

# Southwest Economy



## Has the Housing Boom Increased Mortgage Risk?

For several years, house price appreciation has outstripped income growth in the United States, with most of the price gains concentrated in the East and West. While moderate increases in house prices often reflect, and contribute to, a region's economic and financial health, the steepness of recent price increases has raised concerns. In particular, it has been suggested that borrowers, emboldened by rising house prices, are turning to riskier types of mortgages in order to qualify for the debt necessary to purchase increasingly expensive homes, thereby potentially setting the stage for repayment difficulties in the future.

We examine mortgage characteristics in different regions to assess the extent to which high appreciation in house prices has been associated with the use of riskier types of mortgages. While mortgage products have evolved to include numerous available features, our analysis focuses on the distinction between traditional fixed- and adjustable-rate mortgages (ARMs), given the availability of consistent regional data on traditional

*(Continued on page 2)*

*INSIDE:  
Financial Crises:  
Still a Mystery*

*Mexican GDP Falls  
but No One Notices*

## Making Sense of Elevated Housing Prices

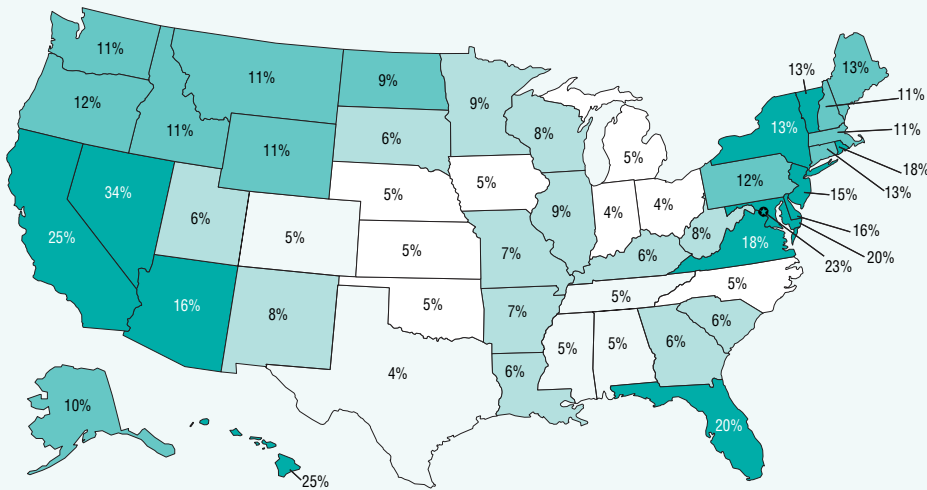
There is widespread concern that housing-price bubbles have formed in several countries, fueled by high demand that stems from low interest rates, the spread of lower-payment mortgage products and portfolio shifts from stocks to real estate. Since 1999, for example, home prices have jumped more than 110 percent in the U.K. and nearly 60 percent in the United States (*Chart 1*).<sup>1</sup>

This issue is important beyond housing markets, because U.S. consumer spending has been bolstered in recent years by mortgage refinancing and households withdrawing equity from their homes.<sup>2</sup> Mortgage innovations

*(Continued on page 7)*

Chart 1

### House Price Appreciation, 2004



NOTE: Darker color indicates greater percent appreciation.  
 SOURCE: Office of Federal Housing Enterprise Oversight, *House Price Index*.

ARM usage. Because ARMs offer initial monthly payments below those required on fixed-rate mortgages at the expense of more variable payments over time, the proportion of mortgages represented by ARMs provides a suitable gauge for assessing the potential link between rising house prices and mortgage risk.

The results are consistent with a direct effect of the housing boom in encouraging the use of traditional ARMs and, by extension, other types of mortgages, such as interest-only loans, that reduce initial payments at the expense of higher payments later in a mortgage's life. While other aspects of our results point to some mitigation of the housing boom's effect in raising mortgage risk, the analysis overall indicates concern is warranted. We also use this framework to understand local housing trends in Texas.

### Regional Nature of the Housing Boom

House prices recently have tended to rise rapidly in the East and West, as shown in Chart 1.<sup>1</sup> Nevada house prices rose 34 percent in 2004, followed by Hawaii, 25 percent; California, also 25 percent; and the District of Columbia, 23 percent. In contrast, house price appreciation has been relatively modest for many other states. Texas experienced an

increase of only 4 percent.

A notable reason for sharp house price appreciation in the East and West is the prevalence in those regions of restrictions on construction and land supply. With housing demand rising in many markets—propelled by general factors such as low interest rates—re-

gions with a tight supply of new homes, resulting from tough zoning requirements or a limited supply of vacant land, have tended to experience the sharpest appreciation.<sup>2</sup> Partly reflecting such building constraints, growth in the stock of housing units has been relatively low in California and especially the Northeast (Chart 2), helping boost house prices in those regions.<sup>3</sup> Conversely, Texas has experienced a substantial volume of home building and high growth in the housing stock, helping explain the state's moderate house price appreciation.

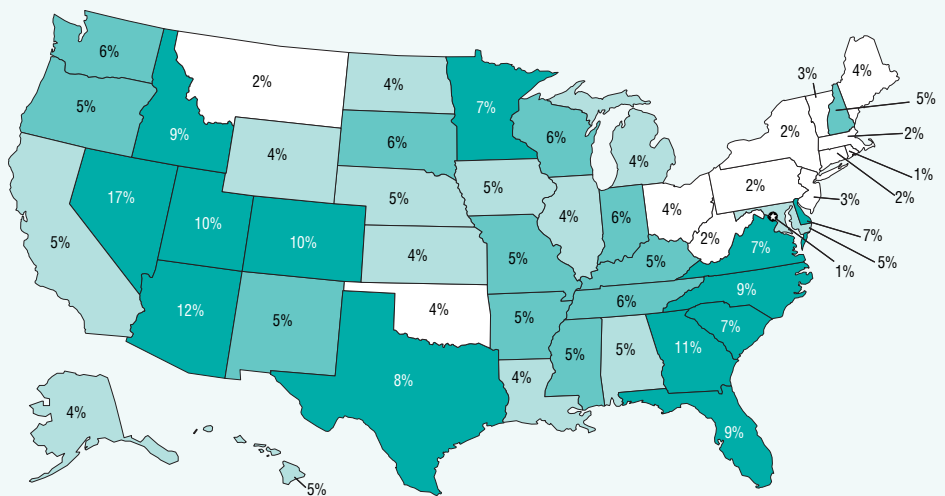
In addition to the supply-side effect of building constraints, other factors may have boosted housing demand in some regions more than others, contributing further to regional disparities in house price appreciation. From an international perspective, anecdotal information suggests the coastal housing markets may have benefited from strong immigration and international investment, with Florida especially popular among European and Latin American investors and California attracting substantial investment from Asia.<sup>4</sup>

### Fixed Versus Adjustable Rates

One of the most notable concerns associated with the housing boom is

Chart 2

### Housing Stock Growth, 2000–04



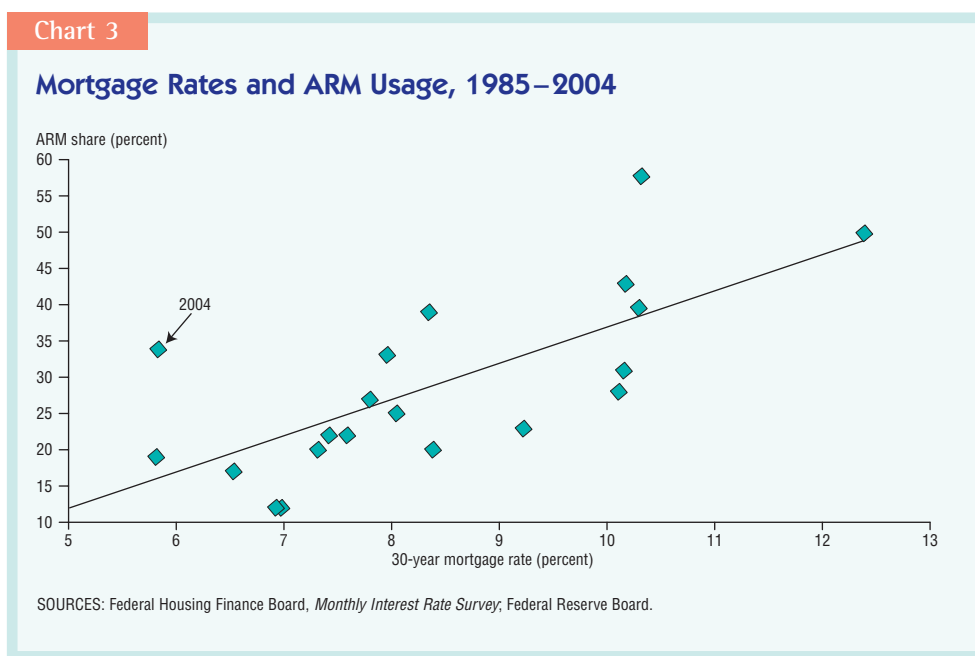
NOTE: Darker color indicates greater percent increase in housing stock.  
 SOURCE: Census Bureau, Population Estimates Program.

based on the perception that despite historically low interest rates, homebuyers nevertheless are frequently opting for mortgage features that reduce the level of initial payments at the expense of higher or more variable payments over time. Supporting this concern is the idea that homebuyers may have been willing to assume the added risk of variability in future mortgage payments, if lowering their initial payments was necessary in order to qualify for the level of debt needed to purchase increasingly expensive homes. Also, homebuyers' expectations of continued increases in house prices may have overshadowed any concern about the potential for higher mortgage payments in the future. In this manner, by feeding expectations of continued gains in house prices, the housing boom may have induced added mortgage risk.

Nontraditional mortgages offering reduced initial payments include interest-only loans, on which borrowers pay only interest for an initial period but then face higher payments, including principal, once the interest-only period ends. Moreover, these higher payments may be boosted further if interest rates rise. Similarly, payment-option mortgages allow borrowers to select from several payment options each month, including payments below the amount of interest due, giving rise to a growing loan balance.

In addition to these nontraditional products, the more standard ARMs also offer initial monthly payments below those required on fixed-rate mortgages, but at the expense of more variable payments. The effect of traditional ARMs in reducing initial monthly payments is magnified by the discount associated with the teaser rate offered on many of these loans, which is set at a constant level, below market rates, for a predetermined teaser period.

By choosing either a traditional ARM or nontraditional mortgage, homebuyers can reduce their initial payments and boost their chances of qualifying for credit, based on their current income. However, such variable-payment mortgages also increase a borrower's risk exposure, heightening the possibility of repayment difficulties should payments increase relative to income. Nevertheless, if homebuyers have come to expect



continued increases in house prices and foresee selling their new home, perhaps within the teaser period while required payments remain relatively low, then they may have viewed ARM risk as negligible.

In analyzing the potential effect of the housing boom in raising mortgage risk, we focus on the share of conventional, fully amortized home purchase loans, or traditional home mortgages, that is represented by ARMs. The distinction between fixed and adjustable rates provides an especially convenient focal point for the analysis; regional data on traditional ARM usage are available on a consistent basis and over a prolonged period, whereas regional data on the different types of nontraditional mortgages are relatively sparse.<sup>5</sup>

Before turning to the regional analysis, we should note that at the national level ARM usage is well below historical highs. As shown in Chart 3, the ARM share in 2004 was near the middle of its 1985–2004 range. Nevertheless, recently the ARM share has actually been substantially higher than its historical relationship with long-term interest rates would predict, as shown by the chart's fitted line. This observation raises the question of why homebuyers have frequently turned to ARMs, despite having the option of a very low fixed-rate loan. Moreover, after accounting for the possi-

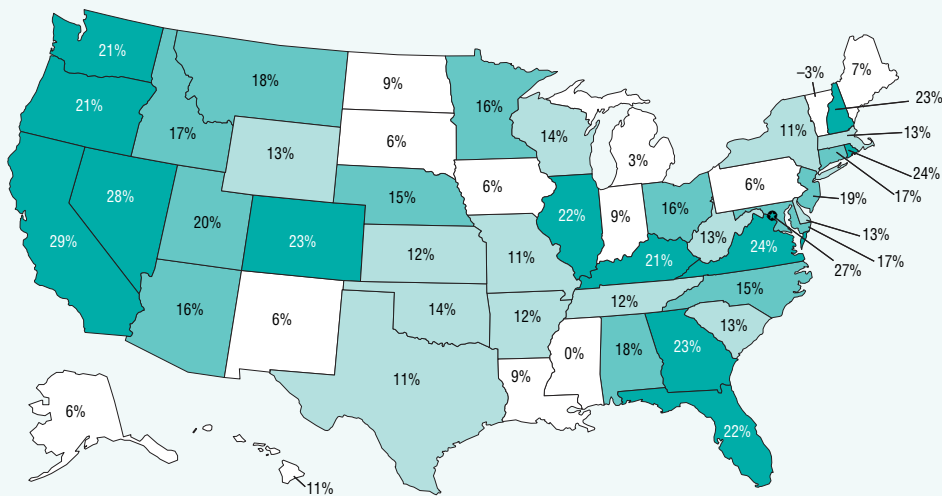
ble effect of the difference between long- and short-term rates on ARM usage, ARM share in 2004 was still much higher than would be expected. Our regional analysis is designed to provide evidence regarding the potential role of the housing boom in helping boost ARM usage above its historical pattern.

**House Price Appreciation and the Change in ARM Share, 2004.** To assess the extent to which sharply higher house prices have contributed to greater use of ARMs, we examine ARM share movements in different regions. Recent gains in ARM usage display a pronounced regional pattern (*Chart 4*). States in the East and especially the West experienced substantial increases in ARM usage last year, whereas the middle of the country recorded relatively small increases.

Most notable, for our purposes, is that the regional pattern of recent changes in ARM usage shown in Chart 4 is highly similar to the regional pattern in house price gains shown in Chart 1. Florida and the Western states are experiencing both a rapid increase in house prices and a relatively strong increase in ARM usage. In Texas, on the other hand, both house price appreciation and growth in the use of ARMs has been relatively mild. The correlation between the regional patterns in the two charts suggests a link between house price appreciation and ARM usage.

Chart 4

Change in ARM Usage, 2004



NOTE: Darker color indicates greater percentage point increase in ARM share.  
 SOURCE: Federal Housing Finance Board, *Monthly Interest Rate Survey*.

To provide further evidence regarding the nature of their relationship, we can also examine various component parts of the overall regional correlation between house prices and ARMs. Toward this end, we now examine in more detail the relationship between house price appreciation and changes in the ARM share, using annual data for each state and the District of Columbia from 1990 through 2004.

**House Price Appreciation and the Change in ARM Share, 1990 to 2004.** As a first step in our historical analysis, we categorize the 765 observations (15 years for 51 regions) into four groups, based on house price appreciation. The first group represents the 25 percent of observations with the lowest appreciation in house prices, while the fourth group contains the 25 percent of observations with the highest appreciation. We then calculate the average annual change in ARM share for each group.

As shown by the first set of bars in Chart 5, observations with the highest appreciation in house prices tended to have the highest change in ARM share, suggesting a direct relationship between the housing boom and ARM usage.

However, some states may have tended to experience high annual changes in ARM share for other reasons

besides high house price appreciation. To help purge the data of such unwanted regional effects and obtain a more direct view of the correlation between house price appreciation and changes in ARM share, we now subtract state averages from our annual observations. The difference between a state's house price appreciation in a particular year and its average appreciation over the entire 15-year period represents a deviation from the state's typical house price experience. Similarly, subtracting away a state's average annual change in ARM share from the change in ARM share that occurred in each year provides a measure of abnormal changes in ARM share. By analyzing deviations from state averages, or mean adjusted data, the potential confounding influence of any fixed regional effects can be avoided.

The second set of bars in Chart 5 shows the relationship between house price appreciation and changes in ARM usage, calculated using the mean adjusted data. In this analysis, all 765 observations are first categorized into four groups, based on mean adjusted annual house price appreciation. The lowest 25 percent of the observations are placed in the first group, while the fourth group contains the top 25 percent of the

observations. As shown in the chart, deviations in the annual change in ARM share from state averages are much higher for observations representing large positive deviations in house price appreciation. This finding further supports the notion of a direct relationship between house prices and ARM usage.

The final set of bars in Chart 5 is expressed in terms of deviations from not only state averages but also time-period averages. After purging the data of all fixed state and time-period effects, house price appreciation and changes in ARM share are still positively correlated, providing further evidence of a direct relationship.

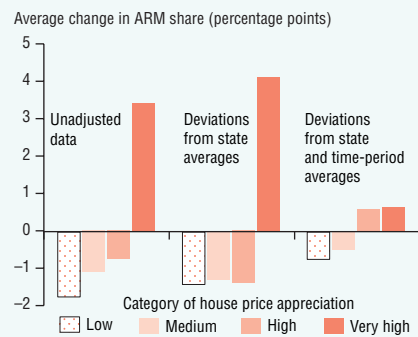
Finally, the first set of bars in Chart 6 represents the average change in ARM share in 2004 for the four groups of states shown in Chart 1, categorized according to house price appreciation. Consistent with what the analysis showed for the entire period from 1990 to 2004, the 2004 change in ARM share was substantially higher for the states with the strongest house price appreciation. And the same is true for the average level of ARM usage in 2004, as shown by the second set of bars in Chart 6.

Loan-to-Value Ratios

The empirical patterns evaluated so far are cause for concern, because they tend to support the perception that borrowers have been turning to riskier types

Chart 5

House Price Appreciation and Change in ARM Usage, 1990-2004



SOURCES: Office of Federal Housing Enterprise Oversight, *House Price Index*; Federal Housing Finance Board, *Monthly Interest Rate Survey*; authors' calculations.



Chart 6

**House Price Appreciation, Mortgage Characteristics and Performance, and Change in Rate of Home Ownership, 2004**



SOURCES: Office of Federal Housing Enterprise Oversight, *House Price Index*; Federal Housing Finance Board, *Monthly Interest Rate Survey*; Census Bureau, *Housing Vacancy Survey*; Mortgage Bankers Association.

of mortgages to qualify for the purchase of increasingly expensive homes. However, there are some additional trends that would appear to mitigate, albeit only partially, concerns regarding increased mortgage risk.

In particular, along another key financing dimension, home mortgages in high-appreciation states appear more conservative than in low-appreciation states. There is some indication that leverage, or the proportion of the house price financed and not paid upfront, has tended to be relatively low in high-appreciation states. The third set of bars in Chart 6 shows that the average 2004 share of conventional, fully amortized home purchase loans with a loan-to-value ratio above 90 percent was relatively low for the states shown in Chart 1 as experiencing the greatest house price appreciation.<sup>6</sup> This association between high house price appreciation and low loan-to-value ratios is also apparent in Chart 7; high loan-to-value ratios were relatively uncommon in the East and West last year, whereas in Texas, a low-appreciation state, high loan-to-value ratios were much more prevalent.

Because these loan-to-value data reflect only first mortgages, without accounting for piggyback, or second, loans extended concurrent with a first

mortgage, loan-to-value in high-appreciation states may be substantially understated. Nevertheless, another possibility is that many trade-up homebuyers in high-appreciation states, having benefited from past home price appreciation, may tend to have sufficient accumulated

wealth to make a large down payment.

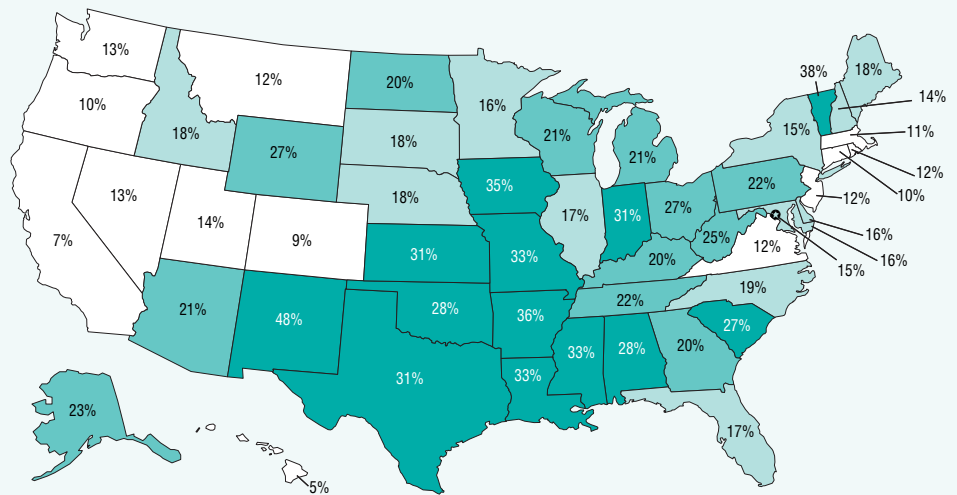
While the lack of data on piggyback loans precludes firm conclusions, the coexistence of ARMs and low loan-to-value ratios in high-appreciation states may make sense. Because trade-up homebuyers in these states have accumulated substantial equity, their loan-to-value ratios may be relatively low. At the same time, though, income levels generally have not kept pace with house prices, perhaps impelling homebuyers to turn to ARMs to qualify for as much credit as possible, based on their current earnings.<sup>7</sup>

**Home-Ownership Rate**

Another interesting pattern in the regional housing data involves the rate of home ownership. Contrary to popular concerns, the available data do not reveal an adverse overall effect of the housing boom in pricing potential buyers out of the market and reducing the rate of home ownership. As indicated by the fourth set of bars in Chart 6, the rate of home ownership actually has risen substantially in high-appreciation states.<sup>8</sup> Of course, the rising home-ownership rates in high-appreciation states do not mean no potential homebuyers have been priced out of the market. Nevertheless, it

Chart 7

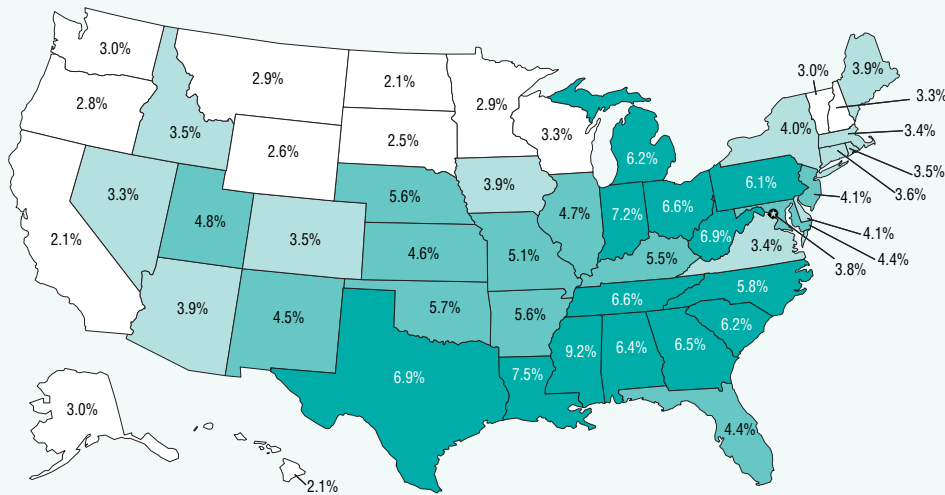
**Mortgages with a Loan-to-Value Ratio Above 90 Percent, 2004**



NOTE: Darker color indicates greater percentage of mortgages with a loan-to-value ratio above 90%.  
SOURCE: Federal Housing Finance Board, *Monthly Interest Rate Survey*.

Chart 8

## Home Mortgage Delinquency Rate, 2004



NOTE: Darker color indicates greater percentage of mortgages that were delinquent in fourth quarter 2004.  
SOURCE: Mortgage Bankers Association.

remains true that a greater proportion of households are living in their own home, despite higher home prices. ARMs and nontraditional mortgage products that can help potential homebuyers qualify for a mortgage may have contributed to the rising rate of home ownership.

### Conclusion

If one were to judge mortgage risk based on recent delinquency rates, concerns over ARMs and nontraditional mortgages would seem misplaced. As shown by the final set of bars in Chart 6, home mortgage delinquency rates have tended to be relatively low in high-appreciation states, despite the greater prevalence of ARMs.<sup>9</sup> California, a high-appreciation state, had a low delinquency rate in 2004, whereas Texas experienced a substantially higher proportion of past-due home mortgage loans (Chart 8).

But, of course, these delinquency data from 2004 do little to allay concerns over increased mortgage risk in high-appreciation states, in the form of increased usage of ARMs and also non-traditional mortgages. Given the recent rapid increases in house prices, one would not expect to find many signs of credit difficulties; financially strapped borrowers could, if nothing else, simply

sell their homes for a profit, rather than default on their loans. In this manner, rapidly rising house prices can conceal the added risk they engender.

It is the possibility of stagnant or falling home prices in the future, combined with the potential, built into much recent borrowing, for increases in the level of mortgage payments relative to income, that gives rise to concern.

—Jeffery W. Gunther  
Robert R. Moore

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### Notes

<sup>1</sup> House price appreciation is computed as the statewide percentage change in the Office of Federal Housing Enterprise Oversight's *House Price Index* from fourth quarter 2003 to fourth quarter 2004. The index is based on repeat sales, with location held constant, but is not adjusted for any effect of renovations or add-ons. The index excludes condominium prices.

<sup>2</sup> John V. Duca discusses building constraints in "Making Sense of Elevated Housing Prices," published in this issue of *Southwest Economy*. Also, Edward L. Glaeser, Joseph Gyourko and Raven E. Saks provide an in-depth analysis of building constraints in "Why Have Housing Prices Gone Up?" Harvard Institute of Economic Research Discussion Paper No. 2061, February 2005.

<sup>3</sup> Housing stock growth is computed as the statewide percentage change in the number of housing units from July 2000 to July 2004, based on data from the Census Bureau's Population Estimates Program. Condominiums and apartments are included as part of the housing stock.

<sup>4</sup> Mark A. Wynne discusses increased immigration generally in "Globalization and Monetary Policy," Federal Reserve Bank of Dallas *Southwest Economy*, July/August 2005.

<sup>5</sup> ARM share data are from the Federal Housing Finance Board's *Monthly Interest Rate Survey*.

<sup>6</sup> Loan-to-value data are from the Federal Housing Finance Board's *Monthly Interest Rate Survey*.

<sup>7</sup> Alan Greenspan, Chairman of the Federal Reserve Board, recently provided further evidence of an association between high house price appreciation and low loan-to-value ratios, after accounting for piggy-back loans, in a speech titled "Mortgage Banking," delivered to the American Bankers Association Annual Convention in Palm Desert, California, on September 26, 2005.

<sup>8</sup> Home-ownership change data represent the percentage point change from 2000 to 2004 in the proportion of households that are homeowners, based on ownership data from the Census Bureau's *Housing Vacancy Survey*.

<sup>9</sup> Home mortgage delinquency rate data are from the Mortgage Bankers Association.

# Making Sense of Elevated Housing Prices

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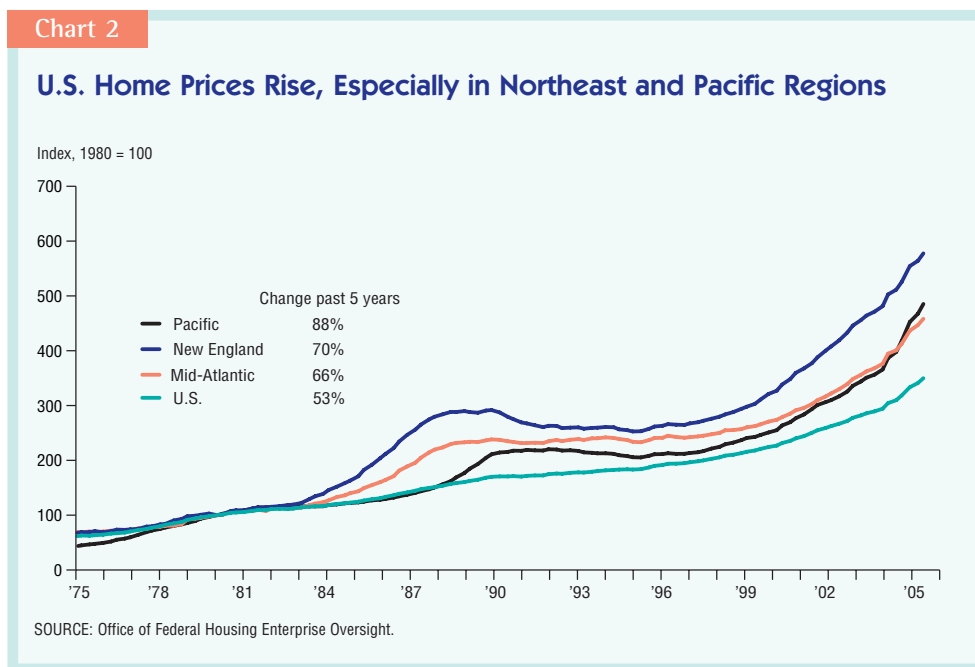
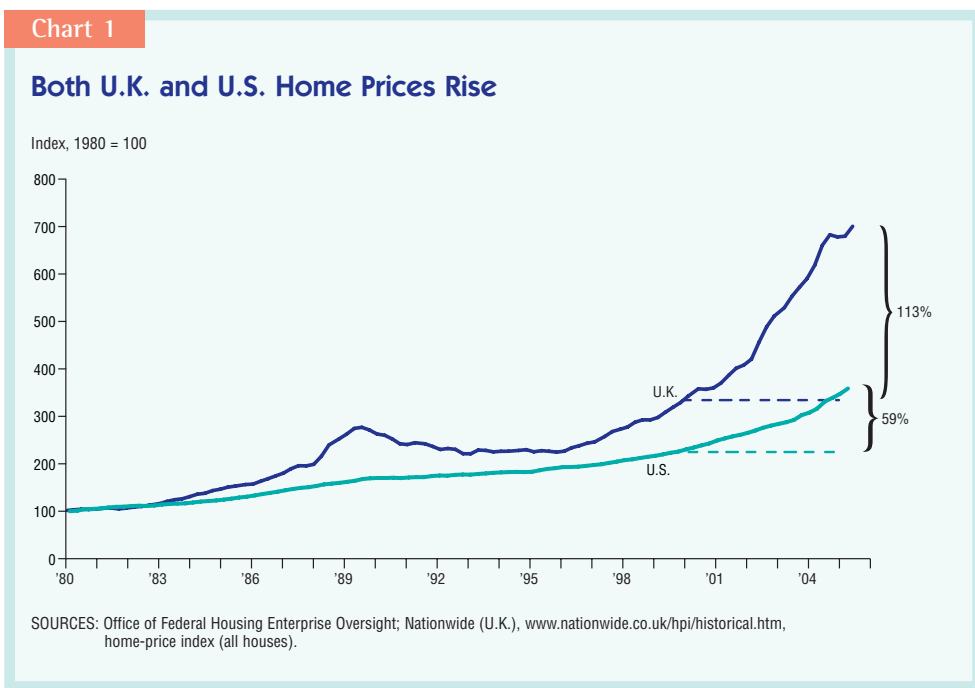
have made it easier and less expensive to do both. Largely by making housing wealth more liquid, these innovations have made consumption more sensitive to housing wealth.<sup>3</sup> So a weakening of home prices can affect consumption—not just construction—beyond what traditional estimates indicate. This is suggested by the experience of the U.K., which has had several, more pronounced swings in home prices than the United States.<sup>4</sup>

In an earlier article, I showed how an overvaluation of home prices was emerging in some parts of the United States.<sup>5</sup> Subsequent increases have only heightened concern that possible price weakness could slow the economy by dampening construction and consumer spending. The current article focuses on making sense of elevated housing prices by analyzing pricing patterns using more recent data and drawing on more recent research to interpret the risks they pose. It also looks at policy implications, including macroeconomic risks from possible weakness in housing prices and factors that might trigger home-price weakness.<sup>6</sup>

## Is There a Bubble?

While there is no generally accepted definition, “bubble” usually describes a substantially overvalued asset price that is in danger of collapsing. As a working definition, substantially overvalued here is a price 20 percent or more above historical norms. The threshold is based on the usual definitions of bull and bear stock markets as having price changes of 20 percent or more from a peak or trough.

**Have U.S. Home Prices Fallen as Fast as Financial Asset Prices?** Stock bubbles are marked by sustained price increases as the bubble builds, followed by more rapid price declines. For example, U.S. stock prices rose for almost a year leading up to the one-day plunge of Oct. 17, 1987. In contrast, over the past 30 years national home prices have trended upward and at worst, roughly flattened out temporarily (*Chart 2*). Moreover, in the few relevant U.S. cases, regional



home-price overvaluations were slower to unwind than stock-price overvaluations. For example, home prices in the New England, Mid-Atlantic and Pacific regions were marked by rapid rises in the mid- to late 1980s, followed by slower paced declines. This asymmetry

likely reflects factors that lead owners to delay selling homes at a loss. Selling a house is more costly, takes longer and involves more personal complications than trading stocks. And some owners cannot afford to take a loss. As a result, stocks are far more liquid than homes,

with annual turnover rates of about 100 percent for those traded on the New York Stock Exchange versus 4 percent on homes.

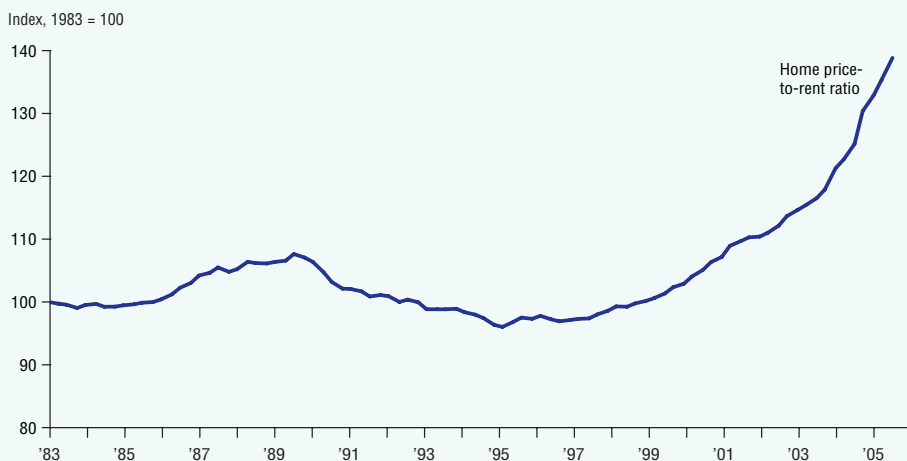
**Are U.S. Home Prices Overvalued Enough to Qualify as a Bubble?** Accounting for the impact of interest rates on home prices, U.S. housing prices appear—on average—to be overvalued by less than 20 percent. But in some markets, the overvaluation may be higher. Of the various gauges for assessing prices, this article focuses on the ratio of home prices to rents. Rents, in this case, are the cash flow homes could generate, and the price-to-rent ratio is much like a stock price-to-earnings ratio.<sup>7</sup>

Relative to rents, U.S. home prices are 38 percent higher than in 1983 (*Chart 3*). When home prices rose sharply in the Northeast and the Pacific states in the mid- to late 1980s, the national ratio rose, only to reverse in the 1990s, when prices in these regions stagnated or fell. Since 1999, the price-to-rent ratio has surged, suggesting that home prices could fall or rents could jump. But the risk that home prices could fall is smaller when recognizing that high home price-to-rent and high stock price-to-earnings ratios imply a low real rate of cash returns, which can be sustained if real interest rates remain low.

To assess if U.S. home prices are overvalued, I estimated the relationship between the home price-to-rent ratio and a measure of real mortgage rates through 2000 and used it to construct estimates of equilibrium home prices since then. *Chart 4* shows the percentage-point gap between actual and equilibrium prices. During the period from 1983 through the end of 2000 that is used to estimate equilibrium, home prices generally stayed within 10 percent of their estimated equilibrium values. Prices surged to 11.5 percent above historical norms by second quarter 2005, implying they were overvalued but not enough to qualify as a bubble.<sup>8</sup> However, because the measure of real mortgage rates is based on a user-cost-of-housing concept that employs lagged price appreciation to adjust nominal rates for inflation, the 11.5 percent figure for second quarter 2005 assumes housing prices would continue appreciating at

Chart 3

### Home Prices Outpacing Rents



SOURCES: Office of Federal Housing Enterprise Oversight; Bureau of Labor Statistics; author's calculations.

about 12 percent. If instead it is assumed the increases would settle down to around 5 percent—about the long-run pace of income growth—the degree of overvaluation would exceed 20 percent.<sup>9</sup>

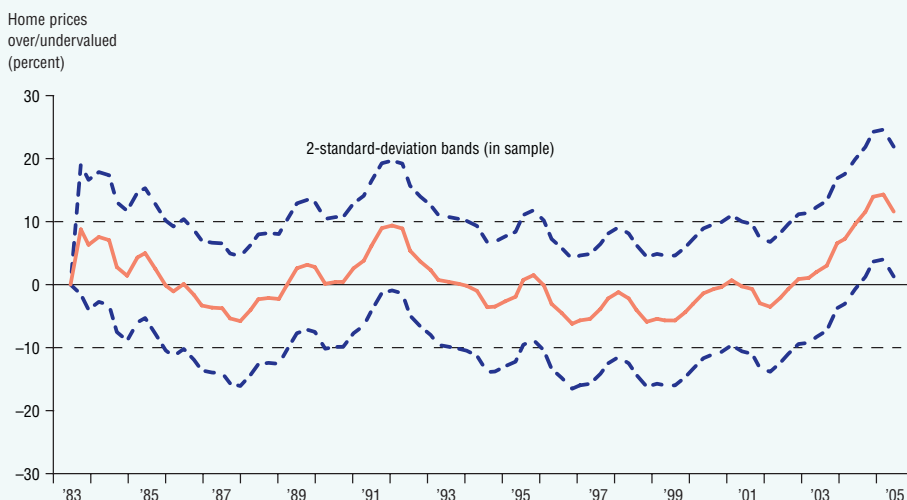
These estimates should be viewed cautiously and seen as shedding light on qualitative, rather than quantitative, conditions, given the short data sample, noise in most asset prices, and difficulty measuring prices and rents. For exam-

ple, the repeat-sales-price index may overstate prices, partly owing to optimistic home appraisals used in refinancing mortgages.<sup>10</sup> Also, the measure of home rents has been criticized.

And estimates of equilibrium home prices are imprecise, reflected by the large gap between the two-standard-deviation lines (in blue) around the overvaluation estimates, which imply that while the estimates statistically differ

Chart 4

### Rents and Mortgage Rates Suggest Home Prices Somewhat Overvalued



SOURCES: Office of Federal Housing Enterprise Oversight; Bureau of Labor Statistics; Federal Reserve Board; author's calculations.



from zero, they are not statistically different from a 10 percent threshold (delineated by the dashed black lines), commonly used to define stock market corrections. This imprecision reflects difficulty with identifying an equilibrium price using a short sample period that covers one and a half housing-price cycles. In addition, equilibrium values may have risen in ways not captured by the variables used to estimate equilibrium prices. For example, mortgage innovations have made housing a more liquid, and thus more attractive, asset. In addition, the demand for owning more than one home has recently increased. For these reasons, prices may not be as overvalued as Chart 4 suggests.

**The Case Against Overvaluation.** Perhaps the strongest case against U.S. home prices being overvalued can be made using the National Association of Realtors' (NAR) national affordability index for all buyers, which is not low (Chart 5). This index measures actual median income relative to the income needed to qualify to buy a median-priced home with 20 percent down at the average conventional mortgage rate. In recent years, median income has been about 130 percent of that needed to qualify but fell to about 120 percent in the second quarter of 2005, largely due to a jump in housing prices and, to a

lesser extent, slightly higher mortgage interest rates. If rates rose a full point, at current prices and incomes this index would decline to about 110 percent, well below the range of recent years.

In addition, the national affordability index ignores that many homebuyers do not make 20 percent down payments. Indeed, 25 percent of homebuyers made no down payment in 2005, according to the NAR. Also, some buyers pay subprime mortgage rates that are above the rates the affordability index uses. Moreover, many purchases are for second homes (13 percent of 2004 home sales, according to the NAR) or investment homes (13 percent of mortgages for February 2005 home purchases, according to Freddie Mac, and 23 percent of 2004 home sales, according to the NAR). The index, in contrast, assumes households have one mortgage.<sup>11</sup>

The index also overlooks the rising use of creative financing, such as interest-only loans (17 percent of mortgage originations in the second half of 2004, according to the Mortgage Bankers Association), which do not require owners to build up equity by paying down principal. And there are risks from the advent of option adjustable-rate mortgages, which give borrowers the option of paying principal and interest, interest only or an amount smaller than the accrued

interest, which increases indebtedness via negative amortization.

### Turnover Suggests Speculation.

Another sign of possible overvaluation is the large rise in home turnover, which could reflect speculative activity and households buying out of fear that prices will be much higher in the future. Turnover, which can be tracked by the ratio of units sold to the number of existing units, recently jumped above its normal 3 to 4 percent range (Chart 6). Likely reflecting swings in housing demand, faster turnover has been accompanied by home-price increases that have outpaced inflation. It is disturbing that recent turnover and relative home-price inflation are at levels last seen in the late 1970s.

### Making Sense of Regional Patterns

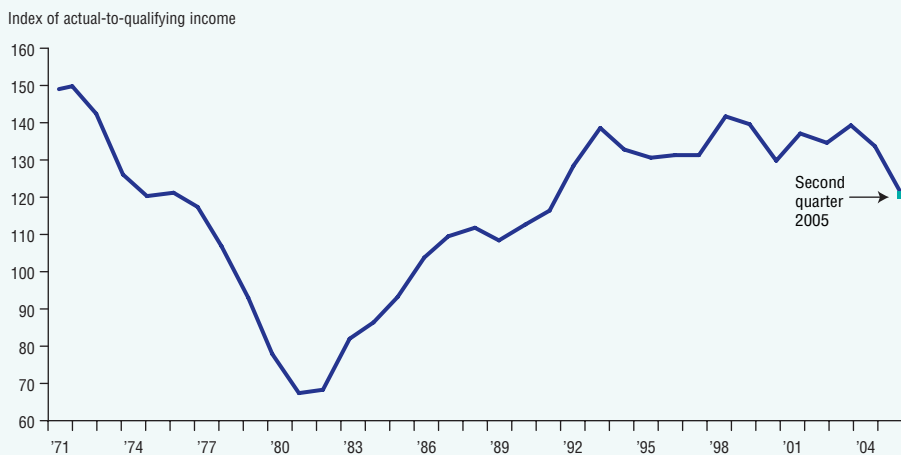
Divergences in regional home prices reflect different supply and demand conditions. The left panel of Chart 7 depicts areas like the Northeast and Pacific states, where, due to tight supplies of building lots, increased housing demand from low mortgage rates is resulting in large price increases and little construction. Recent research has found that home-price movements are dominated by swings in land, rather than structure, costs.<sup>12</sup> The right panel depicts areas like much of the noncoastal South, where, due to plentiful supplies of building lots, increased demand results in smaller price increases and more construction.

Research has found that tougher zoning, reduced supplies of vacant land and longer commutes have made land supply less elastic in the Northeast and Pacific Coast areas since the early 1970s.<sup>13</sup> As a result, regional home prices, particularly for land, are more apt to diverge, with the risk of overvaluation largely in tight land-supply areas like coastal cities in the Northeast and the Pacific states. Nationally, increases were large enough to raise the land component of existing home prices to about 46 percent of constant-quality home prices in third quarter 2003, well above the 38 percent average that had been seen since 1970.<sup>14</sup>

Home prices are again outpacing rents, mainly in areas of tight land supply in the Northeast and West, where

Chart 5

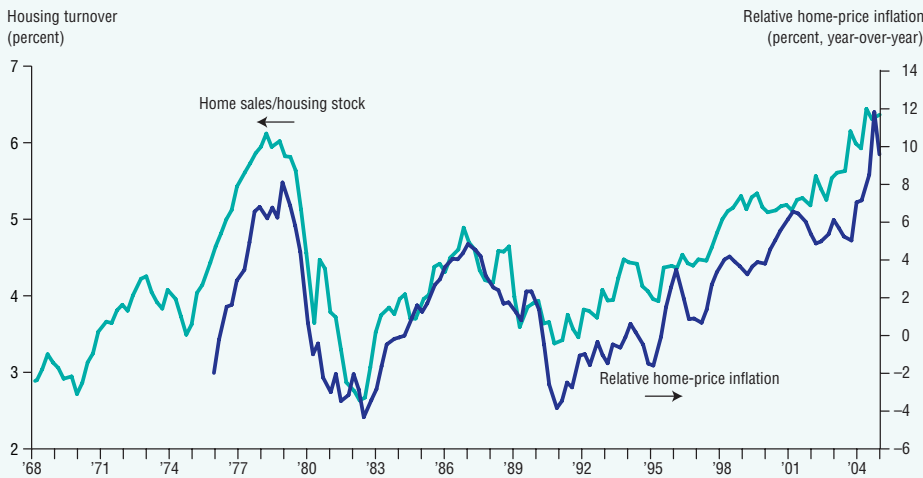
### Housing Affordability Somewhat High but May Be Sagging



SOURCE: National Association of Realtors.

Chart 6

### Home Turnover and Housing Inflation Rise



NOTE: Home price is the gap between the percentage growth in home prices and in the core personal consumption expenditures deflator.

SOURCES: Office of Federal Housing Enterprise Oversight; Bureau of Labor Statistics; National Association of Realtors; Federal Reserve Board; author's calculations.

troubling that affordability has plunged in many coastal cities, with recent estimates from Wachovia Bank and the National Association of Home Builders showing that the share of residents who can afford a median-priced home has fallen to about 5 percent in San Diego and Los Angeles and less than 10 percent in San Francisco and New York City.

### Implications for Monetary Policy

High real estate prices have several implications for monetary policy. Although signs of home-price overvaluation are seen mainly in the Northeast, Pacific states and Florida, these are economically important areas. In addition, there are emerging signs and anecdotal reports that price appreciation is spilling over into nearby areas, as people either migrate to less expensive places or buy investment property to diversify out of particular markets.

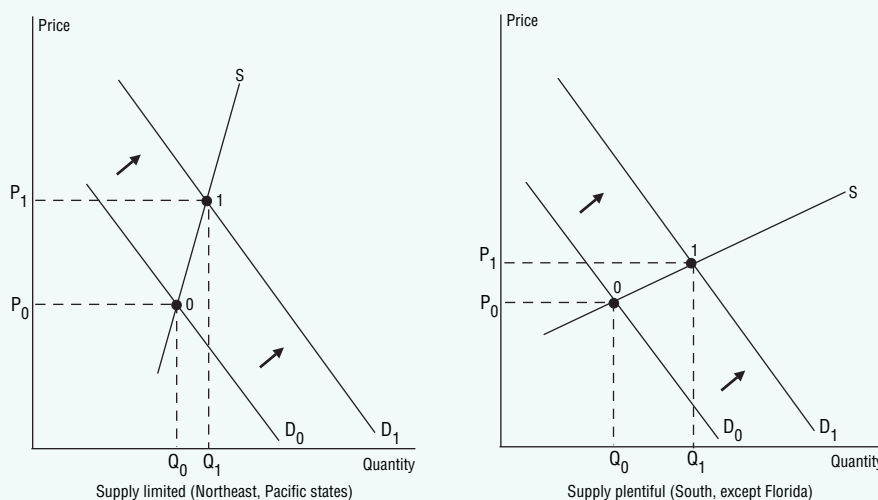
**Macroeconomic Risks.** The main macroeconomic risk from high home prices is not that a housing crash could trigger a recession but that the impact of a new economic headwind could be amplified if it triggered home-price declines. For example, a headwind that pushed up mortgage interest rates could weaken home prices, which in turn could dampen construction by a bit more than what historically based estimates would indicate.

Another risk is that home prices may no longer aid consumption as much as in recent years. The combination of higher home values and financial innovations has enabled owners to refinance mortgages and tap their equity using collateralized loans that have much lower interest rates than in the past.<sup>15</sup> For example, households are now more willing to refinance their mortgages at a given interest rate savings because refinancing entails lower fixed costs and fewer hassles than in the past. In addition, households have become more able to tap home wealth by cashing out equity when refinancing, using home equity lines and not fully using the proceeds from selling prior homes as down payments on subsequent ones.

One reason mortgage equity withdrawals may affect consumption in ways generally unseen in the past is that housing liquidity has increased, enabling

Chart 7

### Supply Affects Price Response to Higher Demand



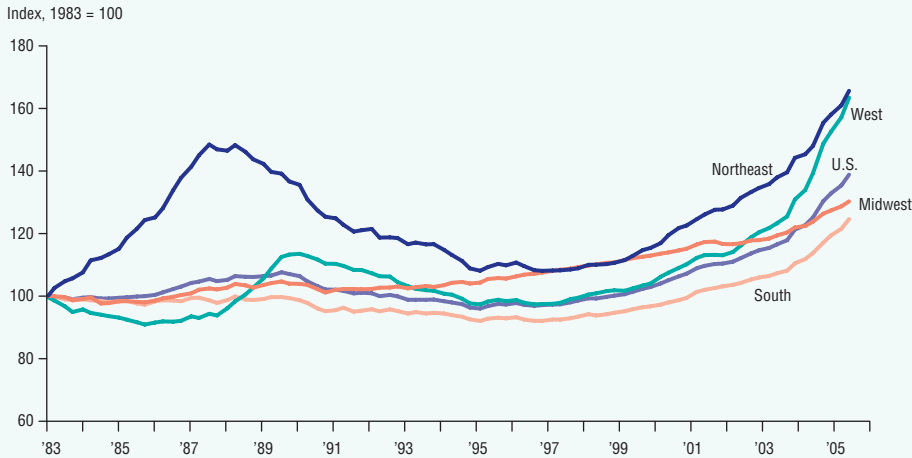
home price-to-rent ratios surged in the mid- or late 1980s, only to retreat in the early 1990s (Chart 8). In the Northeast (New England plus the Mid-Atlantic states), the declines in the early to mid-1990s did not fully reverse earlier increases. Similarly, price-to-rent ratios in coastal cities like Boston, New York and San Francisco rose quickly in the mid- or late 1980s but slowly and only partially

fell back in the early 1990s (Chart 9). Recently, price-to-rent ratios have again jumped in land-tight cities on the Pacific and Atlantic coasts but have risen less in inland cities, like Atlanta and Dallas.

It is plausible that as they become wealthier, people will be willing to pay more to live near the ocean, suggesting that recent price run-ups in coastal cities may not fully unwind. Nevertheless, it is

Chart 8

Price-to-Rent Ratios Rise, Mainly in Northeast and West



SOURCES: Office of Federal Housing Enterprise Oversight; Bureau of Labor Statistics; author's calculations.

owners to more cheaply access capital gains. These withdrawals have jumped recently, at times exceeding \$400 billion at an annual pace and amounting to about 5 percent of income. Through late 2003, mortgage interest reductions from refinancing (as a percentage of income) also surged. Tentative econometric results suggest that in 2003, long-run consumption was boosted 1.5 to 2 percentage points by equity withdrawals and, together with mortgage refinancings, by

roughly 5 percentage points beyond that suggested by traditional housing wealth effects.<sup>16</sup>

**What Could Trigger Home-Price Declines?** Given these macro risks and evidence that home prices may be overvalued in some key markets, it is worthwhile to touch on what factors could trigger home-price declines. While prices appear overvalued in areas of tight land supply, it is important to note that economic developments, particularly those

affecting job growth and interest rates, tend to drive housing markets, rather than the reverse.

Home prices are vulnerable to job market weakness, especially when economic growth slows and a headwind could tip the economy into recession. Also relevant are the risks of regional recessions that could weaken home prices in the Northeast and West. Indeed, in the early 1990s unemployment rose more in those two regions than in the South and Midwest. Higher housing costs made the Northeast and West less competitive and more vulnerable to shocks, such as the defense cutbacks that hurt Southern California in the early 1990s. Weak job markets in those areas likely hurt home prices in the early and mid-'90s. While current labor market conditions are good, high housing costs in the Northeast and the Pacific states may undermine these regions' ability to generate jobs.

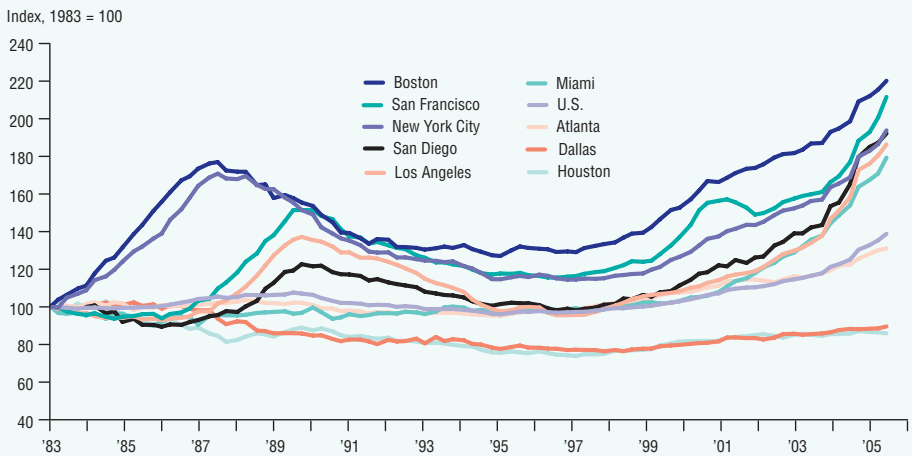
Another factor that could trigger declines in real estate prices is a possible jump in mortgage interest rates, which may have become more difficult to predict. One reason is the unusual behavior of long-term interest rates, which have only recently moved up despite 11 increases in the federal funds rate from 2004 through September 2005. Possible factors include the global savings glut, increased bond investor confidence that the Federal Reserve will keep inflation low and the subdued pace of global economic recovery.

**Mitigating Factors.** Fortunately, some factors mitigate the risks posed by high home prices. First, the impact of possibly higher mortgage rates on U.S. home prices is limited by the use of fixed-rate mortgages, which cushion homeowners from higher payments. And while use of adjustable-rate mortgages has risen in recent years, ARM use has not increased as much as in earlier short-term interest-rate cycles, despite the impression created by many media reports (*Chart 10*). Nevertheless, ARM use is high and, as in earlier cycles, has jumped in some high-cost markets.

Another mitigating factor is that the unemployment rate will likely remain low because the economic expansion will probably continue. In addition, the limits on new-home supply that have fueled

Chart 9

Price-to-Rent Ratios Rise, Mainly on Atlantic and Pacific Coasts



SOURCES: Office of Federal Housing Enterprise Oversight; Bureau of Labor Statistics; author's calculations.

high prices on the East and West coasts suggest that most construction is not in high-cost areas most vulnerable to price declines. Furthermore, U.S. policymakers would likely have time to react because home prices tend to rise faster than they fall, and refinancing and equity withdrawal effects on consumption appear to be more medium-run than short-run, according to new research.<sup>17</sup> Also helping in this regard is that home price-to-rent ratios in the Northeast and California tend to rise faster than they fall, with past downward corrections mainly owing to the combination of stagnant home prices and rising rents. Furthermore, historical norms may overstate how much home prices may be overvalued.

### The United States Is Not Alone

The behavior of housing markets in the U.K. is an interesting example, partly because there are longer time-series data on that country, and home prices appear more overvalued there than in the United States. Indeed, the ratio of home prices to rents has jumped more in the U.K., which appears to be undergoing its third or fourth housing-price cycle since the late 1960s (*Chart 11*). Home-price swings there differ from those in the United States in being more pronounced and as flexible when falling as when rising.

The greater volatility in the U.K. price-to-rent ratio likely stems from two structural differences between the real estate markets there and in the United States.<sup>18</sup> First, U.K. housing demand tends to be more interest-rate sensitive because mortgages there are generally much more adjusted to market rates. Indeed, 70 percent of mortgages have rates that lenders can adjust within one year, and balloon mortgages make up many of the rest. In contrast, Freddie Mac data suggest that only about 30 percent of outstanding U.S. mortgages are subject to adjustment for short-term interest rates. A second difference is that the U.K. has a smaller supply of building lots, so housing-demand swings affect prices more. In this respect, the U.K. may be akin to the land-supply-restricted Northeast and Pacific Coast regions of the United States. By contrast, building lots are plentiful in much of the U.S. South and Midwest.

Another difference is that the Bank

Chart 10

### ARM Share Not (Yet?) as High as in Earlier Fed Tightening Cycles



of England tightened sooner than the Federal Reserve in the most recent interest rate cycle. Probably reflecting this and structural market differences, U.K. home prices, which have jumped 113 percent this decade, may be close to topping out, whereas U.S. prices, which have risen 59 percent, are still going up (*see Chart 1*).

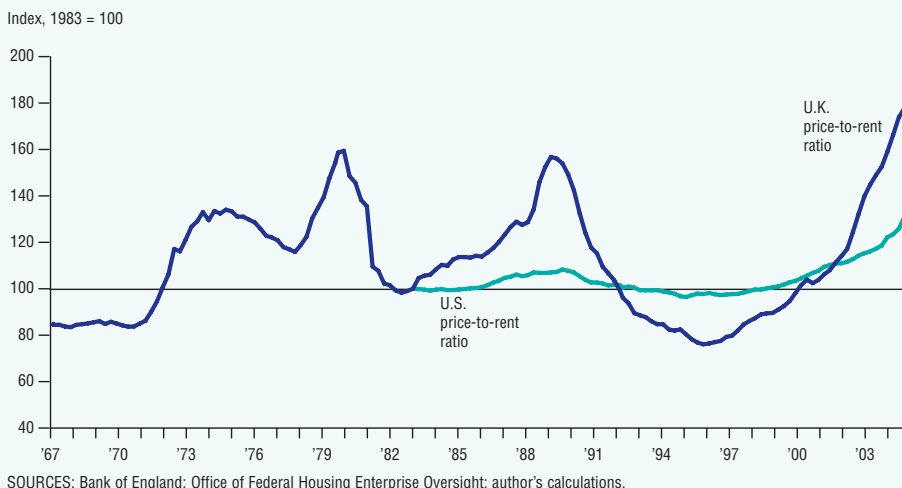
### Outlook

As of second quarter 2005, U.S. housing prices appeared elevated rela-

tive to fundamentals. However, it was unclear whether there was a national housing bubble because of uncertainty about whether estimates of overvaluation were large and precise enough to warrant such a designation. Nevertheless, several indicators suggest that home prices are frothy, particularly in some regions. For example, home prices in the Northeast and Pacific states seem overvalued, based on historical norms. In some coastal metro areas, measures of

Chart 11

### Home Prices Jump More Relative to Rents in U.K. Than in U.S.





affordability have plunged and housing prices have nearly doubled in the past five years, a magnitude hard to justify based on fundamentals. The main risk high prices pose is that they could amplify the effects of an economic headwind, in which case consumption could slow if mortgage refinancing and equity withdrawal activity decrease or flatten. Fortunately, high home prices are mainly in areas with little construction, and our limited experience suggests that U.S. policymakers would have time to cushion the macroeconomic impact of price declines.

Nevertheless, there is considerable uncertainty about how much home prices may be overvalued. The United States has a short track record with constrained supplies of building lots in some regions and with today's new mortgage practices. In addition, the increased liquidity of housing wealth and greater demand for second homes could raise equilibrium values to an unknown extent. A limited experience with regional home-price weakness also makes it unclear how much declining home prices would affect the economy in high-priced areas. Such uncertainties warrant more research and monitoring of residential real estate markets and their effects.

—John V. Duca

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## Notes

The author thanks W. Michael Cox, D'Ann Petersen, Jason Saving and Alan Viard for their comments and suggestions; Christine Rowlette for research assistance; James Kennedy for data on the number of U.S. housing units; and the Bank of England for data on the ratio of U.K. house prices to rents.

<sup>1</sup> In this article, housing prices are tracked by indexes that control for quality by using repeat home sales. Economists have differences of opinion about what index most accurately tracks home prices. For example, Jonathan McCarthy and Richard W. Peach ("Are Home Prices the Next 'Bubble?'" *Federal Reserve Bank of New York Economic Policy Review*, December 2004, pp. 1–17) use an index of constant-quality, new-home prices, partly on grounds that there are some upward biases in the repeat-sales index. But I use repeat-sales prices because land costs are a bigger component of existing-home prices (about 38 percent) than of new-home prices (about 10 percent), and they account for most of the movement in home prices. This follows Joshua Gallin in "The Long-Run Relationship Between House Prices and Rents," Finance and Economics Discussion Series Working Paper No. 2004-50, Federal Reserve Board, September 2004. See also "The Price and Quantity of Residential Land in the United States," by Morris A. Davis

and Jonathan Heathcote, Finance and Economics Discussion Series Working Paper No. 2004-37, Federal Reserve Board, June 2004.

<sup>2</sup> "Monetary Policy Report to the Congress," Federal Reserve Board of Governors, July 2003; "Mortgage Refinancing in 2001 and Early 2002," by Glenn Canner, Karen Dynan and Wayne Passmore, *Federal Reserve Bulletin*, December 2002, pp. 469–81.

<sup>3</sup> "Why House Prices Matter," by Kosuke Aoki, James Proudman and Gertjan Vlieghe, *Bank of England Quarterly Bulletin*, Winter 2001, pp. 460–68; and "Housing Wealth Effects: Housing's Impact on Wealth Accumulation, Wealth Distribution and Consumer Spending," by Eric Belsky and Joel Prakken, National Center for Real Estate Research, November 2004.

<sup>4</sup> "Mortgage Equity Withdrawal and Consumption," by Melissa Davey, *Bank of England Quarterly Bulletin*, Spring 2001, pp. 1001–03; "Housing Price Bubbles—A Tale Based on Housing Price Booms and Busts," by Thomas Helbling, Bank for International Settlements Paper No. 21, April 2005, pp. 30–41; "Booms and Busts in the UK Housing Market," by John Muellbauer and Anthony Murphy, *The Economic Journal*, vol. 107, November 1997, pp. 1701–27; and "House Prices, Consumption, and Monetary Policy: A Financial Accelerator Approach," by Kosuke Aoki, James Proudman and Gertjan Vlieghe, Bank of England Working Paper No. 169, 2002.

<sup>5</sup> "How Vulnerable Are Housing Prices?" by John V. Duca, Federal Reserve Bank of Dallas *Southwest Economy*, March/April 2004.

<sup>6</sup> Home prices currently pose little risk to most banks, according to several indicators and gauges of risk.

<sup>7</sup> See the article by Joshua Gallin referenced in note 1 and "Bubble Trouble? Your Home Has a P/E Ratio Too," by Edward E. Leamer, *UCLA Anderson Forecast*, June 2002, [www.anderson.ucla.edu/documents/areas/ctr/forecast/PE\\_ratio.pdf](http://www.anderson.ucla.edu/documents/areas/ctr/forecast/PE_ratio.pdf).

<sup>8</sup> Real mortgage rates were lagged by three quarters and are defined using the average effective conventional mortgage interest rate adjusted for the Federal Reserve Board's quarterly model estimates of housing depreciation, real estate taxes and other costs, minus the annualized rate of home appreciation over the prior 18 months. Estimates of home-price overvaluation at the end of 2004 were near those of Gallin (note 1), who uses roughly similar, though slightly different, techniques and data.

<sup>9</sup> With both home prices and incomes rising by 5 percent, the implied mortgage-payments-to-income ratio would generally be constant for a given type of mortgage, holding mortgage interest rates constant.

<sup>10</sup> Partly to control for this bias, the Office of Federal Housing Enterprise Oversight created a new, national repeat-sales-price series. While price rises are not as great, this index, the national one used here and existing median home prices move closely together. Since the new series has been available only since 1996, the longer repeat-sales index is used to gain insight from swings in the home price-to-rent ratio from the mid-1980s to mid-1990s.

<sup>11</sup> The NAR estimates that 13 percent and 23 percent of 2004 home sales were for second and investment homes, respectively, while Freddie Mac estimates corresponding figures of 10 percent and 7 percent of prime conforming mortgages. See "Investing in a Second...The Rise of Investor and Second-Home Purchases," by Frank E. Nothaft, [www.freddiemac.com/news/finance/commentary/sp-comm\\_080105.html](http://www.freddiemac.com/news/finance/commentary/sp-comm_080105.html). Nothaft cites data from LoanPerformance, a subsidiary of First American Real Estate Solutions.

<sup>12</sup> "Housing and the Business Cycle," *International Economic Review*, vol. 46, pp. 751–84, August 2005; and "The Price and Quantity of Residential Land in the United States" (see note 1), both by Morris A. Davis and Jonathan Heathcote.

<sup>13</sup> "Why Have Housing Prices Gone Up?" by Edward L. Glaeser, Joseph Gyourko and Raven E. Saks, Harvard Institute of Economic Research, Discussion Paper No. 2061, February 2005. Other factors, such as density and immigration patterns, may also affect regional pricing patterns.

<sup>14</sup> "The Price and Quantity of Residential Land in the United States," by Davis and Heathcote.

<sup>15</sup> See the Canner, Dynan and Passmore article cited in note 2.

<sup>16</sup> These results are implied by findings in "Mutual Funds and the Evolv-

ing Impact of Stock Wealth on U.S. Consumption," by John V. Duca, *Journal of Economics and Business*, forthcoming.

<sup>17</sup> Quarterly mortgage interest savings from refinancing and equity withdrawals as shares of income were statistically insignificant when added to the consumer durable spending equation of the Federal Reserve Board's quarterly U.S. econometric model. However, equity withdrawals and a 12-quarter, cumulative sum of interest savings from refinancing mortgages are significant determinants of long-run consumption, along with wealth and income. (See the Duca article cited in note 16.)

<sup>18</sup> "Asymmetries in Housing and Financial Market Institutions and EMU," by Duncan MacLennan, John Muellbauer and Mark Stephens, manuscript, Oxford University and University of Glasgow, July 2000; "Asset Pricing and the Housing Market," by Olaf Weeken, *Bank of England Quarterly Bulletin*, Spring 2004, pp. 32–41; "What Drives Housing Price Dynamics: Cross-Country Evidence," by Kostas Tsatsaronis and Haiban Zhu, *BIS Quarterly Review*, March 2004, pp. 65–78.

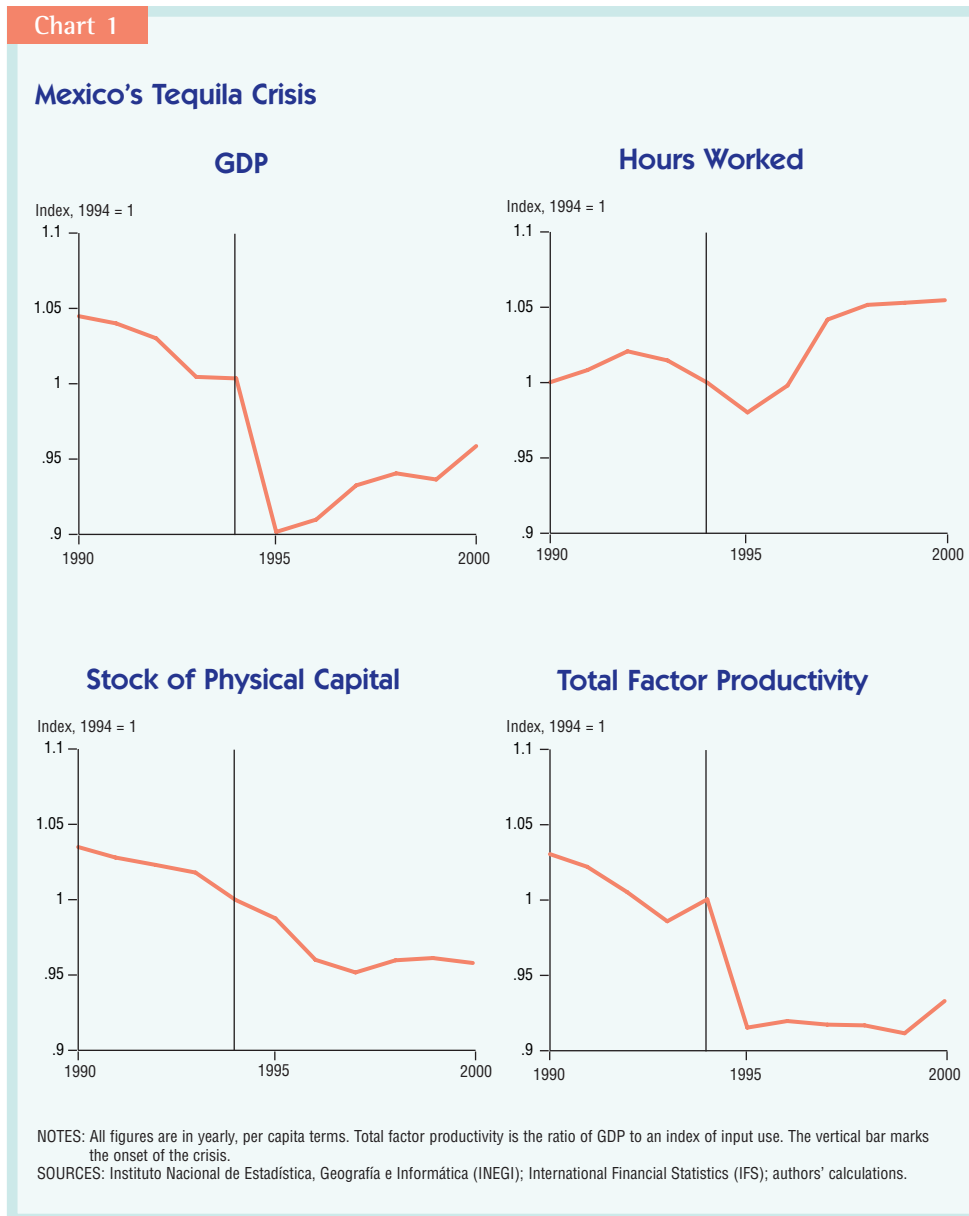
## Financial Crises: Still a Mystery

**F**inancial crises punctuate the history of many developing nations with devastating effects on economic activity and standards of living. In Mexico, for instance, a deep peso devaluation in 1982 and the consequent financial disruptions brought two decades of miraculous growth to a sudden halt. Several episodes followed throughout Latin America, causing much of the area to experience a lost decade of economic stagnation. Mexico's deepest crisis struck in December 1994, when yet another peso devaluation triggered the country's worst recession since the Great Depression.

Partly in hopes of reducing the frequency of such crises, most researchers have focused their attention on what triggers a financial collapse. Among other results, the study of past episodes underscores the importance of a credible commitment to monetary and fiscal discipline. Mexican authorities have made remarkable, well-documented progress in this area since the 1994 Tequila Crisis. As a result, the premium the country must pay on its debt issues is now among the lowest in Latin America, and Mexico has been crisis-free for over a decade.

While our understanding of what triggers crises has improved, the precipitous fall of output that follows most episodes continues to puzzle economists. Qualitatively, it is not surprising that financial turmoil causes economic activity to slow. Trade and investment credit play key roles in market economies, and negative shocks to the availability and cost of finance are bound to reduce output.

But during crises, output falls much more than what the available data on the use of productive factors would lead one to expect. In the case of Mexico's Tequila episode, for instance, gross domestic product fell much more than hours worked and measures of the stock of physical capital (*Chart 1*).<sup>1</sup> In the language of neoclassical economists, total



factor productivity (the ratio of output to input use) falls precipitously during financial crises. In fact, total factor productivity accounts for most of the behavior of output during crises. Countries that experience crises suddenly become less productive, and the size of the drop is far outside the typical range of productivity movements.

The behavior of productivity during crises presents a difficult challenge for standard macroeconomic models. Most obviously, because the productivity of labor falls so drastically, employment and hours worked should fall much more than the data show. So, therefore, should output. In this sense, the most puzzling aspect of financial crises may not be that

output falls so much, but rather that it falls too little.

Because productivity plays a dominant role during turbulent times, a first step toward understanding the real impact of crises is to explain why they cause the average productivity of factors to fall so much. Among many possible explanations, productive resources tend to be used less intensively during turbulent times. High interest rates combined with low productivity give firms strong incentives to postpone the consumption of capital services (for instance, by leaving plants or machines temporarily idle) and economize on variable expenditures, such as wear and tear, until business conditions improve. On the labor side, firms may choose to hoard workers during periods of low activity to economize on labor-adjustment costs. Some recent investigations find that capital utilization and labor hoarding can, in fact, account for a nontrivial part of produc-

tivity movements during crises.

Promising as these findings may be, however, factor utilization is not likely to fully explain the real impact of crises. First, productivity continues to fall by an unusual amount after controlling for changes in factor utilization. Second, some calculations suggest that models with factor utilization also predict that output should fall much more during crises than what we observe.<sup>2</sup> The demand for factors is more stable in those models than in models with fixed utilization, but this is offset by large swings in utilization rates.

Given the difficulties crises pose for standard models, understanding the real impact of financial crises is likely to require some modeling of resource allocation across sectors. For example, employment started growing briskly in Mexico's export sector after the 1994 devaluation. The fall in productivity could reflect transitory losses in the qual-

ity of labor as employees devote time to learning new skills. This line of research should shed much-needed light on the real effects of crises and could yield new explanations for two decades of lackluster growth in Latin America.

—Felipe Meza  
Erwan Quintin

*Meza is an assistant professor at the Universidad Carlos III de Madrid. Quintin is a senior economist in the Research Department of the Federal Reserve Bank of Dallas.*

## Notes

<sup>1</sup> For similar evidence of other crisis episodes, as well as a survey of the recent literature on financial crises, see "Financial Crises and Total Factor Productivity," by Felipe Meza and Erwan Quintin, Center for Latin American Economics Working Paper No. 0105, March 22, 2005 ([www.dallasfed.org/latin/papers/2005/lawp0501.pdf](http://www.dallasfed.org/latin/papers/2005/lawp0501.pdf)).

<sup>2</sup> See Meza and Quintin (2005).

## Mexican GDP Falls but No One Notices

**T**wo years ago, we reported on these pages about difficulty in correctly interpreting Mexico's GDP reports.<sup>1</sup> The complication involves Easter's habit of moving around in the Gregorian calendar. Sometimes this religious holiday occurs in the first quarter and sometimes in the second. Because economic activity is reduced in the quarter in which Easter falls, when Easter switches quarters from one year to the next, the situation is ripe for the confusion we pointed out earlier.

Easter fell in the second quarter in both 2003 and 2004, so last year the issue was moot. This year, Easter fell in the first quarter, leading to possible confusion.

In the opening sentence of its statistical release on Mexico's second quarter 2005 gross domestic product, the Instituto Nacional de Estadística, Geografía e Informática (INEGI, Mexico's census bureau) reports that GDP was 3.1 percent greater than in the second quarter of 2004. This statistic is calculated from data

that have not been seasonally adjusted and, in particular, have not been adjusted for Easter's wayward effects. The report further notes that GDP declined 0.42 percent in second quarter 2005 relative to first quarter 2005.

The year-over-year statistic is what the Mexican report has historically headlined—and with good reason. Until fairly recently, INEGI did not calculate, or at least did not report, seasonally adjusted statistics. When analyzing data that are not seasonally adjusted but are subject to seasonality, it is standard operating procedure to look at year-over-year changes. When seasonal effects are irregular with respect to the calendar, such as Easter's, the year-over-year calculation is not valid when Easter falls in different quarters in successive years. In other words, INEGI's lead statistic sometimes suffers from statistical bias.

INEGI's seasonal adjustment procedure is sophisticated, taking full account of the Easter effect. The seasonally

adjusted data have been purged of the potentially distorting effect of Easter moving around in the calendar. This makes it possible to report meaningful quarter-over-quarter statistics, which INEGI does—but does not emphasize. Although the main reason for emphasizing year-over-year changes has been eliminated with INEGI's now more sophisticated approach to seasonal adjustment, it may still be useful to calculate such changes. But to be meaningful, these changes must be calculated from the seasonally adjusted data. According to INEGI's own seasonally adjusted data, Mexico's GDP grew 1.9 percent from second quarter 2004 to second quarter 2005. INEGI's reported figure of 3.1 percent is biased upward because Easter's occurrence in second quarter 2004 depressed that period's output.

In spite of the stumbling block placed before them, analysts are often able to make sense of the situation. However, their reportage is often awk-

# Mexican GDP Falls but No One Notices

(Continued from page 15)

ward and confusing. In one example of many, *DismalScientist* reports, “The Mexican economy showed a rebound in the second quarter, positively influenced by the Easter holiday.”<sup>2</sup> Note that the terminology “in the second quarter” is confusing. One might think *DismalScientist* is referring to growth between the first and second quarters, but that is not the case. It is referring to INEGI’s reported growth of 2.4 percent from first quarter 2004 to first quarter 2005, compared with 3.1 percent from second quarter 2004 to second quarter 2005. Such reportage is typical of articles about Mexican GDP. In other contexts, reporters often use the expression “in the quarter” to mean “during the quarter,” a more appropriate usage.

According to INEGI’s seasonally adjusted (and Easter-corrected) data, GDP declined by 0.42 percent from first to second quarter 2005. What sort of “rebound” is this? Even the year-over-

year data show no rebound when corrected for Easter. The year-over-year figures above for first- and second-quarter growth (2.4 and 3.1 percent, respectively) become 3.7 and 1.9 percent, respectively. In other words, year-over-year growth declined, primarily due to severe slowing in the first quarter (0.18 percent) and an actual decline of 0.42 percent in the second quarter.

How much clearer to report, simply, “After averaging growth of about 1 percent per quarter in 2004, GDP growth fell to 0.18 percent in the first quarter of 2005 and GDP declined 0.42 percent in the second quarter.” There is no need to mention Easter at all.

—Franklin D. Berger

*Berger is director of technical support and data analysis in the Research Department of the Federal Reserve Bank of Dallas.*

## Notes

<sup>1</sup> “(Mis)reporting Mexico’s Gross Domestic Product,” by Franklin D. Berger, Federal Reserve Bank of Dallas *Southwest Economy*, Issue 5, September/October 2003.

<sup>2</sup> “Mexico: GDP,” by Alfred Coutino, in *DismalScientist*, August 16, 2005, [www.economy.com/dismal/pro/blog.asp?cid=16827](http://www.economy.com/dismal/pro/blog.asp?cid=16827).

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