# National and Regional Housing Patterns

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Residential investment is one of the most volatile components of GDP. Coming out of a recession, it is not uncommon for residential investment to jump by more than 20 percent in a year. Going into a recession, it may fall by a similar fraction. Thus, while residential investment accounts for just 4 percent of GDP, it can have a disproportionate influence at critical junctures.

Fluctuations in residential investment can have even greater impact at the regional level. A construction and real estate bust contributed to the severe economic problems suffered by Texas in the mid 1980s. At the same time, a real estate boom in New England propelled that region to extraordinary prosperity. The subsequent bust, as in Texas, brought severe hardship.[1] In both cases, a number of other factors contributed: rapid growth in nonresidential as well as residential construction, problems in key export industries, and the regional banking industries' excessive entanglement in construction and real estate. However, residential investment is generally regarded as having played an important role in both areas' roller coaster rides.

In the 1990s, residential investment followed a more subdued path. Nationally, the number of housing permits authorized in 1999 was still shy of the levels reached in the mid 1980s. However, in some regions, housing permits had surpassed the highs of the 1980s, increases in home prices had picked up at least by some measures, and anecdotes of "mansionization" or the construction of enormous and enormously expensive homes were numerous. Possibly, regional housing markets in the 1990s may not have been quite as serene as the national numbers indicated.

This article compares patterns of residential investment, with a particular emphasis on the similarities and differences between the 1980s and the 1990s in individual regions. Part I briefly examines the national situation. Part II looks at regions. Whereas regional fluctuations in the 1980s varied considerably in magnitude and timing, the regional experi-

ence in the 1990s was more uniform and generally consistent with that nationally. On balance, the picture as of 1999 was fairly reassuring. Although the volume of construction in the Mountain states was high, even relative to that area's rapid population growth, no region seemed to possess the vulnerabilities that characterized New England and Texas in the 1980s. Moreover, the increase in the federal funds rate of 175 basis points between June 1999 and May 2000 may have provided a timely cooling, as most forecasters now expect residential construction to decline modestly in 2000 and 2001.

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Section III compares the geographic pattern of home building in Massachusetts in the late 1990s with that at the peak of the 1980s boom. Statewide, the volume of construction was much lower in the 1990s, but the falloff was particularly pronounced in the larger, more urbanized communities. A number of communities, particularly on Cape Cod, experienced high levels of construction in both periods, and the cumulative effect may help to explain why casual impression suggests a higher level of development than the numbers indicate.

## I. Housing in the National Economy

Residential investment's share of GDP fell from about 6 percent in the early 1960s to 4 percent in the late 1990s (Figure 1). But more striking than any long-term trend is the sharp cyclical movement. Residential investment typically soars in the early stages of expansions and plummets in recessions. In the first year of recovery from the six recessions shown in Figure 1, residential investment, in real terms, increased an average of 20 percent and accounted for approximately 15 percent of the growth in real GDP. Residential investment often continues to grow rapidly for several years before slowing. Sharp decreases in residential investment often mark the onset of a recession, and a year-over-year decrease of 20 percent is not uncommon going into a recession.[2]

These patterns do not always hold. In particular, decreases in residential investment do not always augur a recession. Residential investment fell quite steeply in the winter of 1966–67, and while the overall pace of economic activity slowed in 1967, the expansion continued nonetheless. Residential investment also declined in 1995. This time, too, GDP growth slowed, but subsequently picked up. In both instances, the Federal Reserve reduced interest rates. Rapid growth in residential investment is almost always associated with relatively vigorous growth overall.[3]

### *Components of Residential Investment*

Residential investment has three major components: construction of new single-family homes, construction of new multifamily housing, and "other structures," which consists primarily of improvements and brokers' commissions (Table 1). Construction of new single-family housing units is the largest segment, accounting for roughly half of residential investment. Construction of new housing units in multifamily structures amounted to just 7 percent of residential investment at the end of the 1990s but played a substantially larger role historically, particularly in the early 1970s.

While multifamily construction has dwindled in importance, other structures has grown. The increase is largely due to brokers' commissions, which rose from 7 percent of residential investment in 1974 to 13 percent in 1998. (Brokers' commissions may not fit everyone's concept of investment; but from a homebuyer's perspective, they are part of the cost of acquir-

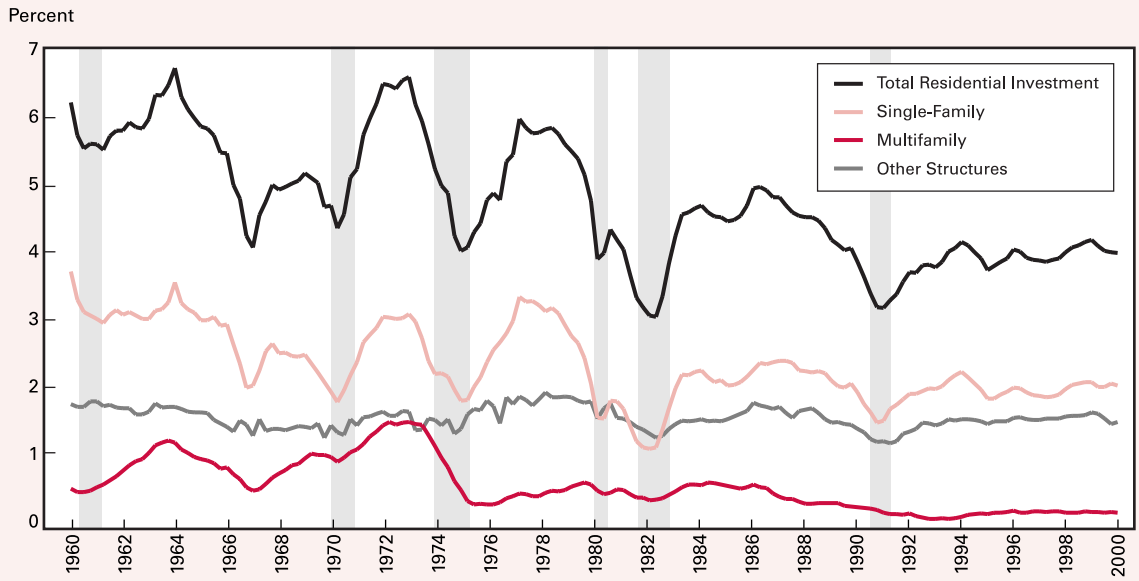
[1] Browne (1992) provides a description and analysis of the construction and real estate-related difficulties of Texas and New England.

[2] Appendix Table 1 presents a regression relating year-over-year percent changes in real GDP to changes in real residential investment in the previous quarter, the federal funds rate, and lagged changes in real GDP. An increase in residential investment of 25 percent provides an impetus to overall economic activity of roughly 0.75 percentage point, while a decrease of 20 percent exerts a drag of over 1 percentage point on GDP in the subsequent quarter.

[3] The recovery in 1971 was something of an exception, as residential construction grew very rapidly, while the overall pace of growth was just moderate for the early stages of a recovery. Federal legislation in 1968 and 1970 facilitated the financing of rental unit construction and homeownership by low-income and moderate-income households (Carliner 1998).

Figure 1

*Residential Investment as a Percent of Real GDP*




Note: Quarterly data in 1996 chain-weighted dollars. Shaded areas indicate NBER-dated recessions.
Source: U.S. Bureau of Economic Analysis, Haver Analytics.

ing a house and, therefore, a capital expenditure.) Improvements have accounted for 20 to 25 percent of residential investment since the early 1970s.

All the major components of residential investment are more volatile than GDP (Table 2). Other structures is the least volatile. As can be seen in Figure 1, other structures tends to move with single-family investment, but the swings are less extreme. Appendix Table 2 presents correlations among the year-over-year percent changes in the three components. Although the correlations among all three are relatively strong, the association between single-family and other structures is tighter than between either of these components and multifamily investment. The latter has, at times, been strongly influenced by changes in federal tax and housing policy. For example, a change to the tax code in 1981 that reduced buildings' depreciable lives encouraged investment in multifamily housing, while changes in 1986 that were intended to curtail use of building investments as tax shelters had a chilling effect. Investment in multiunit housing is positively correlated with investment in nonresidential buildings, while the other two components of residential investment are not.[4]

*Residential investment typically soars in the early stages of expansions and plummets in recessions.*

The table also shows that changes in residential investment are fairly closely correlated with changes in consumption expenditures on furniture and home furnishings. Many of the factors that influence residential investment, such as interest rates, household income, and consumer confidence, also affect the decision to make large consumer expenditures. In addition, the purchase of a house, in itself, probably stimulates purchases of appliances and furniture. Of

[4] Edge (2000) argues that the longer time to plan and build nonresidential structures causes nonresidential investment to respond more slowly to monetary policy than residential investment and that, within residential investment, multifamily housing responds more slowly than single-family housing for the same reason.

Table 1
*Components of Residential Investment*
Percent

| | 1974 | 1978 | 1984 | 1988 | 1994 | 1998 | 1999 |
|---|---|---|---|---|---|---|---|
| Residential investment as a share of GDP | 4.4 | 5.7 | 4.6 | 4.6 | 4.1 | 4.2 | 4.4 |
| Share of residential investment | | | | | | | |
| Structures | 97.1 | 97.9 | 97.4 | 97.4 | 97.6 | 97.7 | 97.8 |
| Single-family structures | 45.0 | 55.3 | 47.6 | 50.2 | 53.8 | 51.4 | 52.0 |
| Multifamily structures | 20.8 | 9.7 | 15.7 | 9.6 | 4.9 | 6.6 | 6.7 |
| Other structures | 31.2 | 32.8 | 34.0 | 37.6 | 38.9 | 39.7 | 39.1 |
| Manufactured homes | 5.0 | 3.6 | 3.5 | 2.2 | 3.3 | 4.1 | |
| Improvements | 20.0 | 20.2 | 22.2 | 25.5 | 24.8 | 22.9 | |
| Dormitories and related | .2 | .1 | .2 | .3 | .1 | .2 | |
| Brokers' commissions | 7.4 | 9.5 | 8.6 | 10.1 | 11.0 | 13.3 | |
| Net purchases of used structures | −1.4 | −.5 | −.6 | −.4 | −.3 | −.8 | |

Note: Calculations are based on current dollar values.
Source: *Survey of Current Business*, April 2000, and *National Income and Product Accounts of the United States, 1*, 1929–94, volume #1, Tables 1.1, 5.4, 5.6.

Table 2
*Volatility of Components of Residential Investment*
Standard deviation of year-over-year percent changes

| | GDP | GDP Excluding Housing | Residential Investment | Single-Family | Multifamily | Other Structures |
|---|---|---|---|---|---|---|
| 1960–99 | 2.3 | 2.0 | 15.5 | 22.6 | 23.2 | 10.5 |
| 1960–69 | 2.1 | 2.1 | 10.7 | 13.6 | 26.6 | 5.8 |
| 1970–79 | 2.7 | 2.4 | 17.4 | 23.3 | 29.6 | 11.5 |
| 1980–89 | 2.6 | 2.2 | 18.7 | 29.9 | 19.8 | 11.2 |
| 1990–99 | 1.5 | 1.3 | 9.5 | 12.2 | 19.0 | 8.6 |

Note: Seasonally adjusted quarterly data in chain-weighted 1996 dollars.
Source: Author's calculations using data from U.S. Bureau of Economic Analysis/Haver Analytics.

relevance to Section II on regional investment patterns, changes in residential investment are closely correlated with changes in housing permits and sales of existing homes.

### *1980s versus 1990s*

By some standards, the expansion in residential investment in the 1980s was not especially large. As a share of GDP, residential investment did not come close to the peaks of the 1960s and 1970s (Figure 1). Neither the number of housing permits authorized nor existing single-family homes sold surpassed the highs of the 1970s (Figure 2). What did distinguish the 1980s housing expansion was the sharpness of the initial recovery from severely depressed levels and the comparatively long period of high residential investment.

The decade began with two back-to-back recessions, which caused real residential investment to fall by more than 40 percent from its peak in 1978 to 1982. In the next two years, however, housing powered back, increasing roughly 60 percent. Residential investment jumped again in 1986, then remained at a high level for the next two years years before falling sharply in 1989.[5] In the two expansions in the 1970s, residential investment grew rapidly until it started to fall, at which point it fell rapidly.

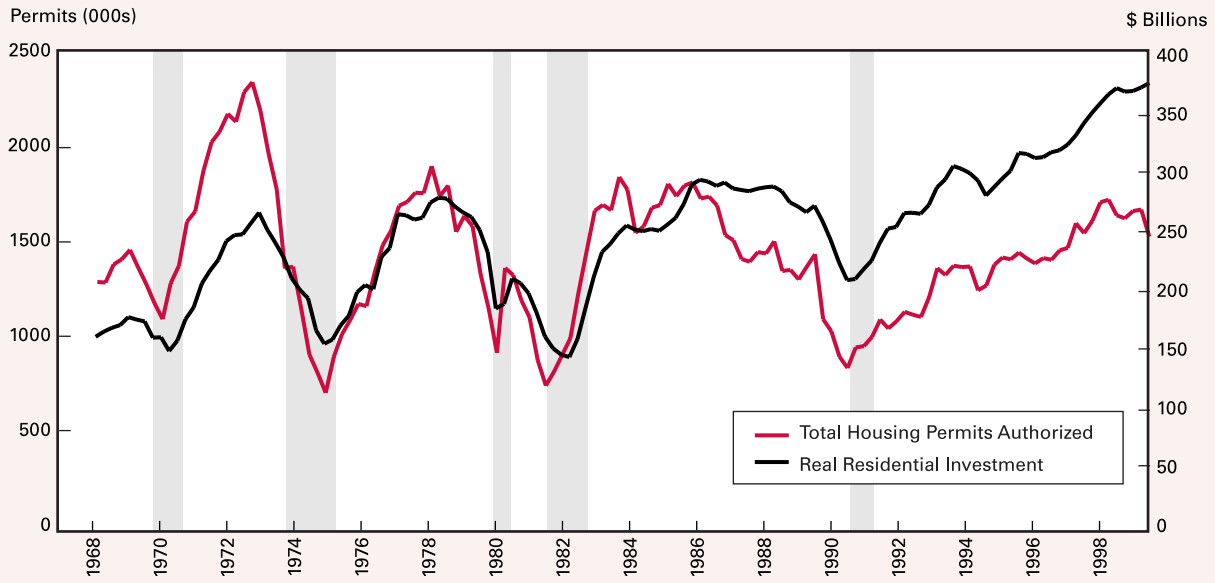
All three components contributed to the swings in residential investment, but multifamily housing played a smaller role than it had in the housing cycles of the 1960s and the early 1970s.[6] Units in multifamily structures still accounted for over 40 percent of total

[5] Real residential investment peaked at $296 billion (1996 dollars) in the third quarter of 1986, but remained at roughly $290 billion through the first quarter of 1989.

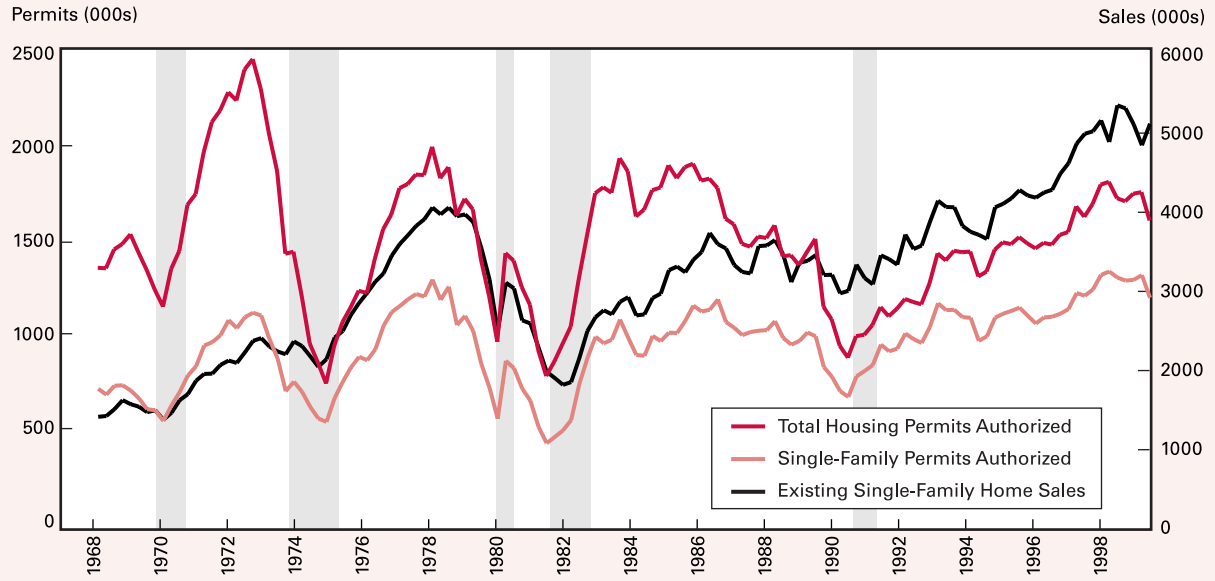
[6] The boom in housing in the second half of the 1970s was also dominated by single-family housing.

Figure 2

*A. Total Housing Permits Authorized vs. Real Residential Investment*




*B. Housing Permits and Sales of Existing Single-Family Homes*




Note: Quarterly data, seasonally adjusted at annual rates. Real residential investment data are 1996 chain-weighted dollars.
Source: National Association of Realtors, U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, Haver Analytics.

housing permits in the first half of the 1980s, but the value per unit was just half that for single-family housing (Table 3). In contrast, investment in other structures accounted for a larger fraction of residential investment in the 1980s than in prior periods, particularly later in the decade.

The pattern of residential investment in the 1990s differed both from that in the 1980s and from previous

Table 3
*Number and Value of U.S. Housing Permits Authorized, Selected Years*

| | 1984 | 1986 | 1988 | 1994 | 1998 | 1999 | Percent Change 1984–99 |
|---|---|---|---|---|---|---|---|
| Total number (000) | 1681.8 | 1769.4 | 1455.6 | 1371.6 | 1612.3 | 1640.2 | |
| Percent single units | 54.8 | 60.9 | 68.3 | 77.9 | 73.7 | 75.1 | |
| Percent of units in multi-unit structures | 45.2 | 39.1 | 31.7 | 22.1 | 26.3 | 24.9 | |
| Average value ($000) | 46.2 | 55.4 | 69.8 | 89.9 | 102.5 | 108.8 | 135.6 |
| Value—single units | 58.9 | 68.4 | 83.3 | 102.3 | 119.8 | 125.9 | 113.8 |
| Value—units in multi-unit structures | 30.7 | 35.1 | 40.7 | 46.1 | 54.2 | 57.3 | 86.5 |

Source: U.S. Bureau of the Census, Manufacturing and Construction Division. Diskette of historical building permits data, by state.

cycles. Once again, the decade began with a recession. Once again, housing fell sharply, although not as much as in the double recessions of the early 1980s. The ensuing recovery, however, was more moderate than typical, both for the economy as a whole and for housing. In the first two years of the expansion, real residential investment rose just over 20 percent—one-third the rate of increase coming out of the 1982 recession. Moreover, this pattern of moderation continued over the course of the decade. Apart from a dip in 1995, residential investment continued to expand and at the end of the decade, it was still growing at a vigorous, but not runaway pace.

*The 1990s housing expansion was much more gradual than prior expansions, including that in the 1980s, and it lasted longer.*

In terms of the composition of investment, multifamily housing was even less of a factor in the 1990s than in the 1980s. Only a quarter of the housing permits authorized in the 1990s were for units in multiunit structures, and the average valuation per permit did not keep pace with the escalation in values for single-family units (Table 3). Other structures continued to gain in importance. With sales of existing homes increasing relative to new construction, as can be seen in Figure 2, brokers' fees accounted for an increasing fraction of residential investment.

In sum, the 1990s housing expansion was much more gradual than prior expansions, including that in the 1980s, and it lasted longer. Even the 1980s housing expansion, while it started very rapidly, did not reach the heights of the 1970s booms. The aggregate data provide no indication of why Texas and New England encountered the problems that they did in the 1980s. The following section considers whether the picture appears any different when one looks below the national level.

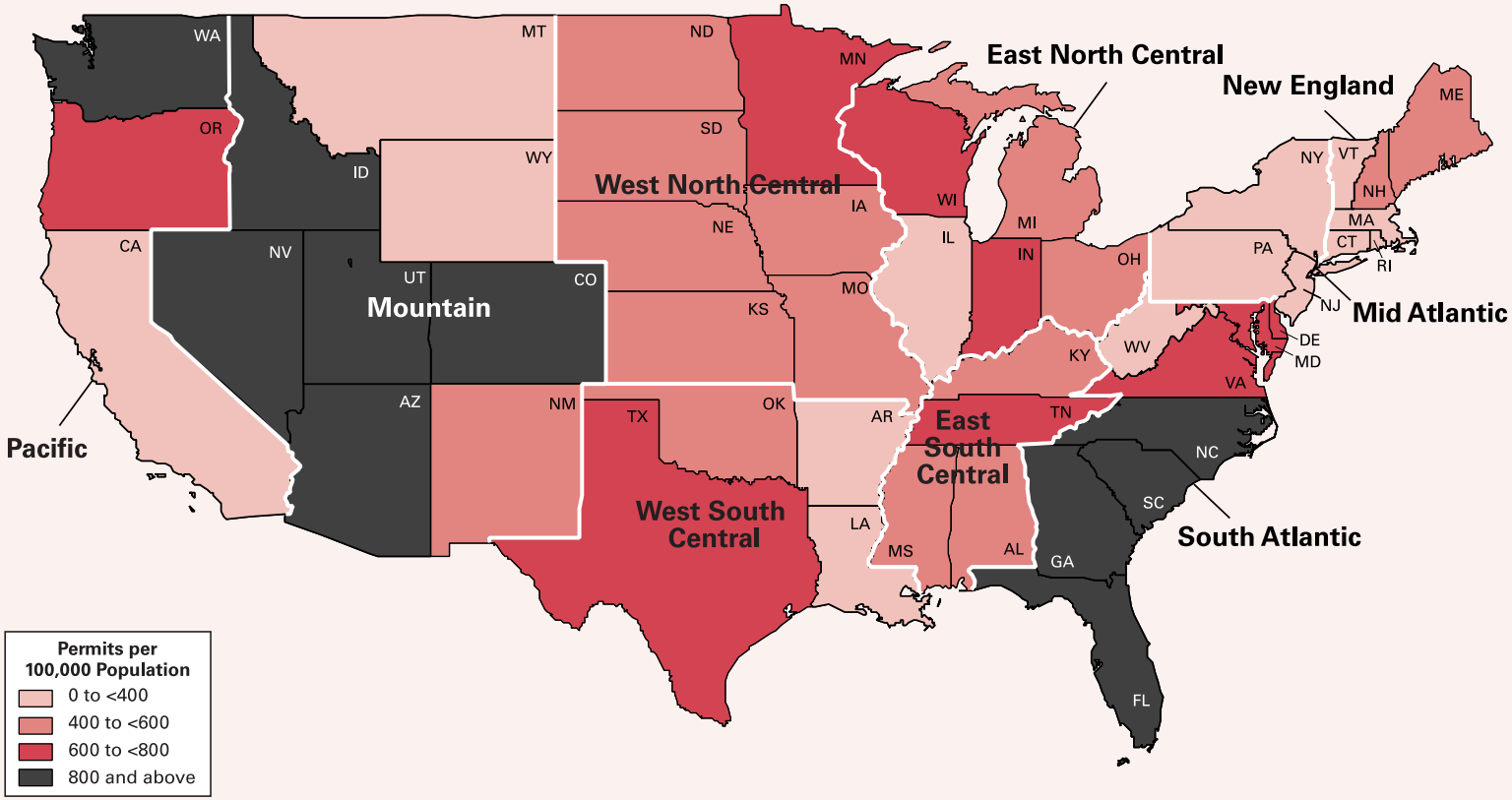
## II. Regional Variations

Figure 3 shows permits per capita in each state in 1998 and identifies the nine census divisions that are the focus of this review of regional variations. As can be seen, a disproportionately large share of the nation's housing is built in the South. In 1998, 45 percent of the housing permits authorized were in the South, which had 35 percent of the nation's population (Table 4). The South Atlantic states were largely responsible for this high level of construction—Florida especially, but also Georgia and the Carolinas. The Northeast, on the other hand, accounted for a disproportionately small share of new housing. Although the Northeast had 20 percent of the nation's population, only 10 percent of new houses were built there. Both New England and the Mid Atlantic states contributed to the deficit.

The Midwest and the West each accounted for 20 to 25 percent of the nation's housing permits in 1998, roughly comparable to their population shares. However, within the West, the Mountain states experienced considerably more building relative to their populations than the Pacific. Relative to population, the pace of construction was particularly rapid in

Figure 3

*Housing Permits Authorized, by State, 1998*




Note: Pacific region includes Alaska and Hawaii, which are not shown.
Source: See Table 4.

Table 4
*Regional Distribution of Population and Housing Permits, 1984 and 1998*
Percent

| | Population | | Number of Permits | | Value of Permits | | Single Units/ Total Permits | |
|---|---|---|---|---|---|---|---|---|
| | 1984 | 1998 | 1984 | 1998 | 1984 | 1998 | 1984 | 1998 |
| Northeast | 21.1 | 19.1 | 11.9 | 9.9 | 13.2 | 10.1 | 70.3 | 77.9 |
| New England (NE) | 5.4 | 5.0 | 4.3 | 3.0 | 4.8 | 3.5 | 71.0 | 84.9 |
| Mid Atlantic (MAT) | 15.7 | 14.2 | 7.6 | 6.9 | 8.4 | 6.6 | 70.0 | 74.8 |
| Midwest | 24.9 | 23.3 | 12.6 | 20.3 | 13.2 | 21.1 | 57.4 | 75.7 |
| East North Central (ENC) | 17.6 | 16.4 | 7.4 | 14.1 | 8.1 | 15.0 | 60.5 | 76.2 |
| West North Central (WNC) | 7.4 | 6.9 | 5.2 | 6.2 | 5.1 | 6.1 | 53.1 | 74.8 |
| South | 34.1 | 35.3 | 48.3 | 44.9 | 43.0 | 40.4 | 53.2 | 72.0 |
| South Atlantic (SAT) | 16.7 | 18.1 | 28.5 | 27.2 | 25.3 | 25.2 | 58.8 | 73.9 |
| East South Central (ESC) | 6.3 | 6.1 | 4.6 | 5.5 | 3.4 | 4.7 | 45.2 | 76.0 |
| West South Central (WSC) | 11.0 | 11.1 | 15.2 | 12.3 | 14.2 | 10.5 | 45.2 | 66.1 |
| West | 19.9 | 22.3 | 27.2 | 24.9 | 30.6 | 28.4 | 49.7 | 73.2 |
| Mountain (MTN) | 5.3 | 6.2 | 10.8 | 12.4 | 9.8 | 12.3 | 45.8 | 75.2 |
| Pacific (PAC) | 14.6 | 16.1 | 16.3 | 12.5 | 20.8 | 16.1 | 52.4 | 71.3 |
| United States | | | | | | | 54.8 | 73.7 |

Source: U.S. Bureau of the Census, Manufacturing and Construction Division, for historical building permits data. Population from U.S. Bureau of the Census, public website.

Nevada, Colorado, and Arizona. In contrast, the pace of construction was relatively slow in California.

The average valuation per housing permit is lower in the South than elsewhere; so by value, the South is not quite so dominant, accounting for 40 percent of the valuation of housing permits. Valuations in the Pacific, especially California, are substantially higher than in the rest of the country.

Figure 4 compares the cumulative numbers of housing permits in the 1980s and 1990s with the regions' population growth in the corresponding decades. A strong correlation was found in both periods.[7] The regions with the most rapid population growth had the highest rates of housing construction. Despite the problems they experienced in the 1980s, New England and the West South Central division do not stand out as outliers. The cumulative volume of housing construction in the decade was not especially high, given these regions' population growth.

### *Patterns over Time*

Regional housing patterns have varied over the past 20 years. In the 1980s, the regional cycles underlying the national cycle differed markedly in their timing and magnitude. In the 1990s, in contrast, the regions generally moved together, although the levels of activity still differed.

Figures 5 and 6 present two measures of regional housing patterns in the 1980s and 1990s. Figure 5 shows the number of housing permits authorized relative to population. Figure 6 shows estimates of residential investment relative to gross product for the nine census divisions. These regional investment shares were obtained by (1) running a regression for the United States in which residential investment's share of GDP was a function of residential contract awards (from F. W. Dodge) and sales of existing homes, both relative to personal income; and (2) using

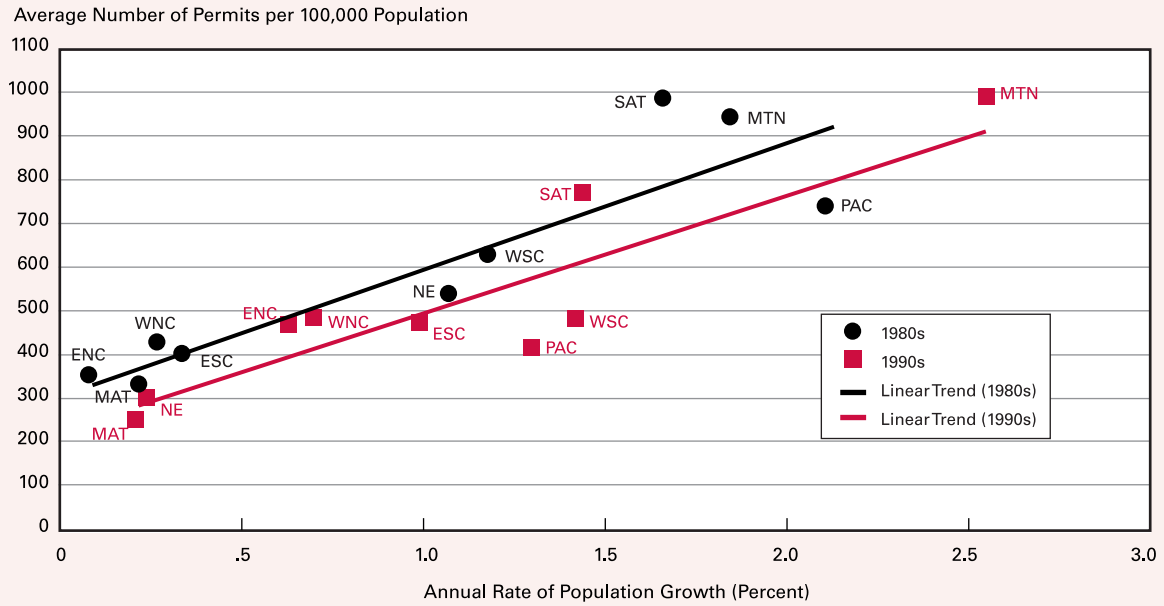
[7] Regressions of average housing permits per 100,000 population on the annual rate of population growth in the 1980s and 1990s produce the following results:

$$HP80s = 312.5 + 288.2\ POP80s$$
$$\quad (5.0) \quad (5.6)$$
Adjusted R squared = .79
and
$$HP90s = 219.9 + 280.8\ POP90s$$
$$\quad (3.3) \quad (5.3)$$
Adjusted R squared = .77

where HP80s is average permits from 1981 through 1990; POP80s is the annual rate of population growth from 1980 to 1990; HP90s is average permits from 1991 through 1999; and POP90s is the annual rate of population growth 1991 to 1999.

Figure 4

*Regional Population Growth and Housing Permits in the 1980s[a] and 1990s[b]*




[a] Average number of permits, 1981 through 1990, and annual rate of population growth, 1980 to 1990.
[b] Average number of permits, 1991 through 1999, and annual rate of population growth, 1990 to 1999.
Source: See the text.

the coefficients from the U.S. equation and regional values for contract awards, sales, and personal income to generate investment relative to gross product for the census divisions.[8]

Focusing first on permits relative to population (Figure 5), housing construction was much higher in the South Atlantic and the Mountain divisions than in the rest of the country in both the 1980s and the 1990s. Construction was consistently low in the Mid Atlantic states, although higher in the 1980s than the 1990s. In contrast, New England and the West South Central and Pacific divisions had *much* higher levels of housing construction in the 1980s—or at least parts of the 1980s—than in the 1990s.

Although the rate of construction was higher in the South Atlantic than in the country as a whole, the pattern of change over time tended to parallel the nation's. Permits fell sharply in the early 1980s, recovered strongly, remained at high levels through the mid 1980s before beginning a lengthy decline. Permits began to increase again in 1992. Growth was much more gradual than in the 1980s, but continued throughout the decade.

The experience of the West South Central region was quite different. Housing permits, already high at the start of the 1980s, did not fall in the 1982 recession. They soared—and soared again the following year. Oil prices had risen sharply from 1978 to 1981, providing a powerful impetus to the economies of the oil-producing West South Central states. Per capita income rose relative to that elsewhere.[9] In-migration picked up. Housing responded. However, the timing proved unfortunate. Oil prices started to turn down in 1982 and they plummeted in 1986. Construction collapsed. The swings were particularly extreme for

[8] The U.S. equation was

$$RI/GDP = \underset{(0.6)}{0.23} + \underset{(9.3)}{0.93}\, C/YP + \underset{(4.0)}{2.3}\, HS/reYP$$

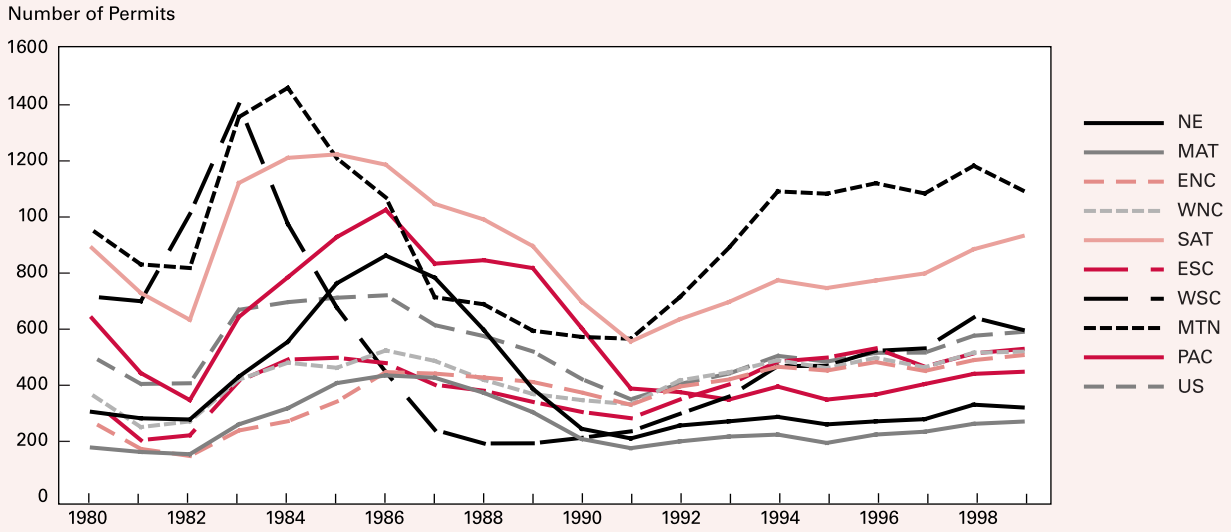
Adjusted R squared = .91
Annual data 1981 to 1999

where RI/GDP is residential construction's share of GDP, current dollars; C is residential contract awards from F.W. Dodge; YP is personal income; reYP is personal income in constant dollars; HS is number of existing home sales from the National Association of Realtors.

[9] From 1969 to 1978, per capita income in Texas rose from 88 percent of the national average to 95 percent. By 1981 it had reached 101 percent. But in 1986 it was just 92 percent of the U.S. figure (U.S. Bureau of Economic Analysis, *Survey of Current Business*, June 2000).

Figure 5

*Housing Permits per 100,000 Population, by Census Division*




Source: See Table 4.

multifamily construction. In 1983 permits were authorized for more than 200,000 multifamily units, in 1988, just 9,000. Housing construction grew quite rapidly in the 1990s, but from a very low base. Permits tripled between 1989 and 1999. Even so, the total number of permits, relative to population, was roughly the same as that nationally and far below the peaks of the early 1980s.

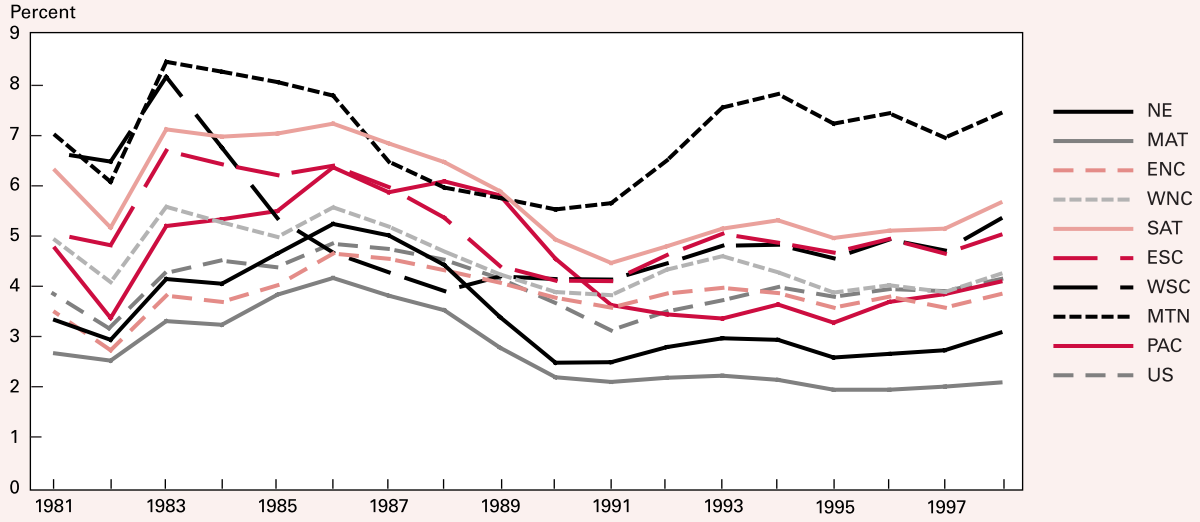
The experience of the Mountain states in the 1980s resembled that of the West South Central region, but the bust was less severe. Some of the Mountain states also have a significant energy base and benefited from the rise in oil prices. Housing construction rose very rapidly in 1983 and 1984 but, as in the West South Central division, quickly collapsed. However, relative to population, the level of construction remained above that nationally. The recovery from the 1990–91 recession was vigorous and the momentum continued to build. Housing permits grew faster in the 1990s in the Mountain states than in the country as a whole. As elsewhere, growth was especially strong for single-family housing, where permits per capita surpassed the peaks of the early 1980s by a wide margin.

New England also experienced a boom and bust in housing in the 1980s, but the timing was later than in the West South Central and Mountain regions. The New England economy weathered the 1982 recession comparatively well; its high technology industries were less adversely affected than more traditional manufacturers in other regions, and the beginnings of the Reagan defense buildup provided a further impetus to this defense-oriented region. Housing responded to the strong economy and, for a time, permits per capita in New England exceeded those nationally. As in the West South Central, the economic fundamentals softened. High tech, led by the minicomputer industry, began a prolonged decline. The peak in housing was reached in 1986, after which construction fell off as steeply as it had risen. Growth in housing permits was very sluggish in the 1990s.

*In the 1990s, the regions generally moved together, although the levels of activity still differed.*

Figure 6

*Estimates of Residential Investment Share of Gross Product, by Census Division*




Source: See text.

Construction in the Pacific region was also relatively weak in the 1990s, largely because of California. Construction was much more buoyant in Washington and Oregon. As in New England, this weakness followed a period of high construction activity in the 1980s.

In contrast to much of the country, housing construction in the East North Central division was stronger in the 1990s than in the 1980s. The East North Central states are heavily industrial and were more adversely affected by the 1980 and 1982 recessions than the country as a whole. Per capita income declined relative to that nationally and people moved out. The decline in housing in the East North Central started earlier than in the rest of the country and the recovery was slower. The area fared much better in the 1990–91 recession. The falloff in employment was relatively mild and the decline in housing construction was also mild, both by the standards of the past and in comparison with other regions. In the expansion, construction steadily increased, matching growth nationally and surpassing the peaks of the 1980s.

The patterns shown by the estimates of residential investment relative to gross product are somewhat similar but considerably more muted (Figure 6). In particular, the boom in New England in the mid 1980s was not especially marked according to this measure. Nor was the weakness in the East North Central in the early 1980s so evident. As pointed out above, the housing boom in New England occurred in the context of an economy that was doing very well. Other segments of the economy were also growing rapidly. Moreover, housing construction can itself function as an economic driver, stimulating growth in other sectors, notably finance, insurance and real estate, and certain services and segments of retail trade. In the East North Central, the weakness in housing was part and parcel of a severe decline in the regional economy.

This regional review reveals that underlying the relatively extended period of high housing construction in the United States in the 1980s were a series of regional fluctuations that differed in timing and magnitude—first, the West South Central and Mountain regions, then New England and, to some degree, the Mid Atlantic, and finally, the Pacific. As housing activity fell off in the West South Central states, it continued to rise in the northeastern part of the country. And when housing started to collapse in the Northeast, the national totals were shored up by the continuation of high levels of activity in the Pacific and by the later-recovering East North Central states.

The 1990s saw no regional cycles. Following the

1990–91 recession, housing permits increased more or less steadily in the various regions, but at different rates and starting from very different levels of activity. The notable outlier was the Mountain region, where permits rose rapidly in the early 1990s and then leveled off at a very high level. The Mountain states also stand out in terms of residential investment's estimated share of gross product. At more than 7 percent in the second half of the 1990s, residential investment was not quite as large a share of the Mountain division's economy as in the early 1980s; but the disparity between the Mountain states and other regions was marked.

*Housing construction can itself function as an economic driver, stimulating growth in other sectors, notably finance, insurance and real estate, and certain services and segments of retail trade.*

***Vulnerabilities***

Are there any signs that the extended expansion in housing in the 1990s might have created dangerous excesses? Were any regions vulnerable to the problems suffered by New England and the West South Central states?

*Housing and Population Growth.* As was shown in Figure 4, housing construction is correlated with population growth. Somewhat surprisingly, over the entire decade of the 1980s, construction in New England and the West South Central states was not unusually high relative to population growth. Of course, construction was very high in some years and low in others. However, population growth was also higher in the high construction years, as people were drawn into the regions by the prosperity that gave rise to, and then was generated by, the high levels of construction.

Figure 7 compares the annual number of housing permits with what would have been consistent with population growth, based on the simple relationships between permits and housing shown in Figure 4.[10] As can be seen, the level of building in New England in the mid 1980s was, indeed, high relative to population growth. In the West South Central, population growth was very rapid at the beginning of the 1980s, justifying a high level of building; but by the time construction responded, growth had slowed considerably. In the Mountain states, the mismatch in the timing of population growth and construction activity was even more pronounced.

However, Figure 7 also makes clear that population growth is not the sole determinant of the level of housing construction that a region can support without encountering difficulties later. The South Atlantic experienced a higher level of construction, relative to its population growth, than most regions through most of the 1980s; yet it did not suffer New England's problems. In contrast, parts of the Pacific *did* experience severe real estate problems in the early 1990s, yet the level of housing construction in the region was not especially high, given population growth.

As of 1999, construction was running ahead of population growth in several regions, but the gap was not especially large by the standards of New England in the 1980s. Exceptions were the South Atlantic division, a consistent outlier, and the Mountain states. In the Mountain states, population growth, while still rapid, had slowed from the pace earlier in the decade; but construction remained at a level consistent with the earlier, higher rate.

*Housing Prices.* The building boom in New England was accompanied by a very rapid escalation in housing prices. In the subsequent bust, housing prices declined. The rise in housing prices, which was echoed in rising prices for commercial property, is commonly believed to have encouraged speculative investment in real estate. Figure 8 plots the rise in housing prices against the number of housing permits per capita for the nine census divisions.[11]

The rise in house prices in New England in the mid 1980s was striking. Prices in the West South Central did not increase nearly as much, although

[10] Note that the regressions are simple cross-sectional relationships in which average permits per capita in each division over the 1980s or 1990s is a function of the division's average annual rate of population growth. They are not pooled cross-section, time-series regressions.

[11] The Housing Price Index (HPI) from the Office of Federal Housing Enterprise Oversight (OFHEO) is based on repeat sales and refinancings of single-family homes whose mortgages have been produced by Fannie Mae or Freddie Mac.

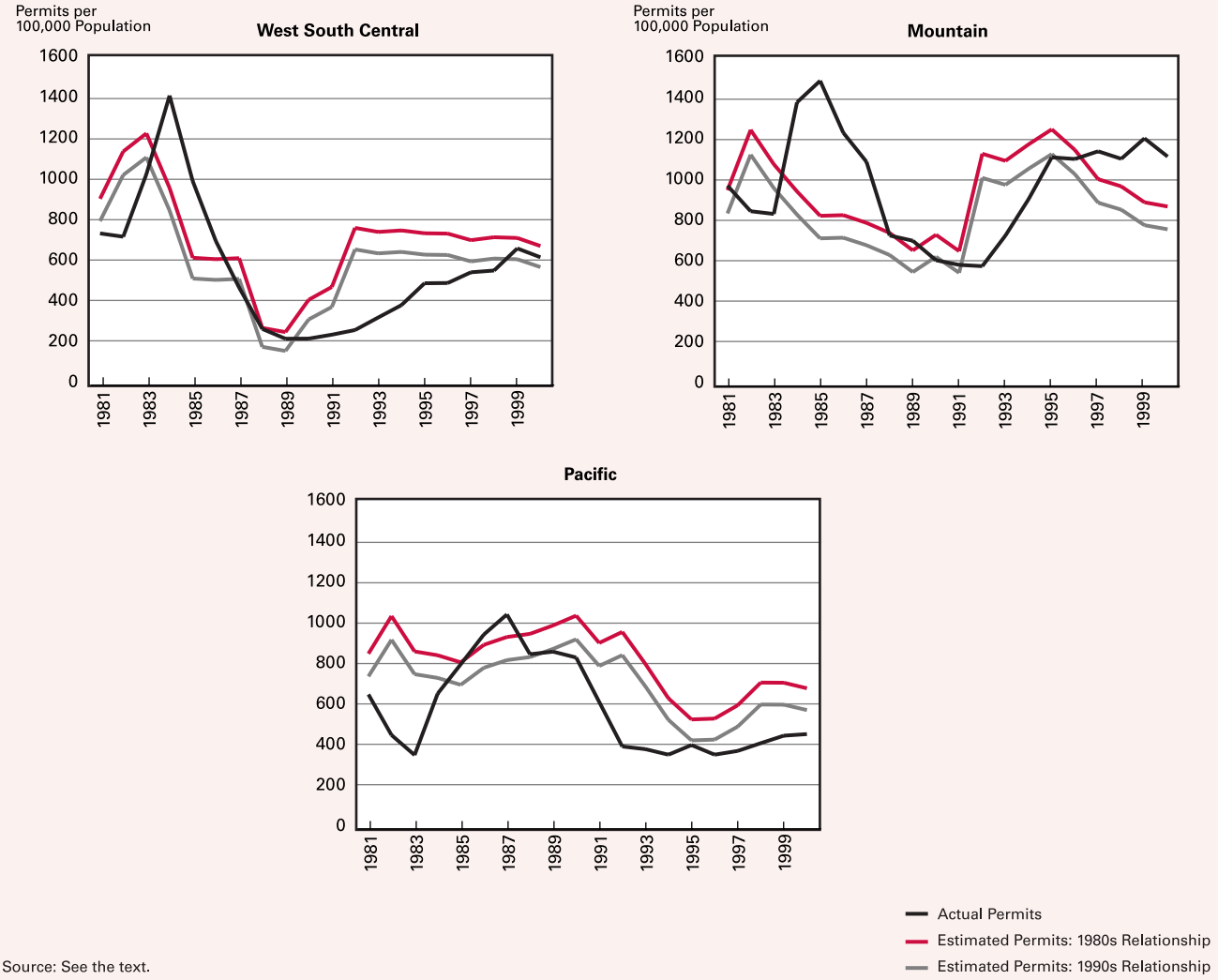
Figure 7

*Actual Housing Permits versus Permits "Justified" by Population Growth*


Source: See the text.

Figure 7, continued

*Actual Housing Permits versus Permits "Justified" by Population Growth*




Source: See the text.

they declined as sharply in the bust. The Mid Atlantic and Pacific divisions, on the other hand, both experienced increases in housing prices similar to those in New England, although in neither case was the rise in permits markedly out of line with population growth. However, the subsequent weakness in both prices and permits in these divisions suggests a real estate bust, albeit not as severe as in New England and the West South Central states.

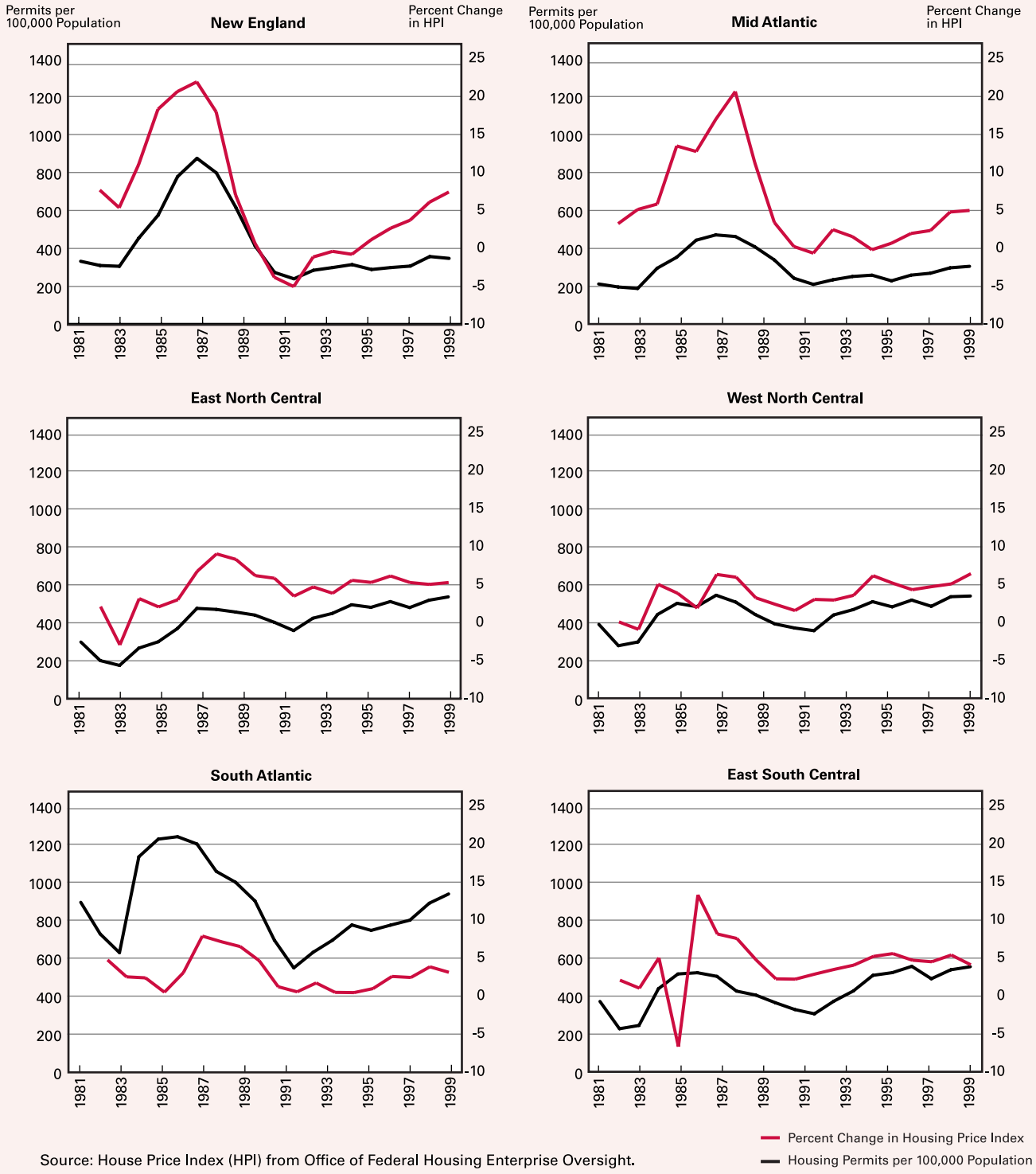
To the degree that rapidly rising prices are a warning signal of a potentially overheated housing market, the picture in 1999 was generally reassuring. Home prices, while rising somewhat faster than they had earlier in the 1990s, were still increasing at a rate of 5 percent or less in most of the country. While prices had accelerated sharply in the Mountain states in the early 1990s, they were increasing only moderately in 1999. The highest rates of price increase were in New England, where housing construction still remained at low levels, historically and relative to population. Anecdotal comments from industry representatives attributed the rising prices, at least partly, to a shortage of housing inventory.[12]

*Nonresidential Construction.* In the construction and real estate busts of the 1980s in the West South Central and New England states, the biggest problems

[12] Numerous "Beige Book" reports included this observation. The Beige Book's formal title is Summary of Commentary on Current Economic Conditions by Federal Reserve Districts.

Figure 8

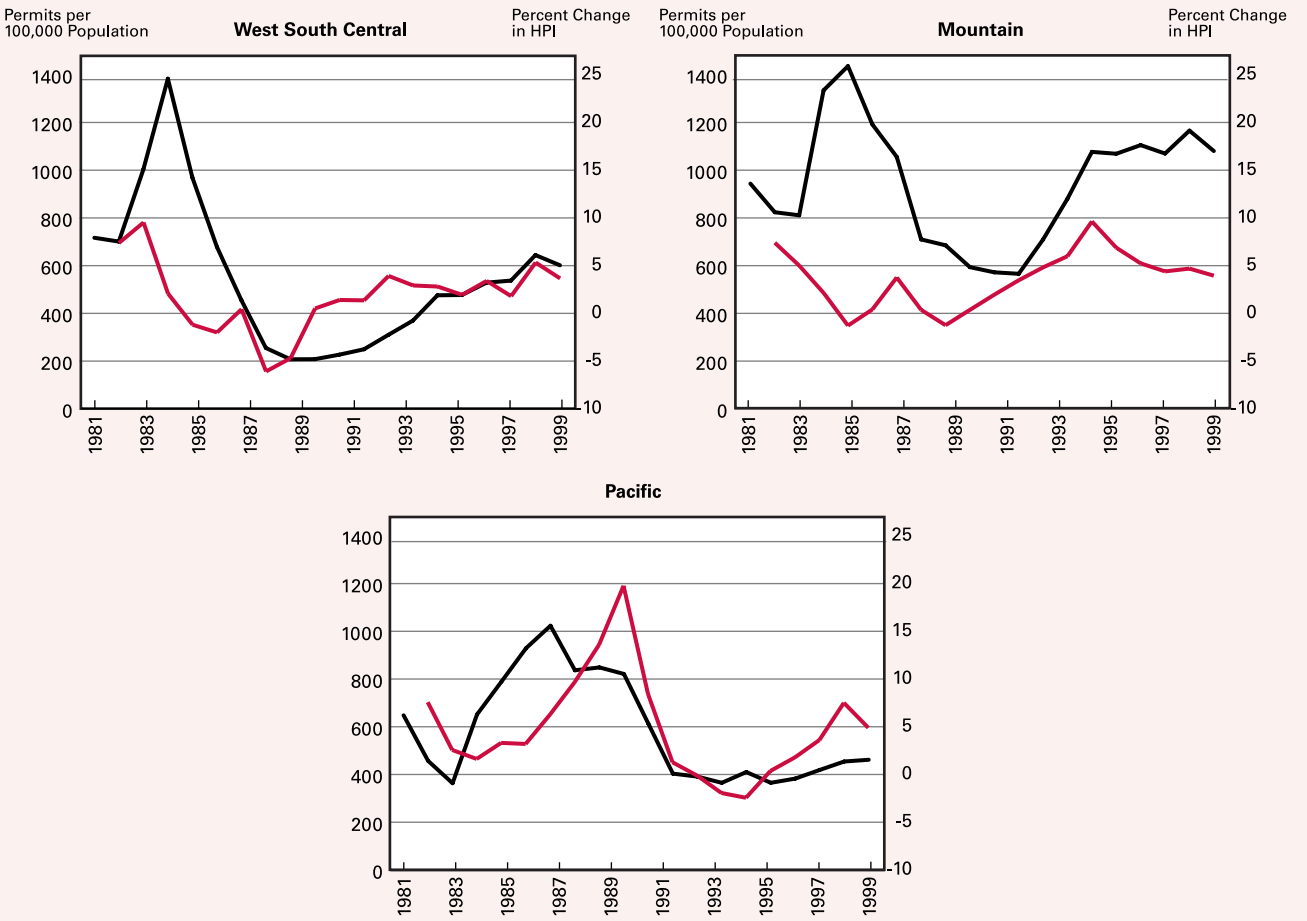
*Changes in Housing Prices, by Census Division*




Source: House Price Index (HPI) from Office of Federal Housing Enterprise Oversight.

Figure 8, continued

*Changes in Housing Prices, by Census Division*




Source: House Price Index (HPI) from Office of Federal Housing Enterprise Oversight.

for financial institutions came from defaults on lending backed by commercial properties. This raises the question of whether investment in nonresidential property, rather than housing, is the real source of vulnerability.

Using data on contract awards for nonresidential buildings from F. W. Dodge, it is possible to make estimates of the share of gross product going to investment in nonresidential buildings for the nine census regions in the same manner as was done for residential investment.[13] As can be seen by comparing Figures 6 and 9, in both the 1980s and the 1990s, nonresidential buildings accounted for smaller shares

[13] An equation was run for the United States relating nonresidential building investment's share of GDP to contracts relative to personal income. A time trend seemed to improve the fit. Then regional values for contracts relative to personal income were plugged into the equation to generate nonresidential investment relative to gross product for the nine census divisions. The U.S. estimate also appears in Figures 6 and 9 as a reference.

The U.S. equation was

$$NR/GDP = 32.6 + 0.89\ NRC/YP - 0.17\ Time$$
$$(2.2) \quad (6.9) \qquad\qquad (-2.2)$$

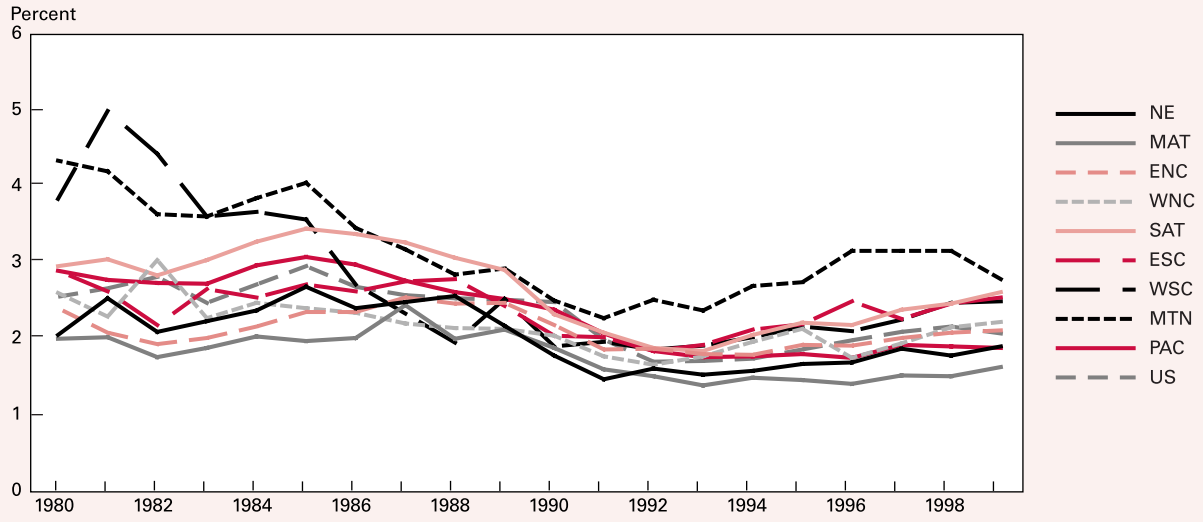
Adjusted R squared = .88

Annual data 1980 to 1999

where NR/GDP is investment in nonresidential buildings as a percent of GDP, current dollars; NRC is contract awards for

Figure 9

*Estimates of Nonresidential Building Investment Share of Gross Product, by Census Division*




Source: See the text.

of economic activity than residential investment, and the differences among the regions in the fraction of gross product going to nonresidential buildings were smaller than for residential investment. The South Atlantic, in particular, was more similar to the rest of the country for nonresidential than for residential investment. However, exceptions to these generalities were the West South Central and Mountain states in the early 1980s and the Mountain states in the 1990s.

*To the degree that rapidly rising prices are a warning signal of a potentially overheated housing market, the picture in 1999 was generally reassuring.*

The West South Central experienced very high levels of investment in nonresidential buildings, coincident with the boom in residential investment. The decline in nonresidential buildings paralleled that in housing. The Mountain states also saw high levels of investment in nonresidential buildings in the early 1980s, which fell off over the course of the decade. Interestingly, the pattern of nonresidential building investment in New England in the 1980s seems unremarkable, providing little clue as to why the region's banks had such difficulties with problem real estate loans. In the 1990s, only the Mountain states stood out, and the difference was smaller than for residential investment.

*Employment Shares.* Table 5 shows the fractions of employment in construction and real estate in the nine census divisions. Not surprisingly, construction accounted for a larger fraction of employment in the Mountain states than in the rest of the country in the late 1990s. At 7 percent, construction's share of employment in the Mountain region surpassed the highs of the 1980s, not only in the Mountain states but also in the South Atlantic and West South Central regions. The combination of construction and real estate, at almost 10 percent of total employment, was below the highest levels seen in the Mountain states in the 1980s, but equal to or above the peaks anywhere else.

Such a large fraction of employment devoted to construction and real estate suggests that the Moun-

nonresidential buildings from F. W. Dodge; YP is personal income.

Table 5

*Share of Employment in Construction and Real Estate, by Census Division, Selected Years*

| | 1982 | 1984 | 1986 | 1988 | 1994 | 1998 |
|---|---|---|---|---|---|---|
| In Construction | | | | | | |
| New England | 4.2 | 4.7 | 5.6 | 6.1 | 4.8 | 5.0 |
| Mid Atlantic | 3.8 | 4.1 | 4.7 | 4.9 | 4.3 | 4.5 |
| East North Central | 3.8 | 3.9 | 4.3 | 4.6 | 4.8 | 5.1 |
| West North Central | 4.4 | 4.6 | 4.7 | 4.5 | 4.9 | 5.2 |
| South Atlantic | 5.4 | 6.2 | 6.7 | 6.5 | 5.6 | 6.0[a] |
| East South Central | 4.8 | 4.9 | 5.3 | 5.4 | 5.5 | 6.0 |
| West South Central | 6.6 | 6.7 | 6.2 | 5.4 | 5.6 | 6.3 |
| Mountain | 6.1 | 6.7 | 6.6 | 5.6 | 6.4 | 7.0 |
| Pacific | 4.1 | 4.5 | 4.9 | 5.1 | 4.7 | 5.1[a] |
| United States | 4.7 | 5.0 | 5.3 | 5.3 | 5.1 | 5.5 |
| In Construction and Real Estate | | | | | | |
| New England | 6.3 | 6.8 | 8.1 | 9.0 | 7.1 | 7.5 |
| Mid Atlantic | 6.0 | 6.3 | 7.1 | 8.0 | 7.4 | 7.5 |
| East North Central | 6.1 | 6.1 | 6.5 | 7.0 | 7.1 | 7.4 |
| West North Central | 6.8 | 6.9 | 7.1 | 6.8 | 6.8 | 7.2 |
| South Atlantic | 8.5 | 9.2 | 9.9 | 9.6 | 8.3 | 8.6[a] |
| East South Central | 6.7 | 6.9 | 7.4 | 7.4 | 7.4 | 7.8 |
| West South Central | 9.2 | 9.6 | 9.3 | 8.2 | 7.9 | 8.5 |
| Mountain | 9.9 | 10.6 | 10.7 | 8.9 | 8.9 | 9.9 |
| Pacific | 7.7 | 8.1 | 8.7 | 8.5 | 7.9 | 8.1[a] |
| United States | 7.4 | 7.7 | 8.2 | 8.2 | 7.7 | 8.0 |

[a]Some components of construction employment for the South Atlantic and Pacific were not available for 1998 and were estimated.

Note: Highlighted values exceed 1998 U.S. values.

Source: U.S. Bureau of Economic Analysis.

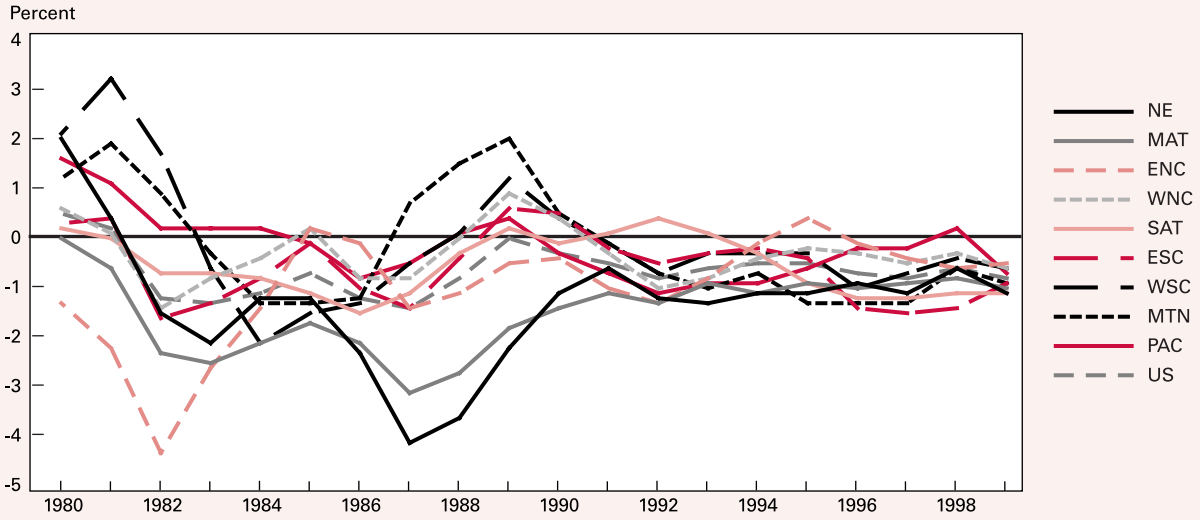
tain division would be more adversely affected than other parts of the country by a downturn in housing activity. However, whether such a large fraction should be interpreted as a sign that the region is overbuilding is not clear. The author has previously argued, in reviewing the real estate and construction booms and busts in the New England and West South Central divisions, that problems arise not simply from a high fraction of employment devoted to construction and real estate, but from a mismatch between the growth in construction and the shrinkage in other industries commonly seen as regional economic drivers.

Construction is a locally oriented industry, and its growth should reflect the growth in population and in other segments of the economy. Particularly important are "export" industries such as manufacturing, mining, and other industries that serve national and international markets. In New England, construction employment increased in the early and mid 1980s, even as computers and other regionally important manufacturing industries began what proved to be a long decline. For a time, the expansion in construction masked the shrinkage in manufacturing. However, the eventual result was overbuilding. Construction was supported by prosperity generated by construction rather than by sectors that derived their growth impetus from other sources. The growth in construction also stimulated growth in a host of related industries, real estate naturally, but also banking, building supply and furniture stores, architectural and legal services. When construction weakened, little was left to sustain the economy. An analysis of the recent economic problems of Korea and other East Asian countries also revealed a mismatch between the growth in construction employment and a contraction in export employment (Browne, Hellerstein, and Little 1998).

Applying such an approach to the nine census divisions today is, again, reassuring. Figure 10 shows the three-year change in export employment (defined as manufacturing, mining, federal government, farming, and agricultural services, forestry, and fishing) less the three-year change in construction and real estate, relative to total employment. While the gap between the change in export employment and the growth in construction and real estate was negative throughout the 1990s in most regions, nothing approached or showed signs of approaching the situation in New England in the second half of the 1980s. The earlier mismatch in the West South Central was also more severe than anything seen recently. (The large mismatch in the Mid Atlantic in the 1980s reflects severe weakness in that region's manufacturing sector and helps explain why that region experienced a relatively steep falloff in residential investment in the 1980s, even though construction activity was low compared to other regions. The gap in the East North Central in the early 1980s resulted from the cyclical decline in the region's large manufacturing sector; construction employment was actually quite low.)

Figure 10

*Gap between Three-Year Growth in Export Employment and in Construction and Real Estate Employment, Relative to Total Employment*




Note: 1999 manufacturing and construction employment figures are estimated by applying 1998 BLS growth rates to 1998 BEA figures. For all other industries, 1998 growth rates are used for 1999.
Source: Author's calulations using employment data from U.S. Bureau of Economic Analysis.

At the same time, the analysis is not foolproof. Construction and real estate problems developed in southern California in the early 1990s, but the gap analysis does not reveal anything unusual. At least part of the explanation is that the problem was not shared by the entire Pacific region; a more detailed geographic breakdown might show a gap between growth in construction and export employment in those areas that experienced the greatest difficulties.

In sum, regional housing patterns were much more similar in the 1990s than in the 1980s. Housing construction rose gradually across the country. Although housing construction in 1999 was at its highest level in over 20 years in the East and West North Central and East South Central regions, activity did not seem far removed from normal. Construction rates in the Mountain and South Atlantic divisions, while below 1980s peaks, were much higher than in other regions. Moreover, while population growth in the Mountain states was more rapid than elsewhere, growth had slowed from earlier in the decade, while housing construction had not. No region, however, showed the rapid escalation in housing prices that had characterized the boom phase of the 1980s cycle in New England; nor did any region have a mismatch between the growth in construction and export employment comparable to that in New England in the mid 1980s.

## III. Patterns in Massachusetts

Many residents of Massachusetts would probably be surprised to learn that the volume of housing construction in the state is closer to recession levels than to the peaks of the mid 1980s. In the three peak years, 1985 through 1987, the number of housing permits authorized in Massachusetts averaged almost 42,000 per year; in the three years 1997 through 1999, an average of just over 18,000 permits were authorized. Yet, driving through such communities as Plymouth and the affluent Boston suburb of Weston, some of the towns along Route 495, and certainly on Cape Cod, it seems that a lot of construction is taking place.[14]

Perceptions may deviate from what the numbers

[14] Increased concern about 'sprawl' and the efforts of some Massachusetts communities to slow growth would seem to confirm the perception of high levels of construction. Concerns about the impact of new construction on the cost of public services is sometimes cited as an issue. (See, for example, "As Growth Takes Off, Cap Sought in Abington," *Boston Globe*, November 14, 1999.)

show in part because some communities had very high levels of residential development in both the 1980s and 1990s. Even where the volume of construction was lower in the 1990s, the cumulative effect of extended periods of high levels of activity has made dramatic changes in some communities. A second reason is that the housing boom of the 1980s was more oriented to the larger, industrial communities than housing development in the 1990s. Almost all the larger, industrial communities participated in the 1980s boom. The high levels of construction activity in these communities may not have been as visible as the activity in less densely populated areas; and to the degree that development was obvious, it may have been more welcome or, at least, seen as more in keeping with the existing character of the community. Consistent with the more urban nature of the 1980s boom, a larger fraction of the housing units built in the 1980s were in multiunit structures.

*Many residents of Massachusetts would be surprised to learn that the volume of housing construction in the state is closer to recession levels than to the peaks of the mid 1980s.*

Figure 11 maps the distribution of housing permits by Massachusetts community in the two three-year periods 1985–87 and 1997–99. The greater intensity of development throughout Massachusetts in the 1980s is clearly evident. However, Cape Cod and the Islands of Martha's Vineyard and Nantucket stand out with high levels of housing construction in the 1990s as well as in the 1980s. Of the Massachusetts communities with the highest number of housing permits in the late 1990s, seven of the top 25 were on Cape Cod and an eighth was Nantucket.[15] While the levels of housing construction were lower in the 1990s than in the 1980s, they were still substantial, and the cumulative effect of intensive development in both decades has had a visible impact in these areas. (Appendix Figure 1 shows permits per capita.)

Apart from the Cape and the Islands, the development of the 1980s had a more urban flavor than that in the 1990s and was more concentrated in the larger cities and the surrounding industrial communities. In absolute terms, the state's largest cities all saw high levels of construction in the 1980s—Boston certainly, but also Worcester, Fall River, Lowell, and Springfield. Moreover, a number of these cities' larger industrial neighbors also experienced substantial construction in this period.

Table 6 shows the distribution of housing permits by community according to both population and a community classification developed by the Massachusetts Department of Revenue. As can be seen, "urbanized centers" accounted for 38 percent of the housing permits authorized in Massachusetts from 1985 to 1987, just 22 percent from 1997 to 1999. Development in the 1990s was less city-focused, more oriented to "residential suburbs" and "small rural communities." In terms of geography, communities along and especially near the intersections of the major highways radiating out from Boston and Routes 495 and 195 were especially popular. In general, the towns with the highest numbers of permits in the 1990s were smaller than those in the 1980s and had more land area (Table 7).

Moreover, with almost all of the construction in the 1990s taking the form of single-family homes, more development occurred in parcels of open land, rather than in concentrations close to town centers. Homes were also bigger and more lavish in the late 1990s. The average valuation associated with a building permit for a single-family home in Massachusetts was $149,400 in 1999, compared to $90,400 in 1987.[16] Nationally, valuations also increased 65 percent (to $125,900), while the price level, as measured by the CPI, rose 47 percent.

Thus, while construction levels statewide were much lower in the late 1990s than in the mid 1980s, the falloff in activity occurred disproportionately in the larger, more industrial communities. The Cape and the Islands and a number of communities at the intersections of major highways experienced high levels of construction in both periods.

## IV. Conclusions

Investment in housing, because of its volatility, has an impact on economic activity that is disproportionate to its relatively small size. Going into recessions, residential investment often plummets more than 20 percent, exerting a drag amounting to more

[15] In the mid 1980s, five were on Cape Cod.

[16] U.S. Bureau of the Census, Manufacturing and Construction Division, diskette of historical building permit data.

Table 6

*Distribution of Housing Permits among Massachusetts Communities by 1990 Population and Kind of Community*

| Communities with 1990 Population | Number of Communities | Average Number of Permits 1985–87 | Average Number of Permits 1997–99 | Percent Change | Share of Permits (Percent) 1985–87 | Share of Permits (Percent) 1997–99 |
|---|---|---|---|---|---|---|
| 100,000 or more | 4 | 1274 | 282 | −78 | 12 | 6 |
| 50 to 100,000 | 17 | 322 | 89 | −72 | 13 | 8 |
| 20 to 50,000 | 61 | 217 | 88 | −59 | 32 | 29 |
| 10 to 20,000 | 79 | 113 | 59 | −48 | 21 | 25 |
| Less than 10,000 | 190 | 47 | 31 | −34 | 21 | 32 |
| Kind of Community | | | | | | |
| Urbanized center | 45 | 349 | 89 | −74 | 38 | 22 |
| Economically developed suburb | 59 | 133 | 70 | −47 | 19 | 22 |
| Growth community | 47 | 145 | 82 | −43 | 16 | 21 |
| Residential suburb | 53 | 68 | 42 | −38 | 9 | 12 |
| Rural economic center | 61 | 59 | 29 | −51 | 9 | 10 |
| Small rural community | 45 | 33 | 25 | −24 | 4 | 6 |
| Resort, retirement, artistic | 41 | 127 | 68 | −46 | 12 | 15 |
| Total | 351 | 119 | 53 | −56 | | |

Source: U.S. Bureau of the Census, Manufacturing and Construction Division, Building Permits Data Subscription; author's calculations. Population data from decennial census. "Kind of community" is a designation developed by the Massachusetts Department of Revenue.

than a percentage point of GDP. Coming out of recessions, residential investment often grows 20 percent in the first year and continues to grow rapidly until it starts to fall again.

In both the 1980s and the 1990s, the behavior of U.S. residential investment diverged from what might be considered the typical pattern of rapid increase followed by rapid decline. While housing did grow very rapidly coming out of the 1982 recession, high levels of investment were sustained for several years. However, the appearance of relative stability at the national level masked sharp fluctuations in several regions. First, the West South Central and Mountain states experienced a boom and bust, then New England and, over a more prolonged period, the Pacific region.

In contrast, residential investment followed a much more gradual course during the 1990s. The initial bounce-back from the 1990–91 recession was less vigorous than normal and the subsequent pace of expansion more moderate. Moreover, most regions followed the same pattern. As of 1999, no region exhibited the signs of vulnerability that emerged in New England and the West South Central region in the 1980s. The level of housing construction was high in the Mountain states, even given that region's rapid population growth. However, other sectors of the Mountain economy were also growing quite rapidly. In both New England and the West South Central states, high levels of construction coincided with sharp declines in key export industries.

At the end of the 1990s, housing construction in New England was still very low relative to the mid 1980s. At least in Massachusetts, the difference was particularly sharp for the state's larger cities and other more urban areas. Construction in the 1990s was oriented more to smaller communities and was overwhelmingly composed of single-family homes. Additionally, some communities, especially on Cape Cod and the Islands, experienced very heavy building in both the 1980s and 1990s.

Table 7

*Correlation Coefficients: Housing Permits in 351 Massachusetts Communities and Population, Land Area, and Density*

| Average Number of Permits Authorized With: | 1985–87 | 1997–99 |
|---|---|---|
| 1990 Population | .84 | .65 |
| Land area—sq. miles | .17 | .26 |
| Population per sq. mile | .40 | .19 |

All correlation coefficients are statistically significant.

Figure 11a

*Average Number of Housing Permits Authorized per Year, 1985 to 1987*

*Massachusetts Communities*

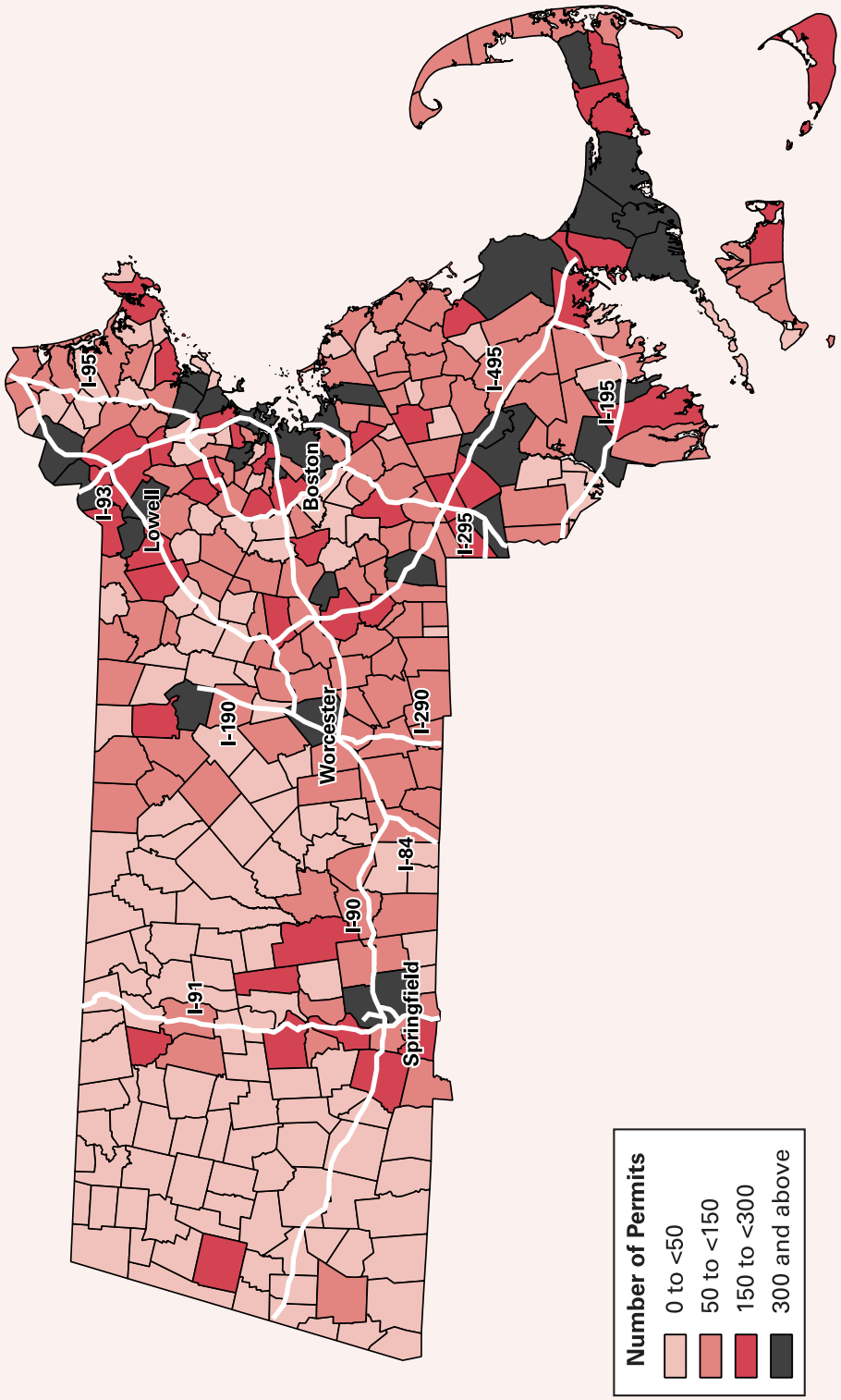
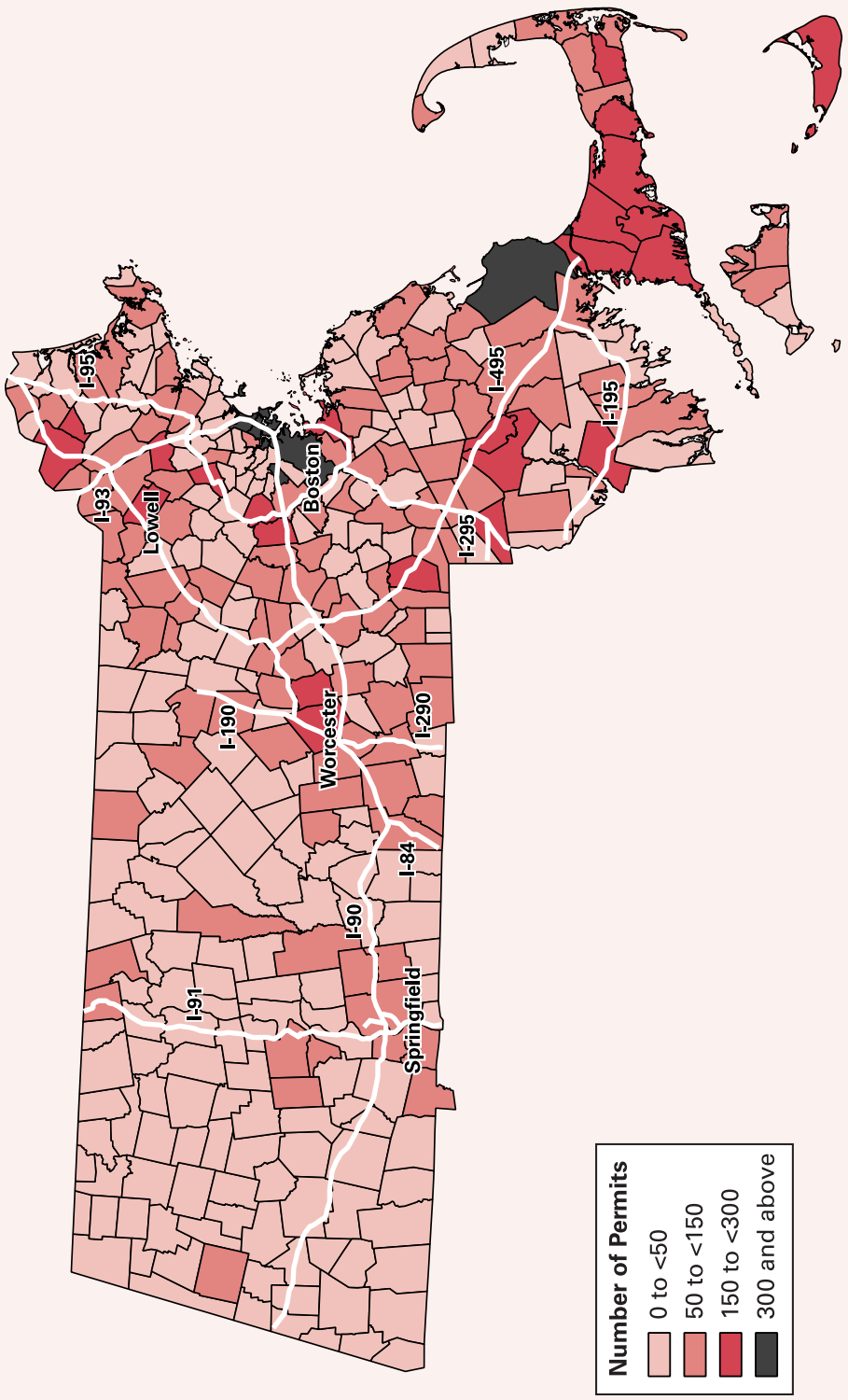


Figure 11b

*Average Number of Housing Permits Authorized per Year, 1997 to 1999*

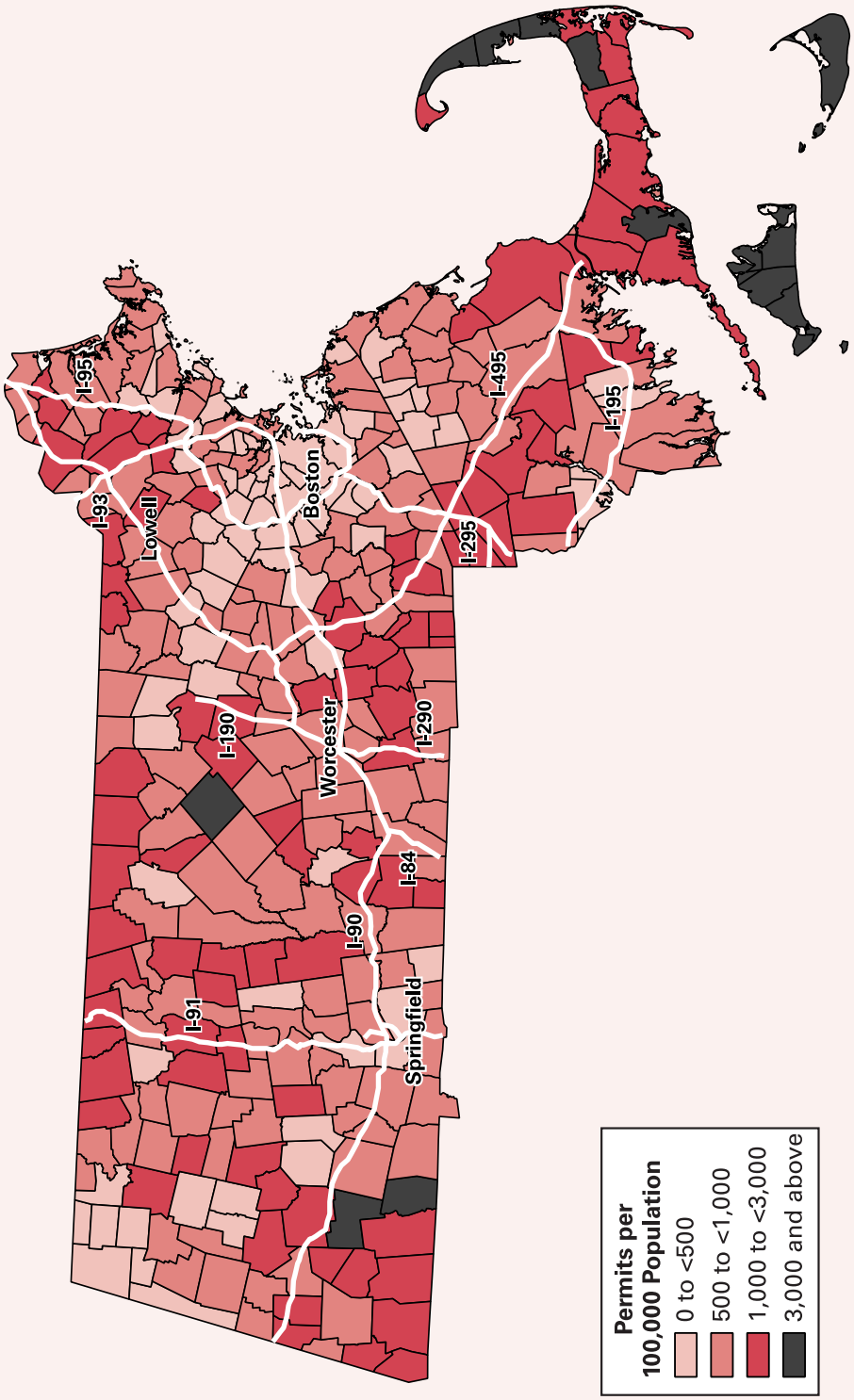
*Massachusetts Communities*



Appendix Figure 1a

*Average Housing Permits Authorized per Capita, 1985 to 1987*

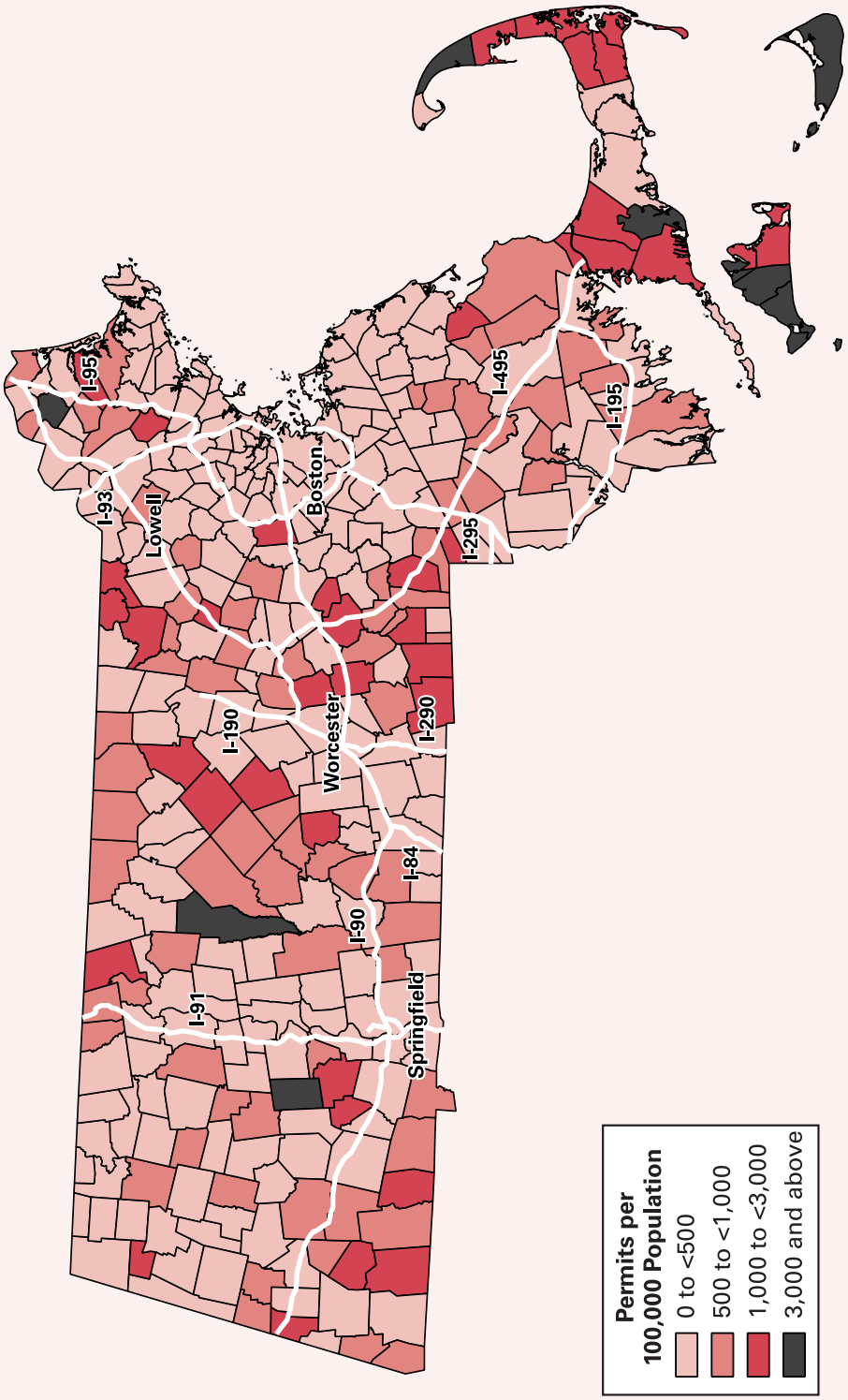
*Massachusetts Communities*



Appendix Figure 1b

*Average Housing Permits Authorized per Capita, 1997 to 1999*

*Massachusetts Communities*



Appendix Table 1

## *Relationship between Residential Investment and GDP*

Quarterly data, 1959Q3 to 1999Q4

| Dependent variable = year-over-year percent change in Independent variables | Coefficient | | | |
|---|---|---|---|---|
| | Real GDP | | Real Nonhousing GDP | |
| Constant | 1.3 | 1.98 | 1.34 | 1.55 |
| | (5.2) | (6.5) | (5.0) | (5.4) |
| Real GDP, y-o-y percent change, lagged one quarter | .67 | .60 | | |
| | (14.8) | (12.6) | | |
| Real Nonhousing GDP, y-o-y percent change, lagged one quarter | | | .73 | .69 |
| | | | (18.0) | (15.9) |
| Real residential investment, y-o-y percent change, lagged one quarter | .04 | | .03 | |
| | (5.7) | | (5.1) | |
| positive changes[a] | | .03 | | .02 |
| | | (3.2) | | (2.2) |
| negative changes[b] | | .07 | | .06 |
| | | (4.2) | | (3.6) |
| Federal funds rate, lagged two quarters | −.05 | −.08 | −.08 | −.06 |
| | (−1.9) | (−2.7) | (−2.8) | (−2.1) |
| Adjusted $R^2$ | .79 | .80 | .78 | .78 |

Figures in parentheses are t-statistics

[a]Percent change multiplied by dummy variable = 1 if change is positive, zero otherwise.

[b]Percent change multiplied by dummy variable = 1 if change is negative, zero otherwise.

Appendix Table 2

## *Real Residential Investment, Construction Indicators, and Components of Real GDP Correlations between Year-over-Year Percent Changes*

Quarterly Data, 1969.I to 1999.IV, seasonally adjusted

| | V1 | V2 | V3 | V4 | V5 | V6 | V7 | V8 | V9 | V10 | V11 | V12 | V13 | V14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| V1 | 1.00 | | | | | | | | | | | | | |
| V2 | .96 | 1.00 | | | | | | | | | | | | |
| V3 | .62 | .49 | 1.00 | | | | | | | | | | | |
| V4 | .78 | .68 | .30 | 1.00 | | | | | | | | | | |
| V5 | .80 | .86 | .28 | .61 | 1.00 | | | | | | | | | |
| V6 | .77 | .83 | .28 | .60 | .98 | 1.00 | | | | | | | | |
| V7 | .71 | .75 | .26 | .59 | .91 | .93 | 1.00 | | | | | | | |
| V8 | .74 | .74 | .25 | .68 | .75 | .76 | .75 | 1.00 | | | | | | |
| V9 | .67 | .59 | .52 | .54 | .41 | .40 | .39 | .60 | 1.00 | | | | | |
| V10 | .04 | −.04 | .22 | .10 | −.18 | −.20 | −.21 | .01 | −.02 | 1.00 | | | | |
| V11 | .26 | .19 | .19 | .30 | .08 | .15 | .14 | .44 | .34 | .18 | 1.00 | | | |
| V12 | .68 | .57 | .57 | .55 | .28 | .27 | .26 | .47 | .75 | .28 | .36 | 1.00 | | |
| V13 | .48 | .37 | .47 | .40 | .07 | .06 | .06 | .32 | .68 | .33 | .35 | .97 | 1.00 | |
| V14 | −.01 | −.16 | .44 | −.05 | −.35 | −.35 | −.31 | −.16 | .22 | .26 | .10 | .45 | .55 | 1.00 |

V1: Private residential investment
V2: Single-family structures
V3: Multi-family structures
V4: Other structures
V5: Housing starts; single unit
V6: Housing permits authorized; single unit
V7: New one-family homes sold
V8: Existing one-family homes sold
V9: PCE-furniture and household equipment
V10: PCE-household services
V11: PCE-household operations
V12: Real GDP
V13: Real GDP less residential investment
V14: Nonresidential investment—buildings

Note: Correlation coefficients of 0.18 or more are statistically significant at the 0.05 level.

Source: U.S. Bureau of Economic Analysis, *Haver Analytics*.

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