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# Case-Shiller<sup>®</sup> House Price Index FAQs

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## How are the CSIs computed?

The Case-Shiller Home Price Indexes are based on observed changes in individual home prices. The main unit used for index calculation is the price change between two arm's-length sales of the same single-family home. Home price data are gathered from local deed recording offices across the country. For each home sale transaction, a search is conducted to find information regarding previous sales of the same house. If an earlier transaction is found, the two transactions are paired into a "sale pair." Sale pairs are designed to yield the price change for the same house, while holding the quality and size of each house constant. A technical description of the methodology is available upon request.

## How often is the CSI published?

Fiserv publishes the CSIs once per quarter. The indexes are released with a three-month lag. The release schedule is the end of March, June, September and December. Moody's Analytics updates DataBuffet with the new data within one business day.

## What is the difference between the Square data set and the Raw data set?

The Raw data set only contains Case-Shiller indexes. The index points are presented in the same frequency used to calculate each index—annual, semiannual or quarterly. The frequency of the index points depends on the number of sale records available across the entire historical span of an index. Markets with larger numbers of sale records will have quarterly frequency indexes, while those with fewer sale records will have semiannual, or in a few instances, annual frequency indexes.

The Square data set is one in which Fiserv splices their CSIs with indexes produced by the Federal Housing Finance Agency. FHFA indexes are provided for markets where there is insufficient sales data to produce a Case-Shiller index, or are spliced onto Case-Shiller indexes that do not span the historical period from 1975 to the present. For any particular quarter, a spliced index only contains FHFA information or Case-Shiller information. Any semiannual or annual frequency CSIs are interpolated to a quarterly frequency in the Square data set. Because FHFA indexes are used to fill in coverage gaps in the CSIs, the Square data set includes single-family home price indexes for all Census divisions, states, and metro areas from 1975 to the present. The square data set also includes Case-Shiller indexes for over 400 counties and nearly 4,800 zip codes.

## What is the minimum number of transactions required in a geography in order for Fiserv to calculate an index?

There is no fixed number. Fiserv strives to estimate the most accurate indexes possible and also provide the greatest coverage possible. The risk to estimating indexes with too few transactions is a volatile index with a great deal of dispersion that fails to represent the true price trend. Thus, the minimum number of transactions is the number that can generate a high quality index. Fiserv carefully evaluates the period-to-period volatility of both median prices and the CSI for each geography to determine if there is an insufficient number of transactions, or if the sample of transactions is not representative of historical home price trends. It is often the case that for the initial periods covered by an index both the median price and the index values are too volatile. This is because the number of repeat sale pairs will increase as you move forward from the first period covered by transaction data. So, many indexes are estimated using data that starts well before the actual starting point of the index. But, the initial, excessively volatile index points are not delivered to customers.

## What transactions are covered in the CSIs?

All arm's-length sales transactions are covered in the CSI indexes. The data are filtered for transactions that are not likely to be a market sale such as sales pairs with short intervals between transactions (and thus likely to be "flips"), or are sales pairs where the buyer and seller have the same last name (likely transfers between family members). A robust estimation method is used to mitigate the effect of non-market transactions that are not removed by these filters.

## Are foreclosures included in the CSI data?

The CSIs incorporate foreclosures, although these transactions are subject to the same filtering processes as any other sale transaction.

## What are the weights used to derive the national index?

The national index is calculated as the weighted average of the nine single-family Census Division indexes. The weights used are the Division's value of housing stock as a share of the national value of housing stock. The data come from the Decennial Census for 1990 and 2000. The 1990 data are used for index data prior to the first quarter of 2000. The 2000 data are used to weight the index points from the first quarter of 2000 until the present.

**How do you seasonally adjust the CSIs?**

We use the Census's X-12-ARIMA seasonal adjustment program. X-12-ARIMA is the seasonal adjustment software produced and maintained by the Census Bureau. It is used for all official seasonal adjustments at the U.S. Census Bureau.

**Why do the growth rates on components of a geography not add up to the total geography?**

A metro area's appreciation rate, for example, may not fall between the rates for its constituent metro divisions because of the robust estimation procedure Fiserv uses to calculate the CSIs. The repeat sale pairs identified as outliers in the two metro division samples may be different than the identified outlier pairs in the metro area sample.

Furthermore, the CSIs are value-weighted; transactions for more expensive homes carry more weight than transactions for less expensive homes. This means, for example, that a metro area CSI will track more closely with CSIs for metro divisions with more expensive housing.

**How comprehensive is the metro area coverage?**

The CSIs calculated with Case-Shiller data only cover approximately 130 metro areas and metro divisions out of 384. These areas are the largest and also the ones in which the FHFA biases are largest. These are the areas where Fiserv feels that they can create accurate indexes based on the availability and quality of the sales transactions data. Approximately 30 metro areas or divisions are covered using spliced Case-Shiller and FHFA indexes, and the remaining metro areas and divisions in the square data set are covered using FHFA indexes.

**How much of the housing market do the CSIs cover?**

The metro areas CSIs cover approximately 45% of U.S. single-family housing stock and more than 60% of the value of single-family housing stock.

**Why do the historic data change?**

Fiserv revises the indexes when it receives new historical data for periods covered by previously estimated index points. Revisions are more likely to occur in markets where there are delays in transaction reporting by local deed recording offices. However, in the majority of markets, revisions are small and are limited to the last two years of index points. Revisions of the entire history occur if an index is reestimated. Reestimation occurs infrequently.

**Do the state or Census division indexes include information that is not in the metro area indexes?**

Yes, the Census division and state indexes will include transactions that occur outside of metro areas.

**Why is the index value-weighted?**

The Case-Shiller indexes are value-weighted, which means that they track the average/aggregate value of a housing market. This type of weighting is analogous to a cap-weighted stock index. Most investors/businesses have exposure to multiple properties within a housing market, often across many price segments. Their price risk is best measured by an index that tracks average value, since their losses and gains for more expensive properties will be larger than those for less expensive properties.

**Are there only three house price tiers?**

In some markets, Fiserv breaks down the high tier price index further into three super-high tier indexes. This breaks down the high-tier into low, middle and high categories as well. The data are available in the Raw database.

**Do the house price tier breaks change over time? Are those data available?**

Yes, they do change over time. The data are available in the historical databases.

**Why are there indexes for two New York City geographies? Do they capture the co-op market?**

The Fiserv Case-Shiller® Indexes include two New York areas with custom definitions. They should not be confused with the MSA, metro division, or City of New York. Two geographic areas available are based on non-standard definitions (i.e., aggregates of counties not defined by the Office of Management and Budget), and consequently are designated in DataBuffet with specialized geo codes. They are: New York City Four Boroughs, NY (NYC\_CSW) and Greater New York City (DMNEY\_CSW). The CSIs do not capture co-op sales.

**When do you update the forecasts? The scenarios?**

Moody's Analytics updates the CSI forecasts every month, generally by the 14th of the month. The scenarios are updated after Moody's Analytics' macro group updates the U.S. macroeconomic scenarios. The new CSI scenarios are generally available by the 20th of each month.

**What is the forecast methodology for the indexes?**

Moody's Analytics' metro area house price model is a structural econometric model of housing demand and supply that allows for serial correlation and mean reversion. The model is estimated as an error correction model, pooling metro area data over 33 years of history, using a fixed effects panel regression. It allows for metro area-specific effects as well as broader region-specific relationships (East Coast, Florida, South ex-Florida, California, West Coast ex-California, Mountain West and Inland) between house prices and driver variables. The driver variables for the price forecasts are all forecasted in Moody's Analytics' simultaneous equation macroeconomic model and large scale regional economic forecast models.

**How do the S&P/Case-Shiller Indexes differ from the Square data set?**

The Case-Shiller index is published by Fiserv Lending Solutions while the S&P/Case-Shiller index is published by Standard & Poor's and Fiserv, Inc. There are numerous differences between the quarterly CSIs and the monthly S&P/Case-Shiller indexes.

The first difference between the two is the different frequency of their release. Fiserv releases the quarterly Case-Shiller data with a three-month lag from the end of the quarter. The S&P/Case-Shiller indexes are released monthly, with a two-month lag. While reported monthly, the S&P data are reported as a three-month moving average. Second, coverage also differs, with the S&P/Case-Shiller reporting 20 metro areas. The Square data set includes over 380 metro areas and divisions, as well as numerous counties and zip codes. The Square data set also provides condo indexes for a number of geographies. Both databases include tier indexes for selected MSAs. The S&P data have history going back to 1987 compared with 1975 for the Square database. The S&P/Case-Shiller data include 10- and 20-city composite indexes every month. Once a quarter, it also includes a quarterly national index. The national index provided in the Square index set is identical to the S&P/Case-Shiller national index.

**Why do the S&P indexes not always track the CSI indexes exactly?**

Discrepancies between a metro area's standard Case-Shiller indexes and the S&P/Case-Shiller indexes arise for several reasons. First, the geographies for the S&P/Case-Shiller may be defined slightly differently from the standard OMB definitions that are used for the Square database. Even if the geographies are identical and the transactions data used to calculate the indexes are identical, because the two types of indexes are updated on different schedules, transactions for specific dates will make their way into each type of index at different times. During index updates, the relative weighting of transactions (repeat-sale pairs) may also be slightly different for individual transactions within each type of index calculation. Consequently, the two types of indexes may evolve over slightly different paths as new transaction data arrive and the indexes are updated.

As past index points are revised, the differences between revised index points for the two types of indexes usually shrink. But the revision period for both the standard and S&P Case-Shiller indexes is limited to two years, so differences in period-to-period changes between the two types of indexes can become permanent.

**What is the difference between the CSIs and the FHFA's house price index?**

The methodologies behind calculation of the price indexes are very similar, with the main difference being that the CSI uses arithmetic weighting, so it is similar to an average price, while the FHFA indexes use geometric weights, so it is similar to a median price.

The main difference between the indexes is the data source for the sales transactions. While Fiserv uses data from local deed recording offices across the country, the FHFA relies on mortgage originations data from Freddie Mac and Fannie Mae. Because the GSEs only hold or securitize conforming, conventional loans, they have no information on house prices purchased with cash, jumbo loans, and FHA and VA loans, and little information on subprime loans. In markets where house prices are high, or where there is a large subprime exposure, the nonconforming loan bias can be large. In recent years, changes in conforming loan limits impose additional biases. Refi transactions cause an additional bias in the metro area data. The FHFA all-transactions index includes prices that are from appraisals for refs, while CSIs only include true market transactions. The FHFA does provide a purchase-only price index for the U.S., Census divisions and states, but not for metros.

**What is driving the current difference between the FHFA and CSI price indexes?**

Currently, the rapid deterioration in the subprime and nontraditional loan markets is the main driver of the differences, in particular the shallower decline in most regional FHFA indexes. The FHFA index does not adequately represent these markets.

See <http://www.fhfa.gov/webfiles/1163/OFHEOSPCS12008.pdf>.

# About Moody's Analytics

## Economic & Consumer Credit Analytics

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Moody's Analytics tracks and analyzes trends in consumer credit and spending, output and income, mortgage activity, population, central bank behavior, and prices. Our customized models, concise and timely reports, and one of the largest assembled financial, economic and demographic databases support firms and policymakers in strategic planning, product and sales forecasting, credit risk and sensitivity management, and investment research. Our customers include multinational corporations, governments at all levels, central banks and financial regulators, retailers, mutual funds, financial institutions, utilities, residential and commercial real estate firms, insurance companies, and professional investors.

Our web and print periodicals and special publications cover every U.S. state and metropolitan area; countries throughout Europe, Asia and the Americas; and the world's major cities, plus the U.S. housing market and other industries. From our offices in the U.S., the United Kingdom, and Australia, we provide up-to-the-minute reporting and analysis on the world's major economies.

Moody's Analytics added Economy.com to its portfolio in 2005. Its economics and consumer credit analytics arm is based in West Chester PA, a suburb of Philadelphia, with offices in London and Sydney. More information is available at [www.economy.com](http://www.economy.com).

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**CONTACT US**

For further information contact us at a location below:

**U.S./CANADA**  
+1.866.275.3266

**EMEA**  
+44.20.7772.5454

**ASIA/PACIFIC**  
+852.3551.3077

**OTHER LOCATIONS**  
+1.610.235.5299

Email us: [help@economy.com](mailto:help@economy.com)  
Or visit us: [www.economy.com](http://www.economy.com)

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