Repeat Sales Index Report
Residential • September 2008

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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 price change of the same housing unit 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 that exist between the two indices are partly due to the use of different house transactions databases and possibly by the way the data has been cleaned prior to the calculation process. For example, the ASU-RSI database provided by Ion Data includes For Sale by Owner (FSBO) sales, which are not included in the S&P/Case-Shiller index since it uses MLS data. 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 in the previous
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, data is included in calculations for the current month and the next two months before it is reported, which accounts for the difference between the date on the report and the ending date on the graphs.

The graphs contained in this report show the annual rate of change in house prices for the Phoenix metropolitan area on a monthly basis. The ten graphs cover two time periods. Five of the graphs present the price changes from January 1990 through February 2008 while the other five graphs cover the recent housing cycle beginning in January 2004. 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, the metro area has been divided into five regions and an index has been calculated for each region. All repeat sales used in the metro index are included in one of the regional indices. An index has also been calculated for seven individual cities where there are a sufficient number of repeat sales for the index to be reliable. A list of the cities included in each region is in Table 1.

| TABLE 1 |
| CITIES INCLUDED IN REGIONS |

<table>
<thead>
<tr>
<th>REGION</th>
<th>CITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORTHEAST</td>
<td>CAREFREE</td>
</tr>
<tr>
<td></td>
<td>CAVE CREEK</td>
</tr>
<tr>
<td></td>
<td>FOUNTAIN HILLS</td>
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<tr>
<td></td>
<td>PARADISE</td>
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<td></td>
<td>VALLEY</td>
</tr>
<tr>
<td></td>
<td>SCOTTSDALE</td>
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<tr>
<td>NORTHWEST</td>
<td>EL MIRAGE</td>
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<tr>
<td></td>
<td>GLENDALE</td>
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<tr>
<td></td>
<td>PEORIA</td>
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<tr>
<td></td>
<td>SUN CITY</td>
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<tr>
<td></td>
<td>SUN CITY WEST</td>
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<tr>
<td></td>
<td>SURPRISE</td>
</tr>
<tr>
<td></td>
<td>YOUNGTOWN</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>PHOENIX</td>
</tr>
</tbody>
</table>

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Summary

The latest data for June 2008 shows a larger decline from one year ago than was reported last month. The overall metro decline from April 2007 to April 2008 was -18.4 percent while from May 2007 to May 2008 the decline was -21.2 percent and in June it is -22.8 percent. March was the first month with a double digit rate of decline (-13.0 percent), indicating that deterioration in the housing market began accelerating last spring. The only good news is that the decline appears to be slowing down. A similar slowing in the rate of decline in house prices occurred in all regions and cities. However, prices are down significantly from one year ago. The rate of appreciation peaked in September 2005 at a 44.1 percent annual rate and house prices increased 76.3 percent from January 2004 to July 2006. Since then the ASU-RSI has declined almost 26 percent in total. While the total decline in prices is still small compared to the increases, the slowing in the rate of decline, if it holds in future months, is a good sign. The housing market will have bottomed out in terms of price when the rate of decline from one year ago is zero. The large annual rates of decline are an indication that the market is still not close to that point.

Regions

Annual rates of decline vary widely across the five regions. From June 2007 to 2008 prices declined by 14 percent in the Northeast but by over 34 percent in the Southwest (Table 2). House prices in the Central, Northwest and Southeast regions were in between with declines ranging from 22 to 27 percent. The May-June change in the indices is smaller compared to the monthly change from April to May.
TABLE 2
ANNUAL AND TOTAL DECLINES IN HOUSE PRICES BY REGION
EARLY 1990s VS THE PRESENT

<table>
<thead>
<tr>
<th></th>
<th>CENTRAL</th>
<th>NORTHEAST</th>
<th>SOUTHEAST</th>
<th>NORTHWEST</th>
<th>SOUTHWEST</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2007 – June 2008</td>
<td>-23.3%</td>
<td>-14.0%</td>
<td>-22.4%</td>
<td>-27.0%</td>
<td>-34.3%</td>
</tr>
<tr>
<td>May 2007 – May 2008</td>
<td>-22.4</td>
<td>-12.3</td>
<td>-21.0</td>
<td>-25.2</td>
<td>-33.0</td>
</tr>
<tr>
<td>2006 – 2008</td>
<td>-25.2</td>
<td>-16.0</td>
<td>-26.8</td>
<td>-31.5</td>
<td>-40.0</td>
</tr>
</tbody>
</table>

The early 1990s saw a recession and fallout from the excesses of the 1980s in the real estate market. On a twelve month basis, house prices declined from August 1990 to December 1991, a record 17 straight months. To put things in historical perspective, a comparison between current housing market conditions and those in the early 1990s for regions and cities included in the ASU-RSI is presented in Tables 2 and 3. The current weakness in the housing market is approaching the duration experienced in the early 1990s and the magnitude of the declines exceeds those from the earlier period in all regions (Table 2). While all five regions showed similar dramatic increases in house prices from January 2004 to their 2006 peaks (73.5 – 80.6 percent), price declines vary widely. The West side is suffering the most followed by the Northwest, Central and Southeast regions. It is unclear whether all regions (or cities) will eventually decline by similar amounts or whether the declines already observed are an indication that some areas will give back more of the earlier appreciation than other areas. The slowing economy and higher fuel costs are likely to have a differential impact on the housing market with house prices holding up better in more attractive or accessible locations. If that is the case, then prices are likely to decline the most in the more distant parts of the metro area and where freeways are least accessible. To some extent that pattern can be seen in the regional and city data.

Cities

Variations similar to those observed in the regional data are also apparent in the city data. Rates of decline in house prices from June 2007 to 2008 ranged from -14 percent in Scottsdale / Paradise Valley to -28 percent in Peoria (Table 3). Similar to other geographic areas, the annual
rate of decline slowed compared to May. Prices have now declined more in percentage terms relative to the early 1990s across the board, making this the worst housing market on record, measured by price change. In Glendale and Peoria the total decline from the 2006 peak is now over 30 percent while in three other cities it exceeds 20 percent.

TABLE 3
ANNUAL AND TOTAL DECLINES IN HOUSE PRICES BY CITY
EARLY 1990s VS THE PRESENT

<table>
<thead>
<tr>
<th>CHANDLER</th>
<th>GLENDALE</th>
<th>MESA</th>
<th>PEORIA</th>
<th>SCOTTSDALE/</th>
<th>SUN CITY/ SUN PARADISE</th>
<th>TEMPE VALLEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 2007-</td>
<td>-20.1 %</td>
<td>-27.4 %</td>
<td>-23.3 %</td>
<td>-28.1 %</td>
<td>-14.0%</td>
<td>-15.4 %</td>
</tr>
<tr>
<td>June 2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 2008</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1989 – 1991</td>
<td>-7.6</td>
<td>-19.6</td>
<td>-10.9</td>
<td>-7.3</td>
<td>-9.7</td>
<td>-10.5</td>
</tr>
<tr>
<td>2006 – 2008</td>
<td>-25.8</td>
<td>-30.5</td>
<td>-27.3</td>
<td>-32.9</td>
<td>-16.4</td>
<td>-23.4</td>
</tr>
</tbody>
</table>

A slowing in the decline in house prices has implications beyond the housing market. The decline creates uncertainty and a sense that wealth is being reduced, which can have a broad impact on a consumer spending. The current economic slowdown is undoubtedly caused by higher gas prices and other factors. One of those factors may well be falling house prices, which would make owners more cautious in their spending decisions. Once house prices level off or are close enough to foresee the bottom, households will have a better idea of where they are financially and that should have a positive effect on spending.

The extraordinary nature of the housing cycle beginning in January 2004 compared to the prior history of the market back to 1989 is apparent in Figure 1. That graph is based on the trend in the annual rate of change in Phoenix house prices calculated from the ASU-RSI beginning in January 1990 through the end of 2003. This trend shows a gradual increase in the rate of price change reaching approximately 7 percent by 2002-2003. The trend is then projected out to the end of 2009 and compared to the actual change in the RSI through June 2008. The peak appreciation
rate of 44 percent in September 2005 clearly was not sustainable and from looking at Figure 1, it is not surprising that prices are now declining at double digit annual rates.

Perhaps the most important question that homeowners have relates to how much further house prices are likely to fall. While it is impossible to predict where prices will level off, Figure 2 contains a comparison of the trend in median house prices in Phoenix with actual median prices through June 2008. The trend is estimated using the RSI database from January 1989 through the end of 2003 and it is then projected through December 2009. As difficult as the market correction has been and still is, the data suggest that the worst of the decline may have occurred and that house prices could return to their long-term trend by early 2009. Whether price changes then approximate the long-term will depend not only on supply and demand factors in the housing market but also on the state of the economy and the mortgage market.

It was stated earlier that the data for each month is also included in calculations for the next two months to smooth the index. A comparison of the change in the index the month before it is released with the final value that is reported has revealed that the preliminary value is fairly close to the final value. This means that it may be possible to get an early, fairly reliable indication of the direction and magnitude of next month’s change in prices. For example, the June decline in the index is -22.8 percent from June 2007 and the preliminary value for July is -24.5 percent. This number is consistent with the slowing nature of the rate of declines observed recently and would be a further indication that at least the rate of price declines is close to leveling off. It must be remembered that the -24.5 percent decline for July is preliminary and that the actual change for July in next month’s report is likely to be somewhat different.

One dimension to the current housing crisis is affordability. The dramatic increase in house prices from 2004 into 2006 far outpaced increases in household incomes, which tend to rise very slowly. This disparity caused housing affordability to decline drastically. Improved affordability alone will not end the crisis but recent declines in house prices are moving the market in the right direction. An affordability index of 100 means that a household earning the median income for the area can afford to buy a median priced house at prevailing interest rates. An index value of 125 means that median income is 125 percent of the income needed to buy a median priced house while an index of 75 means just the opposite. In that case a household earning the median income has only 75 percent of the income needed to buy the same median priced house. As recently as 2003 the index for Phoenix was 126 while by 2006 it had declined to 74\(^1\). The change in house prices and/or interest rates that would be needed to bring the affordability index up to 100, which is a useful benchmark, can be calculated for most cities in the ASU-RSI.

\(^1\) Realty Studies, Arizona State University Polytechnic Campus
The affordability index and median resale house prices for 2008, Q2 at an effective interest rate of 6.3 percent are in the top portion of Table 4. The house price associated with an index value of 100 is then calculated for each city based on estimated gross monthly household income and the effective 6.3 percent interest rate. A comparison of the two house prices is an indication of the condition of the housing market in each city and it can be related to house price changes calculated from the ASU-RSI data. For example, the affordability index for Mesa in the second quarter was 79 and the median resale house price was $235,000. The median price would have to decline an additional 20.7% to $186,373 for the affordability index for Mesa to equal 100 at a mortgage rate of 6.3 percent. Affordability is just one aspect of the current housing problem and it must be remembered that this affordability calculation is not a forecast of how much house prices will decline in any of these cities but rather it is an illustration of the magnitude of the price declines needed to bring about a significant improvement in housing affordability.

Table 4
House Price and Interest Rates for the Affordability Index to = 100

<table>
<thead>
<tr>
<th>Effective Interest Rate 6.3%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chandler</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>2008 Q2 Affordability Index*</td>
</tr>
<tr>
<td>Median Gross Monthly Household Income*</td>
</tr>
<tr>
<td>Median Resale Price*</td>
</tr>
<tr>
<td>House Price for Affordability Index to = 100</td>
</tr>
<tr>
<td>Additional Price Decline Needed</td>
</tr>
</tbody>
</table>

* Realty Studies, Arizona State University Polytechnic Campus
Figure 1
Trend and Actual Annual Change in Phoenix House Prices

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 2
Median Trend and Actual Phoenix House Prices 1989-2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 3
Metro Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data

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Figure 4  
Metro Phoenix Repeat Sales Index (RSI)  
Percent Change from Same Month Previous Year  
January 2004 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
Data Provided by Ion Data
Figure 6
Regional Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 7
Chandler, Mesa, & Tempe Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 8
Chandler, Mesa & Tempe Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 9
Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 10
Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 11
Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data
Figure 12
Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - June 2008

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data