Repeat Sales Index Report
Residential • November 2010

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This issue of the ASU-RSI is dedicated to the memory of Robert McCord. It was at his urging that the W. P. Carey School of Business undertook the development of a repeat sales index to provide more accurate house price information to real estate professionals. The residential report has been followed with the recently introduced commercial RSI, which is produced quarterly. These reports will serve as a lasting testimonial to his commitment to the real estate industry.

The preliminary data for October shows that housing prices declined for the third consecutive month with the annual rate accelerating slightly to -6 percent. Since the housing market is entering what historically has been the slowest time of the year for sales, it is likely that declines on a year-to-year basis will continue for at least the next several months. The recent improvement in Phoenix employment is an important step in getting the housing market back to some semblance of normal conditions but the process will continue through 2011 and beyond. The flow of foreclosures into the market is not likely to end soon so the added demand associated with job creation and the eventual increase in people moving to the Phoenix area may minimize the downward pressure on house prices going into 2011. Demand continues from investors who are showing confidence in the long-term potential of Phoenix and from other buyers who are attracted by 1999-2000 prices. Since it is impossible to predict the bottom in any market, the improving economic situation may be enough to motivate more buyers to take the plunge.

Foreclosure prices also declined for a third month with October prices 3 percent lower than October 2009. However, this is an improvement over the September decline of 5 percent and may indicate that while prices declined, the rate remains fairly small. Non-foreclosure prices have been declining at an annual rate of 9-13 percent since March but the decline in October was only 6 percent compared to 2009. While there have been fluctuations in the rate of non-foreclosure price declines over the past twelve months, the trend clearly is in the right direction (Figure 6). This is the segment of the market that is of interest to most homeowners, whether they are waiting to sell or simply interested in knowing when their equity will stop shrinking. If the present trend continues, non-foreclosure prices should turn positive by mid-2011.

Lower priced houses declined for the second month (-5 percent) in the preliminary October data compared to October 2009, which was a faster rate than the 2 percent decline in September. The prices of more expensive houses deteriorated as a slightly faster rate in October (6 percent) compared to 5 percent in September. Last May, the higher priced RSI showed prices declining at a 1 percent rate but prices have deteriorated at a slow but steady rate since then (Figure 1). Townhouse/condos prices have been declining at the much higher rate of around 20 percent per year since March and the 20 percent rate of decline continued with the preliminary October data.

The overall median price for sales that were included in the August index was $122,000 and the preliminary figure for October is $125,000 (Table 1). Since June 2009, prices have fluctuated between $122,000 and $135,000 reflecting the instability that characterizes the current market and
TABLE 1
CHANGE IN RESIDENTIAL PRICES
(Percent)

<table>
<thead>
<tr>
<th></th>
<th>OVERALL</th>
<th>LOWER PRICED</th>
<th>HIGHER PRICED</th>
<th>TOWNHOUSE / CONDO</th>
<th>FORECLOSURES</th>
<th>NON-FORECLOSURES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 2009 – Aug. 2010</td>
<td>-2.0</td>
<td>3.0</td>
<td>-4.0</td>
<td>-17.0</td>
<td>-4.0</td>
<td>-9.0</td>
</tr>
<tr>
<td>July 2010 - Aug. 2010</td>
<td>-2.0</td>
<td>-2.8</td>
<td>-1.1</td>
<td>-2.2</td>
<td>-5.4</td>
<td>-0.6</td>
</tr>
<tr>
<td>1989–1992</td>
<td>-7.7</td>
<td>-3.9</td>
<td>-12.8</td>
<td>-3.9</td>
<td>na</td>
<td>na</td>
</tr>
<tr>
<td>2006– Aug. 2010</td>
<td>-50.0</td>
<td>-61.0</td>
<td>-42.0</td>
<td>-60.0</td>
<td>-55.0</td>
<td>-45.0</td>
</tr>
<tr>
<td>Median Price - Aug. 2010</td>
<td>$122,000</td>
<td>$90,000</td>
<td>$255,000</td>
<td>$63,750</td>
<td>$110,000</td>
<td>$155,000</td>
</tr>
</tbody>
</table>

Recent median prices are still within that range in spite of indications that the market is softening. The median price for foreclosed houses in August was $110,000 but the preliminary estimate for October is $118,000. For the past twelve months, the foreclosed house median has been between $110,000 and $120,000 (Figure 7). In contrast, the non-foreclosure median in August was $155,000 and the preliminary for October is $148,000. Median prices had fluctuated within a fairly narrow range throughout 2010 but the October figure is below that range (Figure 7). Similar statements about median prices can be made for the lower and upper segments of the market (Figure 3) where prices generally have fluctuated within a narrow range. The exception would be townhouse/condo prices which continued on a generally declining path in October. Relative stability in median prices compared to the past several years in many segments of the housing market is one reason to hope that the softening in prices measured in the various RSIs will be small compared to the declines that occurred from 2007 through early 2010.

Regions

Regional price changes in August were weaker than in July meaning that increases were a little smaller while declines were a little larger. This pattern was also observed last month with the July
data. The Southwest is the only region with an increase in prices from August 2009 to August 2010 while the July increase in the Central region (Phoenix) turned into a small decline in August. The Northeast region continues to show the largest decline (6.0 percent). In terms of total declines from the 2006 peak, the three hardest hit regions are still in excess of 50 percent with the Southeast region down almost 48 percent (Table 2). Even in the Northeast, prices have now dropped almost 38 percent.

### TABLE 2

CHANGE IN HOUSE PRICES BY REGION

(Percent)

<table>
<thead>
<tr>
<th>Region</th>
<th>Central</th>
<th>Northeast</th>
<th>Southeast</th>
<th>Northwest</th>
<th>Southwest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 2009 –</td>
<td>-0.8</td>
<td>-6.0</td>
<td>-4.6</td>
<td>-2.9</td>
<td>2.5</td>
</tr>
<tr>
<td>Aug. 2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July 2010 -</td>
<td>-1.8</td>
<td>-1.4</td>
<td>-2.0</td>
<td>-2.1</td>
<td>0.4</td>
</tr>
<tr>
<td>Aug. 2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2006 – Aug. 2010</td>
<td>-53.9</td>
<td>-37.6</td>
<td>-47.8</td>
<td>-54.6</td>
<td>-57.1</td>
</tr>
</tbody>
</table>

**Cities**

The only cities with appreciation from August 2009 to 2010 were the three new cities, Goodyear, Avondale and Surprise and only Surprise showed a higher rate of appreciation with the new August data. The remaining cities had declines in August with the decline in Sun City/Sun City West reaching almost 12 percent. Total declines from the peak are still very large in all cities (Table 3), ranging from 37 percent in Scottsdale/Paradise Valley to almost 65 percent in Avondale.
### TABLE 3
CHANGE IN HOUSE PRICES BY CITY
(Percent)

<table>
<thead>
<tr>
<th></th>
<th>CHANDLER</th>
<th>GILBERT</th>
<th>GLENDALE</th>
<th>MESA</th>
<th>PEORIA</th>
<th>SCOTTSDALE/ PARADISE VALLEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug. 2009 - Aug. 2010</td>
<td>-8.5</td>
<td>-4.8</td>
<td>-3.9</td>
<td>-1.8</td>
<td>-4.6</td>
<td>-6.4</td>
</tr>
<tr>
<td>July 2010</td>
<td>-2.5</td>
<td>-1.3</td>
<td>-2.0</td>
<td>-2.2</td>
<td>-1.7</td>
<td>-1.0</td>
</tr>
<tr>
<td>Aug. 2010</td>
<td>-7.6</td>
<td>na</td>
<td>-19.6</td>
<td>-10.9</td>
<td>-7.3</td>
<td>-9.7</td>
</tr>
<tr>
<td>1989 – 1992</td>
<td>-46.0</td>
<td>-47.2</td>
<td>-57.1</td>
<td>-51.4</td>
<td>-54.3</td>
<td>-37.0</td>
</tr>
<tr>
<td>2006 – Aug. 2010</td>
<td>-11.9</td>
<td>-7.8</td>
<td>4.8</td>
<td>0.5</td>
<td>1.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SUN CITY/ SUN CITY WEST</td>
<td>TEMPE</td>
<td>GOODYEAR</td>
<td>AVONDALE</td>
<td>SURPRISE</td>
<td></td>
</tr>
<tr>
<td>Aug. 2009 - Aug. 2010</td>
<td>-1.9</td>
<td>0.5</td>
<td>-3.1</td>
<td>-1.7</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>July 2010</td>
<td>-10.5</td>
<td>-1.9</td>
<td>na</td>
<td>na</td>
<td>na</td>
<td></td>
</tr>
<tr>
<td>2006 – Aug. 2010</td>
<td>-42.9</td>
<td>-43.1</td>
<td>-59.7</td>
<td>-64.7</td>
<td>-57.6</td>
<td></td>
</tr>
</tbody>
</table>

**Methodology**

The use of repeat sales is the most reliable way to estimate price changes in the housing market because the repeat sales approach eliminates the need to deal with the many issues associated with the heterogeneous nature of housing. Repeat sales can be used to measure the change in price of the same housing units over time. A large number of repeat sales over many years can be analyzed to develop a repeat sales index. In contrast, indices developed using regression
analysis provide estimates of price changes over time while simultaneously attempting to control for
differences in house characteristics, location, demographics and market conditions, etc. within the
model. Regression analysis can and does produce meaningful estimates of price changes but the
results are not as reliable as those produced using repeat sales data. An even less rigorous approach
would be to simply average sale prices by zip code or some other geographic area where the mix of
housing sizes and ages, etc. would be different each month. The percent changes based on medians
or averages would reflect not only price changes but also differences in the sizes, ages and other
characteristics of the houses sold each month.

The W.P. Carey School of Business – Repeat Sales Index (RSI) tracks very closely to the
S&P/Case - Shiller index for Phoenix since the same methodology is employed for calculating both
indices. The S&P/Case-Shiller index has been developed for 20 metropolitan areas and is being used
as a basis for trading housing futures contracts in 10 of those markets. Any differences between the
two indices are probably due to the way the data has been cleaned prior to the calculation process.
The S&P/Case-Shiller index is proprietary so the cleaning procedure used in connection with that index
could not be completely duplicated. However, following S&P/Case-Shiller, the cleaning process used
with the ASU - RSI excludes pairs where the first sale involved new construction and pairs where sales
occurred within six months of each other. Sale pairs with extremely high or low annual rates of price
change are excluded since at least one of the transactions may involve a data error. The same
justification is used to drop sales with extremely high or low prices or prices per square foot prior to
matching the sale pairs. A more detailed explanation of the data cleaning and calculation process is
contained in the ASU-RSI Methodology Report.

The house price data used in the S&P/Case-Shiller index starts in January 1989. Beginning
with January 1990, the percent change from the same month in the previous year is reported. The
ASU – RSI also begins with January 1989 data so the same percent change calculation also begins in
January 1990 and is reported for each month since then. There is seasonality in house price data so
month to month changes may not accurately reflect changes in market conditions and would cover a
very short time period. Calculating a percent change from the same month last year controls for
whatever seasonality may be present in the data. Annual rates of change typically are thought of
applying to a calendar year but in this report the annual rates that are reported would be measuring
change over the preceding twelve months. To smooth the index, the rate of return calculated from
each sale pair is included in calculations for a total of three months before it is published. Results
using data for the two newest months are labeled as preliminary.

The S&P/Case-Shiller index is published only for the entire Phoenix metro area. One major
advantage to the ASU-RSI is that in addition to the overall index, indices have been calculated for
higher and lower priced houses, smaller geographic areas (regions and selected cities) and for the
housing market segmented in various ways. Price changes for the attached portion of the housing
market (townhouse / condominiums) are presented as a repeat sales index using the same
methodology and indices are also estimated for higher and lower priced single-family detached houses and for foreclosure and non-foreclosure sales. The monthly data are divided into two groups based on the median price of all single-family houses sold. Sales are then paired within each of the two data sets and a repeat sales index is calculated for each. The foreclosure sale pairs are formed using two foreclosure sales or with a foreclosure sale paired with an earlier non-foreclosure sale of the house. The metro area has also been divided into five regions and an index has been calculated for each. All repeat sales used in the metro index are included in one of the five regional indices. Indices have also been calculated for eight individual cities where there are a sufficient number of repeat sales a reliable index to be estimated. A list of the cities included in each region is in Table 4.

The graphs contained in this report show the annual rate of change in house prices for the Phoenix metropolitan area on a monthly basis as well as median house prices. Figures 1 and 2 compare the change in the overall, lower and higher priced indices to the overall trend in the index, where the trend was estimated using data from January 1989 through December 2003. Figure 3 makes the same type of comparison using the median price of single-family sales that were used to form sale pairs for the current month, not the median price of all sales that occurred during the month. Since each index is a moving three month average, preliminary estimates of the index and future median prices for the entire market are included for the next two months (September and October) in Figures 1-7. Figures 4 and 5 include the townhouse / condominium RSI compared to the single-family RSI presented earlier in Figures 1 and 2. The foreclosure and non-foreclosure RSIs are in Figure 6 while Figure 7 has median prices for foreclosure and non-foreclosure houses and townhouse / condo units. Figures 8-17 contain graphs for the regions and cities for two different time periods. Five of the graphs present the price changes from January 1990 through August 2010 while the other five graphs cover the current housing cycle beginning in January 2004. Due to data limitations, a reliable index for Gilbert could not be calculated until January 1999 so the annual changes for Gilbert in Figures 10 and 11 start in January 2000.

Limited historical data has prevented Goodyear, Avondale and Surprise from being included in the monthly reports. However, the methodology used to calculate the indices has been modified and applied to those cities, resulting in enough data to calculate a reliable index for each one. Very simply, if a sale in one of those cities cannot be paired with a prior sale of the same house, the sale is paired with the prior sale of a house that is the same model and in the same subdivision. While model pairing is not ideal, this technique allows these cities to be included in the report. When the model pairing methodology was applied to the existing cities in the report, the index values correlated almost perfectly with those calculated from the traditional sale pair methodology. However, even with the modified pairing technique, fewer pairs are available to calculate the monthly index so the indices for Goodyear, Avondale and Surprise are somewhat more volatile than those for the other eight cities.
TABLE 4  
CITIES INCLUDED IN REGIONAL INDICES

<table>
<thead>
<tr>
<th>REGION</th>
<th>CITIES</th>
</tr>
</thead>
</table>
| NORTHEAST  | CAREFREE  
             CAVE CREEK  
             FOUNTAIN HILLS  
             PARADISE VALLEY  
             SCOTTSDALE  |
| NORTHWEST  | EL MIRAGE  
             GLENDALE  
             PEORIA  
             SUN CITY /  
             SUN CITY WEST  
             SURPRISE  
             YOUNGTOWN  |
| CENTRAL    | PHOENIX  |
| SOUTHEAST  | APACHE JUNCTION  
             CHANDLER  
             GILBERT  
             HIGLEY  
             MESA  
             QUEEN CREEK  
             SUN LAKES  
             TEMPE  |
| SOUTHWEST  | AVONDALE  
             BUCKEYE  
             GOODYEAR  
             LITCHFIELD PARK  |
Figure 1
Phoenix Single-Family Repeat Sales Index (RSI)
Annual Change
January 1990 - October 2010

Trend
Metro Area
Upper Range¹
Lower Range²

September and October are Preliminary

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: 1, Upper -4%  2, Lower 3%
Figure 2
Phoenix Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - October 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: 1, Upper -4%  2, Lower 3%
Figure 3
Phoenix Median Single-Family House Prices
January 1989 - October 2010

Trend
Metro Area
Upper Range¹
Lower Range²

September and October are Preliminary

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: 1, Upper $255,000  2, Lower $90,000
Figure 4
Phoenix Single-Family and Townhouse/Condominium Repeat Sales Index (RSI)
Annual Change
January 1990 - October 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: Single-Family -2%; TH/Condo -17%
Figure 5
Phoenix Single-Family & Townhouse/Condominium Repeat Sales Index (RSI)
Annual Change
January 2004 - October 2010

September and October are Preliminary

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
August: Single-Family -2%, TH/Condo -17%
Figure 6
Phoenix Single-Family
Foreclosure and Non-Foreclosure Repeat Sales Index (RSI)
Annual Change
January 2001 - October 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: Foreclosure -4%; Non-Foreclosure -9%
Figure 7
Phoenix Foreclosures, Non-Foreclosures and Townhouse/Condominium Median Prices
January 1989 - October 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data

August: 1, TH/Condo $ 63,750  2, Foreclosure $110,000  3, Non-Foreclosure $155,000
Figure 8
Regional Single-Family Repeat Sales Index (RSI)
Annual Change
January 1990 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 9
Regional Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 10
Chandler, Gilbert, Mesa, & Tempe Single-Family Repeat Sales Index (RSI)
Annual Change
January 1990 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 11
Chandler, Gilbert, Mesa & Tempe Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 13
Glendale, Peoria, Surprise & Sun City/Sun City West Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 14
Scottsdale/Paradise Valley & Phoenix Single-Family Repeat Sales Index (RSI)
Annual Change
January 1990 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 15
Scottsdale/Paradise Valley & Phoenix Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 16
Avondale and Goodyear Single Family Repeat Sales Index (RSI)
Annual Change
January 1990 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data
Figure 17
Avondale and Goodyear Single-Family Repeat Sales Index (RSI)
Annual Change
January 2004 - August 2010

Source: ASU W.P. Carey School of Business
Data Provided by Ion Data