

What Happens to Banks When House Prices Fall? U.S. Regional Housing Busts of the 1980s and 1990s

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The recent rapid appreciation of house prices in many U.S. markets has prompted concern over the possible effects of a sharp decline in prices, especially for commercial banks and other real estate lenders. This article examines regional real estate booms and busts in the 1980s and 1990s: Only about half of state house price booms were followed by a severe decline in prices, but large declines occurred in several states that did not have a prior boom. Banks in states that had large house price declines experienced high loan default rates and, thus, low profit and high failure rates. Although U.S. banks may have become more exposed to residential real estate recently, they appear less vulnerable to a decline in house prices than banks in states with large price declines in the earlier period. (JEL G210, R110, R310)

Federal Reserve Bank of St. Louis *Review*, September/October 2006, 88(5), pp. 413-29.

House prices in the United States have soared over the past five years. A common measure of the trend in house prices is the repeat sales index produced by the Office of Federal Housing Enterprise Oversight (OFHEO). According to this measure, between 2001:Q1 and 2005:Q3, U.S. house prices increased by an average of 40 percent in nominal terms and 29 percent relative to the consumer price index (excluding the shelter component of the CPI). This rapid appreciation has led some analysts to forecast a correction in real house prices—possibly even a decline in nominal prices.

A decline in nominal house prices would reduce household wealth, which could restrain the growth of consumer expenditures and overall economic activity. Mortgage default rates could increase sharply if a decline in house prices were accompanied by slower growth of household income or rising interest rates. Furthermore, a decline in house prices would reduce the value of collateral behind the \$8 trillion residential

mortgage debt market and thereby increase the losses lenders experience on loan defaults. The popularity of nontraditional mortgage loans, such as interest-only loans and adjustable-rate loans that permit negative amortization (“option ARMS”), raises additional concern about default risk because such loans expose borrowers to more interest-rate and house-price risk than traditional fixed-rate, amortizing loans.

This article explores the implications of a substantial decline in nominal house prices by revisiting episodes of large decline in house prices that occurred in several U.S. states during the 1980s and 1990s. States that experienced large declines in residential real estate prices tended to suffer more bank distress, and longer and deeper declines in economic activity, than did other states. Several states have recently experienced increases in house prices that rival rates of appreciation experienced by states that subsequently saw marked house price declines in the 1980s and 1990s. In the aggregate, however, U.S. banks

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appear less vulnerable to a decline in house prices today than did banks located in states that experienced large declines in house prices in those earlier decades. Further, state-level data from the 1980s and 1990s show that periods of rapid house price appreciation were not frequently followed by large declines in house prices (and, by the same token, that large declines were not always preceded by large house price increases).

The next section reviews the recent rapid appreciation of U.S. house prices. Subsequent sections present information about state housing booms and busts during the 1980s and 1990s, compare the exposure of U.S. commercial banks to residential real estate during 2005 with exposure levels at the height of state housing booms in the 1980s and 1990s, and offer conclusions.

THE RECENT BOOM

Since 2000, U.S. house prices have risen rapidly relative to conventional measures of fundamentals, such as rents and household income. Rental rates, or a measure of the rental-equivalent for owner-occupied housing, represent the flow of income (or services) derived from ownership of a house. Rent is thus analogous to the dividends one receives from ownership of corporate stock. Many analysts argue that house prices and rents should grow at similar rates over the long term. Similarly, house prices are often measured against personal or household income under the presumption that the growth rates of house prices and income cannot diverge for long periods.

Three common relative measures of the growth of U.S. house prices are plotted in Figure 1: (i) the OFHEO repeat sales house price index (HPI) divided by the consumer price index (excluding the shelter component of the CPI); (ii) the HPI divided by an index of property rental rates; (iii) the HPI divided by median household income. By these measures, house prices broke above their long-run averages in 2000, rose during the 2001 recession, and continued to rise through 2005.¹

¹ Because data on median household income for 2005 are not yet available, Figure 1 shows data on the ratio of HPI to household income through 2004.

U.S. averages fail to convey the considerable variation across markets in the extent to which house prices have risen. In general, prices have risen the most rapidly on the coasts, especially in California and southern Florida markets. Figure 2 illustrates the variation in HPI to income across selected states. Between 2000 and 2004, the standard deviation of HPI to median household income across all states nearly doubled.

Economists disagree about whether house prices have become “too high” relative to fundamentals, even in markets that have seen exceptional price appreciation. Although conventional measures suggest that U.S. house prices are overvalued in many markets, carrying costs have fallen, mainly because of a decline in long-term real interest rates.² Still, historically, price/income and price/rent ratios have exhibited long-run mean reversion (Gallin, 2004; Malpezzi, 1999). In this environment, many observers believe that an increase in long-term interest rates would exert considerable downward pressure on house prices, which could have substantial negative impacts on lenders and economic activity in general.³

HOUSING BUSTS OF THE PAST

The United States has not experienced a large, nationwide decline in nominal house prices since the Great Depression of the 1930s. Several cities and a few states have experienced large declines in recent memory, however, as have some countries.⁴

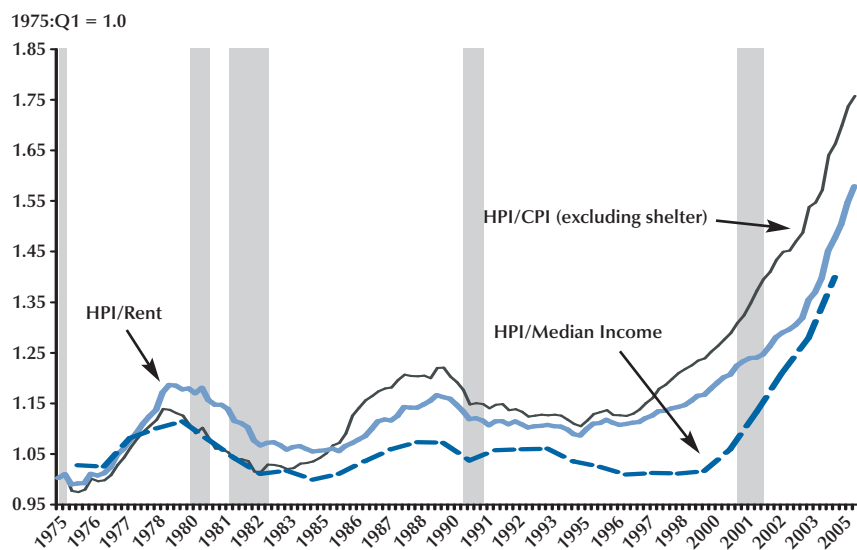
² See Himmelberg, Mayer, and Sinai (2005) for more on the deficiencies of conventional measures and an attempt at a more accurate measurement of the fundamentals. In addition, the HPI has various shortcomings (as do alternative measures), and some alternative aggregate measures of house prices show less appreciation.

³ Case, Quigley, and Shiller (2001) estimate the effects of changes in housing market and financial market wealth on household consumption using data for U.S. states and for 14 developed countries. They find that changes in housing wealth have a much larger impact on consumption than do changes in stock market wealth. Similarly, Helbling and Terrones (2004) find that large declines in house prices have typically led to larger declines in economic activity than have large declines in equity prices.

⁴ Girouard et al. (2006) and the International Monetary Fund (2003) examine the recent rapid appreciation of house prices in many countries and house price cycles that have occurred since 1970.

Figure 1

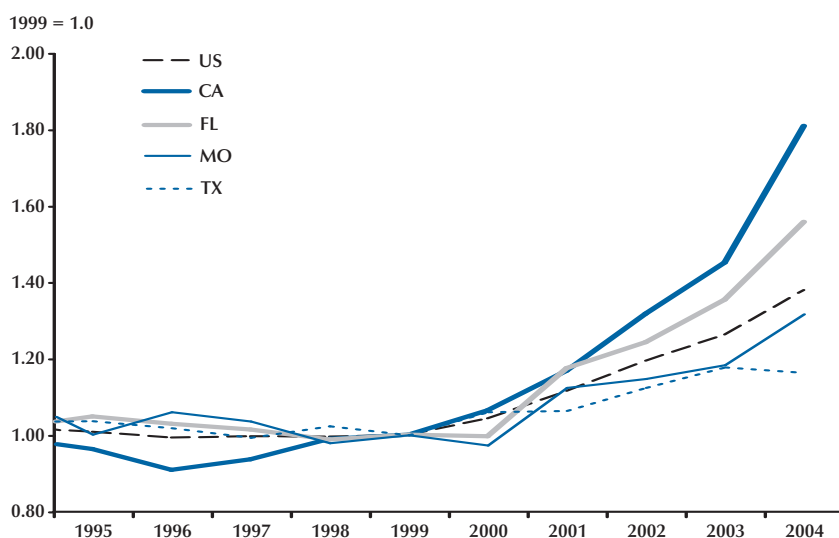
Real Price of Housing, Price/Rent, Price/Median Income, 1975:Q1-2005:Q3



NOTE: National Bureau of Economic Research–dated recessions are shaded in gray.

Figure 2

HPI/Median Household Income: U.S. and Selected States: 1995-2004



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A historical perspective is necessarily restricted to the fairly recent past because comprehensive data on house prices are not available before the 1970s. Nevertheless, the past 30 years contains a rich history of housing booms and busts among U.S. states and cities. Here, I focus on large movements in house prices—measured using the state-level, repeat-sales HPI produced by the OFHEO—that occurred between 1980 and 1999.⁵

First, I sought to determine whether episodes of rapid house price appreciation (“booms”) are typically followed by large declines in nominal house prices (“busts”) and whether large declines are typically preceded by large appreciations. Empirically, I define a “boom” as an increase in the ratio of HPI to state per capita income (HPI/PCY) of at least 7 percent (annual rate) for three or more consecutive quarters. For the United States as a whole, HPI/PCY increased at a 6.2 percent rate during the year ending 2005:Q1 and at an average 5.4 percent annual rate during 2001:Q1–2005:Q1. Seventeen states experienced annualized HPI/PCY growth rates of at least 7 percent for three or more quarters between 2001 and 2005.⁶

U.S. states experienced 20 house price booms (i.e., annualized HPI/PCY growth of at least 7 percent for three or more quarters) between 1980 and 1999. Table 1 lists these episodes and the average annualized growth rate of HPI/PCY during each episode. For booms that were followed by a fall in nominal house prices, the table also identifies the quarter in which the HPI reached its peak and the subsequent percentage decline in the index.⁷ Some booms were not followed by a decline in nominal HPI, but simply by a slowing of the rate of growth of HPI/PCY to under 7 percent. In these cases, the columns labeled “HPI Peak” and “Subsequent Decline in HPI” are not applicable (“N/A”).

⁵ The HPI begins in 1975, but data before about 1980 are very noisy, especially for smaller states.

⁶ Arguably, it would be preferable to measure house prices against household income. However, annual, state-level household income data are not available prior to 1984.

⁷ The nominal HPI peak usually occurred in the same quarter as the HPI/PCY peak. The percentage decline in nominal HPI is from the HPI peak quarter to the quarter in which the HPI reached its low point before a subsequent peak.

Of the 20 booms listed in Table 1, ten were followed within a few quarters by a decline in the nominal HPI of at least 5 percent and nine were followed by declines of more than 10 percent. The other ten booms were followed by periods of either slowly rising or flat house prices. Apparently, the adage that “what goes up, must come down,” does not always apply to the housing market.

I define a “bust” as a decline in *nominal* HPI of at least 10 percent over a period of four or more quarters from an HPI peak to an HPI trough.⁸ I define housing busts in terms of nominal HPI, rather than HPI/PCY or some other relative measure, because mortgage loans are contracted for nominal amounts. Thus, a decline in nominal house prices necessarily produces a decline in household wealth, which will more likely increase loan default rates than a decline in relative house prices that occurs without a decline in nominal prices.

To identify HPI peaks and troughs, I first identified all index observations that equaled the maximum or minimum values of the index within a rolling, nine-quarter window. I then eliminated all but the highest of any consecutive maximums and lowest of any consecutive minimums, to ensure that peaks and troughs alternate, and computed the percentage decline in the HPI between the remaining peaks and troughs.

Between 1980 and 1999, there were 17 instances in which a state experienced a nominal HPI decline of at least 10 percent over four or more quarters. Table 2 presents information about each bust, which I list in four groups. For each episode, the table lists the date of the HPI peak (which I define as the start of the bust) and the percentage decline in the HPI to its subsequent minimum point (which I define as the end of the bust). The table also indicates whether a bust was preceded by a boom, defined, as above, as three or more consecutive quarters of HPI/PCY growth of at least 7 percent. I also report the total number of quarters (not necessarily consecutive) in which

⁸ I impose the requirement that busts occur over at least four quarters because the HPI's for a few small states exhibit considerable volatility, especially in early years, with large declines in the index in some quarters followed immediately by large increases in the next quarter. By focusing on HPI declines lasting at least four quarters, I avoid defining such volatility as booms or busts.

Table 1
State House Price Booms, 1980-99

State	Boom period*	Average growth in HPI/PCY [†] (%)	HPI peak	Subsequent decline in HPI [‡] (%)
AK	1981:Q2–1982:Q3, 1984:Q1	8.7	1984:Q3	43.7
AK	1990:Q3–1991:Q2, 1991:Q4	11.3	N/A [§]	N/A
CA	1988:Q2–1990:Q1	11.9	1990:Q3	14.4
CO	1994:Q1–1994:Q3	7.7	N/A	N/A
CT	1985:Q2–1987:Q4	12.5	1988:Q2	20.7
DE	1986:Q4–1987:Q2	7.8	1993:Q2	3.1
HI	1988:Q3–1992:Q2	11.3	1994:Q3	17.8
MA	1984:Q1–1987:Q2	11.7	1989:Q4	12.2
ME	1985:Q4–1987:Q4	7.9	1989:Q4	11.6
MI	1987:Q1–1987:Q3	8.1	N/A	N/A
MT	1983:Q4–1984:Q2	9.4	1984:Q1	13.1
MT	1994:Q1–1994:Q4	9.7	N/A	N/A
NH	1985:Q2–1987:Q2	12.0	1989:Q4	22.1
NJ	1985:Q3–1987:Q4	12.2	1988:Q3	7.8
NY	1985:Q1–1987:Q3	10.3	1989:Q4	4.7
OR	1990:Q2–1991:Q1	8.5	N/A	N/A
PA	1987:Q1–1988:Q2	8.1	N/A	N/A
RI	1985:Q4–1988:Q1	15.7	1989:Q4	14.1
UT	1993:Q3–1994:Q4	9.9	N/A	N/A
WA	1989:Q4–1990:Q4	12.5	N/A	N/A

NOTE: *Quarters in which year-over-year percentage increase in HPI/PCY exceeded 7 percent. [†]Average year-over-year percentage increase in HPI/PCY from first quarter in which growth exceeded 7 percent to the last quarter of HPI/PCY growth in excess of 7 percent, including any intervening quarters in which growth was below 7 percent. [‡]Percentage decline in nominal HPI from the quarter in which the nominal HPI reached its peak to the quarter in which HPI reached its low value before a subsequent peak; the quarter of the nominal HPI peak was frequently the same quarter that HPI/PCY peaked. [§]Not applicable; these booms were not followed by a decline in nominal HPI, but simply a decline in the growth rate of HPI/PCY to less than 7 percent.

HPI/PCY grew at an annual rate of at least 7 percent during the 24 quarters before each bust.⁹ Ten busts were preceded by a boom.¹⁰ Finally, I also report data on HPI/PCY and the ratio of HPI to median household income (HPI/HY) in the quarter of the HPI peak preceding each bust.¹¹ For comparison, I also present recent levels of HPI/PCY

and HPI/HY (2005:Q1 for HPI/PCY and 2004 for HPI/HY).

The house price busts of Iowa, Michigan, West Virginia, and Wisconsin (and to a lesser extent of other Midwestern states) occurred during the recessions of 1980 and 1981-82.¹² Both farm

⁹ Most busts occurred after several quarters of stagnant house prices, rather than immediately after a period of rapidly rising prices.

¹⁰ The case of Montana was unusual among the ten busts in that the state's nominal HPI peak occurred in the second of the three consecutive quarters of HPI/PCY growth in excess of 7 percent (1983:Q4–1984:Q2). In all other cases, the HPI peak came after the period of rapid HPI/PCY growth.

¹¹ State-level data on median household income are not available before 1984.

¹² Other states that experienced declines in nominal house prices at this time include Missouri (–7.9 percent), Nebraska (–5.0 percent), and Ohio (–5.4 percent). North Dakota and South Dakota also appear to have experienced large house price declines, but the HPIs for both states exhibit too much volatility to measure the size of their declines.

Table 2**State House Price Busts, 1980-99****A. Early-1980s farm and Rust Belt collapse**

State	IA	MI	WI	WV
HPI peak quarter	1980:Q3	1981:Q3	1980:Q3	1981:Q2
HPI % decline	14.4	11.2	18.4	29.5
Boom before bust?	No	Yes	No	No
Quarters before bust that HPI/PCY growth exceeded 7 percent	0	4	0	0
Peak HPI/PCY	1.121	1.017	1.077	1.605
HPI/PCY 2005:Q1	0.726	0.977	0.917	0.814
Peak HPI/HY	N/A	N/A	N/A	N/A
HPI/HY 2004	0.53	0.74	0.65	0.64

B. Mid-1980s drop in energy prices

State	AK	LA	MT	OK	TX	WY
HPI peak quarter	1984:Q3	1983:Q2	1984:Q1	1983:Q4	1986:Q2	1982:Q4
HPI % decline	43.7	16.4	13.1	26.3	15.7	38.1
Boom before bust?	Yes	No	Yes	No	No	No
Quarters before bust that HPI/PCY growth exceeded 7 percent	7	2	3	1	0	3
Peak HPI/PCY	0.777	1.216	1.060	1.085	1.093	0.926
HPI/PCY 2005:Q1	0.656	0.721	1.041	0.627	0.613	0.606
Peak HPI/HY	0.46	0.61	0.59	0.56	0.56	N/A
HPI/HY 2004	0.41	0.56	0.87	0.45	0.47	0.47

and so-called “Rust Belt” states, whose incomes derive relatively heavily from older manufacturing industries, such as automobiles and steel, suffered large income declines during these two recessions. During 1980-82, Iowa, Wisconsin, West Virginia, and Michigan ranked 42nd, 44th, 45th, and 50th, respectively, among all states in real personal income growth, and 45th, 40th, 48th, and 50th in employment growth. None of the states experienced a particularly large increase in house prices before its bust. Among them, only Michigan experienced any quarters of HPI/PCY growth above 7 percent before house prices started to fall.

The second wave of state house price busts was associated with a sharp decline in energy prices. After rising rapidly during the 1970s, the price of oil peaked in mid-1980 at almost \$40 per

barrel. The price of oil then declined to about \$30 per barrel in 1982-84, before plunging to a low of under \$12 in 1986. Although real personal income grew at an average annual rate of 0.97 percent during 1985-87 for the United States as a whole, Alaska, Louisiana, Montana, Oklahoma, Texas, and Wyoming experienced far slower growth rates of -0.29 percent, -0.19 percent, 0.10 percent, -0.19 percent, 0.43 percent, and -0.61 percent.

Among the six energy-producing states that had large declines in nominal house prices, only Alaska and Montana experienced house price booms before their busts. Several of the states witnessed rapid rates of both residential and non-residential construction, however, which some analysts argue contributed to the subsequent collapse of real estate values (Hanc, 1998).

Table 2, cont'd**State House Price Busts, 1980-99****C. New England real estate crash**

State	CT	MA	ME	NH	RI
HPI peak quarter	1988:Q2	1989:Q4	1989:Q4	1989:Q4	1989:Q4
HPI % decline	20.7	12.2	11.6	22.1	14.1
Boom before bust?	Yes	Yes	Yes	Yes	Yes
Quarters before bust that HPI/PCY growth exceeded 7 percent	11	14	7	9	10
Peak HPI/PCY	1.140	1.534	1.477	1.298	1.421
HPI/PCY 2005:Q1	0.895	1.590	1.498	1.219	1.550
Peak HPI/HY	0.78	0.95	0.94	0.74	0.88
HPI/HY 2004	0.75	1.26	1.08	0.79	1.11

D. Early-to-mid 1990s defense cutbacks and Japanese financial crisis

State	CA	HI
HPI peak quarter	1990:Q3	1994:Q3
HPI % decline	14.4	17.8
Boom before bust?	Yes	Yes
Quarters before bust that HPI/PCY growth exceeded 7 percent	8	12
Peak HPI/PCY	1.072	1.155
HPI/PCY 2005:Q1	1.450	1.245
Peak HPI/HY	0.69	0.72
HPI/HY 2004	1.03	0.72

In contrast with the house price busts of the first two groups of states, which for the most part did not follow booms, all of the busts among the states in the third and fourth groups did follow booms. States that had busts in the late 1980s and early 1990s have higher population densities and generally less land available for new construction around their principal cities than states that experienced busts in the early-to-mid 1980s. These differences might explain why the states in the third and fourth groups experienced rapid house price appreciation before their declines when states in the first and second groups did not. Interestingly, most of the states in the third and fourth groups have experienced rapid growth in HPI-to-income measures since 2000; and, as of 2005:Q1, several had price-to-income ratios that

equaled or exceeded the levels reached before their earlier house price busts.

New England experienced rapid growth of income and employment, and a real estate boom, during the national recovery from the 1981-82 recession and subsequent expansion. The New England economy slowed toward the end of the decade, however, when cuts in federal defense spending and increased competition in the computer industry had a disproportionately large impact on the region.¹³ Among U.S. census regions, New England experienced the largest decline in real personal income during the recession of 1990-91, with an average annual growth rate of -1.02 percent, compared with an average

¹³ Federal Deposit Insurance Corporation (FDIC, 1997, p. 340).

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of -0.40 percent for the United States as a whole. Although forces external to New England triggered the region's real estate downturn, many analysts concluded that real estate prices had risen faster than could be justified by fundamentals during the boom, which exacerbated the subsequent collapse.¹⁴

California's experience was similar to that of New England. The state's economy expanded rapidly in the 1980s, but began to slow when federal defense expenditures were cut toward the end of the decade. Continued strong demand for civilian aircraft and increased NASA expenditures offset the impact of defense spending cuts for a time, as did the greater diversity of the northern California economy. Commercial and residential real estate prices plunged, however, when the recession finally took hold.¹⁵ California experienced a larger decline in economic activity during the 1990-91 recession than did the United States as a whole, with an average real personal income growth rate of -0.67 percent, compared with the U.S. average rate of -0.40 percent.

Hawaii was the last state to experience a house price bust in the 1990s. A strong state economy and heavy buying by Japanese investors contributed to a rapid appreciation of Hawaii's real estate from the late 1980s through 1991. HPI/PCY rose at a rate in excess of 7 percent over 12 consecutive quarters between 1988 and 1991. Hawaii's boom ended when Japan's stock and real estate markets collapsed and the U.S. economy was struggling to recover from the 1990-91 recession (Ablan, 2004).

House Price Busts, Income Growth, and Banking Conditions

A systematic examination of real economic activity and banking conditions during each of the 17 large declines in nominal HPI listed in Table 2 reveals common characteristics of these events, especially about the timing of changes in economic activity and banking conditions during bust episodes. The following are some general observations:

- House price declines typically followed an economic shock, such as a decline in commodity prices, a cutback in government expenditures, etc., and frequently came after a period of rising interest rates. HPI peaks usually coincided with or followed declines in state personal income growth and other measures of general economic activity.
- House prices often continued to fall after economic activity had begun to recover.
- Banks experienced loan losses and falling net income after house prices started to decline. Bank holdings of nonperforming loans and "other real estate owned" (a measure of foreclosed property) typically rose sharply about eight quarters after an HPI peak. Most states also experienced an increase in bank and thrift failures at this time.¹⁶

Figures 3 through 6 illustrate these patterns for the case of Massachusetts, which is somewhat representative. Massachusetts and other New England states experienced a classic real estate boom/bust cycle and banking crisis. After increasing rapidly over the preceding six years, Massachusetts house (and other real estate) prices reached a plateau in early 1989 and peaked in the fourth quarter of that year. State personal income growth declined a few quarters before house prices peaked and became negative in the first quarter of 1989 (Figures 3 and 4). Massachusetts experienced a deeper and slightly longer decline in real personal income during the 1990-91 recession than did the United States as a whole. After falling some 12 percent, nominal house prices reached a low point in 1992:Q2, two quarters after real personal income had begun to rise.

Massachusetts banks experienced heavy losses and numerous failures as a result of real estate loan defaults, and the aggregate return on equity (ROE) of the state's banks was below the national average for six quarters beginning in 1989:Q4

¹⁴ See FDIC (1997, Chap. 10) and references therein.

¹⁵ California's experience is described in FDIC (1997, Chap. 11).

¹⁶ Thrift institutions include savings and loan associations, savings banks, and similar depository institutions. Data on bank and thrift failures are available on the website of the Federal Deposit Insurance Corporation: www.fdic.gov.

Figure 3

Massachusetts Housing Bust and Real Personal Income Growth (year-over-year)

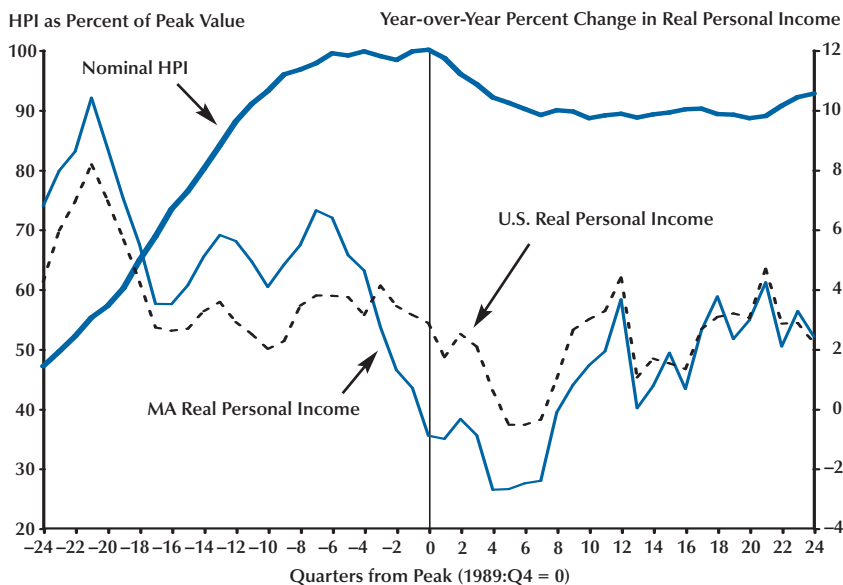


Figure 4

Massachusetts Housing Bust and Real Personal Income Growth (annualized percent change)

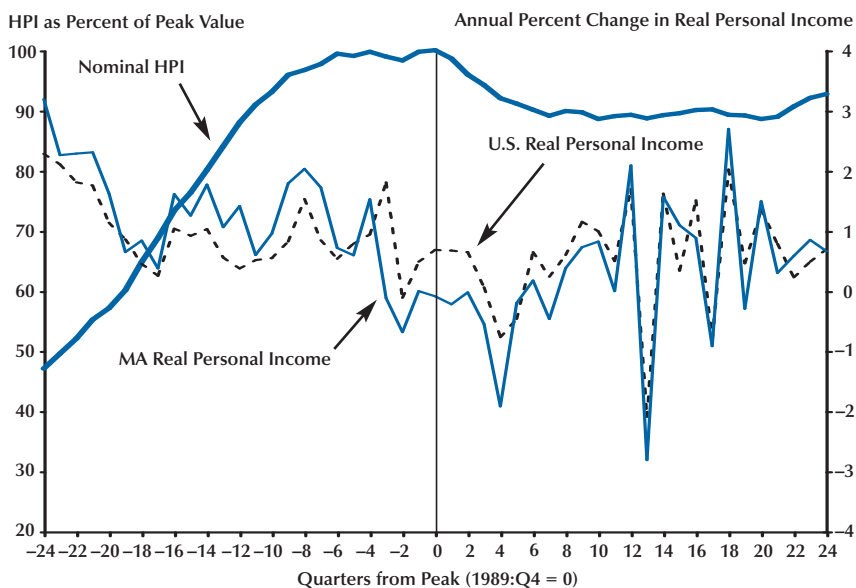


Figure 5

Massachusetts Housing Bust and Bank Return on Equity

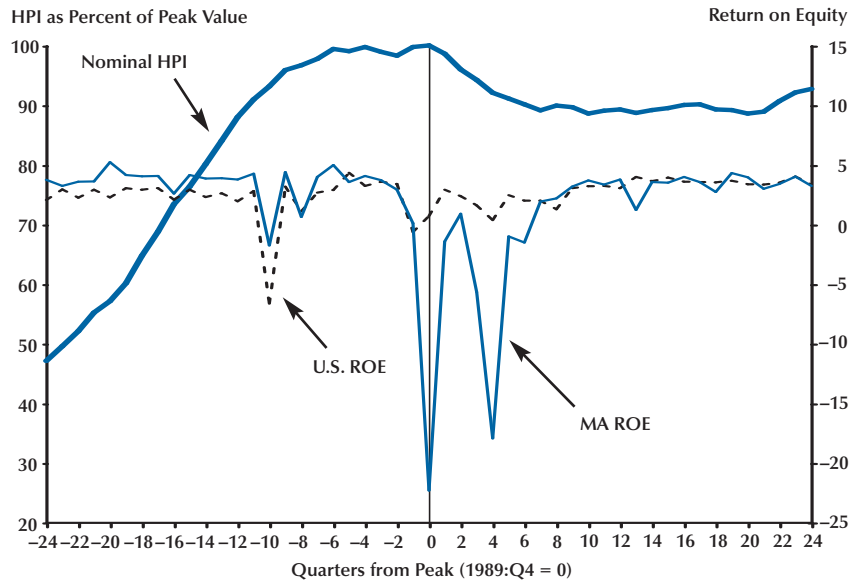
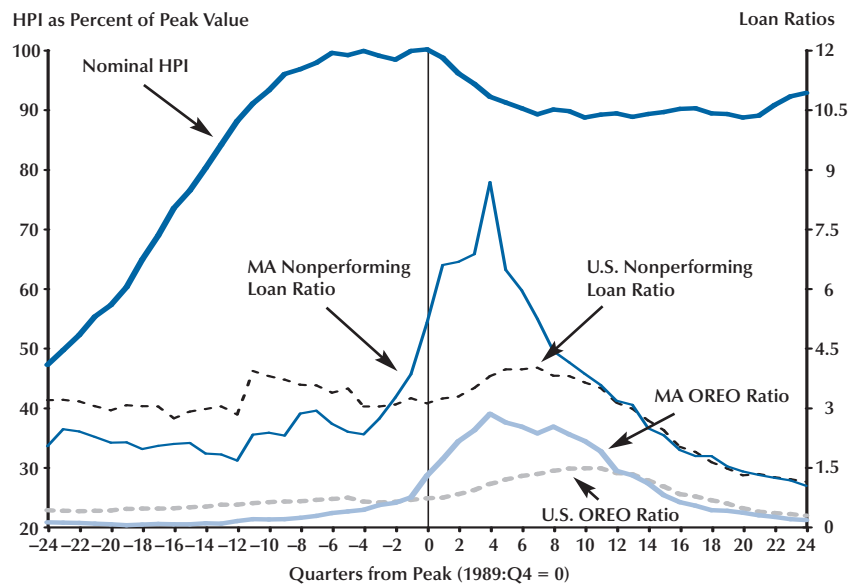


Figure 6

Massachusetts Housing Bust and Bank Loan Performance



(Figure 5). Typical of banks in other states with sharp declines in real estate prices, Massachusetts banks experienced a large increase in nonperforming loans and other real estate owned (OREO, which reflects foreclosures) as a percentage of total assets, peaking four quarters after house prices had begun to decline (Figure 6). Massachusetts experienced a surge in bank failures. Although just one Massachusetts bank failed in 1989, seven failed in 1990, 14 failed in 1991, and 16 failed in 1992. These 38 failures represented 37 percent of the total number of Massachusetts banks in operation at the end of 1988.¹⁷

The patterns illustrated in Figures 3 through 6 do not, of course, indicate whether the decline in house prices contributed to the decline in real personal income. Loan losses eroded bank capital and impaired the ability of financial institutions to extend credit, however, suggesting that a “capital crunch” may have contributed to the decline in economic activity.¹⁸ Indeed, then-Federal Reserve Chairman Alan Greenspan (2004) blamed “financial headwinds” associated with the weak capital positions of U.S. banks for the unusually slow recovery of the U.S. economy from the recession of 1990-91.

ARE FINANCIAL INSTITUTIONS CURRENTLY VULNERABLE TO A HOUSE PRICE COLLAPSE?

Various measures suggest that U.S. banks have become increasingly exposed to residential real estate since 2000.¹⁹ Two measures are plotted in Figures 7 and 8. The first plots quarterly

observations on the stock of bank loans on 1- to 4-family residential property plus the market value of bank holdings of mortgage-backed securities (excluding those issued or guaranteed by a U.S. government agency or enterprise), all divided by total U.S. commercial bank assets. The second plots the stock of untapped home equity lines at banks divided by total bank assets. Both figures show that as a percentage of total assets, banks’ exposure to residential real estate increased substantially over the five years ending in 2005:Q1.²⁰

These simple exposure measures indicate little, however, about whether banks have become more vulnerable to a decline in house prices. Without information about the risks of specific assets held by banks, one cannot determine definitively how vulnerable banks are to a decline in house prices. However, alongside the large increase in the size of bank residential real estate portfolios has been a substantial increase in bank equity-capital relative to total bank assets. The greater a bank’s capital, the larger the amount of loan defaults and other declines in asset value it can withstand before becoming insolvent. Because capital serves as a cushion against loan and security losses, the increase in real estate loans and securities as a share of bank assets is probably less worrisome than it otherwise would have been.

Of course, banks might have increased their capital in recent years to compensate for increased risks in their real estate loan portfolios or other assets. Still, banks in general have a larger cushion against possible losses now than they did at the end of the 1990s. Between 1999:Q1 and 2005:Q1, capital increased from 8.5 percent of total bank assets to 9.9 percent of total assets, as illustrated in Figure 9. Hence, banks’ exposure to residential real estate as a fraction of total capital, which is illustrated in Figure 10, increased much less dramatically than did exposure as a fraction

¹⁷ Massachusetts also had 28 unassisted bank mergers between 1989 and 1992, and the number of banks in the state declined from 103 at the end of 1988 to 61 at the end of 1992 (FDIC web site: www2.fdic.gov/hsob/hsobRpt.asp).

¹⁸ Peek and Rosengren (1992) present evidence of a capital crunch (i.e., a reduction in the supply of loans associated with impaired capital) among New England banks.

¹⁹ Of course, many other financial intermediaries are involved in the mortgage market, including thrifts, private mortgage insurers, and government-sponsored enterprises, such as Fannie Mae and Freddie Mac. I focus here on commercial banks because they are more central to the monetary transmission mechanism and payments system and because comparable historical data on other intermediaries are less complete.

²⁰ Broader measures that include all residential real estate bank loans show similar trends. The stock of bank loans on 1- to 4-family residential property plus the market value of bank holdings of mortgage-backed securities (excluding those issued or guaranteed by a U.S. government agency or enterprise) is computed as the sum of the following items from the reports of income and condition (call reports) that banks file quarterly with federal banking authorities: RCON1430, RCFD0409, RCFD1710, RCFD1713, RCFD1734, and RCFD1736. Total bank assets is call report item number RCFD1710. Untapped home equity lines of credit is item number RCFD3814.

Figure 7

Residential Real Estate Exposure/Assets, U.S. Bank Average, 1994:Q1-2005:Q1

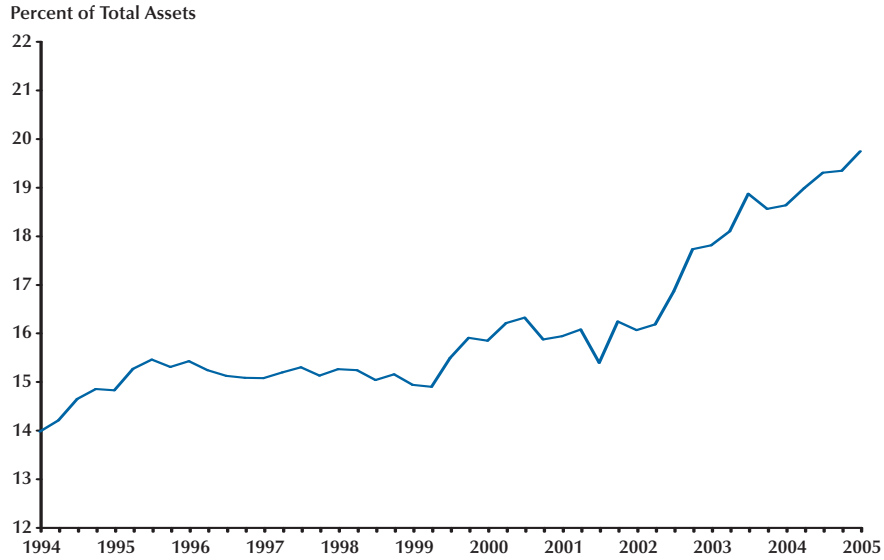


Figure 8

Home Equity Lines Not Drawn, U.S. Bank Average, 1994:Q1-2005:Q1

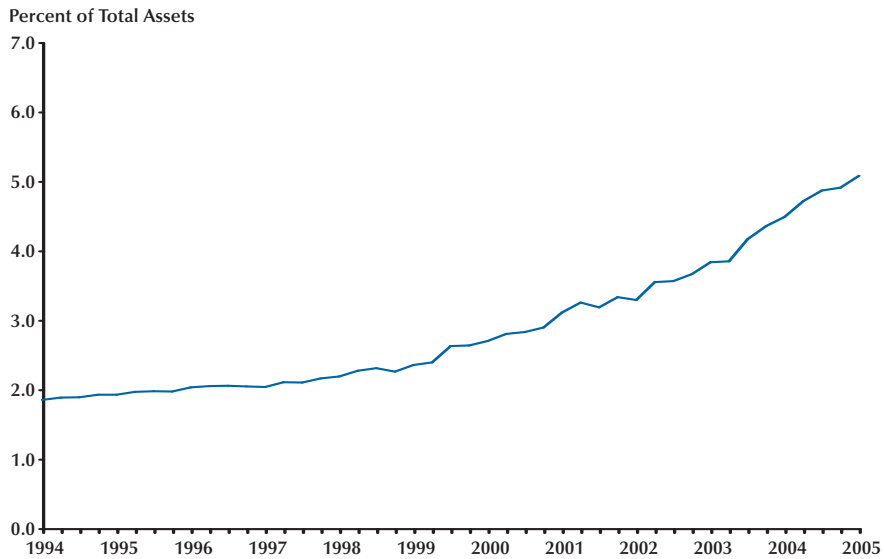


Figure 9

Capital/Assets, U.S. Bank Average, 1980:Q1-2005:Q1

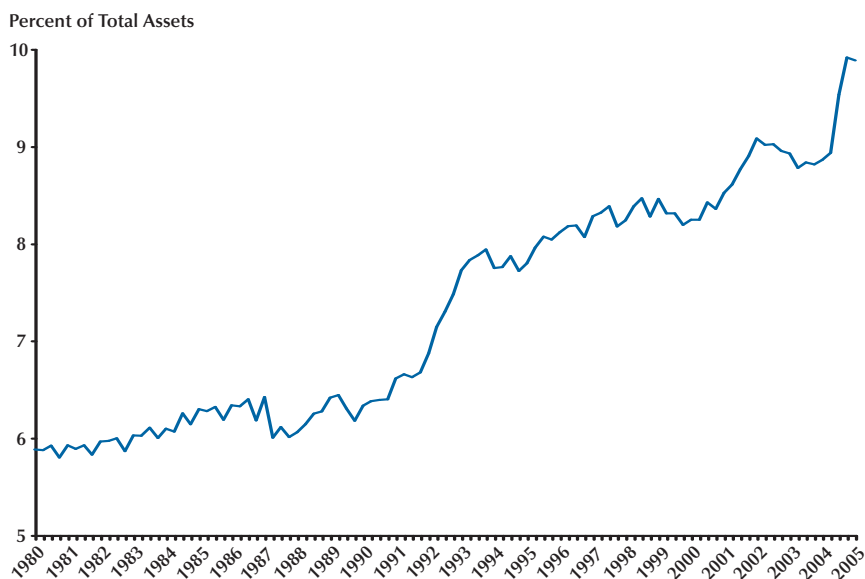


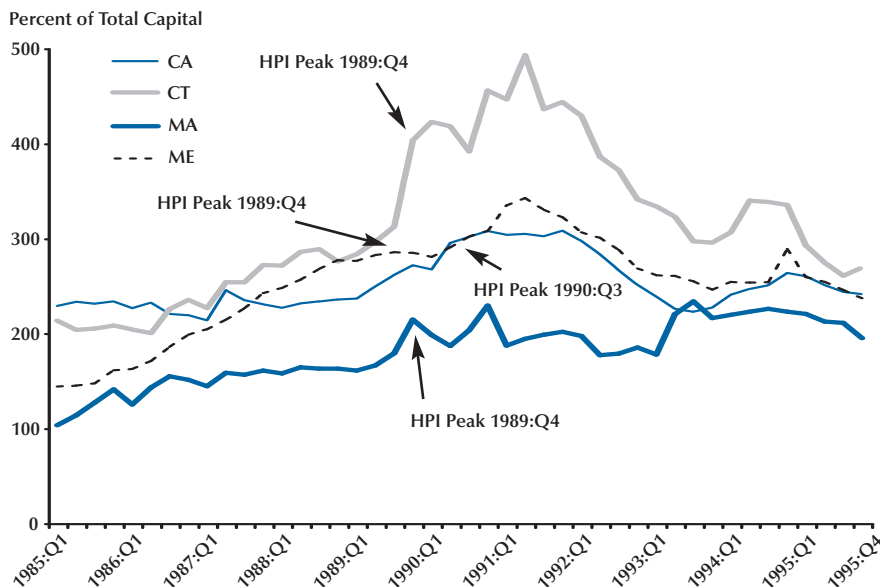
Figure 10

Residential Real Estate Exposure/Capital, U.S. Bank Average, 1994:Q1-2005:Q1



Figure 11

Residential Real Estate Exposure/Capital, Selected States, 1985:Q1-1995:Q4



of total bank assets. As of 2005:Q1, U.S. banks held about \$2 of 1- to 4-family residential real estate loans and non-government-issued or non-government-guaranteed mortgage-backed securities for every \$1 of capital, roughly 8 percent more than in the late 1990s.

The U.S. banking industry today is considerably better capitalized than it was in the 1980s and early 1990s. Interstate branching, which has been permitted only since 1997, makes cross-state comparisons of bank exposure to real estate (as well as other measures of bank condition) less meaningful today than in the late 1980s and early 1990s.²¹ As a whole, however, U.S. banks currently are less exposed to residential real estate than were banks located in most states that had large house price declines in the late 1980s and early 1990s.

Figure 11 plots residential real estate exposure as a percentage of bank capital from 1985:Q1 to 1995:Q4 for banks located in four states that suf-

fered a large decline in house prices in the early 1990s. The quarter in which the HPI attained its peak in each state is marked on the figure. In 2005:Q1, U.S. commercial bank holdings of 1- to 4-family residential real estate loans and non-government-issued or non-government-guaranteed mortgage-backed securities totaled 200 percent of aggregate bank capital. Massachusetts banks had a comparable level of residential real estate exposure, at 214 percent of capital, when the state HPI peak was reached in 1989:Q4. Massachusetts banks were, however, considerably more exposed to nonresidential real estate in 1989 than U.S. banks were in 2005. For example, the total real estate loans of Massachusetts banks in 1989:Q4 equaled 551 percent of bank capital, whereas the total real estate loans of U.S. banks as a whole in 2005:Q1 equaled 308 percent of bank capital.

The other three states for which data are shown in Figure 11 all had considerably greater exposure to residential real estate at their HPI peaks than did U.S. banks in 2005:Q1. Banks of most other northeastern states that experienced

²¹ The Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 permitted interstate branch banking as of 1997.

Table 3**Commercial Bank Residential Real Estate Exposure by Asset Quartile, 2005:Q1**

Quartile*	Exposure/assets [†]	HELC/assets [‡]	Capital/assets [§]	Exposure/capital [¶]
1	0.15	0.01	0.13	1.14
2	0.17	0.01	0.11	1.62
3	0.18	0.02	0.10	1.82
4	0.20	0.05	0.10	2.02

NOTE: *Quartiles 1 through 4 consist, respectively, of banks with less than \$53 million, \$53 to \$106 million, \$106 to \$238 million, and more than \$238 million of assets. [†]The stock of loans on 1- to 4-family residential property plus the market value of bank holdings of mortgage-backed securities (excluding those issued or guaranteed by a U.S. government agency or enterprise), all divided by total assets for all banks in the given quartile. [‡]The stock of untapped home equity lines of credit divided by total assets for all banks in the given quartile. [§]The ratio of tier-1 equity-capital to assets for all banks in the given quartile. [¶]The stock of loans on 1- to 4-family residential property plus the market value of bank holdings of mortgage-backed securities (excluding those issued or guaranteed by a U.S. government agency or enterprise), all divided by total equity-capital for all banks in the given quartile.

large declines in house prices in the early 1990s had similarly high exposure levels.²² Thus, U.S. banks today are, on the whole, less exposed to residential real estate than were banks located in states that experienced large declines in residential real estate prices in the early 1990s. This suggests that a decline in house prices today of a size comparable to those experienced by New England states or California in the early 1990s would have less impact on the U.S. banking system than it did on New England banks in the early 1990s.

Aggregate exposure measures do not, of course, reveal the extent of variation across banks. In general, large banks tend to have more exposure to residential real estate, and also hold less capital as a percentage of total assets, than small banks. Table 3 presents data for 2005:Q1 on residential real estate exposure and capital-to-asset ratios for banks in each asset-size quartile. Residential real estate exposure is lowest and the aggregate capital-to-asset ratio is highest for banks in quartile 1, which comprises the smallest 25 percent of U.S. banks in terms of total assets. Across suc-

cessive quartiles, exposure rises and capital-to-assets ratios fall.²³

On the surface, the negative association between residential real estate exposure and capital-to-assets ratios across quartiles might suggest that larger banks are generally more vulnerable to a decline in residential real estate prices than small banks. Without information about the specific loans and securities that comprise a bank's portfolio, however, one cannot judge how vulnerable a given bank is to a decline in house prices. For example, a bank with a geographically diversified real estate loan portfolio would be less vulnerable to a localized decline in real estate prices than a bank with a less diversified portfolio. Thus, if larger banks are better able to diversify their portfolios than small banks, they could maintain higher ratios of real estate loans to capital without necessarily being more vulnerable to a decline in real estate prices. Similarly, if larger banks are more adept at hedging portfolio risk through the use of derivative securities or other means, they could operate with lower capital-to-asset ratios than smaller banks without being any more vulnerable to a decline in real estate markets.

²² Among states that had large house price declines, ratios of 1- to 4-family residential property loans plus non-government-issued or non-government-guaranteed mortgage-backed securities to total bank capital were as follows (HPI peak quarter): CA, 3.01 (1990:Q3), CT, 4.03 (1989:Q4), MA, 2.14 (1989:Q4), ME, 3.07 (1989:Q4), NH, 3.18 (1989:Q4), NJ, 2.68 (1988:Q3), RI, 1.71 (1989:Q4). As of 2005:Q1, the ratio for U.S. banks was 2.00.

²³ Quartiles 1 through 4 consist, respectively, of banks with total assets of less than \$53 million, between \$53 million and \$106 million, between \$106 million and \$238 million, and more than \$238 million.

CONCLUSION

The rapid increase in U.S. house prices since 2000 has prompted concerns about the possible effects of a sharp decline in house prices on financial institutions and macroeconomic activity. Evidence from other countries suggests that declining house prices, especially when preceded by a period of rapid house price appreciation, can have a marked contractionary impact on macroeconomic activity. This article looks to the experiences of U.S. states for evidence about house price booms and busts. This review finds that house price booms have not always led to busts and that busts do not always follow booms. Sharp declines in nominal house prices in farm and manufacturing states in the early 1980s, and in energy-producing states in the mid-1980s, were not generally preceded by periods of rapid house price appreciation. The large declines in house prices experienced in New England states, California, and Hawaii in the late 1980s and early 1990s, however, were preceded by extended periods of rapid growth in house prices relative to personal income.

Banking conditions deteriorated markedly in all states that experienced a large decline in nominal house prices during the 1980s or 1990s. Within a few quarters of the start of a decline, banks experienced increased loan defaults and falling income. Several states that had large declines in real estate prices also witnessed increases in bank failures, as well as more severe declines in economic activity than did the United States as a whole. Additional research is required, however, to determine whether either the decline in real estate prices or the deterioration of banking conditions caused state income growth to lag the national average.

U.S. banks, as a whole, have become increasingly exposed to residential real estate since 2000, as reflected in increases in their holding of real estate loans and securities and in the amount of available home equity lines of credit as a percentage of total bank assets. Bank capital has also increased, however, which makes the increase in residential real estate exposure less worrisome than it would otherwise be. Further, a portion of

the residential real estate loans and securities held by banks are guaranteed by third parties, and many banks purchase only highly rated securities that have little credit risk.²⁴

Although they have become more exposed to residential real estate since 2000, U.S. banks as a whole appear considerably less vulnerable to a decline in residential real estate prices than were banks located in states that experienced large house price declines in the late 1980s and early 1990s. Further, the proliferation of interstate branching that has occurred since 1997 suggests that, today, banks in general are probably less vulnerable to local real estate shocks than in the late 1980s and early 1990s.

In sum, U.S. banks seem well positioned to withstand a modest decline in house prices, especially a localized decline. Still, empirical evidence from the United States and other countries indicates that declines in housing wealth can have severe macroeconomic repercussions, especially if banking system capital does become impaired.

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²⁴ Lenders typically purchase insurance against default for mortgages that exceed 80 percent of a home's value from the Federal Housing Administration (FHA), Department of Veterans Affairs (VA), or one of several private mortgage insurance companies. Private mortgage insurance companies as a whole are profitable and have experienced an increase in capital per dollar of assets insured since the mid-1990s, suggesting that they could withstand an increase in claims associated with some decline in the housing market and increase in defaults. See Mortgage Insurance Companies of America (2005).

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