HOUSE PRICE INDEX
FREQUENTLY ASKED QUESTIONS

(updated February 23, 2017)

1. What is the value of the House Price Index (HPI)?

The HPI is a broad measure of the movement of single-family house prices. It serves as a timely, accurate indicator of house price trends at various geographic levels. It also provides housing economists with an analytical tool that is useful for estimating changes in the rates of mortgage defaults, prepayments and housing affordability in specific geographic areas. The HPI is a measure designed to capture changes in the value of single-family houses in the U.S. as a whole, in various regions and in smaller areas. The HPI is published by the Federal Housing Finance Agency (FHFA) using data provided by Fannie Mae and Freddie Mac. The Office of Federal Housing Enterprise Oversight (OFHEO), one of FHFA's predecessor agencies, began publishing the HPI in the fourth quarter of 1995.

2. What transactions are covered in the HPI?

The House Price Index is based on transactions involving conforming, conventional mortgages purchased or securitized by Fannie Mae or Freddie Mac. Only mortgage transactions on single-family properties are included. Conforming refers to a mortgage that both meets the underwriting guidelines of Fannie Mae or Freddie Mac and that does not exceed the conforming loan limit. For loans originated in the first nine months of 2011, the loan limit was set by Public Law 111-242. That law, in conjunction with prior legislation, provided for loan limits up to $729,750 for one-unit properties in certain high-cost areas in the contiguous U.S. Mortgages originated after September 30, 2011 were no longer subject to the terms of prior initiatives and, under the formula established under the Housing and Economic Recovery Act of 2008, the "ceiling" limit for one-unit properties in the contiguous U.S. fell to $625,500. The current conforming loan limit is $417,000 in most of the U.S.

Conventional mortgages are those that are neither insured nor guaranteed by the FHA, VA, or other federal government entities. Mortgages on properties financed by government-insured loans, such as FHA or VA mortgages, are excluded from the HPI, as are properties with mortgages whose principal amount exceeds the conforming loan limit. Mortgage transactions on condominiums, cooperatives, multi-unit properties, and planned unit developments are also excluded.

3. How is the HPI computed?

The HPI is a weighted, repeat-sales index, meaning that it measures average price changes in repeat sales or refinancings on the same properties. This information is obtained by reviewing repeat mortgage transactions on single-family properties whose mortgages have been purchased or securitized by Fannie Mae or Freddie Mac since January 1975. The HPI is updated each quarter as additional mortgages are purchased

or securitized by Fannie Mae and Freddie Mac. The new mortgage acquisitions are used to identify repeat transactions for the most recent quarter and for each quarter since the first quarter of 1975.

4. How often is the HPI published?

A comprehensive report is published every three months, approximately two months after the end of the previous quarter. Beginning in March 2008, OFHEO (one of FHFA's predecessor agencies) began publishing monthly indexes for census divisions and the U.S. FHFA continues publishing and updating these indexes each month.

5. How is the HPI updated?

Each month, Fannie Mae and Freddie Mac provide FHFA with information on their most recent mortgage transactions. These data are combined with the data from previous periods to establish price differentials on properties where more than one mortgage transaction has occurred. The data are merged, creating an updated historical database that is then used to estimate the HPI.

6. How do I interpret "four-quarter," "one-year," "annual," and "one-quarter" price changes?

The "four-quarter" percentage change in home values is simply the price change relative to the same quarter one year earlier. For example, if the HPI release is for the second quarter, then the "four-quarter" price change reports the percentage change in values relative to the second quarter of the prior year. It reflects the best estimate for how much the value of a typical property increased over the four-quarter period (FAQ #2 reports the types of properties included in this estimate). "One-year" and "annual" appreciation are used synonymously with "four-quarter" appreciation in the full quarterly HPI releases.

Similar to the "four-quarter" price changes, the "one-quarter" percentage change estimates the percentage change in home values relative to the prior quarter. Please note that, in estimating the quarterly price index, all observations within a given quarter are pooled together; no distinction is made between transactions occurring in different months. As such, the "four-quarter" and "one-quarter" changes compare typical values throughout a quarter against valuations during a prior quarter. The appreciation rates do not compare values at the end of a quarter against values at the end of a prior quarter.

7. How are Metropolitan Statistical Areas (MSAs) and Metropolitan Divisions defined and what criteria are used to determine whether an MSA index is published?

MSAs are defined by the Office of Management and Budget (OMB). If specified criteria are met and an MSA contains a single core population greater than 2.5 million, the MSA is divided into Metropolitan Divisions. The following MSAs have been divided into

Metropolitan Divisions: Boston-Cambridge-Newton, MA-NH; Chicago-Naperville-Elgin, IL-IN-WI; Dallas-Fort Worth-Arlington, TX; Detroit-Warren-Dearborn, MI; Los Angeles-Long Beach-Anaheim, CA; Miami-Fort Lauderdale-West Palm Beach, FL; New York-Newark-Jersey City, NY-NJ-PA; Philadelphia-Camden-Wilmington, PA-NJ-DE-MD; San Francisco-Oakland-Hayward, CA; Seattle-Tacoma-Bellevue, WA; Washington-Arlington-Alexandria, DC-VA-MD-WV. For these MSAs, FHFA reports data for each Division, rather than the MSA as a whole.

FHFA requires that an MSA (or Metropolitan Division) must have at least 1,000 total transactions before it may be published. Additionally, an MSA or Division must have had at least 10 transactions in any given quarter for that quarterly value to be published. Blanks are displayed where this criterion is not met.

8. Does FHFA use the February 2013 revised Metropolitan Statistical Areas (MSAs) and Divisions?

Yes, FHFA uses the revised Metropolitan Statistical Areas (MSAs) and Divisions as defined by the Office of Management and Budget (OMB) in February 2013 (and revised in July 2015). These MSAs and Divisions are based on Census data. According to OMB, an MSA comprises the central county or counties containing the core, plus adjacent outlying counties having a high degree of social and economic integration with the central county as measured through commuting. For information about the current MSAs, please visit:
https://obamawhitehouse.archives.gov/sites/default/files/omb/bulletins/2015/15-01.pdf.

Prior to the second quarterly release in 2013, FHFA produced metropolitan area indexes based on the December 2009 delineations provided by the OMB at https://obamawhitehouse.archives.gov/sites/default/files/omb/assets/bulletins/b10-02.pdf. That quarter's Highlights piece explains the transition from the December 2009 to the February 2013 definitions. HPIs constructed from both the 2009 and 2013 delineations are available on the Downloadable Data page under the "Additional Data" section then the "Utility Files and Background Information for Index Construction" subsection.

9. What geographic areas are covered by the House Price Index?

The HPI includes indexes for all nine census divisions, the 50 states and the District of Columbia, and every Metropolitan Statistical Area (MSA) in the U.S., excluding Puerto Rico. OMB recognizes 382 MSAs, 11 of which are subdivided into a total of 31 Metropolitan Divisions. As noted earlier, FHFA produces indexes for the divisions where they are available, in lieu of producing a single index for the MSA. In total, 402 indexes are released: 371 for the MSAs that do not have Metropolitan Divisions and 31 Division indexes. The starting dates for indexes differ and are determined by a minimum transaction threshold; index values are not provided for periods before at least 1,000 transactions have been accumulated.

In each release, FHFA publishes rankings and quarterly, annual, and five-year rates of changes for the MSAs and Metropolitan Divisions that have at least 15,000 transactions over the prior 10 years. In this release, 265 MSAs and Metropolitan Divisions satisfy this criterion. For the remaining areas, MSAs and Divisions, one-year and five-year rates of change are provided.

10. What is the methodology used by FHFA in computing the Index?

The methodology is a modified version of the Case-Shiller® geometric weighted repeat-sales procedure. A detailed description of the HPI methodology is available upon request from FHFA at (202) 649-3195 or online at: http://go.usa.gov/8BBT.

11. How does the HPI differ from the S&P/Case-Shiller® Home Price indexes?

Although both indexes employ the same fundamental repeat-valuations approach, there are a number of data and methodology differences. Among the dissimilarities:

a. The S&P/Case-Shiller indexes only use purchase prices in index calibration, while the all-transactions HPI also includes refinance appraisals. FHFA's purchase-only series is restricted to purchase prices.

b. FHFA's valuation data are derived from conforming mortgages provided by Fannie Mae and Freddie Mac. The S&P/Case-Shiller indexes use information obtained from county assessor and recorder offices.

c. The S&P/Case-Shiller indexes are value-weighted, meaning that price trends for more expensive homes have greater influence on estimated price changes than other homes. FHFA's index weights price trends equally for all properties.

d. The geographic coverage of the indexes differs. The S&P/Case-Shiller National Home Price Index, for example, does not have valuation data from 13 states. FHFA's U.S. index is calculated using data from all states.

For details on these and other differences, consult the HPI Technical Description (see http://go.usa.gov/8BBT) and the S&P/Case-Shiller methodology materials (see http://us.spindices.com/documents/methodologies/methodology-sp-cs-home-price-indices.pdf).

A paper that analyzes in detail the methodological and data differences between the two price metrics can be accessed at http://go.usa.gov/8BBJ.

12. How does the House Price Index differ from the Census Bureau's Constant Quality House Price Index (CQHPI)?

The HPI published by FHFA covers far more transactions than the Commerce Department survey. The CQHPI covers sales of new homes and homes for sale, based

on a sample of about 14,000 transactions annually, gathered through monthly surveys. The quarterly purchase-only HPI is based on more than seven million repeat transaction pairs over 41 years. This gives a more accurate reflection of current property values than the Commerce Department index. The HPI also can be updated efficiently using data collected by Fannie Mae and Freddie Mac in the normal course of their business activity.

13. Where can I access MSA index numbers and standard errors for each year and quarter?

In addition to the information displayed in the MSA tables, FHFA makes available MSA indexes and standard errors. The data are available in ASCII format and may be accessed at http://go.usa.gov/8kXz.

14. What role do Fannie Mae and Freddie Mac play in the House Price Index?

FHFA uses data supplied by Fannie Mae and Freddie Mac in compiling the HPI. Each of the Enterprises had previously created a weighted repeat-transactions index based on property matches within its own database. In the first quarter of 1994, Freddie Mac began publishing the Conventional Mortgage Home Price Index (CMHPI). The CMHPI was jointly developed by Fannie Mae and Freddie Mac. The CMHPI series covers the period 1970 to the present.

15. Why is the HPI based on Fannie Mae or Freddie Mac mortgages?

FHFA has access to this information by virtue of its role as the federal regulator responsible for these government-sponsored enterprises. Chartered by Congress for the purpose of creating a reliable supply of mortgage funds for homebuyers, Fannie Mae and Freddie Mac are the largest mortgage finance institutions in the U.S. representing a significant share of total outstanding mortgages.

16. When are the indexes normalized in the downloadable ASCII data?

The ASCII data for metropolitan areas are normalized to the first quarter of 1995. That is, the HPI equals 100 for all MSAs in the first quarter of 1995. States and divisions are normalized to 100 in the first quarter of 1980. The purchase-only indexes are normalized to 100 in the first quarter of 1991. Note that normalization dates do not affect measured appreciation rates.

17. Is the HPI adjusted for inflation?

No, the HPI is not adjusted for inflation. For inflation adjustments, one can use the Consumer Price Index “All Items Less Shelter” series. The Bureau of Labor Statistics’ price index series ID# CUUR0000SA0L2, for example, has tracked non-shelter consumer prices since the 1930s. That series and others can be downloaded at: http://data.bls.gov/cgi-bin/srgate.

18. How do I use the manipulatable data (in TXT files) on the website to calculate appreciation rates?

The index numbers alone (for census divisions and U.S., individual states, and MSAs) do not have significance. They have meaning in relation to previous or future index numbers, because you can use them to calculate appreciation rates using the formula below.

To calculate appreciation between any 2 quarters, use the formula:

(QUARTER 2 INDEX NUMBER - QUARTER 1 INDEX NUMBER) / QUARTER 1 INDEX NUMBER

You can generate annual numbers by taking the four quarter average for each year or monthly numbers by finding the difference between two months.

19. How is FHFA's House Price Index constructed for MSAs? The website says that FHFA uses the 2015 definitions based on the 2010 Census to define each MSA. Is this true for all time periods covered by each index? Or do the definitions change over time as the Census expanded its MSA definitions? For example, if the definition of an MSA added three counties between 1980 and 2000, would the value of the index in 1980 cover the three counties that were not included in the 1980 SMSA definition?

The HPI is recomputed historically each quarter. The MSA definition used to compute the 1982 (for example) index value in Anchorage, AK would be the most recent definition. The series is comparable backwards.

20. How can the House Price Index for an MSA be linked to zip codes within that MSA?

Although FHFA has published experimental house price indexes for some ZIP codes, those indexes are annual (i.e. quarterly index values are not provided). Researchers needing quarterly values for ZIP codes may be interested in using index values for the applicable metropolitan area.

Because ZIP codes sometimes overlap county boundaries, a single ZIP code can be located partially inside and outside of a Metropolitan Area. Thus, the development of a crosswalk between ZIP codes and Metropolitan Areas is not a straightforward exercise. The Department of Housing and Urban Development has released a lookup table that maps ZIP codes to the Metropolitan Area(s) that they fall within. That lookup file, as well as a discussion of the underlying technical issues, can be found here: http://www.huduser.org/portal/datasets/usps_crosswalk.html.

21. How and why is the HPI revised each quarter?

Historical estimates of the HPI revise for three primary reasons:

1) The HPI is based on repeat transactions. That is, the estimates of appreciation are based on repeated valuations of the same property over time. Therefore, each time a property "repeats" in the form of a sale or refinance, average appreciation since the prior sale/refinance period is influenced.

2) Fannie Mae and Freddie Mac (the Enterprises) purchase seasoned loans, providing new information about prior quarters.

3) Due to a 30- to 45-day lag time from loan origination to Enterprise funding, FHFA receives data on new fundings for one additional month following the last month of the quarter. These fundings contain many loans originating in that most recent quarter, and especially the last month of the quarter. This will reduce with subsequent revisions, however data on loans purchased with a longer lag, including seasoned loans, will continue to generate revisions, especially for the most recent quarters.

In connection with the release of the 2012Q2 HPI results, a special revision was made to two historical HPI values. In prior releases, the all-transactions index values for Vermont-1976Q1 and West Virginia-1982Q1 were both reported to be 100.01. Those values were not correct; index values for those respective periods should have been set to missing because no modeling data were available in the underlying sample. The HPI releases for 2012Q2 and later periods reflect the change.

22. What transaction dates are used in estimating the index?

For model estimation, the loan origination date is used as the relevant transaction date.

23. Are foreclosure sales included in the HPI?

Transactions that merely represent title transfers to lenders will not appear in the data. Once lenders take possession of foreclosed properties, however, the subsequent sale to the public can appear in the data. As with any other property sale, the sales information will be in FHFA's data if the buyer purchases the property with a loan that is bought or guaranteed by Fannie Mae or Freddie Mac.

24. How are the monthly House Price Indexes calculated?

The monthly indexes are calculated in the same way the quarterly indexes are constructed, except transactions from the same quarter are no longer aggregated. To construct the quarterly index, all transactions from the same quarter are aggregated and index values are estimated using the assigned quarters. In the monthly indexing model, all transactions for the same month are aggregated and separate index values are estimated for each month.

25. How are the Census Division and U.S. House Price Indexes formed?

As discussed in the Highlights article accompanying the 2011Q1 HPI Release (available for download at http://go.usa.gov/8k5d), the census division indexes are constructed from statistics for the component states. For the quarterly all-transactions and purchase-only indexes, the census division indexes are constructed from quarterly growth rate estimates for the underlying state indexes. Census division index estimates are "built-up" from quarterly growth rate estimates (monthly growth rates for the monthly index) for the component states.

The census division indexes are set equal to 100 in the relevant base periods. Then, the index values for subsequent periods are increased (or decreased) by the weighted average quarterly (or monthly) price change for the underlying states. Index values for periods before the base period are calculated in a similar fashion; beginning with the base period value, the preceding index values are sequentially determined so that the growth rate in each period always reflects the weighted average growth rate for the component states.

The national HPI is constructed in an analogous fashion, except that the weighted components are census divisions. Because the census divisions measures are themselves weighted averages of state metrics, the U.S. index is equivalent to a state-weighted metric.

26. What weights are used in forming the Census Division and U.S. Indexes?

The weights used in constructing the indexes are estimates for the shares of one-unit detached properties in each state. For years in which decennial census data are available, the share from the relevant census is used. For intervening years, a state's share is the weighted average of the relevant shares in the prior and subsequent censuses, where the weights are changed by ten percentage points each year. For example, California's share of the housing stock for 1982 is calculated as 0.8 times its share in the 1980 census plus 0.2 times its share in the 1990 census. For 1983, the Pacific Division's share is 0.7 times its 1980 share plus 0.3 times its 1990 share.

For years since 2000, state shares are calculated as follows:

- For the 2001-2005 interval, shares are straight-line interpolated based on the state shares in the 2000 decennial Census and the 2005 values from the American Community Survey (ACS).
- For 2006-2014, the estimates are from the annual ACS.
- Until 2015 ACS estimates become available, shares from the 2014 ACS are used for subsequent periods.

The year-specific estimates of the state shares of U.S. detached housing stock can be accessed at http://go.usa.gov/x9Syt.

27. For those house price indexes that are seasonally adjusted, what approach is used in performing the seasonal adjustment?

The Census Bureau's X-12 ARIMA procedure is used, as implemented in the SAS software package. The automated ARIMA model-selection algorithm in X-12 is employed, which searches through a series of seasonality structures and selects the first that satisfies the Ljung-Box test for serial correlation.

To obtain more information on the HPI contact us via the Data and Research Contact page at http://go.usa.gov/8kN3.

28. How is the Expanded-Data HPI calculated?

The approach to estimating the expanded-data HPI is detailed in the Highlights article published with the 2011Q2 HPI at http://go.usa.gov/8kNm. In general, the methodology is the same as is used in the construction of the standard purchase-only HPI, except a supplemented dataset is used for estimation. The augmented data include sales price information from Fannie Mae and Freddie Mac mortgages as well as two new information sources: (1) transactions records for houses with mortgages endorsed by FHA and (2) county recorder data licensed from CoreLogic. The licensed county recorder data do not include records in many U.S. counties—particularly rural ones. To ensure that the addition of the CoreLogic data to the estimation sample does not unduly bias index estimates toward price trends in urban areas, the expanded-data index for certain states is estimated by weighting price trends in areas with CoreLogic coverage and other areas. Details on this sub-area weighting can be found in the text of the Highlights piece referenced above.

29. What is the "distress-free" index?

FHFA released a "distress-free" HPI in 2012Q2 along with the Highlights article at http://go.usa.gov/8kNJ. The index is a version of the purchase-only index that removes short sales and sales of bank-owned properties from the transactions data used to compute that traditional index. The index is still in a developmental stage. An analysis of how distressed sales affect the FHFA HPI is provided in an FHFA Working Paper released August 2013 at http://go.usa.gov/8kRB.