

## Research

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The past decade has witnessed an unprecedented rise in homeownership and an enduring boom in the housing market. The homeownership rate grew from less than 64% in 1994 to more than 68% today. By the end of 2003, more than 75 million households owned homes, an increase of more than 13.2 million homeowners over the last decade.

Housing affordability, which decreasing interest rates have recently pushed up, has been the primary driver of the rapid rise in housing demand. Within the last five years, mortgage rates dropped to historic lows, prompting a home purchase and refinancing boom, the degree of which has never been seen before.

With the very real prospect of interest rates rising in the immediate future, many are now concerned that a housing bubble exists, which surely will burst when interest rates begin to move up, resulting in rapidly declining home prices. This scenario would be a dramatic deviation from past patterns. On an annual basis, the national median home price has never fallen, although home prices have declined at times in certain metropolitan areas. While rising interest rates will have a negative effect on home prices, additional factors will mitigate the impact.

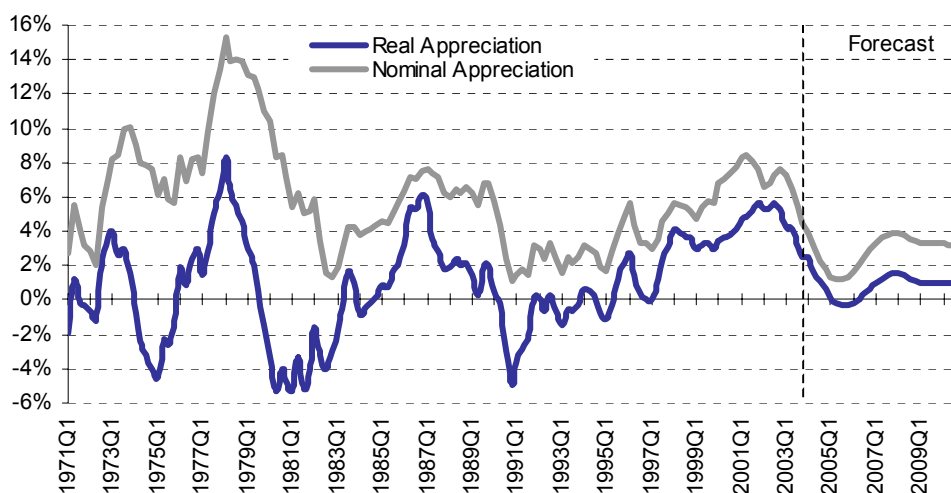
Three fundamental forces drive housing appreciation: income growth; interest rates; and the propensity of households to spend on housing. Alternatively stated, housing appreciation can be broken down into three components. This decomposition allows a better understanding of historical appreciation in the housing market. It also provides a conceptual framework to project future home prices, both on a national and metropolitan level.

Realistic assumptions about these forces indicate that the national housing market is structurally sound and should, once again, weather the impending rate increases without catastrophe. Over the next five years, the housing market will likely experience modest annual appreciation, in the range of 2.5% to 3%. On a metropolitan basis, the areas that have seen high price growth recently seem to be at the greatest risk, while markets that have tracked closer to the national average are more likely to witness only modest impacts from a rise in interest rates.

## A Historical Perspective

Three periods of significant home price inflation have occurred since 1970 (see **Exhibit 1**). The first, and the strongest in nominal terms, was in the late 1970s, when annual home price growth eclipsed 14%. During this time, however, inflation played a major role in driving up prices. At the peak, home prices grew just over 8% on an inflation-adjusted basis during this period. Demographics propelled housing demand as baby boomers entered the prime age for household formation. Rapidly rising mortgage rates, however, put an end to this boom as the 30-year fixed mortgage rate doubled between 1977 and 1981, peaking at more than 18% in the third quarter of 1981.

**Exhibit 1: Appreciation of Median Home Price (year-over-year)**



Sources: FHLMC; Economy.com; Prudential Real Estate Investors

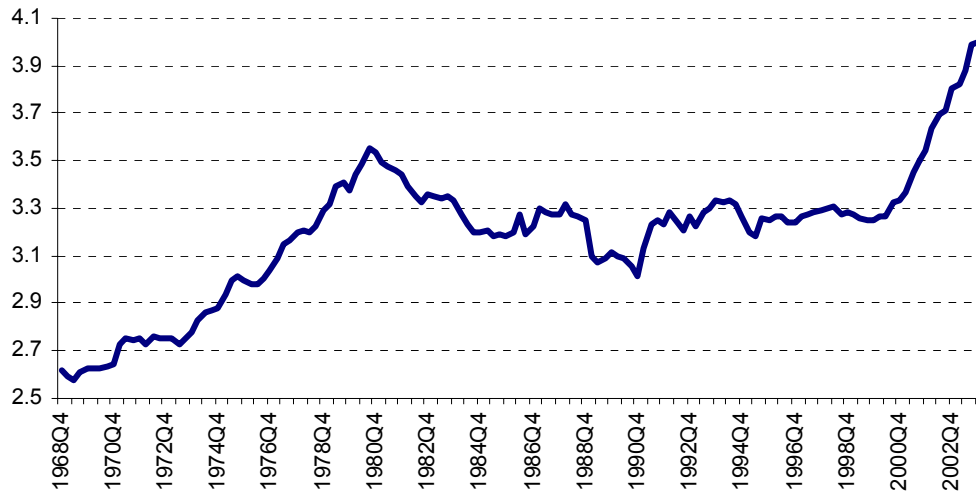
The second period of significant home price appreciation was in the mid to late 1980s, driven by a secular decline in mortgage rates, which had peaked in 1981, and the release of pent-up demand from baby boomers. Thirty-year fixed rate mortgages hovered around 10% to 11% during most of this time, making homes far more affordable, relative to previous years when fixed rates were in the high teens. Many baby boomers who were formerly priced out of homeownership due to interest rate spikes became homeowners for the first time. The booming stock market, prior to the stock crash in 1987, strengthened many households' balance sheets. Increased household assets also contributed to the boom of the housing market. During this booming period, inflation remained contained, at least relative to the earlier expansion. Home sales accelerated but did not match the record volume of the previous upturn. Home price appreciation peaked at almost 8% (approximately 6% in real terms) during this upturn in 1987, immediately following the trough in mortgage rates.

The current boom began in early 1997 and peaked during 2001 at more than 8% appreciation (about 6% in real terms). During this time, household income growth and inflation were modest. Interest rates, however, plummeted; as they trended downward, homes became more affordable. Increased affordability spurred housing demand, and prices were pushed up. Inflated stock prices due to the Internet boom also inflated the ability of many consumers to build or purchase more expensive homes. Paper gains from stock portfolios noticeably propelled the housing market.

## Warning Bells

Peak price appreciation during the current housing boom is not any stronger than the previous two. But in real terms, the current boom is more enduring. The median home price to median household income multiple has reached record territory, driven by historically low interest rates. **Exhibit 2** shows that the price-to-income multiple, for the most part, remained between 3.1 and 3.3 from mid-1984 through mid-2000. Rapid appreciation of home prices since then has skyrocketed this multiple to a current level of 4.0.

**Exhibit 2: Price-Income Multiple (Median Home Price Over Median Household Income)**



Sources: FHLMC; Economy.com; Prudential Real Estate Investors

In mid-2000, the 30-year fixed mortgage rate was about 8.3%. Mortgage rates then began to decline rapidly. The 30-year rate fell to a low of 5.5% in mid-2003, prompting an unprecedented boom in housing sales and financing. Based on value, more mortgages were refinanced from 2001 through 2003 than from 1987 through 2000. In 2003, new single-family home sales eclipsed 1 million units, while existing home sales totaled more than 6 million, both historical highs. In the wake of the stock market collapse, this rapid increase in the price-to-income multiple and the very high levels of home sales and financing highlight the most recent home price expansion, causing speculation about a pricing bubble.

Another factor that raises the visibility of recent home price inflation is its concentration and intensity in several major markets. In particular, the two coasts have witnessed dramatic price increases. For example, all major metropolitan areas in California registered more than 10% annual growth in their median home prices over the last five years (see **Exhibit 3**). The Northeast corridor, including Boston, New York City, New Jersey, and on down to Washington, DC, saw double-digit annual gains over the last five years as well. Major markets in Florida were as strong as the markets in the Northeast and California.

**Exhibit 3: Annualized Appreciation of Median Home Prices**

	<b>1994-2003</b>	<b>1999-2003</b>
San Diego	9.4%	<b>15.8%</b>
Los Angeles Area	7.0%	<b>15.0%</b>
W. Palm Beach	7.8%	<b>14.9%</b>
Sacramento	6.9%	<b>14.1%</b>
Boston	9.1%	<b>13.6%</b>
Miami/Fort Laud.	8.9%	<b>13.2%</b>
NY/No. NJ	7.1%	<b>13.0%</b>
Wash./Baltimore	6.5%	<b>11.9%</b>
SF Bay Area	8.0%	<b>10.6%</b>
Tampa	6.9%	<b>10.2%</b>

Sources: Economy.com; Prudential Real Estate Investors

**A Three-Factor Model**

While the recent trends in the housing market are interesting, and the dramatic effects of the low interest rate environment are very clear, this subjective analysis does not provide a framework to ascertain what the future holds for home prices in the expected rising interest rate environment. Thus, a more tangible model is needed. Our model is based on the three fundamental forces driving housing prices: 1) household income growth; 2) the interest rate effect resulting from fluctuating mortgage rates; and 3) the consumption effect from the changing propensity of households to consume housing. The following illustrates the decomposition process:

$$\text{Price} = \text{Income} * (\text{Price/Payment}) * (\text{Payment/Income}),$$

where price denotes home price; income is short for household income, and payment is the mortgage payment. Price/payment is the present value of an annuity with a constant \$1 payment, which has an inverse relationship to the interest (mortgage) rate. This measures the interest rate effect on home price. Payment/income measures the percentage of household income devoted to mortgage payment, or the propensity of households to consume housing.

Measuring all terms in percentage growth (with small interaction errors omitted), we arrive at the following equation:

$$\text{Price Appreciation} \cong \text{Income Growth} + \text{Interest Effect} + \text{Consumption Effect}.$$

While this model is simply a mathematical truism, it illustrates the historical, and potential future, effects of changes in the underlying home price determinants. The first factor, income growth, has always positively contributed to house price changes, and the most recent expansion is no exception. This is due, in large part, to inflation, as income growth is in nominal terms. The second factor, interest rate effect, varies significantly over time. As interest rates decline, homes become affordable to more people, thus increasing housing demand. The expected rise in interest rates should put downward pressure on prices. The final factor, the housing consumption effect, represents a measure of the average household's willingness to dedicate income toward housing expenditures – the biggest of which is mortgage payment. When the interest rate rises, the consumption effect tends to offset the negative impact of higher mortgage rates, thus preventing a free fall in prices.

**Exhibit 4** shows the decomposition of recent housing appreciation and the projected growth of median home prices for the next five years. For example, the median home price appreciated 6.1% annually for the five years ending December 2003. Income growth contributed 2.0%. (The recession of 2001 lowered the income growth of this period from its trend of approximately 3%.) Interest rate declines of 115 basis points over the five years contributed 1.7% to yearly appreciation (the second half of 1998 saw record low mortgage rates for that time). The increasing share of household income devoted to mortgage payments contributed 2.4%.

**Exhibit 4: Price Appreciation and Its Components**

	Price Appreciation	Income Growth	Interest Effect	Consumption Effect
1994-1998	4.4%	4.7%	0.9%	-1.2%
1999-2003	6.1%	2.0%	1.7%	2.4%
2003-2008	2.7%	2.9%	-2.8%	2.6%

Source: Prudential Real Estate Investors; Based on median home price, median household income, and changes in 30-year fixed mortgage rates.

For the next five years, annual appreciation of median home prices is projected to be 2.7%. Median household income will average 2.9% annual growth, contributing directly to housing appreciation. Thirty-year fixed mortgage rates are assumed to rise 140 basis points over the next five years, subtracting an annual rate of 2.8% from housing appreciation. With income growth and the interest rate effect roughly offsetting each other, housing appreciation will be propelled by a positive consumption effect – households will continue to increase their income share earmarked for mortgage payments.

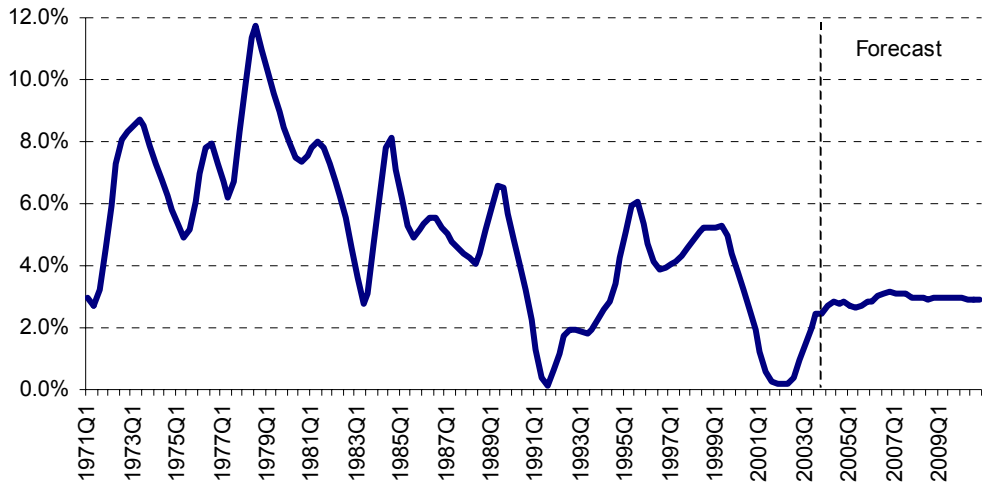
#### *Income Growth*

Income growth is relatively predictable, and has a direct and stable influence on home price. Historically, nominal income growth has always been positive. Inflation is the biggest driver of income growth. Since 1970, median household income growth averaged about 5% per year, and inflation, measured by the all-urban Consumer Price Index, was 4.7% for the same period.

As **Exhibit 5** illustrates, income growth has recently been trending upward but remains low compared with trend growth since 1971. The downward trend in income growth stems primarily from lower inflation in the past and low inflation expectations for the future. Over the last five years, income grew approximately 2% per year, dragged down by the 2001 recession. Income growth is projected to revert to its trend for the five-year forecast period, averaging 2.9% annually. Inflation is forecast to be about 2.5% per annum for the next five years, and real income growth is expected to be 0.4% per year.

While median household income has seen little real growth, income growth among the top-earning families has been much higher. For example, since 1980, income for the top 20% of households grew 1.5% per year faster than the median household income. While we expect median household income to grow 2.9% per year, the upper-income families (e.g., the top 20%) will likely see their incomes rise 4% to 4.5% annually.

**Exhibit 5: Annual Growth of Median Household Income**

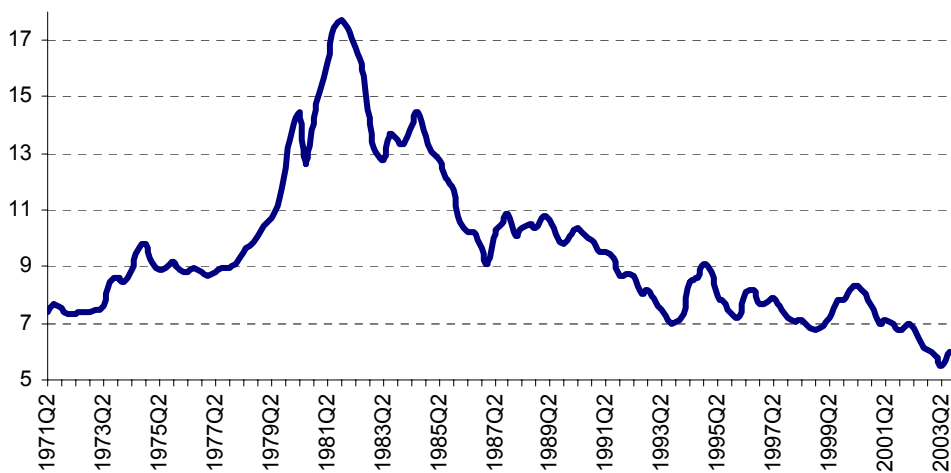


Sources: Bureau of Census; Economy.com; Prudential Real Estate Investors

*Interest Rate Effect*

The interest rate is the most volatile driver of housing appreciation and the most important factor in the recent boom in the housing market. The 30-year fixed mortgage rate has been on a secular decline since peaking in 1981 (see **Exhibit 6**). After reaching a low point in 1998, the 30-year mortgage rate rose to about 8% in 2000. Since then, it has crept downward to as low as 5.5%. The dramatic decline of mortgage rates in the last three years overpowered the negative forces of a prolonged labor market recession, supercharging the housing market.

**Exhibit 6: 30-Year Fixed Mortgage Rate (%)**



Sources: FHLMC; Economy.com; Prudential Real Estate Investors

A one-to-one relationship exists between income growth and housing appreciation. For example, a 1% growth in income is expected to increase home prices by 1%, holding other factors constant. But the relationship between changes in mortgage rates and housing appreciation must be estimated. **Exhibit 7** illustrates the potential effects on home prices solely due to interest rate changes. These effects assume all other contributing factors are held constant. For example, if

30-year mortgage interest rates rise from 6% to 7%, home values would decrease by about 10%. Most homes are financed with 30-year fixed-rate mortgages, so the 30-year rate is the most useful in assessing interest rate effects on home prices. Increasingly, however, shorter-term or variable-rate instruments are gaining acceptance in home finance. **Exhibit 7** also provides a scenario based on a 15-year mortgage. Shorter-term instruments have shorter durations and are less price-sensitive to interest rate changes. Thus, the 15-year financing scenario indicates a lower home price sensitivity to interest rate changes.

**Exhibit 7: Potential Interest Effects on Home Price**

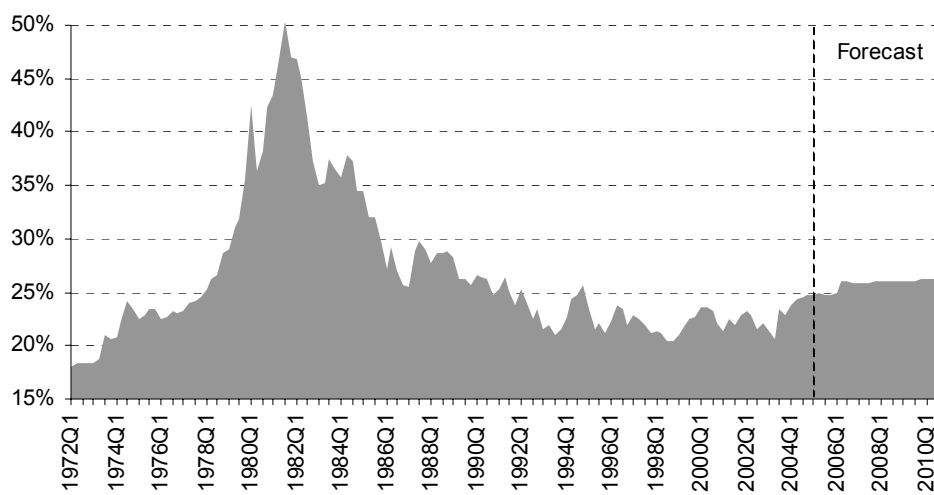
	30-Year Mortgage Rate	% Change in Value	15-Year Mortgage Rate	% Change in Value
Base Rates	6.0		5.0	
New Rates	6.5	-5%	5.5	-3%
	7.0	-10%	6.0	-6%
	7.5	-14%	6.5	-9%
	8.0	-18%	7.0	-12%
	8.5	-22%	7.5	-15%
	9.0	-25%	8.0	-17%

Source: Prudential Real Estate Investors; % change in value is solely attributed to change in interest rates, holding other factors constant.

### Consumption Effect

The final factor that determines home prices is the consumption effect, which measures the result of the changing propensity to consuming housing. Mortgage payments can be calculated from the median home price and the prevailing 30-year fixed mortgage rate. **Exhibit 8** shows the ratio of mortgage payment to median household income over time, assuming a loan-to-value ratio of 80%.

**Exhibit 8: Payment-to-Income Ratio**



Sources: Economy.com; Prudential Real Estate Investors

A high ratio means that households are, by choice or necessity, spending a greater percentage of their income on housing. A low multiple signals that households are spending a smaller portion of their income on housing. **Exhibit 8** shows that the ratio has ranged from a low of about 18% in early 1972 to a high of about 50% in late 1981.

As the ratio decreases, it negatively influences home prices. Increases in the ratio cause upward pressure on home prices. For example, over the last several years, the ratio has averaged about 22%. If the ratio rises by only 3 percentage points from this average, the result would be a roughly 14% increase in home prices, which is the scenario forecast to occur over the next five years. Of course, this pressure will be generated, and offset, by the negative impact from rising interest rates. Increasing total assets of households, especially upper-income households with substantial financial portfolios, could support the rising consumption effect.

### **Local Market Trends**

The three-factor model provides a useful tool for assessing potential housing market effects at the national level. But important differences exist across the US that may make certain locations more susceptible to changes in the underlying determinants. **Exhibit 9** illustrates the historical and forecast home price appreciation by metropolitan area, plus its decomposition into income growth, interest rate effect and consumption effect.

The interest rate effect is assumed to be the same (–2.8% annually) in all metropolitan areas, since home financing costs are the same across local US markets. However, forecasted income growth and consumption effects differ noticeably. For example, Economy.com foresees a rebound in income growth in many of the markets where the collapse of the technology bubble has constrained growth. For example, Austin and Raleigh are both projected to have relatively strong income growth over the next five years.

In general, the areas that witnessed the greatest home appreciation over the last five years are projected to grow more slowly in the immediate future. These tend to be the larger coastal markets with relatively expensive housing. California, in particular, exhibits low housing affordability and is one of the areas with recent high home price appreciation.

At the extreme, in San Diego, the median home value increased an average of 15.8% per year over the last five years. San Diego's current median home value is \$438,000. Given an 80% loan-to-value ratio and a 6%, 30-year fixed-rate mortgage, a household's principal and interest payment alone would represent almost half the median household income. Homeowners in San Diego may be less able to absorb additional housing costs stemming from rising interest rates, so the consumption effect is not projected to offset the effect of rising interest rates.

Variations in historical and forecasted home price appreciation also highlight the significant differences in the volatility of housing markets.<sup>1</sup> Markets with few development constraints, such as those in the Southwest or South, respond to changes in demand relatively quickly, and prices do not typically grow at the exponential pace of the more supply-constrained markets in the West and East. Houston is a good example. While its economy has historically been volatile, home prices there have been only slightly more volatile than the national average. Markets such as San Diego, San Francisco and Boston, on the other hand, have experienced home price volatility of more than double the national average. Markets with more pronounced upward swings in value in the recent past seem to be at higher risk, should interest rates rise substantially.

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<sup>1</sup> For more information, see Case, Karl E. and Robert J. Shiller, "Is There a Bubble in the Housing Market? An Analysis," prepared for the Brookings Panel on Economic Activity, September 2003.



**Exhibit 9: Decomposing Metro Home Price Appreciation**

	Appreciation: 1999-2003	Appreciation: 2004-2008	Income Growth: 2004-2008	Consumption Effect: 2004-2008
Austin	5.2%	4.7%	3.8%	3.8%
Raleigh/Durham	2.5%	4.6%	3.3%	4.1%
Detroit	4.7%	4.4%	2.9%	4.4%
Seattle	6.6%	4.3%	3.1%	4.0%
Dallas/Fort Worth	3.9%	4.0%	3.7%	3.2%
Nashville	4.7%	3.9%	3.5%	3.3%
Columbus	3.6%	3.9%	3.0%	3.8%
Memphis	3.6%	3.8%	3.3%	3.4%
Phoenix	4.8%	3.8%	3.4%	3.2%
Indianapolis	2.7%	3.8%	2.7%	4.0%
Houston	6.8%	3.7%	3.8%	2.8%
Kansas City	5.2%	3.7%	3.1%	3.4%
San Antonio	6.3%	3.4%	3.3%	2.9%
St. Louis	4.0%	3.4%	2.9%	3.3%
Denver	8.4%	3.4%	3.3%	2.9%
Cleveland	4.6%	3.3%	3.1%	3.1%
Chicago	7.3%	3.3%	2.7%	3.5%
Cincinnati	4.0%	3.3%	2.3%	3.8%
Charlotte	3.6%	3.1%	2.8%	3.1%
Atlanta	5.4%	3.1%	2.8%	3.1%
Norfolk	8.1%	3.0%	3.0%	2.8%
Sacramento	14.1%	2.8%	4.3%	1.4%
New Orleans	5.9%	2.7%	3.3%	2.2%
Philadelphia	7.2%	2.7%	3.0%	2.6%
Salt Lake City	3.2%	2.7%	2.9%	2.6%
Portland	5.4%	2.7%	2.2%	3.3%
SF Bay Area	10.6%	2.6%	3.2%	2.2%
Wash./Baltimore	11.9%	2.5%	3.1%	2.2%
Oklahoma City	5.0%	2.4%	2.9%	2.4%
Orlando	8.4%	2.4%	2.7%	2.5%
Boston	13.6%	2.4%	3.0%	2.2%
Tampa	10.2%	2.3%	3.0%	2.2%
Las Vegas	7.4%	2.3%	2.7%	2.4%
NY/No. NJ	13.0%	2.1%	2.8%	2.1%
Minn./St. Paul	9.4%	2.0%	2.5%	2.3%
Jacksonville	7.9%	2.0%	2.4%	2.4%
San Diego	15.8%	1.7%	2.5%	2.1%
Miami/Fort Laud.	13.2%	1.7%	3.2%	1.4%
W. Palm Beach	14.9%	1.4%	2.7%	1.5%
Los Angeles Area	15.0%	1.4%	2.9%	1.4%

Source: Prudential Real Estate Investors; Interest effects over 2004-2008 for all MSAs are the same as the national effect of -2.8%.

**Summary**

Some analysts have suggested that irrational exuberance has propelled the housing market and that it is now poised for a collapse in values. This seems highly unlikely. First, history has shown that the national housing market, as a whole, is quite resilient. Consistent population and income growth, inflation, and the willingness of households to adjust their finances to accommodate interest rate changes have all played important roles in ensuring home values. Second, the pressure on home prices has *not* stemmed from irrationality. Quite the contrary, households

simply reacted rationally to declining interest rates, which increased affordability and thus, housing demand.

A national annual decrease in home prices has never occurred, and a significant fall in the near future seems improbable. Rising interest rates will likely cause downward pressure on home prices in the immediate future, but a “bursting” seems very implausible. Certainly nothing similar to the experience of the public markets in 2001 will occur. With a rise in interest rates, households are likely to increase their housing expenditures, preventing a free fall in prices. We expect that housing will appreciate 2.5% to 3% annually over the next five years, and rising income will offset the negative effect of rising interest rates. Appreciation, therefore, will be driven primarily by households spending more of their income on housing.

While the national home price outlook calls for relative stability, it hides material local differences in market conditions that may make some areas more prone to softening. Affordability across markets varies greatly. Less affordable areas may be less able to withstand the downward pricing pressure of rising interest rates. The large coastal markets, which witnessed higher recent home price appreciation, are more likely to see stagnation, or even marginal declines, in home prices if interest rates rise precipitously.

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