

HIGHLIGHTS – Part 2

Monthly House Price Indexes

The HPI was developed as a quarterly rather than a monthly index partly because of data limitations. The volume of observations has increased substantially in recent years, making a monthly series much more feasible.

This Highlights article presents monthly measures, with and without seasonal adjustments, constructed using the same data as the quarterly, purchase-only index. The monthly index for the U.S. indicates that, after seasonal adjustments, prices increased 0.3 percent between March and April and decreased by 0.4 percent between April and May. Historical data suggest that revisions in these monthly estimates will be reasonably low in absolute terms.

Availability of Monthly Price Measures

Three monthly price measures are commonly referenced, although month-over-month appreciation rates are rarely computed with the three and producers of the statistics do not explicitly support their use for such a purpose.¹ The National Association of Realtors (NAR) produce data series of mean and median prices for existing homes for four regions and the U.S. as a whole. The Federal Housing Finance Board (FHFB) produces a series of average house prices for the U.S. Finally, the Census Bureau produces average and median price measures for sales of new homes. A fourth set of “monthly” house price measures—the S&P/Case-Shiller House Price Indexes—is also available, but those measures actually represent three-month rolling averages. A given month’s index value incorporates data from sales for that month, as well as the prior two months.²

As is reflected in Figure 1, the three monthly price measures exhibit extreme volatility. The graph plots monthly price changes for the three metrics between January 2004 and June 2007.³ As is evident in the graph, price changes swing wildly, with monthly appreciation rates frequently changing by more than five percentage points between one month and the next. Also, the values of the appreciation measures are, in themselves, more extreme than would be expected. The NAR medians, the least extreme measures, reflect monthly price increases of more than three percent (an extreme rate even in the most robust market periods) and price declines in market periods known to be strong.

The volatility shown in Figure 1 reflects a number of factors. First, sample sizes for the Census Bureau and FHFB series are very small and thus statistical precision is relatively low. Second, different responding entities may report results each month and, to the extent that price levels systematically differ across some responders (banks, local real estate boards, etc.), the mix of responding entities can influence price levels. Third, the geographic and quality composition of the sample may differ from month to month. The representation of each state in the sample of sold homes likely differs from month to

¹ Press releases with the newest data do not report month-over-month changes in the price metrics.

² See S&P/Case Shiller Home Price Indices Methodology, page 6 (available at: http://www2.standardandpoors.com/spf/pdf/index/SP_Case_Shiller_Home_Price_Indices_Methodology_Web.pdf).

³ More precisely, the plotted series are: median prices for existing single-family homes (NAR), median sales prices for new homes (Census/HUD), and average prices for previously-occupied homes (FHFB).

month, for example, as might the representation of homes from various price tiers. Fourth, monthly seasonal effects appear to be present. According to the NAR, for instance, “Demand for homes usually hits its seasonal peak in the third quarter, and strong price appreciation generally follows suit, and then declines moderately over the next three months.”⁴

OFHEO Monthly Price Measures

A monthly index using a repeat-transactions methodology (such as the one used in the HPI estimation) can avoid much of this volatility. OFHEO’s sample of sales transactions is relatively large and includes data from both Enterprises each quarter. Also, the repeat-transactions methodology mitigates the effects of shifts in home quality in monthly figures. For example, a temporary increase in transaction volumes for very expensive homes would have a very direct effect of median and average price measures: months with large shares of expensive properties would show illusory price gains relative to prior periods. A repeat-transactions model is less susceptible to such effects. Ephemeral increases in the share of expensive homes would only have indirect effect, influencing results only if expensive homes evidenced systematically different price growth than other homes.

Figure 2 plots price changes for a monthly index constructed using OFHEO’s HPI dataset. The index, which reports monthly price changes for the U.S. over the last three years, is constructed using exclusively sales price data (refinance appraisals are omitted) and employs the same methodology as is used in the construction of OFHEO’s quarterly purchase-only index. Also reported on the graph are monthly price changes for the NAR and FHFB price series, which cover existing properties. The Census Bureau data presented in Figure 1 are omitted because they comprise sales prices only for new homes and thus are more unlike OFHEO’s index.

The figure clearly indicates that a significant proportion of the volatility is removed in the OFHEO monthly index. Monthly appreciation rates fluctuate in a much tighter range, varying between -0.2 and +1.5 percent since January 2004.

Although these monthly appreciation rates are more stable indicators of market conditions, they still reflect seasonal patterns. Figure 3 plots the OFHEO index shown in Figure 2 against a seasonally-adjusted series.⁵ The graph clearly indicates that the seasonally-adjusted index is more stable than the unadjusted series over the latest 30 months. In the latest two months, April and May, the adjusted series shows more anemic market conditions, with monthly appreciation rates of +0.3 and -0.4 percent.

These monthly estimates are consistent with the stronger-appearing seasonally adjusted *quarterly* appreciation of 0.5 percent between the first and second quarters. The quarterly number is higher than these monthly estimates, in part, because relatively strong appreciation in the latter part of the first quarter is an important component of the quarterly growth rate estimate. With prices growing 0.4 percent between February and March (and another 0.3 percent between March and April), prices started the second quarter at a

⁴ See “Existing Homes Sales Methodology” available at: <http://www.realtor.org/Research.nsf/Pages/EHSMeth>.

⁵ The Census Bureau’s X-12 ARIMA procedure is used for seasonal adjustment. The optimal ARIMA structure is determined through an automatic model selection procedure.

relatively high level. Thus, the May decline was relative to higher prices than generally prevailed in the first quarter.⁶

Price changes between May and June, which are not shown in the table, also contribute to the second quarter seasonally-adjusted appreciation of 0.5 percent. Preliminary data for that period suggest that market conditions were more stable in that interval than they were between April and May.

Monthly Index Revisions

A primary concern with the construction of monthly indexes is that revisions will tend to be large. That is—initial estimates of appreciation rates will differ significantly from ones produced with later datasets, which incorporate more historical data.

With OFHEO's standard quarterly HPI, revisions tend to be largest for the most recent period—the latest quarter. As a result of delays associated with mortgage funding, the initial estimate of a given period's index value will frequently be revised significantly as a substantial amount of relevant data become available with later data submissions.

By analogy, the most recent monthly price measures would seem to be particularly susceptible to later revision. A June index estimate and the corresponding May-June appreciation rate estimate would be prone to the greatest revision, and a review of the evidence suggests that the estimates would not be reliable. The April and May index values would also seem to be vulnerable, although later data submissions from the Enterprises will most likely contribute a smaller number of new observations for those months.

The monthly index calculated in this analysis has employed the latest HPI data submission—data from the second quarter of 2007. To study the revision magnitudes, monthly indexes can be constructed using prior quarterly HPI datasets. The index points can then be compared against the later estimates to determine the relevant magnitude of revisions for the monthly series.

Figure 4 plots recent monthly appreciation rates calculated using the last five datasets submitted by the Enterprises. The dark red line, the same as was plotted in Figure 3, shows price growth estimates from the latest dataset. The thin red line shows price growth rates calculated using Enterprise data submitted for the First Quarter 2007 HPI release. The line only extends through February 2007 because that data submission only included data through March, and—as indicated above—the index point for the latest month (March) is not deemed to be reliable. The other lines correspond with prior data releases, including the second, third, and fourth quarters of 2006. As with the other series, these series are plotted for all but the latest month of available data.

Revisions are evident in the graph as differences between the various lines. For instance, the orange line indicates that the first estimate of seasonally-adjusted monthly appreciation

⁶ The quarterly growth rate for the second quarter is roughly equal to the average of the three-month growth rates for January to April, February to May, and March to June. The change from March to April is a component of each of these, and the change from February to March is as important as the change from April to May; both are components in two of the three.

in November 2006 was approximately -0.1 percent.⁷ Data from the next HPI release (depicted in the thin red line) revised that estimate to a rate closer to 0.0 percent, and the newest index estimates suggest that the rate was almost exactly 0.0 percent. The graph shows that the estimate of February appreciation was also revised only minimally; the initial and second estimates of February appreciation were both close to 0.3 percent.

In general, the graph suggests a propensity for revisions to be larger for the latest months. The earliest appreciation rates in the graph, rates for months in the early part of 2005, are scarcely revised across various index productions.

Using monthly indexes computed from ten HPI release datasets, Table 1 reports average revision magnitudes for the most current months. The table focuses on magnitudes for first revisions—the size of the first update to an initial estimate. In the data reflected in the Figure 4, the relevant revision for November was 0.1 percent (the first updated value of 0.0 percent minus the initial estimate of -0.1 percent).

Statistics are reported separately for the middle month and the first month of the quarter. The middle months are the second months in the latest quarter (e.g., February and May for the first and second quarter datasets) and first months are the initial month in the latest quarter (i.e., January and April for the latest two quarters). Because negative revisions sometimes occur (i.e., the original appreciation rate estimates exceed later estimates), the table calculates average revisions and the average *absolute value* of revisions.

The table, which presents information for a U.S. monthly index as well as Census Division indexes (which are used to construct the national index), confirms that revisions tend to be relatively small for the middle and first months.⁸ For example, the average absolute revision for the U.S. index for the middle month is .06 percent, which indicates that estimates of *annualized* appreciation rates tend to be revised by about 0.7 percentage points (i.e., 12 x .06 percent). The range of revisions was .09 to .19 percent for the nine Census Divisions.

Note that revisions for the U.S. estimates are a function of revisions for Census Divisions, some of which are positive and others are negative. The negative revisions for some of the Census Divisions offset some positive revisions, thus the average revision for the U.S. (and the corresponding average absolute revision) is lower than the range of revisions for the Census Divisions.

It is also worth noting that, as evidenced by the fact that the average revisions tend to be similar to average *absolute* revisions, revisions of the monthly appreciation rates have tended to be positive in recent periods. In other words, recent initial estimates of monthly appreciation rates have proved to be too low; appreciation estimates for a given period have tended to increase as more data become available.

⁷ The “November 2006” appreciation actually measures appreciation between October and November. To simplify exposition, this descriptive convention is used.

⁸ The index values used in these calculations are not seasonally adjusted.

Figure 1: Month-over-Month Appreciation Reflected in Existing Monthly Price Metrics

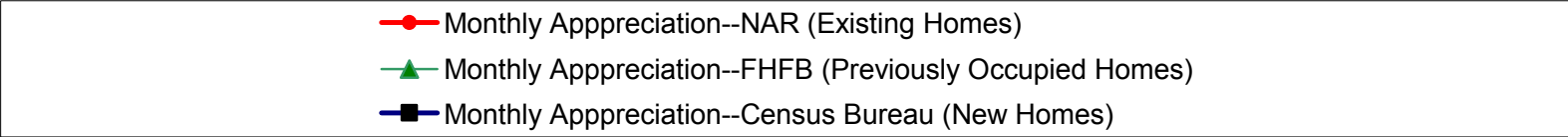
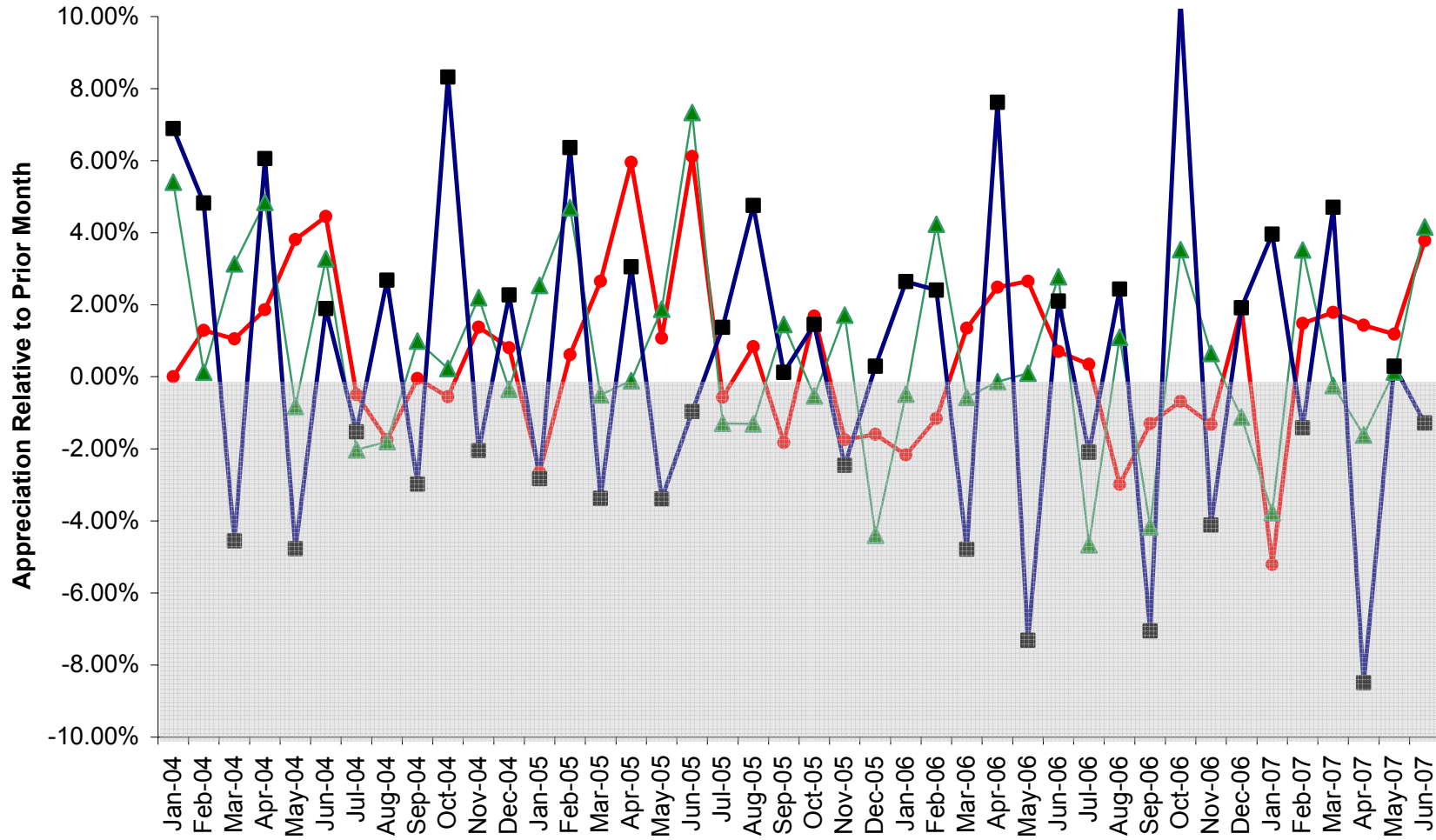
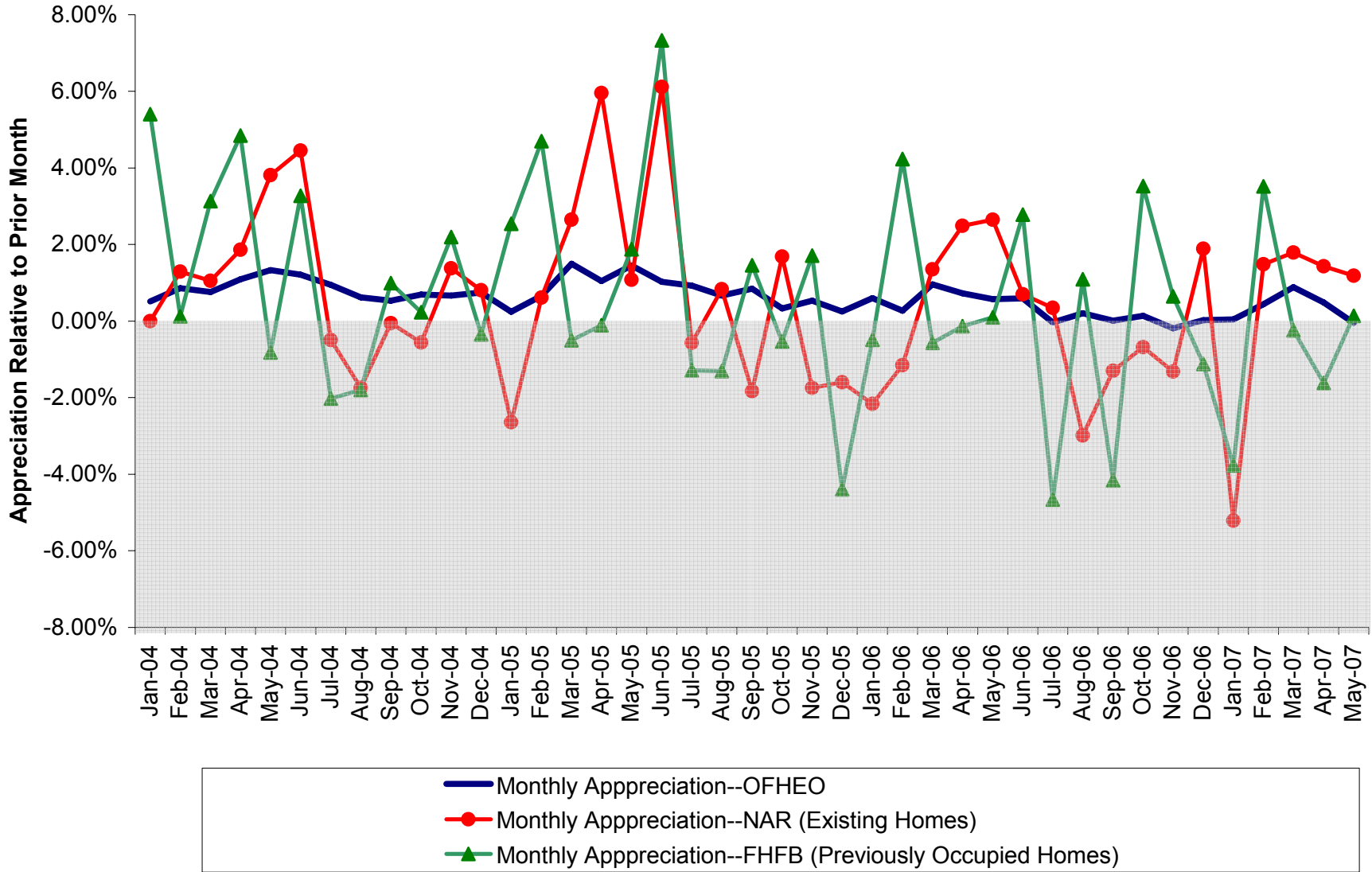


Figure 2: Month-over-Month Appreciation Reflected in NAR, FHFB and OFHEO Monthly Price Metrics



**Figure 3: Monthly Appreciation Rates for U.S.
Seasonally Adjusted and Unadjusted Rates**

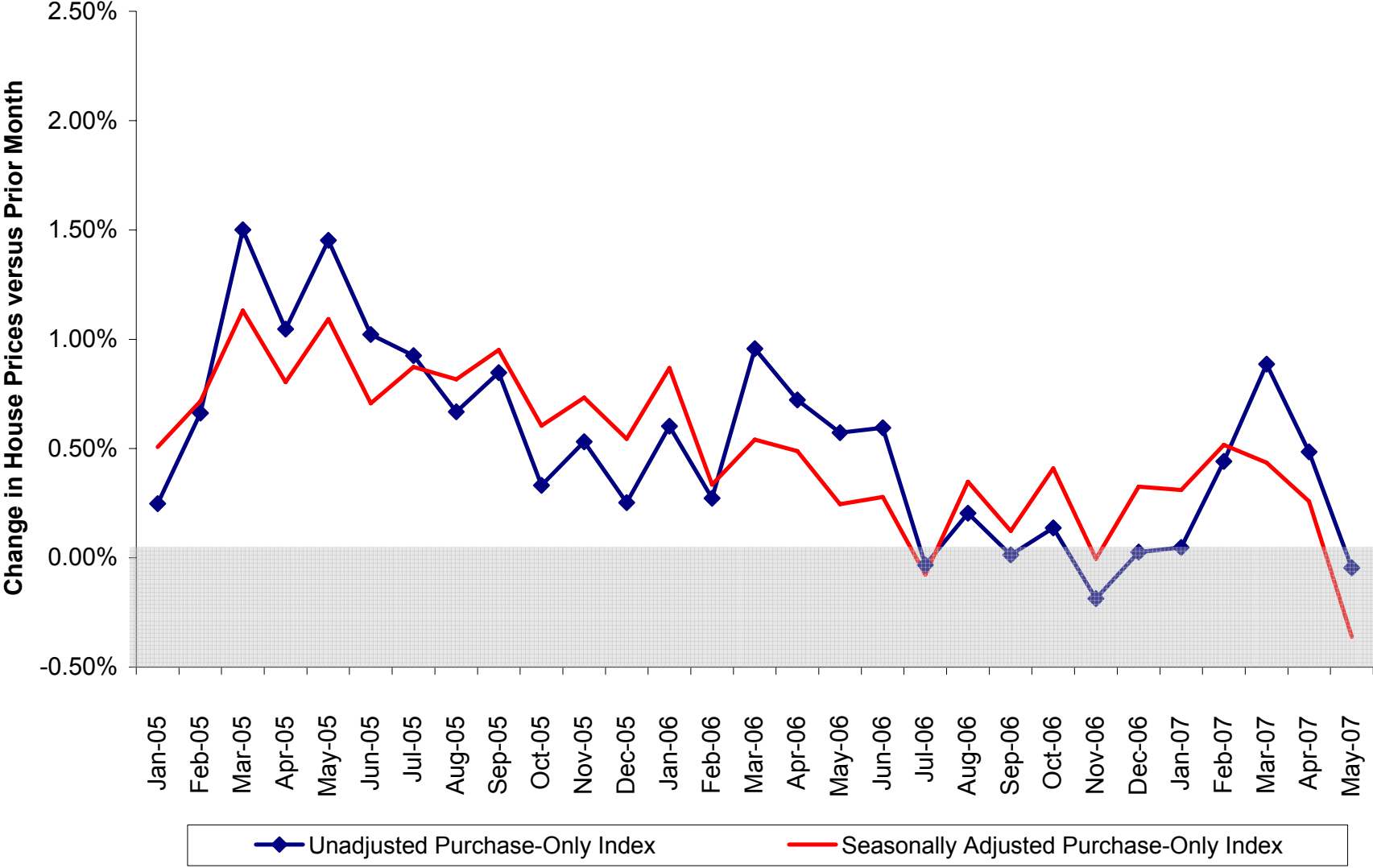
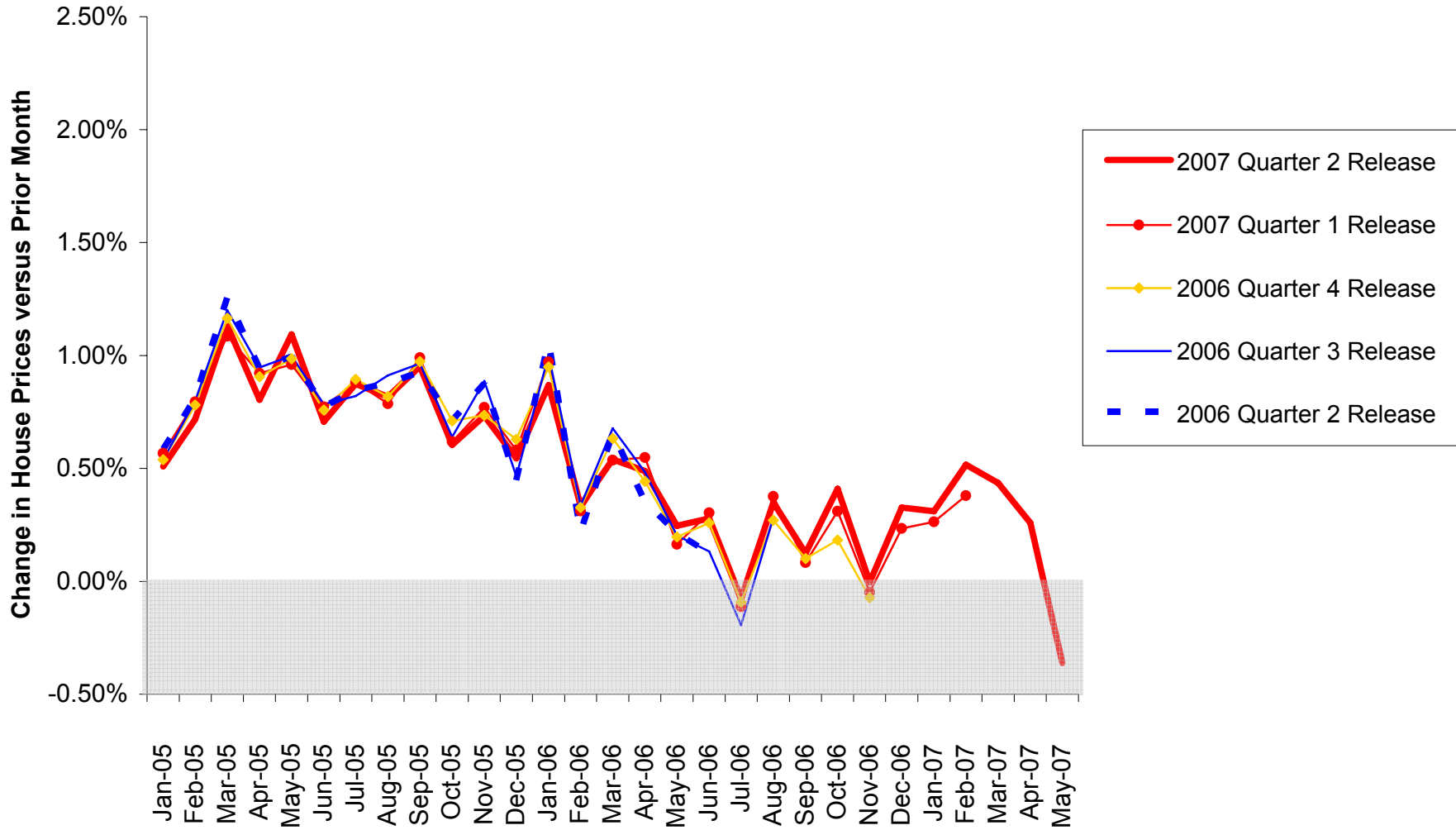


Figure 4: Revisions in Monthly Appreciation Rates for U.S.
 Seasonally Adjusted Series Calculated with Release Data from 2006Q2 - 2007Q2



**Table 1: Average First Revisions of Monthly Appreciation Rates
Constructed using Quarterly HPI Submissions**

	USA	Pacific	Mountain	West North Central	West South Central	East North Central	East South Central	New England	Middle Atlantic	South Atlantic
First Revision of Monthly Appreciation Rates for Middle Month of Quarter										
Average Revision	0.05%	0.13%	0.16%	-0.05%	0.11%	-0.05%	0.08%	0.03%	0.16%	-0.09%
Average Absolute Revision	0.06%	0.18%	0.19%	0.10%	0.16%	0.09%	0.14%	0.12%	0.16%	0.14%
First Revision of Monthly Appreciation Rates for First Month of Quarter										
Average Revision	0.08%	0.13%	-0.05%	0.13%	-0.02%	0.09%	0.11%	-0.03%	0.07%	0.11%
Average Absolute Revision	0.08%	0.23%	0.13%	0.16%	0.06%	0.10%	0.21%	0.17%	0.11%	0.17%

Note: Underlying index values are not seasonally adjusted