The Housing Cycle in Eastern Massachusetts: Variations among Cities and Towns

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Numerous studies over the years have attempted to identify the impact of amenities on housing price levels within specific metropolitan areas. It is well known, for example, that local public goods, tax burdens, school quality, crime rates, and the like are capitalized into land values.[1] While reasonably good cross-sectional data bases on house prices have been available for some time, data limitations have prevented researchers from looking at *changes* in home prices over time at any meaningful level of geographic disaggregation. Newly available data show that appreciation and depreciation rates over the cycle have varied widely within metropolitan areas, particularly in those parts of the country that have experienced large swings in home prices.

In Eastern Massachusetts since 1982, differences in appreciation rates across cities and towns have been pronounced. During the boom, houses in various towns appreciated in value on average from 141 to 250 percent. These variations were far from random: Houses located in towns close to Boston and towns with lower initial price levels appreciated at above-average rates. Subsequent price declines also varied significantly, between 9 and 25 percent, and the largest losses were concentrated in towns located farthest from Boston.

Case and Mayer (1995) explore the cross-sectional pattern of house price appreciation in the Eastern Massachusetts area during the 1980s boom and bust. Their study finds that affordability, proximity to downtown Boston, the shift from manufacturing to services-based jobs, the aging of the baby boom, and new construction all had significant effects on which towns' house prices rose fastest. In addition, the authors show that the premium associated with higher-quality schools actually fell during the 1980s, when Massachusetts public school enrollments declined dramatically.

This article expands upon the results in Case and Mayer (1995) by dividing the Eastern Massachusetts area into small groups of similar towns and updating the analysis, using recently acquired data from the

1991–94 period. The first part of the article discusses the previous literature. Next, similar towns in Eastern Massachusetts are grouped and the pattern of price appreciation across those groups during the boom, bust, and recovery periods is examined. This examination reveals that housing affordability was the most important factor explaining price changes during the boom period, but location, schools, and a town's employment base became relatively more consequential during the bust and the recovery.

I. Previous Results

Since Tiebout (1956) and Muth (1969), most research in urban economics has used variations in the level of public services and taxes and distance from the city center to explain differences in price levels among individual cities and towns within a metropolitan area. Although not explicitly addressed, the implication of these early articles was that changes in the relative prices between different towns are caused by unexpected development (causing a shift in the rent gradient) or changes in the level of town services or the taxes that finance them. In the Tiebout tradition, however, towns are assumed to constantly adjust their public services and zoning requirements in order to maximize the price of housing within the town. Thus, observed changes in a town's public services might be related to shifts in the cost of providing those services.

The rate of house price appreciation within a metropolitan area can vary significantly for properties in different price ranges.

Several articles have shown that the rate of house price appreciation within a metropolitan area can vary significantly for properties in different price ranges. Smith and Tesarek (1991) develop a methodology to estimate a price index for different quality levels. Using data from Houston over several years between 1970 and 1989, they find that high-quality properties appreciated faster than average during the boom of the 1970s, but that they fell faster during the oil bust of the 1980s. Case and Shiller (1994) show that house price appreciation by price tier differed between Boston and Los Angeles over the boom/bust cycle.[2]

Although these papers provide little hard evidence on the reasons for the patterns observed, several recent studies have attempted to provide explanations for differential movements in house prices that are unrelated to differences in the cost of providing public services or shifts in the rent gradient. Poterba (1991) suggests that high marginal tax rates and expectations of rising inflation led high-priced properties to appreciate faster than low-priced properties in the late 1970s. Mayer (1993) shows that even after accounting for taxes, population shifts, and changes in the income distribution, higher-priced homes exhibit more price volatility than lower-priced homes. He argues that this volatility is consistent with a Stein (1993)-type liquidity model, in which the wealth of existing home owners is affected more by shocks to the housing market than is the wealth of first-time buyers.

Previous empirical articles on cross-sectional price changes have tended to focus on movements in price tiers rather than on town-by-town deviations in house price appreciation, because of data limitations. In a statistical study of determinants of house price appreciation, Case and Mayer (1995) combine town-level house price indexes for the Boston metropolitan area with detailed data about town residents' employment and demographic characteristics, town amenities, and location. The authors regress the change in house prices by town on town characteristics and find that these characteristics can explain a significant portion of observed changes in single-family house prices in towns from trough to trough.

Their results validate some of the predictions of the standard urban models discussed earlier. For example, house prices over the cycle increased faster in towns located closer to Boston, resulting in a steeper rent gradient as the local economy expanded. In addition, marketwide shifts in the employment base and in demographics also had significant housing market implications. House prices in towns with a large share of residents working in the manufactur-

[1] See Oates (1969), Brueckner (1982), Roback (1982), Yinger et al. (1988), and a host of other tests of tax capitalization and the Tiebout (1956) hypothesis.

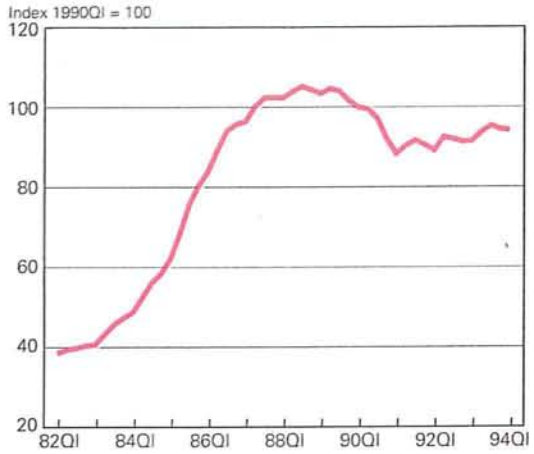
[2] Case and Shiller (1994) present three reasons for the observed differences in price behavior by tier in the two cities: (1) Boston had a higher rate of first-time buyers entering the market; (2) Boston had a greater increase in the supply of homes at the bottom than at the top, and poorer areas were hit hardest by the 1990–91 recession; (3) low-tier prices in California have been supported by immigration and pent-up demand for ownership.

ing sector in 1980 grew less quickly in the ensuing years, when aggregate manufacturing employment fell. Houses appreciated faster in towns with a larger initial percentage of middle-aged residents, as baby boomers moved into middle age.[3] Housing values rose more slowly in towns that allowed additional construction. Finally, the price premium associated with housing in towns with good schools appeared to fall as demographic shifts resulted in fewer families with children attending public schools in Massachusetts.

While the statistical analysis in Case and Mayer (1995) is suggestive and helps explain patterns of home price movement across towns, it is by nature an aggregate analysis. The research presented here is an attempt to better understand the causes of the observed aggregate patterns by looking in more detail at specific submarket areas, defined geographically.

Figure 1

House Price Changes in the Boston Metropolitan Area



Source: Case Shiller Weiss Inc.

II. Data Summary and Town Groupings

The indexes presented in this article were estimated using a variation on the weighted repeat sales methodology first presented in Case and Shiller (1987). The method uses the arithmetic weighting proposed by Shiller (1991) and is based on recorded transactions for all properties that sold more than once between 1982 and 1994. The price indexes were produced using an iterative process, in which an aggregate index was calculated based on all recorded sale pairs for each broad market area and then separate town indexes were calculated for 168 individual towns in Eastern Massachusetts.[4] Figure 1 presents the movement of the aggregate price index for the Boston metropolitan area.

Table 1 summarizes the data for the 168 cities and towns used in this paper. Apart from the price indexes, most information about them comes from the 1980 and 1990 Censuses; exceptions are noted below. The advantage of using Census data is that they are available in detail at the individual city and town level. The limitation of Census data, however, is that they are available only for the decennial Census years of 1980 and 1990. Clearly, data for the key years 1982 (trough), 1988 (peak), and 1992 (trough) would have better captured changes in the towns over the real estate cycle, but they were not available.

School and crime data come from various Massachusetts state government departments and are available for selected years after 1980. Except for crime statistics, all the data used in the analysis are available for all 168 towns in eastern Massachusetts. The crime data are reported only for larger towns, which generally have higher crime rates. Crime rates for certain small towns are not reported.[5]

A comparison of the 1980 and 1990 Census data shows considerable economic change over the 10-year period. Most obviously, real median household income rose by over one-third, a rate much higher than the national increase in real household income. Over the same period, employment in the manufacturing sector fell substantially; the percentage of workers employed in the manufacturing sector declined from 32 to 23 percent. The percentage of the population in

[3] The empirical estimates in Case and Mayer (1995) suggest only modest differences in appreciation rates as a result of these aggregate changes in employment or demographics, however. For example, with an average total appreciation of 132 percent over the cycle, house prices appreciated by a total of 6 percentage points less in a town with a 1980 share of manufacturing workers that is one standard deviation above the mean. The impact of a change in demographics on cross-sectional appreciation rates was even smaller.

[4] Case Shiller Weiss Inc. supplied all of the house price indexes used in this article.

[5] Even for larger towns, reported crime rates are still a rough proxy for the actual number of crimes committed because of differences in reporting rates across cities and towns.

Table 1
Summary of Data for 168 Cities and Towns in Eastern Massachusetts

	Mean	Standard Deviation	Minimum	Maximum
Housing Price Data (percent, except as noted)				
Price Change: 1982-Peak[a]	175	19	141	249
Price Change: Peak-Trough[a]	−16	3	−25	−9
Price Change: Trough-1994[a]	6	3	0	13
Price Change: 1982–1994[a]	145	16	110	187
Miles from Boston	31.5	16.1	0	118
1980 Data for Town Residents (Census data, except as noted)				
Percent of Residents Working in Manufacturing	32	10	11	56
Percent of Residents Working in Services	34	8	20	62
Percent of Residents 35 to 60 Years Old	28	4	20	40
School Spending per Weighted Pupil[b]	$ 1,837	$ 332	$ 1,049	$ 3,255
Median Single-Family House Value	$ 56,000	$19,000	$33,000	$144,000
Median Household Income	$ 21,700	$ 5,800	$11,500	$ 47,600
Crimes per 1,000 Residents[c]	42	19	10	135
1990–1992 Data for Town Residents (Census data, except as noted)				
Percent of Residents Working in Manufacturing	23	7	9	42
Percent of Residents Working in Services	40	7	28	68
Percent of Population 35 to 60 Years Old	32	4	23	47
1992 School Spending per Weighted Pupil (1980 Dollars)[b]	$ 2,465	$ 581	$ 1,209	$ 4,496
Median Single-Family House Value (1980 Dollars)	$116,700	$38,500	$70,600	$314,000
Median Household Income (1980 Dollars)	$ 29,300	$ 8,300	$14,000	$ 60,000
Crimes per 1,000 Residents (1992)[c]	31	21	3	109
1988 Assessment Test Scores[b]	2,673	164	2,190	3,090

[a]Source: Case Shiller Weiss Inc.
[b]Source: Massachusetts Department of Education.
[c]Source: Massachusetts Department of State Police.
Source of remaining data, U.S. Bureau of the Census.

the middle-age years (age 35 to 60) also increased during the decade, as the first 10 years of the baby boom generation passed the 35-year-old threshold.

The town data also show that, contrary to public perception, reported crime rates fell and real school spending per weighted pupil increased substantially.[6] While the mean amount of school spending increased, so did the differences across towns. One measure of dispersion, the ratio of the standard deviation to the mean, increased from 0.18 in 1980 to 0.24 in 1992.

To make the subsequent analysis more tractable, the 168 cities and towns in the sample were divided into 27 separate submarket groups. The groupings were subjective and based on the authors' knowledge of the metropolitan area housing market, data on income levels, and geography, and are intended to reflect groups of towns that buyers would find close substitutes for one another.

Table 2 presents the submarket groups, ranked by nominal price appreciation between the beginning of the period (1982) and the market peak in each town. Peaks occurred between late 1987 and mid-1989. The table also shows changes from the town-specific peak to the cyclical trough, which occurred for some towns as early as mid-1991 and for others as late as 1994. The third column shows the extent of price recovery for each of the submarket groups by mid-1994. The price change for each group is the population-weighted average of each town's individual price change. The rest of the article analyzes these price changes. Appendix Table 1 presents population-weighted means for selected data series for each of the 27 groupings.

[6] The weighted pupil count is reported by the Massachusetts Department of Education and reflects estimates of the additional cost of educating students who have special needs, or whose families are below the poverty line or do not speak English as a first language. Dividing school spending by weighted pupils yields a per-pupil spending estimate that is adjusted for such costs.

Table 2
Changes in Nominal House Prices, for Submarket Groups of Cities and Towns

Submarket Group	Percent Change in House Prices 1982 to Peak	Percent Change in House Prices Peak to Trough	Percent Change in House Prices Trough to Mid-1994	Percent Change in House Prices 1982 to Mid-1994
1) Fall River, New Bedford	235	−19	2	177
2) City of Boston	228	−22	1	159
3) Acushnet, Fairhaven, Mattapoisett, Marion, Westport, Wareham	220	−18	2	167
4) Attleboro, Taunton, Rehoboth, Somerset, Seekonk, Swansea	211	−19	6	168
5) Brockton, Bridgewater, East Bridgewater, West Bridgewater	204	−21	1	142
6) Raynham, Norton, Middleborough	201	−19	5	158
7) Everett, Saugus, Malden, Medford	200	−14	3	165
8) Braintree, Quincy, Randolph, Rockland, Abington, Whitman, Stoughton, Holbrook	193	−14	3	160
9) Lawrence, Lowell, Methuen, Haverhill	186	−21	4	134
10) Cambridge, Waltham, Arlington, Watertown	185	−12	6	167
11) Salem, Peabody, Danvers, Beverly, Marblehead, Lynn, Swampscott	179	−14	1	143
12) Dedham, Norwood, Canton, Milton	176	−13	5	154
13) Woburn, Burlington, Reading, Wakefield, Melrose, Stoneham, Lynnfield, Billerica, Bedford	176	−16	7	160
14) Fitchburg, Leominster, Lunenburg, Westminster, Gardner, Ashburnham, Shirley, Princeton, Groton, Pepperell, Townsend, Tyngsborough, Templeton	175	−21	2	122
15) Uxbridge, Blackstone, Hopedale, Upton, Southbridge, Webster, Douglas, Mendon	175	−19	5	134
16) Hingham, Cohasset, Norwell, Marshfield, Hull, Duxbury	173	−11	6	159
17) Worcester	172	−19	1	123
18) Belmont, Winchester, Newton, Lexington	171	−11	9	164
19) Gloucester, Topsfield, Ipswich, Rowley, Middleton, Rockport, Manchester, Amesbury, Merrimac, Boxford	171	−15	4	139
20) Franklin, Wrentham, Bellingham, Foxborough, Sharon, Walpole, Norfolk, North Attleborough	168	−15	8	145
21) Plymouth, Halifax, Carver, Pembroke, Hanson, Hanover	164	−17	7	135
22) Concord, Wellesley, Weston, Carlisle, Acton, Wayland, Sudbury, Dover, Sherborn, Westwood	164	−14	11	153
23) Auburn, Millbury, Grafton, Oxford, Spencer, Leicester, Shrewsbury, Holden, West Boylston, North Brookfield, Rutland	162	−19	4	119
24) Andover, North Reading, Tewksbury, North Andover, Dracut, Chelmsford	160	−13	7	142
25) Westford, Ayer, Littleton, Harvard, Maynard, Hudson, Clinton, Marlborough, Northborough, Southborough, Westborough, Stow, Lancaster, Sterling	157	−17	9	132
26) Medfield, Medway, Millis, Holliston, Hopkinton, Milford, Ashland	153	−16	10	134
27) Framingham, Natick	152	−14	11	140

Note: Peak and trough values are calculated based on price indexes for individual towns. Average price changes for each group are weighted based upon each town's 1980 population.
Source: Case Shiller Weiss Inc.

Table 3
Boom Period Appreciation, by City/Town Groupings and City/Town Characteristics

	Percent Change in Nominal House Prices 1982 to Peak	Percent of Residents Working in Manufacturing 1980	Median Household Income 1980	Median Single-Family House Value 1980	Assessment Test Scores 1988	School Spending Per Weighted Pupil 1980	Crimes Per 1,000 Residents 1980	Distance to Boston[a]	Percent Decrease in Public School Enrollment 1980 to 1988
Highest Quartile	214	31	$15,700	$40,300	2,490	$1,773	66	31	−15.6
Second Quartile	181	30	$19,100	$52,100	2,565	$1,900	49	21	−27.4
Third Quartile	171	29	$20,300	$54,500	2,640	$1,841	36	36	−20.5
Bottom Quartile	158	33	$24,300	$64,200	2,751	$1,962	30	30	−28.5
Mean	175	32	$21,700	$56,000	2,673	$1,837	42	32	−22.8

[a]Distance to Boston is in miles from the center of the grouping.
Source: See Table 1.

III. The Boom Period

The great boom in housing prices began in late 1984, and peaked between the end of 1987 and mid-1989, depending on the town. Single-family home prices in the average town increased 175 percent; that is, a house worth $100,000 at the beginning of the period was worth $275,000 less than seven years later. At their height, appreciation rates were nearly 40 percent per year, and the average appreciation rate was over 18 percent per year. The boom was also very broad-based, with all towns experiencing a dramatic rise in house prices. In the top seven groups of Table 2 (the top quartile), house values at least tripled. Even in the bottom two groups, average house prices appreciated at least 150 percent. A $50,000 home in the Framingham/Natick and Medfield/Medway, etc. groups in 1982 was worth about $125,000 at the market peak; that home in Fall River or New Bedford was worth about $168,000 at peak.[7]

Table 3 shows city/town characteristics for group quartiles (shown in Table 2) based on the appreciation rate from 1982 to peak. The results clearly indicate that the groups that appreciated the most had the *lowest* initial values, the *lowest* incomes, the *worst* schools, and the *highest* crime rates. These high-appreciation-rate groups saw house prices rise 214 percent and had an average median household income of $15,700 and an average median home value of $40,300 in 1980. The groups with the least appreciation saw prices rise "only" 158 percent and had an average median household income of $24,300 and an average median home value of $64,200.

The Fall River/New Bedford and Boston groups provide the most dramatic examples, with house prices rising 228 to 235 percent during the boom. Fall River/New Bedford had the *lowest* median household income among the 27 groups, at $11,600 in 1980. The City of Boston (itself a group), with appreciation second only to Fall River/New Bedford, had the second lowest median household income in 1980 at $12,500. The lower-income towns of Brockton, Bridgewater, Everett, Malden, and Taunton were also in the highest quartile of appreciation during the boom. The geographic pattern of price changes can be seen in Appendix Figure A1.

At the other end of the spectrum, the highest income grouping among the 27 in 1980 included such west suburban towns as Concord, Dover, Wellesley, and Weston, with an average median household income in 1980 of $34,100. This group was in the *lowest* quartile of towns by appreciation during the boom. The average house price increase there was just 164 percent. Also in the quartile with the least appreciation were such high-income towns as Andover and the more distant southwestern suburban group that includes Medfield, Medway, and Hopkinton.

The groups with the lowest 1980 median house values and income levels had the highest crime rates and the worst schools, as measured by test scores and

[7] In the regression analysis in Case and Mayer (1995), the most important coefficient is the one on the constant term. The constant term ranges from 1.72 to 2.08 in the boom equations with t-statistics no lower than 8.2.

Table 4
Housing Affordability,[a] 1980 and 1990: Selected Massachusetts Towns

	Median Value 1980	Median Value 1990	Income Needed to Purchase, 1980: Amount	Income Needed to Purchase, 1980: Percent of Mass. Households with Income >	Income Needed to Purchase, 1990: Amount	Income Needed to Purchase, 1990: Percent of Mass. Households with Income >
Wellesley	$99,400	$349,500	$39,760	15.3	$139,800	1.9
Belmont	$87,000	$307,800	$34,800	20.2	$123,120	3.2
New Bedford	$32,600	$115,900	$13,040	66.7	$ 46,360	34.1
Fall River	$34,100	$127,800	$13,640	66.4	$ 51,120	30.2
Brockton	$38,200	$131,700	$15,280	60.1	$ 52,680	29.8

[a]Affordability assumes that a household can afford to spend 30 percent of after-tax income on monthly payments on a 30-year fixed-rate mortgage at 8.5 percent. Ratio of affordable home to pre-tax income: 2.5.
Source: U.S. Bureau of the Census, 1980 and 1990 User Tapes.

expenditures per weighted pupil. The Fall River/New Bedford pair had the lowest average test scores, the lowest cost-adjusted per-pupil expenditures, and the third highest crime rates among the 27 groups. In contrast, four of the top six groups ranked by school test scores were in the lowest appreciation quartile, while the other two (the Belmont/Winchester and Hingham/Cohasset groups) were in the third quartile. Table 3 shows that the average crime rate among the cities and towns in the highest appreciation quartile (66 per 1,000) was twice that of the two lowest appreciation quartiles (36 and 30 per 1,000).

What explains the somewhat counterintuitive result that house values in towns with high crime rates and poor schools increased at above-average rates? Housing affordability is one likely explanation. During the boom, as house prices grew much more rapidly than incomes, the pool of potential buyers shrank faster for the more expensive towns relative to the cheaper towns, despite the fact that housing prices increased more rapidly at the bottom. For the entire Commonwealth of Massachusetts between 1980 and 1990, nominal median income increased from $19,666 to $41,678, an increase of 112 percent. During the same period, the statewide median price of owner-occupied housing rose from $51,047 to $167,450, an increase of 228 percent.[8] The ratio of median house price to median income rose from 2.6 to 4.0. The distribution of income is such that an increase in the median home price relative to income disproportionately reduces potential demand for the most expensive houses.

This point is illustrated in Table 4, which presents affordability calculations for the median-priced single-family home in three low-priced towns and two high-priced towns in 1980 and 1990. The third column shows the income needed to buy the median-priced home in each town in 1980. This calculation assumes that 30 percent of after-tax income is spent on principal and interest with a 30-year fixed-rate mortgage at 8.5 percent, which translates into a house price/income ratio of 2.5. The fourth column shows the percentage of Massachusetts households in 1980 that could afford the median-priced home in each town. For example, 15.3 percent of Massachusetts households could afford the median-priced home in Wellesley in 1980, while about two-thirds of the Massachusetts population could afford the median-priced home in New Bedford.

Columns 5 and 6 show how much more expensive housing became in the subsequent 10 years. By 1990, only 1.9 percent of households in the Commonwealth could afford the median-priced home in Wellesley, an 88 percent reduction in the pool of potential buyers, while slightly over one-third of households could afford the median-priced New Bedford home, a decrease of 51 percent. Put simply, as the distribution of home prices rose, potential buyers were priced out of the high-priced towns, disproportionately increasing demand for houses in low-priced towns. Case and Shiller (1994) show that the home-ownership rate among middle-income households in-

[8] In fact, the median house price increased faster than average house prices over the same time period, in part because of changes in the mix of sold properties and new construction of above-average-price houses.

creased significantly during the boom in Massachusetts. This rush to home ownership clearly was concentrated in the low-priced towns, which were the only towns with houses that middle-income households could afford to buy.

Also apparent from the data shown in Table 3 is the relatively large increase in house prices in towns with poorer-quality schools, at least as measured by assessment test scores.[9] Because homes in good school districts command a premium over homes in lesser districts, other things equal, this result suggests that those premiums declined between 1982 and 1988.[10]

The boom in housing prices was very broad-based, with all cities and towns experiencing a dramatic rise in house prices, but the groups that appreciated the most had the lowest initial values, the lowest incomes, the worst schools, and the highest crime rates.

While slower price appreciation for homes in towns with good schools may seem counterintuitive at a time when incomes were rising, a powerful explanation can be found in school enrollment figures. Enrollment in public elementary and secondary schools (K–12) in Massachusetts dropped 13 percent between 1982 and 1988, while enrollments nationwide dropped 2 percent. The drop in overall enrollments was the largest among the 50 states.[11] Since enrollment rates in Massachusetts actually increased during the period, the phenomenon seems to be almost entirely demographic. That is, fewer children of school age lived in Massachusetts in 1988 than in 1982. The public school enrollment decline was made worse by a relative increase in enrollments in private elementary and secondary schools.

In addition, the pattern of enrollment declines is consistent with the view that affordability problems led households with children to disproportionately locate in towns with lower house prices, even if those towns had worse-than-average schools. The right-hand column of Table 3 shows the enrollment declines (per capita) by grouping quartile. Between 1980 and 1988, per capita enrollments dropped 15.6 percent in the highest-appreciation quartile, while they dropped more than 28 percent in the lowest-appreciation quartile.

Whether because of demographics or an increase in the popularity of private schools, fewer home buyers were concerned with the quality of public schools in 1990 than in 1980, and thus the premium associated with good schools fell.

IV. The Bust Period

Beginning in 1989, housing prices began to fall. An excess supply of properties on the market, a national recession, and an even more severe regional recession all began to take their toll. After some initial resistance,[12] nominal prices fell. The mean nominal decline from peak to trough across the 168 towns was 15.8 percent. The biggest drop was in Boston (22 percent) followed closely by the Lawrence/Lowell, Brockton/Bridgewater, and Fitchburg/Leominster groups (21 percent each). The smallest declines were along the South Shore in the Hingham/Cohasset group (11 percent), and in the Belmont/Winchester group (11 percent). The geographic pattern of price declines is shown in Appendix Figure A2.

Table 5 shows bust-period depreciation for city/town groups ranked by the quartile of the price change from peak to trough. In towns in the quartile with the greatest declines, prices overall fell by more than 20 percent, while prices in the quartile with the smallest declines fell by just over 12 percent.

Consistent with the findings in Case and Mayer (1995), house price declines were the steepest in the cities and towns with a large percentage of manufacturing workers. The quartile with the sharpest drops in value had 38 percent of residents employed in the

[9] In fact, Case and Mayer (1995) found that school test scores were significant and had a negative effect on appreciation rates during the boom, even controlling for initial median house value and other town characteristics. Unfortunately, assessment tests were only given beginning in 1988 and are not available for the start of the sample period.

[10] See Yinger et al. (1988) for a survey of the literature on school quality and home prices.

[11] The enrollment data come from the U.S. Bureau of the Census, *Statistical Abstract of the United States*, 1994, Table 242, from the U.S. Department of Education, *Digest of Educational Statistics*, 1988 and 1993, and the Massachusetts Department of Education.

[12] See Case (1991 and 1994) for a discussion of price dynamics during the period, and Case and Shiller (1994) for a discussion of behavior by price tier.

Table 5
Bust Period Depreciation, by City/Town Groupings and City/Town Characteristics

	Percent Change in Nominal House Prices Peak to Trough	Percent of Residents Working in Manufacturing 1980	Median Household Income 1980	Median Single-Family House Value 1980	Assessment Test Scores 1988	School Spending Per Weighted Pupil 1988	Crimes Per 1,000 Residents 1988	Distance to Boston[a]
Highest Quartile	−20.3	38	$15,500	$39,800	2,502	$2,751	63	40
Second Quartile	−17.9	32	$18,600	$45,800	2,568	$3,025	36	39
Third Quartile	−14.6	28	$22,000	$59,600	2,659	$3,732	29	19
Bottom Quartile	−12.3	23	$23,200	$66,000	2,712	$3,935	32	16
Mean	−15.8	32	$21,700	$56,000	2,673	$3,505	29	32

[a]Distance to Boston is in miles from the center of the grouping.
Source: See Table 1.

manufacturing sector in 1980, while in the quartile with the smallest drops only 23 percent were manufacturing workers.

Manufacturing employment is particularly significant, since Massachusetts lost nearly 120,000 manufacturing jobs between 1988 and 1992 while gaining almost 17,000 services jobs.[13] For this analysis, information on the location of lost manufacturing jobs would have been preferable, but it is not available from the decennial Census data. Instead, the Census provides data on the industry of employment for each town's residents. With the relative decline in manufacturing jobs, towns containing larger concentrations of manufacturing workers ultimately experienced the biggest home price declines during the bust. The analysis in Case and Mayer (1995) finds that the 1980 percentage of manufacturing workers is correlated with larger price declines, even after controlling for changes in income between 1980 and 1990. That analysis suggests that the percentage of manufacturing workers who live in a town is proxying for the proximity of that town to manufacturing jobs, presumably because workers choose to live close to where they work.

In particular, the four largest concentrations of manufacturing workers in 1980 were in the Fall River/New Bedford (50 percent), Lawrence/Lowell (46 percent), Uxbridge/Blackstone (46 percent), and Fitchburg/Leominster (44 percent) groups, which also had some of the largest percentage declines in house values. Boston itself is an outlier in this analysis. Only 16 percent of its residents were employed as manufacturing workers in 1980, but Boston suffered the largest percentage drop in home value (−22 percent).

Table 5 also shows that the communities where house prices fell further had the lowest incomes and the highest crime rates. In other words, many of the towns that experienced the biggest price run-ups during the boom, fell the furthest during the bust. The 1980 median household income for the town groups in the quartile with the greatest losses was $15,500, much lower than the median income of the other three groups.

Similarly, the cities and towns with the greatest declines in house prices had poorer schools, as measured by average test scores and spending per weighted pupil, than those with smaller losses in house values. The three groups with the lowest test scores, Lawrence/Lowell, Fall River/New Bedford, and Boston, were in the quartile with the greatest price declines, while the highest test scores were in the west suburban group of Concord/Wellesley, a group in the quartile experiencing the smallest losses.

With the obvious exception of Boston itself, distance from Boston also was strongly associated with price changes during the bust. The final column of Table 5 clearly shows that the price declines were more prevalent in towns that were located farther out from Boston.[14] The increased importance of proximity to Boston may be related to the increased importance of service sector in the economy. Many service sector jobs are located in downtown Boston's 50 million square feet of office space. In fact, Boston is the fifth largest office market in the United States.[15]

[13] Data from the *New England Economic Indicators* data base.
[14] The distance calculation excludes Boston proper.
[15] *CB Commercial*/Torto-Wheaton, quarterly.

Table 6
Recovery Period Appreciation, by City/Town Groupings and City/Town Characteristics

	Percent Change in Nominal House Prices Trough to Mid-1994	Percent of Residents Working in Manufacturing 1990	Median Household Income 1990	Median Single-Family House Value 1990	Asessment Test Scores 1992	School Spending Per Weighted Pupil 1992	Crimes Per 1,000 Residents 1992	Distance to Boston[a]
Highest Quartile	9.3	21	$57,100	$213,400	2,843	$4,913	15	26
Second Quartile	6.0	22	$43,600	$178,600	2,696	$4,039	29	32
Third Quartile	3.6	23	$38,900	$163,100	2,643	$3,708	27	28
Bottom Quartile	1.3	22	$31,000	$143,800	2,497	$3,250	50	33
Mean	5.7	23	$46,500	$185,500	2,750	$4,200	31	32

[a]Distance to Boston is in miles from the center of the grouping.
Source: See Table 1.

V. The Recovery Period

For some cities and towns, the period since 1991 has seen substantial recovery in home prices; for others, prices continue to fall. In fact, the pattern of relative price changes observed during the bust period has continued into the recovery. The town groups that experienced the biggest declines during the bust seem to have recovered the least between their trough values and 1994, while the towns that suffered the smallest declines during the bust seem to have recovered the most. That is, house prices in towns with the highest incomes, the lowest crime rates, the best schools, and smallest distance to Boston have risen at above average rates.

Table 6 presents the city/town groups ranked by the percentage increase in prices between the date of the town-specific trough and the middle of 1994. The highest quartile experienced house price appreciation of 9.3 percent while the lowest quartile saw nominal house prices increase only 1.3 percent. The geographic pattern of price changes during the recovery is shown in Appendix Figure A3.

Although the town characteristics associated with price changes in the bust and the recovery are similar, manufacturing employment provides one exception. Column 2 of Table 6 shows that the four quartiles have virtually identical 1990 concentrations of manufacturing workers. As is clear from Column 3, however, household income appears to play an even greater role during the recovery than it did in earlier periods. Median 1990 household income in the towns in the quartile with the largest percentage house price increases in the recovery averaged $57,100, which was 84 percent higher than the $31,000 median income in the towns in the bottom quartile. Specifically, groups such as Concord/Wellesley ($75,000) and Plymouth/Halifax ($41,960) were in the top quartile, while the lowest quartile includes the Fall River/New Bedford ($22,500), Worcester ($28,960), and Boston ($29,180) groups.

Average appreciation rates for house prices were also higher for towns with higher 1992 school assessment test scores. Test scores in the highest quartile averaged 2,843 during the recovery, 14 percent higher than the average score in the lowest quartile. In addition, spending per weighted pupil in the highest quartile averaged about 50 percent more than expenditures in the lowest quartile.

Massachusetts school enrollments, which had fallen so sharply prior to 1988, reversed sharply after that time and provide one reason for the greater turnaround in house prices in towns with good schools. Indeed, demographic projections for the 1995–2000 decade suggest an increase in public primary and secondary school enrollments (K–12) in Massachusetts of 50,000 or 5.5 percent, and an increase in high school (9–12) enrollments of 12 percent.[16]

Another reason for the faster recovery of house prices in high-income, high-priced towns was the reversal of the affordability problems that many of these towns faced in the mid-1980s. The decline in housing prices beginning in 1989 and 1990 and the drop in mortgage interest rates between 1990 and 1993

[16] See U.S. Department of Education, National Center for Educational Statistics, *Projections of Education Statistics to 2005*, January 1995.

reduced the monthly payments for new home owners. Interest rates for conventional 30-year fixed-rate mortgages fell from over 10 percent in 1990 to under 7 percent by 1993.[17]

In addition, trade-up buyers who owned a home during the boom period found themselves with a large amount of equity, which did not disappear during the bust. Recall that house prices in the average town grew 175 percent in the boom, but fell only 16 percent during the bust, for a total nominal increase of 131 percent. Finally, many members of the baby boom generation had moved into their prime earning years by 1990.

Thus, while median household incomes in Massachusetts did not grow during the early 1990s,[18] households in the upper-middle income brackets saw their incomes rise.[19] While precise calculations are difficult in non-Census years, the pool of potential buyers for houses in the more expensive city/town groups expanded relatively more during the 1990s than did the pool of potential home buyers for properties in the less expensive city/town groups.

VI. Conclusions

The dramatic housing cycle that swept the Eastern Massachusetts housing market between 1982 and 1994 had very disparate impacts on different cities and towns. Between 1982 and the end of the boom, housing prices grew more rapidly in lower-income towns with lower initial home prices and less rapidly in towns with higher incomes and higher initial home values. Several explanations are apparent. First, as housing prices increased more rapidly than incomes, higher-priced towns became unaffordable to all but a very small percentage of Massachusetts households. Thus, the number of potential buyers shrank more at the high end of the market than it did at the low end. In addition, declining school enrollments in the 1980s reduced the relative importance of good schools to potential home owners, resulting in a relatively slower increase in home prices in cities and towns with high-quality schools.

During the bust and the subsequent recovery periods, however, higher-income cities and towns did much better relative to lower-income areas. That is, the cities and towns in which house prices fell more during the bust period and showed little sign of recovery by the middle of 1994 had lower median incomes, lower-quality schools, and higher crime rates, and they were farther from Boston. Areas with smaller price declines in the bust and more recovery since were those with higher incomes, better schools, and less crime, and areas with better access to Boston. In fact, house prices in many affluent cities and towns in Eastern Massachusetts have exceeded their previous peak.

Housing affordability was the most important factor explaining price changes during the boom period, but location, schools, and a town's employment base became relatively more consequential during the bust and the recovery.

Several factors seem to explain the pattern since the peak of the market. The decline of manufacturing in the Commonwealth has hurt towns with higher concentrations of manufacturing workers, which are mostly located around the periphery of the Boston metropolitan area, and has benefited towns with better access to the service sector jobs located in and around the City of Boston. The actual and projected increases in public school enrollments during the 1990s have helped towns with high-quality schools. Finally, changes in interest rates and demographics, the drop in home values, and the build-up of housing equity accumulated during the boom have combined to make higher-priced towns accessible to more potential buyers. The increase in the number of potential buyers in high-priced towns was significantly greater during the early 1990s than was the case for lower-priced towns. In a sense, with increased affordability, a shift to quality occurred, along with an increase in demand for cities and towns with strong fundamentals.

The pattern of price changes over the whole cycle presents an interesting picture. During the boom, the towns with initially lower prices gained the most, compressing the distribution of home values. That is,

[17] *Economic Report of the President*, 1995.

[18] *Statistical Abstract of the United States*, 1994, Table 713.

[19] U.S. Bureau of the Census, household income statistics from the 1993 Current Population Survey, press release received by fax February 1995.

the price differential between the more expensive towns and the less expensive towns shrank during the boom as demand shifted toward more affordable sub-markets. During the subsequent bust and recovery periods, the distribution of home values widened again. Through mid-1994, however, the gap remains smaller than it was in 1982. The right-hand column of Table 2 shows that the overall change in home values over the entire cycle has been the largest in the lower-priced groupings.

If the trend of 1991–94 continues, however, it will not be long before the distribution of home prices across towns looks much as it did in 1982. This trend has at least two possible interpretations. One might argue that the equilibrium prices prior to the boom were consistent with the distribution of town characteristics, and that the boom period created a temporary distortion. Thus, the current trend could be interpreted as a simple restoration of the "correct" equilibrium price structure.

Alternatively, it could be argued that amenities changed over the period, initially to favor towns at the lower end of the price range and subsequently to favor towns at the higher end. Certainly the pattern of school enrollments and sectoral changes in employment provides support for this second hypothesis. Nonetheless, because the evidence in Eastern Massachusetts is consistent with both scenarios, additional evidence will be needed to determine the extent to which fundamental factors explain short-run variations in house prices across cities and towns within a metropolitan area.

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Appendix Table 1

Submarket Groups of Cities and Towns: Population-Weighted Means of Data

Submarket Group	Median Household Income 1980 $	Median Household Income 1990 $	Median Single-Family House Value 1980 $
1) Fall River, New Bedford	11,570	22,550	33,330
2) City of Boston	12,530	29,180	36,000
3) Acushnet, Fairhaven, Mattapoisett, Marion, Westport, Wareham	16,170	33,940	40,190
4) Attleboro, Taunton, Rehoboth, Somerset, Seekonk, Swansea	18,100	36,640	41,740
5) Brockton, Bridgewater, East Bridgewater, West Bridgewater	16,390	34,360	39,970
6) Raynham, Norton, Middleborough	17,680	39,750	40,680
7) Everett, Saugus, Malden, Medford	17,410	36,170	50,000
8) Braintree, Qunicy, Randolph, Rockland, Abington, Whitman, Stoughton, Holbrook	18,610	37,380	44,960
9) Lawrence, Lowell, Methuen, Haverhill	14,480	28,590	43,120
10) Cambridge, Waltham, Arlington, Watertown	17,320	38,050	61,720
11) Salem, Peabody, Danvers, Beverly, Marblehead, Lynn, Swampscott	18,220	37,280	52,670
12) Dedham, Norwood, Canton, Milton	24,110	50,510	60,790
13) Woburn, Burlington, Reading, Wakefield, Melrose, Stoneham, Lynnfield, Billerica, Bedford	23,450	48,490	60,200
14) Fitchburg, Leominster, Lunenburg, Westminster, Gardner, Ashburnham, Shirley, Princeton, Groton, Pepperell, Townsend, Tyngsborough, Templeton	17,240	36,170	41,280
15) Uxbridge, Blackstone, Hopedale, Upton, Southbridge, Webster, Douglas, Mendon	15,600	34,860	41,770
16) Hingham, Cohasset, Norwell, Marshfield, Hull, Duxbury	24,110	53,820	61,370
17) Worcester	14,120	28,960	35,500
18) Belmont, Winchester, Newton, Lexington	27,310	60,930	83,360
19) Gloucester, Topsfield, Ipswich, Rowley, Middleton, Rockport, Manchester, Amesbury, Merrimac, Boxford	19,700	42,610	59,330
20) Franklin, Wrentham, Bellingham, Foxborough, Sharon, Walpole, Norfolk, North Attleborough	22,530	49,600	53,790
21) Plymouth, Halifax, Carver, Pembroke, Hanson, Hanover	18,640	41,960	46,130
22) Concord, Wellesley, Weston, Carlisle, Acton, Wayland, Sudbury, Dover, Sherborn, Westwood	34,100	75,020	96,430
23) Auburn, Millbury, Grafton, Oxford, Spencer, Leicester, Shrewsbury, Holden, West Boylston, North Brookfield, Rutland	20,340	40,870	43,380
24) Andover, North Reading, Tewksbury, North Andover, Dracut, Chelmsford	24,520	53,420	65,360
25) Westford, Ayer, Littleton, Harvard, Maynard, Hudson, Clinton, Marlborough, Northborough, Southborough, Westborough, Stow, Lancaster, Sterling	21,720	46,650	56,640
26) Medfield, Medway, Millis, Holliston, Hopkinton, Milford, Ashland	23,550	50,930	59,730
27) Framingham, Natick	21,630	44,900	63,390

Source: U.S. Bureau of the Census; Massachusetts Department of Education; Massachusetts Department of State Police.

(continued)

Appendix Table 1 continued

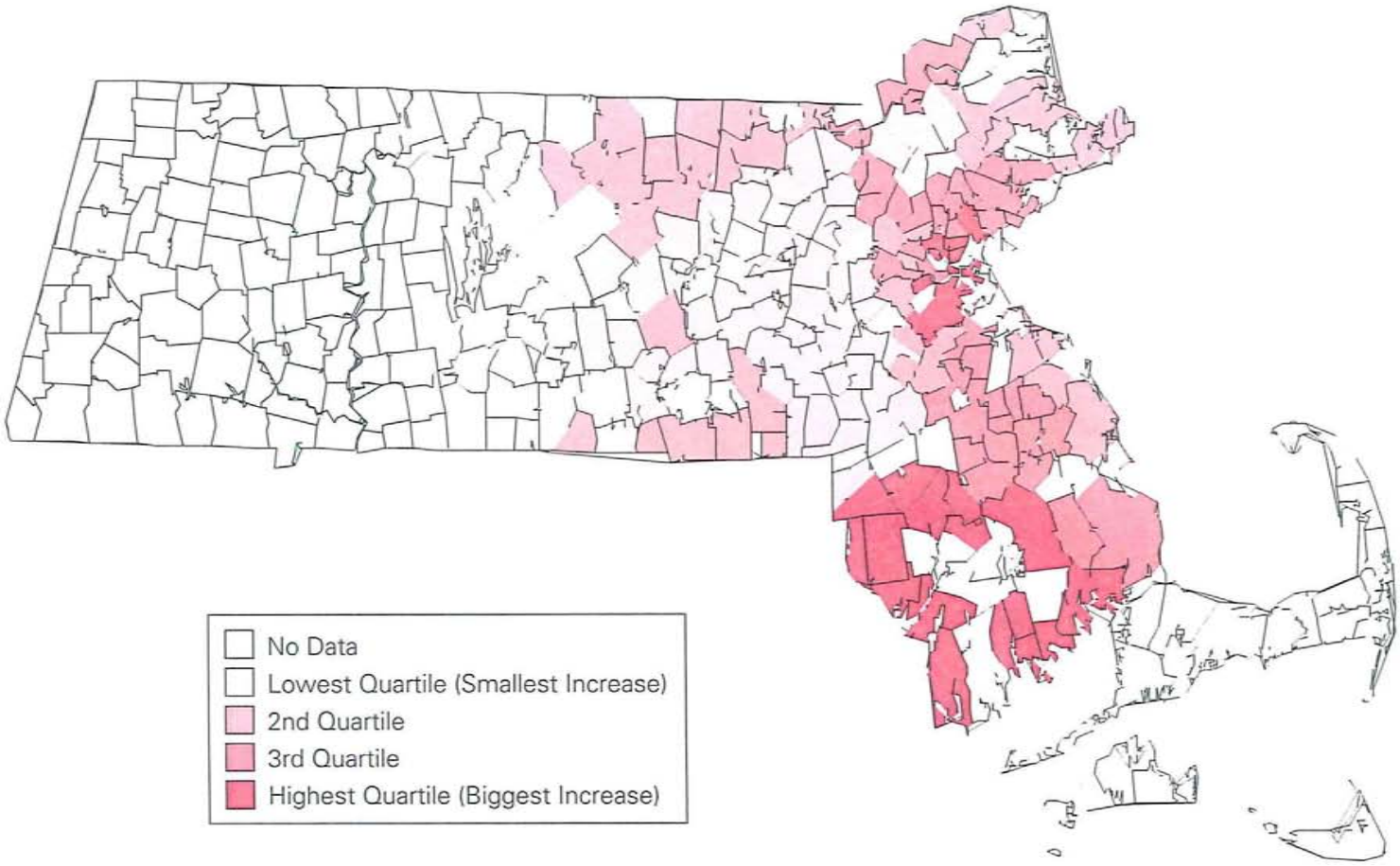
Submarket Groups of Cities and Towns: Population-Weighted Means of Data

Assessment Test Scores 1988	School Spending Per Weighted Pupil 1980 $	Crime Per 1,000 Residents 1980	Percent of Residents Working in Manufacturing		Miles to Boston	Percent Decrease in School Enrollment 1980 to 1988
			1980	1990		
2,326	1,465	7	50	34	54	−.2
2,390	2,403	13	16	12	0	−18.7
2,542	1,811	5	28	21	57	−4.6
2,522	1,627	5	38	26	40	−18.9
2,551	1,643	8	28	20	25	−17.4
2,595	1,548	4	31	22	37	−16.1
2,502	1,911	4	23	17	8	−33.1
2,614	2,016	5	22	15	12	−49.0
2,367	1,503	6	46	34	32	−5.4
2,584	2,377	6	20	16	6	−25.7
2,518	1,838	6	30	22	18	−23.6
2,589	1,984	4	18	14	13	−31.9
2,653	1,855	3	29	20	14	−30.8
2,628	1,726	4	44	33	51	−25.5
2,564	1,578	3	46	33	72	−8.6
2,765	1,898	5	19	13	25	−27.2
2,400	1,866	1	30	21	42	−8.9
2,903	2,447	4	17	14	12	−28.0
2,665	1,766	4	32	24	34	−24.1
2,710	1,680	3	36	24	29	−27.0
2,474	1,653	5	23	15	38	−19.5
2,948	2,588	3	23	19	19	−26.1
2,685	1,679	3	34	24	45	−35.6
2,750	1,826	3	36	27	30	−28.6
2,717	1,695	3	44	33	31	−23.3
2,723	1,847	2	33	25	31	−28.0
2,681	2,135	4	27	19	23	−29.2

Figure A1

Changes in House Prices by Quartile, 1982 to Peak

Town Groups

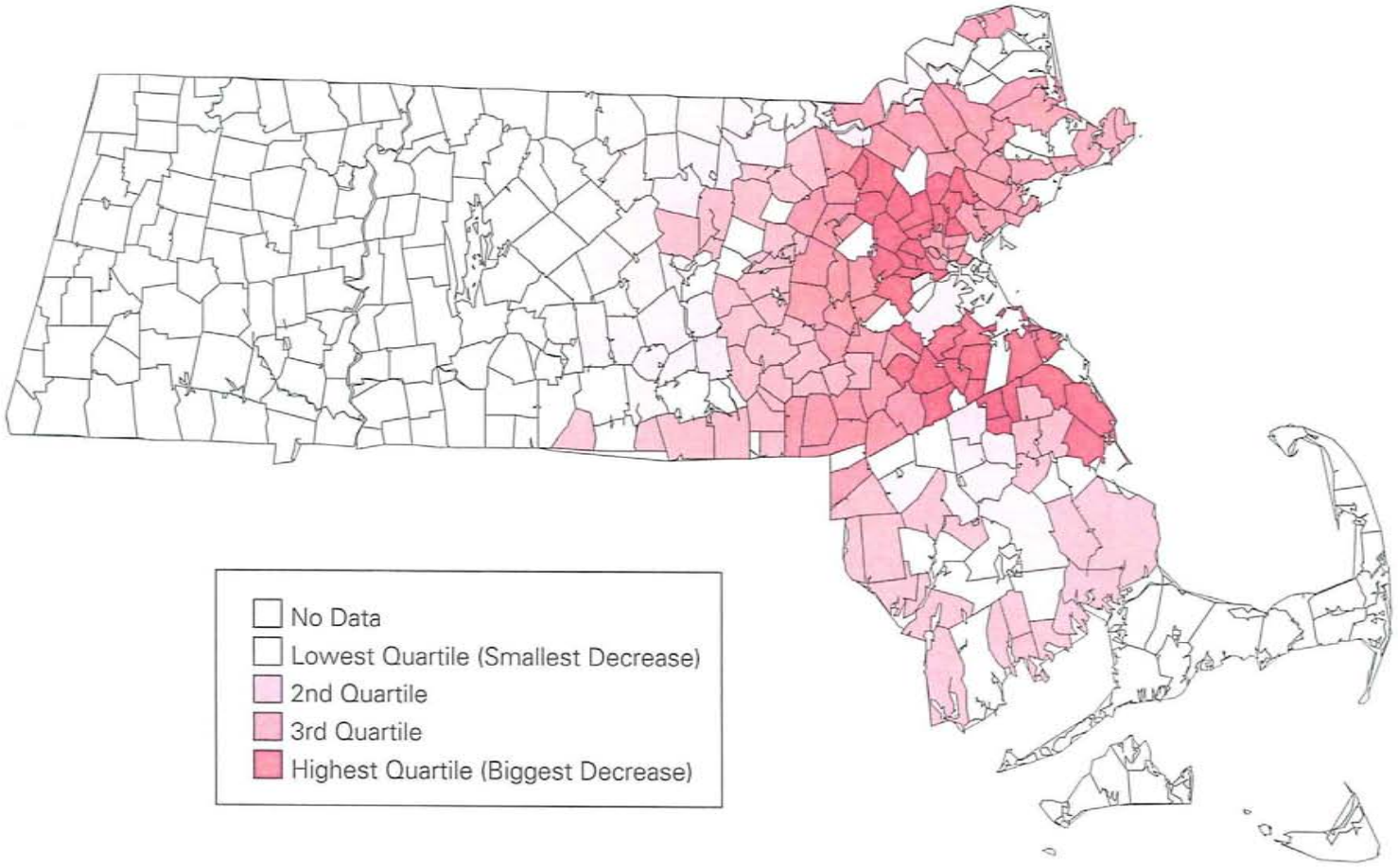


Source: Case Shiller Weiss Inc.

Figure A2

Changes in House Prices by Quartile, Peak to Trough

Town Groups

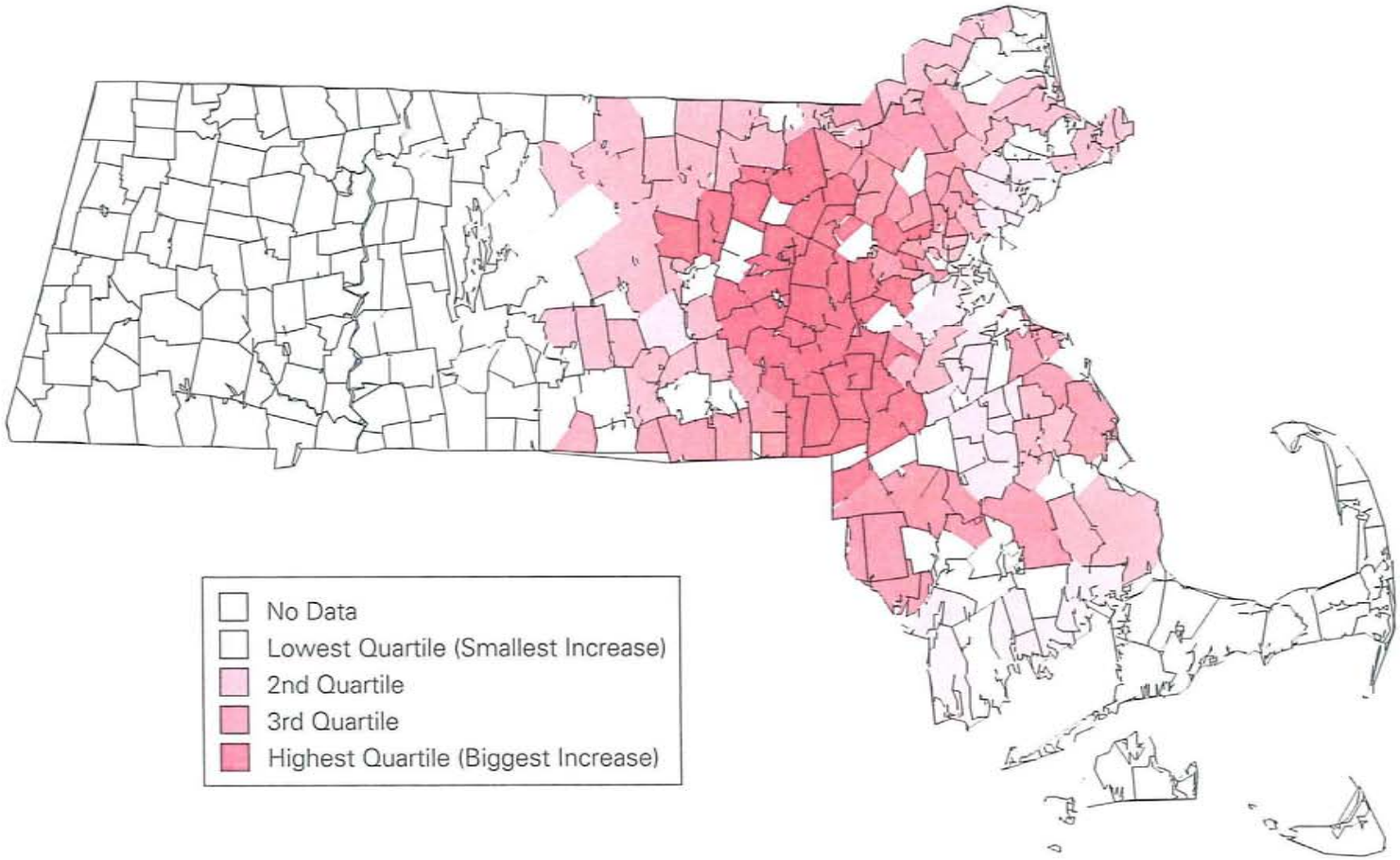


Source: Case Shiller Weiss Inc.

Figure A3

Changes in House Prices by Quartile, Trough to 1994

Town Groups



Source: Case Shiller Weiss Inc.