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 Express 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. This means that the rate of return calculated from each sale pair is included in calculations for a total of three months before it is published, 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. Figure 1 compares the change in the index to the trend based on data through December 2003. Figure 2 makes the same type of comparison using the median price of 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 the index is a moving three month average, preliminary estimates of the index and future median prices are included for the next two months in Figures 1 and 2 (April and May). The next ten graphs cover two time periods. Five of the graphs present the price changes from January 1990 through March 2009 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. Indices have 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>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CITIES INCLUDED IN REGIONS</td>
</tr>
</tbody>
</table>

<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>
</tr>
<tr>
<td></td>
<td>PARADISE VALLEY</td>
</tr>
<tr>
<td></td>
<td>SCOTTSDALE</td>
</tr>
<tr>
<td>NORTHWEST</td>
<td>EL MIRAGE</td>
</tr>
<tr>
<td></td>
<td>GLENDALE</td>
</tr>
<tr>
<td></td>
<td>PEORIA</td>
</tr>
</tbody>
</table>

2
Summary

The latest data for March 2009 reveals that house prices declined by 37 percent in the Phoenix metro area, which was also the decline for February, and slightly higher than the -35 percent in January. The decline in the index which began in March 2007 has continued for 25 months compared to 17 months of decline in the early 1990s. Preliminary estimates of the index for April and May have prices declining by 35 and 33 percent respectively. While preliminary and subject to change, the April and May figures, if they hold up, would be the first evidence that the housing market has reached a turning point. The rate of appreciation for the overall metro area peaked in September 2005 at a 44 percent annual rate with house prices increasing by 76 percent from January 2004 to July 2006. As of March the total decline from the peak is 47 percent, which would put prices at a level not seen since March 1999.

An important factor for both home owners and prospective purchasers is the median price of housing. Based on the sales reflected in the index, the median price was $119,000 in March compared to $121,000 in February. The preliminary estimates for April, $117,500 and May, $115,000 would put prices back to the levels of November and October 1998, respectively. While there is evidence that the rate of decline is slowing, actual prices continue to decline but by much smaller amounts than they typically have during the past 18 months. The large number of
foreclosed properties being sold at distressed price levels suggests that the median price is unlikely to increase significantly in the near future.

**Regions**

Annual rates of decline vary widely across the five regions as does the change in the rate of decline from February to March. The leveling off in the rate of decline is evident in all regions with relatively small changes from those reported last month. Declines in the Central and Southwest regions are over 40 percent for the preceding twelve months and the Northwest is close behind at -38 percent. At the other end, prices declined by 25 percent in the Northeast, a slight improvement from February and 31 percent in the Southeast region. Prices declined by six percent or more from February in the Central and Southwest regions while they increased slightly in the Northeast region.

**TABLE 2**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Central</td>
<td>-44.1%</td>
<td>-24.7%</td>
<td>-6.0%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Northeast</td>
<td>-24.7%</td>
<td>-30.5%</td>
<td>-4.2%</td>
<td>-3.9%</td>
</tr>
<tr>
<td>Southeast</td>
<td>-30.5%</td>
<td>-37.9%</td>
<td>-3.9%</td>
<td>-6.5%</td>
</tr>
<tr>
<td>Northwest</td>
<td>-37.9%</td>
<td>-42.7%</td>
<td>-3.9%</td>
<td>-6.5%</td>
</tr>
<tr>
<td>Southwest</td>
<td>-42.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

While all five regions showed similar dramatic increases in house prices from January 2004 to their 2006 peaks (74 – 81 percent), total price declines vary widely. The Southwest is down the most since the peak (58%) with the Central and Northwest regions close behind and even the Northeast down by over 30 percent in total. The early 1990s saw a recession and fallout from the excesses of the 1980s in the real estate market. The current weakness in the housing market has not only exceeded the duration experienced in the early 1990s but the magnitude of the declines far exceeds those from the 1989 - 1992 period in all regions.
Variations similar to those observed in the regional data are also apparent in the city data. Rates of decline in house prices from March 2008 to 2009 ranged from 18 percent in Tempe to 40 percent in Glendale (Table 3). In Sun City / Sun City West the annual decline in the index had been in the range of 13 to 15 percent for over a year but increased for the third month in a row to -20 percent. The February to March change varied widely with declines of five percent in Mesa and Tempe to an increase of 0.4 percent in Scottsdale / Paradise Valley. Prices have declined by over 50 percent in Glendale and Peoria since the 2006 peak and are around 30 percent lower in Scottsdale / Paradise Valley and Tempe.

### TABLE 3

**ANNUAL, MONTHLY AND TOTAL DECLINES IN HOUSE PRICES BY CITY**

<table>
<thead>
<tr>
<th>CITY PRIVATE</th>
<th>CHANDLER</th>
<th>GLENDALE</th>
<th>MESA</th>
<th>PEORIA</th>
<th>SCOTTSDALE/ PARADISE VALLEY</th>
<th>SUN CITY/ SUN CITY WEST</th>
<th>TEMPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2008-March 2009</td>
<td>-28.1%</td>
<td>-40.1%</td>
<td>-35.2%</td>
<td>-35.8%</td>
<td>-23.7%</td>
<td>-19.5%</td>
<td>-17.5%</td>
</tr>
<tr>
<td>Feb. - March 2009</td>
<td>-4.0%</td>
<td>-5.0%</td>
<td>-4.9%</td>
<td>-4.2%</td>
<td>0.4%</td>
<td>-1.2%</td>
<td>-5.0%</td>
</tr>
<tr>
<td>1989 – 1992</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>
<td>-1.9</td>
</tr>
<tr>
<td>2006 – 2008</td>
<td>-39.1</td>
<td>-52.8</td>
<td>-47.0</td>
<td>-51.7</td>
<td>-29.2</td>
<td>-34.7</td>
<td>-31.0</td>
</tr>
</tbody>
</table>
Figure 1
Trend and Annual Percent Change in Phoenix House Price
January 1990 - May 2009

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

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 3
Metro Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 4
Metro Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 5
Regional Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 6
Regional Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 7
Chandler, Mesa, & Tempe Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 8
Chandler, Mesa & Tempe Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 9
Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 10
Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 11
Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 1990 - March 2009

Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice
Data Provided by Ion Data Express
Figure 12
Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)
Percent Change from Same Month Previous Year
January 2004 - March 2009

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