Stimulating Housing Markets

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*The views expressed here are the authors’ and do not necessarily reflect those of the Internal Revenue Service or the Office of Tax Analysis.
Motivating Questions

1. What is the effect of fiscal stimulus on durables?
   Hall and Jorgenson (1967); Abel (1982); Auerbach and Hassett (1992); Cummins, Hassett, and Hubbard (1994, 1996); Adda and Cooper (2000); Desai and Goolsbee (2004); Johnson, Parker, and Souleles (2006); Agarwal, Liu, and Souleles (2007); House and Shapiro (2008); Mian and Sufi (2012); Dynan, Gayer, and Plotkin (2013); Floetotto, Kirker, and Stroebel (2014); Best and Kleven (2015); Zwick and Mahon (2016)
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2. **How should policy respond to capital overhang?**
   Hayek (1931); Fisher (1933); Keynes (1936); Shleifer and Vishny (1992); Kiyotaki and Moore (1997); Bolton and Rosenthal (2002); Lorenzoni (2008); Hall (2009); Ramey and Shapiro (2001); Eisfeldt and Rampini (2006); Shleifer and Vishny (2010); Correia, Farhi, Nicolini, and Teles (2012); Eggertsson and Krugman (2012); AABCPS (2012); AACPSY (2015); Mian and Sufi (2015); Rognlie, Shleifer, and Simsek (2015)
Motivating Questions

1. What is the effect of fiscal stimulus on durables?
   
   **Temporary housing credits + New data**

2. How should policy respond to capital overhang?
   
   **For the policy we study, the effect on quantities**
   
   ▶ is large,
   ▶ does not immediately revert,
   ▶ is concentrated among existing assets,
   ▶ likely enables stable reallocation from low value sellers to high value buyers,
   ▶ stabilized house prices.
1. Policy Setting, Data & Research Design
First-Time Homebuyer Tax Credit

1. Temporary fiscal stimulus with three iterations
   - V1 (April 2008-June 2009): Interest-free loan up to $7.5K for first-time homebuyers
   - V2 (Feb 2009-Nov 2009): Refundable tax credit of $8K for first-time homebuyers
   - V3 (Nov 2009-May 2010): Extended V2 and expanded to long-time homebuyers

We focus on V2 and V3 (refundable tax credit).
First-Time Homebuyer Tax Credit

1. Temporary fiscal stimulus with three iterations

2. Maximum $8K credit for FTHC, $6.5K for LTHC
   - Claimed on federal tax return and delivered by refund
   - Could be applied to prior return to accelerate payment
   - Bridge loans administered by state FHAs and pvt lenders; could be applied to down payment or closing costs

3. Eligibility requirements

4. Big number? Why this policy?
   - 5-6X size of CARS (Mian and Sufi 2012), $16B estimated
   - Did not destroy existing capital
   - Though wasn’t exclusive to new home sales
   - Capital overhang in housing markets
   - Extraordinary distress and inventory levels
   - High leverage and tight credit for buyers in bust
   - Negative spillovers of foreclosures
**First-Time Homebuyer Tax Credit**

1. Temporary fiscal stimulus with three iterations

2. Maximum $8K credit for FTHC, $6.5K for LTHC

3. Eligibility requirements
   - For FTHC, must not own during 3-year period preceding purchase date
   - For LTHC, must have owned and used home for 5-year period in last 8 years
   - Must earn less than 75K-95K (single) or 150-170K (joint)
   - Must buy during policy window

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First-Time Homebuyer Tax Credit

1. Temporary fiscal stimulus with three iterations

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     - Negative spillovers of foreclosures
State of the Housing Market

Housing inventories (000s)

Year/Month

2004m1 2006m1 2008m1 2010m1 2012m1 2014m1
State of the Housing Market

- REOs & Foreclosures
- Short Sales
- Other Resales

Percent of Monthly Sales

- 2004m1
- 2006m1
- 2008m1
- 2010m1
- 2012m1
- 2013m9
Research Design

1. Measure geographic variation in ex ante exposure to FTHC
   ▶ First-time homebuyer share in 2000

2. Confirm places with higher ex ante exposure saw more people claim the credit

3. Estimate policy effect with a generalized diff-in-diffs design using ex ante exposure as the instrument
   ▶ Existing home sales
   ▶ New home sales
   ▶ Prices

4. Explore reallocation with detailed information on sellers and buyers during the policy period
Data Sources

1. **US Dept of Treasury tax files (de-identified)**
   - Homeownership from itemized deductions (1040 Sch A), interest payments (Info Return 1098)
   - Credit claiming (Form 5405)
   - Use to construct exposure measures

2. **Housing sales**
   - Monthly from Dataquick deeds records (2004-2013m6)
   - Can use zip, county, and CBSA level counts

3. **Origination loan characteristics**
   - Dataquick transactions and concurrent loan records
   - Fannie/Freddie/Ginnie MBS loan pools (HMDA)

4. **House prices**
   - Corelogic
   - FHFA
   - Dataquick

5. **Demographics**
   - Use Census/ACS for covariates, housing stock, Equifax
Google Search Data

The diagram illustrates the search activity for two keywords: "first time home buyer" and "home buyer credit". The x-axis represents time in months (2008M5 to 2010M6), and the y-axis represents search activity. The lines show fluctuations in search activity over time, with peaks and troughs indicating periods of high and low interest. The keywords show different trends, with "first time home buyer" peaking in 2009M11 and "home buyer credit" peaking in 2009M2.
Aggregate time series

Annualized Existing Home Sales (000s)

2004m1, 2006m1, 2008m1, 2010m1, 2012m1, 2014m1
AGGREGATE TIME SERIES

Annualized Home Sales (000s)

2004m12 2008m5 2010m6 2012m12
Total Claims: 1.8M for V2 and V3 (~250K LTHBC)
Measuring Place-Based Exposure

**Exposure:** Fraction of residents in 2000 who were first-time buyers

1. Itemize tax return with property tax or mortgage interest deduction (Form 1040 Schedule A)
2. Receive information return from lender (Form 1098)
3. First-time buyers were not owners in \( t - 1 \) and \( t - 2 \)

**Pros**

1. Analysis at the ZIP code level with CBSA-time effects
2. Measured prior to the policy and subprime expansion

**Cons**

1. Miss those who own homes outright
2. Places may change over time
3. Not exogenous
   - Test parallel trends graphically, with controls, subsamples, placebo test, extra diff, age distribution
Geographic Variation in Exposure

Chicagoland

Boston

- Cambridge
- South Boston
- Dorchester

Legend:
- 0.028 – 0.123
- 0.023 – 0.028
- 0.019 – 0.023
- 0.001 – 0.019
- No data
### Exposure and Covariates

<table>
<thead>
<tr>
<th>Exposure Correlates:</th>
<th>LHS is Exposure</th>
<th>Coefficient</th>
<th>$R^2$</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Age</td>
<td>-.052+</td>
<td>0.0027</td>
<td>8882</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Median Rent</td>
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<td>Fraction below Poverty Line</td>
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<td>Fraction Classified as Urban</td>
<td>.0785**</td>
<td>0.0062</td>
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<td>Controls:</td>
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</tr>
<tr>
<td>Log(Population)</td>
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<td>8882</td>
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<tr>
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<tr>
<td>Unemployment Rate</td>
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<td>(.0335)</td>
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<tr>
<td>Log(Average Gross Income)</td>
<td>.0247</td>
<td>0.0006</td>
<td>8882</td>
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<tr>
<td>Subprime Cardholder Fraction</td>
<td>-.0161</td>
<td>0.0003</td>
<td>8732</td>
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<tr>
<td></td>
<td>(.0386)</td>
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</tbody>
</table>

Note: All variables are standardized for ease of interpretation.
Exposure and FTHC claims: ZIP level

Coefficient: 0.33, Clustered t-stat: 22, $R^2$: 0.42
2. The Effect of FTHC on Sales
**Monthly Regressions: ZIP w/CBSA FEs**

The graph illustrates the sales impact coefficient over different months from 2007 to 2013, with and without controls. The y-axis represents the sales impact coefficient, ranging from -0.02 to 0.08, and the x-axis represents the months from 2007m1 to 2013m1.

The graph shows the sales impact coefficient with and without controls, along with their respective 95% confidence intervals. The data points for each month are plotted, with the solid line indicating the sales impact coefficient with controls and the dashed line indicating the sales impact coefficient without controls.

The 95% confidence intervals are represented by shaded areas around the lines, providing a visual indication of the uncertainty around the estimates. The graph effectively communicates the fluctuation in sales impact coefficients over time, highlighting the importance of considering control variables in econometric analyses.
### Cumulative Regressions: ZIP w/CBSA FEs

Sales impact coefficient, cumulative purchases

<table>
<thead>
<tr>
<th>Month</th>
<th>With controls</th>
<th>95% Confidence Interval</th>
<th>Without controls</th>
<th>95% Confidence Interval</th>
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<tr>
<td>2007m1</td>
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<tr>
<td>2012m1</td>
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<tr>
<td>2013m1</td>
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</tbody>
</table>

**Legend:**
- Red dashed line: With controls
- Blue dashed line: Without controls
- Red solid line: 95% Confidence Interval
- Blue dashed line: 95% Confidence Interval
$$\frac{\text{Sales}_i, t \rightarrow T}{\text{Sales}_i, 2007} = \alpha + \beta \text{Exposure}_i + \gamma X_i + \epsilon_i$$

<table>
<thead>
<tr>
<th></th>
<th>(1) No Controls</th>
<th>(2) Controls</th>
<th>(3) CBSA FE</th>
<th>(4) Logs</th>
<th>(5) No wgts</th>
<th>(6) Ex sand</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-policy 2007m9-2009m1</strong></td>
<td>0.001 (0.005)</td>
<td>0.001 (0.005)</td>
<td>0.002 (0.003)</td>
<td>0.005 (0.004)</td>
<td>0.002 (0.003)</td>
<td>0.001 (0.003)</td>
</tr>
<tr>
<td><strong>Policy 2009m2-2010m6</strong></td>
<td>0.025** (0.01)</td>
<td>0.024* (0.01)</td>
<td>0.024** (0.005)</td>
<td>0.031** (0.007)</td>
<td>0.03** (0.008)</td>
<td>0.02** (0.005)</td>
</tr>
<tr>
<td><strong>Post-policy 2010m7-2011m11</strong></td>
<td>0.014 (0.011)</td>
<td>0.019 (0.012)</td>
<td>0.002 (0.005)</td>
<td>-0.005 (0.008)</td>
<td>0.009 (0.008)</td>
<td>-0.003 (0.004)</td>
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<tr>
<td><strong>Early policy 2009m2-2009m9</strong></td>
<td>0.013 (0.008)</td>
<td>0.012 (0.008)</td>
<td>0.017** (0.005)</td>
<td>0.029** (0.008)</td>
<td>0.022** (0.007)</td>
<td>0.014** (0.005)</td>
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<tr>
<td><strong>Spike 1 2009m10-2009m12</strong></td>
<td>0.046** (0.012)</td>
<td>0.043** (0.013)</td>
<td>0.04** (0.007)</td>
<td>0.042** (0.007)</td>
<td>0.047** (0.009)</td>
<td>0.036** (0.007)</td>
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<tr>
<td><strong>Spike 2 2010m4-2010m6</strong></td>
<td>0.033** (0.01)</td>
<td>0.031** (0.011)</td>
<td>0.032** (0.007)</td>
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<td>0.037** (0.009)</td>
<td>0.028** (0.007)</td>
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<td>Yes</td>
<td>Yes</td>
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<td><strong>CBSA FE</strong></td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>(a) 1-3 Bedrooms, ZIP</td>
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<td>(2) CBSA FE</td>
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<tr>
<td><strong>Pre-policy</strong></td>
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<tr>
<td>2007m9-2009m1</td>
<td>0.01 (0.008)</td>
<td>0.012* (0.005)</td>
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<tr>
<td><strong>Policy</strong></td>
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<tr>
<td>2009m2-2010m6</td>
<td>0.018 (0.011)</td>
<td>0.025** (0.006)</td>
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<tr>
<td><strong>Post-policy</strong></td>
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<tr>
<td>2010m7-2011m11</td>
<td>0.009 (0.012)</td>
<td>0.01+ (0.005)</td>
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<tr>
<td><strong>Early policy</strong></td>
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<tr>
<td>2009m2-2009m9</td>
<td>0.008 (0.009)</td>
<td>0.019** (0.005)</td>
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<tr>
<td><strong>Spike 1</strong></td>
<td></td>
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<tr>
<td>2009m10-2009m12</td>
<td>0.033* (0.014)</td>
<td>0.037** (0.008)</td>
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<td>2010m4-2010m6</td>
<td>0.024* (0.012)</td>
<td>0.031** (0.006)</td>
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<tr>
<td><strong>Controls</strong></td>
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<tr>
<td><strong>CBSA FE</strong></td>
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</table>

<table>
<thead>
<tr>
<th>(b) 4+ Bedrooms, ZIP</th>
<th>(1) No Controls</th>
<th>(2) CBSA FE</th>
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</thead>
<tbody>
<tr>
<td><strong>Pre-policy</strong></td>
<td>-0.008 (0.007)</td>
<td>-0.003 (0.006)</td>
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<tr>
<td>2007m9-2009m1</td>
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<tr>
<td><strong>Policy</strong></td>
<td>-0.003 (0.008)</td>
<td>0.006 (0.006)</td>
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<td>2009m2-2010m6</td>
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<tr>
<td><strong>Post-policy</strong></td>
<td>-0.007 (0.008)</td>
<td>-0.0 (0.006)</td>
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<td>2010m7-2011m11</td>
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<tr>
<td><strong>Early policy</strong></td>
<td>-0.006 (0.007)</td>
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<td>2009m2-2009m9</td>
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<td>0.01 (0.007)</td>
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<td>2009m10-2009m12</td>
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<tr>
<td><strong>Spike 2</strong></td>
<td>-0.0 (0.009)</td>
<td>0.008 (0.008)</td>
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<td>2010m4-2010m6</td>
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<td><strong>Controls</strong></td>
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<td>Yes</td>
</tr>
<tr>
<td><strong>CBSA FE</strong></td>
<td>No</td>
<td>Yes</td>
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</table>
Heterogeneity by Initial Price Level

![Graph showing heterogeneity by initial price level. The x-axis represents price level bins from 1 to 10, and the y-axis represents sales longdiff coefficient ranging from -0.5 to 0.5. The graph includes error bars for each bin.]
Distribution of First-Time Homebuyers by Age

2003
Distribution of First-Time Homebuyers by Age

Primary Taxpayer Age

Share of FTHBs

2004
Distribution of First-Time Homebuyers by Age

![Graph showing the distribution of first-time homebuyers by age. The graph has a y-axis labeled 'Share of FTHBs' ranging from 0 to 0.05 and an x-axis labeled 'Primary Taxpayer Age' ranging from 20 to 60. The highest peak is labeled '2005.' ]
Distribution of First-Time Homebuyers by Age

Primary Taxpayer Age

Share of FTHBs

2006
Distribution of First-Time Homebuyers by Age

The chart shows the distribution of first-time homebuyers by age. The Y-axis represents the share of FTHBs, while the X-axis represents the primary taxpayer age. The data is presented for different years, with 2008 being highlighted. The chart indicates that the highest share of FTHBs is among individuals aged 20-30 years.
DISTRIBUTION OF FIRST-TIME HOMEBUYERS BY AGE

[Graph showing the distribution of first-time homebuyers by age, with a peak around the year 2009.]
Distribution of First-Time Homebuyers by Age

![Graph showing distribution of first-time homebuyers by age with peaks in 2009 and 2010. The x-axis represents primary taxpayer age ranging from 20 to 60, and the y-axis represents the share of FTHBs. The graph indicates a higher peak in 2009 compared to 2010.](image)
Distribution of First-Time Homebuyers by Age

Share of FTHBs

Primary Taxpayer Age

2009

2011
Distribution of First-Time Homebuyers by Age

Share of FTHBs vs Primary Taxpayer Age

- 2009
- 2012
Distribution of First-Time Homebuyers by Age

![Graph showing the distribution of first-time homebuyers by age with data points for 2009 and 2013.]
**Distribution of First-Time Homebuyers by Age**

<table>
<thead>
<tr>
<th>Year</th>
<th>Age P50</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009 All</td>
<td>33</td>
</tr>
<tr>
<td>2009 FTHC</td>
<td>32</td>
</tr>
<tr>
<td>Other</td>
<td>35</td>
</tr>
</tbody>
</table>

![Graph showing the distribution of first-time homebuyers by age with specific data points for 2009 and age P50 values for different categories.]
Age Distribution Shift vs. Exposure

Excess Mass of Young Buyers vs. Place-based Exposure
The Effect Persists

- 1 SD of exposure $\implies$ 50-60% more sales cumulatively
- Induced sales relative to bottom quantile of 157K (7.4%)

$$\Delta Sales_g = 17 \times \beta \times (e_g - e_{g,low}) \times s_{g,2007}$$

- 382K if similar effect in uncovered areas
- Compare to 1.6M FTHC claims during this time
- Lower bound if lowest exposure group also responds
- If $e_{g,low} = 0$, then aggregate is 546K (10.7%)

Key Results: Significant response and slow post-policy reversal
**Existing Sales versus New Sales**

<table>
<thead>
<tr>
<th>Change in Existing Sales</th>
<th>Change in New Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>-0.125σ</td>
<td>0.125σ</td>
</tr>
</tbody>
</table>

Delta Average Home Sales, Policy vs. Pre:

-2  -1  0  1  2

Place-based Exposure

Key Result: GDP effects likely second order or indirect

- **Fees:** (3-5%) × (382K Sales) × ($190K price) = $2.2-3.6B
- **Furniture:** (1-1.5%) × (382K) × ($190K) = $700M-1.1B
- **Cost:** ~$11B for FTHC
3. The Effect of FTHC on Reallocation
**FTHC as a Market Stabilizer**

**Policy Problem:** Extraordinary distress in housing market
- Vacancies, short sales, and foreclosures depress house prices
- Widespread concern fire sale dynamics would continue because many distressed sellers and constrained buyers

**Policy Rationale:** Correct market failures due to distress
1. Pecuniary externality
   - Foreclosures/short sales affect prices nearby
2. Credit market failure due to constrained buyers and elevated vacancies
   - MC of delivering house $< $ MB of unit being occupied
   - Vacant homes depreciate faster, enable crime
The Evidence for Reallocation

1. Many transactions involve low value or distressed sellers
   - Inventories of builders and developers
   - Portfolios of banks and government-sponsored entities
   - Foreclosures and short sales

2. High value, constrained buyers induced to enter
   - Large share of buyers down payment constrained
   - Constraints relaxed by FTHC

3. The reallocation strengthened the market and was stable
   - Quantity response does not reverse
   - Low subsequent defaults by buyers
   - Large fraction of purchased homes previously vacant
   - Positive house price effects
Low Value Sellers

<table>
<thead>
<tr>
<th>Share of Policy Period Sales</th>
<th>Recently Built</th>
<th>Short Sale</th>
<th>Foreclosure/REO Sale</th>
<th>Developer Seller</th>
<th>GSE Seller</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.15</td>
<td>0.2</td>
<td>0.25</td>
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</tr>
</tbody>
</table>
FORECLOSURE AND SHORT SALE EFFECTS

Delta Average Foreclosures/Short Sales, Policy vs. Pre-Place-based Exposure
Federal Loan Origination LTVs in 2009

---

Kernel weighted density

20 30 40 50 60 70 80 90 100 110
Percent

0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7

FHA
GSEs

Percent
**Federal Loan Origination LTVs in 2009**

**FHA**: 1.66M FTHB loans in 2009, 2010

**Loan Cost Comparison** \((P = \$200K)\)

<table>
<thead>
<tr>
<th></th>
<th>GSE</th>
<th>FHA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Down</td>
<td>$40K</td>
<td>$7K</td>
</tr>
<tr>
<td>(r)</td>
<td>4.8%</td>
<td>6.2%</td>
</tr>
<tr>
<td>Insurance</td>
<td>None</td>
<td>0.55% + UMI</td>
</tr>
<tr>
<td>Cost</td>
<td>$301K</td>
<td>$436K</td>
</tr>
</tbody>
</table>

Kernel weighted density

Percent

Cost $301K $436K

GSEs

FHA
FTHC Cohorts Default at Low Rates

Policy cohorts with 2011 post cohort

Including pre-policy cohorts

Denominator is a running sum of new sales in each month up to the gray line, after which it remains constant.
Vacant Homes and Household Formation

Questions:
1. Do FTHC claimers move into previously vacant homes?
2. Do FTHC claimers move from multi to single family homes?

Answers:
1. 42% of FTHCs file at addresses with no filers in 2007
   - At ZIP level, vacancy share of claims correlated with foreclosure/short sale share of transactions
   - Not driven by new construction
2. 33.1% of FTHCs transition from multi to single filer address
   - Relative to 30.5% in other years
Price Effects

\[ \Delta p \approx 77 \text{ bps (}$1,720 \text{ at median} \ p_0) \]
**Key Result:** Potentially large indirect GDP effects

- $23B if $MPC = 0.1$, all housing stock affected
- $12B$ if only 1-3 bedroom homes
Stimulating Housing Markets

1. The effect on quantities is large, does not immediately revert, and is concentrated among existing assets.
   ▶ Limited direct GDP stimulus
   ▶ Focus on extensive margin can pull demand forward
   ▶ Down payment effects potentially key amplification mechanism

2. Enabled a stable reallocation from low value sellers to high value buyers, stabilized house prices.
   ▶ Mitigates the costs of capital overhang
   ▶ Likely complementary to principal/payment programs that focus on pre-foreclosure borrowers (e.g., HAMP, HARP)
   ▶ Possibly large indirect GDP stimulus through house prices
Stimulating Housing Markets

**Bottom Line**

1. The effect on quantities is large, does not immediately revert, and is concentrated among existing assets.

2. Enabled a stable reallocation from low value sellers to high value buyers, stabilized house prices.

**Next Steps**

- Estimate quantitative life-cycle model to clarify extensive margin/leverage mechanism
- Explore which model features explain difference between FTHC and other stimulus programs
Thanks!