

THE ROLE OF INVESTORS IN THE 2007-2009 HOUSING CRISIS: AN ANATOMY

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Workshop on Housing, Credit and Heterogeneity:
New Challenges for Stabilization Policies

Stockholm, September 13-14 2018

INTRODUCTION

- Facts about 2007-2009 housing crisis:

(Albanesi, DeGiorgi, Nosal 2017)

high default rates among mid-high credit score borrowers
mostly driven by **investors**

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- **Agenda:** extensive examination of investors' role in the crisis

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high default rates among mid-high credit score borrowers
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- **Agenda:** extensive examination of investors' role in the crisis

1 What drives investor activity?

i.e credit supply, house price expectations, response to housing demand

2 What is the relation between investor activity and house price dynamics?

3 Did investors' high default rates exacerbate the decline in in consumption and employment associated with housing crisis?

4 Given the high default risk associated with investor mortgages, should these products be regulated, and how?

FIRST STEP: EMPIRICAL ANALYSIS

- Who are real estate investors?
income, credit score, age
- How do borrowers become investors?
transition in and out of investor status
- How do investors borrow?
mortgage industry, terms, maturity
leverage
- How do investors default?
delinquency, foreclosure, bankruptcy
strategic/distressed default
- Spatial distribution of investors
population density & growth
house price dynamics
foreclosure regime

DATA

- Experian credit file data

 - 1 million borrowers with an Experian credit report
nationally representative, anonymous

 - quarterly, 2004:Q1-2012:Q4

- Information

 - all consumer debt except pay day loans

 - delinquent behavior

 - public record items

 - credit score, age, ZIP code

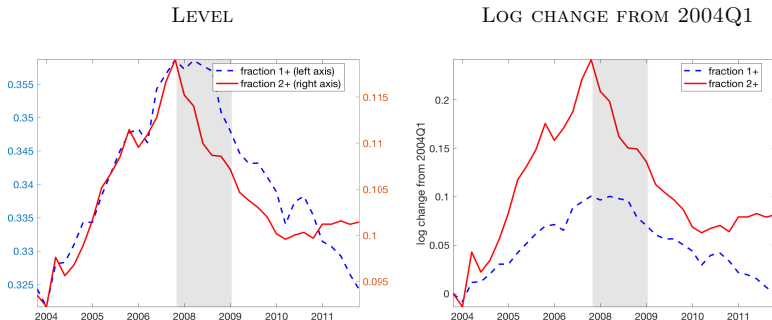
 - IRS verified estimates on individual and household income

IDENTIFYING INVESTORS

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- 2006-2007 surge in investor activity
10% rise in fraction with first mortgage, 25% rise in fraction of investors



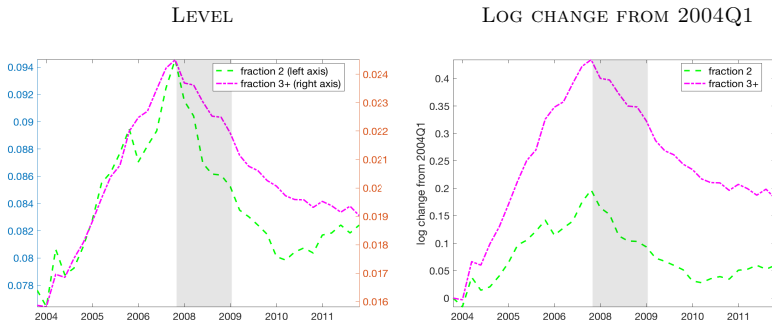
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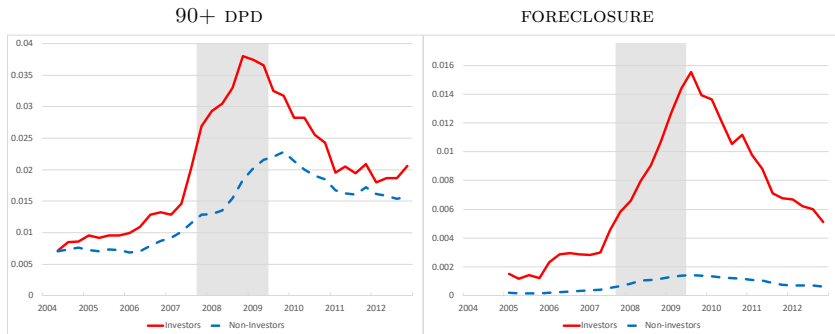
10% rise in fraction with first mortgage, 25% rise in fraction of investors
15% rise in fraction with 2, 45% rise in fraction with 3+ first mortgages



Source: Author's calculations based on Experian Data.

INVESTORS' DEFAULT BEHAVIOR

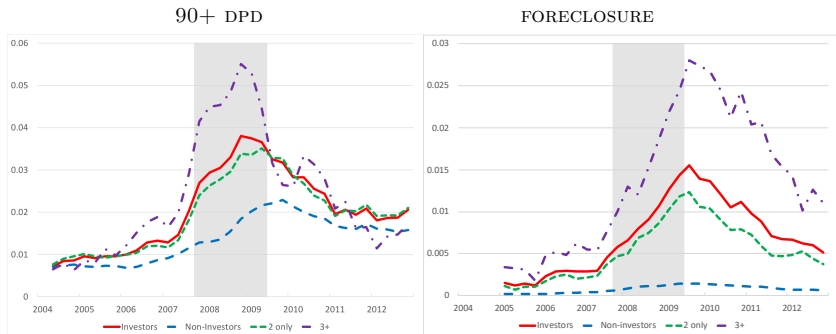
- Higher investor default rates, especially in 2007-2009



Source: Author's calculations based on Experian Data.

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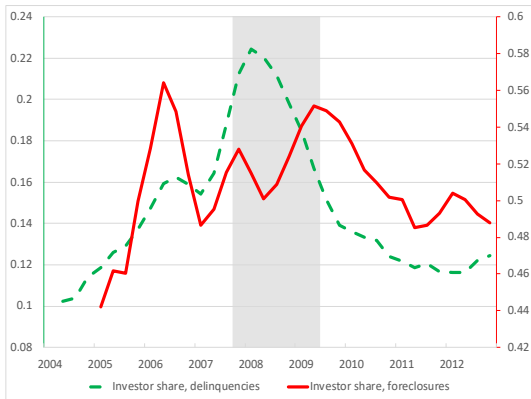
- Higher investor default rates, especially in 2007-2009
- increasing in number of first mortgages
variation by first mortgages bigger for foreclosure



Source: Author's calculations based on Experian Data.

INVESTORS' DEFAULT BEHAVIOR

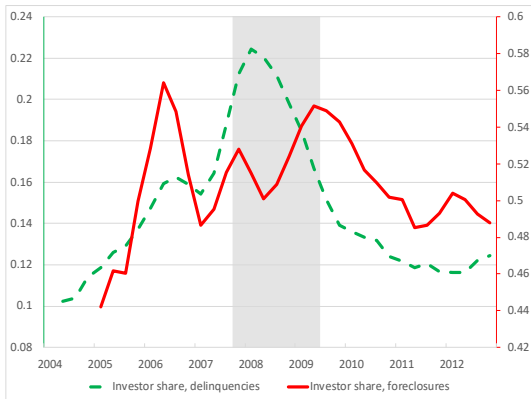
- Investor share of defaults much higher than share in population



Source: Author's calculations based on Experian Data.

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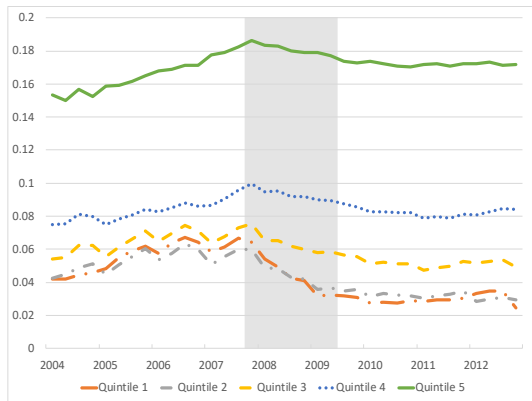
- Investor share of defaults much higher than share in population
- especially for foreclosures



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INVESTORS: DEMOGRAPHICS

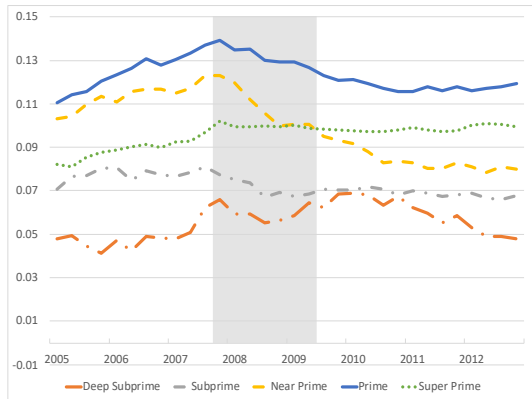
- Investor share highest in top income quintile
- rise in investor share similar across income quintiles



Source: Author's calculations based on Experian Data.

INVESTORS: DEMOGRAPHICS

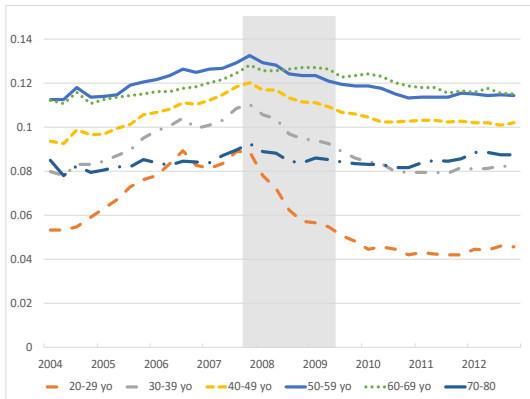
- Investor share highest for Prime & Near Prime borrowers
- strongest rise for Prime in 2004-2007



Source: Author's calculations based on Experian Data.

INVESTORS: DEMOGRAPHICS

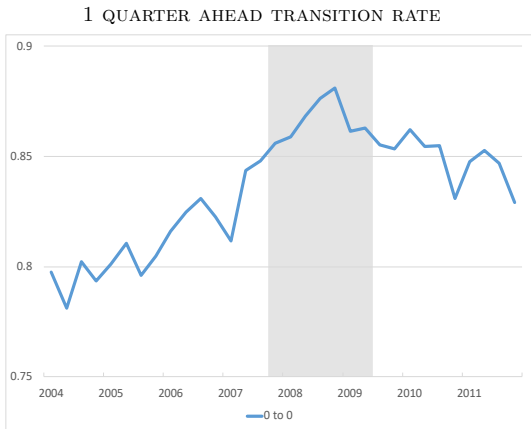
- Investor share highest for 40-69 year olds
- notable increase in 20-39 yo investor share during boom



Source: Author's calculations based on Experian Data.

DYNAMICS OF INVESTMENT ACTIVITY

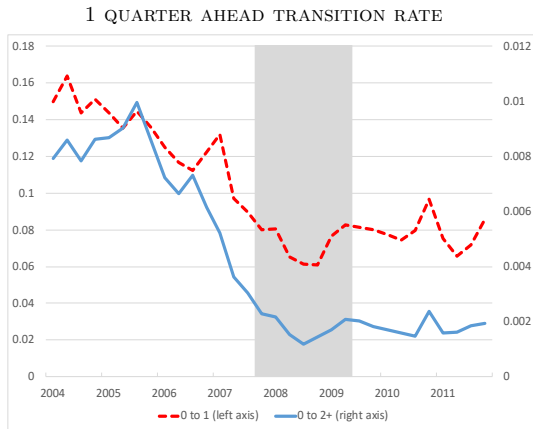
- Rise in 0-to-0 transitions in 2004-2008



Source: Author's calculations based on Experian Data.

DYNAMICS OF INVESTMENT ACTIVITY

- Rise in 0-to-0 transitions in 2004-2008
- Rise in 0-to-2+ transition rates in 2004-2006, decline after
- 0-to-1 transitions decline throughout the boom

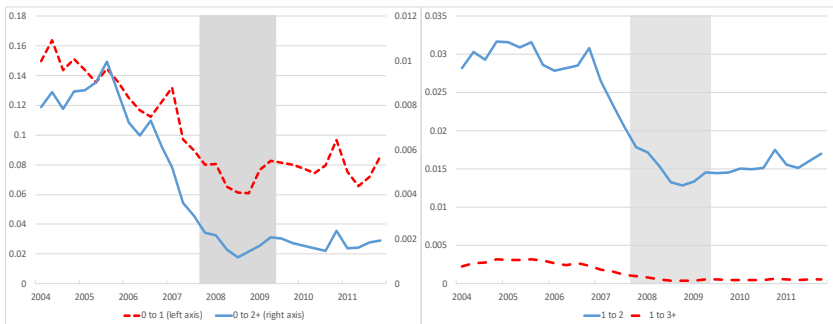


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DYNAMICS OF INVESTMENT ACTIVITY

- 1-to-2 transition rate 1/6 as large as 0-to-1
- 1-to-3+ transition rate 1/2 as large as 0-to-2+

1 QUARTER AHEAD TRANSITION RATE

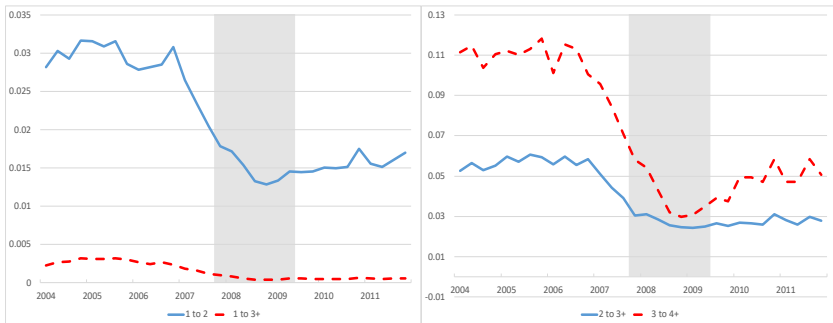


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- 3-to-4+ transition rate twice as large as 2-to-3+

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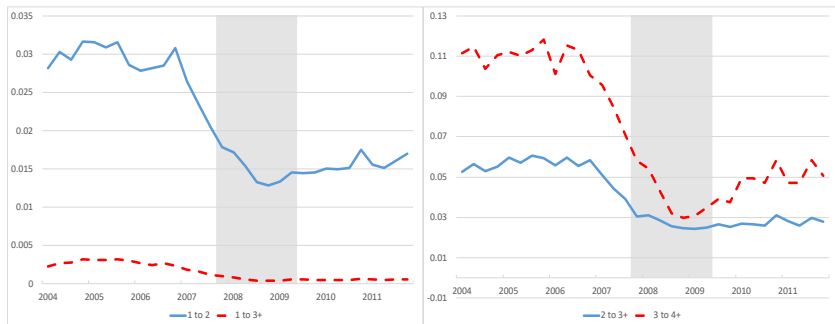


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- consistent with presence of investor class

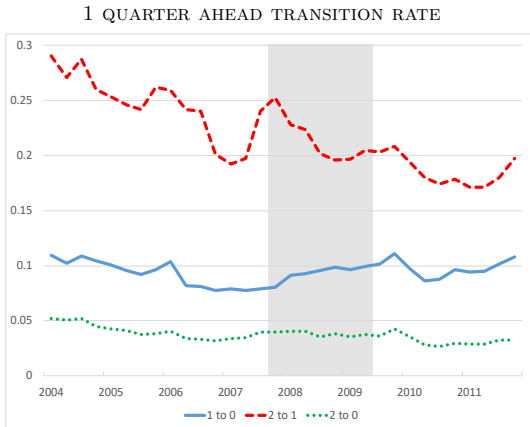
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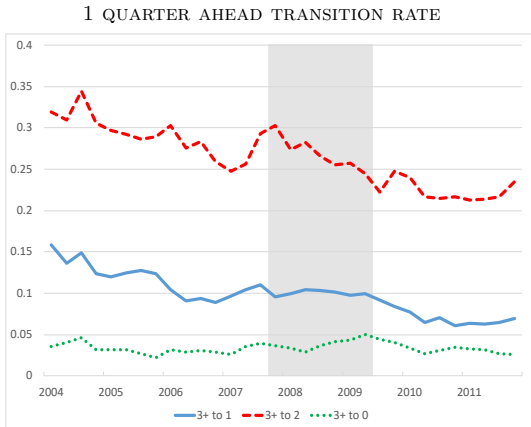
- 1-to-0 and 2-to-0 transitions stable, trend decline in 2-to-1 transition



Source: Author's calculations based on Experian Data.

DYNAMICS OF INVESTMENT ACTIVITY

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- 3+-to-0 transitions stable, trend decline in 3+-to-1 and 3+-to-1 transition



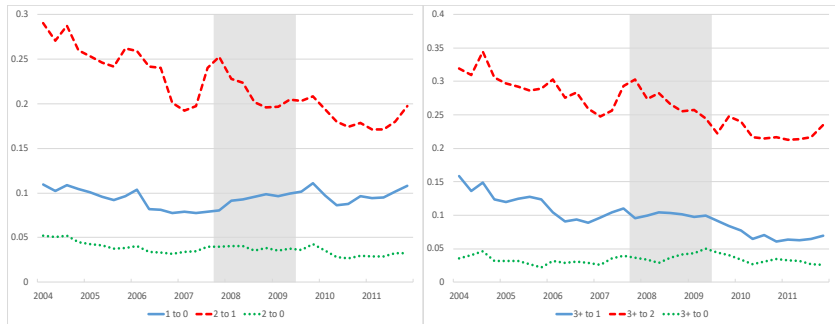
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DYNAMICS OF INVESTMENT ACTIVITY

- 1-to-0 and 2-to-0 transitions stable, trend decline in 2-to-1 transition
- 3+-to-0 transitions stable, trend decline in 3+-to-1 and 3+-to-1 transition

→ 5pp rise in 3+-to-2 and 2-to-1 transitions at start of crisis

1 QUARTER AHEAD TRANSITION RATE



Source: Author's calculations based on Experian Data.

LOAN PROPERTIES: MORTGAGE INDUSTRY

- Investors more likely to have GSE trades

Number of first mortgages	1	2	3+
Share with 1 GSE trade	0.309	0.360	0.294
Share with 2 GSE trades	0	0.118	0.194
Share with 3+ GSE trades	0	0	0.141

Source: Author's calculations based on Experian Data.

LOAN PROPERTIES: MORTGAGE INDUSTRY

- Investors more likely to have GSE trades
- number of GSE trades smaller than number of first mortgages

Number of first mortgages	1	2	3+
Among those with GSE trades			
Share with 1	1	0.753	0.467
Share with 2	0	0.247	0.308
Share with 3+	0	0	0.225

Source: Author's calculations based on Experian Data.

LOAN PROPERTIES: MORTGAGE INDUSTRY

- Investors more likely to have GSE trades
- number of GSE trades smaller than number of first mortgages
- Fraction of GSE balances similar by number of first mortgages
- GSE balances decreasing fraction of total by number of first mortgages

Number of first mortgages	1	2	3+
Fraction of GSE balances			
2010	0.375	0.369	0.360
2011	0.381	0.381	0.381
2012	0.396	0.396	0.396
If GSE balances positive			
Fraction of total			
2010	1	0.671	0.533
2011	1	0.679	0.541
2012	1	0.687	0.558

Source: Author's calculations based on Experian Data.

LOAN PROPERTIES: MORTGAGE INDUSTRY

- Investors more likely to have GSE trades
- number of GSE trades smaller than number of first mortgages
- Fraction of GSE balances similar by number of first mortgages
- GSE balances decreasing fraction of total by number of first mortgages
- Mean GSE balance closer to mean overall as number of first mortgages rise

Number of first mortgages	1	2	3+
Mean GSE balances (USD)			
2010	141,010	176,977	175,539
2011	132,390	182,813	188,543
2012	123,194	183,848	201,644
GSE/overall balances			
2010	0.87	0.95	0.91
2011	0.82	0.99	1.00
2012	0.77	1.01	1.08

Source: Author's calculations based on Experian Data.

LOAN PROPERTIES: FIXED RATES AND MATURITY

- Investors less likely to have fixed monthly payments

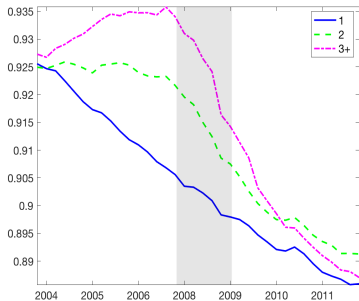
Number of first mortgages	1	2	3+
Fraction with fixed monthly payment			
Over 2 consecutive quarters	0.55	0.49	0.37
Over 4 consecutive quarters	0.16	0.09	0.048

Source: Author's calculations based on Experian Data.

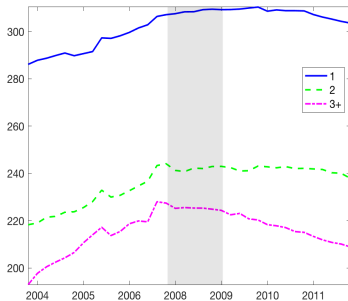
LOAN PROPERTIES: FIXED RATES AND MATURITY

- Investors less likely to have fixed monthly payments
- Investors have higher outstanding residual debt, shorter residual maturity

RESIDUAL BALANCE/INITIAL DEBT



MINIMUM REMAINING MATURITY

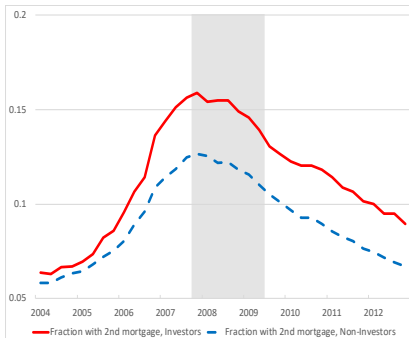


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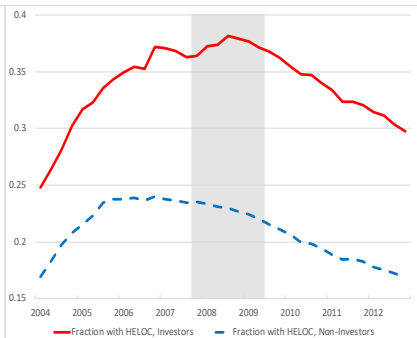
LEVERAGE

- Fraction with second mortgage up to 50% higher for investors
- Fraction with HELOC up to 100% higher for investors

FRACTION WITH SECOND MORTGAGE



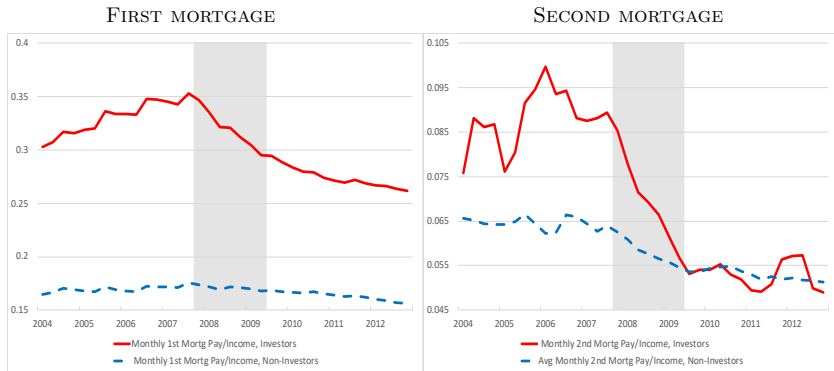
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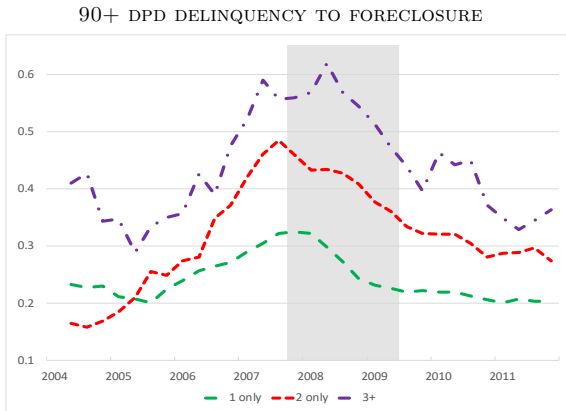
- Fraction with second mortgage up to 50% higher for investors
- Fraction with HELOC up to 100% higher for investors
- Payment to income more than twice as high for investors for first mortgages, 50% higher for second mortgages in 2004-2007



Monthly payment to income ratio. Source: Authors' calculations based on Experian Data.

DEFAULT BEHAVIOR

- Investor transition from delinquency to foreclosure twice as high



4 quarter ahead transition rate. Source: Authors' calculations based on Experian Data.

DEFAULT BEHAVIOR

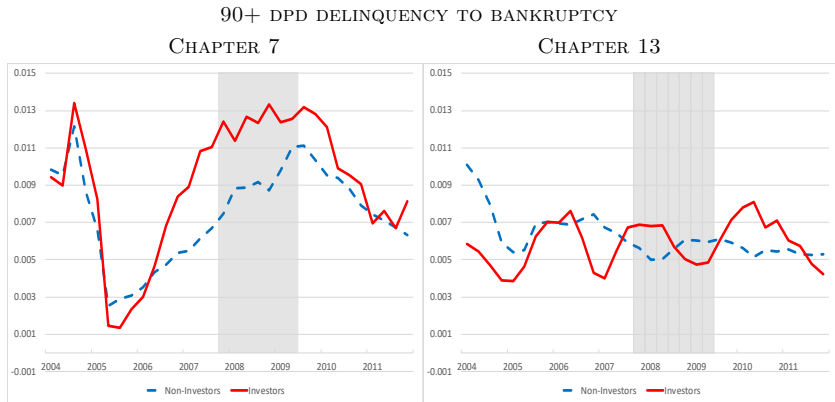
- Investor transition from delinquency to foreclosure twice as high
- Investors do not foreclose on all mortgages, foreclose on mortgage with smallest balances

Number of mortgages	2	3+	2	3+
	Foreclosures < mortgages		Foreclosure on smallest	
2004Q1-2006Q4	0.87	0.78	0.63	0.46
2007Q1-2010Q4	0.75	0.84	0.47	0.51
2011Q1-2012Q4	0.75	0.84	0.63	0.66

Source: Authors' calculations based on Experian Data.

DEFAULT BEHAVIOR

- Higher investor transitions from delinquency to Ch 7 in 2006-2009

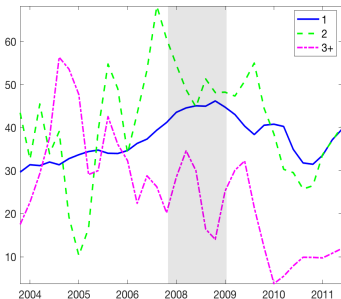


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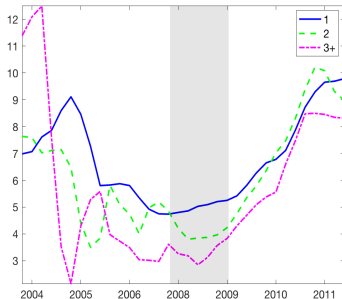
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MONTHS SINCE BANKRUPTCY



MONTHS SINCE FORECLOSURE

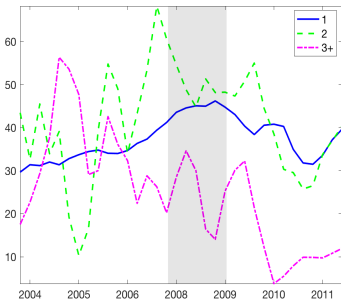


Borrowers with new foreclosure in last 24 months.
Source: Authors' calculations based on Experian Data.

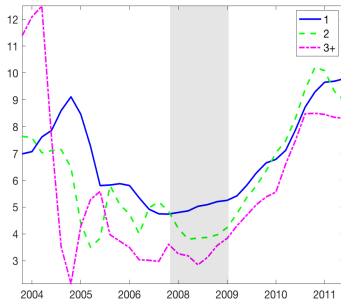
DEFAULT BEHAVIOR

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- Foreclosure typically occurs after bankruptcy
- time between bankruptcy and foreclosure shrinks for borrowers with 3+ mortgages during/after crisis

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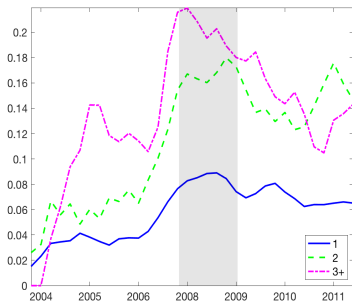
STRATEGIC DEFAULT

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- straight roll to severe mortgage delinquency, no other delinquencies

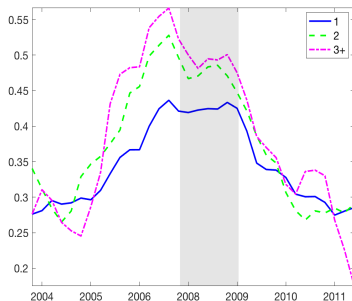
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- **Strategic default:** borrower could continue paying mortgage
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- **Distressed default:** borrower cannot make payments
- increasingly severe mortgage delinquency, with additional delinquencies

SHARE STRATEGIC



SHARE DISTRESSED

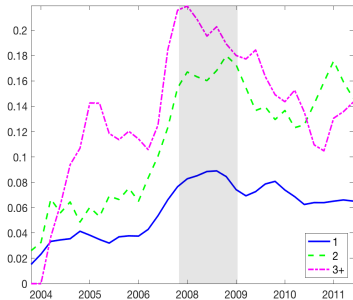


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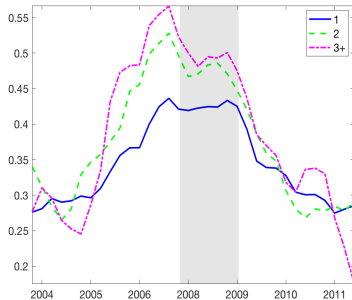
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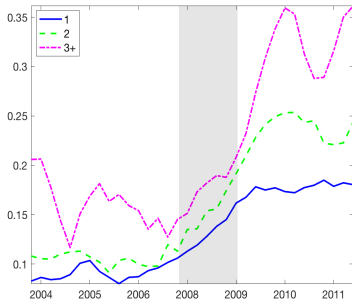
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- also possibly strategic
 - Pay-downs: borrower cures delinquency

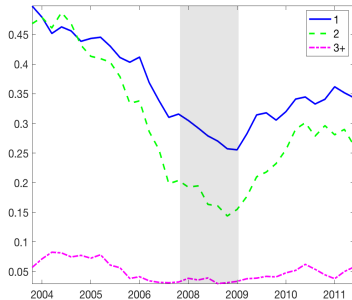
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SHARE CASH-FLOW MANAGERS



SHARE PAY-DOWNS



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- Investors' greater propensity to escalate from delinquency to foreclosure driven in part by strategic behavior

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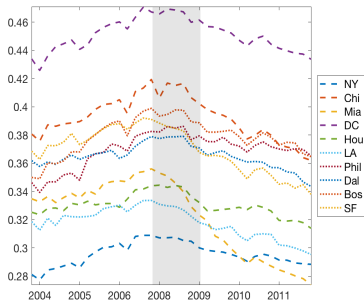
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- 6 Investors do not default on all first mortgages & default on mortgage with lower balance
- 7 Investors more likely to default strategically

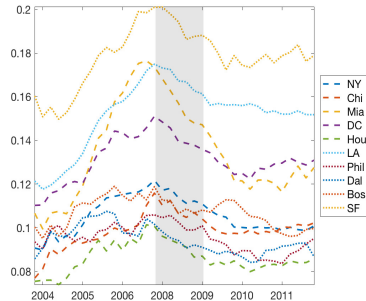
GEOGRAPHY OF INVESTOR ACTIVITY

- Substantial geographical variation in investor activity, especially log change

FRACTION WITH FIRST MORTGAGE



FRACTION WITH 2+ FIRST MORTGAGES

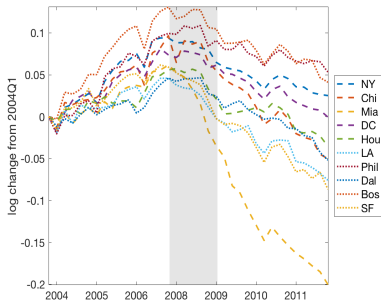


Top 10 MSAs by 2010 population. Source: Authors' calculations based on Experian Data.

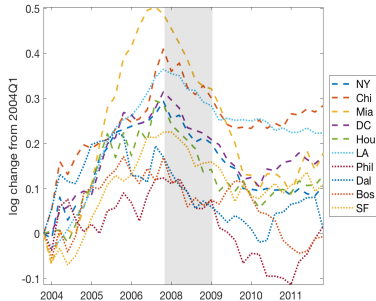
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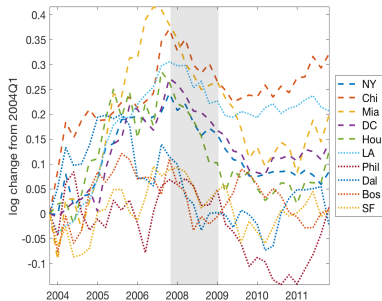


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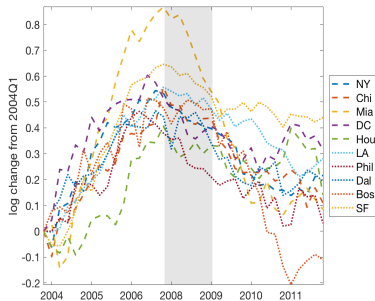
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- Log rise in 3+ mostly larger than log rise in 2

FRACTION WITH 2 FIRST MORTGAGES



FRACTION WITH 3+ FIRST MORTGAGES

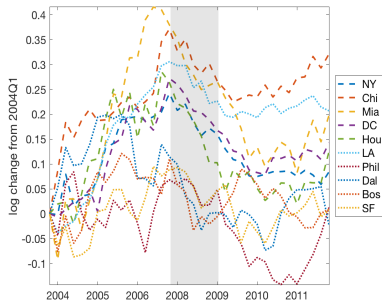


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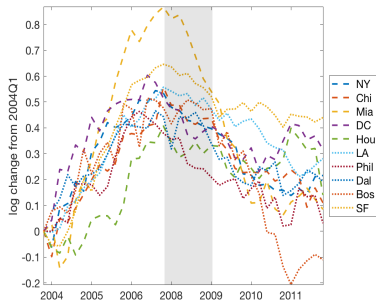
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- Log rise in 3+ mostly larger than log rise in 2
- Miami, Chicago, LA show largest log rise in 2004-2007 for both 2 and 3+
- SF displays large log rise in 3+, not in 2

FRACTION WITH 2 FIRST MORTGAGES



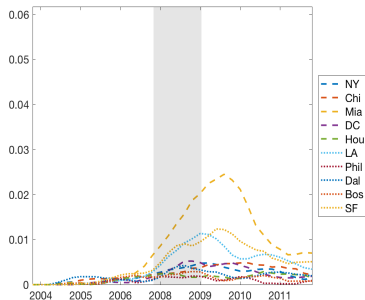
FRACTION WITH 3+ FIRST MORTGAGES



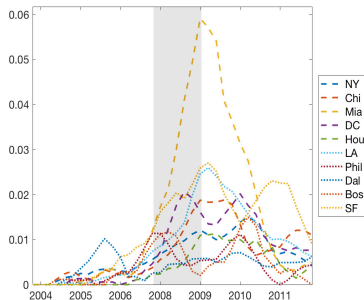
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- Log rise in 3+ mostly larger than log rise in 2
- Miami, Chicago, LA show largest log rise in 2004-2007 for both 2 and 3+
- SF displays large log rise in 3+, not in 2
- Higher foreclosure rates for investors, but gap varies

FORECLOSURE, NON-INVESTORS

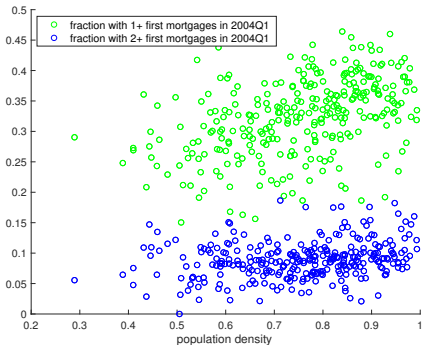


FORECLOSURE, INVESTORS



FACTORS IN GEOGRAPHICAL VARIATION: POPULATION

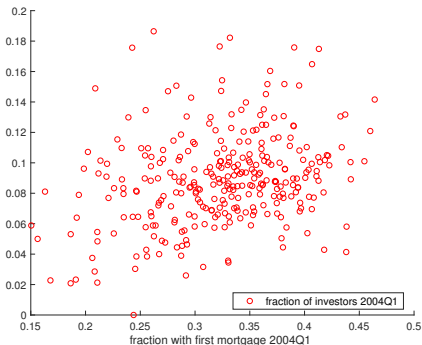
- Fraction with first mortgage increasing with population density



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: POPULATION

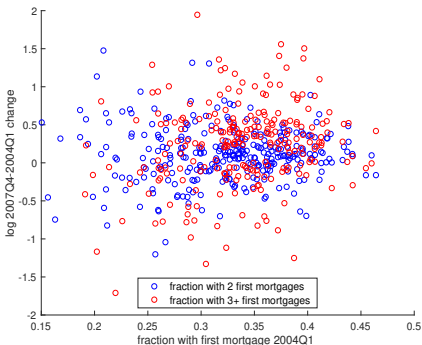
- Fraction with first mortgage increasing with population density
- Initial fraction of investors increasing in fraction with first mortgages



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: POPULATION

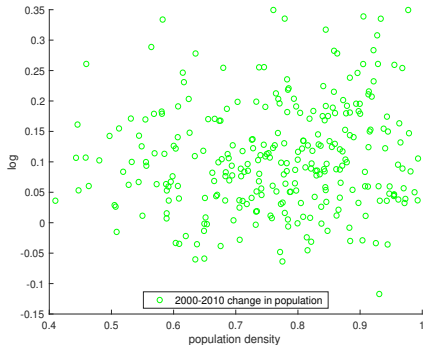
- Fraction with first mortgage increasing with population density
- Initial fraction of investors increasing in fraction with first mortgages
- Increase in investor activity increasing in fraction with first mortgages



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: POPULATION

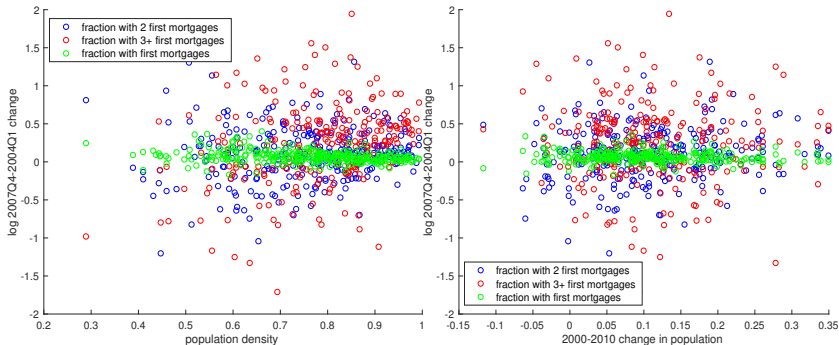
- 2000-2010 population growth positively related to population density



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: POPULATION

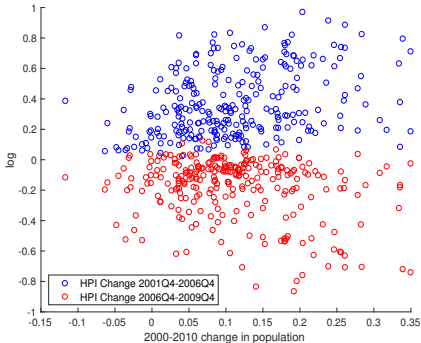
- 2000-2010 population growth positively related to population density
- Growth in investor activity positively related to population density and population growth



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: HOUSE PRICES

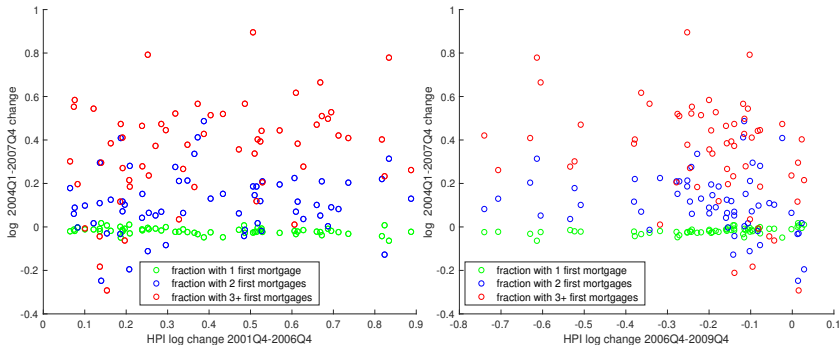
- House price fluctuations positively related to population growth



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FACTORS IN GEOGRAPHICAL VARIATION: HOUSE PRICES

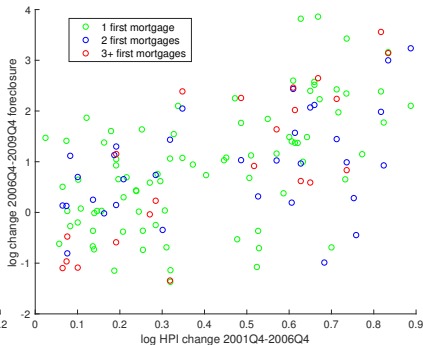
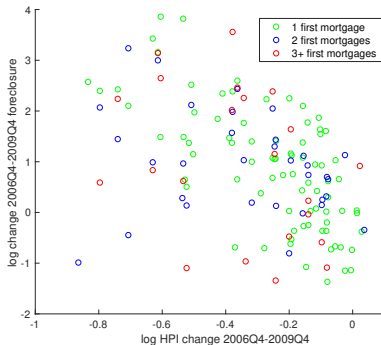
- House price fluctuations positively related to population growth
- Growth in fraction with 3+ first mortgages positively related to house price drop



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FACTORS IN GEOGRAPHICAL VARIATION: HOUSE PRICES

- House price fluctuations positively related to population growth
- Growth in fraction with 3+ first mortgages positively related to house price drop
- Rise in foreclosure increasing in amplitude of house price fluctuations



Top 300 MSAs by population. Source: Authors' calculations based on Experian Data.

FORECLOSURE REGIME

Foreclosure regime	States	# MSAs
Non-judicial non-recourse	AK, AZ, CA, ID, MN, ND, OR, TX, WA	217
Non-judicial recourse	AL, AR, CO, GA, IA, MA, MD, MI, MO, MS, MT, NE, NH, NV, RI, TN, VA, WV, WY	329
Judicial non-recourse	CT, NC	46
Judicial recourse	DE, FL, HI, IL, IN, KS, KY, LA, ME, NJ, NM, NY, OH, OK, PA, SC, SD, VT, WI	395

Foreclosure regime by state for top 1000 MSAs by population size.

Source: Author's calculations based on Census data.

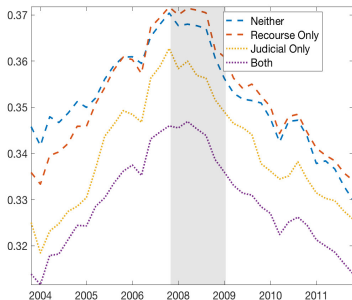
FORECLOSURE REGIME

- **Judicial non-recourse:** foreclosure more advantageous to borrower
can live in home
no financial responsibility for deficiency
- **Non-judicial recourse:** foreclosure more advantageous to lender
no delay, legal costs
can sue for deficiency
- **Non-judicial non-recourse** → fast execution
advantageous for borrowers not sensitive to moving cost
advantageous to lender less sensitive to deficiency

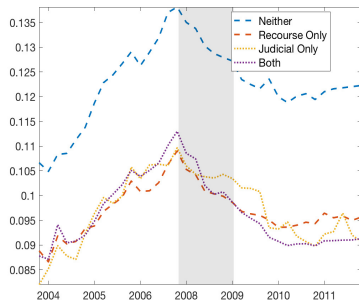
FORECLOSURE REGIME

- Higher investor activity in non-recourse non-judicial states

FRACTION WITH FIRST MORTGAGE



FRACTION WITH 2+ FIRST MORTGAGES

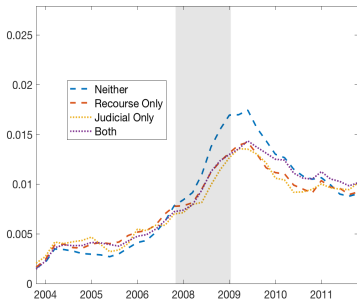


Source: Authors' calculations based on Experian Data.

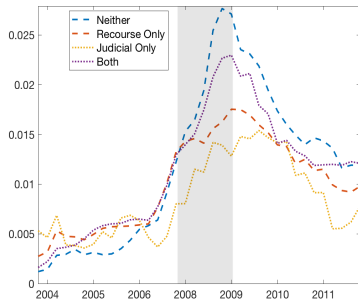
FORECLOSURE REGIME

- Higher investor activity in **non-recourse non-judicial states**
- Higher 90+ dpd delinquency rates in non-recourse non-judicial states, especially for investors

DELINQUENCY, NON-INVESTORS



DELINQUENCY, INVESTORS

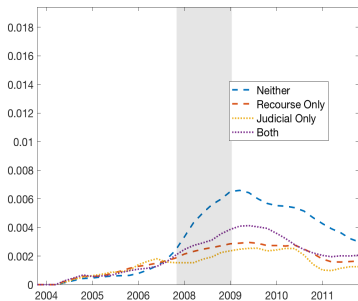


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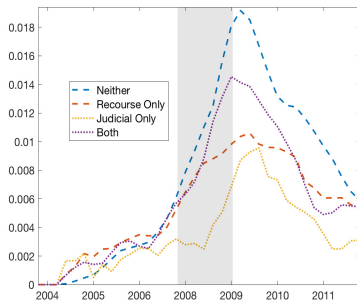
FORECLOSURE REGIME

- Higher investor activity in **non-recourse non-judicial states**
- Higher 90+ dpd delinquency rates in non-recourse non-judicial states, especially for investors
- Investor/non-investor difference in foreclosure larger than delinquency

FORECLOSURE, NON-INVESTORS



FORECLOSURE, INVESTORS

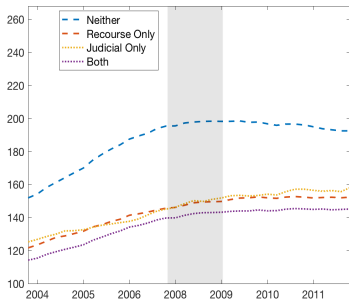


Source: Authors' calculations based on Experian Data.

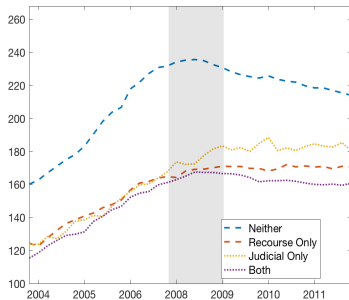
FORECLOSURE REGIME

- Larger average first mortgage balance in non-recourse non-judicial states

1 FIRST MORTGAGE



2+ FIRST MORTGAGES

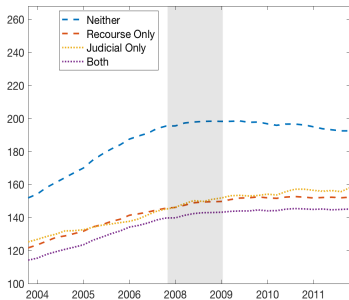


Average first mortgage balance. Source: Authors' calculations based on Experian Data.

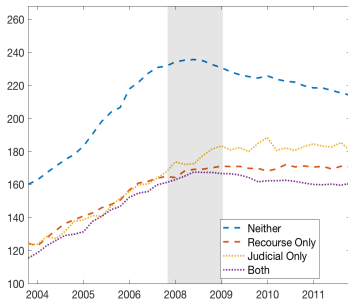
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- stronger growth in average balance in these states, **only for investors**

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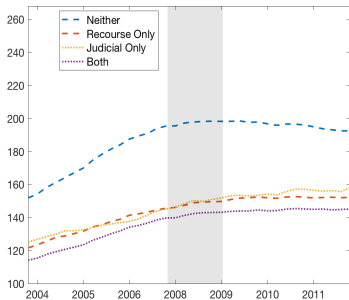


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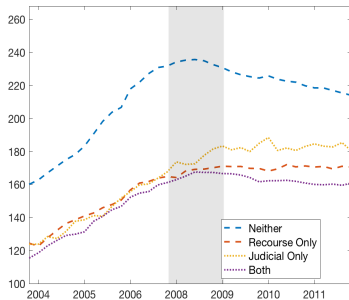
FORECLOSURE REGIME

- Larger average first mortgage balance in **non-recourse non-judicial states**
- stronger growth in average balance in these states, **only for investors**
- Same pattern for average second mortgage and HELOC balance
- **higher leverage in non-recourse non-judicial states**

1 FIRST MORTGAGE



2+ FIRST MORTGAGES



Average first mortgage balance. Source: Authors' calculations based on Experian Data.

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 - non-judicial non-recourse states** have higher share of investors and higher investor default rates relative to non-investors, followed by judicial recourse states
 - judicial non-recourse states**, where foreclosure is most favorable to borrower, show low investor activity and low investor default rates, compared to non-investors

DISCUSSION AND ONGOING WORK

- What are the mechanisms that drive uncovered patterns?
- surge in investor activity by young borrowers due to increase in supply of credit, loosening of credit standards, or rise in income of young?

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Ongoing research

- 1 Structural empirical analysis
- 2 Quantitative theory (Albanesi 2018)