An assessment of local house prices: How low can we go?

William Doerner
Federal Housing Finance Agency (FHFA)

based on a series of co-authored papers with Alexander Bogin & William Larson (both at FHFA)

The Hoyt Group
Friday May 19, 2017
11:30-12:30pm

Disclaimer: The analysis and conclusions are those of the authors and do not necessarily represent the views of the Federal Housing Finance Agency or the United States.
10 years ago house prices fell dramatically.

2 weeks ago major news sources ran headlines like:
“Most U.S. homes remain below precrash peaks”

Is this a really bad sign for the “future of real estate”? No.
We released local indices. These data can provide insights across the nation. And show price trends are actually fine in most places.
A main claim in a USA Today article:

“Only about one-third of U.S. homes have topped their prerecession price peaks, undermining other measures that have shown average national housing prices zooming past those high-water marks.”
The claim and data analysis were a bit misleading.

Local values vs national HPIs. Where are HPIs above peak?
• 74% of states, 50% of MSAs, 34% of ZIPs, 37% of tracts
• You get those results as you go more local with data.
• We have such indices but news sources didn’t use them.

Peak vs trend. How close are prices to long-run trends?
• 70% of ZIP codes are within 10%, 37% are within 5%.
• Prior peaks don’t convey current market health.
• Today’s environment is very different than 10 years ago.

Be fair, thorough, & transparent in analysis.
Findings can impact public confidence.
Data should enlighten, not beguile.
• Motivation for using an index

• FHFA’s House Price Indices (HPIs)

• Our recent research on local HPIs
  – Construction of new indices and stylized facts
  – Local accelerations, declines, and recoveries
  – Mortgage valuation and modeling

• Concluding thoughts
How many of you have used house price measures before?
Motivation

Imagine we observe sales of two different houses.

What can we say about the housing market?
Reflection

How do we measure value?

Value = Price * Quantity

How is change measured?

\[ V' = P'Q + Q'P \]

What does this imply for housing indices?
Medians and means conflate changes in price and quantity.

How do we measure a change?
We focus only on price (or “constant-quality”) by pairing up transactions that sell more than once and compute average price changes using a statistical repeat-sales methodology.
How do we construct our HPIs?

Start with a standard house price specification:

$$\ln(P_{it}) = \beta_{it} + H_{it} + N_{it}$$

Then use a three-step repeat-sales estimation:

Step 1:  $$\Delta V_i = \ln(P_{it}) - \ln(P_{is}) = \sum_{t=0}^{T} \beta_t D_{it} + \varepsilon_{it}$$

Step 2:  $$E \left[ d_i^2 \right] = A(t - s) + B(t - s)^2 + 2C$$

Step 3:  $$\frac{\Delta V_i}{\sqrt{\hat{d}_i^2}} = \sum_{t=0}^{T} \beta_t \frac{D_{it}}{\sqrt{\hat{d}_i^2}} + \frac{\varepsilon_{it}}{\sqrt{\hat{d}_i^2}}$$
Pros and cons

What are some of the challenges with repeat-sales?

• Houses do not transact every period.
• No two houses are perfectly identical.
• Data on characteristics don’t go far back in time.
• Data are seldom available across all jurisdictions.

What are some of the advantages with repeat-sales?

• Requires limited information.
• Provides a constant-quality comparison.
• Can be aggregated in different ways.
FHFA’s House Price Indices (HPIs)
What is FHFA?

Federal Housing Finance Agency

- An independent regulatory agency that oversees Fannie Mae, Freddie Mac, and the Federal Home Loan Bank System.

  Combined, those entities provide over $5.8 trillion in funding for the U.S. mortgage market and financial institutions. Our mission is to ensure they:
  - Operate in a safe and sound manner.
  - Serve as a reliable source of liquidity and funding for housing finance and community investment.

- Conservator of Fannie Mae and Freddie Mac.

- Our HPIs are still sometimes attributed to the Office of Federal Housing Enterprise Oversight (OFHEO) . . . but that had changed with HERA in 2008.
What is the FHFA HPI?

What does the HPI provide?
A broad measure of the movement of single-family house prices.

What data go into the HPI?
Transactions of conforming, conventional mortgages purchased or securitized by Fannie Mae or Freddie Mac.

What does the HPI represent?
The cumulative price change since a base period. The value is nominal and is not annualized.

What is meant, then, if an index rises from 120 to 150?
An area has experienced a 25% increase in the average house price.

\[
\frac{150 - 120}{120} \times 100\% = \frac{30}{120} \times 100\% = 0.25 \times 100\% = 25\%
\]
Let’s use the data for an example

What is the trough-to-peak recovery in Prince George’s County?

<table>
<thead>
<tr>
<th>Year</th>
<th>HPI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>413.90</td>
</tr>
<tr>
<td>2016</td>
<td>532.07</td>
</tr>
</tbody>
</table>
Common questions from data users

1) What is the average market appreciation over a period?
   Use the HPI to compute the percentage change from 2012 to 2016.

\[
\frac{New - Old}{Old} * 100\% = \frac{532.07 - 413.90}{413.90} * 100\% \\
= 0.2855 * 100\% \approx 29\%
\]

2) How can the HPI be used to adjust an average house price?
   Imagine a house sold for $200,000. Multiple that by the increase!

\[
$200,000 * (1.2855) = $257,100
\]
Common questions from data users

3) Where are the largest percentage gains over the last year?
What areas are covered by our HPIs?

**Already provide quarterly:**
- Nation
- Census Divisions
- States
- Metropolitan statistical areas (MSAs)
- ZIP3 areas

**Now provided annually:**
- *NEW*: Counties, ZIP codes, Census tracts
- *MORE*: CBSAs
- *ALSO*: Nation, States, ZIP3 areas

FHFA’s HPIs are currently made from around 100 million transactions going back to the 1970s.
Where you can download the data?

https://www fhfa gov/hpi
https://www fhfa gov/papers/wp1601 aspx
Want to interact with the data?

Our recent research on local HPIs
Our recent working papers on local HPIs

1. House price gradients are shifting upward again

2. Quick growth is most sustainable in CBDs of large cities

3. Best valuation accuracy and model fit with city & ZIP5 HPIs
Our recent working papers on local HPIs
What indices are available?

<table>
<thead>
<tr>
<th>Index</th>
<th>Geography</th>
<th>Count</th>
<th>Frequency</th>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>S&amp;P/Case-Shiller</td>
<td>CBSA</td>
<td>20</td>
<td>Monthly</td>
<td>1987</td>
</tr>
<tr>
<td>FHFA</td>
<td>CBSA</td>
<td>401</td>
<td>Quarterly</td>
<td>1975</td>
</tr>
<tr>
<td>Freddie Mac</td>
<td>CBSA</td>
<td>367</td>
<td>Quarterly</td>
<td>1975</td>
</tr>
<tr>
<td>FHFA</td>
<td>ZIP3</td>
<td>885</td>
<td>Quarterly</td>
<td>1995</td>
</tr>
<tr>
<td>Zillow (Value)</td>
<td>ZIP5</td>
<td>12,988</td>
<td>Monthly</td>
<td>1996</td>
</tr>
<tr>
<td>This Paper:</td>
<td>CBSA</td>
<td>914</td>
<td>Annual</td>
<td>1975</td>
</tr>
<tr>
<td></td>
<td>County</td>
<td>2,742</td>
<td>Annual</td>
<td>1975</td>
</tr>
<tr>
<td></td>
<td>ZIP3</td>
<td>879</td>
<td>Annual</td>
<td>1975</td>
</tr>
<tr>
<td></td>
<td>ZIP5</td>
<td>17,936</td>
<td>Annual</td>
<td>1975</td>
</tr>
</tbody>
</table>
New data opens up new doors.
Is there really local house price variation?
Might it be a D.C. thing?
How do well do HPIs predict the next sale?
How do far out do the predictions work?
How do those predictions compare to Zillow?
What’s an interesting long-term trend since the 1990s?

House price gradients are shifting upward again.
Do house prices decline the same everywhere?
Are quick accelerations always followed by decline?

ZIP 20003 (Washington, DC)  

ZIP 90210 (Los Angeles, CA)
How often do major accelerations occur?

We identify extreme acceleration episodes. There are over 4,000 mutually exclusive ZIP code-level acceleration episodes between 1975 and 2015.
Where do major acceleration occur?

Private Equity Boom (1985-1990)  


Subprime Boom (2004-2006)  

Recovery & Oil Boom (2014-2015)
Do prices mean revert once they fall?

Quick growth is most sustainable in downtowns of large cities.
Thinking about losses...let’s build a credit model!
Do more granular HPIs improve credit model fit?

Best valuation and model accuracy with city and ZIP5 HPIs.
Concluding thoughts
Takeaways from our research

• New annual local HPIs are available.
  o Free, constant-quality, long-time span, nationwide

• Proximity within a city can explain house prices.

• We’re seeing interesting results with center-city prices:
  o Stable over the last 25 years
  o Contrasts suburbanization of last 1/2 of 20th century
  o Mean reversion is found across cities but center-city areas have smaller and less volatile corrections
  o Localized HPIs can improve mortgage valuation and performance modeling in center-city areas
Concluding thoughts . . .

- Local HPIs offer tools to explore housing markets for realtors, mortgage bankers, policy makers, etc.

- granularity is especially helpful in centers of large cities.

www.fhfa.gov/hpi
www.fhfa.gov/papers/wp1602.aspx

Local data can improve decision making and inform public discussions about the future of real estate!

Thanks!