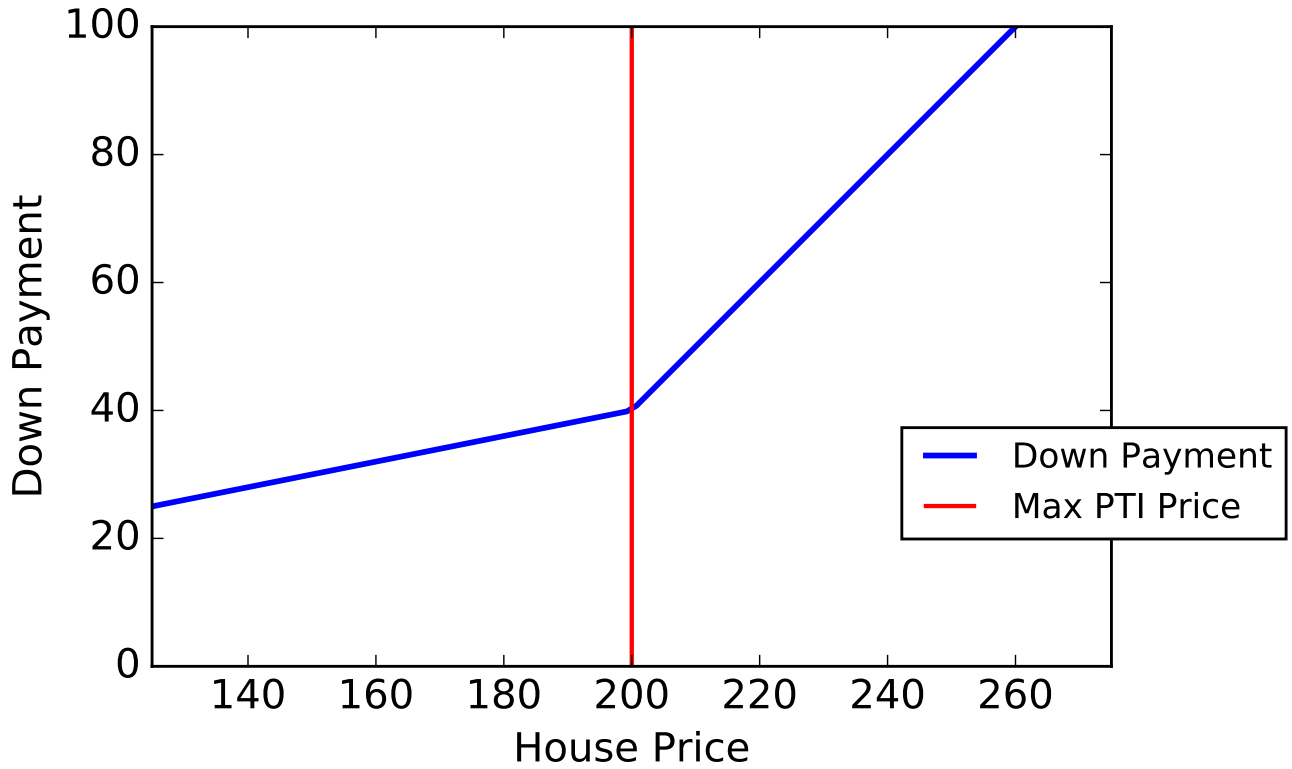
Simple Example

- At 6% interest rate, \$1,200 payment $\Longrightarrow$ maximum PTI loan size \$160k. Plus 20% down payment $\Longrightarrow$ house price of \$200k.



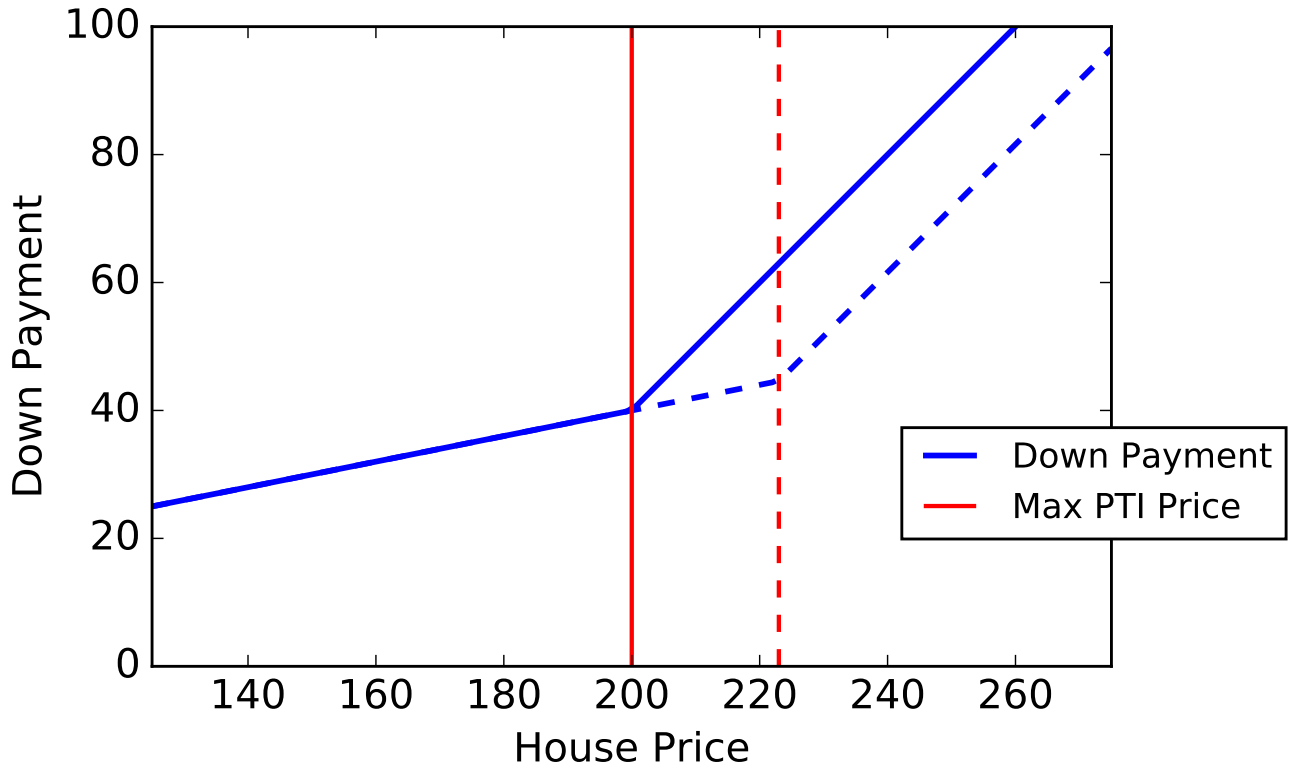
Simple Example

- Kink in down payment at price \$200k. Below this point size of loan limited by LTV, above by PTI. Kink likely optimum for homebuyers.



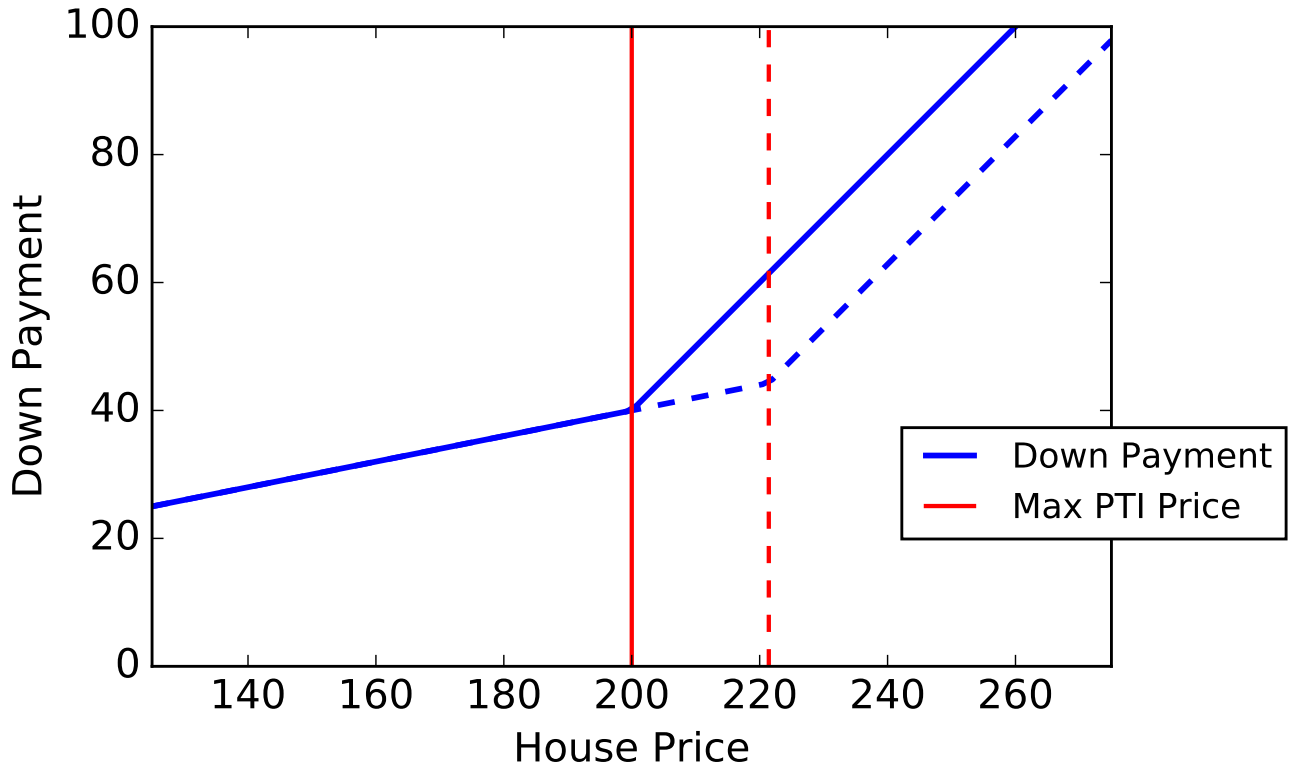
Simple Example

- Interest rates fall from 6% to 5%. Borrower's max PTI now limits loan to \$178k (rise of 11%). Kink price now \$223k, housing demand increases.



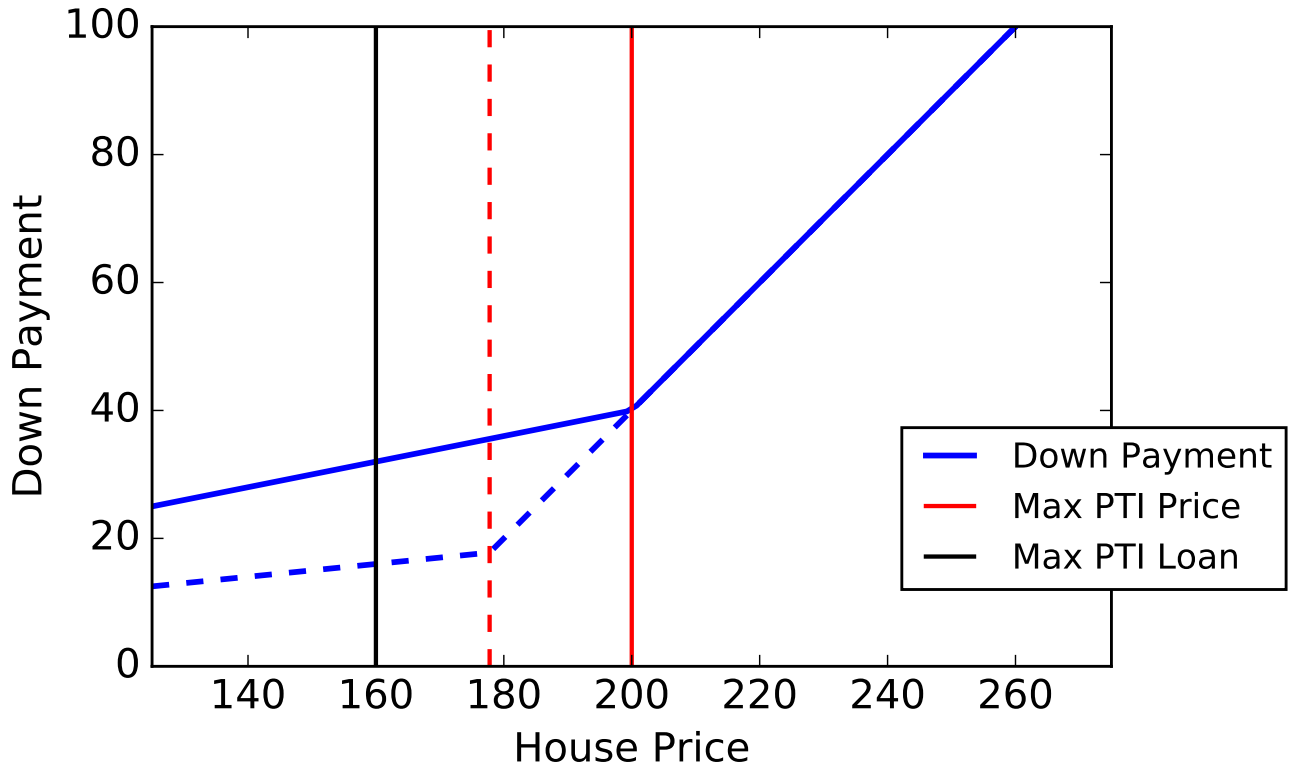
Simple Example

- Increasing the maximum PTI ratio from 28% to 31% has a similar effect to fall in rates, increases max loan size and corresponding price.



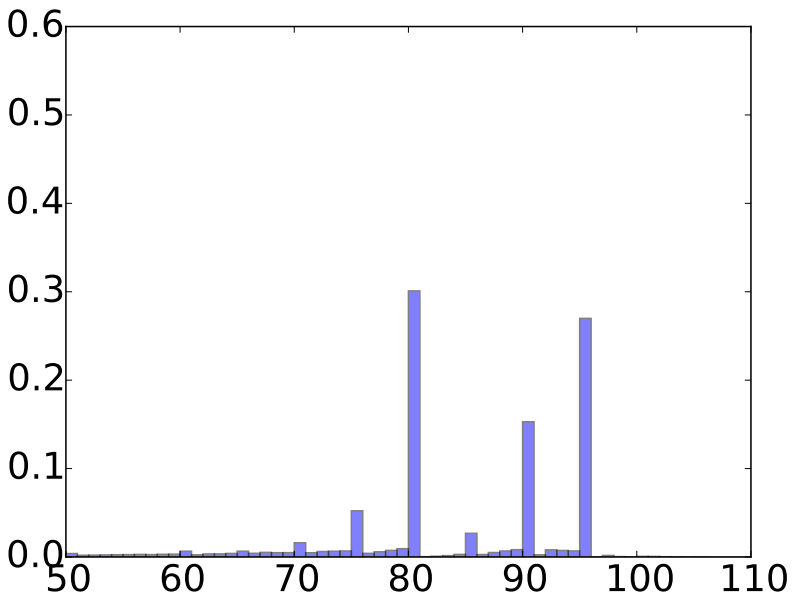
Simple Example

- In contrast, increasing maximum LTV ratio from 80% to 90% means that \$160k loan associated with only \$178k house. Housing demand falls.

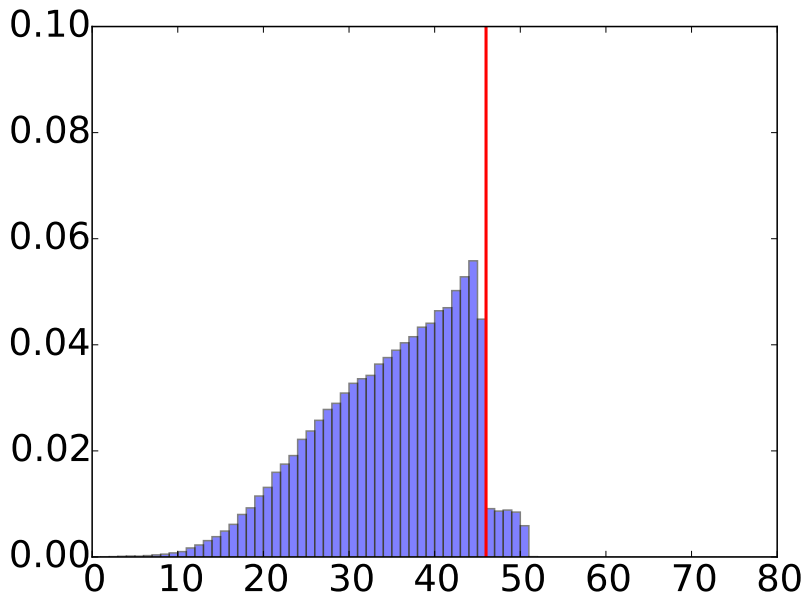


LTV and PTI in the Data

- LTV constraint: balance cannot exceed fraction of house value.
  - Key property: moves with house prices.
  - Clear influence on borrowers: large spikes at institutional limits.



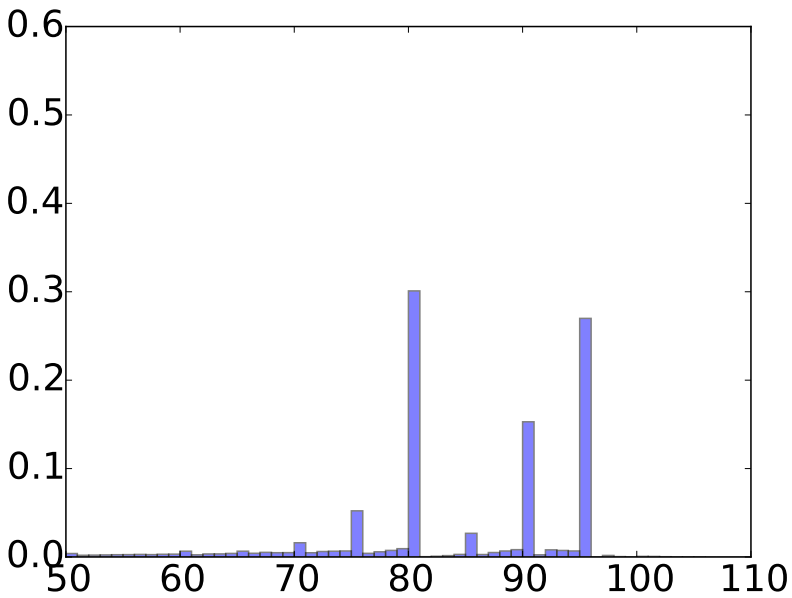
(a) CLTV Histogram: 2014 Q3



(b) PTI Histogram: 2014 Q3

LTV and PTI in the Data

- PTI constraint: payment cannot exceed fraction of income.
  - Key property: moves with interest rates (elasticity $\simeq 10$)
  - Data consistent with some PTI constrained + search frictions.



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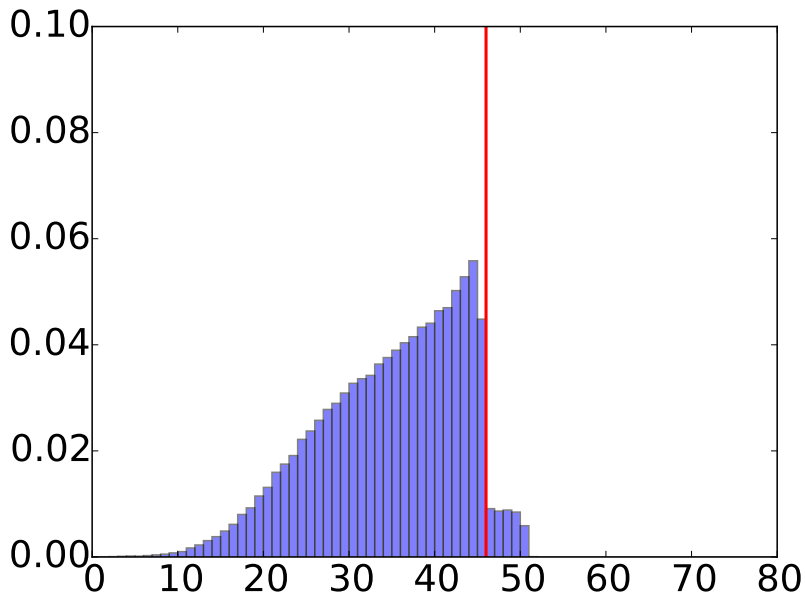
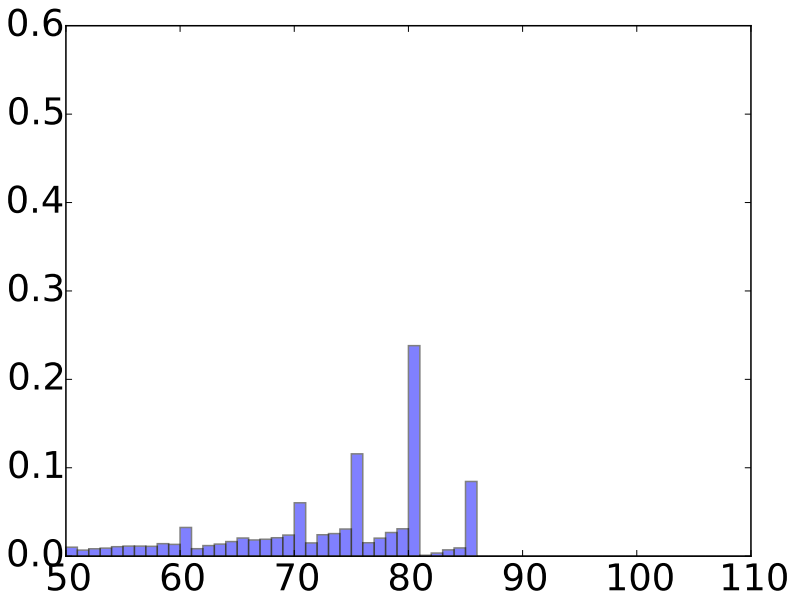


(b) PTI Histogram: 2014 Q3

LTV and PTI in the Data

- PTI bunching larger in cash-out refinances, where no housing search occurs.
  - But majority of borrowers probably not PTI constrained.



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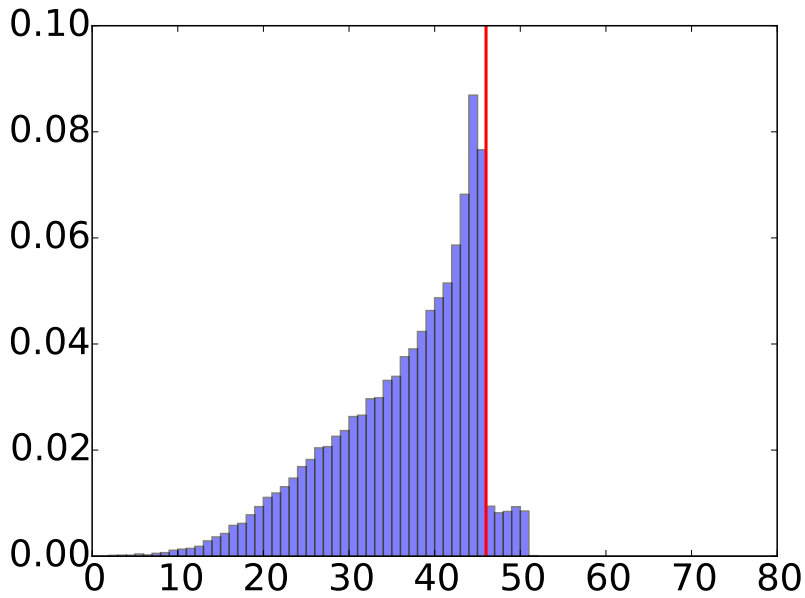
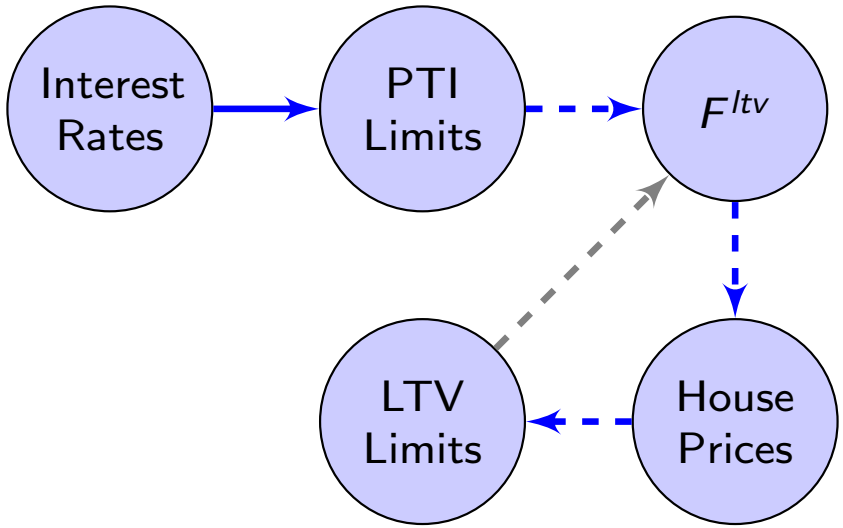


(b) PTI Histogram: 2014 Q3

Constraint Switching Effect

- General model includes population heterogeneity.
  - Fraction of LTV-constrained borrowers (F^{ltv}) depends on macro state.
  - LTV-constrained value housing more, willing to pay premium.
- When rates fall, PTI limits loosen.
  - Borrowers switch from PTI-constrained to LTV-constrained, increasing F^{ltv}.
  - House prices rise, also loosening LTV limits.

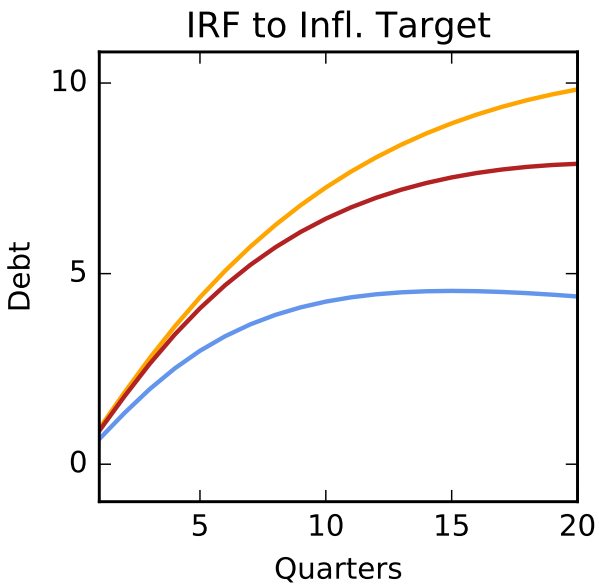


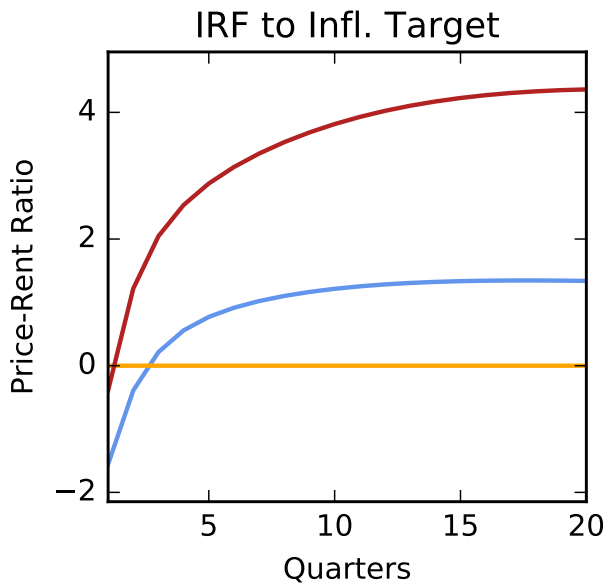
Comparison of Models

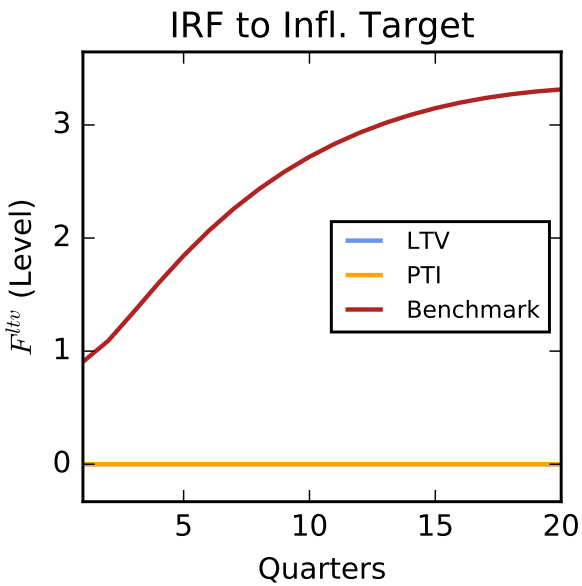
- **Main Result #1:** Strong transmission from interest rates into debt, house prices, economic activity.
- **Experiment:** consider economies that differ by credit limit and compare response to interest rate movements:
  1. **LTV Economy**: LTV constraint only.
  2. **PTI Economy**: PTI constraint only.
  3. **Benchmark Economy**: Both constraints, applied borrower by borrower.
- **Computation:** Linearize model to obtain impulse responses.

Constraint Switching Effect (Inflation Target Shock)

- Response to near-permanent -1% (annualized) fall in nominal rates.



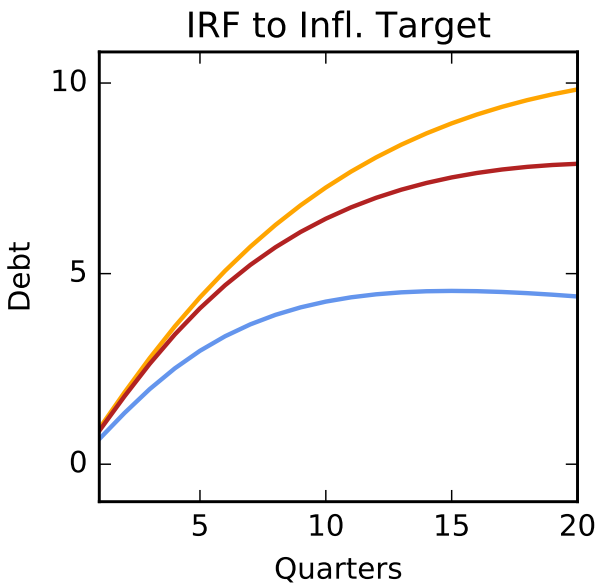


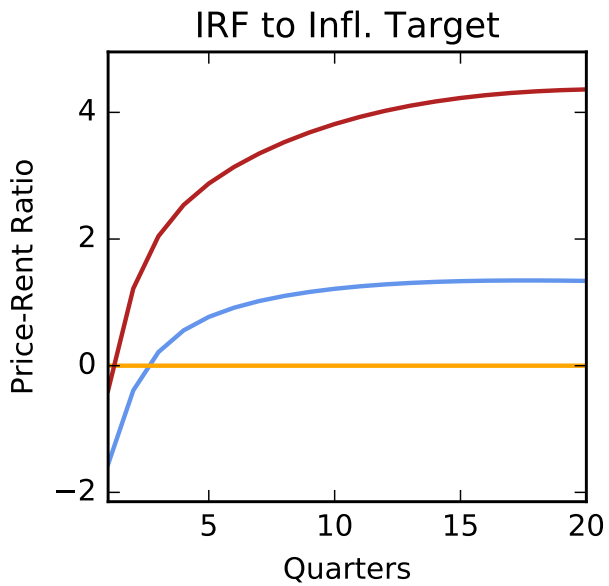


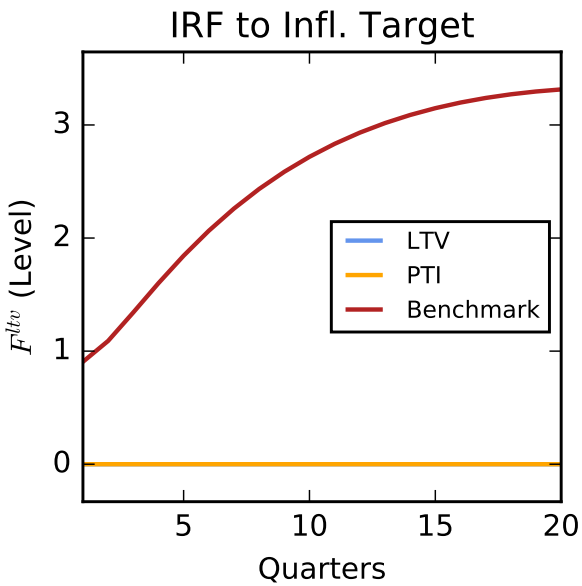
▸ Exog. Prepay Version ▸ TFP IRFs ▸ Credit Standards IRFs ▸ 43% PTI

Constraint Switching Effect (Inflation Target Shock)

- Debt response of Benchmark Economy closer to PTI Economy even though most borrowers constrained by LTV ($\sim$ 75% in steady state).







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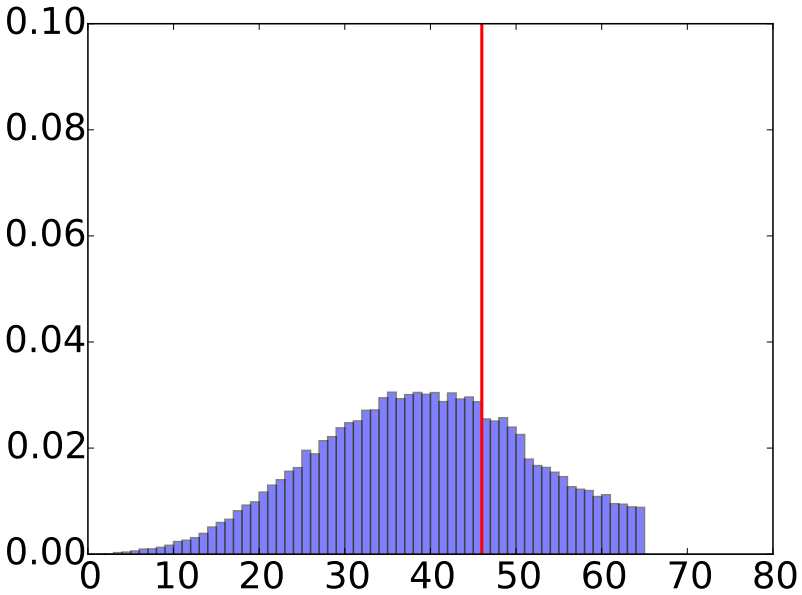
Credit Standards and the Boom-Bust

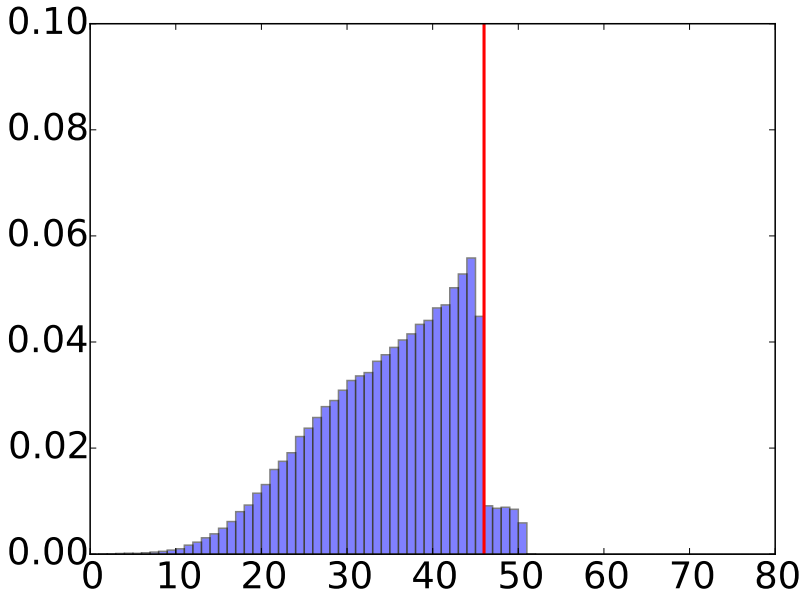
- **Main Result #2:** PTI liberalization essential to the boom-bust.
  - So far, have been treating maximum LTV and PTI ratios as fixed, but credit standards can change.
  - Fannie/Freddie origination data: substantial increase in PTI ratios in boom.
- **Experiment**: unexpectedly change parameters, unexpectedly return to baseline 32Q later.
  1. **PTI Liberalization**: max PTI ratio from 36% $\rightarrow$ 54%.
  2. **LTV Liberalization**: max LTV ratio from 85% $\rightarrow$ 99%.
- **Computation:** nonlinear transition paths.

Credit Standards and the Boom-Bust

- Fannie Mae data: PTI constraints appear to bind after bust but not during boom.



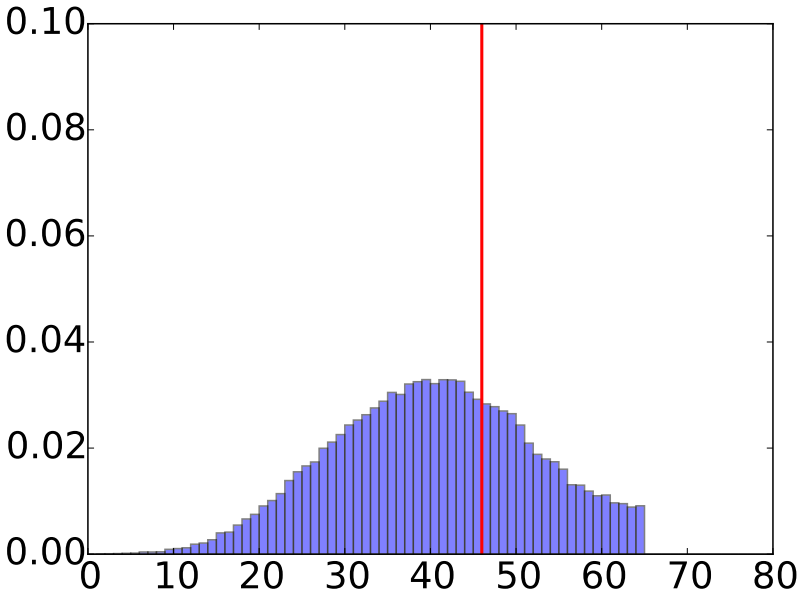
(a) PTI Histogram: 2006 Q1



(b) PTI Histogram: 2014 Q3

Credit Standards and the Boom-Bust

- Cash-out refi plots even more striking.



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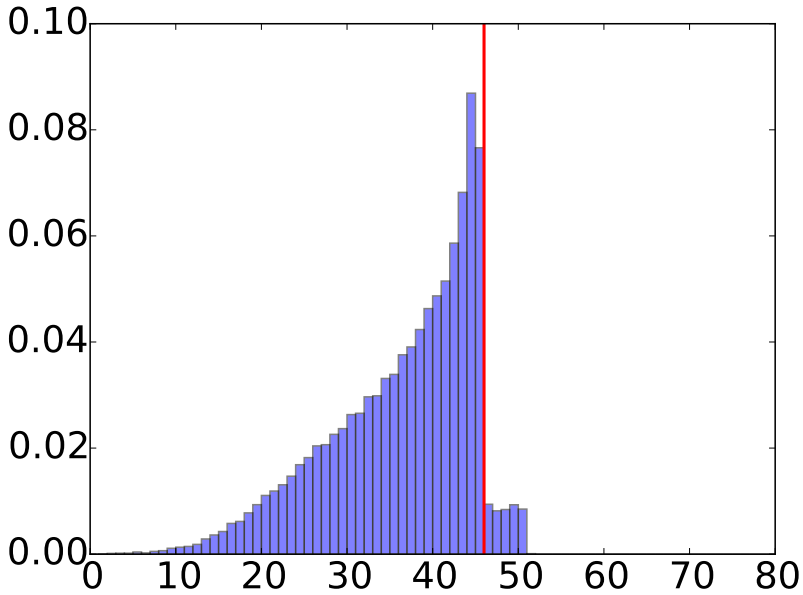

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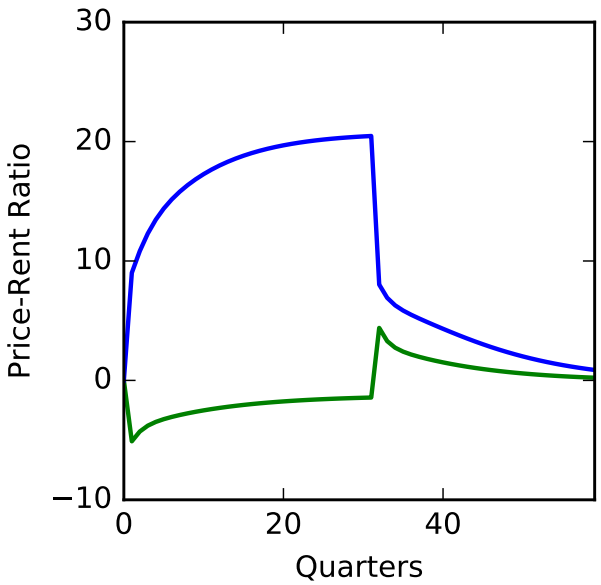
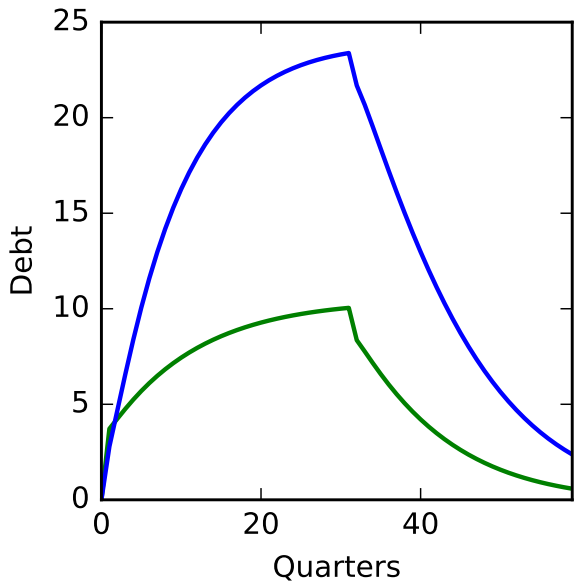
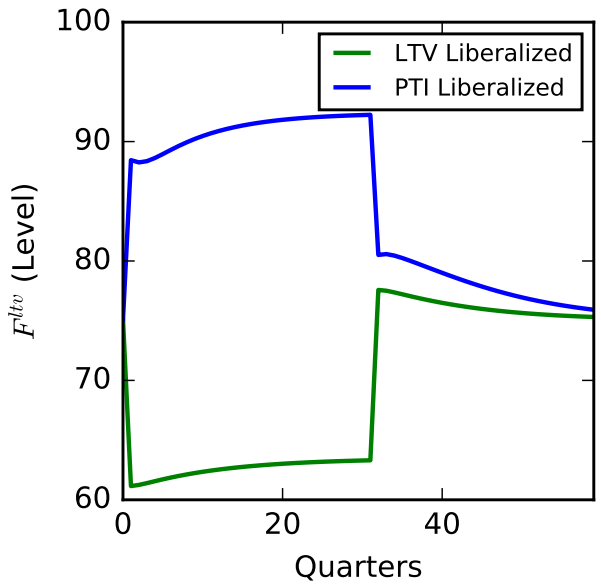
Credit Liberalization Experiment

- **LTV Liberalization** generates small rise in debt-to-household income (19%). House prices, price-rent ratios fall (-2%).



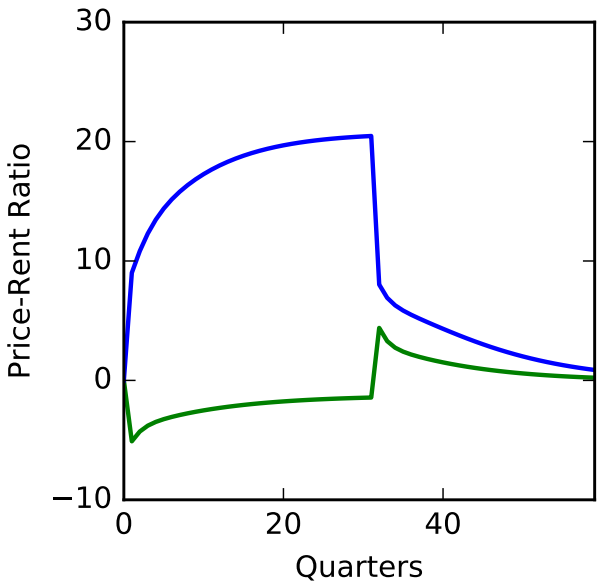


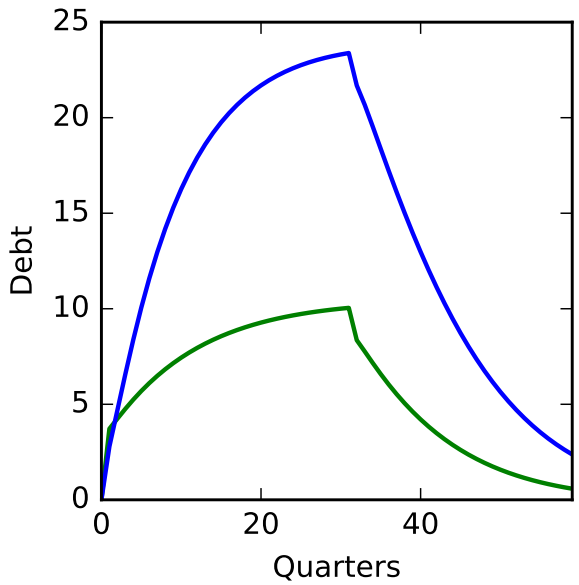


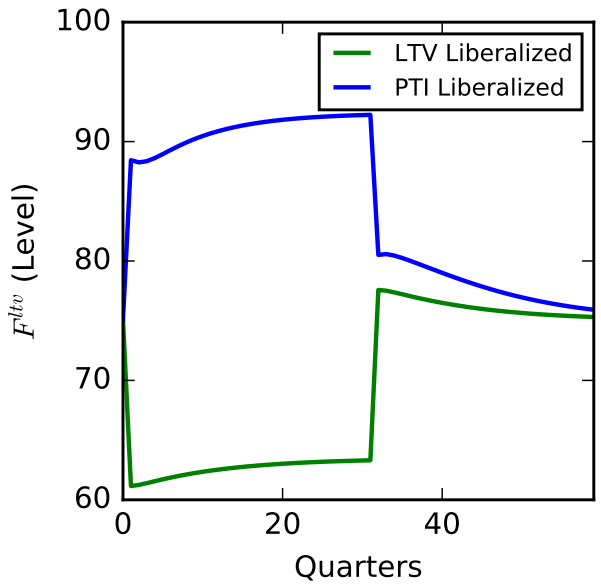
▸ Data ▸ More Series ▸ LTV Intuition ▸ PTI Intuition ▸ Preference Shocks

Credit Liberalization Experiment

- **PTI Liberalization** generates large boom in house prices, price-rent ratios (38%), debt-household income (47%).



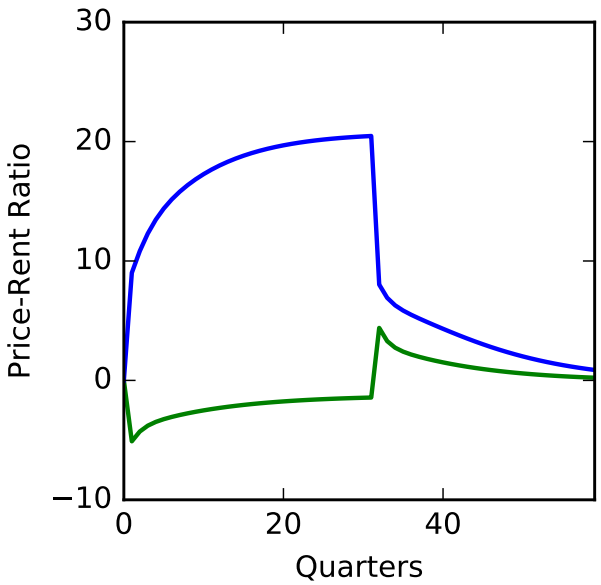


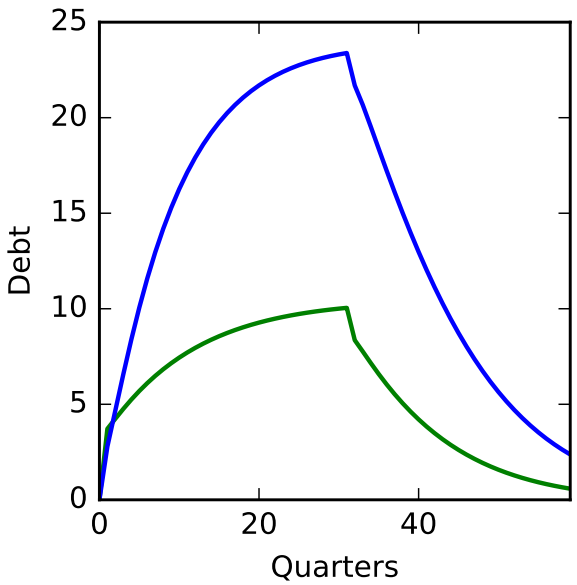


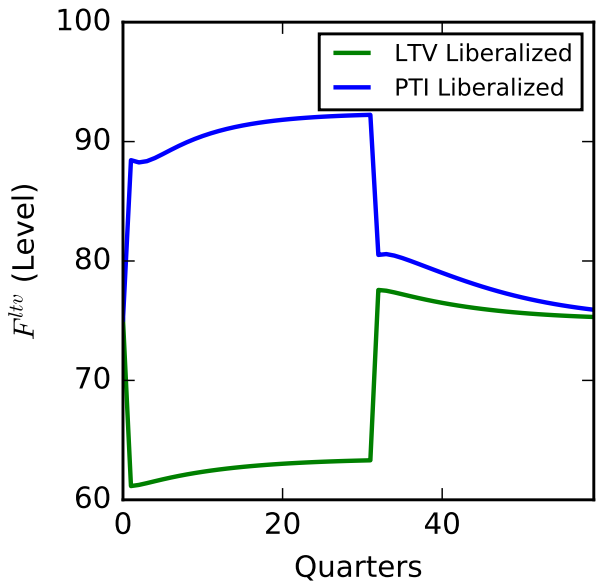
▸ Data ▸ More Series ▸ LTV Intuition ▸ PTI Intuition ▸ Preference Shocks

Credit Liberalization Experiment

- Macroprudential policy: cap on PTI ratios more effective at limiting boom-bust cycles.







▸ Data ▸ More Series ▸ LTV Intuition ▸ PTI Intuition ▸ Preference Shocks

Conclusion

- Macro model with two novel features:
  - Payment-to-income constraint.
  - Endogenous prepayment of long-term debt.
- Novel transmission channel from interest rates into credit, house prices, economic activity.
  - Credit, house prices through constraint switching effect.
  - Amplification into output through endogenous prepayment (see paper).
  - Monetary policy more effective, but may pose tradeoff (see paper).
- PTI liberalization appears essential to boom-bust.
  - Cap on PTI ratios, not LTV ratios more effective macroprudential policy.

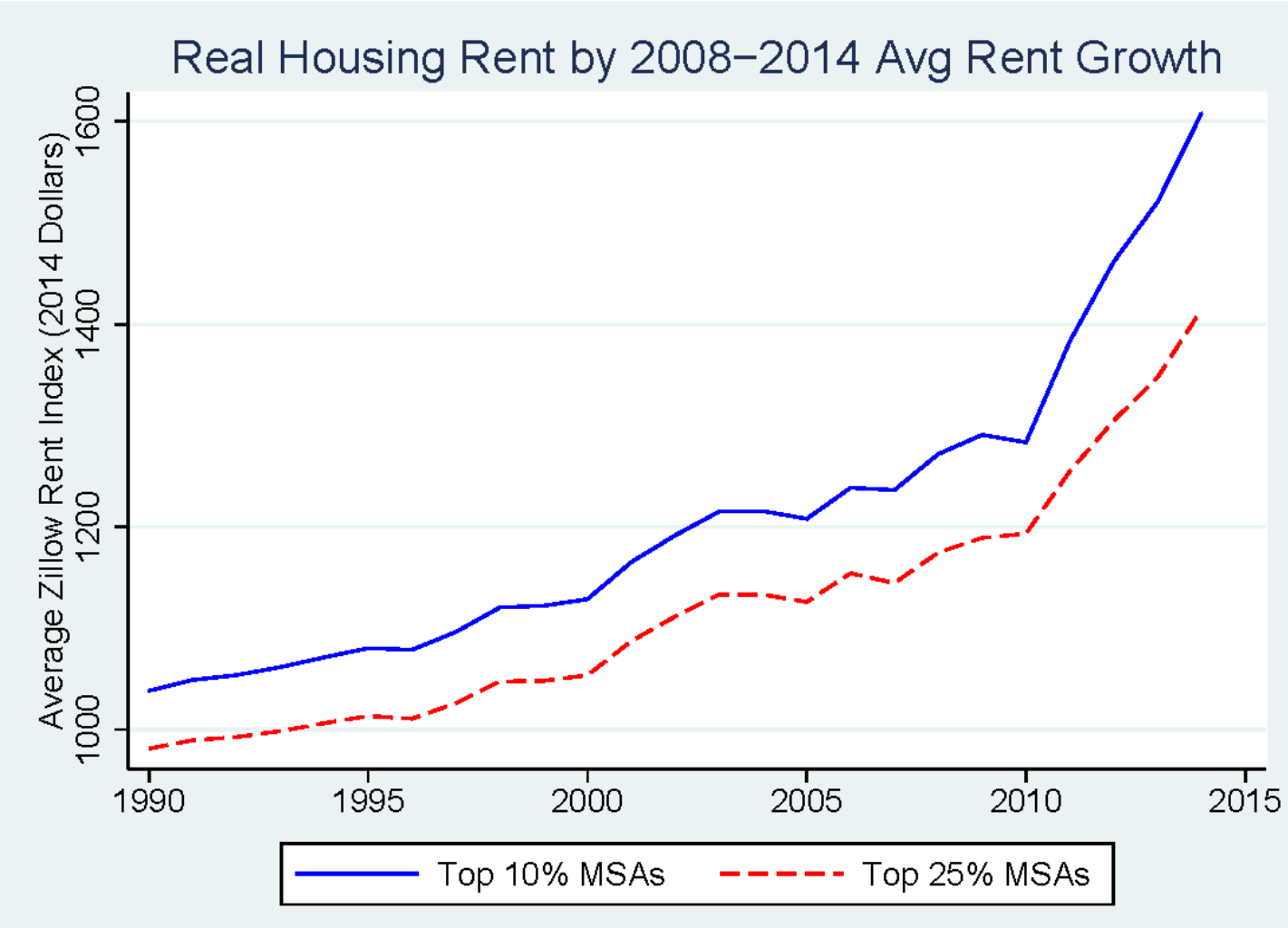
Systemic Banks, Mortgage Supply and Housing Rents

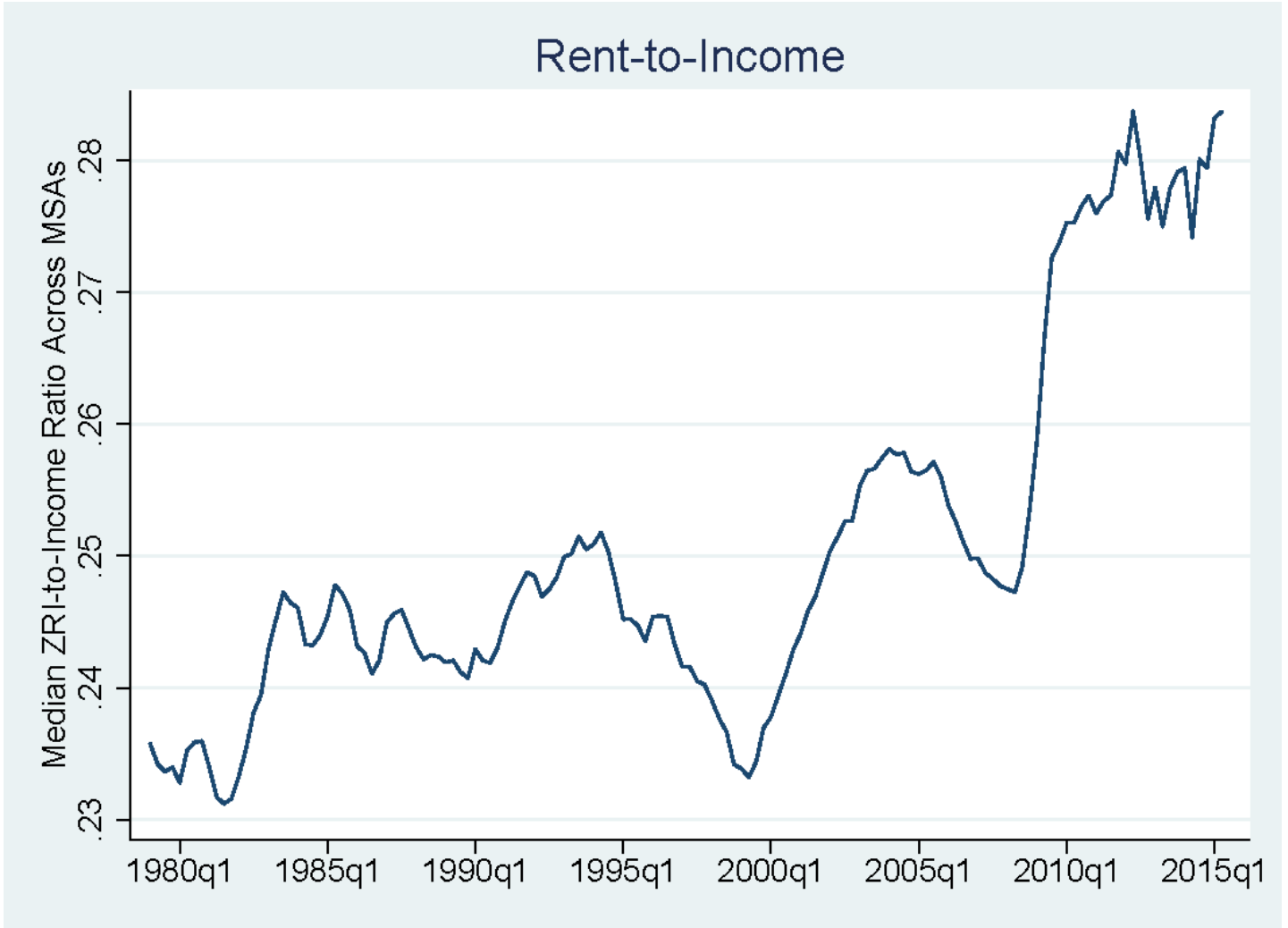
Pedro Gete and Michael Reher

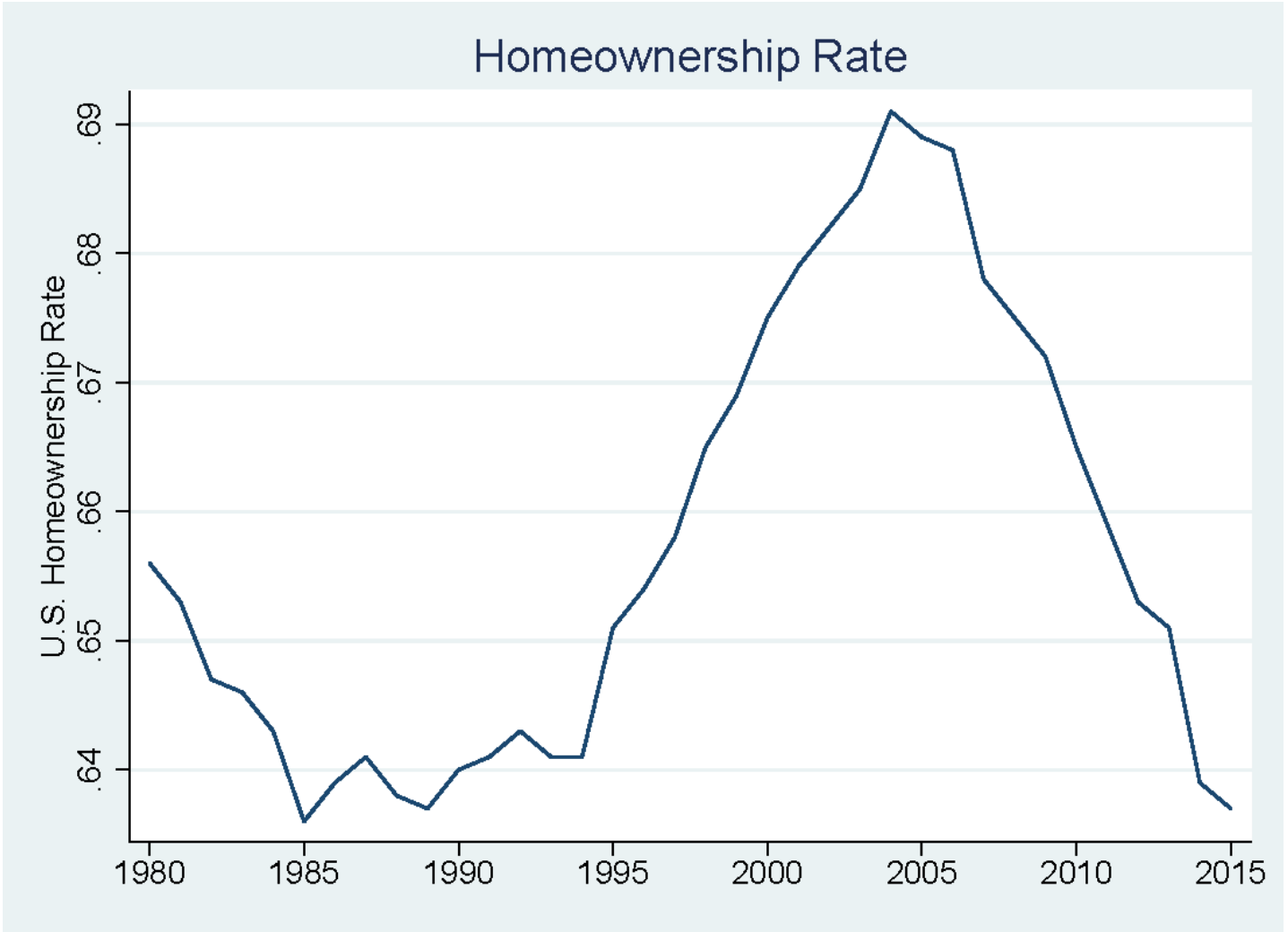
Georgetown & Harvard

September 2016

Motivation


Real Housing Rent by 2008−2014 Avg Rent Growth
Average Zillow Rent Index (2014 Dollars)
1000
1200
1400
1600
1990
1995
2000
2005
2010
2015
Top 10% MSAs
Top 25% MSAs


Rent-to-Income
Median ZRI-to-Income Ratio Across MSAs
.23
.24
.25
.26
.27
.28
1980q1
1985q1
1990q1
1995q1
2000q1
2005q1
2010q1
2015q1


Homeownership Rate
U.S. Homeownership Rate
.64
.65
.66
.67
.68
.69
1980
1985
1990
1995
2000
2005
2010
2015

What drives recent housing rents and HOR dynamics?

- Tight credit supply (among other factors)
- A 1pp increase in mortgage denials leads to...
  - $\simeq$2.3% increase in housing rents
  - $\simeq$2.4pp reduction in a city's homeownership
  - $\simeq$40% increase in multifamily building permits

What drives recent housing rents and HOR dynamics?

- Stress-testing since 2011 discourages risk-taking
  - SIFIs: BofA, Citi, JPM-Chase, Wells Fargo
- Department of Justice invoking the False Claims Act since 2011
  - Big-4 banks (plus Ally) paid $25 billion in 2012
  - In addition, each of the Big-4 also faced other settlements:
    from $82 million for Wells Fargo in 2015 to $16.65 billion for Bank of America in 2014

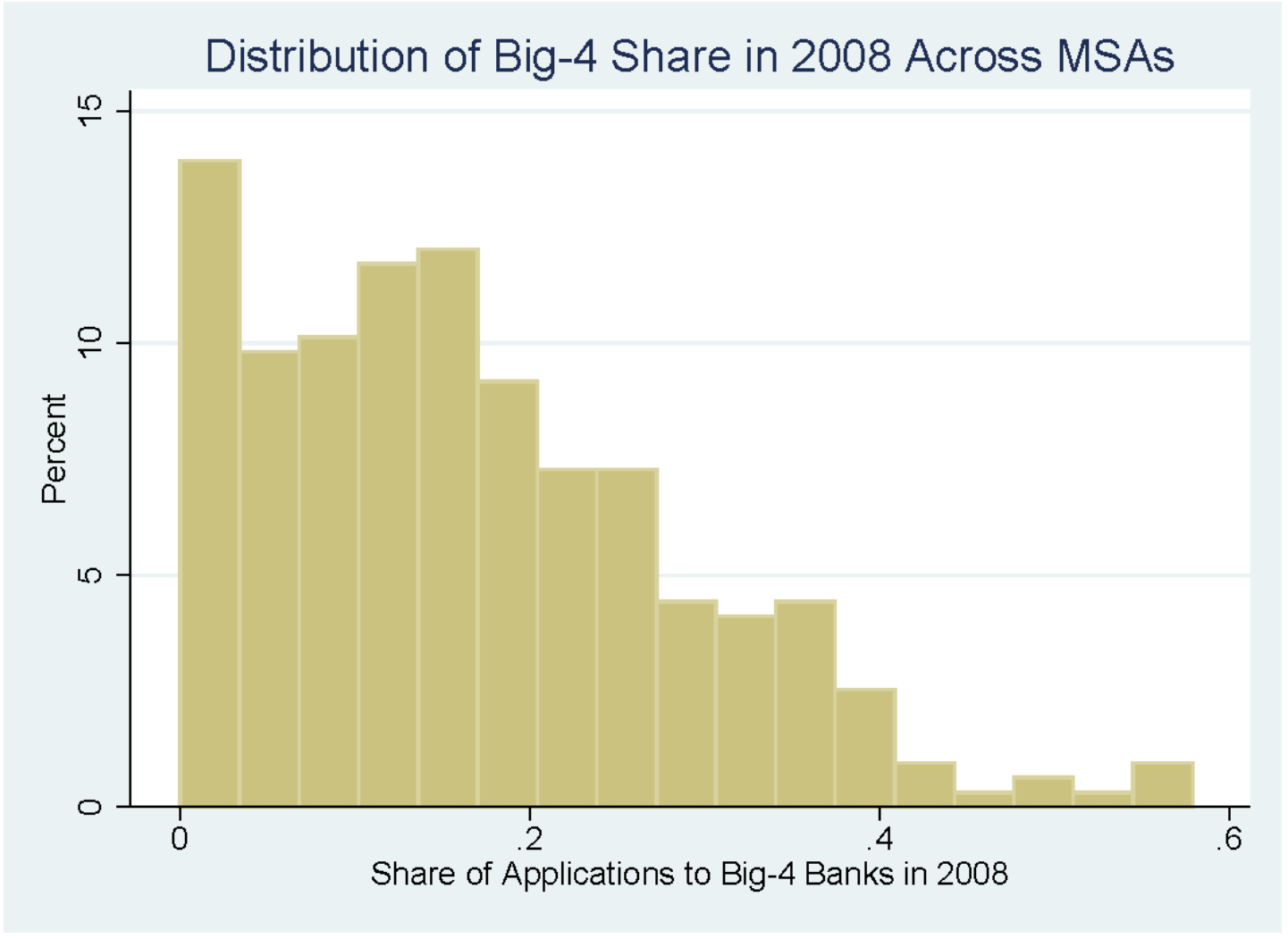
- “If you guys want to stick with this programme of ‘*putting back*’ any time, any way, whatever, that’s fine, we’re just not going to make those loans and there’s going to be a whole bunch of Americans that are underserved in the mortgage market.”

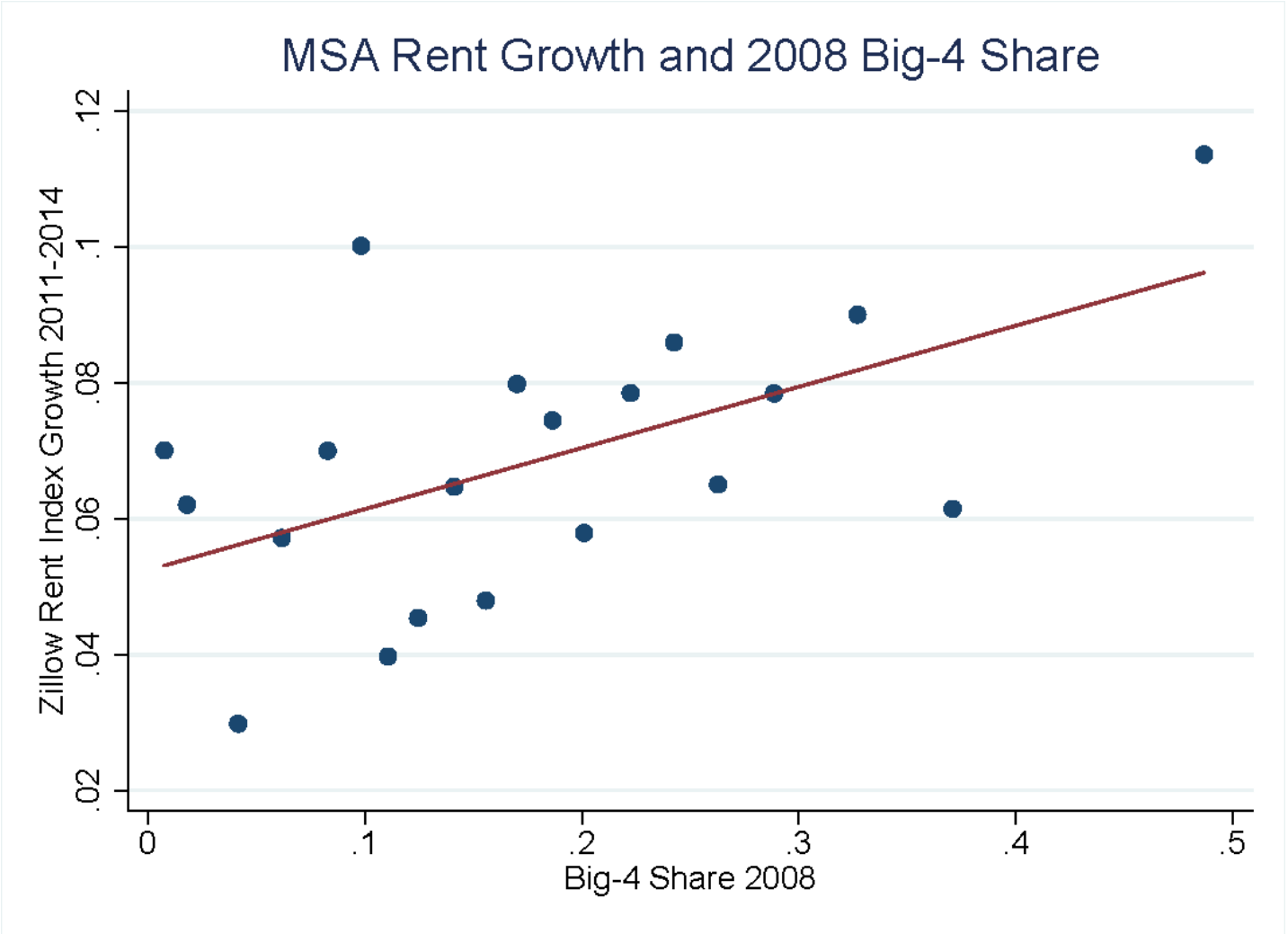
  Wells Fargo’s CEO (August 2014, Financial Times)

- Similar remarks by JP Morgan’s CEO

Our theory

- Tight credit supply of Big-4 banks
- More households denied credit
- Frictions to substitute across lenders
- Higher demand for rental housing, supply sluggish
- Higher rents, HOR down, rental vacancies down
- Increase construction of rental housing (multifamily)


Distribution of Big-4 Share in 2008 Across MSAs
Percent
0
5
10
15
0
.2
.4
.6
Share of Applications to Big-4 Banks in 2008



- Each point groups around 15 MSAs

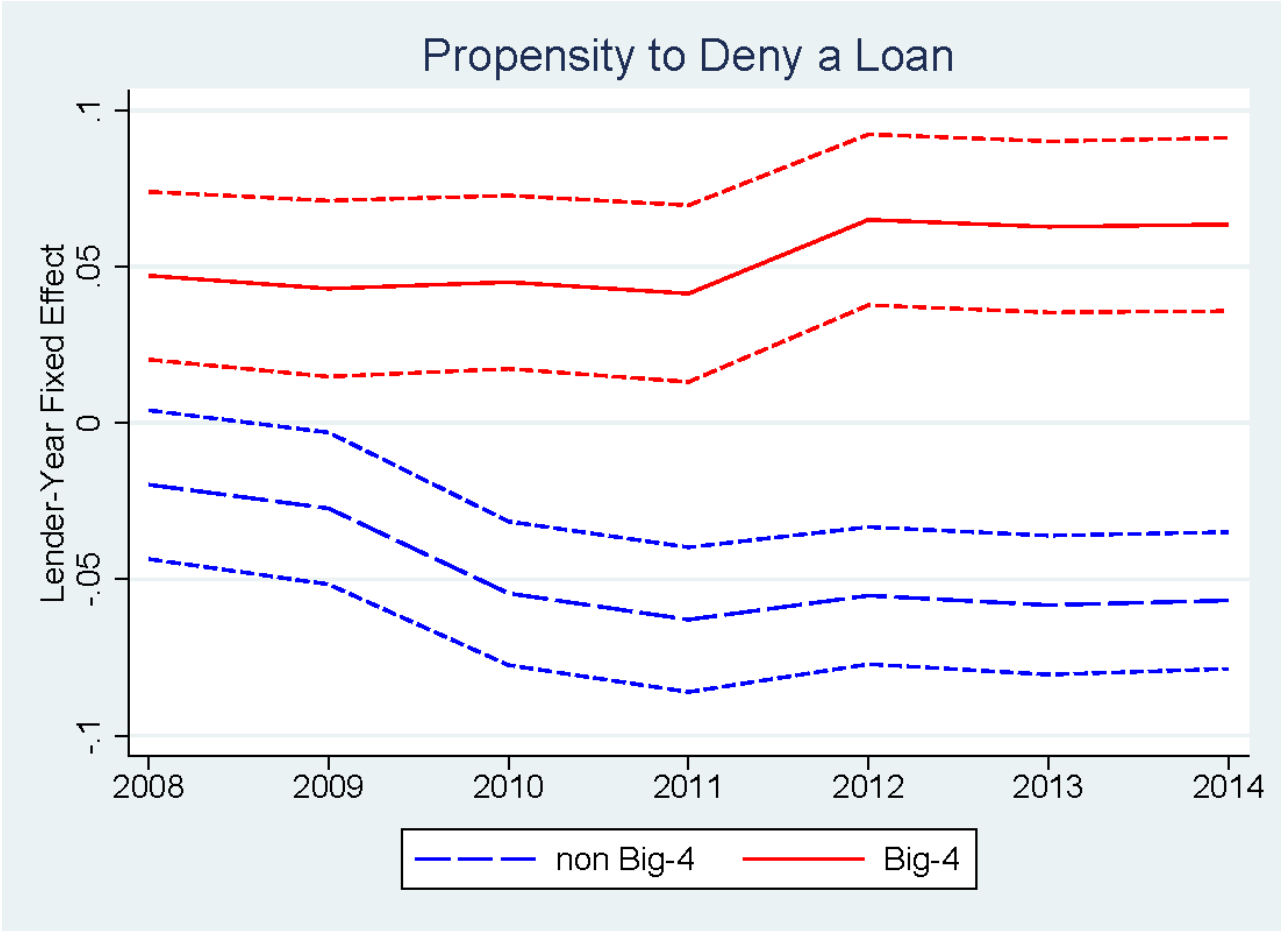
Identification strategy

1. Estimate national propensity to deny mortgage application by Big4 and non-Big4 banks (Khwaja and Mian 2008)

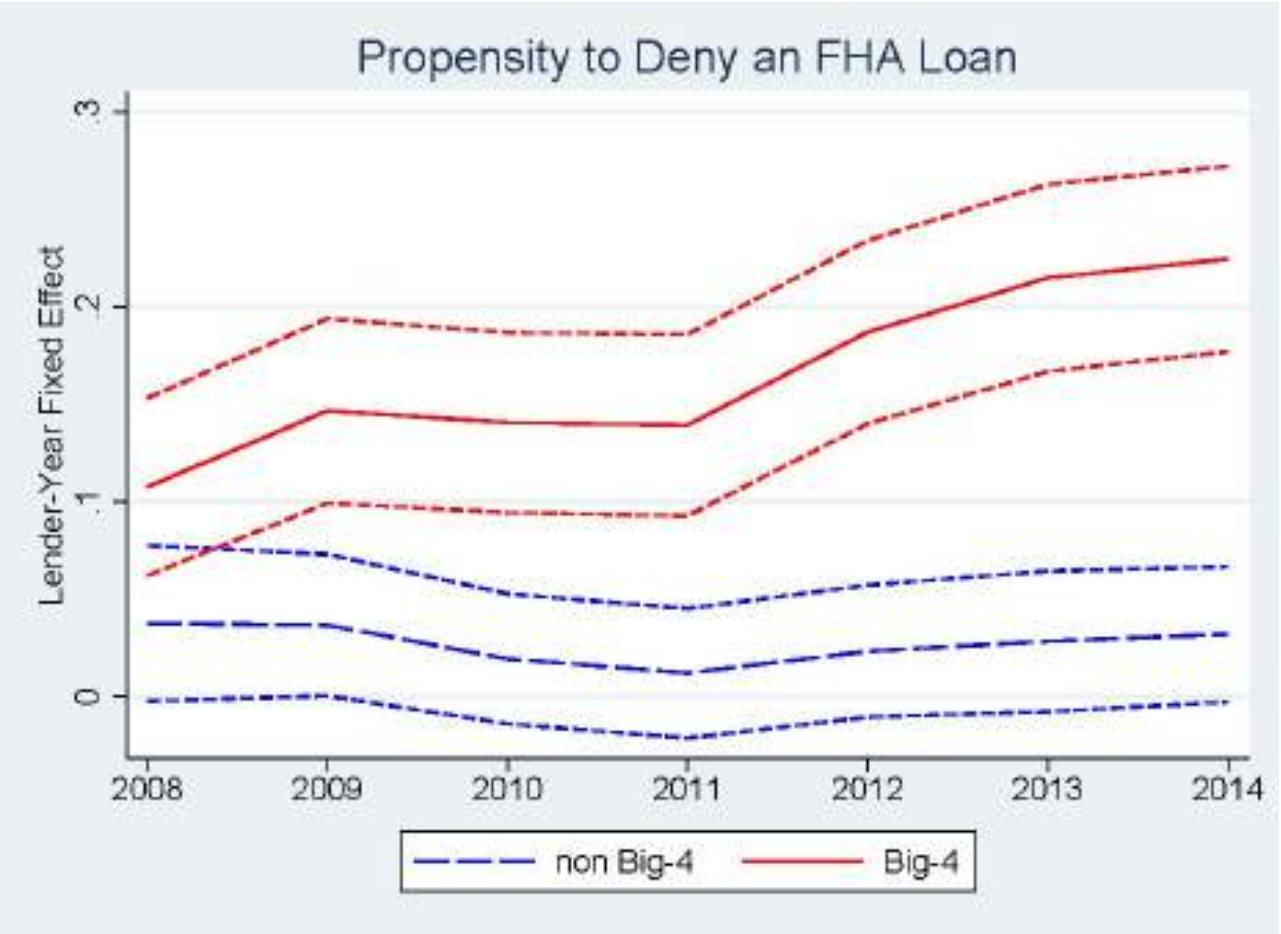
$$\Pr(\text{denial}_{i,l,m,t} = 1) = X_{i,l,m,t}\beta + L_{l,t} + \alpha_{m,t} + \alpha_{m,l}$$

- Control for borrower's characteristics (X_{ilmt}), lender, time, and regional shocks $(\alpha_{m,t},\ \alpha_{m,l})$
- Focus on $L_{l,t}$, a lender-year fixed effect (propensity to deny loan)

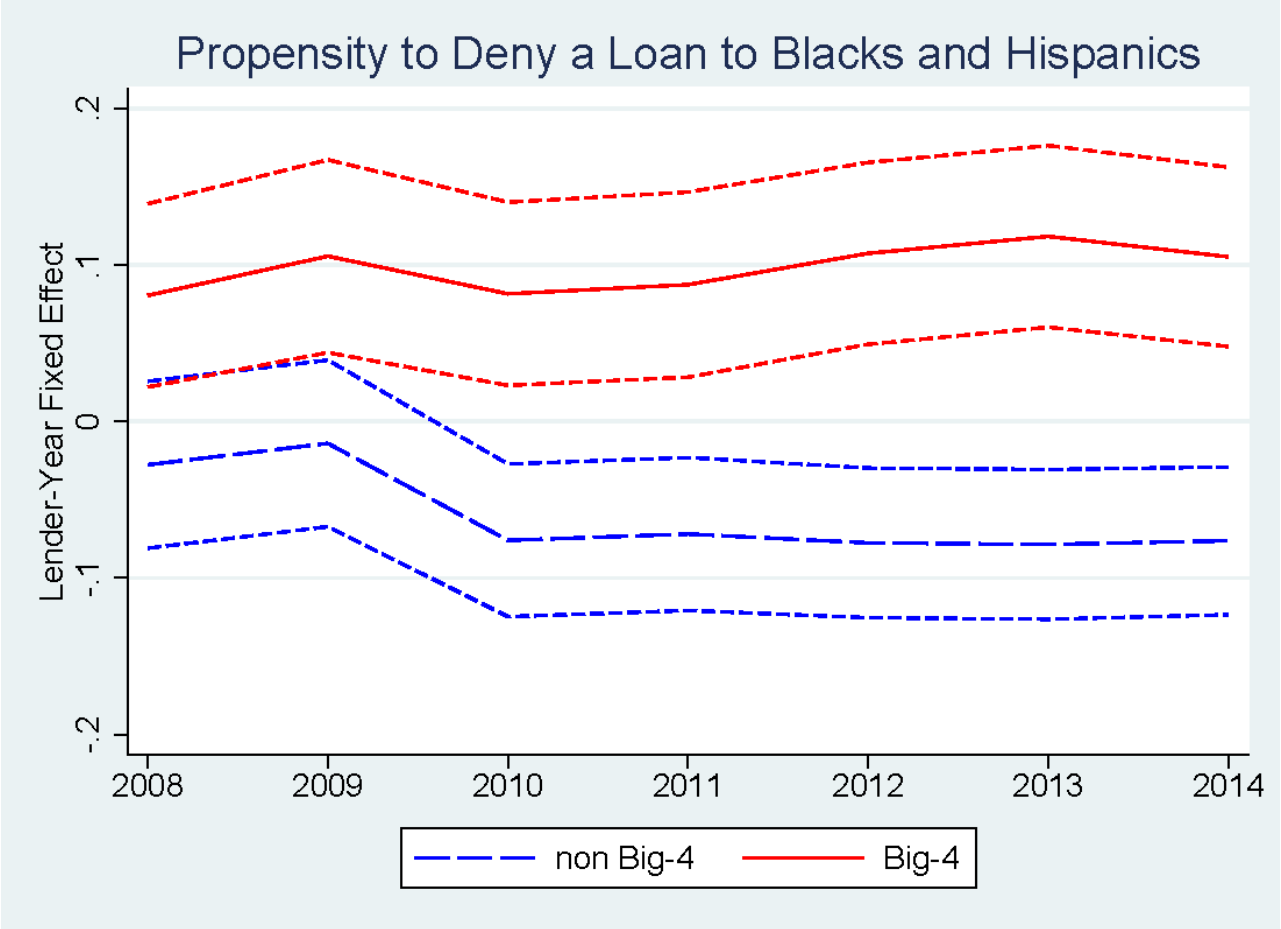
Big4 deny relatively more mortgages, especially after 2011



More denials among FHA loans



More denials among Black and Hispanics loans



Create credit shock à la Bartik

- Wedge between lenders' national propensity to deny weighted by market share :

$$V_{m,t} = \left(L_{t,\text{Big4}} - L_{t,\sim\text{Big4}}\right) \cdot share2008_m$$

- We control for other factors driving rents (population, income, MSA's age, lagged rents, unemployment, past foreclosures...)

Use Bartik shock as IV for denial rates

Stage 1:

$$\Delta \text{Denial Rate}_{m,t} = V_{m,t-1}\delta + \Delta X_{m,t}\eta + \lambda_m + \lambda_t + \nu_{mt},$$

Stage 2:

$$\Delta \log(\text{Rent})_{m,t} = \overline{\Delta \text{Denial Rate}_{m,t}}\beta + \Delta X_{m,t}\gamma + \alpha_m + \alpha_t + u_{mt}$$

IV Estimation (Stage 2)

Table: Denial Rates and Rent Growth based on IV Estimation (Stage 2).

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
ΔDenial Rate$_{m,t}$	2.342^{***}	2.329^{**}
	(0.845)	(0.940)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
# Observations	1380	1380

Table: Denial Rates and Homeownership Rate based on IV Estimation

Outcome:	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$
ΔDenial Rate$_{m,t}$	-2.014*	-2.367**
	(1.128)	(0.933)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
# Observations	358	358

Table: Denial Rates and Rental Vacancies Based on IV Estimation

Outcome:	ΔVacancy Rate$_{m,t}$	ΔVacancy Rate$_{m,t}$
ΔDenial Rate$_{m,t}$	-1.256	-2.501
	(1.399)	(2.051)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
# Observations	348	348

Table: Denial Rates and New Building Permits Based on IV Estimation

Outcome:	$\Delta\log(\text{Multi Unit})_{m,t}$	$\Delta\log(\text{Multi Unit})_{m,t}$
$\Delta\text{Denial Rate}_{m,t}$	41.671***	49.529***
	(15.264)	(9.546)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
# Observations	1223	1223

Frictions to substitute among lenders

1. Internet accessibility (use of online lenders):
   - # inhabitants over 50yrs old to inhabitants 25-49
   - Forbes.com rank of internet accessibility
2. Competition among credit suppliers:
   - States with tighter requirements to license brokers
   - Herfindahl index among non Big-4 lenders

Table: Credit Shock and Homeownership Rate by Internet Access

Outcome:	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$
$V_{m,t-1}$	-1.620***	-0.293	-1.336***	0.238
	(0.220)	(0.279)	(0.359)	(0.152)
$V_{m,t-1} \times \text{Older}_m$	-0.510***		-0.509***	
	(0.168)		(0.173)	
$V_{m,t-1} \times \text{LowInternet}_m$		-0.941***		-1.136***
		(0.360)		(0.307)
$V_{m,t-1} \times \text{WRLURI}_m$			-0.398	-0.538*
			(0.309)	(0.281)
MSA-Year Controls	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-Squared	0.084	0.085	0.086	0.087
# Observations	358	358	358	358

Table: Credit Shock and Homeownership Rate by Broker and Lender Competition

Outcome:	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$	$\Delta HR_{m,t}$
$V_{m,t-1}$	-0.791***	-3.378***	-0.329	-3.057***
	(0.248)	(1.027)	(0.527)	(0.976)
$V_{m,t-1} \times License_m$	-0.223		-0.381	
	(0.208)		(0.318)	
$V_{m,t-1} \times HHI_m$		-2.583**		-2.769**
		(1.135)		(1.176)
$V_{m,t-1} \times WRLURI_m$			-0.438	-0.690**
			(0.341)	(0.339)
MSA-Year Controls	Yes	Yes	Yes	Yes
MSA FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
R-Squared	0.082	0.107	0.084	0.111
# Observations	358	358	358	358

Conclusions

- SIFI banks contracted credit supply
- Effects on rents, HOR, vacancies
- Effects to weaken as frictions to switch to new lenders are overcome
- Once new buildings are complete, rent growth should slow

Appendix

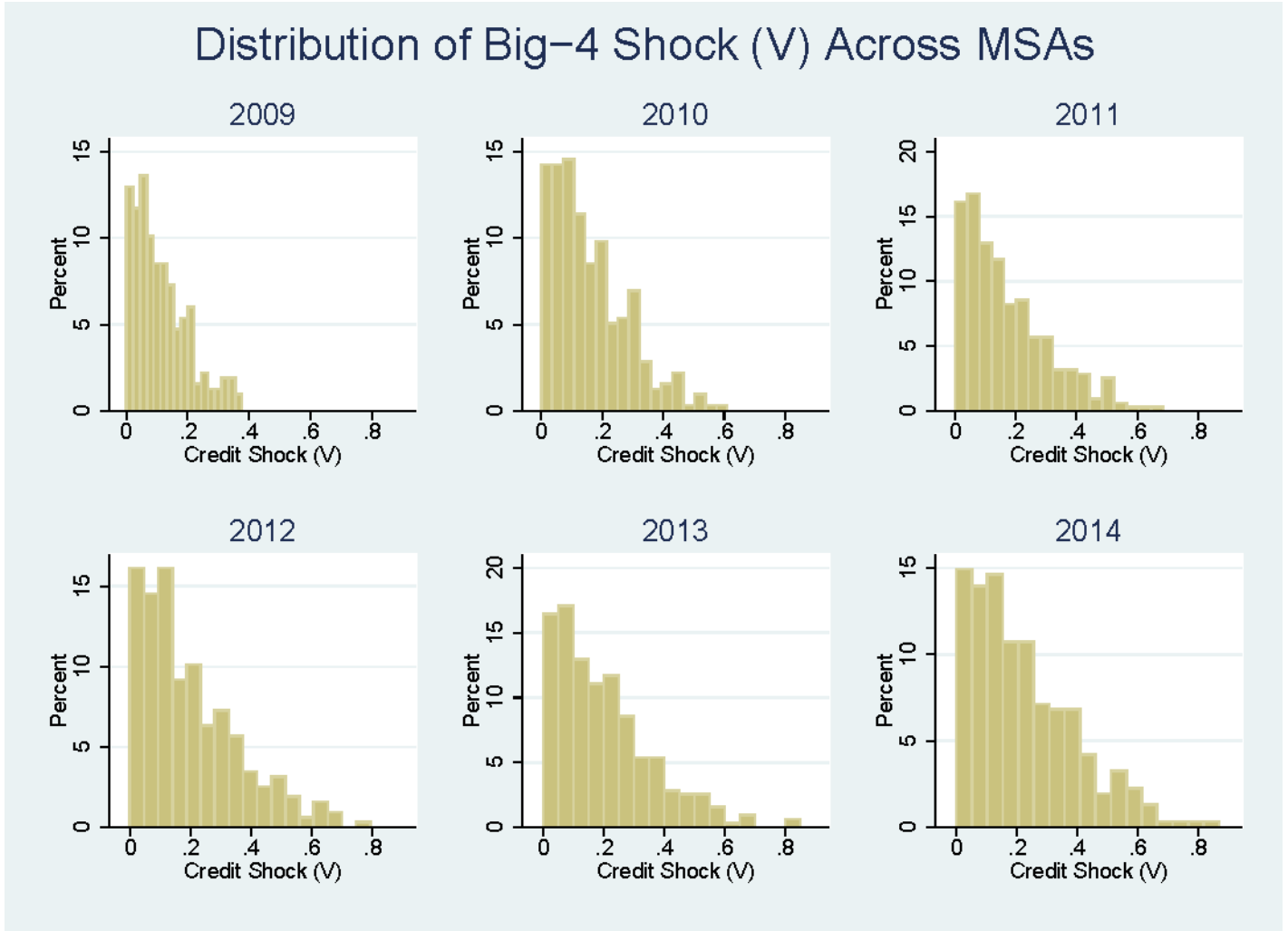
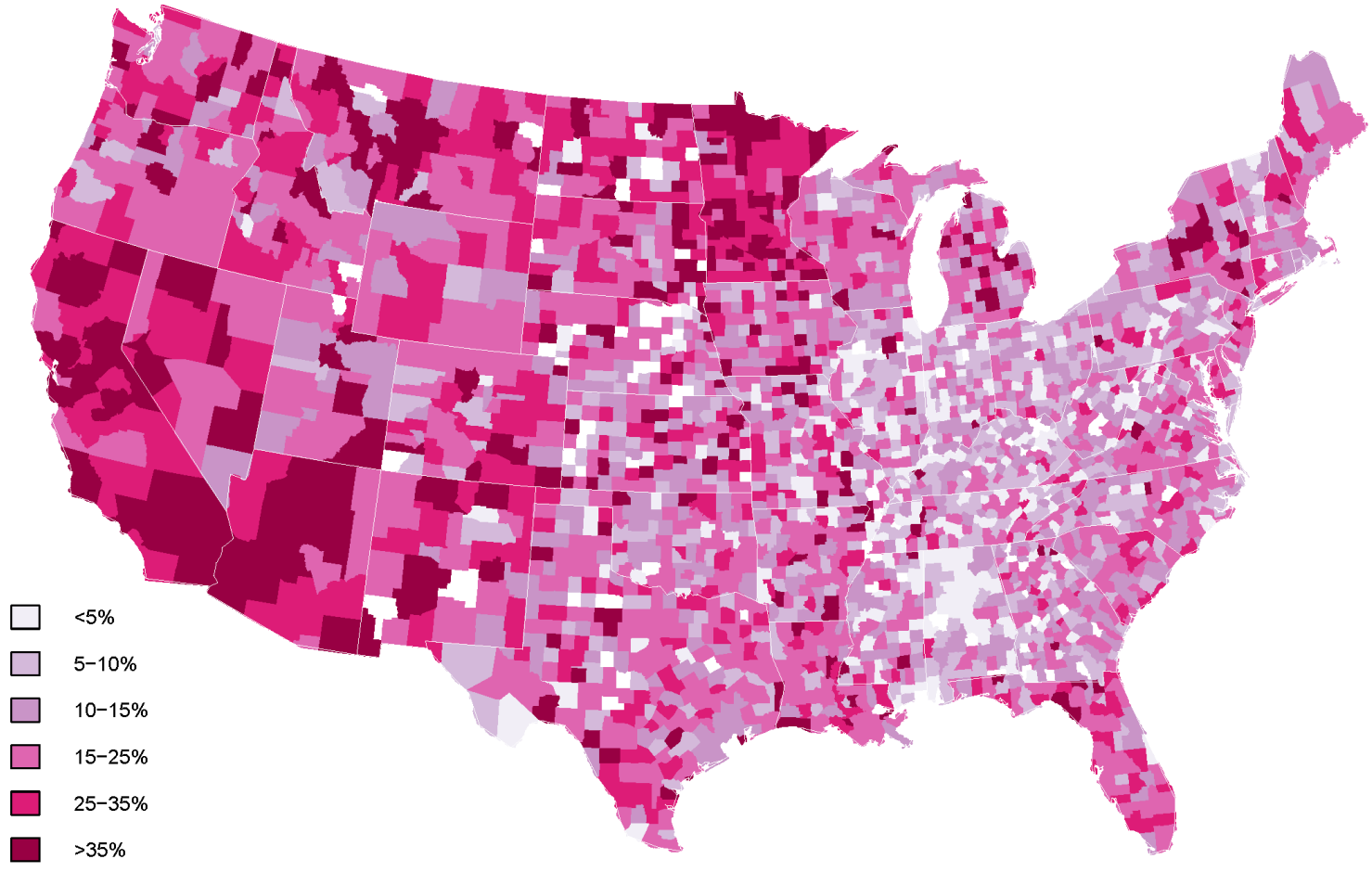

Distribution of Big−4 Shock (V) Across MSAs
2009
2010
2011
2012
2013
2014
Percent
Credit Shock (V)
0
.2
.4
.6
.8
5
10
15
20

Table: Determinants of Big-4 Share in 2008.

Outcome:	$\text{Share}_{m,08}$
ΔUnempl $\text{Rate}_{m,07\text{-}08}$	1.845***
	(0.510)
$\Delta \log(\text{Rent})_{m,00\text{-}08}$	1.116***
	(0.393)
$\Delta \log(\text{Income})_{m,00\text{-}08}$	-2.283***
	(0.554)
$\Delta \log(\text{Population})_{m,00\text{-}08}$	-0.122**
	(0.055)
$\Delta \log(\text{Age})_{m,00\text{-}08}$	-3.200***
	(1.023)
ΔUnempl $\text{Rate}_{m,00\text{-}08}$	-14.404***
	(2.849)
Big-4 Headquarter_{m}	0.118***
	(0.020)
R-squared	0.302
Number of Observations	299

Geography of Big-4 market share



Bartik type regression

$$\Delta \log(\text{Rent})_{m,t} = V_{m,t-1}\beta + \Delta X_{m,t}\gamma + \alpha_m + \alpha_t + u_{m,t}$$

- $X_{m,t}$ control for: MSA's age, unemployment, income, population, past rents and lags

Table: Credit Shock and Housing Rents in Bartik-type Regressions

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
$V_{m,t-1}$	1.373^{***}	1.373^{***}
	(0.471)	(0.526)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.019	0.108
# Observations	1380	1380

Table: Credit Shock and Homeownership Rate in Bartik-type Regressions

Outcome:	$\Delta \text{HR}_{m,t}$	$\Delta \text{HR}_{m,t}$
$V_{m,t-1}$	-0.983***	-1.003***
	(0.277)	(0.135)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.015	0.082
# Observations	358	358

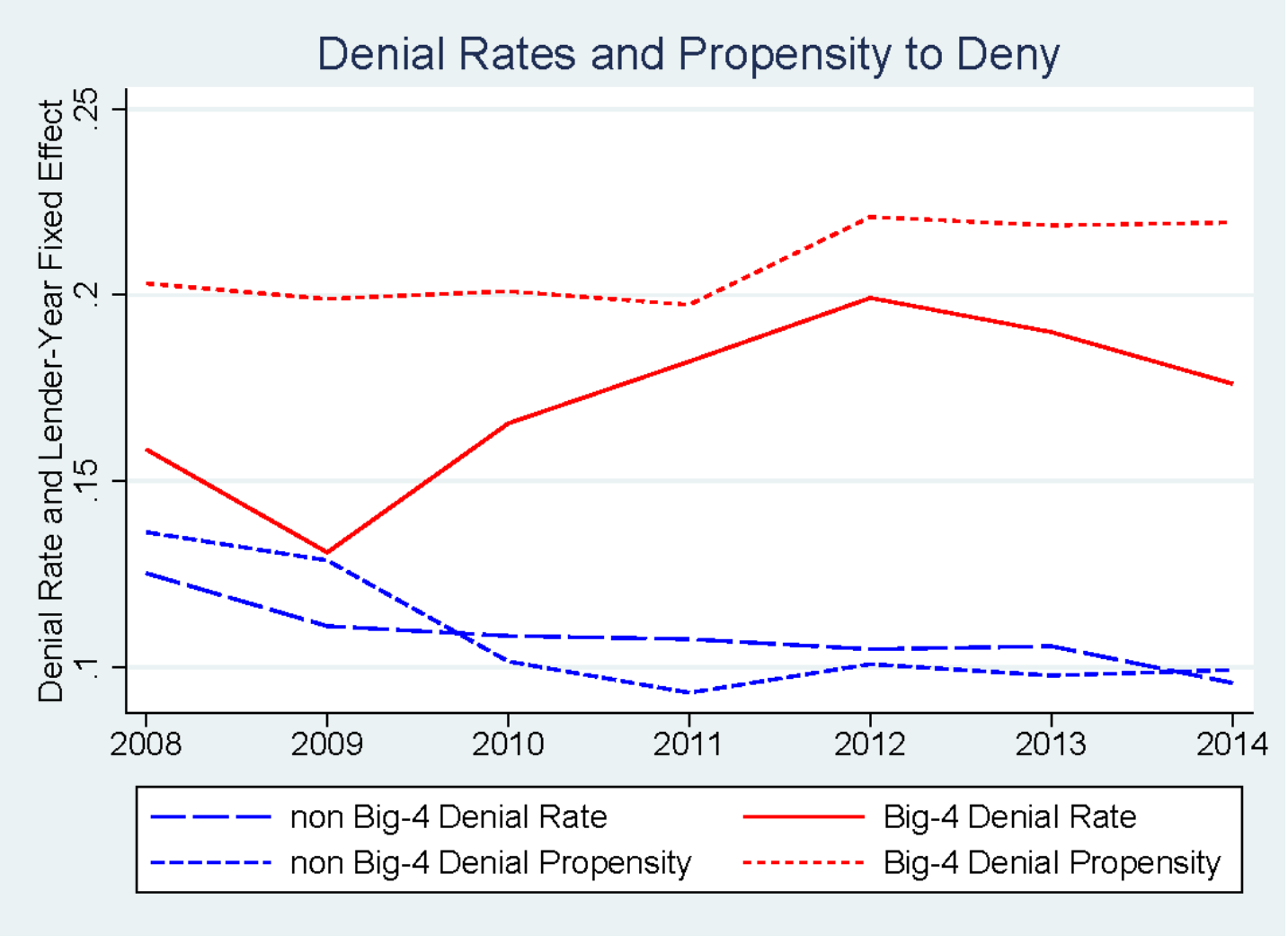
Table: Rental Vacancies and Big-4 Credit Shock in Bartik-type Regressions

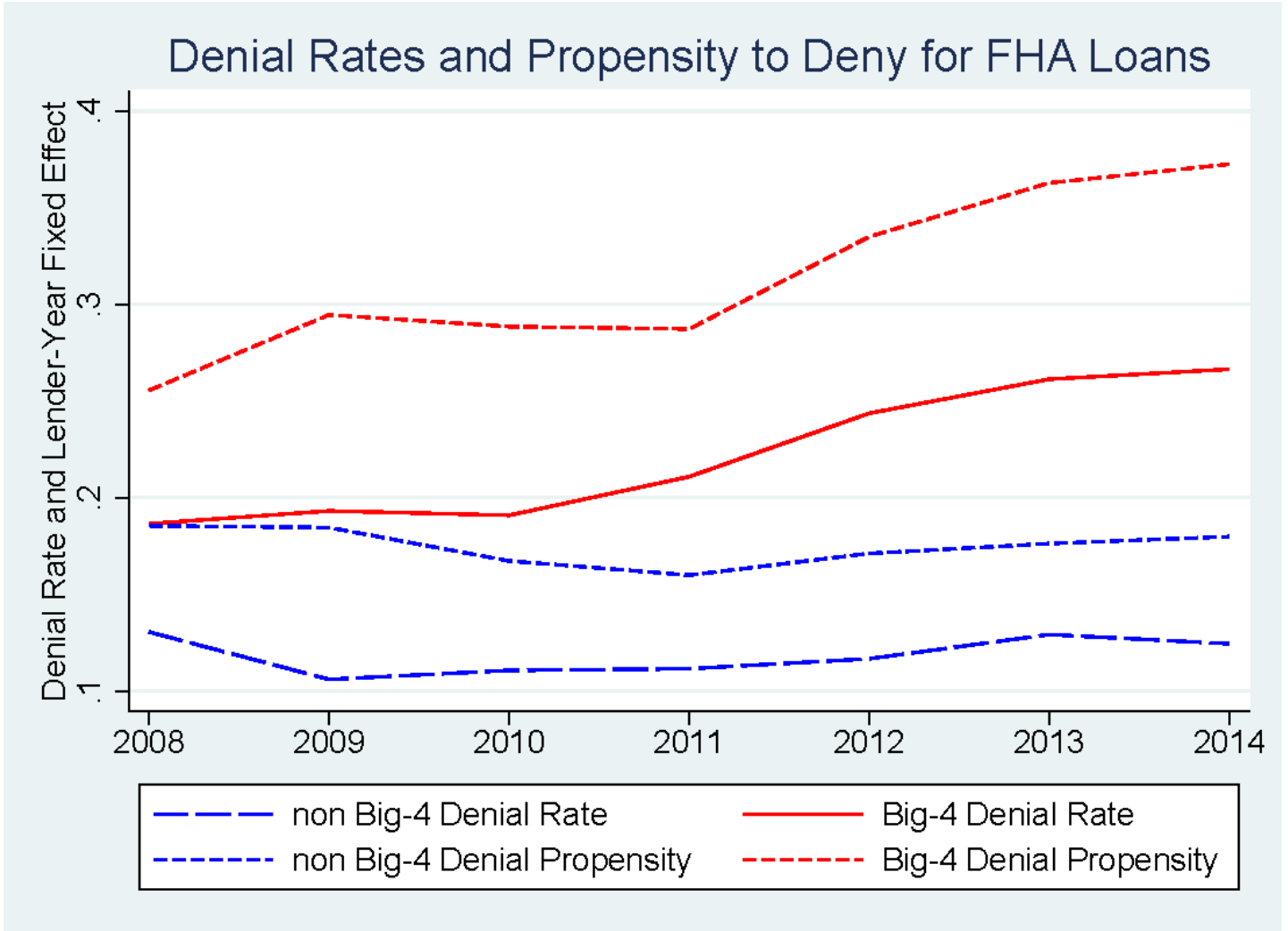
Outcome:	ΔVacancy Rate$_{m,t}$	ΔVacancy Rate$_{m,t}$
$V_{m,t-1}$	-0.593	-0.923*
	(0.641)	(0.523)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.052	0.290
# Observations	348	348

Table: New Building Permits and Big-4 Credit Shock in Bartik-type Regressions

Outcome:	$\Delta\log(\text{Multi Unit})_{m,t}$	$\Delta\log(\text{Multi Unit})_{m,t}$
$V_{m,t-1}$	24.534^{**}	29.796^{***}
	(12.273)	(8.899)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.331	0.430
# Observations	1223	1223

Fly to quality?




Denial Rates and Propensity to Deny for FHA Loans
Denial Rate and Lender-Year Fixed Effect
.1
.2
.3
.4
2008
2009
2010
2011
2012
2013
2014
non Big-4 Denial Rate
Big-4 Denial Rate
non Big-4 Denial Propensity
Big-4 Denial Propensity

IV estimation

- What are effects of higher denial rates on rents, HOR, vacancies, construction?
- Mortgage denial rates are likely endogenous with respect to housing rents:
  - lower rents$\Longrightarrow$
  - $\Longrightarrow$lower-quality borrowers choose to rent
  - $\Longrightarrow$quality of the pool of borrowers improves
  - $\Longrightarrow$ denial rates decrease

- Instrument for denial rate with Bartik shock:
  - Valid instrument? hard to justify that either the systematic tightening of the Big-4's approval standards or the historical presence of the Big-4 in an MSA are endogenous with respect to MSA-level rents.
- We perform robustness checks based on pre-trends and alternate credit shocks

Robustness #1: Idiosyncratic Big-4 Share

- Obtain idiosyncratic part of $share2008_m$

$$s_m = share2008_m - \hat{\beta} X_m$$

  - X_m =set of variables that affect market share and rent dynamics over 2008-2014

- Re-estimate core specifications using a different definition of the $V_{m,t}$ shock:

$$W_{m,t} = \left(L_{t,\text{Big4}} - L_{t,\text{NoBig4}}\right) \cdot s_m.$$

Table: Determinants of Big-4 Share in 2008.

Outcome:	$\text{Share}_{m,08}$
ΔUnempl $\text{Rate}_{m,07\text{-}08}$	1.845***
	(0.510)
$\Delta \log(\text{Rent})_{m,00\text{-}08}$	1.116***
	(0.393)
$\Delta \log(\text{Income})_{m,00\text{-}08}$	-2.283***
	(0.554)
$\Delta \log(\text{Population})_{m,00\text{-}08}$	-0.122**
	(0.055)
$\Delta \log(\text{Age})_{m,00\text{-}08}$	-3.200***
	(1.023)
ΔUnempl $\text{Rate}_{m,00\text{-}08}$	-14.404***
	(2.849)
Big-4 Headquarter_{m}	0.118***
	(0.020)
R-squared	0.302
Number of Observations	299

Table: Robustness Check: Bartik Regression and Second Stage IV Estimation

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
$W_{m,t-1}$	1.245^{***}	
	(0.397)	
ΔDenial $\text{Rate}_{m,t}$		2.226^{**}
		(0.901)
MSA-Year Controls	Yes	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
# Observations	1368	1368

Robustness #2: Focus on FHA

- Sample only FHA loans

$$Y_{m,t} = (L^{FHA}_{t,\text{Big4}} - L^{FHA}_{t,\text{NoBig4}}) \cdot \text{Share}_m$$

Table: Robustness Check: FHA Credit Shock and Housing Rents in Bartik-type Regressions

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
$Y_{m,t-1}$	0.904^{***}	0.931^{***}
	(0.336)	(0.354)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
R-squared	0.020	0.110
Number Observations	1380	1380

Table: Robustness Check: Denial Rates, Rents, and FHA Denial Propensity based on IV Estimation (Stage 2).

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
ΔDenial Rate$_{m,t}$	2.091***	2.096**
	(0.780)	(0.868)
MSA-Year Controls	No	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
Underidentification test (p-value)	0.130	0.130
Number of Observations	1380	1380

Robustness #3: Loutskina and Strahan (2015) instruments

- Conforming Loan Limits (CLL) Instruments:
  - fraction of applicants at time t-1 within 5% of the CLL at time t
  - this fraction times the inverse elasticity of housing supply

Table: Denial Rates and Rent Growth with Various Instruments (Stage 2)

Outcome:	$\Delta\log(\text{Rent}_{m,t})$	$\Delta\log(\text{Rent}_{m,t})$
ΔDenial Rate$_{m,t}$	3.505***	2.622***
	(1.168)	(0.973)
CLL Instruments	Yes	Yes
$V_{m,t-1}$ as an Instrument	No	Yes
MSA-Year Controls	Yes	Yes
MSA FE	Yes	Yes
Year FE	Yes	Yes
J-statistic (p-value)	0.335	0.346
C-statistic (p-value)		0.350
# Observations	1380	1380

Discussion of Papers: Ground Zero: Housing and the Mortgage Market

Paul S. Willen

3rd Annual Golub Center for Finance and Policy Conference
MIT
September 29, 2016

Disclaimer

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Two different views

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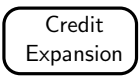
Explaining the boom



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  - Drive up house prices (also relaxes constraints)
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  - Wealth effects?
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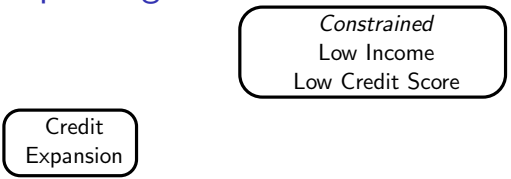

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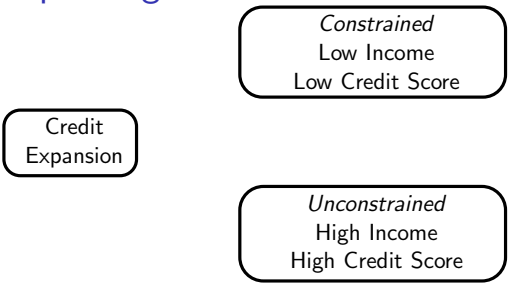

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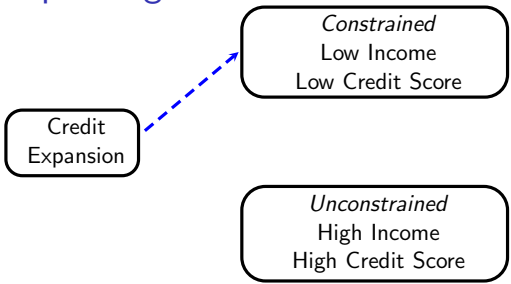

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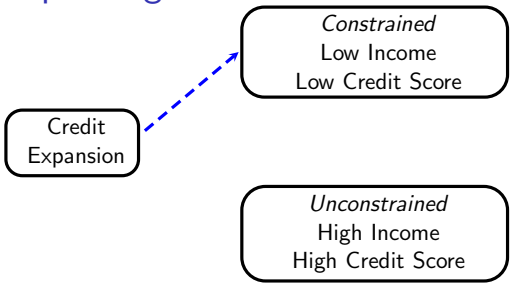

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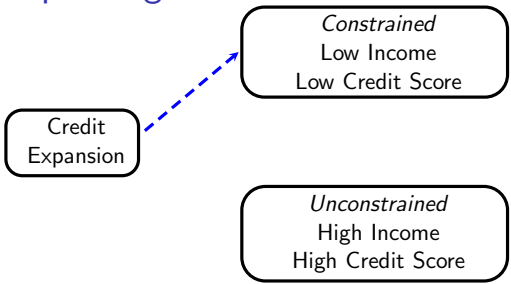

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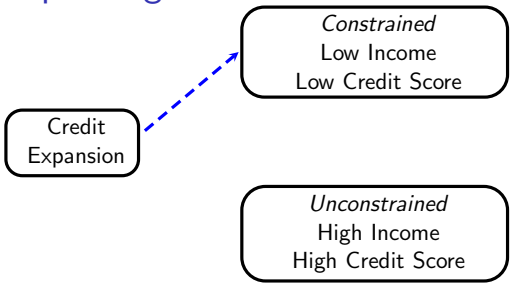

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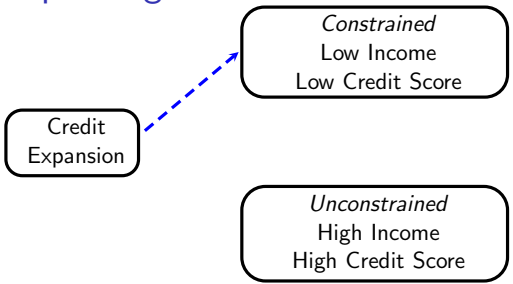

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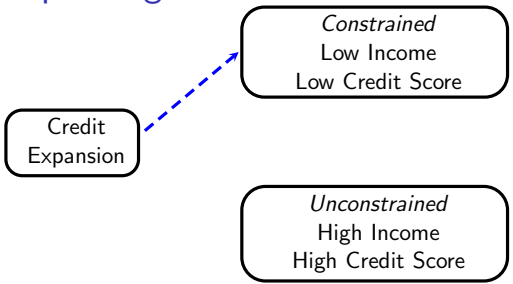

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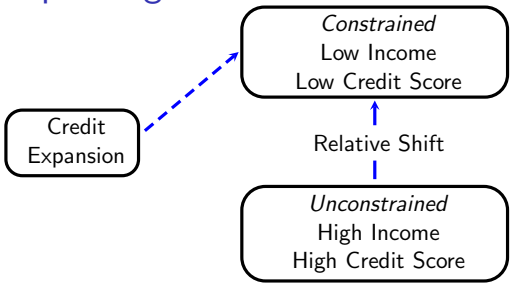

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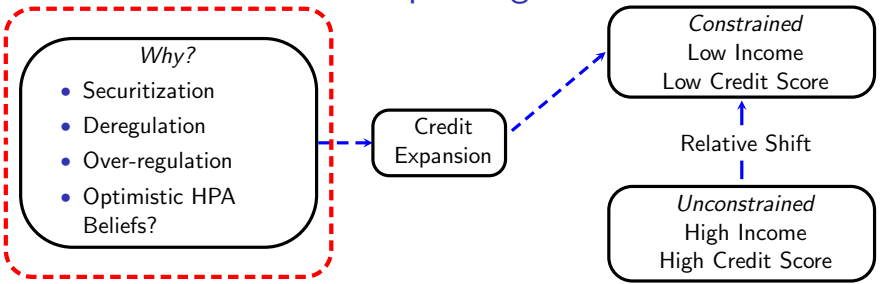

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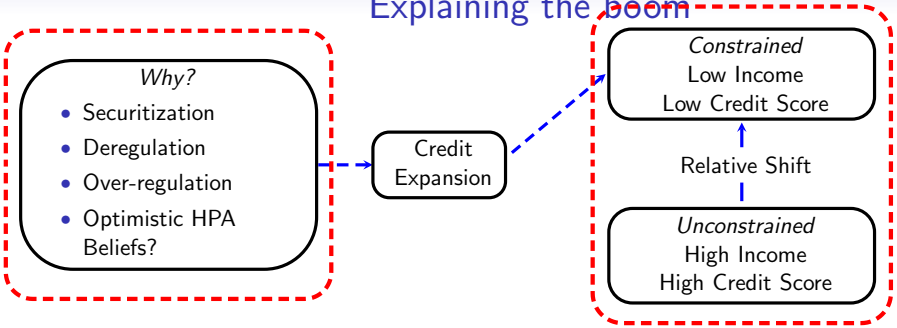

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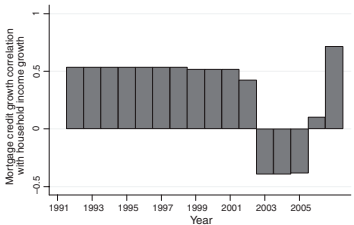

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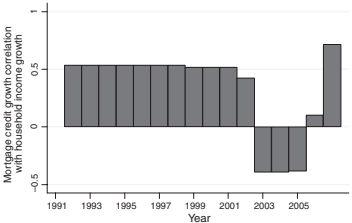

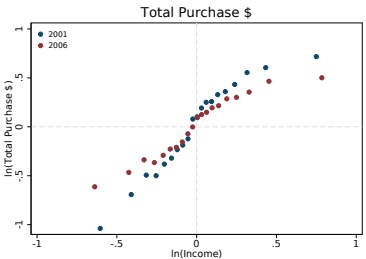

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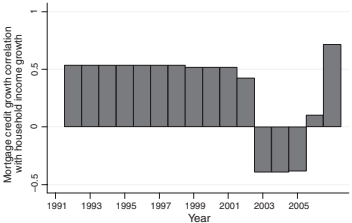

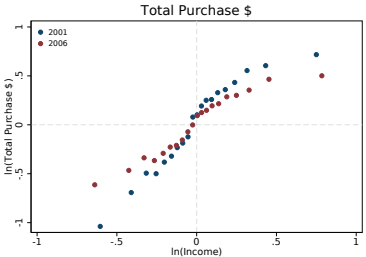

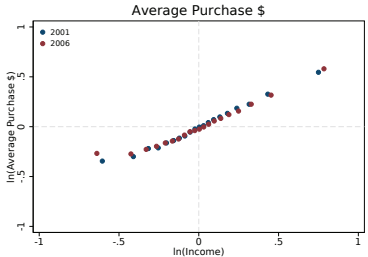

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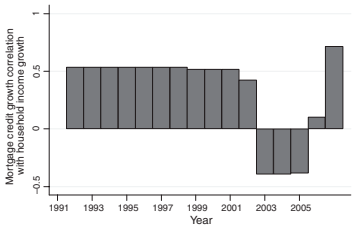

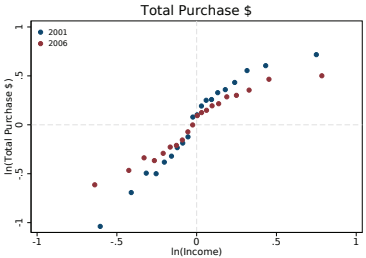

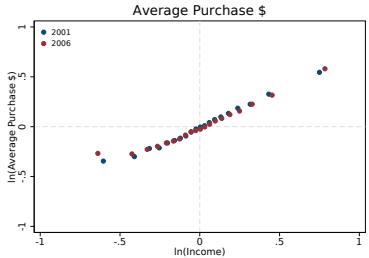

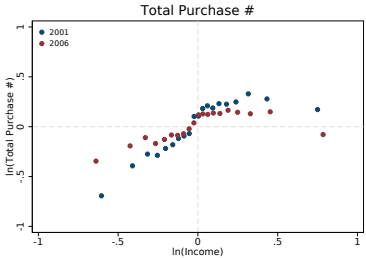

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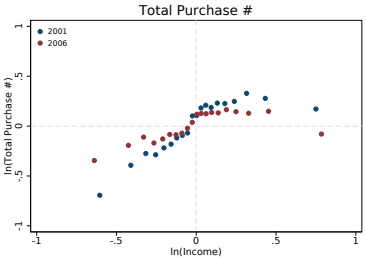

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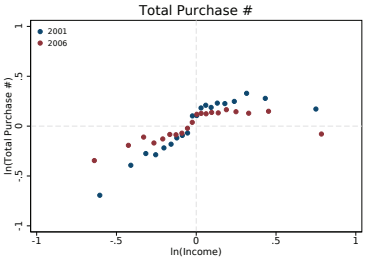

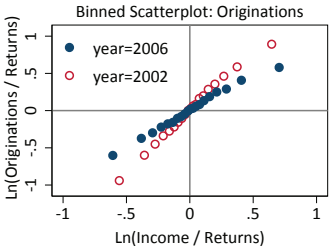

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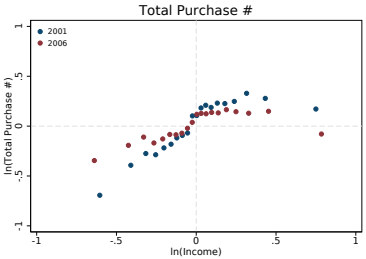

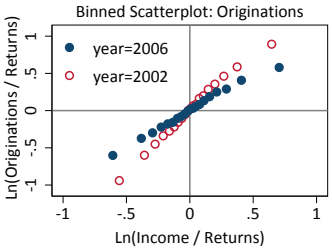

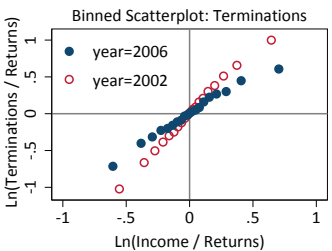

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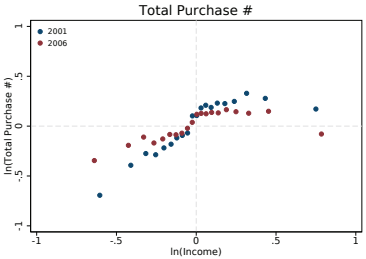

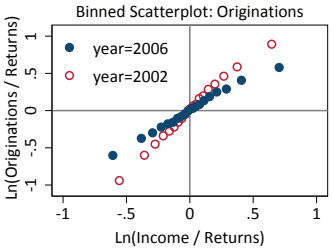

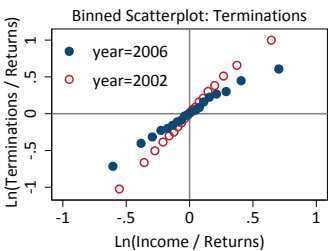

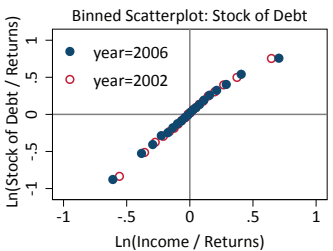

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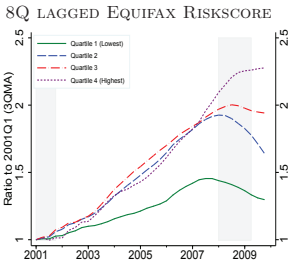

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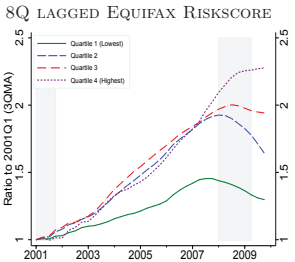

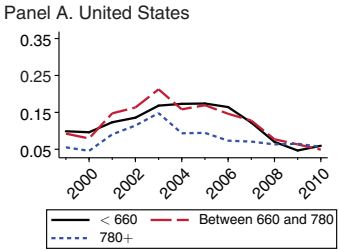

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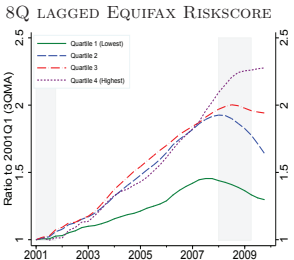

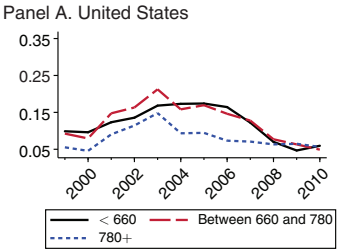

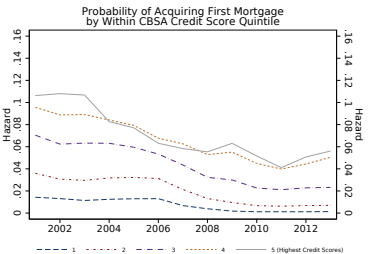

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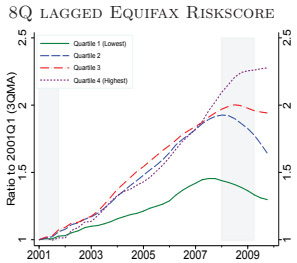

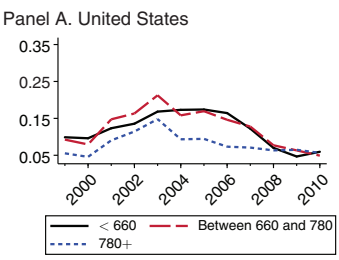

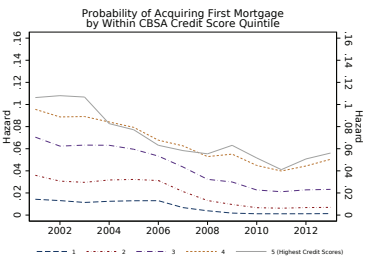

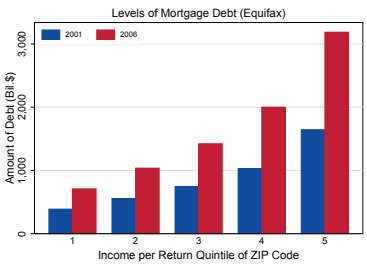

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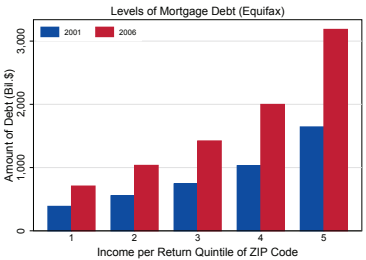

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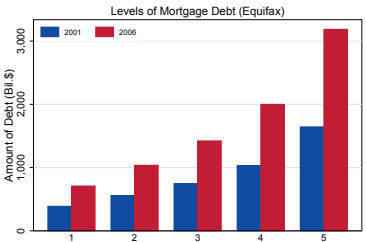
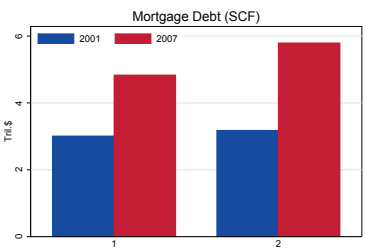
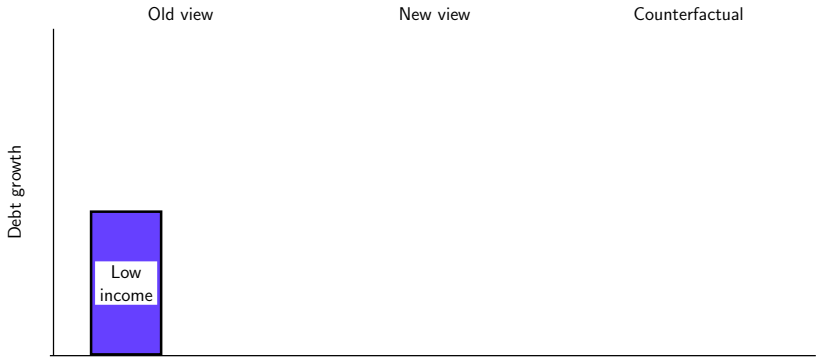




New View of Credit Expansion



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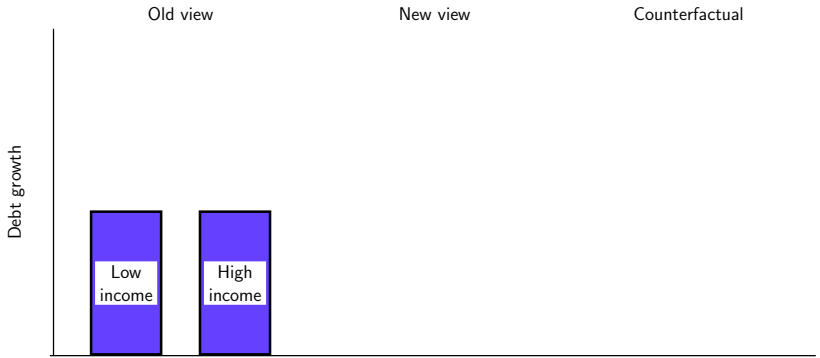

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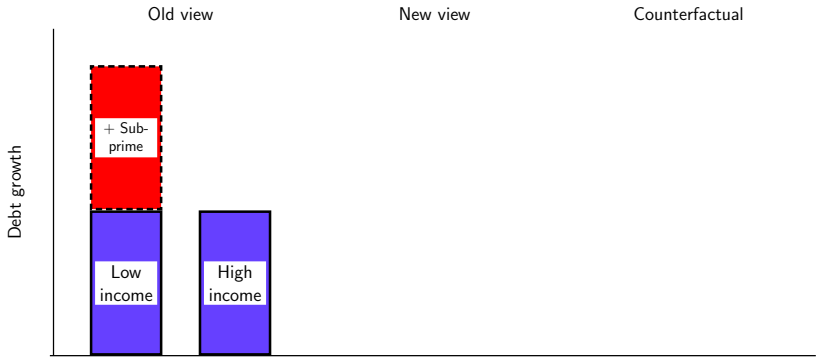

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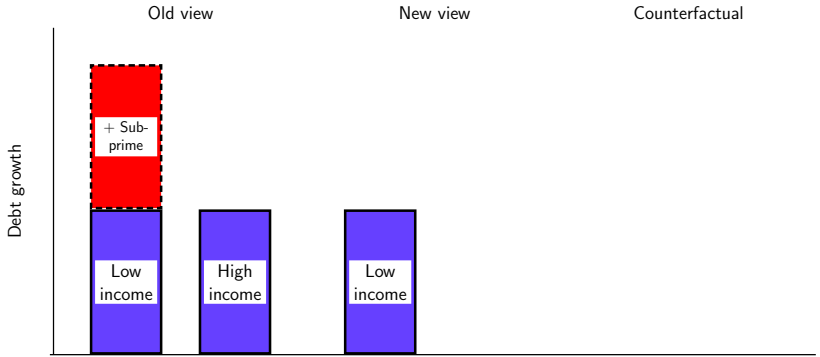

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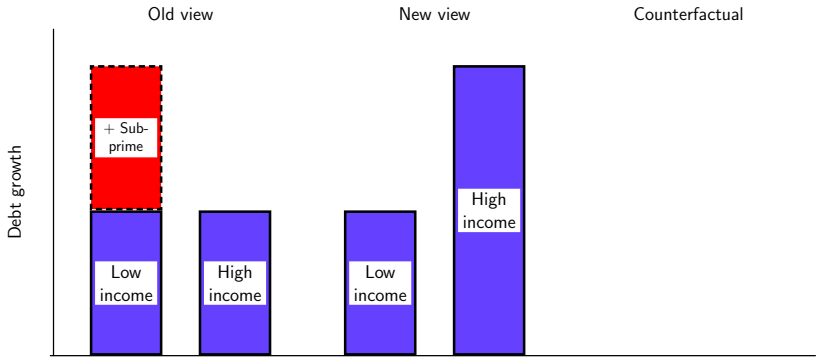

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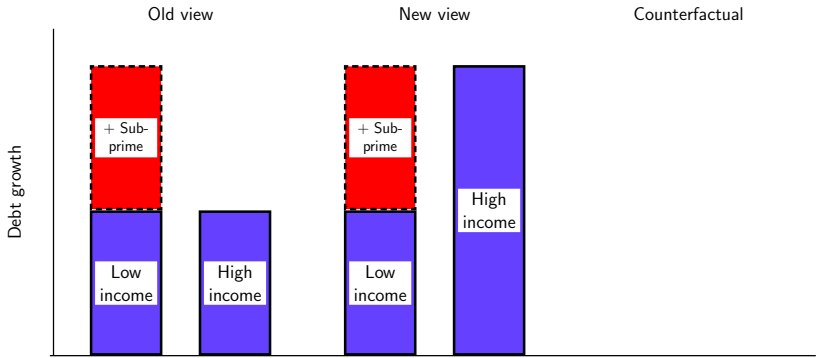

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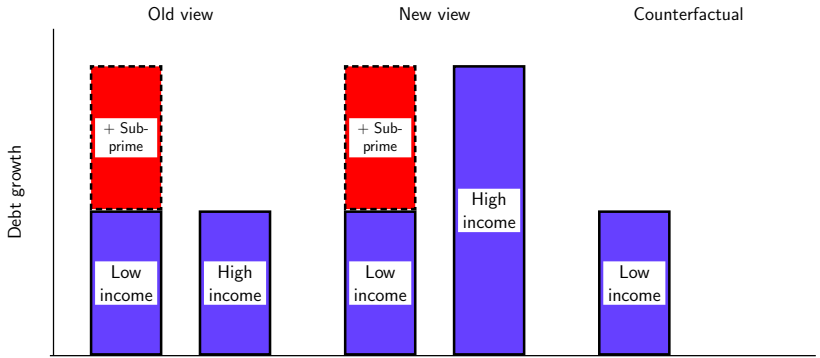

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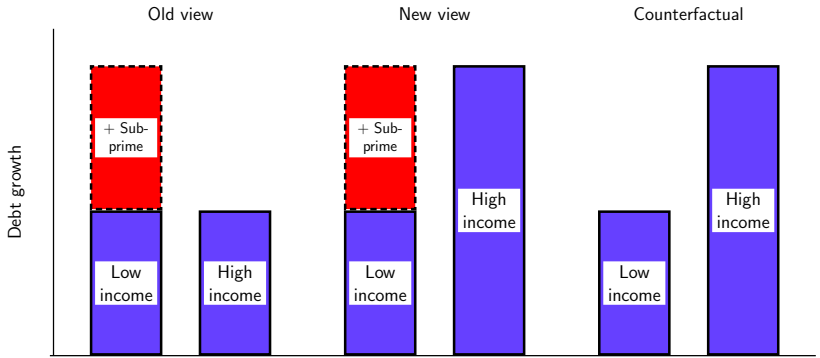

Policy Implications: Gete and Reher (2016)

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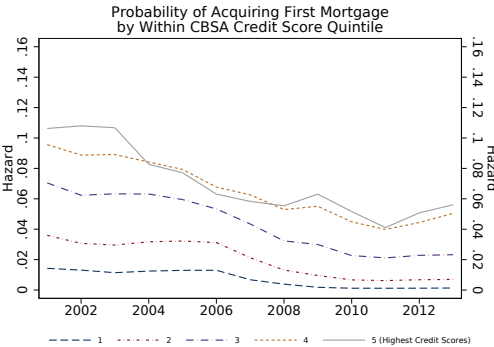

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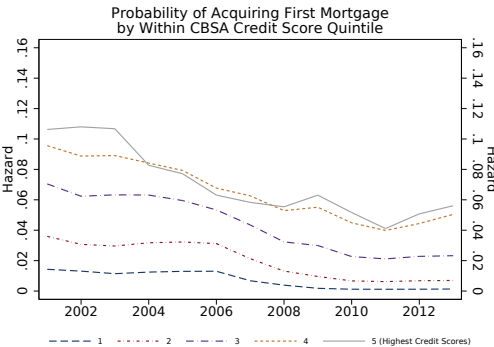

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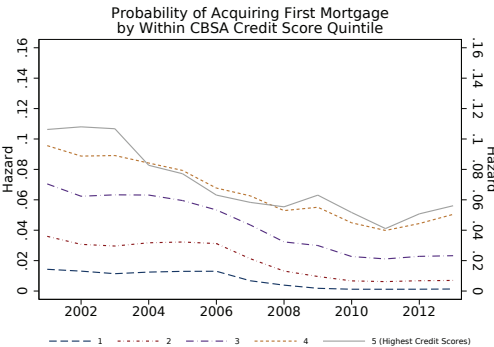

The slide you've all been waiting for...

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