Presentation Overview

- Original housing sample (introduced January 1999)
- Housing Initiative - July 2010 & ongoing
- Future work
CPI Housing Survey

- Relative Importance
  - Rent - 6.5%
  - Owners’ Equivalent Rent (OER) - 24%

- Housing units contribute to both Rent and OER indexes
1999 Housing Revision

- Frame drawn from 1990 Census
- Sample introduced in 1999
- Target sample 50,000 units
- Actual sample 25,000 units
- Most shortfall – high owner occupied areas:
  target 29,000 actual 11,000 (37%)
1999 continued

- Special augmentation in 2000
  - Drawn from existing segments
  - Yielded an additional 12,000 units

- New construction survey until 2006
  - Frame from Census new construction permit data
  - Yield about 150 units per year
1999-2010

- Sample becomes less representative
  - 1990 frame becomes less representative of 2010 housing universe
  - Rent change may differ by neighborhood
  - No opportunity for newly built units to enter the sample
  - Rent change for newer units may be different from that of older units
1999-2010

- Sample decreases
  - Renter units become owner units or non-residential
  - Respondent burden accumulates and leads to more refusals
  - Housing units demolished

- Sample size in 2010 was 29,000
Initial Housing Revision Plan

- CPI began requesting funding in 2005 to replace the housing sample:
  - Replace sample over a 6-year period
  - Increase sample size to 50,000 units
  - Continuously update 1/6th of sample units annually thereafter

- Plan was modified due to budget cuts and funding delays
2007 CPI Housing Initiative

- Improve accuracy and reduce costs by using private sector data as an alternative to former BLS method
- Improve weight calculations
- Update weights based on 2000 Census instead of 1990 Census
- Reduce average age of the housing sample
- Increase sample size
- Update rental unit samples on a continuous rather than decennial basis
Addressing Yield Problems and Reducing Costs

- Purchased private sector address lists
  - Replaces BLS data collectors listing in-person
  - Eliminates units with a high likelihood of owner occupancy

- Mail prescreening survey
  - Further reduces in-person screening by 20%

- Initiation cost half of previous approach and outlet yield is 40% higher
Weighting Improvements

- Updated sampling and weighting based on 2000 Decennial Census information
- Improved the model used to estimate OER expenditures used in sampling and weighting
- Added dynamic reweighting process
  - Weights for under-performing segments are increased
  - Weights for over-performing segments are reduced
Housing Initiative

3 stage effort

- Augmentation
- Replacement
- Rotation
Augmentation / Replacement

- Entirely new sample drawn and compared to existing sample
- “Holes” in percent renter and county dimensions filled in during augmentation
- Remaining segments rotated in during replacement
Augmentation

- 4 six month waves over a two year period
- Adding new segments without dropping existing ones
- Original sample mapped into 2000 Census geographies to update weights
- Target 16,000 units
Augmentation

Yield as of October 2013

<table>
<thead>
<tr>
<th>Augmentation Wave</th>
<th>First Production Use</th>
<th>Used in estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>July 2010</td>
<td>4,421</td>
</tr>
<tr>
<td>2A</td>
<td>January 2011</td>
<td>4,961</td>
</tr>
<tr>
<td>3A</td>
<td>July 2011</td>
<td>4,632</td>
</tr>
<tr>
<td>4A</td>
<td>January 2012</td>
<td>4,294</td>
</tr>
</tbody>
</table>

Total: 18,308
Price Movements

- Looking at 24 month price relatives for the original and augmentation samples:
  - Results: in 85% of the comparisons, the augmentation sample relatives were lower than the original sample relatives.
  - Augmentation has a higher concentration of OER important units and this result is consistent with overall RENT and OER differences.
Standard Errors

RENT 12 MONTH STANDARD ERRORS (5 YEARS)
Standard Errors

OER 12 MONTH STANDARD ERRORS (5 YEARS)
Replacement

- 8 six month waves over a four year period
- As new sample is introduced, old sample is dropped
- Completed July 2016 - all original sample quotes will be gone
# Replacement

<table>
<thead>
<tr>
<th>Replacement Waves</th>
<th>First Use</th>
<th>Used in Estimation</th>
<th>Rotated out</th>
</tr>
</thead>
<tbody>
<tr>
<td>1R</td>
<td>November 2012</td>
<td>5,093</td>
<td>3,681</td>
</tr>
<tr>
<td>2R</td>
<td>May 2013</td>
<td>4,163</td>
<td>3,728</td>
</tr>
<tr>
<td>3R</td>
<td>November 2013</td>
<td></td>
<td></td>
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<tr>
<td>4R</td>
<td>May 2014</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5R</td>
<td>January 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6R</td>
<td>July 2015</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7R</td>
<td>January 2016</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8R</td>
<td>July 2016</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(As of October 2013)
### October 2013 production

<table>
<thead>
<tr>
<th>Sample source</th>
<th>Number used in estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original</td>
<td>21,364</td>
</tr>
<tr>
<td>Augmentation</td>
<td>18,308</td>
</tr>
<tr>
<td>Replacement</td>
<td>9,256</td>
</tr>
<tr>
<td>Total</td>
<td>48,928</td>
</tr>
</tbody>
</table>

Sample will continue to grow because replacement segments tend to have more units than the original sample segments they are replacing.
## Age of Housing Sample

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Average Age</th>
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</thead>
<tbody>
<tr>
<td>2010</td>
<td>10.3</td>
</tr>
<tr>
<td>2011</td>
<td>9.3</td>
</tr>
<tr>
<td>2012</td>
<td>8.7</td>
</tr>
<tr>
<td>2013</td>
<td>7.4</td>
</tr>
<tr>
<td>2014</td>
<td>est 6.4</td>
</tr>
<tr>
<td>2015</td>
<td>est 5.1</td>
</tr>
<tr>
<td>2016</td>
<td>est 3.8</td>
</tr>
</tbody>
</table>
Using 2010 Decennial Census definitions and latest 5 year American Community Survey
Beginning 2016
6 year rotation
Continuous process of updating CPI Housing survey
Future Work

- Investigating ACS data
- Investigating rent websites for secondary source data
- Investigating further improvements to OER expenditure estimation
- Improving tools to optimize sample allocation
Contact Information

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