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

Manuel Adelino (Duke),
Antoinette Schoar (MIT Sloan and NBER)
Felipe Severino (Dartmouth)
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 %.. -
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

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

<table>
<thead>
<tr>
<th>Year</th>
<th>FICO &lt; 660</th>
<th>660 ≤ FICO &lt; 720</th>
<th>FICO ≥ 720</th>
</tr>
</thead>
<tbody>
<tr>
<td>2003</td>
<td>71</td>
<td>20</td>
<td>9</td>
</tr>
<tr>
<td>2004</td>
<td>63</td>
<td>25</td>
<td>12</td>
</tr>
<tr>
<td>2005</td>
<td>47</td>
<td>34</td>
<td>18</td>
</tr>
<tr>
<td>2006</td>
<td>39</td>
<td>38</td>
<td>23</td>
</tr>
</tbody>
</table>
Share of Delinquency 3 Years Out by HP Growth and FICO – Value Weighted

2003 Cohort

- Low HP Growth 02-06: 26 (8 FICO < 660, 18 FICO > 660)
- Q2: 7 (6 FICO < 660, 1 FICO > 660)
- Q3: 7 (6 FICO < 660, 1 FICO > 660)
- High HP Growth 02-06: 17 (17 FICO < 660, 0 FICO > 660)

2006 Cohort

- Low HP Growth 02-06: 6 (4 FICO < 660, 2 FICO > 660)
- Q2: 7 (7 FICO < 660, 0 FICO > 660)
- Q3: 14 (14 FICO < 660, 0 FICO > 660)
- High HP Growth 02-06: 37 (37 FICO < 660, 0 FICO > 660)
Recourse vs. Non-Recourse States

Non-Recourse States

Recourse States

FICO < 660 □ FICO ≥ 720 □ 660 ≤ FICO < 720

2003 2004 2005 2006

2003 2004 2005 2006
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 out 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.
  
  2. Borrowers hold long-term, fixed-rate loans and can choose to prepay existing loans and replace with new ones.
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%.
At income of $50k per year, 28% PTI limit $\Rightarrow$ max monthly payment of $\sim$ $1,200.$
At 6% interest rate, $1,200 payment $\implies$ maximum PTI loan size $160k. Plus 20% down payment $\implies$ house price of $200k.
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.
Increasing the maximum PTI ratio from 28% to 31% has a similar effect to fall in rates, increases max loan size and corresponding price.
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 \(\approx 10\))
  - Data consistent with some PTI constrained + search frictions.

(a) CLTV Histogram: 2014 Q3

(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.

(a) CLTV Histogram: 2014 Q3

(b) PTI Histogram: 2014 Q3
The 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.
Response to near-permanent -1% (annualized) fall in nominal rates.
Debt response of Benchmark Economy closer to PTI Economy even though most borrowers constrained by LTV (~75% in steady state).
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% → 54%.
2. LTV Liberalization: max LTV ratio from 85% → 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.

(a) PTI Histogram: 2006 Q1  
(b) PTI Histogram: 2014 Q3
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% → 54%.

2. LTV Liberalization: max LTV ratio from 85% → 99%.

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

![Graphs showing the effects of LTV and PTI liberalization](image-url)
PTI Liberalization generates large boom in house prices, price-rent ratios (38%), debt-household income (47%).
Macroprudential policy: cap on PTI ratios more effective at limiting boom-bust cycles.
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)

- Blue line: Top 10% MSAs
- Red dashed line: Top 25% MSAs

What drives recent housing rents and HOR dynamics?

- Tight credit supply (among other factors)
- A 1pp increase in mortgage denials leads to...
  - ≈2.3% increase in housing rents
  - ≈2.4pp reduction in a city’s homeownership
  - ≈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

Share of Applications to Big-4 Banks in 2008

Percent

0  0.2  0.4  0.6
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:

\[ V_{m,t} = (L_{t,\text{Big4}} - L_{t,\sim\text{Big4}}) \cdot \text{share2008}_m \]

- 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:

\[ \Delta \log(\text{Rent})_{m,t} = \frac{\Delta \text{Denial Rate}_{m,t}}{\beta} + \Delta X_{m,t} \gamma + \alpha_m + \alpha_t + \mu_{mt}. \]
**IV Estimation (Stage 2)**

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

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \text{Denial Rate}_{m,t}$</td>
<td>2.342*** (0.845)</td>
<td>2.329** (0.940)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>1380</td>
<td>1380</td>
</tr>
</tbody>
</table>
Table: Denial Rates and Homeownership Rate based on IV Estimation

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta HR_{m,t}$</th>
<th>$\Delta HR_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta$Denial Rate$_{m,t}$</td>
<td>-2.014*</td>
<td>-2.367**</td>
</tr>
<tr>
<td></td>
<td>(1.128)</td>
<td>(0.933)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>358</td>
<td>358</td>
</tr>
</tbody>
</table>
### Table: Denial Rates and Rental Vacancies Based on IV Estimation

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta$ Vacancy Rate$_{m,t}$</th>
<th>$\Delta$ Vacancy Rate$_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta$Denial Rate$_{m,t}$</td>
<td>-1.256</td>
<td>-2.501</td>
</tr>
<tr>
<td></td>
<td>(1.399)</td>
<td>(2.051)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>348</td>
<td>348</td>
</tr>
</tbody>
</table>
Table: Denial Rates and New Building Permits Based on IV Estimation

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(Multi \ Unit)_{m,t}$</th>
<th>$\Delta \log(Multi \ Unit)_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \text{Denial Rate}_{m,t}$</td>
<td>41.671*** (15.264)</td>
<td>49.529*** (9.546)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>1223</td>
<td>1223</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta HR_{m,t}$</th>
<th>$\Delta HR_{m,t}$</th>
<th>$\Delta HR_{m,t}$</th>
<th>$\Delta HR_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>-1.620***</td>
<td>-0.293</td>
<td>-1.336***</td>
<td>0.238</td>
</tr>
<tr>
<td></td>
<td>(0.220)</td>
<td>(0.279)</td>
<td>(0.359)</td>
<td>(0.152)</td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{Older}_m$</td>
<td>-0.510***</td>
<td>-0.509***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.168)</td>
<td>(0.173)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{LowInternet}_m$</td>
<td>-0.941***</td>
<td></td>
<td>-1.136***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.360)</td>
<td></td>
<td>(0.307)</td>
<td></td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{WRLURI}_m$</td>
<td></td>
<td>-0.398</td>
<td>-0.538*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.309)</td>
<td>(0.281)</td>
<td></td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.084</td>
<td>0.085</td>
<td>0.086</td>
<td>0.087</td>
</tr>
<tr>
<td># Observations</td>
<td>358</td>
<td>358</td>
<td>358</td>
<td>358</td>
</tr>
</tbody>
</table>
Table: Credit Shock and Homeownership Rate by Broker and Lender Competition

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \text{HR}_{m,t}$</th>
<th>$\Delta \text{HR}_{m,t}$</th>
<th>$\Delta \text{HR}_{m,t}$</th>
<th>$\Delta \text{HR}_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>-0.791***</td>
<td>-3.378***</td>
<td>-0.329</td>
<td>-3.057***</td>
</tr>
<tr>
<td></td>
<td>(0.248)</td>
<td>(1.027)</td>
<td>(0.527)</td>
<td>(0.976)</td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{License}_m$</td>
<td>-0.223</td>
<td>-0.381</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.208)</td>
<td>(0.318)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{HHI}_m$</td>
<td></td>
<td>-2.583**</td>
<td></td>
<td>-2.769**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.135)</td>
<td></td>
<td>(1.176)</td>
</tr>
<tr>
<td>$V_{m,t-1} \times \text{WRLURI}_m$</td>
<td></td>
<td></td>
<td>-0.438</td>
<td>-0.690**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.341)</td>
<td>(0.339)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-Squared</td>
<td>0.082</td>
<td>0.107</td>
<td>0.084</td>
<td>0.111</td>
</tr>
<tr>
<td># Observations</td>
<td>358</td>
<td>358</td>
<td>358</td>
<td>358</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>Determinants</th>
<th>Coefficient</th>
<th>Standard Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>ΔUnempl Rate_{m,07-08}</td>
<td>1.845***</td>
<td>(0.510)</td>
</tr>
<tr>
<td>Δ log(Rent)_{m,00-08}</td>
<td>1.116***</td>
<td>(0.393)</td>
</tr>
<tr>
<td>Δ log(Income)_{m,00-08}</td>
<td>-2.283***</td>
<td>(0.554)</td>
</tr>
<tr>
<td>Δ log(Population)_{m,00-08}</td>
<td>-0.122**</td>
<td>(0.055)</td>
</tr>
<tr>
<td>Δ log(Age)_{m,00-08}</td>
<td>-3.200***</td>
<td>(1.023)</td>
</tr>
<tr>
<td>ΔUnempl Rate_{m,00-08}</td>
<td>-14.404***</td>
<td>(2.849)</td>
</tr>
<tr>
<td>Big-4 Headquarter_{m}</td>
<td>0.118***</td>
<td>(0.020)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.302</td>
<td></td>
</tr>
<tr>
<td>Number of Observations</td>
<td>299</td>
<td></td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>1.373***</td>
<td>1.373***</td>
</tr>
<tr>
<td></td>
<td>(0.471)</td>
<td>(0.526)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.019</td>
<td>0.108</td>
</tr>
<tr>
<td># Observations</td>
<td>1380</td>
<td>1380</td>
</tr>
</tbody>
</table>
Table: Credit Shock and Homeownership Rate in Bartik-type Regressions

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta HR_{m,t}$</th>
<th>$\Delta HR_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>-0.983***</td>
<td>-1.003***</td>
</tr>
<tr>
<td></td>
<td>(0.277)</td>
<td>(0.135)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.015</td>
<td>0.082</td>
</tr>
<tr>
<td># Observations</td>
<td>358</td>
<td>358</td>
</tr>
</tbody>
</table>
### Table: Rental Vacancies and Big-4 Credit Shock in Bartik-type Regressions

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \text{Vacancy Rate}_{m,t}$</th>
<th>$\Delta \text{Vacancy Rate}_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>-0.593</td>
<td>-0.923*</td>
</tr>
<tr>
<td></td>
<td>(0.641)</td>
<td>(0.523)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.052</td>
<td>0.290</td>
</tr>
<tr>
<td># Observations</td>
<td>348</td>
<td>348</td>
</tr>
</tbody>
</table>
Table: New Building Permits and Big-4 Credit Shock in Bartik-type Regressions

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(\text{Multi Unit})_{m,t}$</th>
<th>$\Delta \log(\text{Multi Unit})_{m,t}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{m,t-1}$</td>
<td>24.534**</td>
<td>29.796***</td>
</tr>
<tr>
<td></td>
<td>(12.273)</td>
<td>(8.899)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.331</td>
<td>0.430</td>
</tr>
<tr>
<td># Observations</td>
<td>1223</td>
<td>1223</td>
</tr>
</tbody>
</table>
Fly to quality?

Denial Rates and Propensity to Deny

Denial Rate and Lender-Year Fixed Effect

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 $\implies$
    - lower-quality borrowers choose to rent
    - quality of the pool of borrowers improves
    - 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 $share_{2008_m}$

$$s_m = share_{2008_m} - \hat{\beta}X_m$$

- $X_m =$ 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:

$$W_{m,t} = (L_{t,Big4} - L_{t,NoBig4}) \cdot s_m.$$
Table: Determinants of Big-4 Share in 2008.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Share_{m,08}</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta Unempl \ Rate_{m,07-08}$</td>
<td>1.845***</td>
</tr>
<tr>
<td></td>
<td>(0.510)</td>
</tr>
<tr>
<td>$\Delta \log(\text{Rent})_{m,00-08}$</td>
<td>1.116***</td>
</tr>
<tr>
<td></td>
<td>(0.393)</td>
</tr>
<tr>
<td>$\Delta \log(\text{Income})_{m,00-08}$</td>
<td>-2.283***</td>
</tr>
<tr>
<td></td>
<td>(0.554)</td>
</tr>
<tr>
<td>$\Delta \log(\text{Population})_{m,00-08}$</td>
<td>-0.122**</td>
</tr>
<tr>
<td></td>
<td>(0.055)</td>
</tr>
<tr>
<td>$\Delta \log(\text{Age})_{m,00-08}$</td>
<td>-3.200***</td>
</tr>
<tr>
<td></td>
<td>(1.023)</td>
</tr>
<tr>
<td>$\Delta Unempl \ Rate_{m,00-08}$</td>
<td>-14.404***</td>
</tr>
<tr>
<td></td>
<td>(2.849)</td>
</tr>
<tr>
<td>Big-4 Headquarter$_m$</td>
<td>0.118***</td>
</tr>
<tr>
<td></td>
<td>(0.020)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.302</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>299</td>
</tr>
</tbody>
</table>
**Table:** Robustness Check: Bartik Regression and Second Stage IV Estimation

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$W_{m,t-1}$</td>
<td>1.245***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.397)</td>
<td></td>
</tr>
<tr>
<td>$\Delta \text{Denial Rate}_{m,t}$</td>
<td>2.226**</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.901)</td>
<td></td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td># Observations</td>
<td>1368</td>
<td>1368</td>
</tr>
</tbody>
</table>
Robustness #2: Focus on FHA

- Sample only FHA loans

\[ Y_{m,t} = (L_{t,\text{Big4}}^{FHA} - L_{t,\text{NoBig4}}^{FHA}) \cdot \text{Share}_m \]
<table>
<thead>
<tr>
<th>Outcome: $Y_{m,t-1}$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.904***</td>
<td>0.931***</td>
</tr>
<tr>
<td></td>
<td>(0.336)</td>
<td>(0.354)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.020</td>
<td>0.110</td>
</tr>
<tr>
<td>Number Observations</td>
<td>1380</td>
<td>1380</td>
</tr>
</tbody>
</table>
### Table: Robustness Check: Denial Rates, Rents, and FHA Denial Propensity based on IV Estimation (Stage 2).

<table>
<thead>
<tr>
<th>Outcome:</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
<th>$\Delta \log(\text{Rent}_{m,t})$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\Delta \text{Denial Rate}_{m,t}$</td>
<td>2.091*** (0.780)</td>
<td>2.096** (0.868)</td>
</tr>
<tr>
<td>MSA-Year Controls</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>MSA FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Year FE</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Underidentification test (p-value)</td>
<td>0.130</td>
<td>0.130</td>
</tr>
<tr>
<td>Number of Observations</td>
<td>1380</td>
<td>1380</td>
</tr>
</tbody>
</table>
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)

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

• I am speaking today as a researcher and as a concerned citizen
• not as a representative of:
  • The Boston Fed
  • or the Federal Reserve System

• When I say “we”, I don’t mean Janet and me.
Disclaimer

• I am speaking today as a researcher and as a concerned citizen
• not as a representative of:
  • The Boston Fed
  • or the Federal Reserve System

• When I say “we”, I don’t mean Janet and me.
Disclaimer

- I am speaking today as a researcher and as a concerned citizen
- not as a representative of:
  - The Boston Fed
  - or the Federal Reserve System

- When I say “we”, I don’t mean Janet and me.
Disclaimer

• I am speaking today as a researcher and as a concerned citizen

• not as a representative of:
  • The Boston Fed
  • or the Federal Reserve System

• When I say “we”, I don’t mean Janet and me.
Disclaimer

- I am speaking today as a researcher and as a concerned citizen
- not as a representative of:
  - The Boston Fed
  - or the Federal Reserve System

- When I say “we”, I don’t mean Janet and me.
Disclaimer

• I am speaking today as a researcher and as a concerned citizen
• not as a representative of:
  • The Boston Fed
  • or the Federal Reserve System

• When I say “we”, I don’t mean Janet and me.
Two different views
Two different views
Explaining the boom

- Credit Expansion in early 2000s
  - Helped constrained borrowers
    - Marginal borrowers
    - Constrained borrowers
    - Drive up house prices (also relaxes constraints)
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
  - Revisit shift
  - Old Question: Why credit expansion?
Explaining the boom

Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

Unconstrained borrowers?
- Wealth effects?
- Relative balance sheet shift in debt to constrained
- Old Question: Why credit expansion?
- Revisit shift
Explaining the boom

- Credit Expansion in early 2000s
  - Helped constrained borrowers
    - Marginal borrowers
    - Constrained borrowers
    - Drive up house prices (also relaxes constraints)
  - Unconstrained borrowers?
    - Wealth effects?
    - Relative balance sheet shift in debt to constrained
    - Old Question: Why credit expansion?
    - Revisit shift

Constrained
Low Income
Low Credit Score

Unconstrained
High Income
High Credit Score
Explaining the boom

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)
- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
- Old Question: Why credit expansion?
- Revisit shift
Explaining the boom

- **Credit Expansion in early 2000s**
- **Helped constrained borrowers**
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)
- **Unconstrained borrowers?**
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
- **Old Question: Why credit expansion?**
  - Revisit shift
Explaining the boom

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)
- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
- Old Question: Why credit expansion?
  - Revisit shift

Credit Expansion

Constrained
- Low Income
- Low Credit Score

Unconstrained
- High Income
- High Credit Score
Explaining the boom

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
  - Old Question: Why credit expansion?
  - Revisit shift
Explaining the boom

Credit Expansion

Constrained
Low Income
Low Credit Score

Unconstrained
High Income
High Credit Score

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
  - Old Question: Why credit expansion?
  - Revisit shift
Explaining the boom

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)
- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
  - Old Question: Why credit expansion?
  - Revisit shift
Explaining the boom

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)
- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
- Old Question: Why credit expansion?
  - Revisit shift
Explaining the boom

Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

Unconstrained borrowers?
- Wealth effects?
- Relative balance sheet shift in debt to constrained
- Old Question: Why credit expansion?
- Revisit shift

Why?
- Securitization
- Deregulation
- Over-regulation
- Optimistic HPA Beliefs?

Constrained
Low Income
Low Credit Score

Relative Shift

Unconstrained
High Income
High Credit Score

Credit Expansion
Explaining the boom

Why?
- Securitization
- Deregulation
- Over-regulation
- Optimistic HPA Beliefs?

Credit Expansion

Constrained
Low Income
Low Credit Score

Relative Shift

Unconstrained
High Income
High Credit Score

- Credit Expansion in early 2000s
- Helped constrained borrowers
  - Marginal borrowers
  - Constrained borrowers
  - Drive up house prices (also relaxes constraints)

- Unconstrained borrowers?
  - Wealth effects?
  - Relative balance sheet shift in debt to constrained
  - Old Question: Why credit expansion?
  - Revisit shift
Adelino, Schoar and Severino (2016)

- Mian and Sufi (2009): “In fact, 2002 to 2005 is the only period in the past eighteen years in which income and mortgage credit growth are negatively correlated.”

- Adelino et al (2016): Misinterpreted as showing that low income people taking relatively bigger loans
Mian and Sufi (2009): “In fact, 2002 to 2005 is the only period in the past eighteen years in which income and mortgage credit growth are negatively correlated.”

Adelino et al (2016): Misinterpreted as showing that low income people taking relatively bigger loans
Adelino, Schoar and Severino (2016)

- Mian and Sufi (2009): “In fact, 2002 to 2005 is the only period in the past eighteen years in which income and mortgage credit growth are negatively correlated.”

- Adelino et al (2016): Misinterpreted as showing that low income people taking relatively bigger loans
Mian and Sufi (2009): “In fact, 2002 to 2005 is the only period in the past eighteen years in which income and mortgage credit growth are negatively correlated.”

Adelino et al. (2016): Misinterpreted as showing that low income people taking relatively bigger loans
Adelino, Schoar and Severino (2016)

- Mian and Sufi (2009): “In fact, 2002 to 2005 is the only period in the past eighteen years in which income and mortgage credit growth are negatively correlated.”
- Adelino et al (2016): Misinterpreted as showing that low income people taking relatively bigger loans
The extensive margin

- Mian and Sufi (2016): More loans is credit reallocation
- Foote, Loewenstein and Willen (2016): Increase in originations in low income areas offset by increase in terminations.
The extensive margin

- Mian and Sufi (2016): More loans is credit reallocation
- Foote, Loewenstein and Willen (2016): Increase in originations in low income areas offset by increase in terminations.
The extensive margin

- Mian and Sufi (2016): More loans is credit reallocation
- Foote, Loewenstein and Willen (2016): Increase in originations in low income areas offset by increase in terminations.
The extensive margin

- Mian and Sufi (2016): More loans is credit reallocation
- Foote, Loewenstein and Willen (2016): Increase in originations in low income areas offset by increase in terminations.
New Facts about the Cross Section of Debt in the Boom

- Adelino et al. (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.
New Facts about the Cross Section of Debt in the Boom

- Adelino et al (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.
New Facts about the Cross Section of Debt in the Boom

- Adelino et al. (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.

![8Q lagged Equifax Riskscore](image-url)
New Facts about the Cross Section of Debt in the Boom

- Adelino et al (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.
New Facts about the Cross Section of Debt in the Boom

- Adelino et al (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.
New Facts about the Cross Section of Debt in the Boom

- Adelino et al. (2016) important in its own right
- New research revising our view of the boom.
  - Albanesi et al. (2016)
  - Bhutta and Keys (2016)
  - Foote, Loewenstein and Willen (2016)
- No credit reallocation to constrained borrowers.
Greenwald (2016)

- Key ingredient is a focus on the flow debt constraint
- Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
- Ganong and Noel (2016) compare two policies
  - Cut monthly payment
  - Cut monthly payment and principal
- Challenge is cross-sectional implications
  - Model implies a big shift in debt to constrained
Key ingredient is a focus on the flow debt constraint

Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.

Ganong and Noel (2016) compare two policies
  • Cut monthly payment
  • Cut monthly payment and principal

Challenge is cross-sectional implications
  • Model implies a big shift in debt to constrained
Greenwald (2016)

- Key ingredient is a focus on the flow debt constraint
- Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
- Ganong and Noel (2016) compare two policies
  - Cut monthly payment
  - Cut monthly payment and principal
- Challenge is cross-sectional implications
  - Model implies a big shift in debt to constrained
Greenwald (2016)

• Key ingredient is a focus on the flow debt constraint
• Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
• Ganong and Noel (2016) compare two policies
  • Cut monthly payment
  • Cut monthly payment and principal
• Challenge is cross-sectional implications
  • Model implies a big shift in debt to constrained
• Key ingredient is a focus on the flow debt constraint
• Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
• Ganong and Noel (2016) compare two policies
  • Cut monthly payment
  • Cut monthly payment and principal
• Challenge is cross-sectional implications
  • Model implies a big shift in debt to constrained
Greenwald (2016)

- Key ingredient is a focus on the flow debt constraint
- Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
- Ganong and Noel (2016) compare two policies
  - Cut monthly payment
  - Cut monthly payment and principal
- Challenge is cross-sectional implications
  - Model implies a big shift in debt to constrained
Greenwald (2016)

- Key ingredient is a focus on the flow debt constraint
- Lots of empirical research now confirms that it is the flow burden of debt that matters not the stock.
- Ganong and Noel (2016) compare two policies
  - Cut monthly payment
  - Cut monthly payment and principal
- Challenge is cross-sectional implications
  - Model implies a big shift in debt to constrained
New View of Credit Expansion

Old view

New view

Counterfactual

Debt growth

Low income
New View of Credit Expansion

Old view | New view | Counterfactual

Debt growth

Low income | High income
New View of Credit Expansion

Old view

- Low income
- + Sub-prime

New view

- High income

Counterfactual
New View of Credit Expansion

Old view

+ Sub-prime

Low income

High income

Low income

New view

Counterfactual
New View of Credit Expansion

Old view

- Low income
- High income
- Sub-prime

New view

- Low income
- High income
- High income

Counterfactual

- High income
New View of Credit Expansion

Old view

- Low income + Sub-prime
- High income

New view

- Low income + Sub-prime
- High income

Counterfactual

- High income
New View of Credit Expansion

Old view
- Low income
- High income
- + Sub-prime

New view
- Low income
- High income
- + Sub-prime

Counterfactual
- Low income
- High income
New View of Credit Expansion

Old view
- Low income
- High income
- + Subprime

New view
- Low income
- High income
- + Subprime
- High income

Counterfactual
- Low income
- High income
• Credit constraints view led to policy
• Restrict credit to marginal borrowers!
• Gete and Reher (2016): “Tighter mortgage standards have increased demand for rental housing and led to higher rents, depressed homeownership rates, greater construction of multifamily housing, and lower rental vacancies.”
• Given what we now know, is this an appropriate response?
Policy Implications: Gete and Reher (2016)

- Credit constraints view led to policy
- Restrict credit to marginal borrowers!
- Gete and Reher (2016): “Tighter mortgage standards have increased demand for rental housing and led to higher rents, depressed homeownership rates, greater construction of multifamily housing, and lower rental vacancies.”
- Given what we now know, is this an appropriate response?
Policy Implications: Gete and Reher (2016)

- Credit constraints view led to policy
- Restrict credit to marginal borrowers!
- Gete and Reher (2016): “Tighter mortgage standards have increased demand for rental housing and led to higher rents, depressed homeownership rates, greater construction of multifamily housing, and lower rental vacancies.”
- Given what we now know, is this an appropriate response?
Policy Implications: Gete and Reher (2016)

- Credit constraints view led to policy
- Restrict credit to marginal borrowers!
- Gete and Reher (2016): “Tighter mortgage standards have increased demand for rental housing and led to higher rents, depressed homeownership rates, greater construction of multifamily housing, and lower rental vacancies.”
- Given what we now know, is this an appropriate response?
The slide you’ve all been waiting for...

- The end.
The slide you’ve all been waiting for...

- The end.