



## 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.

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

<u>REGION</u>	<u>CITIES</u>
<u>NORTHEAST</u>	CAREFREE CAVE CREEK FOUNTAIN HILLS PARADISE VALLEY SCOTTSDALE
<u>NORTHWEST</u>	EL MIRAGE GLENDALE PEORIA SUN CITY SUN CITY WEST SURPRISE YOUNGTOWN
<u>CENTRAL</u>	PHOENIX

## SOUTHEAST

APACHE  
JUNCTION  
CHANDLER  
GILBERT  
HIGLEY  
MESA  
QUEEN CREEK  
SUN LAKES  
TEMPE

## SOUTHWEST

AVONDALE  
BUCKEYE  
GOODYEAR  
LITCHFIELD  
PARK

### Summary

The latest data for April 2008 shows significantly sharper rates of decline from one year ago than was reported last month. The overall metro decline from April 2007 increased from -13 percent in March to -18 percent in April. March was the first month with a double digit rate of decline so deterioration in the housing market began accelerating rapidly last spring. A similarly large increase in the rate of decline in house prices occurred in all regions and most cities with the decline reaching double digits for the first time in Scottsdale and Paradise Valley (-10 percent). 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 over 21 percent in total. While the total decline in prices is still small compared to the increases, the accelerating rate of decline suggests that house prices have a long way to decline and that things will get worse before they get better.

### Regions

Annual rates of decline vary widely across the five regions. From April 2007 to 2008 prices declined by 10 percent in the Northeast but by more than 30 percent in the Southwest (Table 2). House prices in the Central, Northwest and Southeast regions were in between with declines ranging from 18 to 23 percent. The decline in house prices, which picked up speed last month, increased again with all regions down over 5 percent from March to April and the Southwest region registering an 11 percent decline in just one month. Even in the Northeast region, where prices have been stable or down only slightly since early 2007, they are now down by double digits from April 2007.

TABLE 2  
ANNUAL AND TOTAL DECLINES IN HOUSE PRICES BY REGION  
EARLY 1990s VS THE PRESENT

	CENTRAL	NORTHEAST	SOUTHEAST	NORTHWEST	SOUTHWEST
April 2007 – April 2008	-19.2 %	-10.2 %	-18.4 %	-23.5 %	-30.6 %
March 2007 – March 2008	-14.4	-4.3	-13.8	-19.0	-22.9
1989 – 1990/92	-3.2	-9.7	-7.0	-15.3	-21.2
2006 – 2008	-20.7	-12.4	-22.9	-26.6	-34.6

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 closely by the Southeast and Central 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 April 2007 to 2008 ranged from 10 percent in Scottsdale / Paradise Valley to 26 percent in Peoria (Table 3). The annual rate of decline is not only greater in

all cities compared to March but the decline accelerated everywhere with the exception of Tempe. 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.

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

	CHANDLER	GLENDALE	MESA	PEORIA	SCOTTSDALE/ PARADISE VALLEY	SUN CITY/ SUN CITY WEST	TEMPE
April 2007- April 2008	-15.0 %	-23.5 %	-18.5 %	-25.8 %	-10.0%	-14.2 %	-12.1 %
March 2007- March 2008	-9.2	-19.4	-13.3	-21.6	-4.1	-11.2	-12.1
1989 – 1991	-7.6	-19.6	-10.9	-7.3	-9.7	-10.5	-1.9
2006 – 2008	-15.3	-21.2	-18.2	-24.7	-7.3	-18.9	-16.3

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<sup>1</sup>. 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.

The affordability index and median resale house prices for 2008, Q1 at an effective interest rate of 6.0 percent are in the top portion of Table 4. The house price associated with an index value

<sup>1</sup> Realty Studies, Arizona State University Polytechnic Campus

of 100 is then calculated for each city based on estimated gross monthly household income and the effective 6.0 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 first quarter was 93 and the median house price was \$205,000. The median price would have to decline an additional 7.1% to \$191,477 for the affordability index for Mesa to equal 100 at a mortgage rate of 6.0 percent. The total decline in Mesa house prices through March 2008 has been 18.2 percent (Table 3) so Mesa is roughly three-quarters of the way back to achieving parity in housing affordability. 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.

The results of the calculations for most cities are encouraging. Except for Mesa and Tempe, where prices would need to decline an additional 26.6 percent based on current gross monthly household income, the other four cities, Chandler, Glendale, Peoria and Phoenix have affordability indexes close to or above 100. In Chandler the median price, \$242,000 is already below the \$261,062 needed for the index to equal 100. While the trends in the ASU-RSI indicate that further declines in house prices will occur, improved affordability suggests that other factors, such as the cost and availability of mortgage financing and the perception on the part of potential buyers that prices will continue to decline may be bigger impediments to recovery in the housing market than the current price of housing in many cities.

The bottom portion of Table 4 recalculates the affordability index based on a 6.5 percent interest rate. Lowering interest rates to benefit the housing market is one goal of the Federal Reserve but unfortunately mortgage rates recently have been moving in the opposite direction. A higher interest rate, at the same level of monthly household income and median resale price would reduce the affordability index because the median income household could only afford to buy a lower priced house. The reduced affordability of housing also means that house prices would have to decline by more to bring the index back to 100. The required declines in house prices at a 6.5 percent interest rate are in the bottom row of Table 4. By comparing the price declines needed at 6.5 versus 6.0 percent, it is clear that interest rates have a dramatic effect on housing affordability.

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

Effective Interest Rate 6.0%\*

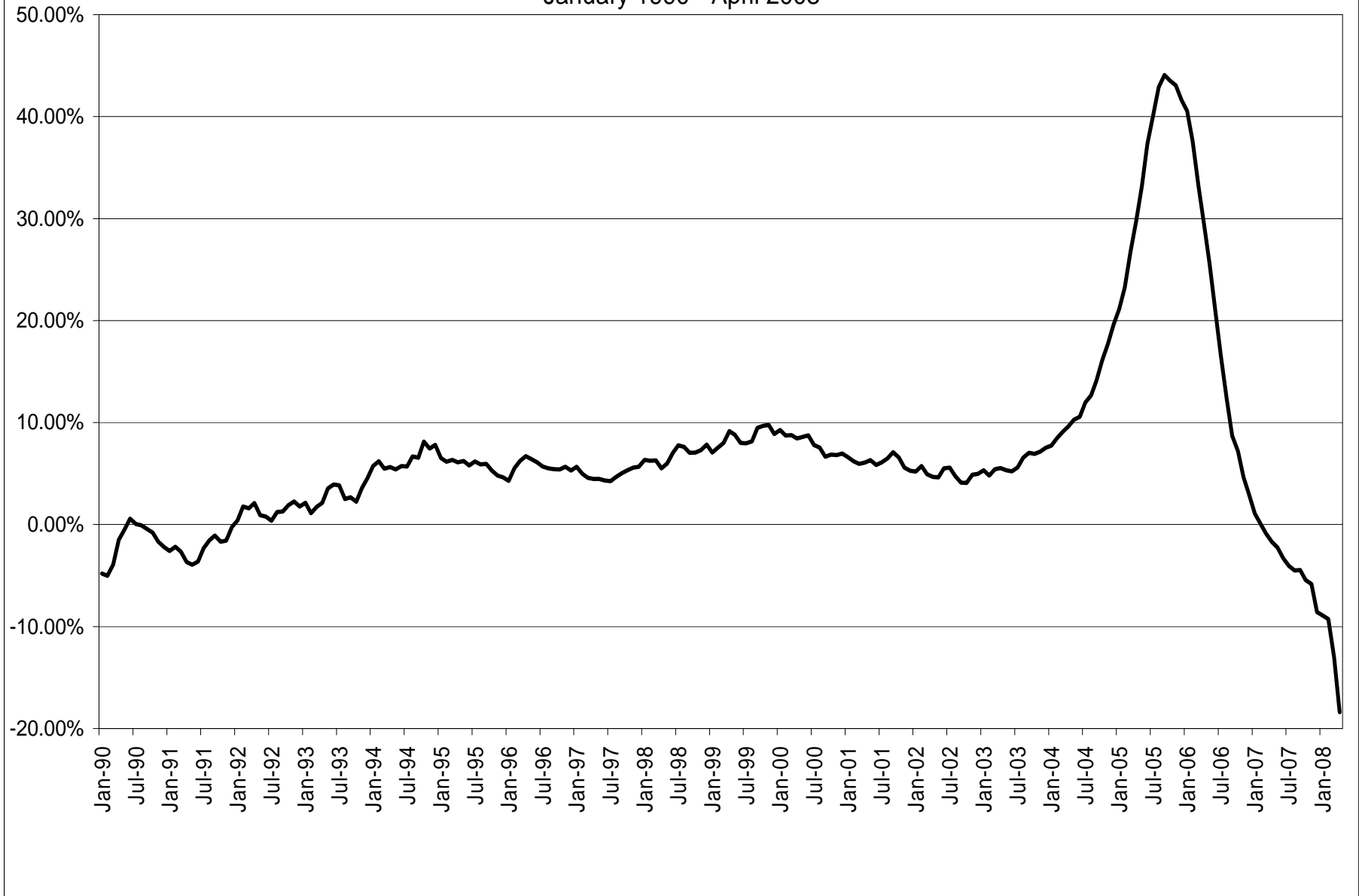
	Chandler	Glendale	Mesa	Peoria	Phoenix	Tempe
2008 Q1 Affordability Index*	108	97	93	102	98	79
Median Gross Monthly Household Income*	\$ 5,590	\$ 4,310	\$ 4,100	\$ 5,000	\$ 3,945	\$ 4,060
Median Resale Price*	\$242,000	\$ 206,465	\$ 205,000	\$ 230,000	\$188,075	\$240,000
House Price for Affordability Index to = 100	\$261,062	\$ 201,284	\$ 191,477	\$ 233,508	\$184,238	\$189,609
Additional Price Decline Needed	-7.3%	2.6%	7.1%	-1.5%	2.1%	26.6%

Effective Interest Rate 6.5%

	Chandler	Glendale	Mesa	Peoria	Phoenix	Tempe
2008 Q1 Affordability Index	102	92	89	96	93	75
Median Resale Price*	\$242,000	\$ 206,465	\$ 205,000	\$ 230,000	\$188,075	\$240,000
House Price for Affordability Index to = 100	\$247,632	\$ 190,929	\$ 181,626	\$ 221,495	\$174,760	\$179,854
Additional Price Decline Needed	-2.3%	8.1%	12.9%	3.8%	7.6%	33.4%

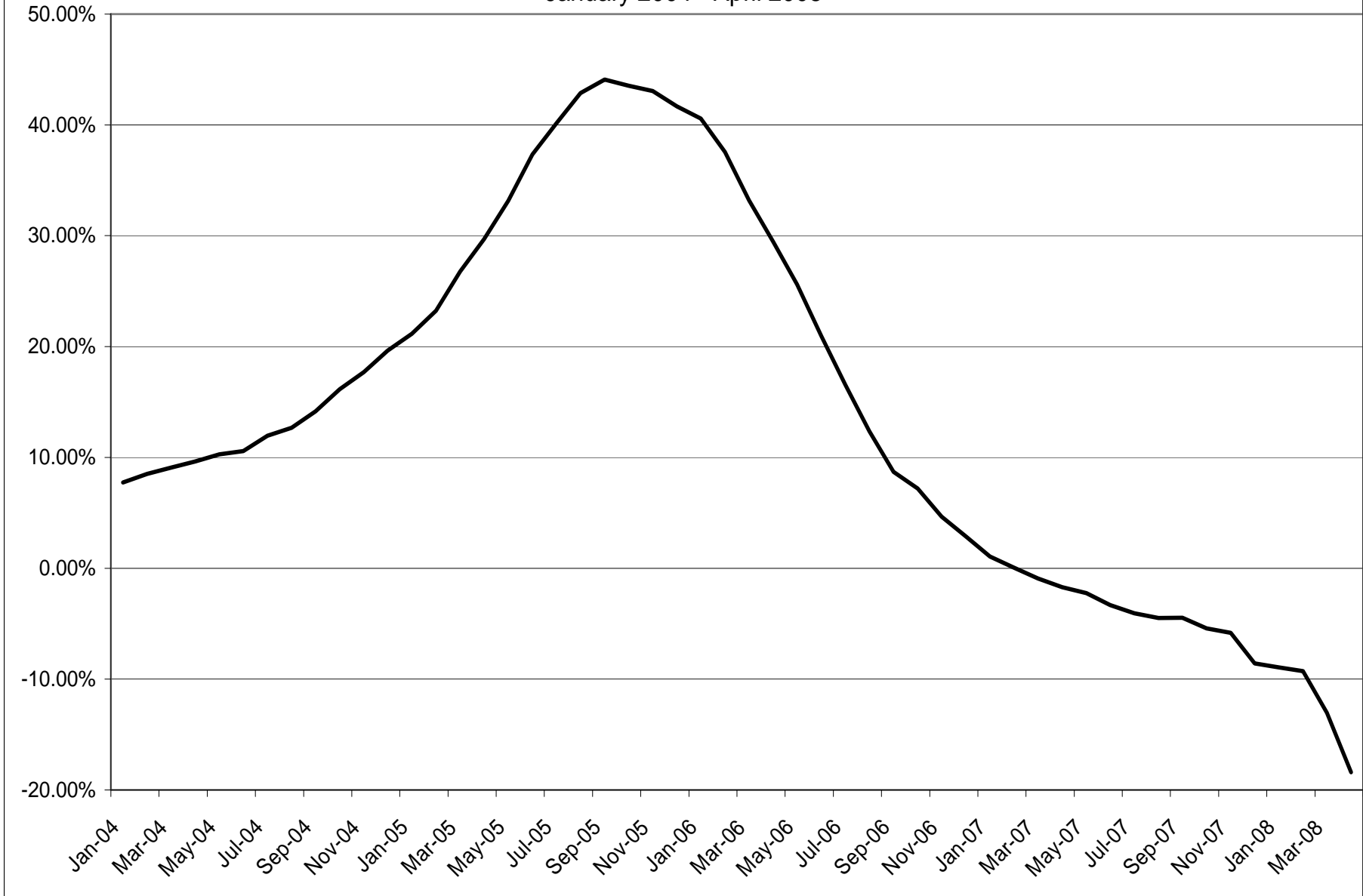
\* Realty Studies, Arizona State University Polytechnic Campus

**Metro Phoenix Repeat Sales Index (RSI)**  
Percent Change from Same Month Previous Year  
January 1990 - April 2008



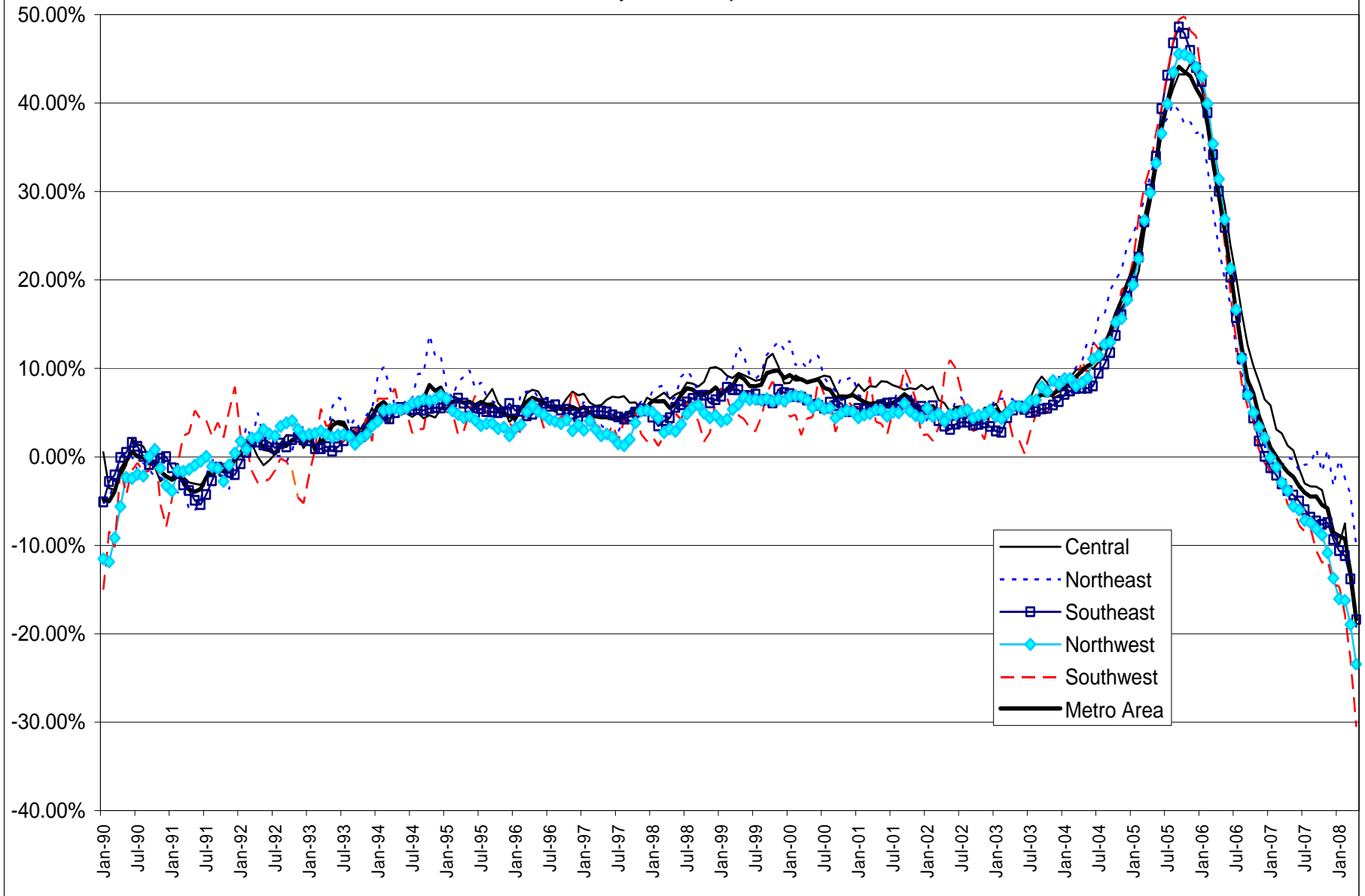
Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
Data Provided by Ion Data

**Metro Phoenix Repeat Sales Index (RSI)**  
 Percent Change from Same Month Previous Year  
 January 2004 - April 2008



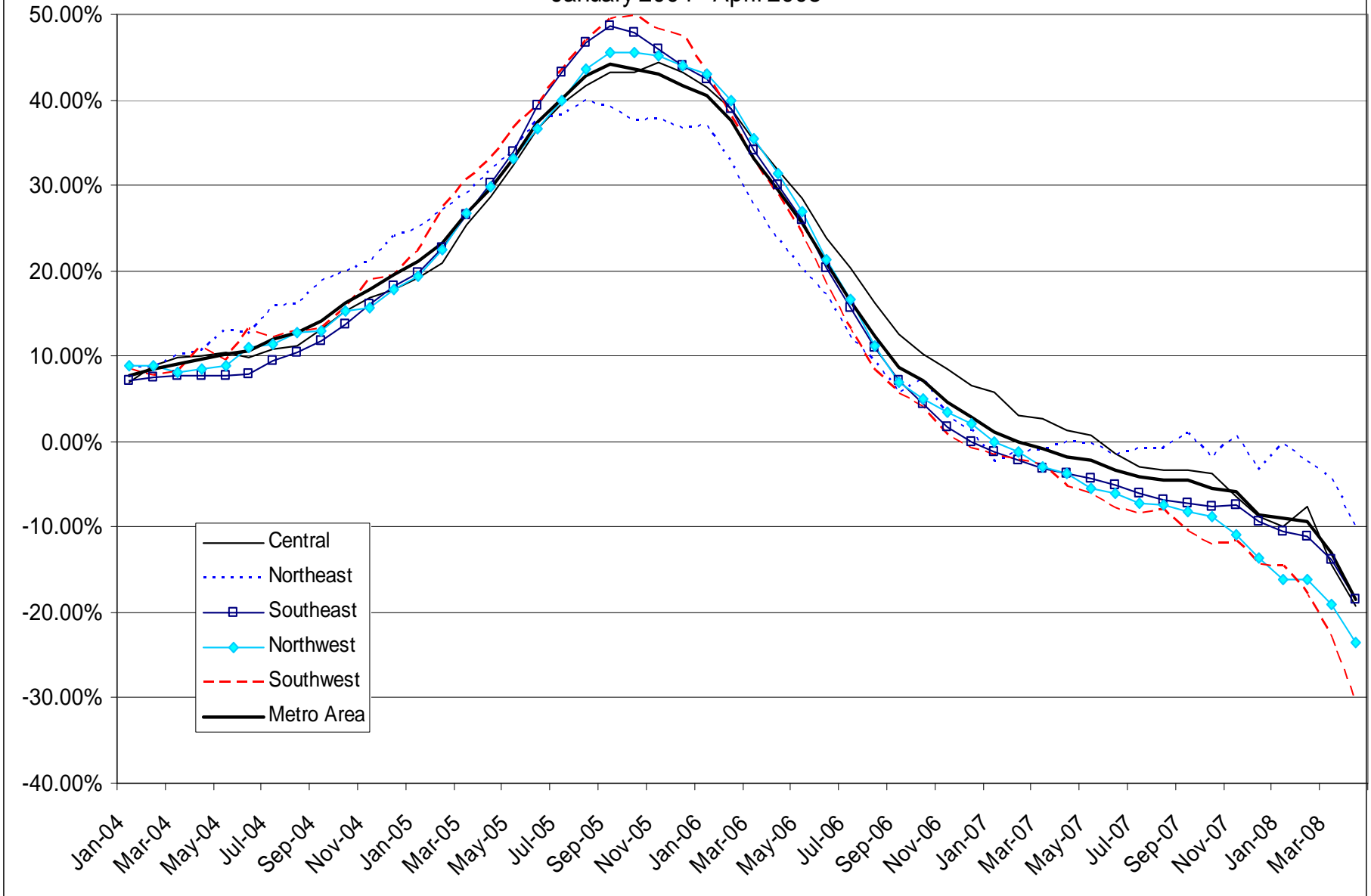
Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
 Data Provided by Ion Data

**Regional Repeat Sales Index (RSI)**  
 Percent Change from Same Month Previous Year  
 January 1990 - April 2008



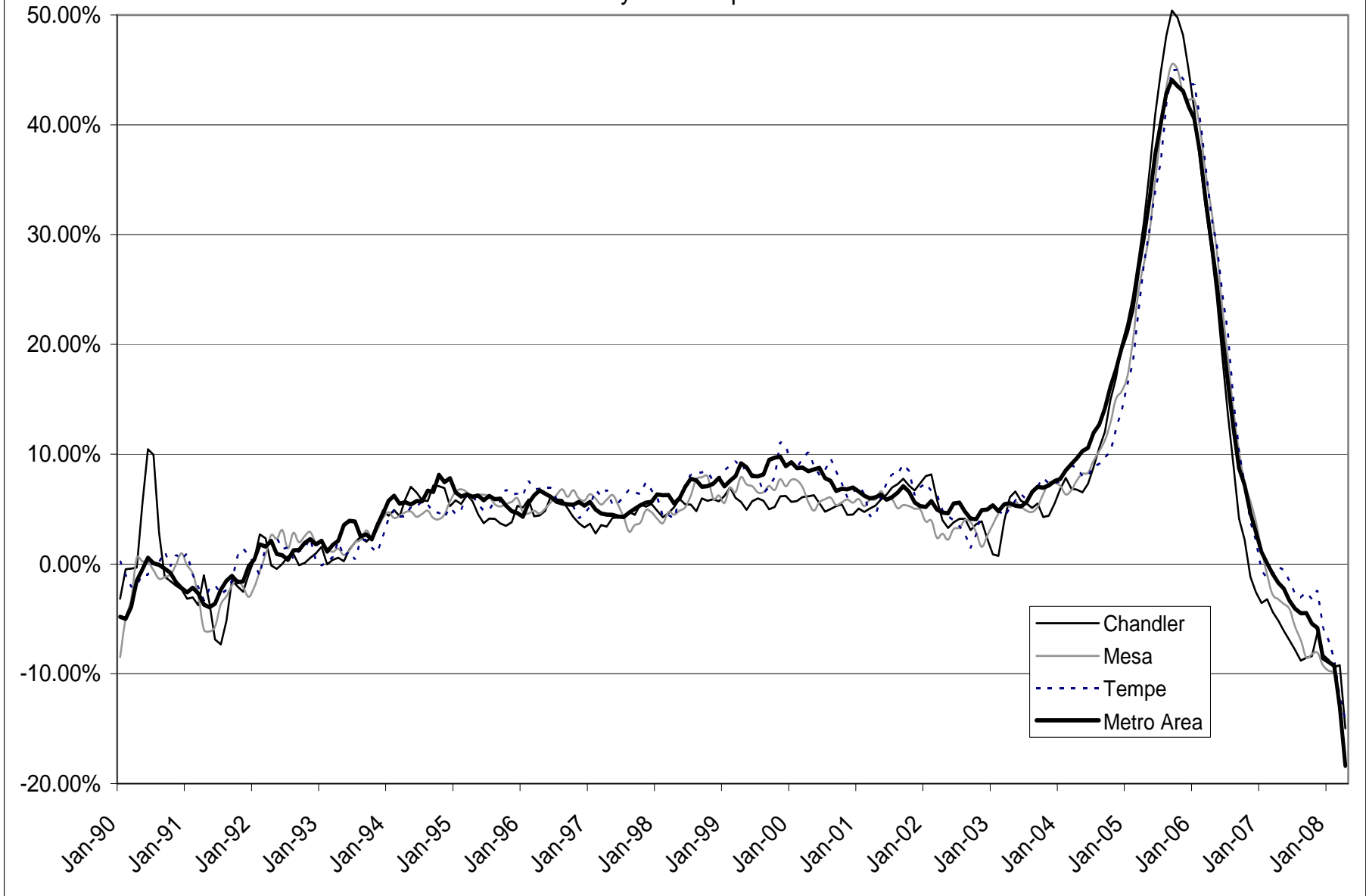
Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
 Data Provided by Ion Data

### Regional Repeat Sales Index (RSI) Percent Change from Same Month Previous Year January 2004 - April 2008



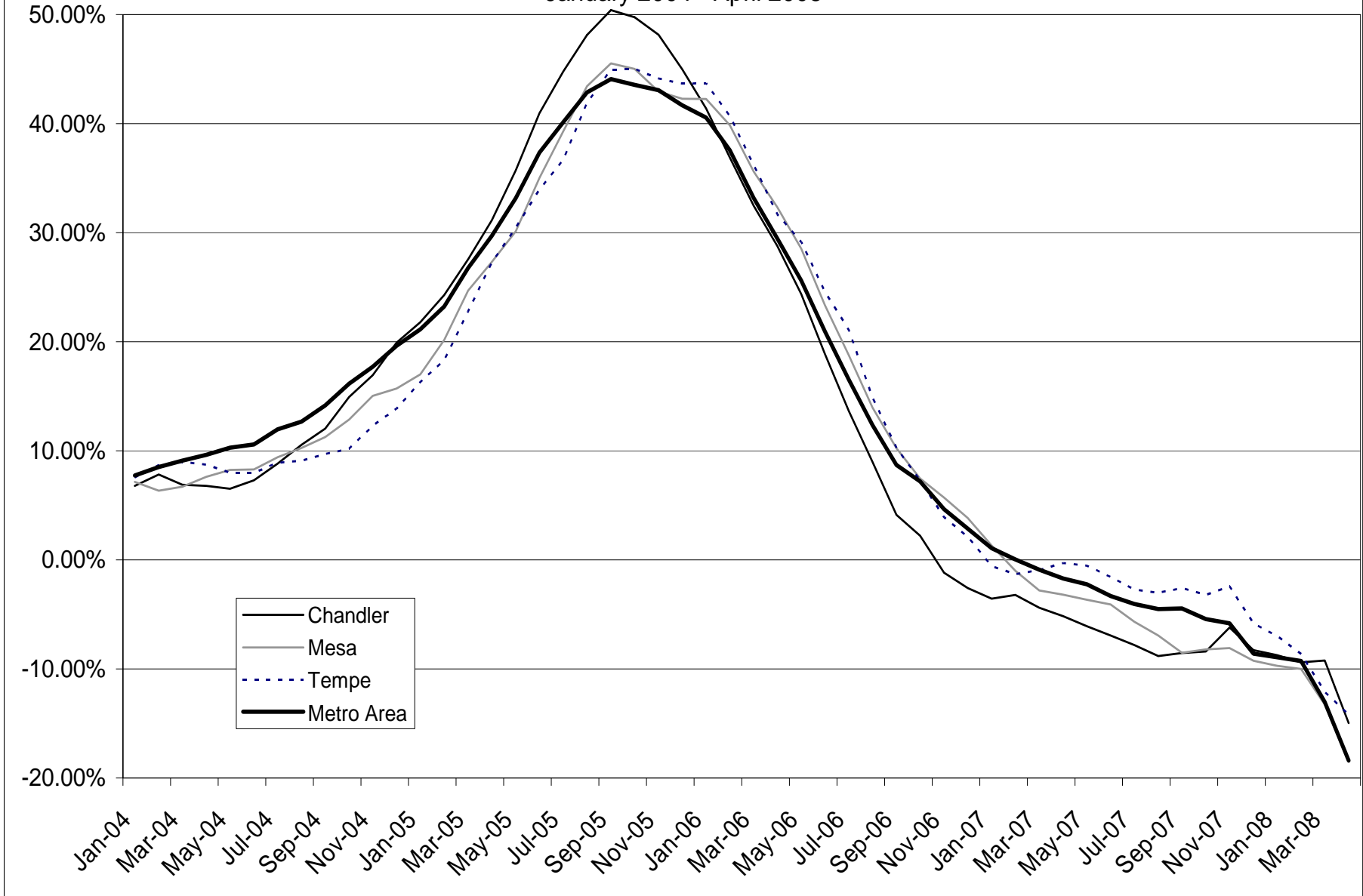
Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
Data Provided by Ion Data

**Chandler, Mesa, & Tempe Repeat Sales Index (RSI)**  
 Percent Change from Same Month Previous Year  
 January 1990 - April 2008



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

**Chandler, Mesa & Tempe Repeat Sales Index (RSI)**  
 Percent Change from Same Month Previous Year  
 January 2004 - April 2008

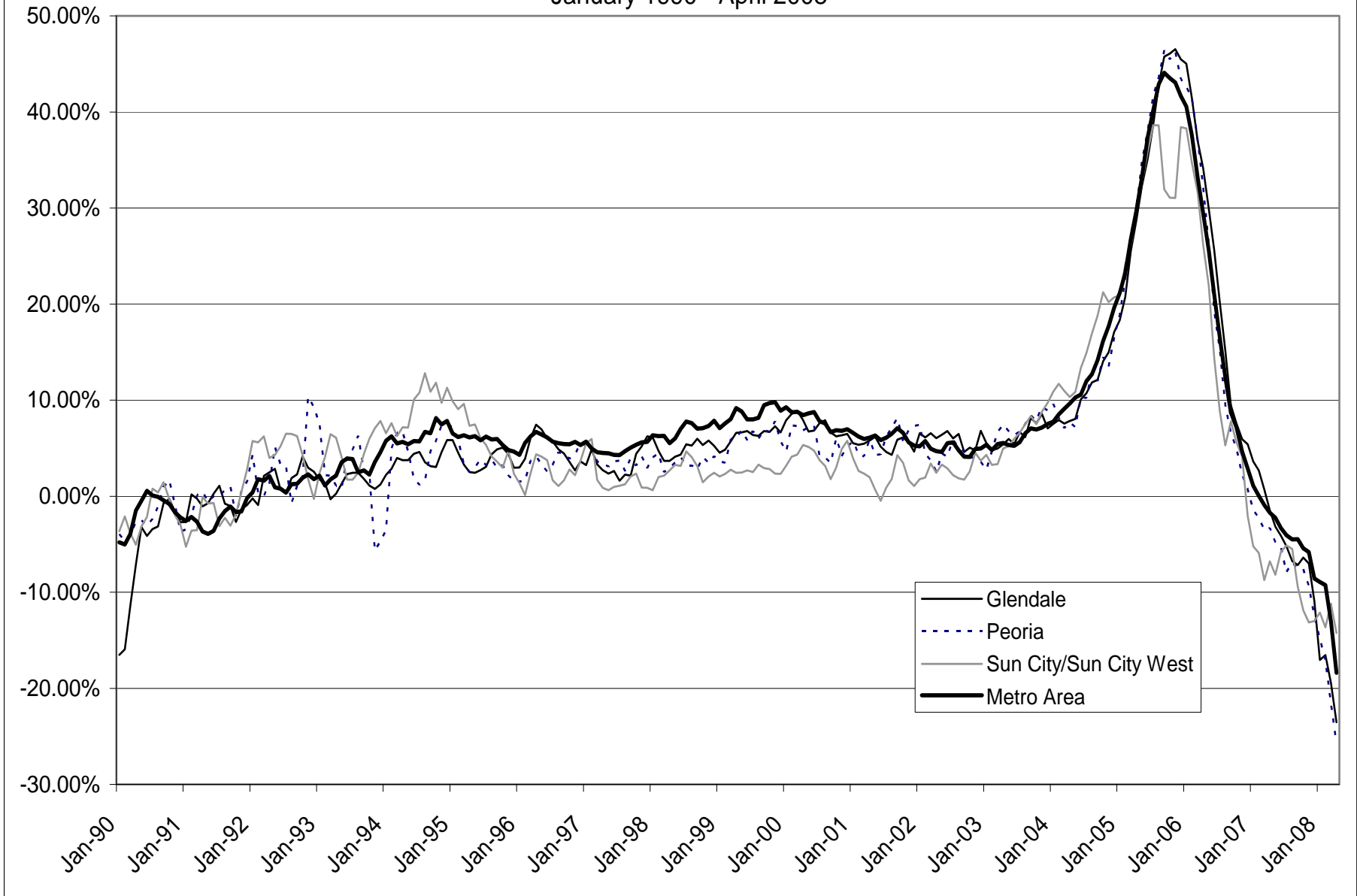


Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
 Data Provided by Ion Data

# Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)

Percent Change from Same Month Previous Year

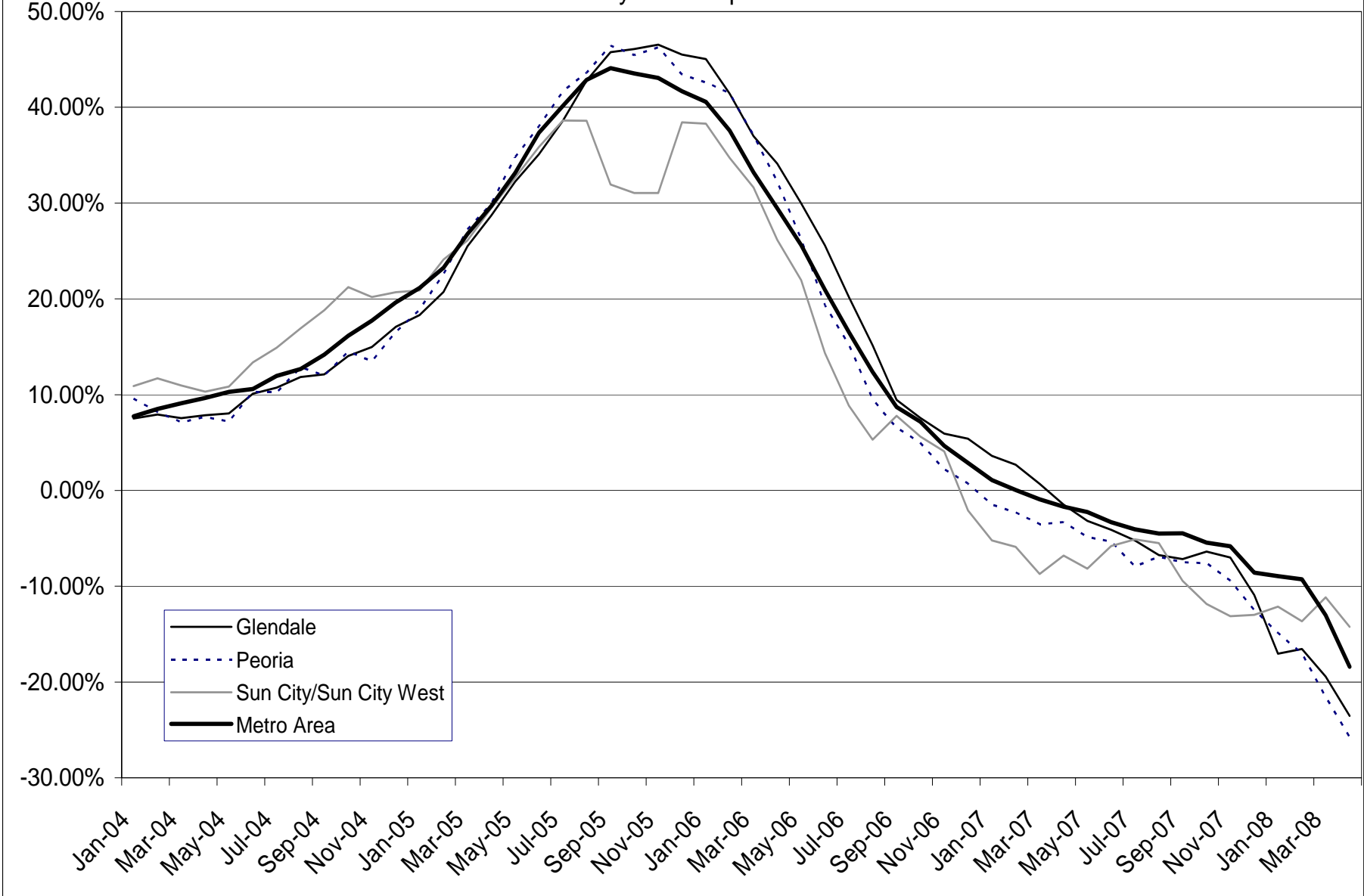
January 1990 - April 2008



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

Data Provided by Ion Data

**Glendale, Peoria, & Sun City/Sun City West Repeat Sales Index (RSI)**  
 Percent Change from Same Month Previous Year  
 January 2004 - April 2008

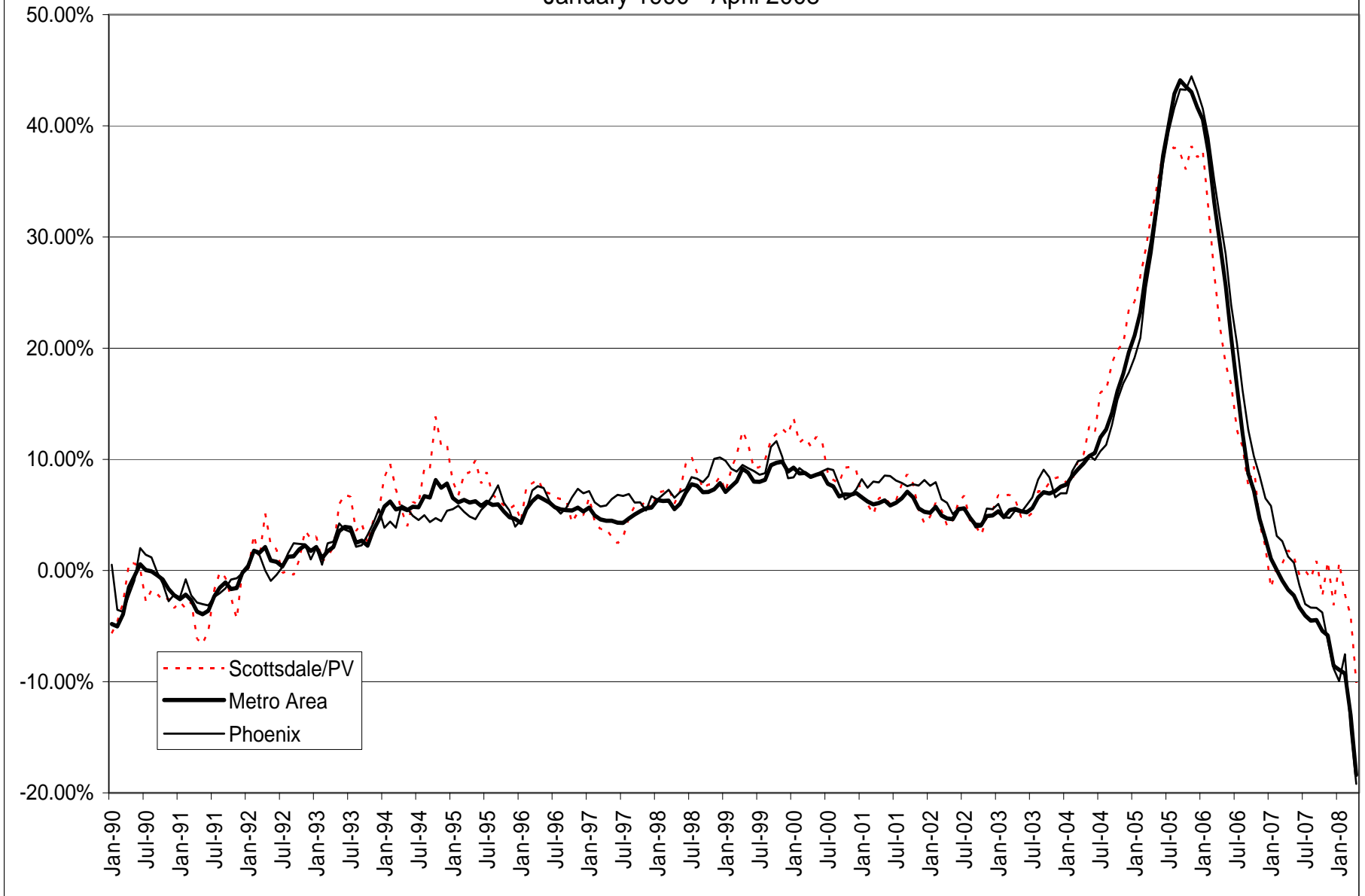


Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice  
 Data Provided by Ion Data

### Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)

Percent Change from Same Month Previous Year

January 1990 - April 2008



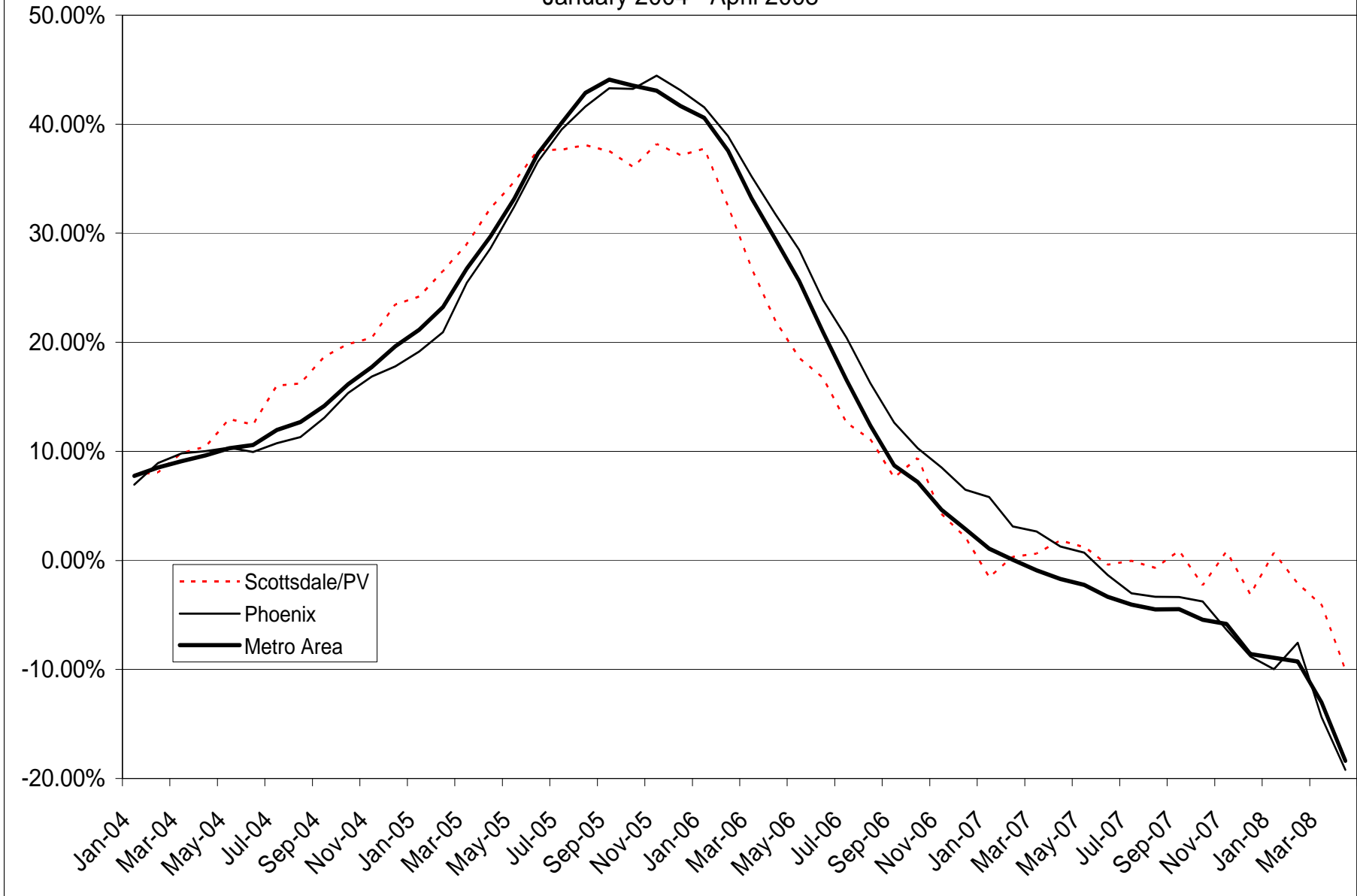
Source: ASU W.P. Carey School of Business; Center for Real Estate Theory and Practice

Data Provided by Ion Data

### Scottsdale/Paradise Valley, & Phoenix Repeat Sales Index (RSI)

Percent Change from Same Month Previous Year

January 2004 - April 2008



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

Data Provided by Ion Data