Why Must House-Price Indexes Disagree?

Robert Van Order is Freddie Mac's chief economist.

The 76-year-old Consumer Price Index (CPI) lately has evoked a fair amount of controversy, with an independent commission of economists appointed by Congress claiming that the widely used measure consistently has overestimated inflation by about 1 percent a year.

While most economists agree with the commission's conclusions, some disagree on the size of the overestimate. Some also worry that changing the CPI will hurt, among others, Social Security recipients whose government payments are tied to the CPI.

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As the debate suggests, calculating price indexes is not easy. This is as true of narrower indexes, like those devoted to house prices, as it is of the CPI, although for different reasons.

The CPI calculates the inflation rate by measuring the average change in prices paid by urban households for a fixed market basket of goods and services. However, the nature of the market basket actually chosen by consumers fluctuates over time, leading to two types of index "errors" of particular importance. The first error type deals with quality changes. For instance, a computer included in the market basket might cost more today than it did five years ago, a fact the CPI reflects. However, it is difficult for the index to register the extent to which today's computer might perform calculations faster and, more broadly, the degree to which it is a better computer. Failing to capture quality changes, therefore, can result in an overstatement of inflation.

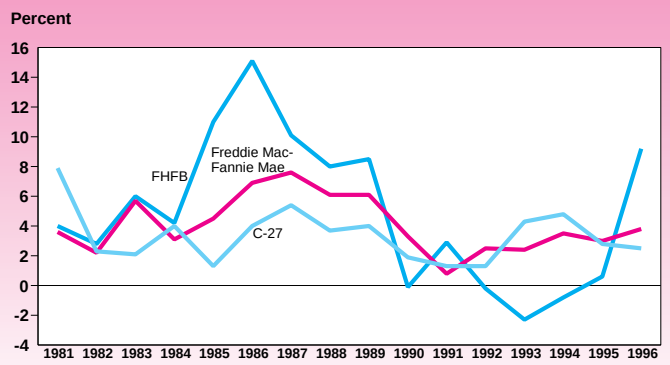
The second type of error—substitution—is more subtle. It occurs when some prices rise faster than others. As a result, people tend to make different choices, perhaps buying fewer of more expensive items. For example, if beef prices go up temporarily, shoppers might switch to chicken. Yet the CPI's market basket continues to include the same amount of beef. Under those circumstances, the measure again exaggerates inflation by attaching too much weight to the items growing most rapidly in price.

The designers of house-price indexes face similar issues. For instance, housing quality increases over the years as larger houses with more amenities enter the market. One way to try to hold quality constant is to look at the same houses over time. The Conventional Mortgage Home-Price Index (CMHPI), produced by Freddie Mac in association with Fannie Mae, does this by measuring price fluctuations every time the same residential properties are sold or refinanced with mortgages funded by one of the two companies. The actual sales prices or appraised values are culled from mortgage data going as far back as the late 1960s. Nonetheless, a potential weakness in the CMHPI lies in its inability to recognize that the same house may either improve over time—through a room addition, perhaps—or depreciate.

Alternatively, an index builder could adjust for housing-quality variations when comparing sales of different homes over time by factoring out price differences attributable to such things as the square footage or the number of bedrooms. The Commerce Department uses this approach with its Constant Quality C-27 House-Price Index, which follows the prices of newly constructed houses

which have been normalized on the basis of the 10 most important characteristics influencing the prices of new houses sold in 1982. In doing so, the Commerce Department believes it can account for approximately 62 percent of selling-price variations among new one-family houses sold. By ignoring sales of older houses, the C-27 avoids the issue of how to adjust for qualitative changes in the general housing stock over time.

EXHIBIT 1: Comparison of House-Price Growth-Rate Measures



Sources: Federal Housing Finance Board, Freddie Mac, U.S. Commerce Department

Substitution issues also crop up in house-price measures, but along a different dimension. Whereas the CPI's market basket does not change when it should to reflect the real world, a house-price basket sometimes changes when it shouldn't. Most house-price indexes are constructed from actual transaction data, but not all houses trade every year. As a result, a change in the type of houses bought and sold could prompt an index movement unrelated to whether the same house is worth more or less. For instance, suppose that house prices and quality do not change, but for some reason, many low-cost houses switch hands this year while high-end houses dominated the market last year. An index that simply reflects an average sales price will show a decrease in house prices due to the trading bias, when in fact house prices did not change.

Trading bias can also infiltrate an index when geographic buying shifts occur. Most parts of the country have experienced major downturns over the past two decades, but not all at the same time. As a result, housing activity frequently has swung from high-cost to low-cost areas and vice versa. Even within a region, however, trading patterns can vary. For instance, an economic slowdown may hit high-priced houses harder, causing them to trade less frequently, as the recent California recession illustrates.

Freddie Mac attempts to control for geographic shifts in its national index by computing the weighted average of the nine regional indexes from which the CMHPI is built. Each weight represents an area's share of the housing stock in the same base year. However, this approach does not control for trading biases within regions. The C-27, through statistical regression techniques, controls for locational variations down to whether a property is located in a metropolitan area. But even this finer geographic distinction will miss price variations between residences located in the developed exurbs that lie beyond a city's suburbs and those located in genuinely rural areas.

That different methodologies produce different measurements of house-value change is of practical interest, for instance, because of a series put out by the Federal Housing Finance Board (FHFB). This house-price measure determines each year's growth rate in the maximum mortgage amount that Freddie Mac and Fannie Mae can buy. In the 1980s, this house-price series grew more rapidly (*Exhibit 1*) than the C-27 or the Freddie Mac-Fannie Mae index, which is a variation of the published CMHPI. However, the FHFB series has slowed in recent years compared to the other indexes. It even recorded a price drop in 1993.

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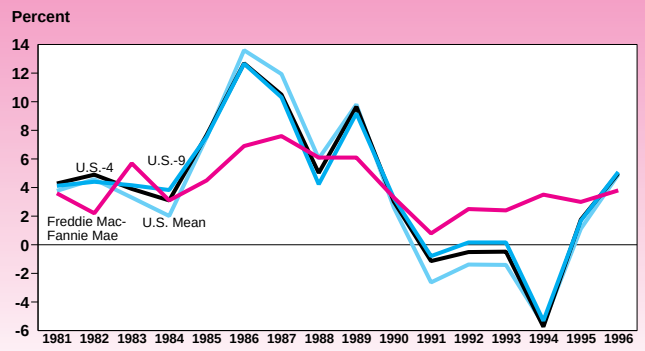
These low values generated by the series have shut out some borrowers from the benefits of the lower interest rates on Freddie Mac and Fannie Mae loans.

Despite these differences, all three indexes perform similarly over the long run. Since 1981, the FHFB series has grown by 4.9 percent, the Freddie Mac-Fannie Mae repeat sales index by 4.1 percent and the C-27 index by 3.4 percent. The unique features underlying the construction of each measure undoubtedly explain much of the long-run differences among these indexes. For example, a price series that makes no adjustment for quality differences among the houses compared, as is the case with the FHFB, is bound to grow faster than those that do.

EXHIBIT 2: Comparison of House-Price Growth-Rate Methodologies



Source: Freddie Mac

The big difference among the three indexes, though, lies in their volatility over the short run. More precisely, the FHFB series displayed the greatest variability, with a standard deviation of 5 percent in annual growth rates, compared to less than 2 percent for the other two indexes.

The indexes' different results stem from using both different methodologies and different samples of house-price data. The FHFB series and the Freddie Mac-Fannie Mae index rely on loan-origination information for price data but use different data sets. Input for the FHFB series comes from a monthly survey covering conventional, one-family loans used to purchase homes that are closed late in the month by major lenders. The Freddie Mac-Fannie Mae index, by comparison, draws only on loan-origination information for mortgages sold to the two secondary-market firms. The index compares price changes marked by repeat transactions involving the same house rather than changes in whatever sets of houses are financed between two consecutive months. In contrast to the FHFB and Freddie Mac-Fannie Mae indexes, the C-27 captures sales-contract prices for new houses as reported by builders surveyed monthly by the Commerce Department.

Differences in methodological approaches among the three indexes explain many of the inconsistencies in the house-price changes seen over a 15-year span. To determine index values' sensitivity to the methodology selected, Freddie Mac analysts subjected the same Freddie Mac-Fannie Mae loan-purchase data to three other methods of computing house-price changes.

One model estimates an average rate of growth for the country (the U.S. Mean) based on a simple, unweighted average of the house prices in the Freddie Mac-Fannie Mae sample. The two other indexes attempt to control for geographic trading biases by using weighted averages relative to the housing stock in their designated regions. One computes house-price changes by the four census regions (the U.S.-4 index). The other (the U.S.-9) sorts the data into nine smaller census divisions.

Looking first at 1991 through 1996, *Exhibit 2* shows that the unweighted U.S.-Mean index actually declined at an average rate of -0.8 percent per year during those six years. Controlling for quality shifts by the four regions increased the average growth rate to about -0.2 percent. Controlling by the nine divisions raised the growth

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rate to 0.2 percent. These numbers, however, fall well below the 2.4-percent growth rate recorded by the Freddie Mac-Fannie Mae index. In fact, the U.S.-Mean series closely resembles the FHFB series charted in Exhibit 1.

Obviously, controlling for geographic shifts in demand does matter, but most of the differences between the unweighted U.S.-Mean index and the Freddie Mac-Fannie Mae index came from price movements within the nine regions. The importance of adjusting for trading bias shows up even more clearly in the earlier years. Note, for instance, the high growth rates in 1986 and 1987 in the U.S.-Mean, the U.S.-4 and the U.S.-9 indexes, which largely disappear when the methodology underlying the Freddie Mac-Fannie Mae index is employed.

As illustrated in Exhibit 1, the differences among the measures arise more from their short-run volatility than from their long-run projections. All four demonstrated nearly the same average growth rate of around 4 percent from 1981 through 1996. However, the Freddie Mac-Fannie Mae index produced a standard deviation of 1.9 percent in the growth rate, while the others experienced variability of around 5 percent. Better controls built into the Freddie Mac-Fannie Mae index lead to more stable index values and, perhaps, more accurate ones.

This exercise in index comparisons shows that almost any sort of house-price index will tell the same story over the long haul. In the short run, though, different indexes can behave quite differently, making a strong case for understanding trading bias.**—Robert Van Order, chief economist**