The Fiscal Impact of New Housing Development in Massachusetts: A Critical Analysis

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A Critical Analysis

For Citizens' Housing and Planning Association
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University of Massachusetts Donahue Institute
Economic and Public Policy Research Unit

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The Fiscal Impact of New Housing Development in Massachusetts: A Review of Current Theory and Municipal Data

UMass Donahue Institute
Office of the President
University of Massachusetts

1 Introduction

There has been a great deal of news recently about the rising prices of housing in Massachusetts. There have been 380 articles in the past year on housing in the Boston Globe alone, according to Lexis-Nexis, and most of these discuss the lack of, construction of, or need for affordable housing units.[1] One of the reasons cited for the increase in housing prices is the lack of construction of new housing units in all price ranges.

Virtually all new housing construction in Massachusetts is controlled and regulated at the local level. Within the confines of state law, municipalities have the right to adopt zoning and subdivision regulations as they see fit, and to issue or deny building permits and subdivision certifications. Recently, there have been some criticisms of how many municipalities in Massachusetts make these decisions, as they are seen as supporting efforts to curb development instead of regulate it more effectively. The major reasons used by municipalities to deny new construction within their borders are environmental protection, historic preservation, traffic control, and fiscal impact. The fiscal impacts of new development are an important factor for municipalities to consider, but these impacts are seen to greatly affect the development of affordable housing, where fiscal impact models are sometimes used as a basis for denying development rights based on the costs of the development to municipal services, especially school systems.

Because of this, the UMass Donahue Institute (UMDI) was asked by the Citizen's Housing and Planning Association (CHAPA) to analyze the fiscal impact of housing on municipalities, including examining the assumptions that lie behind the models relied upon by many cities and towns. As the Per Capita Multiplier Method is the most common method used for fiscal impact analysis,[2] this report concentrates on examining its accuracy and the underlying trends that would affect its ability to create reliable forecasts. We examined the methods used to forecast population in newly-constructed housing units and how well they work in practice. In addition, we examined trends in municipal expenditures and revenues for trends in municipal finance that could affect fiscal impact analysis. It is hoped that such an examination will make it easier for municipalities and developers to understand the real impacts of development and will

[1] According to a September 17, 2002 search for headlines containing "Housing" in the Lexis-Nexis Academic Universe Database.

[2] Burchell, R., D. Listokin and W. Dolphin, 1985. *The New Practitioner's Guide to Fiscal Impact Analysis*, New Jersey, Center for Urban Policy Research. P. 6.

create a more robust model of the effects of development on municipalities within Massachusetts.

1.1 Methods and Data Sources

After reviewing the available data and the various methods used to perform fiscal impact analysis in communities across the nation, we chose the methods and data to research our study topic that we felt were the most straightforward to understand and relied on publicly available and accurate data.

UMDI generally concentrated on studying the time period between 1990 and 2000. We chose this time period because it fits with accurate population data released from the decennial Census of Population by the U.S. Bureau of the Census. We also used data from the Division of Local Services of the Massachusetts Department of Revenue (DLS). Both of these data sources are publicly available and can easily be downloaded from Internet web sites. Unfortunately, while Census data was available from 1980, not all the DLS data was available that far in the past. We also used data from the Massachusetts Department of Education whenever it was applicable. A chart of the data sources and types is below.

Table 1.1 Data Source Table

Data Provider	Data Title	Data Type	Time Period
U.S. Bureau of the Census	Decennial Census	Population Change Housing Unit Type and Change	1990 and 2000
Dept. of Revenue, Division of Local Services	Municipal Data Bank	Municipal Revenues by Source Municipal Expenditures by Type State Aid by Type Property and Parcel Tax Data Other Various Data	1990 through 2000
Dept. of Education	School District Data	School Population School Budget Data	1990 through 2000

- **Inflation Adjustment**: All dollar amounts were standardized to Year 2000 values using the Consumer Price Index from the Bureau of Labor Statistics. The index for "all urban consumers" for the United States was used for adjustment (U.S. All items, 1982-84=100 - CUUR0000SA0). Dollar amounts for years after 2000 were brought back to 2000 values for comparison purposes.

- **Per capita values** for municipal expenditures and revenues were calculated using relatively accurate municipal population data from both the 1990 and 2000 decennial Census' sample count data files (STF/SF3 data).

- **Per pupil values** were calculated by using data from the Department of Education on Net Average Membership of Pupils, which apportions the number of pupils sent to a public school system by municipality even if that municipality is part of a regional school system.

- **Population estimates** were calculated using 1990 Public Use Microdata Sample (PUMS) data from the 5 percent sample. Unfortunately, 2000 Census PUMS data was not available in time to be used in this report

- **Population Growth Ranks** were calculated by assigning a quintile rank to each municipality in Massachusetts based on their population growth from 1990 to 2000. These quintiles (or fifths) each contain 70 municipalities, except for the third, which contains 71. The quintiles were automatically generated in SPSS.

- **Kind of Community** codes were created in 1985 for the Massachusetts Department of Education. While they are now somewhat dated, they still describe most towns fairly accurately and have become a coding system that is used by various agencies in Massachusetts, and are therefore a standard that can be used for comparison purposes.

All data was processed in either SPSS v.11.0 or Microsoft Excel 2000. All maps were generated using Maptitude v.4.5 using data from the Massachusetts Geographic Information Systems Agency (MassGIS) of the Executive Office of Environmental Affairs.

1.2 Limitations of the Study

As in any research, this study has certain limitations brought on by the availability of data and the types of analyses used.

- Because accurate population data was not available for years other than 1990 and 2000, the comparison gap for the Per Capita Multiplier Method analysis is 10 years. This may exaggerate differences or changes in per capita spending over a smaller gap of one year. However, year-to-year comparisons using estimated population data between 1990 and 2000 also showed differences in per capita spending that were sometimes quite significant. This was partly attributable to the fall in state aid and tax receipts after the recession of the early 1990's and the subsequent rebounding of both local and state revenues.

- Using graphical representations of median data points, as are used to represent most trends in per capita expenditures and revenues, can mask the wide variation in each data category. For clarity, we decided not to use error bars or other graphical representations of the range of data points within each category. The reader should always be aware, however, that the median is simply the middle measurement of a wide range of data and is only used to illustrate trends.

- We chose to separate municipalities into five different rankings (or quintiles) based on their population growth rates from 1990 to 2000 to make analysis easier. These quintiles consist of equal numbers of municipalities (70 in each, except for the third which contains 71). This was done to make a grouping scheme that was easy for the reader to understand. We believe that using five equal categories, or "bins," to contain data avoids the problem of "binning." Binning occurs when the size of the "bins" chosen for analysis are so large that they obscure relevant data. Even so, some data is lost whenever any categorizations of this sort are made.

- Using 1990 Public Use Microdata Sample (PUMS) data misses any changes in household composition that may have occurred from 1990 to 2000. Also, PUMS data from the 5 percent sample is aggregated into regions called Public Use Microdata Areas, or PUMAs, which must contain at least 100,000 persons. These large areas do not allow town-by-town estimates of household populations that could be used for forecasting purposes.

- This study did not examine capital expenditures (for durable items such as new buildings, etc.). While these are an important part of municipal spending, we felt that achieving a concise and clear answer on the changes over time in capital expenditures would be difficult due to the details of public financing that we would need to collect. Instead, we chose to use debt service payments as a proxy for capital expenditure changes as the data was easily available and is directly related to new capital expenditures.

- State aid for education is given directly to regional school systems and does not appear in either the expenditures or revenues of the municipalities that belong to them. Conversely, state aid for education does appear in the budgets of municipalities that operate their own school systems. Therefore, comparing education expenditures on a municipal level is difficult. While we could have apportioned state aid to regional school systems to the member towns per pupil, we felt that this would be an artificial solution. Instead, we have separated out the effects of state aid for education in certain charts throughout the report so that municipalities can be compared without education expenditures and aid included. The reader should be aware, however, that the total amount of state education aid disbursed to school systems is not included in this analysis.

- Due to the individual nature of cities and towns in Massachusetts, it is difficult to compare them to each other. The decisions made in each municipality affect how monies are collected and expended, and each municipality has different priorities that stem from the different wishes and needs of its citizens. Therefore, any comparison that tries to fit these various municipalities into simple categories will miss these individual variations.

2 Demographic and Municipal Revenue Trends

2.1 Demographic Changes 1990-2000:

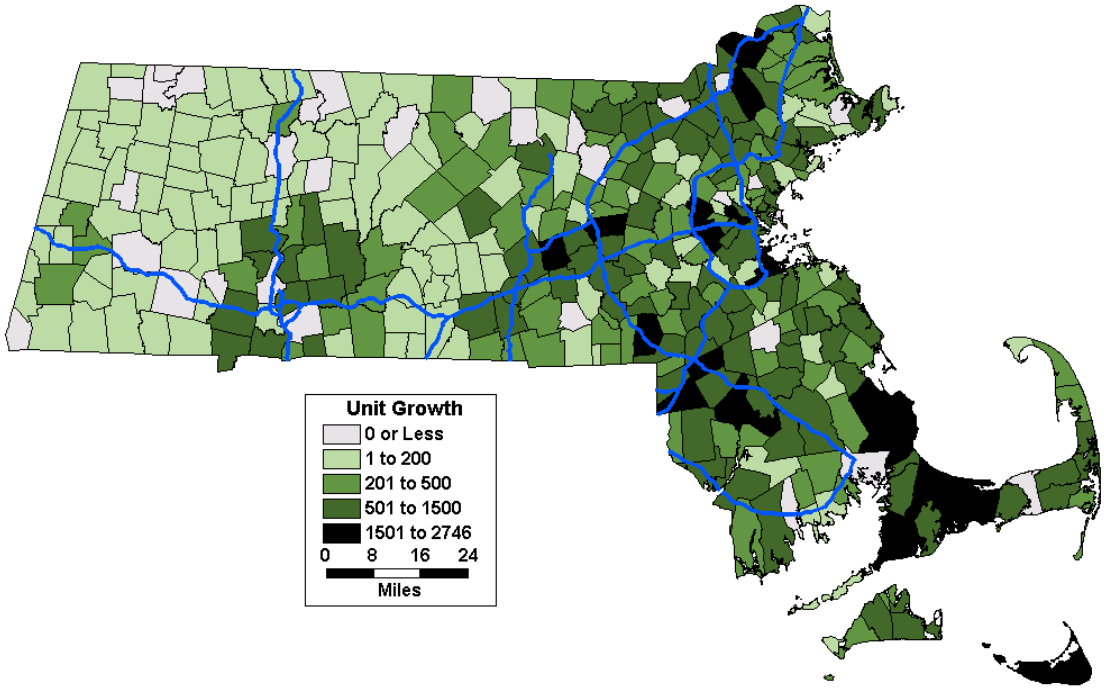
With the recent release of the year 2000 decennial census, we now have a reliable data source for performing recent comparisons over time. According to the census, the population of the Commonwealth grew 5.5 percent between 1990 and 2000.[3] This is much less than the 13 percent growth seen for the nation overall. However, number of households in Massachusetts increased almost 9 percent, compared to almost 15 percent for the nation. The number of housing units lagged this growth, however. Massachusetts saw an increase of 6 percent between 1990 and 2000, while the nation saw an increase of slightly over 13 percent. To ensure that there are enough housing units to house all newly-created households, these growth rates should be roughly equal.

Most of the growth in households has been housed in existing vacant units. In 1990, the vacancy rate for housing in Massachusetts was 10 percent in total, with a 1.7 percent owned vacancy rate and a 6.9 percent rented vacancy rate. In 2000, the vacancy rate was 6.8 percent of all housing, with rental housing reporting a 3.5 percent vacancy rate and owner-occupied housing reporting vacancy rates of less than one percent.[4]

As shows in figure 2.1, most of the growth in population and housing in Massachusetts occurred within the 495 beltway. There was also a significant amount of growth in the Springfield Metropolitan Statistical Area (MSA). Except for this area, there was little numeric growth in the western part of Massachusetts. However, looking at percentage growth rates shows a different story. Many of the highest percentage growth rates occurred in small towns that would be considered "exurban", or in regions beyond suburbs that were often rural in nature. Even so, there were still high percentage growth rates within the 495 beltway and in southeastern Massachusetts. Figure two illustrates these trends. Measuring both numeric growth rates and percentage growth can best find where the stresses of growth are being felt.

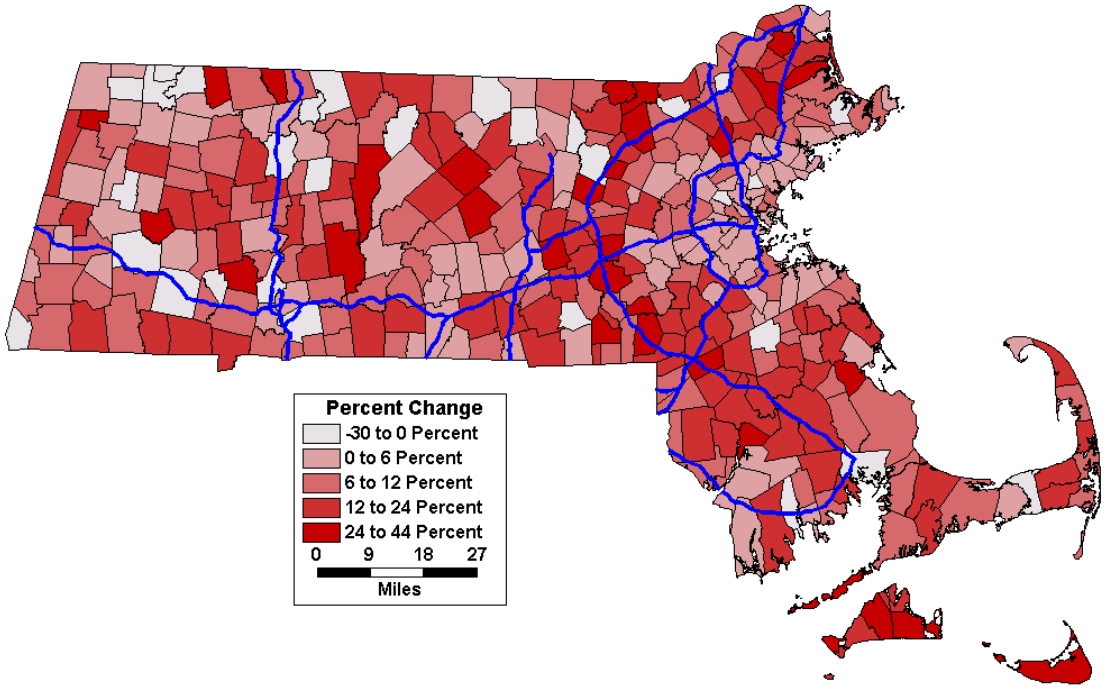
[3] http://quickfacts.census.gov/qfd/states/25000.html
[4] U.S. Census Bureau, 1990 and 2000 Decennial Censuses

Figure 2.1 Growth in the Total Number of Housing Units By Town, 1990 to 2000



Source: Decennial Census, 1990 and 2000, U.S. Census Bureau

Figure 2.2 Percentage Growth in Housing Units By Town, 1990 to 2000



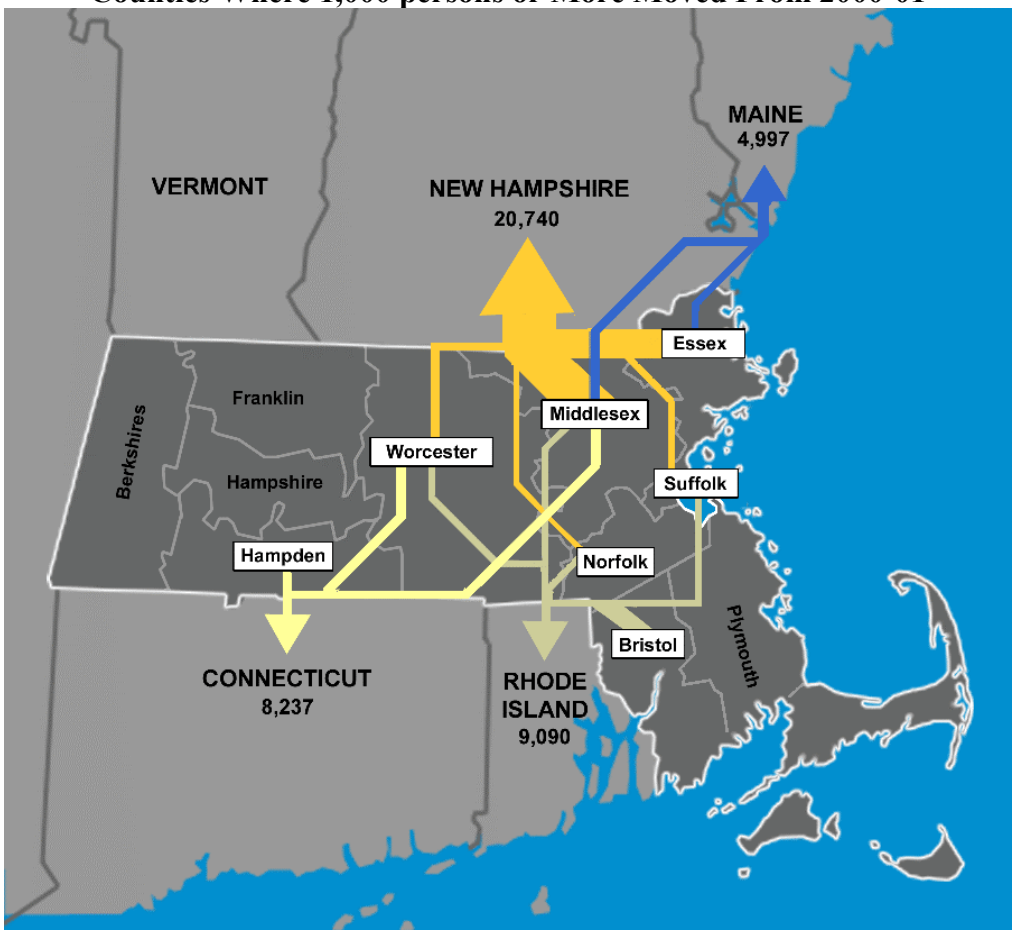
Source: Decennial Census, 1990 and 2000, U.S. Census Bureau

2.2 Out-Migration from Massachusetts[5]

One of the trends observed over the last ten years is the out-migration of people from Massachusetts to other states, most notably to other New England states. While definitive data on the reasons for this movement is hard to obtain, many researchers believe that people are moving partly due to the high cost of housing in Massachusetts. A June 2002 article in *Massachusetts Benchmarks* analyzed migration patterns from 2000 through 2001 using data from the Internal Revenue Service (IRS).

The IRS tracks migration using tax return data. These data show that almost 184,000 people left the Commonwealth in 2000, including 45,000 to neighboring New England states (see Figure Two). Nearly 139,000 moved out of New England entirely.[6] Relocation patterns suggest that reasons for out-migration may include more affordable housing, better job opportunities, and retirement.

Figure 2.3 Migration Patterns of Massachusetts Residents
Counties Where 1,000 persons or More Moved From 2000-01



Source: Internal Revenue Service, 2000-2001 County Migration Data

[5] Portions of this section previously appeared in *Massachusetts Benchmarks*, June 2002 and are used with permission.

[6] During the same period, 166,000 people moved into the state.

Major trends within New England include migration from the Boston Metro and Northeast regions to Southern New Hampshire and Southern Maine, from the Southeast region to Rhode Island, and from Central and Western Massachusetts to Northern Connecticut. Of the top five destination states, two are immediate neighbors. The top 20 destinations include the other five New England states, with New Hampshire being the most popular. Outside of New England, major destinations include many Florida counties, Southern California, and New York City and its surrounding areas.

While we do not know at this point who has left the state or who is contemplating doing so, previous migration research has been very consistent in finding that young, higher skilled people are more likely to migrate. Domestic migrants (distinguished from international migrants), generally in their twenties and thirties, have higher educational and income characteristics than the overall population. As our economy triggers an outflow of migrants due to labor market conditions, it is likely that we will be losing the best-educated members of our young labor force.

As the Massachusetts workforce ages, the ability of regions to accommodate younger workers and their families becomes an increasingly critical economic issue. Throughout Massachusetts, high-tech as well as manufacturing businesses rely on younger workers to fill the job ranks. Without a steady influx of new talent, these industries face a declining labor force. Other fields, including teaching, nursing and public safety all rely on young workers to balance attrition due to retirements. Regions across the state are already experiencing serious shortages of nurses and teacher shortages have, increasingly, become a concern.[7] But in spite of the need to encourage young workers to stay and work in Massachusetts, housing in many parts of the state is unaffordable to younger workers and their families.

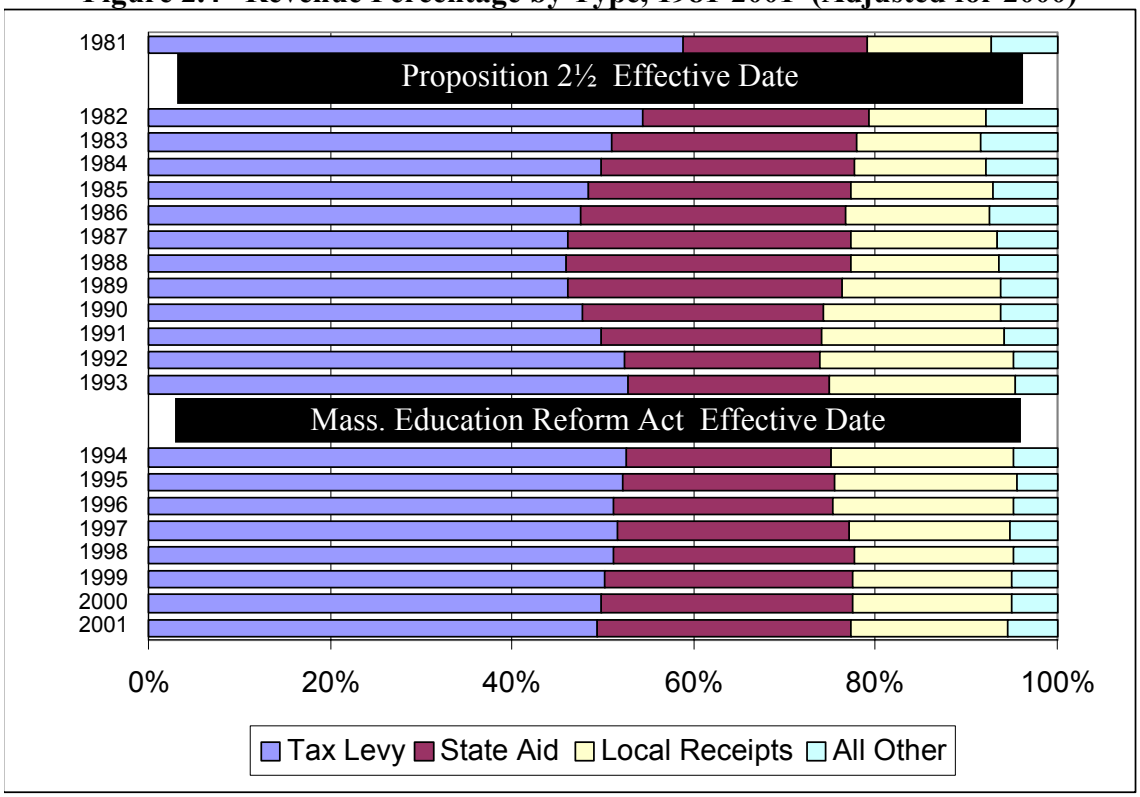
The ongoing challenge of workforce retention in Massachusetts and the critical role the availability of affordable housing plays in meeting this challenge underscores the importance of accurately estimating the costs and the benefits of housing development. Developing accurate estimates, however, requires a thorough understanding of the fiscal environment in which Massachusetts cities and towns operate. In the pages that follow we examine historical trends in municipal revenues and expenditures in an effort to better understand the fiscal context in which municipalities make their development decisions.

2.3 Municipal Revenue Trends 1981-2001

There were some significant changes in municipal finance trends between 1990 and 2000. The Massachusetts Education Reform Act (MERA) took effect in 1994 and changed the way that schools are funded, many cities and towns saw significant growth in population and tax base, and Proposition 2½, which became effective in 1982 (20 years before the writing of this report) continued to have a significant effect on revenues.

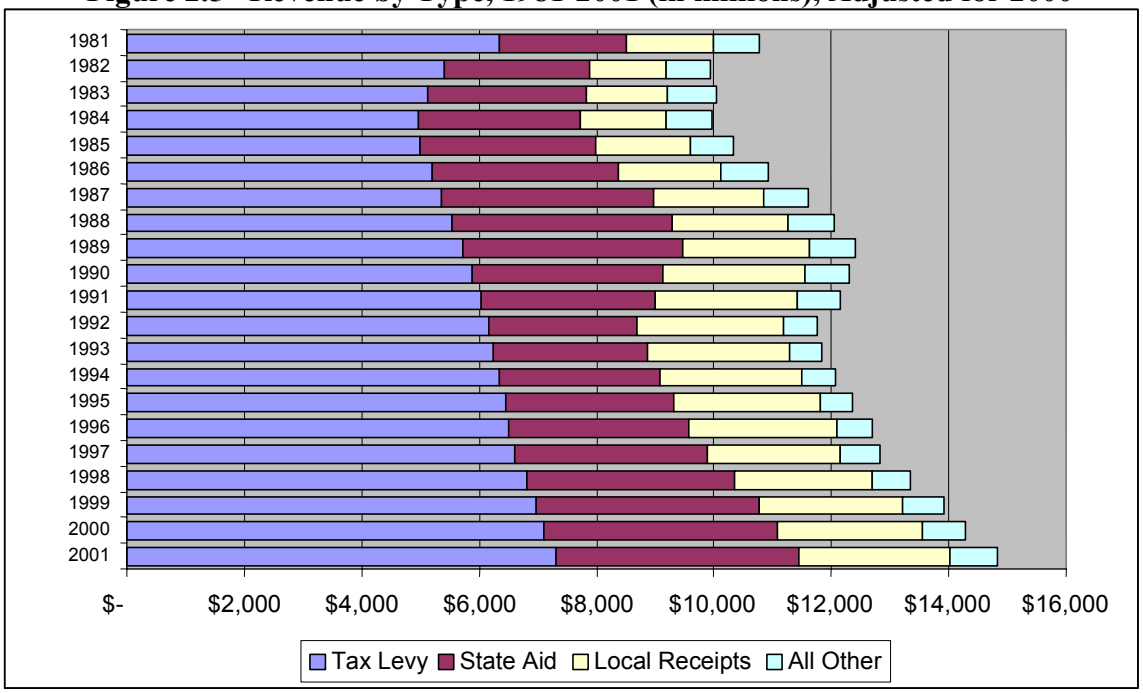
[7] A Statement by David P. Driscoll, Massachusetts Commissioner of Education, On Teacher Shortages, August 15, 2001. Massachusetts Department of Education, 2001 News Archive. www.doe.mass.edu/news/archive01

Figure 2.4 Revenue Percentage by Type, 1981-2001 (Adjusted for 2000)



Source: Division of Local Services, Dept. of Revenue

Figure 2.5 Revenue by Type, 1981-2001 (in millions), Adjusted for 2000



Source: Division of Local Services, Dept. of Revenue

Because of MERA and Proposition 2½, the Commonwealth stepped up the amount of aid that it distributed to cities and towns, in part using funds from the successful state lottery.

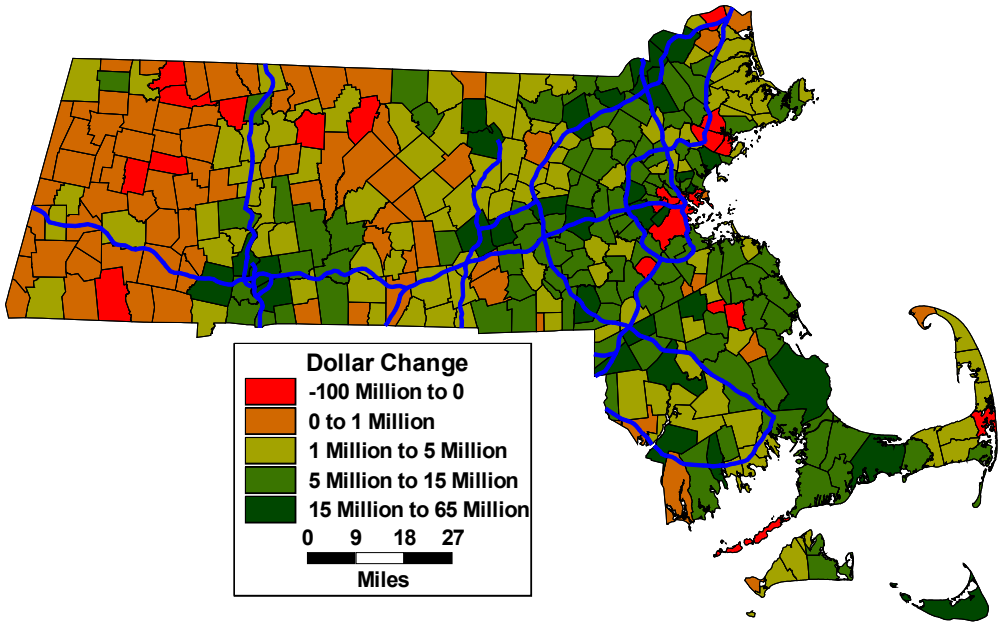
Between 1981 (the year before prop 2 ½ was effective) and 2001, the mix of revenue sources for municipalities has shifted many times. Revenues are divided into four different sources by the Division of Local Services: Tax levies (collected from property taxes), state aid, local revenues (such as vehicle excise taxes), and all other sources. In 1981, the average percentage of tax levy revenues as compared to total revenues was 59 percent. By 1988, this percentage had dropped to 46 percent, due mostly to an increase in state aid from 20 percent in 1981 to 31 percent in 1998. By 1993, the reliance on property tax it had risen again to 53 percent of total revenues, and state aid had decreased to 22 percent. By 2001, state aid had increased to 28 percent and the tax levy had decreased again to 49 percent.

The situation is similar when viewing revenues in dollars, but there are some important differences. For example, except for a decrease in property tax revenues collected by municipalities from 1982 to 1984 to bring them into line with the requirements of Proposition 2 ½, actual dollar amounts of property taxes collected have increased in real dollars every year since then. Total municipal revenues have increased 38 percent in real dollars in the last 20 years, to $14.8 billion in 2001. There have been waves in municipal revenue collections over time, with an overall loss of $816 million from 1981 to 1982 due to Proposition 2 ½, a subsequent increase, fueled mostly by state aid but also by increasing property tax collections up until 1989, and a revenue decrease due to the collapse of the "Massachusetts Miracle." Municipalities did not regain the total 1989 revenue level until 1995, and they have now far surpassed it, with an increase of almost $2.5 billion in total yearly revenue recorded from 1995 to 2001. State aid saw its lowest post-1990 dollar level in 992, with $2.5 billion reported as revenue by municipalities, and its highest in 2001, with $4.1 billion reported (again, all revenues are in year 2000 dollars). In all, total municipal revenues grew 16 percent from 1990 to 2000.

2.4 Geographic Patterns of Municipal Revenues, 1990 to 2000

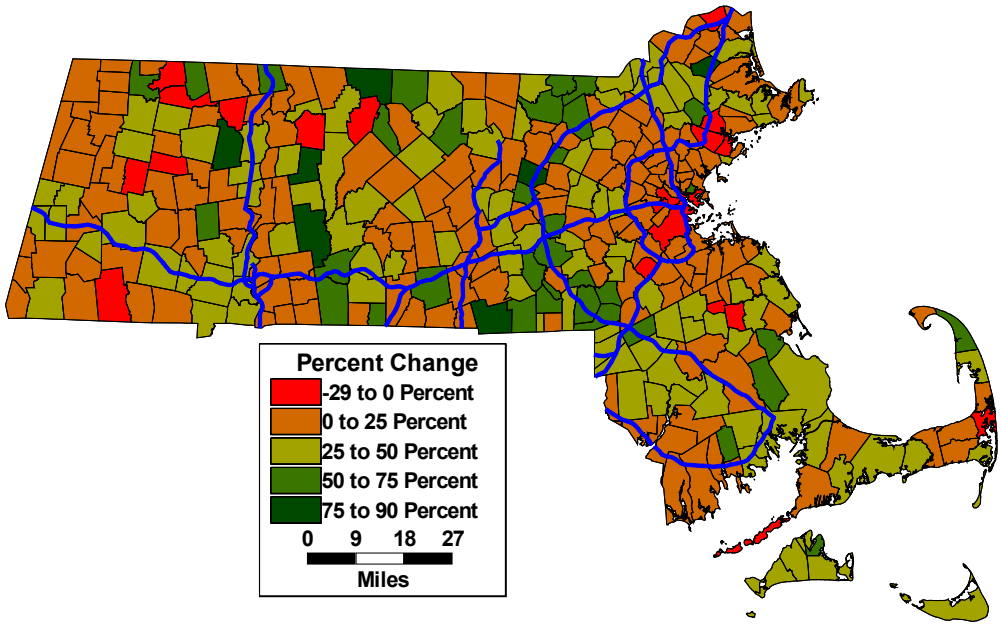
The geographic patterns of change in municipal revenue track population changes somewhat, but there are some differences. Looking at the change in total revenue in real dollars by municipality, illustrated in figure three. definitely shows many of the same trends seen in total population change illustrated in figure one. Most of the growth has occurred in the Greater Boston region of the state, with a smaller bet definite pattern of growth in the Springfield MSA. A closer look at the two maps shows that, while some towns demonstrate similar trends in population and revenue growth, other towns can vary widely. One example is North Adams, which posted negative population growth from 1990 to 2000 but added revenues at a high rate during that same time period. There are similar discrepancies in the percentage growth maps, with some towns showing population growth without much revenue growth or vice-versa.

Figure 2.6 Growth in Total Revenues in Adjusted Dollars By Town, 1990 to 2000



Source: Division of Local Services, Dept. of Revenue

Figure 2.7 Percentage Growth in Total Revenues in Adjusted Dollars By Town, 1990 to 2000



Source: Division of Local Services, Dept. of Revenue

2.5 Demographic and Municipal Revenue Trends: Conclusions

While the population of Massachusetts has grown 5.5 percent between 1990 and 2000, the number of households grew almost 9 percent. This implies that household sizes are getting smaller and that less households have dependents. Even though the number of households grew almost 9 percent, the supply of housing units needed to house them increased only 6 percent, decreasing Massachusetts' supply of vacant housing stock. While this is good news for unit owners and sellers, it means that there are less available units for buyers or renters. Most new housing unit construction occurred in the eastern portion of the Commonwealth, with a small but significant amount occurring in the Springfield MSA.

Municipal revenue trends tend to follow population and housing construction trends, but with deviations. Growth rates in municipal revenue do not exactly track growth rates in population and housing units. The total revenues that all cities and towns collected increased 16 percent from 1990 to 2000, but the mix of revenue types varies from year to year due to state cutbacks during the recession of the early part of the 1990's. By 2001, cities and towns were, on average, collecting 49 percent of their revenues from real property taxes and 28 percent from state aid.

Geographic trends in revenue collection generally match those in housing unit construction and population growth, but there are some differences. Some slow-growing municipalities (like North Adams) showed revenue growth, and some faster growing municipalities showed lagging revenue growth. The reasons for this will be examined later in this report.

3 Demographic Analysis and Municipal Rankings

3.1 Introduction

It is difficult to analyze 351 separate cities and towns, each with different population mixes, governmental structures, and taxpayer priorities, without creating a system that groups them together based on similarities, or that divides them based on measurable differences. Because this is a difficult task, we chose to use two separate systems for grouping municipalities: population growth rankings based on the growth rate of each municipality's population from 1990 to 2000, and the Kind of Community coding developed by the Commonwealth of Massachusetts and used by various agencies to describe municipal characteristics. Using these two different systems allowed us to "triangulate" the findings for each categorizing scheme and obtain a clearer view of what changes occurred in municipal finance between 1990 and 2000.

3.2 Ranking Municipalities by Population Growth

To make analysis easier, each of the 351 cities and towns were assigned a rank from one (very low growth) to five (very high growth) based on their percentage population growth rate. Each fifth, or quintile, rank contained 70 towns, except for the third, which contained 71. The median growth rate was taken for each quintile. We used these rankings to examine per capita growth rates of certain general fund expenditure categories (including general government, police, fire, public utilities, fixed costs and debt service), as well as total expenditures. The median growth rates of these categories were compared to the median population growth rate for each population ranking to find overall trends.

There was a great difference between the lowest and highest growth rates calculated for each municipality. Table 6.2 shows the lowest, highest, average and median growth rates for each category. Note that the total range of population growth for municipalities in Massachusetts was from –51.5% to 71.1%. These towns are aberrations, as Harvard reported the largest percent population decrease due to the closing of Fort Devens and Aquinnah (Gay Head) reported the highest increase most likely because of its small size (344 persons in 2000). These outliers do not substantially affect the analysis.

Table 3.1 Population Growth Rates by Quintile Rank, 1990-2000

Growth Rank	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Lowest	-51.5%	1.07%	4.7%	9.8%	16.8%
Highest	1.05%	4.6%	9.7%	16.6%	71.1%
Average	-4.2%	2.9%	6.9%	12.9%	27.8%
Median	-2.8%	2.9%	6.4%	12.6%	25.1%

Source: 1990 and 2000 Decennial Census, U.S. Census Bureau; Author Calculations

3.3 Ranking Municipalities by Kind of Community

However, ranking municipalities by growth rate may not be the most accurate method for finding patterns, because each town has very different characteristics. Another method for ranking towns has been devised for the Department of Education. This method uses certain criteria to separate towns into seven different categories: Urbanized Center (1); Economically Developed Suburb (2); Growth Community (3); Residential Suburb (4); Rural Economic Center (5); Small Rural Community (6); and Resort, Retirement, and Artistic Community (7). All 351 towns fall into one of these codes, and there is a rough parity between the numbers of towns within each code. DOR/DLS refers to this as the "Kind of Community," or KOC code. While this coding system may be somewhat dated, as it was created in the mid-1980's, our analysis showed to our satisfaction that it was still basically sound.

Looking at growth rates within each KOC code begins to make the picture clearer. The number of municipalities that fall within each community type and growth ranking are listed in table 3.2. Note that Chelsea is only municipality rated as "very high" population growth in the "Urban Center" community type, and it is not possible to draw conclusions based on only one data measurement.

Table 3.2 Number of Municipalities Within Categories

Growth Rate	Urbanized Center	Economically Developed Suburb	Growth Community	Residential Suburb	Rural Economic Center	Small Rural Community	Resort, Retirement, and Artistic
Very Low	17	15	5	4	15	4	10
Low	14	17	6	7	19	5	2
Medium	10	10	5	12	21	8	5
High	3	9	15	18	3	14	8
Very High	1	8	15	12	3	15	16
Total	**45**	**59**	**46**	**53**	**61**	**46**	**41**

Source: Division of Local Services, Dept. of Revenue; Author Calculations

3.4 Demographic Analysis of the Categories

To better explain the different categories used in this report to aggregate municipalities for analysis, we have chosen some key demographic indicators that can be used to understand better each population growth category and kind of community. The following figures compare general population in 1990 and 2000, the total number of housing units, the number of vacant housing units, single family detached housing units to all housing units in 2000, new housing units built in the five years previous to the decennial Census (1985 to March 1990 vs. 1995 to March 2000), and the net average membership of pupils in 1990 and 2000. We present this selected information to help the reader understand the demographics of each category used in the previous analysis.

3.5 Conclusions

Most of the following figures are self-explanatory. Generally, population grew in all categories used in this analysis except for the "very low" growth cities and towns, which saw an decline in their aggregated population (see figures 3.1 and 3.2). The largest number of people lived in "low" growth cities and towns, while the largest populations by kind of community were in Urban Centers and Economically Developed Suburbs.

Not surprisingly, the largest number of housing units were also in these categories. Viewing rented vs. owned units shows that the vast majority of those are in Urban Centers, which are the only kind of community where the number of rented housing units exceeds owned housing units (see figure 3.3). There are surprisingly few renter occupied units in certain community types, such as Small Rural communities and Resort, Retirement, and Artistic communities.

Figures 3.5 and 3.6 show the decline in vacant non-seasonal housing units between 1990 and 2000 in all categories of analysis, especially in "low" growth municipalities and in Urban Centers. Note that while this analysis excludes seasonal housing units, the vast majority of all vacant units in many types of communities (especially Resort, Retirement, and Artistic) were for seasonal use.

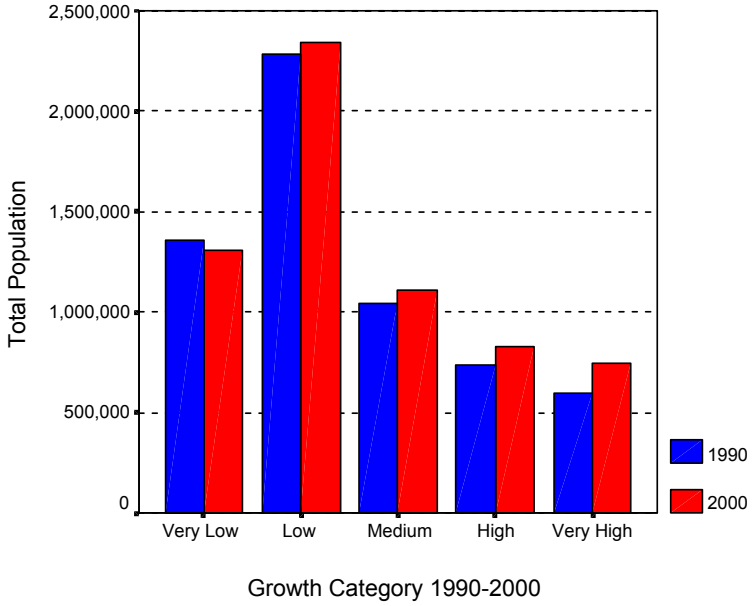
Another interesting housing statistic is the number of single family detached units, which are lowest as a proportion of all units in "very low" and "low" growth municipalities and highest in the "very high" growth municipalities (see figure 3.7). Not surprisingly, Urban Centers have the smallest proportion of this housing type (see figure 3.8), while suburban and rural community types have high proportions of single family detached housing.

There was a very large drop in the number of housing units built in a five year period before each Census was taken. Comparing the period of 1985 to March 1990 with 1995 to March 2000 shows that all categories of analysis showed declines, especially lower growth rate municipalities (see figure 3.9) and Urban Centers (see figure 3.10).

Finally, school populations have increased in all categories of analysis, but the "low" growth municipalities still educate the largest number of students, as do Urban Centers and Economically Developed Suburbs (see figures 3.11 and 3.12).

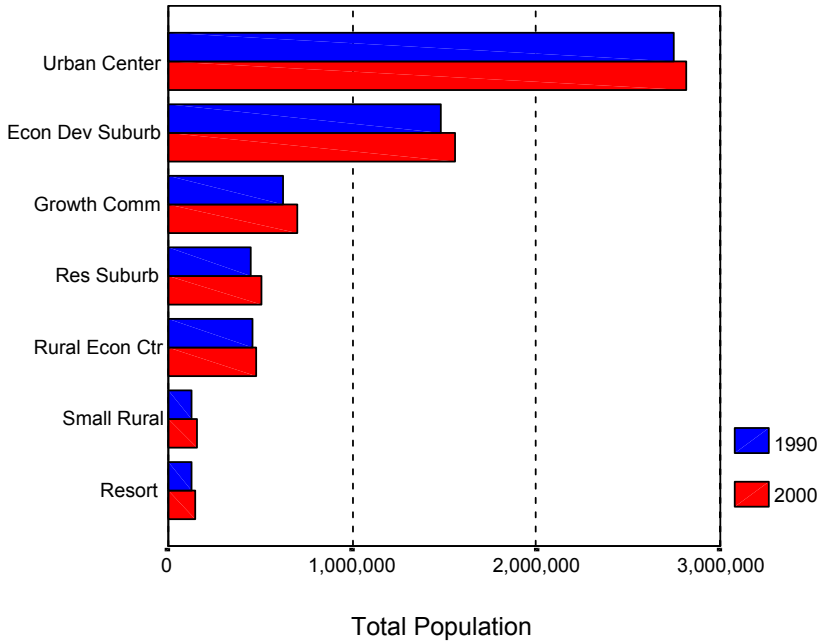
3.6 Total Population by Category

Figure 3.1 Total Population by Population Growth Category, 1990-2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

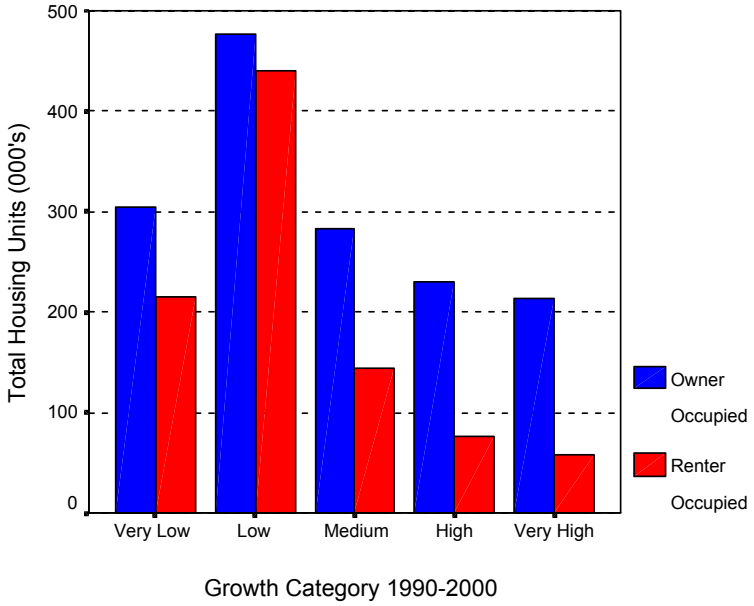
Figure 3.2 Total Population by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

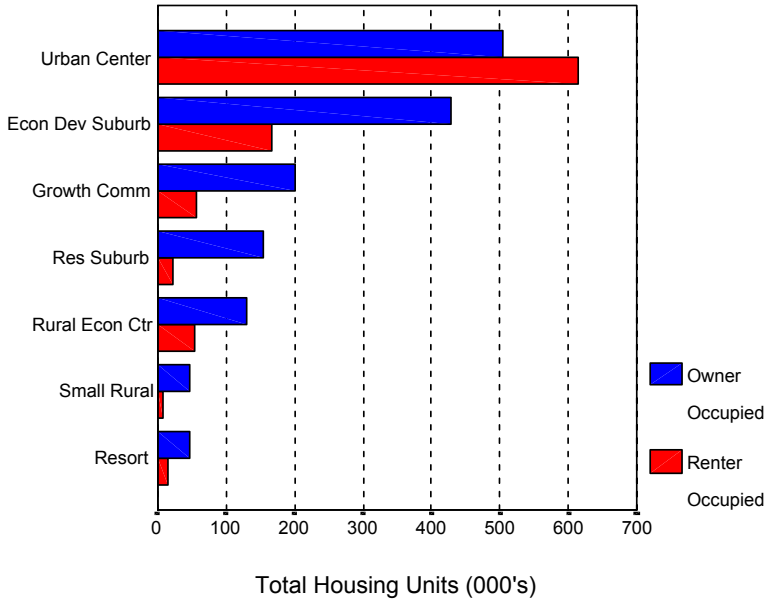
3.7 Total Housing Units by Category

Figure 3.3 Total Owner- and Renter-Occupied Housing Units by Population Growth Category, 2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

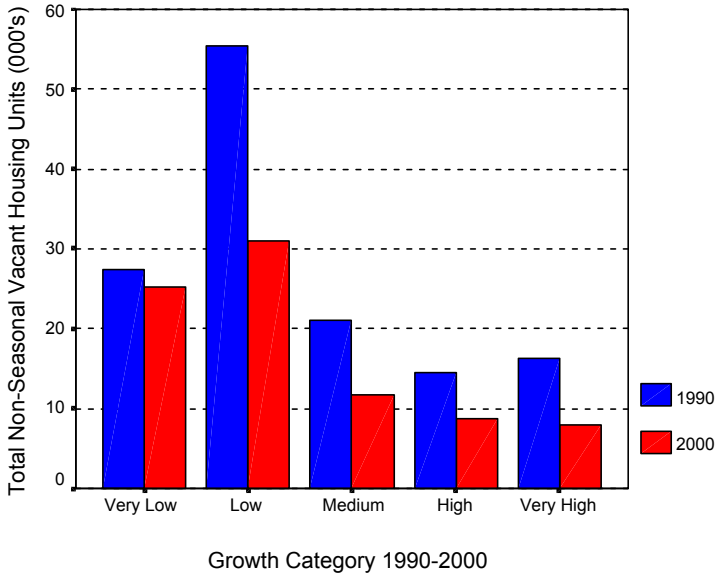
Figure 3.4 Total Owner- and Renter-Occupied Housing Units by Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

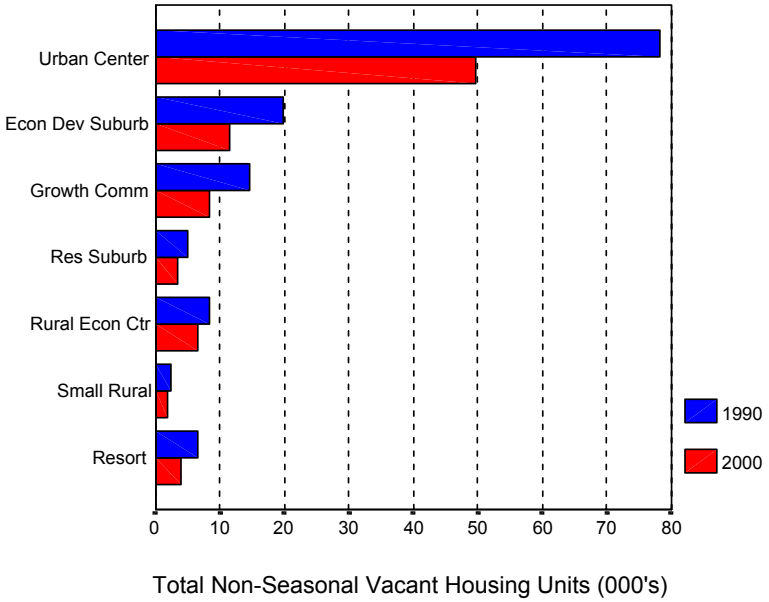
3.8 Total Vacant Non-Seasonal Housing Units by Category

Figure 3.5 Total Vacant Non-Seasonal Housing Units by Population Growth Category, 1990-2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

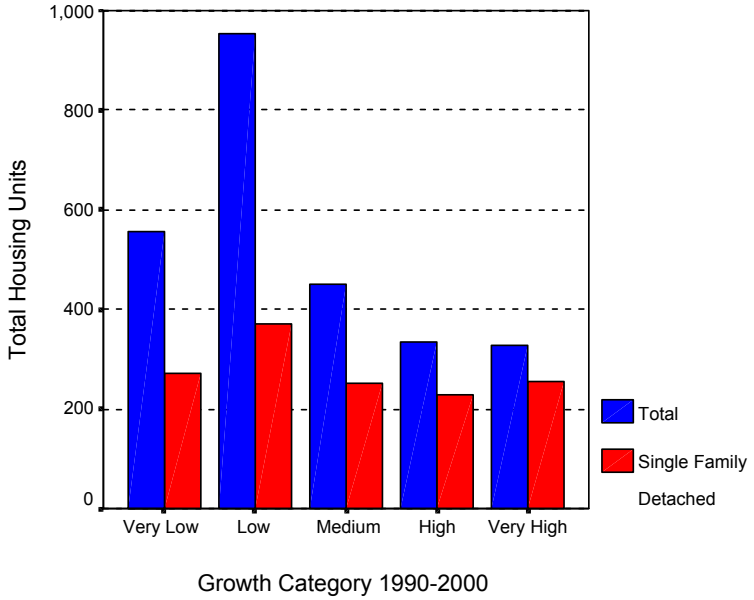
Figure 3.6 Total Vacant Non-Seasonal Housing Units by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

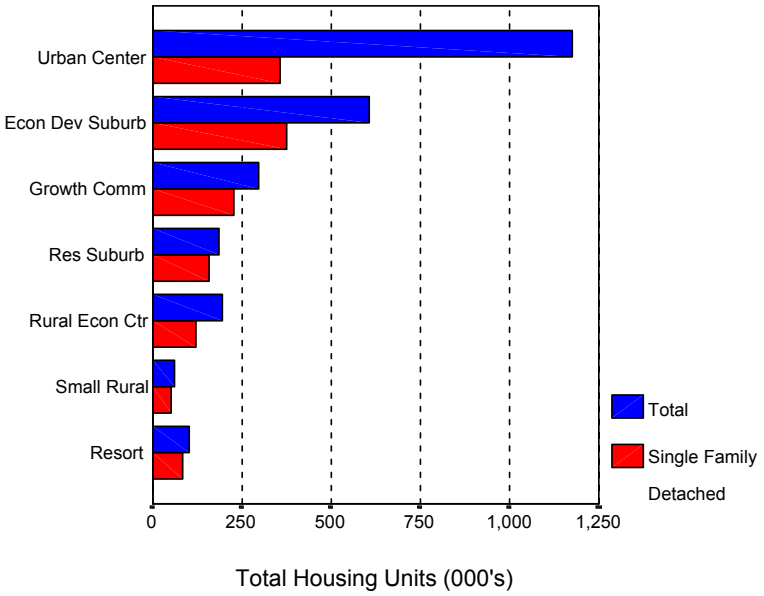
3.9 Total Single Family Detached Housing Units by Category

Figure 3.7 Total Single Family Detached Housing Units by Population Growth Category, 2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

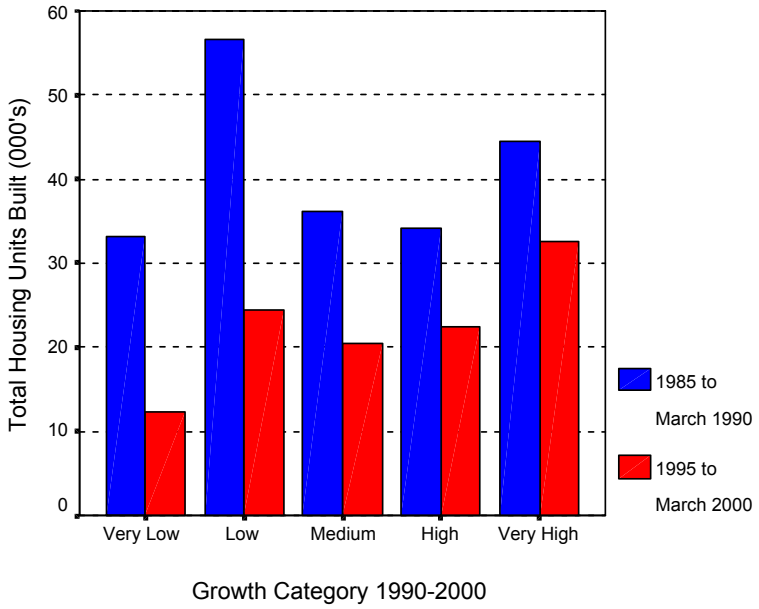
Figure 3.8 Total Single Family Detached Housing Units by Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

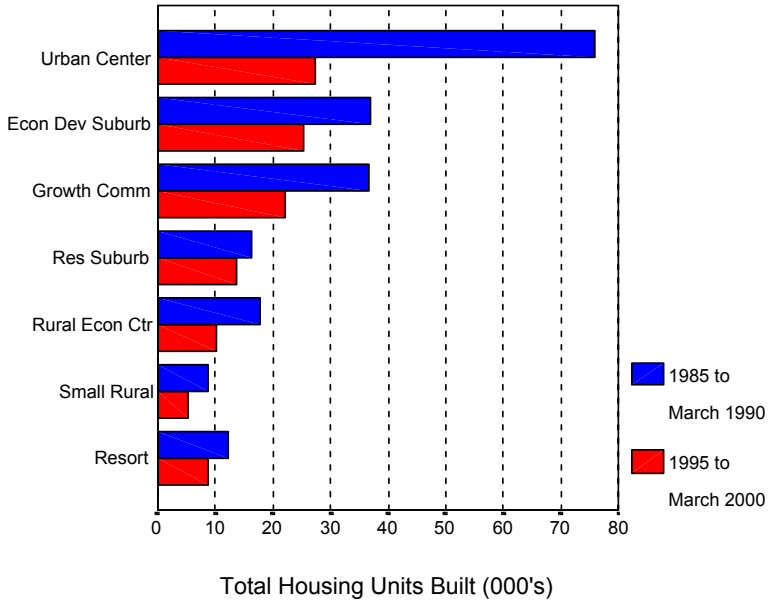
3.10 Total New Housing Units Built by Category

Figure 3.9 Total New Housing Units in the Previous Five Years by Population Growth Category, 1990-2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

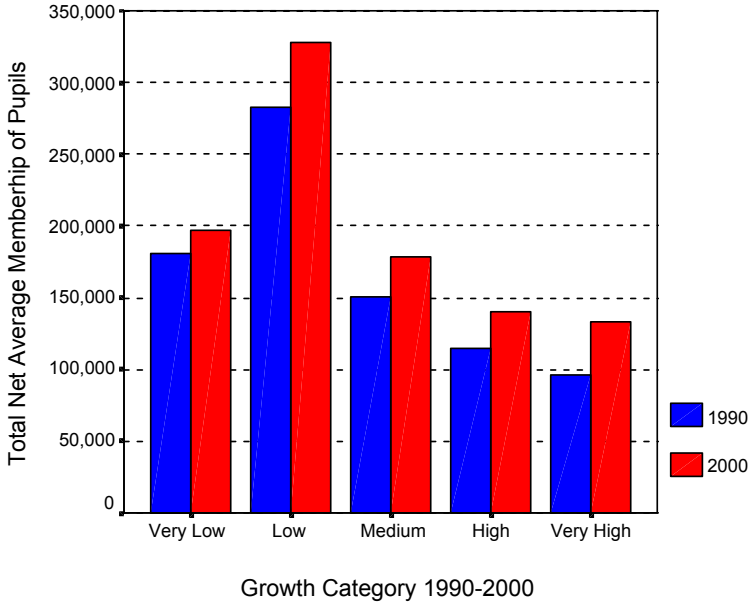
Figure 3.10 Total New Housing Units in the Previous Five Years by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

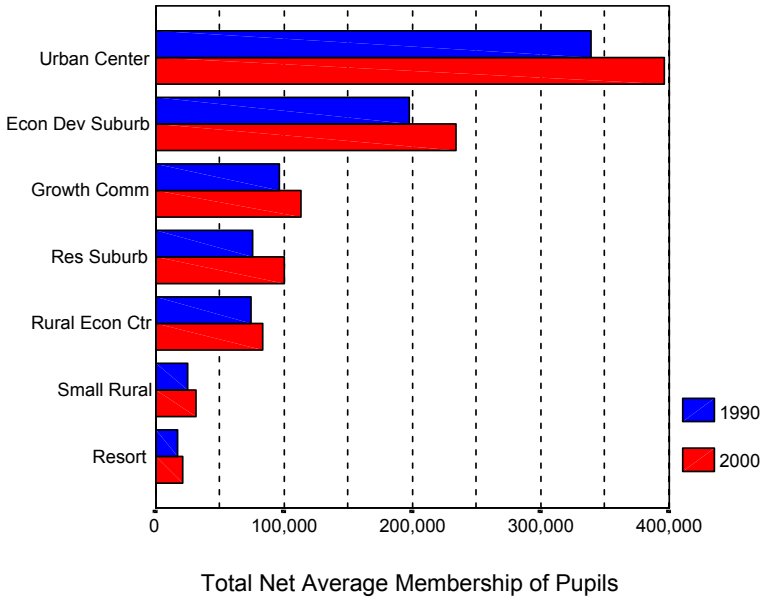
3.11 School Population by Category

Figure 3.11 Total Net Average Membership of Pupils by Population Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 3.12 Total Net Average Membership of Pupils by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

4 Fiscal Impact Analysis in Massachusetts

The Division of Community Services (now the Division of Municipal Development) at the Department of Housing and Community Development (DHCD) created in the past a document entitled the "Growth Impact Handbook." This document examines methods for calculating the fiscal impact of growth on municipalities, and is intended to help cities and towns understand and plan for the effects of development. Unfortunately, this handbook has not been updated in several years. In April 2002, the Executive Office of Environmental Affairs (EOEA), as a part of their Community Preservation Initiative, created a Fiscal Impact Tool (FIT) based in part on the old DHCD manual. This tool is a computer program that contains a great deal of information about town financing, as well as data from models used to estimate the population and other impacts of new development. We examined these resources to discover what fiscal impact theories and data sources were used, so that we could then examine those theories and data.

4.1 The DHCD Growth Impact Handbook

DHCD collected information to allow cities and towns to predict a variety of fiscal effects of new development on municipal services and published it in one reference book. Data are available to assist municipalities in estimating school and municipal operating and capital costs, property tax revenues, and local aid impacts. Some of this information is taken directly from state formulas for local aid, property tax rates, and other factors that are relatively easy to calculate accurately. Others, however, are not easy (or are impossible) to calculate, and therefore rely on models to create estimates of future impacts.

The DHCD handbook lists various methods for assessing the fiscal impact of development. These methods are listed in table one. The most common approaches are the first two in the chart, cost averaging and marginal costs (DHCD). While cost averaging is much easier than marginal cost analysis, it is much less accurate. Cost averaging is often based on a per capita calculation of municipal costs.

Table 4.1 Methods for Assessing Municipal Fiscal Impacts

Method	Comment
Cost Averaging	Usually a Per Capita multiplier
Marginal Cost Analysis	More realistic, but more difficult
Service Standard	Based on staff needs and costs for new development
Comparable City	Looks at similar, larger communities
Proportional Valuation	Assigns costs based on proportional share of local real estate valuations
Employee Anticipation	Based on anticipated needs of new employees

Source: Growth Impact Handbook, DHCD, p.12-13.

4.1.1 Population Estimate Model

To forecast school population, the most important (and expensive) component of growth, DHCD used a model created by Dr. Robert Burchell of Rutgers University in the mid-1980's. This model, described in the 1985 book "The New Practitioner's Guide to Fiscal Impact Analysis," is derived from data collected by the U.S. Census Bureau. It estimates the number of persons living in certain types and sizes of housing. These estimates are meant to be applied to the number of housing units to be constructed by type, and an overall estimate of the additional population that can be expected is generated for a new development.

4.1.2 School Cost Models

After the additional school-aged population emanating from new development is estimated, the cost of educating that population needs to be calculated. DHCD recommends that operating and capital costs be estimated separately. To estimate *school operating costs*, DHCD recommends using the per-capita cost averaging method. After subtracting the estimated number of children who will attend private school (from 7 to 12% of all children, or the reported percentage from the Dept. of Education for the community), the average school cost per pupil, either from the DoEd or calculated from the school operating budget, is multiplied by the estimated new public school students.

DHCD recommends a different process for estimating *school capital costs*. This is a real cost estimating method for new school construction that takes the Commonwealth's share of the cost (through the School Building Assistance Program) into account. One area where estimates can be used is in the school construction cost if the municipality does not have an exact cost for the construction. These estimates are based on DoEd School Building Assistance Bureau numbers, and they use one set of cost estimates for the entire Commonwealth.

4.1.3 Municipal Cost Models

The DHCD manual offers a great deal of information on using the per-capita averaging method for estimating *municipal operating costs*. A detailed worksheet that contains categories for all major budget areas, and these areas match the standard budget categories from the Division of Local Services of the Massachusetts Department of Revenue. The calculation formula is simply the current cost of a service divided by the number of current residents, then multiplied by estimated new residents.

Estimating new *municipal capital costs* is carried out in a similar fashion as estimating school capital costs. The type and size of the new or upgraded capital asset is estimated using various formulas, and the cost is estimated in a similar fashion. Construction costs for buildings are estimated using data from R. S. Means, a publisher that prints the "Means Assemblies Cost Data" publication for estimating building costs. This data can be adjusted for different regions of the Commonwealth to create a more accurate picture of construction costs.

4.1.4 Local Aid and Property Tax Models

Calculating changes to Chapter 70 education aid and lottery distributions is complex and ever-changing, and the DHCD document does not go into it in detail. However, a simple method for estimating whether Chapter 70 school aid will increase, created by John Mullin, is included. Essentially, if the increase in the number of school aged children is higher than the increase in total property value, Chapter 70 aid will increase. If the reverse is true, it will decrease. As for lottery aid, disbursements depend on the amount of money collected by the lottery, the change in property valuation compared to the state, and change in population. Unlike local aid, calculating changes in property tax revenues is straightforward. The value of new property is known, as is the amount of money taken in by local impact fees (if applicable).

4.1.5 Quality of Life Issues (QOL)

DHCD included a discussion on quality of life issues that could be taken into account when doing an analysis. To measure quality of life, DHCD uses the examples of a Planners Advisory Service (PAS) memo from August 1996 (Defining and Measuring Quality of Life), the community report card compiled on itself by the City of Jacksonville, Florida, the Oregon Benchmarks Program, and the criteria used by the *Places Rated Almanac*.

The PAS memo from 1996 was written by Michelle Gregory and published in the August 1, 1996 issue of the Planner's Advisory Service Memo. The abstract from the APA web site states that "Quality of life assessment involves identifying the elements of living that a community wants to preserve, enhance, or achieve. This Memo discusses the types of indicators used in quality of life evaluations, including the Places Rated Almanac and the Lomax Index."[8]

The method developed by the City of Jacksonville used many elements to compile its "community report card," including education levels, economic information, public safety data, measures of water and air quality, health statistics, the social environment (racial harmony, individual opportunity, etc.), government policies and leadership, and cultural and recreational resources. Oregon went even farther than Jacksonville, creating a state measure of QOL called the Oregon Benchmarks Program that uses 259 different standards. Finally, the national-level *Places Rated Almanac* uses indicators on cost of living, employment, housing, transportation, education, health care, crime, culture, recreation, and climate to come up with its QOL index. Unfortunately, there is no real information on applying this information to a cost-benefit analysis available.

[8] Planner's Advisory Service, American Planning Association, http://www.planning.org.

4.1.6 Marginal Cost Analysis

The DHCD manual also included a discussion on using the marginal cost method of fiscal impact analysis. However, the discussion is biased towards the expensive side of marginal cost analysis, which occurs when the capacity of a service is exceeded and new capacity has to be developed. Some discussion of issues that are related to "smart growth" strategies is also included, but due to the age of this manual, there are no "smart growth" methods or information resources available.

4.1.7 Appendices

The report ends with a large section of appendices that contain multiple types of information, including school size recommendations, school reimbursement percentages by town, estimates of per-capita expenditures and employment by type per town size for Massachusetts, trip generation rates for certain land uses, water use estimates and water system costs, and road construction costs. This is a very useful section, even though much of the information contained within it is only briefly discussed in the text.

4.2 The EOEA Massachusetts Fiscal Impact Tool (FIT)

In 2002, the Executive Office of Environmental Affairs (EOEA) has created a computer model for forecasting growth impacts that is partly based on information from the DHCD Handbook, called the Massachusetts Fiscal Impact Tool (FIT). It is a custom computer program that runs on Windows machines. It has a database containing much of the information presented in the DHCD report appendices as well as complete municipal finance data and "cherry sheet" (local aid) data. Analyses can be generated for residential or commercial development. The concept is that, after going through all of the screens and inputting all of the relevant information, a realistic estimate of the direct fiscal impact will be created and exported as a Microsoft Excel spreadsheet.

The MA-FIT model comes pre-programmed with municipal expenditure and population data to allow use of the per-capita average cost analysis method. It also allows actual data to be entered into the program for users who want to perform a marginal cost analysis. It is also possible to use a mixture of methods depending upon the availability of data to the user. While it is not really possible to estimate future lottery, chapter 70, and other state aid programs, the program does predict future aid impacts using the per capita multiplier method.

4.3 Conclusions

While both the DHCD handbook and the EOEA FIT tool are useful to those who want to calculate the fiscal impacts of new development, they are based on the standard impact methods developed years ago, most notably the Per Capita Multiplier Method. Therefore, their accuracy is reliant on the accuracy of the underlying models. These models are discussed in the next chapter.

5 Fiscal Impact Theory

There are many different models for predicting fiscal impacts, and the most commonly-used are laid out in the book The New Practitioner's Guide to Fiscal Impact Analysis by Robert Burchell, David Listokin and William Dolphin and published by the Center for Urban Policy Research at Rutgers University.[9] This is considered one of the important works on the subject and Professor Burchell is nationally-recognized as a leading expert in the fiscal impact analysis field.

The New Practitioner's Guide to Fiscal Impact Analysis identifies six different methods for conducting fiscal impact analysis. There are two basic approaches to municipal cost analysis: average costing and marginal costing. Average costs are simply per-unit costs, whether the unit is a person, a household, or some other measure. In impact analysis, the new number of units (often people) is multiplied by the average cost per unit for a particular service and added to the existing budget. This is one of the most common methods for estimating fiscal impacts.[10] Marginal cost analysis uses an analysis of the current capacity and infrastructure of a community to discover whether certain types of new development will rely on existing capacities or will "push" certain services over a "threshold" that will require new, expensive capital investments.[11]

Table 5.1 Comparison of Average Costing vs. Marginal Costing Methods[12]

	Advantages	Disadvantages
Average Costing	Easier data gathering; In the long term, estimates of growth impact similar to Marginal Costing	Does not consider existing excess or deficient capacity that might exist for particular services or the possibility that a new development might fall at the threshold level, calling for major new capital construction to accommodate increased growth
Marginal Costing	Takes potential deficiencies into account; Careful analysis of existing demand/supply relationships for local governmental and school services; In the long term, estimates of growth impact similar to Average Costing	Getting the data takes more time and effort Analysis can be more complex and require more input from different departments or people

The three fiscal impact analysis techniques based on the average costing approach are the Per Capita Multiplier method, the Service Standard method, and the Proportional Evaluation method. Of these, the first two methods are used for residential land uses and the third is used for non-residential land uses. The three marginal costing techniques are

[9] Burchell, R., Listokin, D., and Dolphin, R. *The New Practitioner's Guide to Fiscal Impact Analysis.* New Brunswick, NJ, Center for Urban Policy Research 1985.
[10] Burchell, R., Listokin, D., and Dolphin, R. *The New Practitioner's Guide to Fiscal Impact Analysis.* New Brunswick, NJ, Center for Urban Policy Research 1985, p 6.
[11] Ibid., p.6.
[12] Ibid., pp 6-38.

the Case Study method, the Comparable City method, and the Employment Anticipation method. Of these, only the case study method is applicable for both residential and nonresidential land uses, while the others are useful for one or the other, respectively.[13] Because this report focuses on the fiscal impact of housing development, we will only review forecasting methods that are useful for residential development.

5.1 Per Capita Multiplier Method

The per-capita multiplier method is one of the most common methods used to forecast the fiscal impacts of residential development. It is very simple to use, as all that is required is a population forecast and current budget numbers. This method takes the cost of a municipal service and divides it by the current population to calculate the per capita cost of the service. The new population forecast that would result from the new development is multiplied by the per-capita value and added to the current budget, creating the municipal expenditure forecast. A similar process is used to estimate new taxes, and the results are compared to each other to discover if the new development will have a positive or negative impact on development.

According to Burchell, there are certain assumptions built into this model. Over the long term, it is assumed that current average operating costs per capita and per student are the best estimates of future operating costs caused by growth. In addition, current local levels and types of city services are the most accurate indicators of future service levels, as it is assumed that they will continue on the same scale in the future. In addition, the current composition of the population and the population contributing to future costs are assumed to be similar enough to cause average costs to be correct, and current expenditures by various city departments are assumed to stay constant and can be used to estimate how future expenditures will be allocated.[14]

Because of the assumptions built into this model, it will not work accurately if there are changes in levels of city service per capita, population composition, or municipal cost structures. This approach to estimating the fiscal impacts of residential development is widely used in Massachusetts. A test of this model using actual municipal expenditure data revealed that when the predicted fiscal impacts generated by this model are compared to the actual financial experiences of Massachusetts cities and towns, it is evident that, for most municipalities in Massachusetts, the predictive validity of the per-capita model is quite limited. An examination of how this model works in Massachusetts is presented in the next chapter.

5.2 Service Standard Method

This is another average costing method that uses data from the U.S. Census of Governments on employment levels and the capacity of facilities for similarly-sized and located municipalities and school districts. The Service Standard method calculates the needed number of new employees by city service type to serve the proposed new

[13] Ibid., pp 6-38.

[14] Burchell, R., Listokin, D., and Dolphin, R. *The New Practitioner's Guide to Fiscal Impact Analysis.* New Brunswick, NJ, Center for Urban Policy Research 1985, pp 9-10.

development. This analysis calculates expenditure per employee for each type of service, as well as the annual capital expenditure for that service. The annual capital expenditure is derived from data collected in the Census of Governments.

The assumptions in this method are similar to the per capita method above, that there will be no change in current service levels over time. In addition, This method assumes that similarly-sized and located cities will have similar expenditures and employment patterns. It has the advantage of being very detailed and relatively simple to use. Its disadvantage is that calculating fiscal impacts by using cost multipliers derived from aggregated data is likely to over- or underestimate actual expenditures for individual cities or towns.[15]

5.3 Case Study Method

This is also known generally as the marginal cost method, although there is more than one way of measuring marginal costs. It relies on collecting a large amount of information specific to the city or town being analyzed. It's main focus is to discover which services possess excess capacity that can be inexpensively used to deal with new population, and which services are at capacity and require new capital investments to serve additional development. The excess capacity or needed capital investments are factored into the cost estimates for new employment or other non-capital outlays for servicing the new population and the result is the fiscal impact of the new development.

Like the previous methods, this is based on certain assumptions. It assumes that each municipality has a different mix of service capacities which would have a significant affect on the ability to accurately forecast growth, that calculating excess capacity of need for new capital outlays is the most accurate way of calculating future costs, that actual local service levels differ from national averages and are a better measure of future service levels, and that local decision-makers are the most familiar with the needs and capacities of municipal services.

Unlike the averaging methods, the case study method requires a great deal of research to discover actual local costs and capital needs. It also requires input from many local decision-makers and department heads. However, it is considered to be the most accurate method for forecasting the costs associated with new development.[16] As the FIT computer model allows users to use the case study model in their analyses, we feel that this should be the recommended method for using this tool.

5.4 Comparable City Method

The Comparable City method is a type of marginal costing method that includes some aspects of averaging methods. The averaging comes from the creation of multipliers calculated from the U.S. Census of Governments. The multipliers are based on growth rates and community size. The method projects increases or decreases in

[15] Ibid, pp. 22-23.

[16] Burchell, R., Listokin, D., and Dolphin, R. *The New Practitioner's Guide to Fiscal Impact Analysis.* New Brunswick, NJ, Center for Urban Policy Research 1985, pp. 15-16.

future gross expenditures for the five basic municipal services (general government, public safety, public works, health and welfare, recreation and culture) and is based on the assumption that municipalities of similar size and with similar growth rates will have similar changes in their municipal costs by category.

Unlike the case study method above, the reliance on average multipliers limits accuracy. If local costs for services are different than the average multipliers would suggest, there may be under- or overestimation of costs Therefore, this method is only somewhat better than pure cost averaging methods.[17]

5.5 Population Estimates and School Costs

One of the major factors affecting municipal cost forecasting is population change. It is difficult to know how many people are going to be attracted by new development, and what mix of people that population will contain. To forecast new population, Burchell et al. created a model based on U.S. Census data from the 1980 Census of Population. It estimates the number of persons living in certain types and sizes of housing by two categories: overall new population and school-aged children. This model is discussed in detail later in this report.

The data on school-aged children created from the population forecasting model Burchell and his colleagues created is then used to estimate school operating costs. The generally-accepted method for doing this is to use the per-capita cost averaging method. After subtracting the estimated number of children who will attend private school, the average school cost per pupil is multiplied by the estimated number of new public school students.

5.6 Conclusions

The many different methods for fiscal impact analysis can be reduced to two basic types: averaging and marginal. While the averaging method has the potential to be inaccurate, it is much more likely to be used in practice. This can lead to serious over-estimation or underestimation of future costs. A much more accurate method, according to the literature, is to use marginal costing methods such as the Case Study method. While marginal costing requires a more extensive data collection and analysis process to create a prediction of future costs, it is also much more likely to be accurate.

[17] Ibid, pp.23-24.

6 Test of the Pre-Capita Forecasting Method

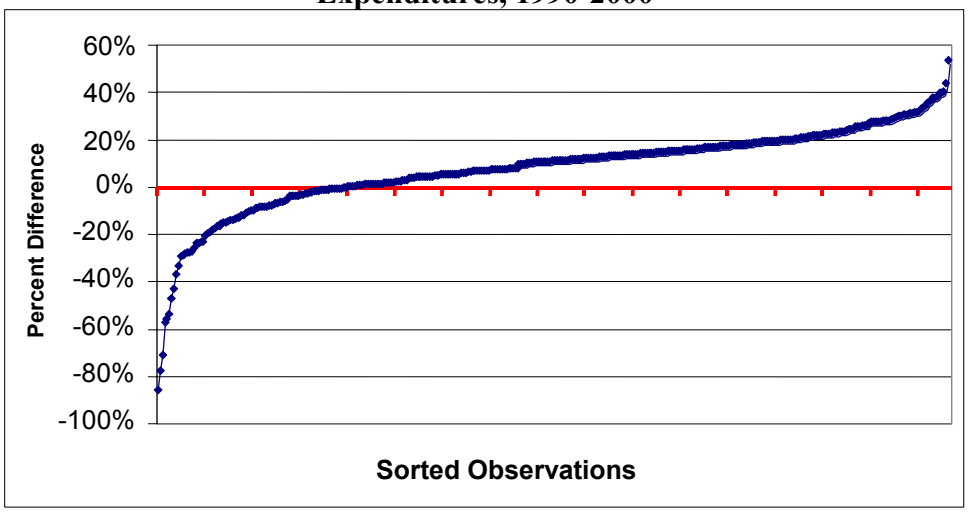
One of the major forecasting methods used to infer the effect of new development is the per-capita method. In this method, costs of municipal services are averaged across the population and any additional members of the population are expected to increase costs in that proportion. For example, if a town of 1000 persons spends $100,000 on police serves, the per-capita cost of this service is calculated to be $100 per person. If 10 new people move into the town, this forecasting method would predict that the police budget would become $101,000. This method is often used because it is easy to apply and simple to understand. Unlike the marginal cost method, it requires little research into the state of services in a municipality and the actual effects that growth could have. UMDI decided to test the per-capita forecasting method to determine whether it was a valid tool for estimating the impacts of development on a municipality. We tested in the simplest manner possible: by analyzing real changes over time and comparing them to projected changes using the per-capita method.

6.1 Real versus Predicted Municipal Expenditures, 1990-2000

The simplest test of the per-capita model is to choose two points in time with reliable data and compare the earlier point to the later point using the model. We have chosen to compare 1990 and 2000, as accurate Census data is available for these years. We calculated the per-capita expenditures in 1990 for certain budget categories as reported by each municipality to the Division of Local Services of the Dept. of Revenue (DLS), calculated the population difference between 1990 and 2000, multiplied the per-capita 1990 calculation by the population change, and adjusted the 1990 dollar figures for inflation to create an estimated year 2000 budget figure. We then simply compared the actual year 2000 budget figures to the estimated year 2000 figure and measured the difference.

Chart one graphs the difference between the general fund expenditures that would be expected using the per-capita forecasting method and the actual expenditures. Results were sorted from lowest (a –86% difference) to highest (a +52% difference). A negative result means that the actual general fund expenditures were lower than the projected expenditures using the per-capita method of impact analysis. The sorted results imply that there is a trend of the per-capita method underestimating spending. In fact, 79, or 23% of all municipalities showed inflation-adjusted increases in their expenditures that were below what would be predicted by the model. The vast majority showed increases that were higher than would be expected, many much higher. The median estimation error was 9% of expenditures, and 63 towns showed under-estimations of 20% or more. Since the MA-FIT model from EOEA allows the program user to use this method, it is possible for the results of an analysis to be based on estimates that either over- or underestimate future impacts.

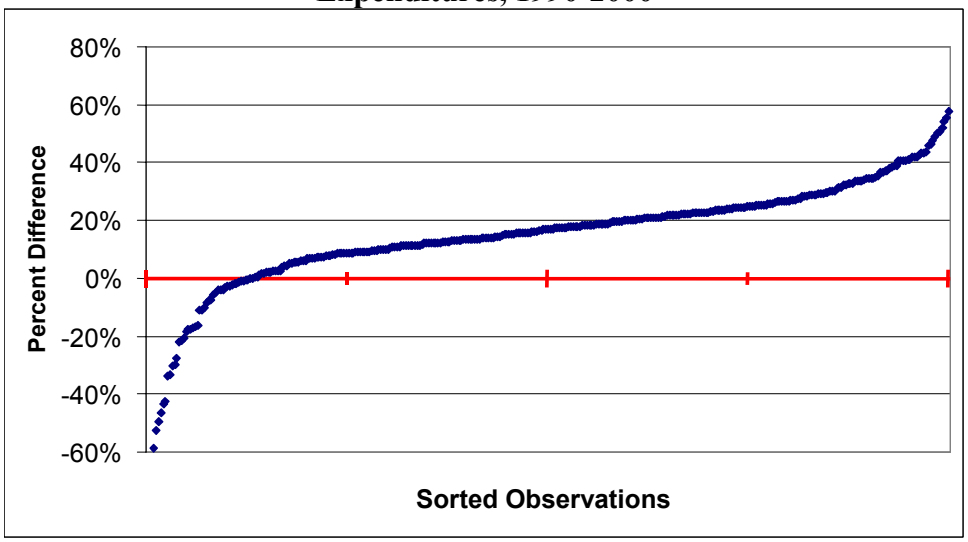
Figure 6.1 Percent Difference Between Actual and Predicted General Fund Expenditures, 1990-2000



Source: U.S. Census Bureau, 1990 and 2000 Decennial Census
Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Examining education expenditures showed similar trends. Because of the effects of the Massachusetts Education Reform Act (MERA), over 80% of all municipalities spent more on education than would have been predicted by the per-capita model. Some spent much more. Table one shows the ten municipalities with the most divergence from the per-capita model's expected results. Of the bottom 5 municipalities (the ones where the cost was most overestimated) three are special cases, as all of their education costs in 2000 were paid directly by the Commonwealth to the school system, which means that the municipality did not record the expenditure on their yearly balance sheet.

Figure 6.2 Percent Difference Between Actual and Predicted Educational Expenditures, 1990-2000

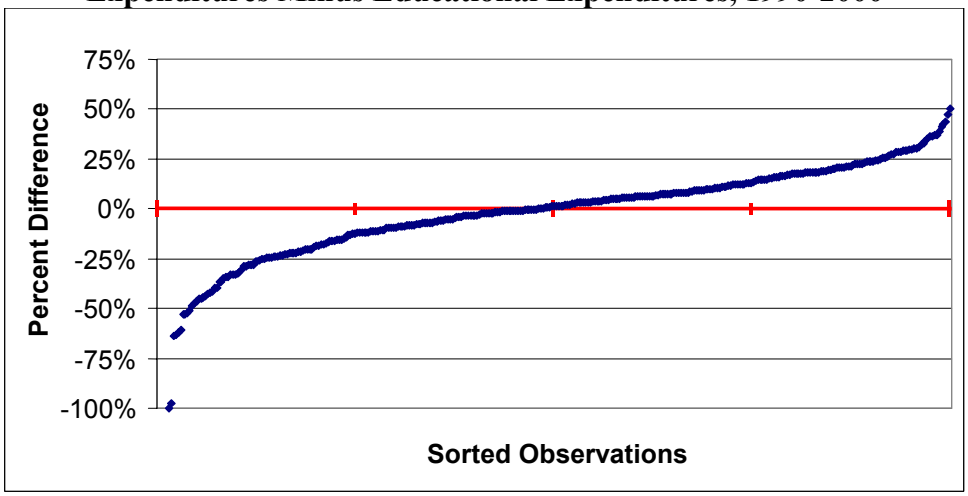


Source: U.S. Census Bureau, 1990 and 2000 Decennial Census
Division of Local Services, Mass. Dept. of Revenue

A caveat for this section is that not all education costs are reflected in the education line item in a municipalities' reported expenditures. For example, maintenance on playing fields used by a school system may actually be funded through the parks and recreation department, and certain items such as pension plans may also appear in other areas of a municipal budget. More impotantly, some smaller towns that belong to regional school districts will not have state aid appear in their town education budget, as that aid goes to the school system. The reader is directed to chapter 11, which is dedicated to examining educational funding, for a more detaile ddiscussion of education funding measurement and issues.

To help control for the effect that MERA may be having on municipal finance, we removed education expenditures identified by municipalities from the general fund expenditure total and plotted them in chart three. This graph shows the data in a way that would be expected for an averaging prediction method, as the curve crosses almost exactly at the center point of the graph. Even so, the further away from the average a town is, the more it is over- or under-estimated..

Figure 6.3 Percent Difference Between Actual and Predicted General Fund Expenditures Minus Educational Expenditures, 1990-2000



Source: U.S. Census Bureau, 1990 and 2000 Decennial Census
Division of Local Services, Mass. Dept. of Revenue, 1990-2000

6.2 Estimation Errors by Community Rank and Type

The above analysis raises the question of which municipalities are overestimated, which are underestimated, and which have the least or most estimation error. To remove the potentially misleading effect of education expenditures, which are generally estimated using data on the number of school children and not on the total population, this question is examined using non-education expenditures only.

Tables 6.1 and 6.2 show the number of municiplaities in each of five categories based on the amount of overestimation or underestimation of real non-school costs the model predicted, based on population change from 1990 to 2000. The data show that almost 19 percent of all municipalities had real budgets in 2000 that were more than 20

percent under their predicted costs based on the Per Capita Multiplier Method model and using 1990 real budget information. In addition, over 14 percent had real budgets in 2000 that were more than 20 percent higher than the predicted budget based on 1990 data and the model. The municiplaities are separated into their growth ranks (Table 6.1) and their kinds of community (Table 6.2).

Table 6.1 Real Budget Versus Estimation Error of Municipal Budgets by Population Growth Rank, 1990-2000 (with Percentages by Rank)

Growth Rate	Under 20%	Under 5% to 20%	Under 5% to Over 4%	Over 5% to Over 20%	21% and Over	Total
Very Low	9 (12.9%)	7 (10.0%)	13 (18.6%)	21 (30.0%)	20 (28.6%)	70 (100%)
Low	15 (21.4%)	10 (14.3%)	13 (18.6%)	24 (34.3%)	8 (11.4%)	70 (100%)
Medium	9 (12.7%)	19 (26.8%)	20 (28.2%)	18 (25.4%)	5 (7.0%)	71 (100%)
High	13 (18.6%)	16 (22.9%)	10 (14.3%)	20 (28.6%)	11 (15.7%)	70 (100%)
Very High	20 (28.6%)	14 (20.0%)	12 (17.1%)	17 (24.3%)	7 (10.0%)	70 (100%)
Mass.	**66 (18.8%)**	**66 (18.8%)**	**68 (19.4%)**	**100 (28.5%)**	**51 (14.5%)**	**351 (100%)**

Source: U.S. Census Bureau, 1990 and 2000 Decennial Census
Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Table 6.2 Real Budget Versus Estimation Error of Municipal Budgets by Kind of Community (with Percentages by Community Type)

Kind of Community	Under 20%	Under 5% to 20%	Under 5% to Over 4%	Over 5% to Over 20%	21% and Over	Total
Urban Center	7 (15.6%)	10 (22.2%)	11 (24.4%)	15 (33.3%)	2 (4.4%)	45 (100%)
Econ Dev Suburb	10 (16.9%)	16 (27.1%)	12 (20.3%)	16 (27.1%)	5 (8.5%)	59 (100%)
Growth Comm	4 (8.7%)	11 (23.9%)	9 (19.6%)	17 (37.0%)	5 (10.9%)	46 (100%)
Res Suburb	5 (9.4%)	6 (11.3%)	11 (20.8%)	20 (37.7%)	11 (20.8%)	53 (100%)
Rural Econ Ctr	15 (24.6%)	12 (19.7%)	10 (16.4%)	11 (18.0%)	13 (21.3%)	61 (100%)
Small Rural	15 (32.6%)	7 (15.2%)	9 (19.6%)	10 (21.7%)	5 (10.9%)	46 (100%)
Resort Retirement	10 (24.4%)	4 (9.8%)	6 (14.6%)	11 (26.8%)	10 (24.4%)	41 (100%)
Massachusetts	**66 (18.8%)**	**66 (18.8%)**	**68 (19.4%)**	**100 (28.5%)**	**51 (14.5%)**	**351 (100%)**

Source: U.S. Census Bureau, 1990 and 2000 Decennial Census
Division of Local Services, Mass. Dept. of Revenue, 1990-2000

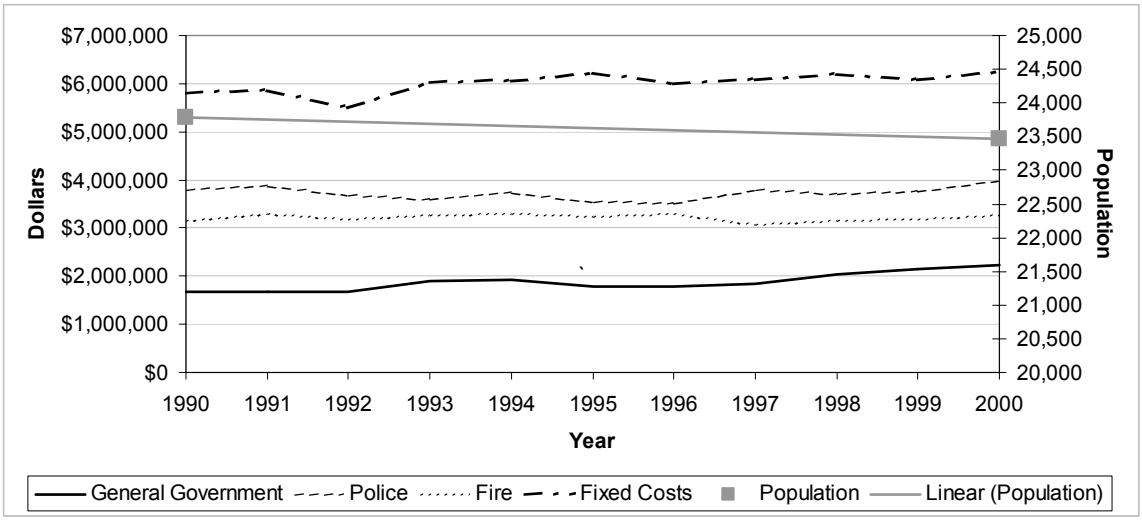
6.3 Year-by-Year Expenditure Changes

While accurate population data is not available on a year-by-year basis, it is possible to track the yearly changes in expenditures for different expenditure types and compare this to the population growth rate. Doing this on a municipal level shows that changes in expenditures on a yearly basis have little to do with population change alone, but are likely to be dependent on many factors.

Figures 6.4 and 6.5 show expenditures for different budget categories for two different municipalities, Dedham and Rowley. Dedham is an economically developed suburb (KOC 2) in the Boston Metro Benchmarks region whose population growth from 1990 to 2000 ranked in the "very low" category (Rank 1), and whose public school pupil growth ranked in the "low" category (Rank 2). Dedham actually had a negative population growth rate (-1.34 percent) from 1990 to 2000. Rowley is a growth

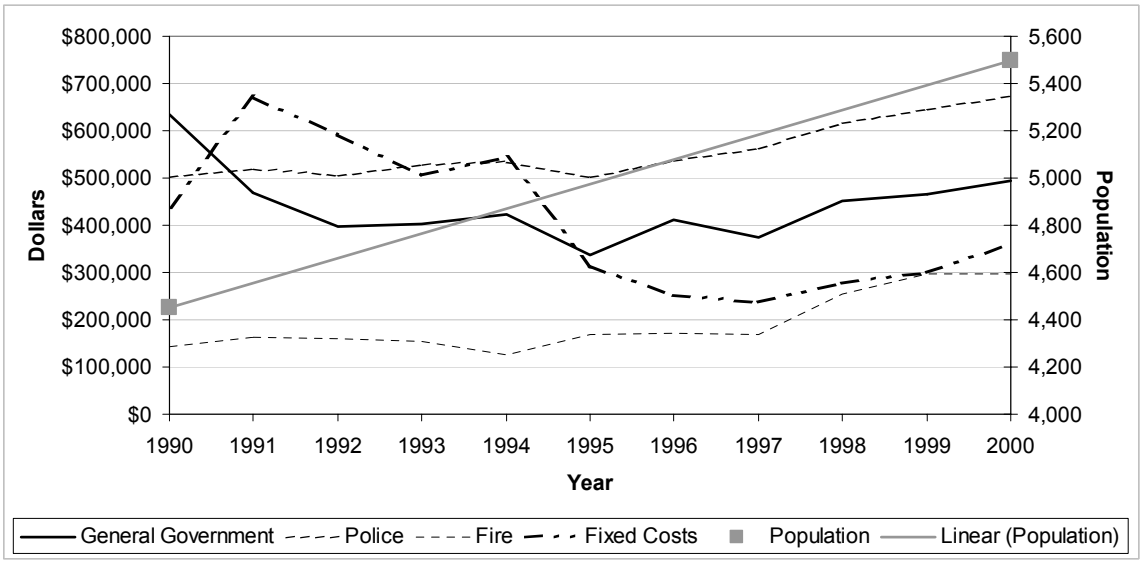
community (KOC 3) in the Northeast Benchmarks region whose population growth rate and public school pupil growth ranked in the "very high" category (Rank 5). Rowley's population growth for the decade was 23.5 percent.

Figure 6.4 Selected Expenditures by Year for Dedham, Adjusted for Inflation



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Figure 6.5 Selected Expenditures by Year for Rowley, Adjusted for Inflation



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

As Figure 6.4 shows, Dedham had a slight decline in population with a relatively steady expenditure amount for each of the four selected expenditure categories. In fact, there were yearly variations in all of the selected categories, and while population went down, by the end of the decase each category rose in real dollars between 3 percent and 33 percent. Compare this behavior to Rowley, which had much more year-to-year volatility, whith the end of the decade seeing expenditure changes from –22 percent to 110 percent for different categories.

6.4 Conclusions on the Per-Capita Forecasting Method

If the per-capita method of measuring the fiscal impact of additional population on municipal budgets were accurate, we would expect to see the results of a test such as this to show much less variation, or at least to show that the average result follows the model. Unfortunately, the data we have generated show neither. While we are only comparing two points in time (1990 and 2000), we are comparing these two points for all 351 cities and towns in the Commonwealth. The consistency of the results implies that the method is faulty. While we chose not to publish all of the graphs that we generated in this analysis, it should be noted that we analyzed many different line items (general government, police, fire, debt service, and fixed costs) and saw similar results.

In addition, there is inconsistency within town budgets themselves when using this test. A single town may show vastly different results among the selected budgetary line items that were analyzed, with overall expenditures showing a 20% overestimation, fire costs showing a 30% overestimation, education costs showing a 5% overestimation, etc. In other words, this method does not even work consistently within a single municipal budget. This is because changes in expenditures over time are affected by many different internal and external pressures, only one of which is population change.

7 Population Forecasting

One of the criticisms of fiscal impact forecasting tools relate to population projection techniques. Many people rely on the tables created by Burchell et. al from 1980 Census data and published in The New Practitioner's Guide to Fiscal Impact Analysis. Unfortunately, this population projection data is now very out of date and is not specific to Massachusetts, which may mean that it is affected by different population patterns in the other New England states. The New Practitioner's Guide's calculations for household composition in the New England states are contained in Table A.1 in Appendix A.

There are three potential problems with using Burchell's model today. First, the data used to create the model is now 22 years old. Second, the larger geographic region that it covers means that Massachusetts-specific trends may be missed. Third, the lack of detail on the number of bedrooms in certain housing types may mask the population differences seen in practice in larger units. As the proper type of Census 2000 data is not yet available, UMDI used data from the 1990 Decennial Census of Population and Housing for Massachusetts to create a more localized and up-to-date estimate.[18]

This estimate was developed by first calculating the average total population and the average population of school aged children (defined as children between the ages of 5 and 17) of each census-defined type of housing.. Categories of housing types were pre-defined by the Census dataset as being single family detached, single family attached, various sized multi-family buildings (from 2 to "50 or more" units), mobile homes, and "other." The number of bedrooms recorded ranges from none to "5 or more." For the purpose of this analysis, the various multifamily building sizes were broken out somewhat differently than the data in Table A.1. We separated apartments using Census categories into 2-4 units buildings, 5-9 unit buildings, 10-19 unit buildings, 20-49 unit buildings, and 50 or more unit buildings instead of combining apartments into "garden" and "high-rise" categories. (These categories were collapsed into 2-4 unit buildings and 5+ unit buildings for regional comparisons due to small sample sizes.)

7.1 Differences Between the Models

A comparison between the New Practitioner's Guide tables and the tables for newly-constructed housing units (Table A.4) in Massachusetts reveals some important differences. For example, the 1980 New England PUMS data predicts that there will be 2.417 persons and 0.243 school-aged persons in each 2-bedroom single-family detached house, while the 1990 Massachusetts PUMS data predicts 2.325 persons and 0.248

[18] The Bureau of the Census creates the Public Use Microdata Sample, or PUMS, from census questionnaires. A percentage of answered "long form" questionnaires (either one or five percent) are selected from the total for a state and aggregated by Public Use Microdata Areas (PUMAs). A PUMA must contain at least a certain amount of people (either 400,000 for one percent or 100,000 for five percent sample as a way of protecting the confidentiality. Approximate sample sizes for Massachusetts are 122 thousand households for the five-percent sample and 25 thousand for the one-percent sample. http://www.census.gov/geo/puma/puma2000.html

school-aged persons in this type of house. The relative accuracy of this estimate did not hold up when larger houses were examined.

For a four-bedroom single family detached home, the New Practitioner's model predicts 4.141 persons and 1.470 school-aged children, while the Census data for Massachusetts predicts 3.578 persons and 0.817 school-aged children For a development of 100 four-bedroom homes, the New Practitioner's model would over-estimate the new population by 56 persons, a relevant number when using per-capita fiscal impact forecasting methods. For school-aged children, the model over-estimates 65 children. For 100 three-bedroom homes, the over-estimation would be 41 persons and 28 school-aged children, while for 100 2-bedroom homes there would only be a 6 person overestimation and a 1 child underestimation.

In addition, an analysis of regional Census data indicates that the Rutgers model overestimates the number of new residents and school-age children that accompany new residential development even more in certain regions of the Commonwealth. For example, in the Berkshires region of the state a 100 unit three-bedroom single-family detached development would have, on average, 196 persons (1.9555 persons per unit), or a predicted difference of 59 persons. However, the more recent 1990 Census data for Massachusetts also shows that, for units in multi-unit buildings, the Rutgers model underestimates both general population and school-aged children.

7.2 Housing Units by Value

While the New Practitioner's model selected housing units constructed from 1975 to 1980 to create a population forecasting model, UMDI decided to analyze both new units and households who recently moved into any housing unit. We did this because moving into a new housing unit is usually caused by a "life cycle change" for a household (new children, retirement, etc), and it may not matter if the housing unit is newly constructed or not. According to the 1990 PUMS manual, a recent mover is a household who has moved within the 5 years before the Census was taken.[19] Therefore, in 1990 the questionnaire asked where the residents lived in 1985. We further subdivided recent movers into owners and renters and sorted them by housing value to see if there were any important differences. These results of these analyses can be found in tables A.4 and A.5 in Appendix A.

Comparing tables A.4 and A.5 to the Rutgers data contained in Table A.1 shows less of a divergence from the New Practitioner's model, but also some differences. Most important is that there seems to be less school-aged children in more expensive homes, whether those homes are owned or rented. This pattern is evident across all types of housing units. Generally, detached structures such as single-family homes and mobile homes show equal or lesser average populations using Massachusetts-only data, but attached and multi-unit homes tend to show greater average populations. In all, the tables contained in Appendix A outline the average population by housing unit type, tenure and value calculated from 1990 PUMS data. These data confirm what housing specialists that

[19] 1990 PUMS Manual, U.S. Bureau of the Census

we queried suspected: that there is a definite increase in the number of school-aged children in units of three bedrooms or larger, and there are, on average, more school-aged children in housing units of lesser value than there are in housing units of greater value.

7.3 Aggregation Bias (or the Ecological Fallacy)

Aggregation bias is caused by a mismatch in the scale of data available for analysis and the geographic area or population being studied.[20] It is sometimes called the "ecological fallacy," which refers to drawing erroneous conclusions from ecological inferences about individual behavior based on aggregate data.[21] Whenever data drawn from a large geographic area is used to predict the behavior, demographics, or outcomes of a small geographic area, the results are subject to aggregation bias.

Aggregation bias in estimations can be minimized by using care in developing those estimations. Two researchers who were trying to create a constant-quality price index (CQI) for multi-family housing found that apparent inconsistencies in the accepted methods for creating these indeces were explained by examining the available data and basing the index on the data that created the best analysis, which turned out to be the square footage of the multifamily unit.[22] Other research has examined using statistical methods to factor out errors using statistical models. However, those models and methods are beyond the scope of this paper.

Generally, any researcher using a household population model based on aggregated data over a wide geogaphic area to predict the population of a few households in a specific municipality opens themselves up to two different forms of aggregation bias. First, the assumption that households living in a certain form of housing in a particular town have the same composition as all households in that housing type in a large geographic area ignores spatial differences in household composition. Second, assuming that the composition of one specific household can be predicted by the average population of all hosueholds ignores the effect of non-random factors on the population forecasting model's assumptions. In other words, the messy reality of families and households has a way of undermining the best-laid forecasting models of social scientists.

7.4 Conclusions

The problems with creating any population forecasting method are that it uses average data to forecast specific outcomes and it assumes that patterns that occurred in the past will continue to occur in the future. Unfortunately, both of these problems can introduce inaccuracy into the forecast. Average data for a group of states, one state, or even a part of a state will miss important trends that may be occurring on a municipal

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[20] Smith, T. 2001. *Aggregation Bias in Maximum Likelihood Estimation of Spatial Autoregressive Processes,* Philadelphia, Dept. of Systems Engineering, University of Philadelphia, p. 2.

[21] Freedman, D. 1999. *Ecological Inference and the Ecological Fallacy,* Technical Report No. 549, Berkeley, Dept. of Statistics, University of California, p. 1.

[22] Guttery, R, and C. F. Sirmans. 1998. *Aggregation Bias in Price Indices for Multi-Family Rental Properties*, Journal of Real Estate Research, v.15, n.3, p. 323.

level. Also, household composition has been changing in Massachusetts, with single family households and smaller households becoming more prevalent.[23]

There are additional issues with the geographic specificity of these models. For example, the Rutgers model used data for the entire New England region to create population forecasting models for use in individual cities and towns, and our models use Massachusetts-specific or regional models for the same purpose. But even the models that we created have discrepancies when compared to each other. Cutting the data in different ways, whether by housing value, Benchmarks region, rented or owned, etc. has an effect on the outcome of the prediction. Data available from the decennial Census does not contain municipal level information that can be used to create population forecasts except for a small amount of cities whose populations are above 100,000 and therefore become their own Public Use Microdata Area (PUMA). It is possible to perform a case study of similar housing types in the same or similar municipalities in the same manner that case studies are performed, but there is no guarantee that even these projections will be correct.

Even with models that concentrate on a smaller geographic area, there is still the real and unavoidable effect of aggregation bias, which can lead the users of the model into false conclusions. Population forecasts can be used to estimate future population, but the results will always be just estimates, and the smaller the scale of the estimate, the more likely it is to be wrong.

[23] UMass Donahue Institute. 1998. *A Profile of Housing in Massachusetts*, Amherst, MA, University of Massachusetts, p. 6.

8 Expenditure Analysis

To examine further if and how fiscal impact analysis models can predict change, UMDI examined the expenditure data collected by the Division of Local Services (DLS) from 1990 through 2000 and compared it to the population growth rate as reported by the U.S. Census Bureau. Municipalities were ranked by growth rate in population, and were separated into one of seven "kinds of communities" using a classification scheme developed for the Division of Local Services. Ranking the municipalities allows trends to be discovered that may be lost if all 351 municipalities are analyzed separately. Note that the data used in this chapter is expenditure data, meaning it tracks the amount of money spent on various budget categories that is collected from any source, whether it is property taxes, state aid, federal grants, etc..

Originally we thought a more accurate analysis would result from creating a median yearly growth rate instead of simply comparing 1990 to 2000. This would cancel out any special budgetary circumstances that may have occurred in either 1990 or 2000 that may have been outside the normal parameters of a municipalities "average" budget. However, due to the massive decrease in municipal budgets from 1990 to 1992 and the slow but steady climb back to and past "Massachusetts Miracle" levels, nearly all municipalities posted a negative median yearly budget growth between 1990 and 2000. We felt that, on the whole, comparing 1990 to 2000 would create the most accurate assessment as both years were at the height of decade-long booms that were in the process of bursting.

Table 8.1 Total Massachusetts Municipal Expenditures by Type, 1990-2000

Massachusetts	1990	Rank 1990	2000	Rank 2000	Change 90-00	Rank 90-00
Population	6,016,425		6,349,097		5.5%	
Population 5-17	940,711		1,102,796		17.2%	
Education	$4,575,975,992	1	$5,852,557,097	1	27.9%	1
Fixed Costs	$1,311,831,981	2	$1,336,861,696	2	1.9%	7
Police	$825,661,636	3	$962,392,976	3	16.6%	3
Debt Service	$695,236,789	4	$819,181,584	4	17.8%	2
Fire	$687,021,548	5	$724,011,117	5	5.4%	6
General Government	$607,580,273	6	$618,006,690	6	1.7%	8
Other Public Works	$567,853,174	7	$451,986,887	7	-20.4%	11
Public Works Highways	$444,004,014	9	$397,226,053	8	-10.5%	10
Inter- Governmental	$305,021,637	10	$332,775,214	9	9.1%	5
Culture & Recreation	$262,091,095	11	$294,393,297	10	12.3%	4
Health & Welfare	$464,113,310	8	$204,215,954	11	-56.0%	13
Other Public Safety	$189,788,929	12	$173,810,090	12	-8.4%	9
Other Expenditures	$84,946,445	13	$48,983,257	13	-42.3%	12
General Fund Total	**$11,021,126,842**		**$12,216,401,912**		**10.8%**	

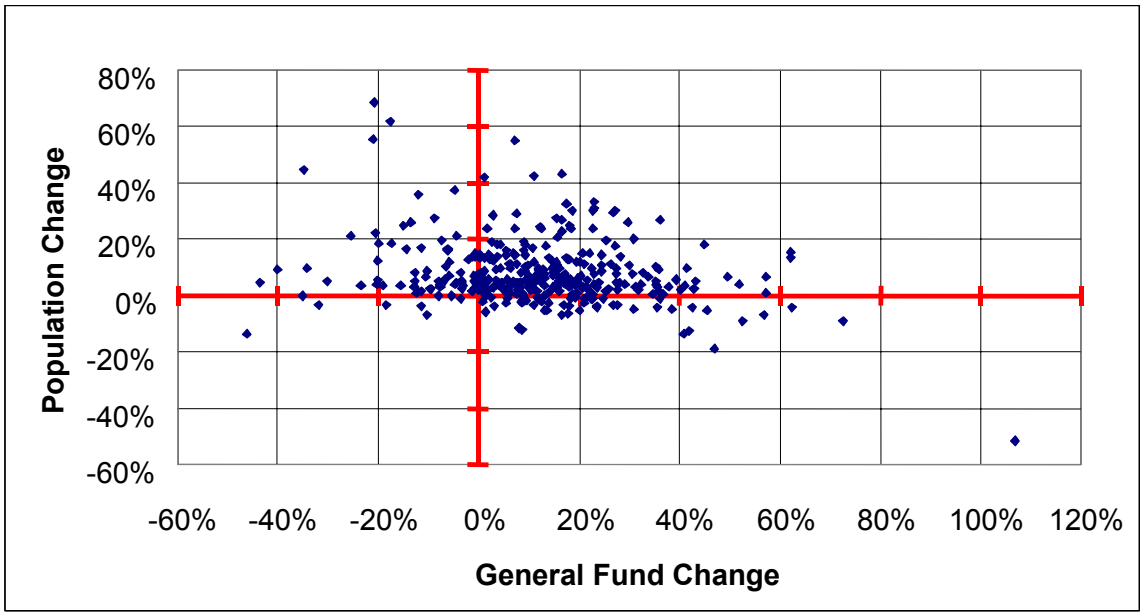
Source: U.S. Census Bureau, Decennial Census 1990 and 2000
Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Overall, expenditures in Massachusetts increased 10.8 percent between 1990 and 2000, while population increased only 5.5 percent, as shown in table 8.1. In 1990 and 2000, the largest single municipal expenditure item was education, which increased almost 28 percent and rose from 41.5 to 47.9 percent of all reported municipal expenditures. Second were fixed costs, which increased only 2 percent. The major expenditure loser from 1990 to 2000 were health and welfare expenditures, which decreased 56 percent and fell from 8th place in expenditures in 1990 to 11th in 2000. This section will examine the relationships between certain of the above expenditure categories and growth rates in population, parcels, and also by kind of community.

8.1 Per-Capita Municipal Expenditures by Population Growth

It is difficult to discern a pattern that could be used to explain the relationship between population change and municipal expenditure change. Figure 8.1 is a simple plot of population change versus per-capita expenditure change from 1990 to 2000, where each point represents one of the 351 cities and towns in Massachusetts. It shows that some municipalities had high population growth with negative per-capita expenditure growth, some had negative population growth with a high per-capita expenditure growth.

Figure 8.1 Population Change vs. General Fund Expenditure Change in Adjusted Dollars, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.2 Expenditures by Growth Rate Category

As figure 8.2 below shows, when the median growth rate for each municipality growth category is charted, a negative correlation between population growth and per-capita total general fund expenditure increases can be seen. Except for the towns in the "high growth" quartile, the decrease in growth rate for total expenditures and general

fund expenditures for each growth category seems quite linear. While there is a great deal of variation between the highest and lowest per-capita expenditure growth rate for each category, the general trend implies that growth may be the best way to keep per-capita costs under control. Table 6.3 shows the per-capita expenditure growth rates for each growth category. Removing education expenditures from the total shows a slightly different pattern, one where certain growth categories actually showed decreases in per-capita expenditures for non-education line items (see figure 6.6.2).

Table 8.2 Per-Capita Total General Fund Expenditure Growth Rates by Population Growth Quintile Rank, 1990-2000

Growth Rank	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)
Lowest	-46.2%	-43.7%	-30.2%	-41.6%	-36.4%
Highest	107.0%	52.0%	55.8%	60.8%	60.8%
Average	18.1%	11.5%	8.8%	9.62%	5.5%
Median	17.3%	10.2%	8.6%	10.6%	5.9%

Source: Division of Local Services, Dept. of Revenue; Author Calculations

We examined each budget line items, such as education, police, fire, public works, etc, to see if there were similar correlations by population growth. The charts for each line item can be found in sections 8.7 through 8.19. As the high growth rate in total municipal education expenditures suggests, median per-capita education spending per quintile is much higher than general fund expenditure growth. Figure 8.23 shows that the highest median growth rate in per-capita education spending was found in the "medium" growth rate towns. While these towns showed a median population growth of 6.4 percent, their median education expenditure growth was over 24 percent. Except for this spike, there is a slight general downward trend in per-capita cost increases that goes along with that seen in most other general fund line-item expenditures.

While most expenditure line items have shown median increases in all population growth rate categories, some expenditure types have shown declines. The largest per-capita decline in spending was seen in public works and highway spending (see figures 8.25 and 8.26). Health and welfare per-capita expenditures also bucked the trend, showing no discernable pattern in changes by growth rate, as did culture and recreation and debt service. Generally, we have seen that most per-capita expenditures do change over time, and more often than not the change is an increase in spending. Overall expenditure patterns for aggregate general fund spending do imply that growth can help to hold down these per capita cost increases.

8.3 Municipal Expenditures by Kind of Community (KOC) Code

The above analyses suggest that there is a negative correlation between growth and increases in municipal expenditures per capita. Figure 8.4 examines the same data as before, except that all municipalities are categorized by their KOC code. They show a different picture, one that is less obvious. Essentially, the community type with the lowest overall growth in per-capita expenditures were the Small Rural Communities (KOC 5), which also had a rather high population increase. Those with the highest growth were the Residential Suburbs (KOC 4) and Urbanized Centers (KOC 1), two very

different types of communities. Interestingly, while KOC types 2 and 3 showed very similar expenditure growth patterns, KOC 2 communities (Economically Developed Suburbs) had the third lowest median population growth, while KOC 3 (Growth Communities) had a the second highest median population growth rate.

Looking at growth rates within each KOC code begins to make the picture clearer. While the patterns are not completely consistent throughout the community types, there is an overall pattern of median per-capita costs decreasing as growth rates increase in each type of community. Note that Chelsea is only municipality rated as "very high" population growth in the "Urban Center" community type, and it is not possible to draw conclusions based on only one data measurement. Note that growth rate breakouts by kind of community are only shown for total expenditures and total expenditures minus education (sections 8.5 and 8.6).

8.4 Conclusions on Municipal Expenditure Analysis

Analyzing municipal expenditures is difficult. While there are general rules about which types of expenditures fall under each expenditure category, there can be some variation between municipalities in their exact categorization. For example, certain costs may be categorized as expenditures in one town and therefore show up in expenditure data, while other towns may classify the same cost as a capital expense which is not tallied in expenditure data. In addition, certain costs associated with education, such as pensions or playing fields, may actually be tallied under other line items in the expenditure data, such as fixed costs or recreation. Therefore, analyzing this data can only give an approximate picture of the fiscal realities of municipalities.

The wide variation in per-capita general fund expenditure growth rates illustrates the vast differences between each municipality in Massachusetts. The scatterplot of expenditure growth versus population growth (figure 8.1) shows that towns with the same level of population growth can have widely differing per-capita expenditure growth rates. Even so, aggregating these expenditure growth rates into categories based on the population growth rate of each municipality begins to show patterns that imply that higher-growth municipalities have less per-capita increases in expenditures than lower-growth ones.

Analyzing the various budget categories by growth rate ranking showed similar growth trends. Of note is the profoundly negative growth in "public works/highway" and "other public works" per-capita expenditures from 1990 to 2000. Contrasted with the increase in education spending, this implies that education expenditures may be cannibalizing monies that may have been used for other purposes. Of interest is the lack of any pattern seen in some of the line items, such as "fixed costs" and "debt service" expenditures. While these seem to have increased significantly for some municipalities, they have not done so for all.

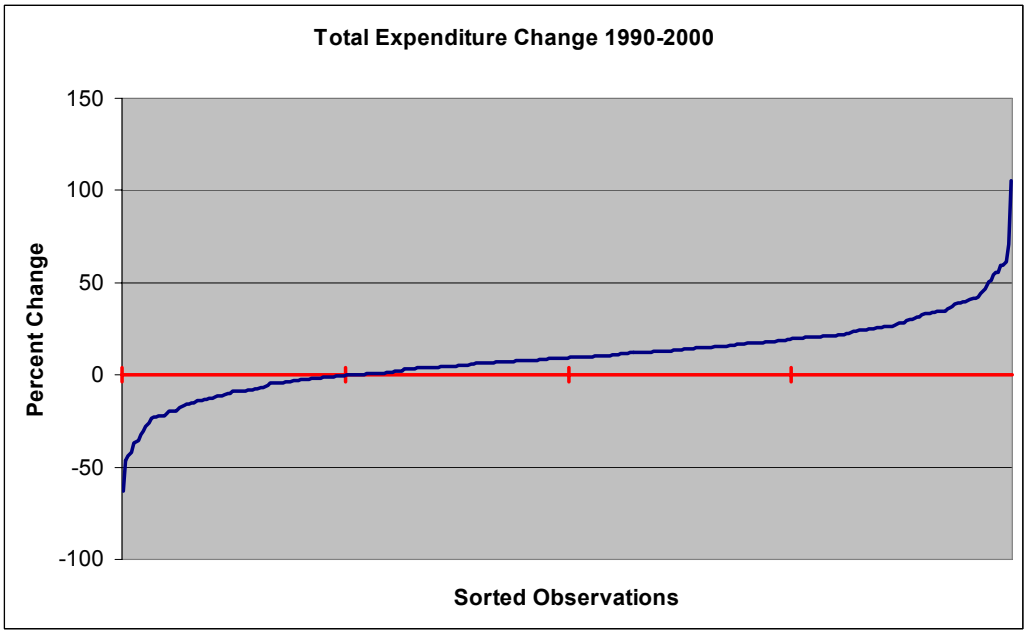
Looking at per-capita expenditure growth by community type also illustrates some interesting trends. Certain community types (urbanized centers (1), economically developed suburbs (2), residential suburbs (4), and rural economic centers (5)) show

median per-capita expenditures growth rates that are higher than median population growth rates, while the other three community types show the opposite. Looking at the growth rates of each town within the seven community types shows a general but imperfect pattern of lower-growth towns having greater increases in median per-capita expenditures than higher-growth towns.

Overall, there is a trend of per-capita expenditures increasing less with higher population growth rates. This implies that growth helps keep per-capita costs down, but there may be other forces at work as well. Older municipalities may possess older infrastructure that is more expensive to maintain, or there may be more poverty in certain types of cities and towns that requires more services. Even so, the pattern is intriguing.

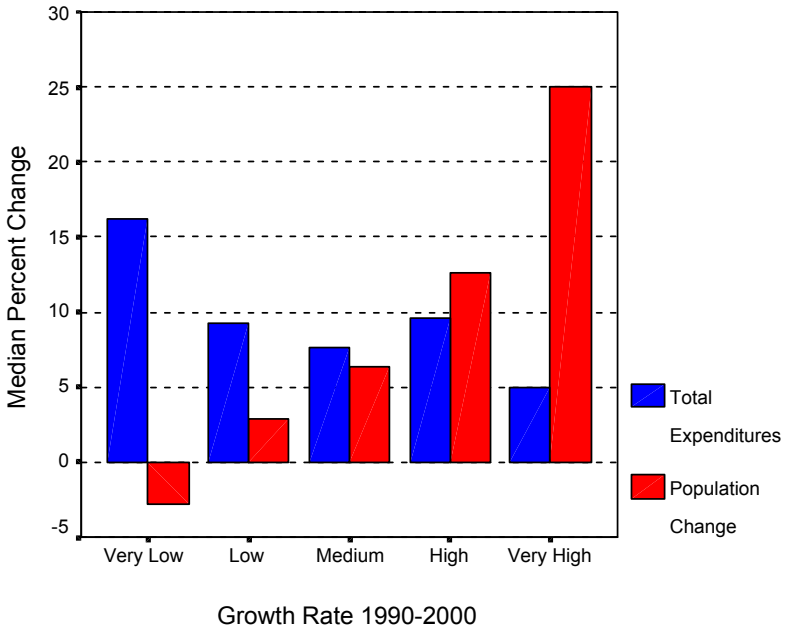
8.5 Total General Fund Expenditure Charts

Figure 8.2 Per Capita Total General Fund Expenditure Change



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.3 Median Percent Change in Per Capita Total General Fund Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.4 Median Percent Change in Per Capita Total General Fund Expenditures by Kind of Community, 1990-2000

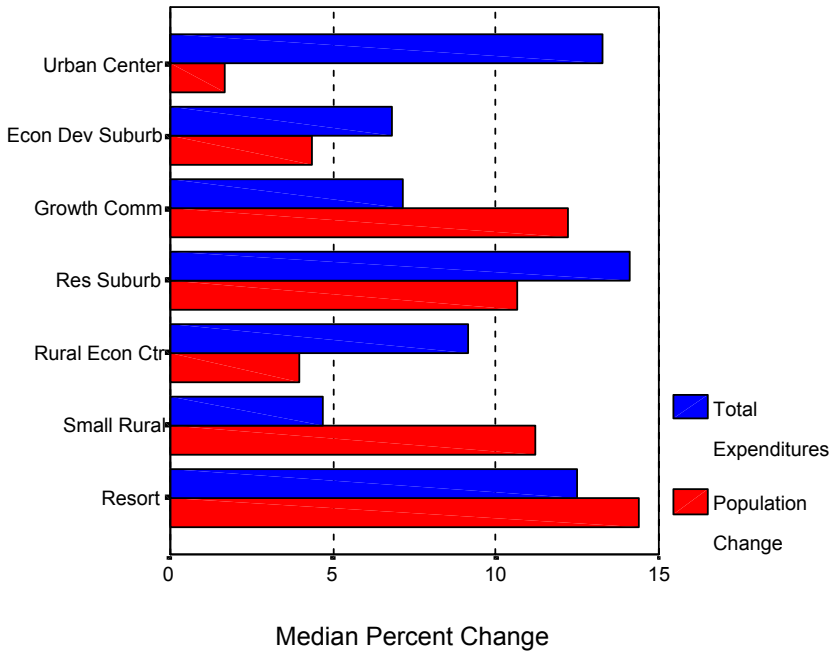
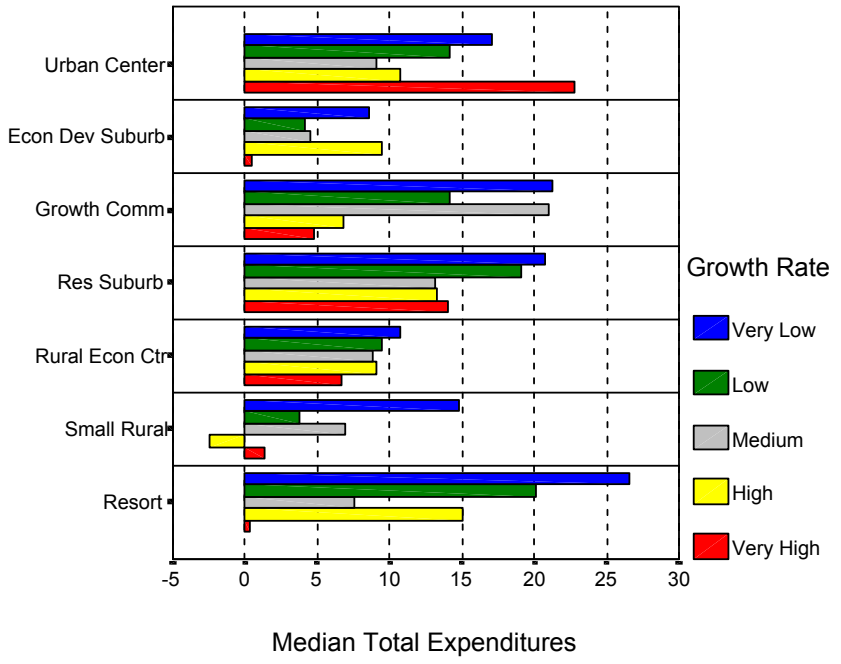


Figure 8.5 Median Percent Change in Per Capita Total General Fund Expenditures by Kind of Community and Growth Rate, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.6 Total Expenditures Minus Education Expenditure Charts

Figure 8.6 Per Capita Total Expenditure Minus Education Change

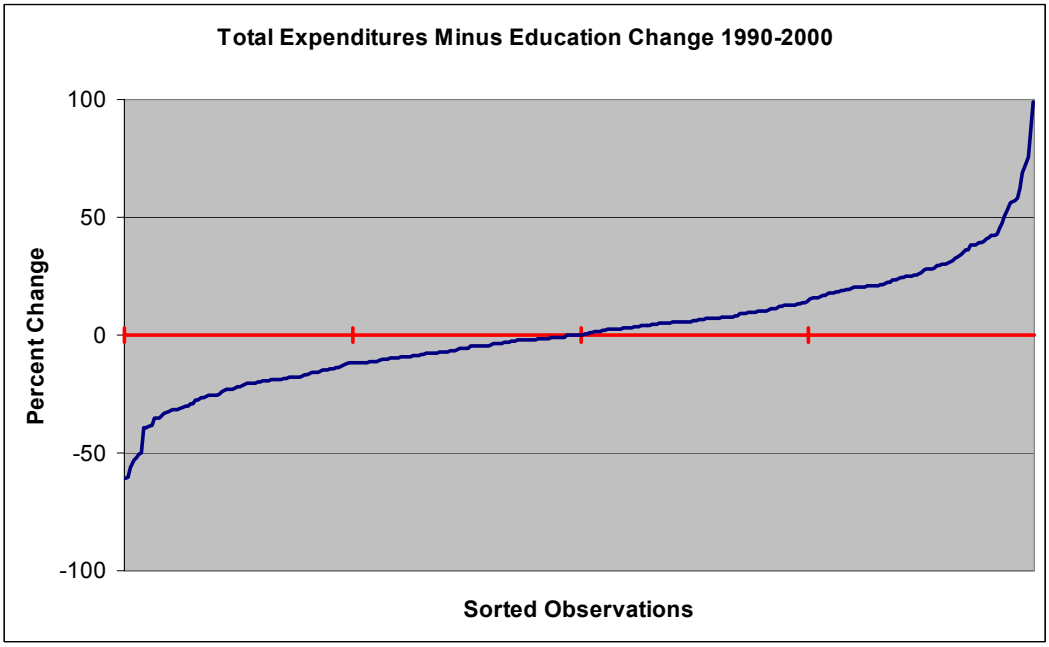
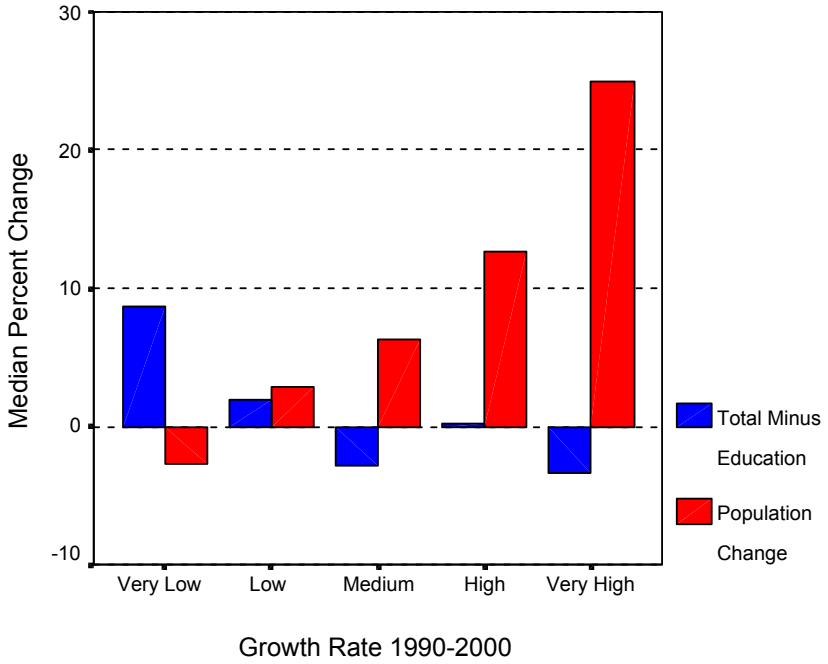


Figure 8.7 Median Percent Change in Per Capita Total Expenditures Minus Education by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000 Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.8 Median Percent Change in Per Capita Total Expenditures Minus Education by Kind of Community, 1990-2000

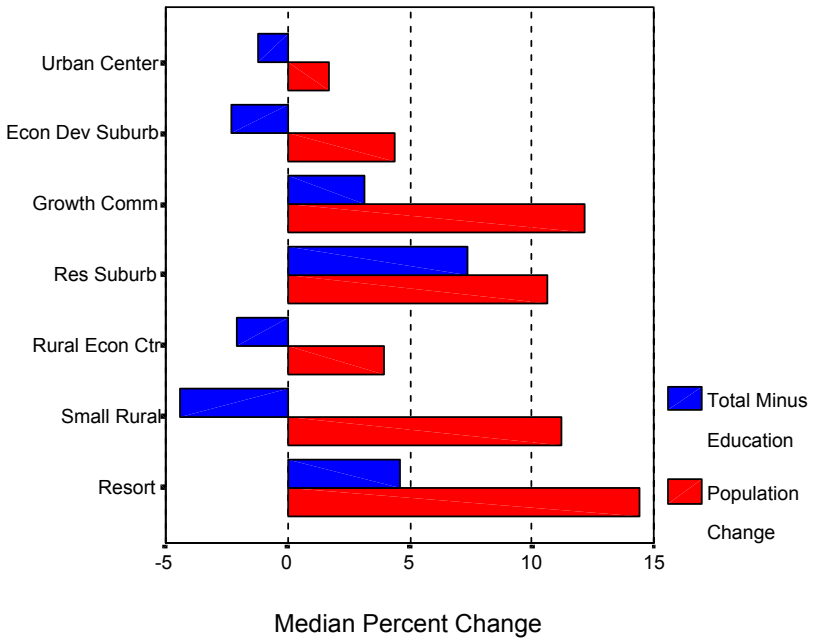
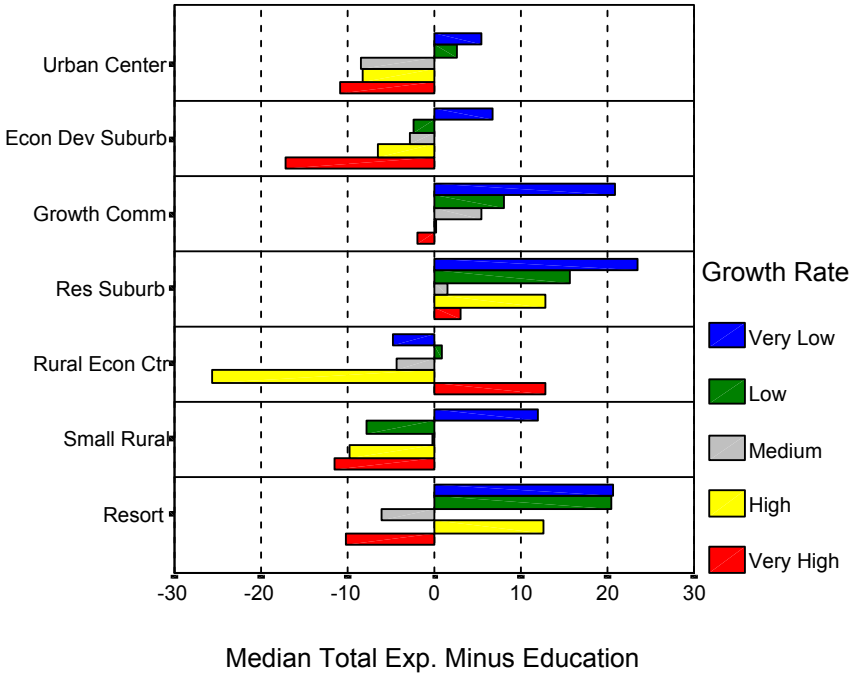


Figure 8.9 Median Percent Change in Per Capita Total Expenditures Minus Education by Kind of Community and Growth Rate, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.7 General Government Expenditure Charts

Figure 8.10 Per Capita General Government Expenditure Change

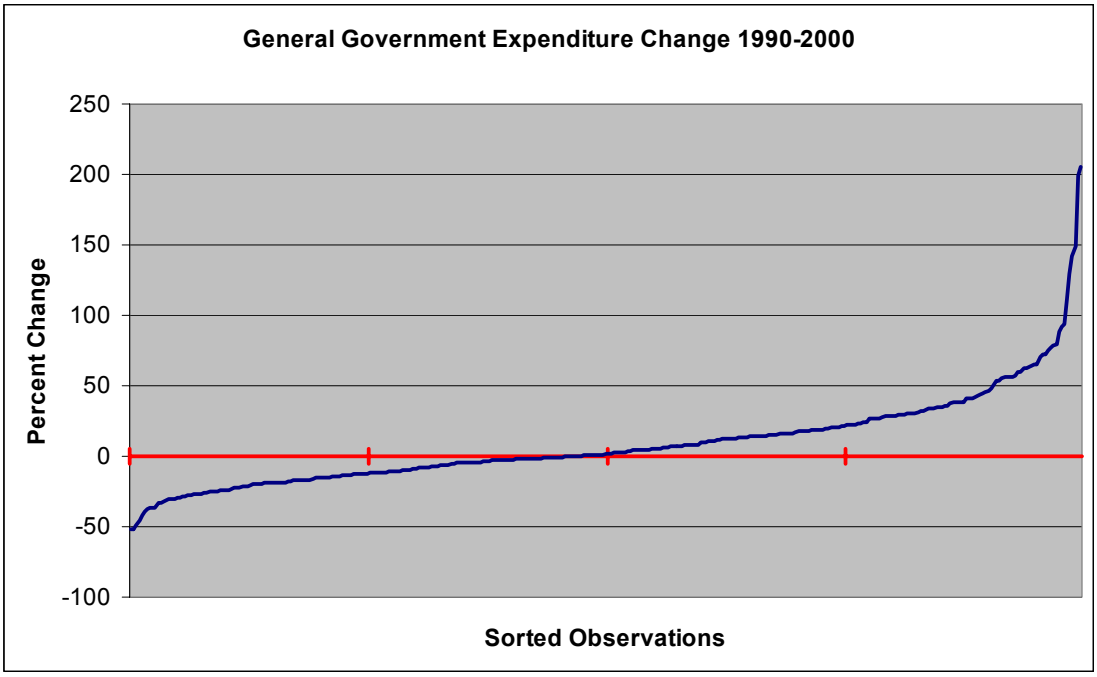
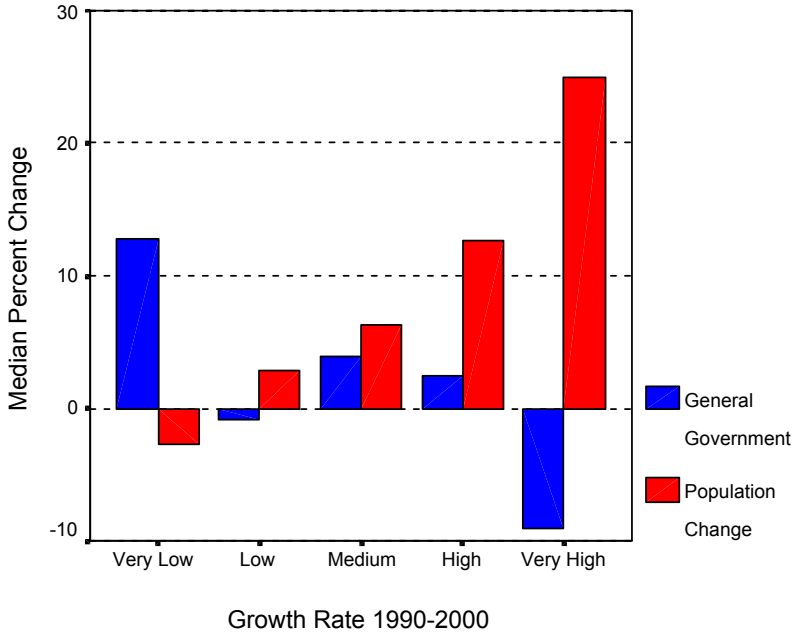
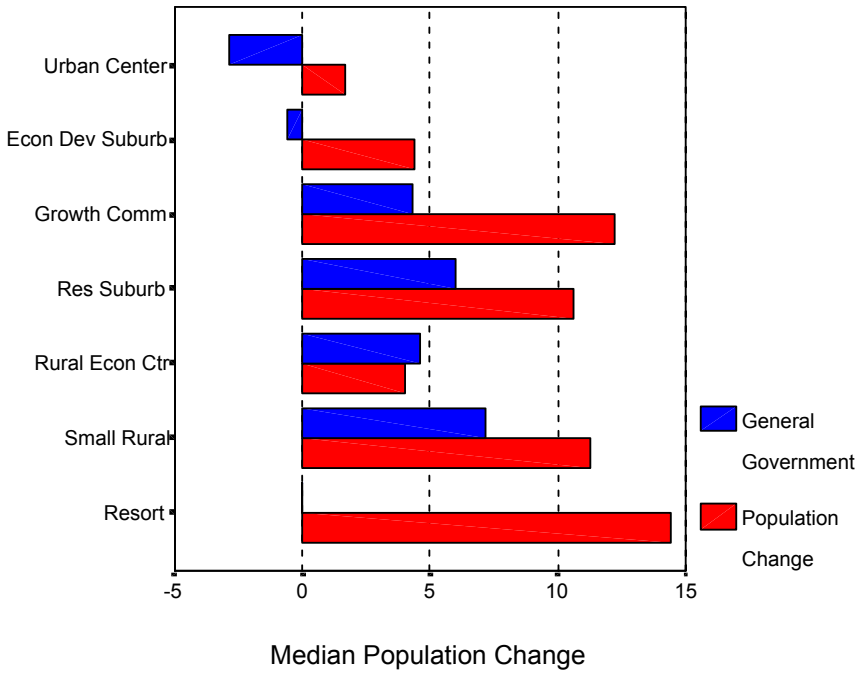


Figure 8.11 Median Percent Change in Per Capita General Government Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.12 Median Percent Change in Per Capita General Government Expenditures by Kind of Community, 1990-2000



8.8 Police Expenditure Charts

Figure 8.13 Per Capita Police Expenditure Change

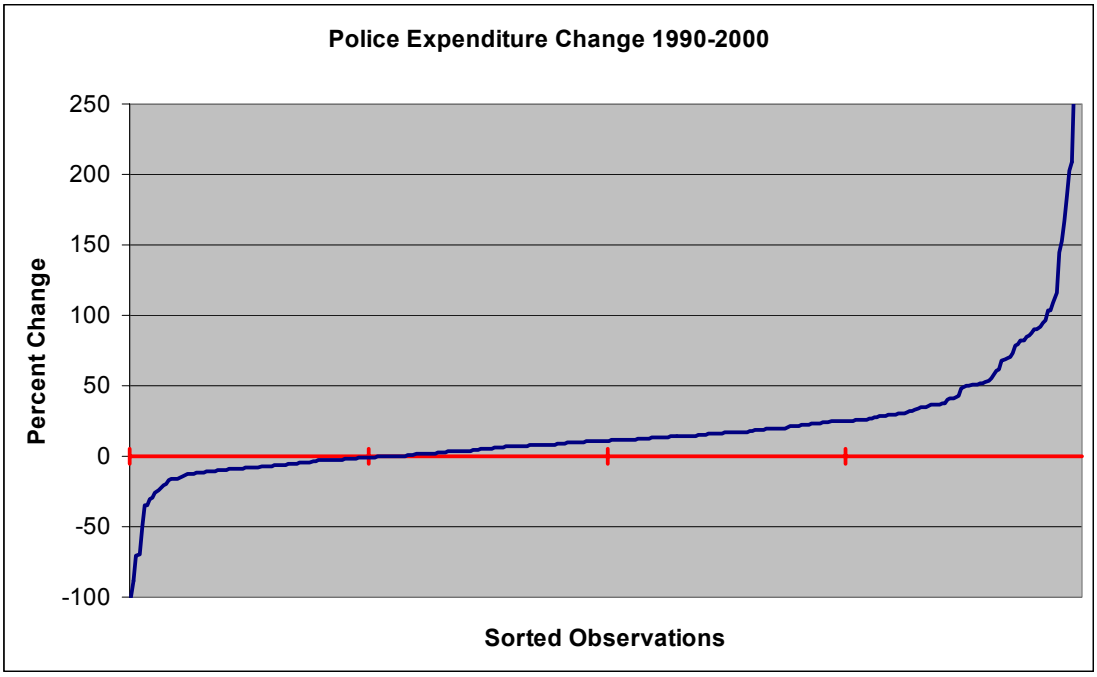
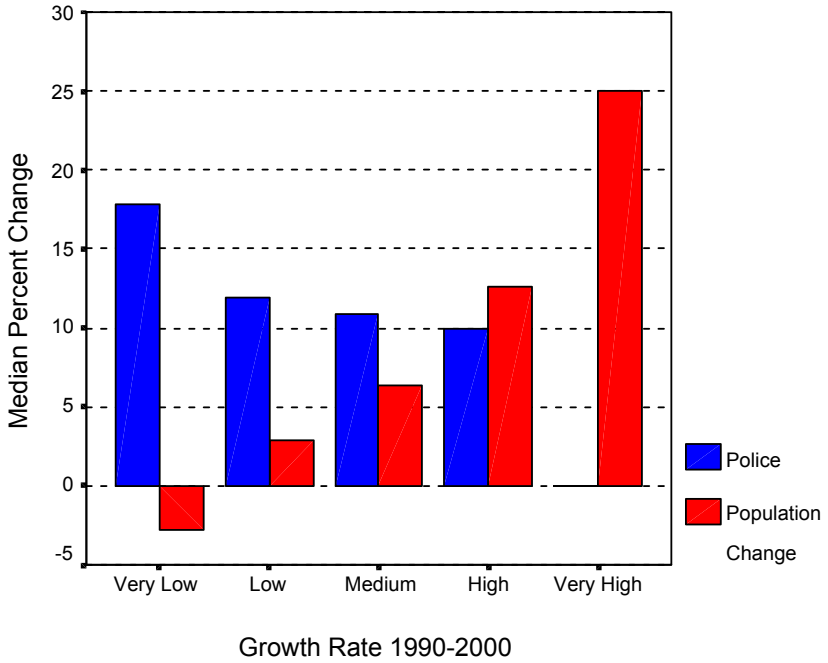
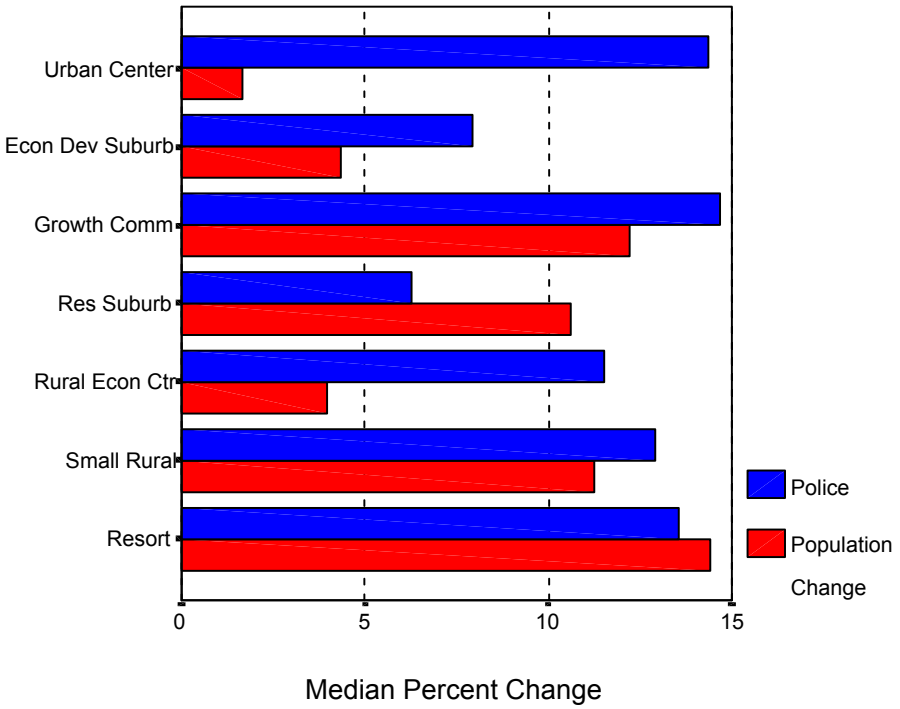


Figure 8.14 Median Percent Change in Per Capita Police Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.15 Median Percent Change in Per Capita Police Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000 Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.9 Fire Expenditure Charts

Figure 8.16 Per Capita Fire Expenditure Change

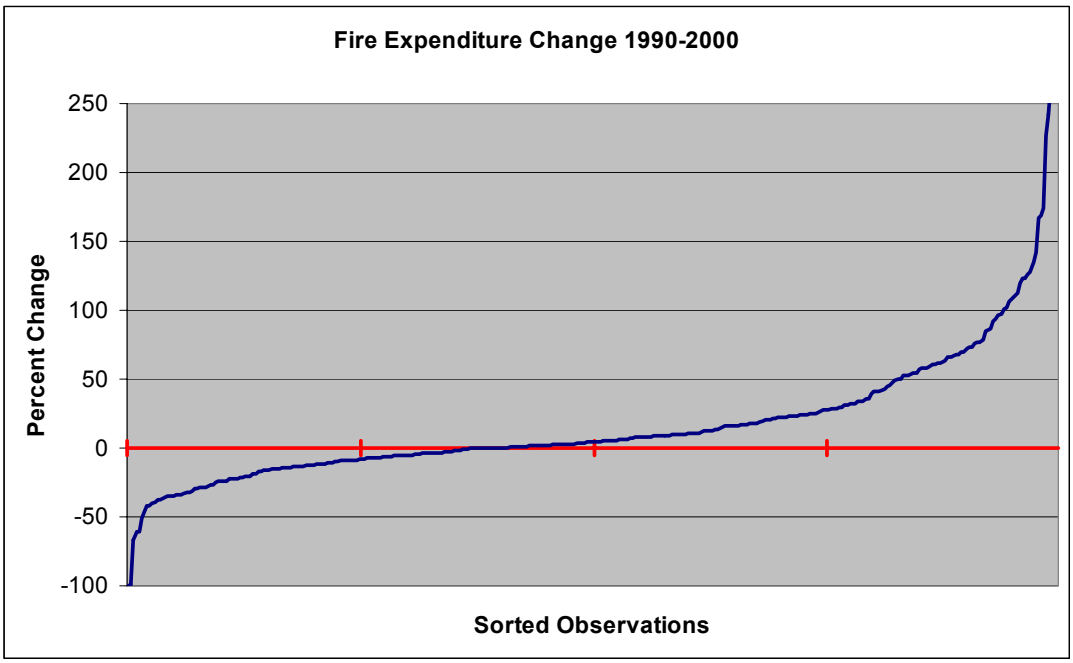
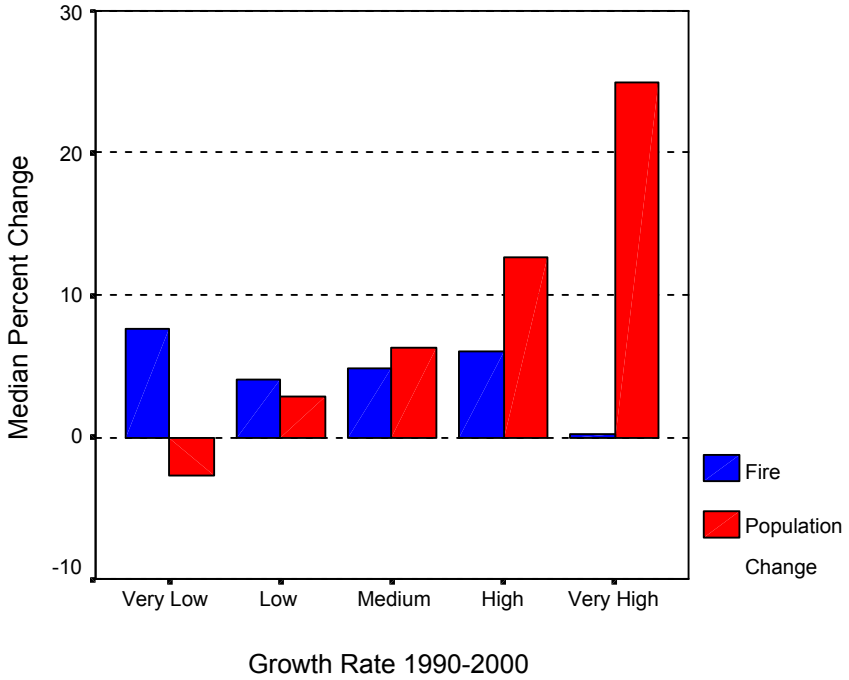
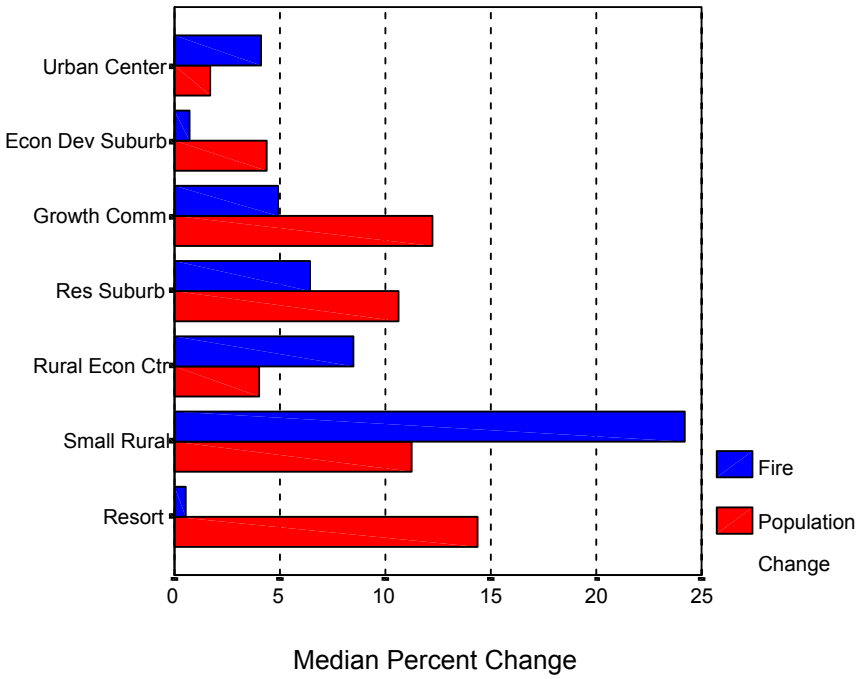


Figure 8.17 Median Percent Change in Per Capita Fire Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.18 Median Percent Change in Per Capita Fire Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.10 Other Public Safety Expenditure Charts

Figure 8.19 Per Capita Other Public Safety Expenditure Change

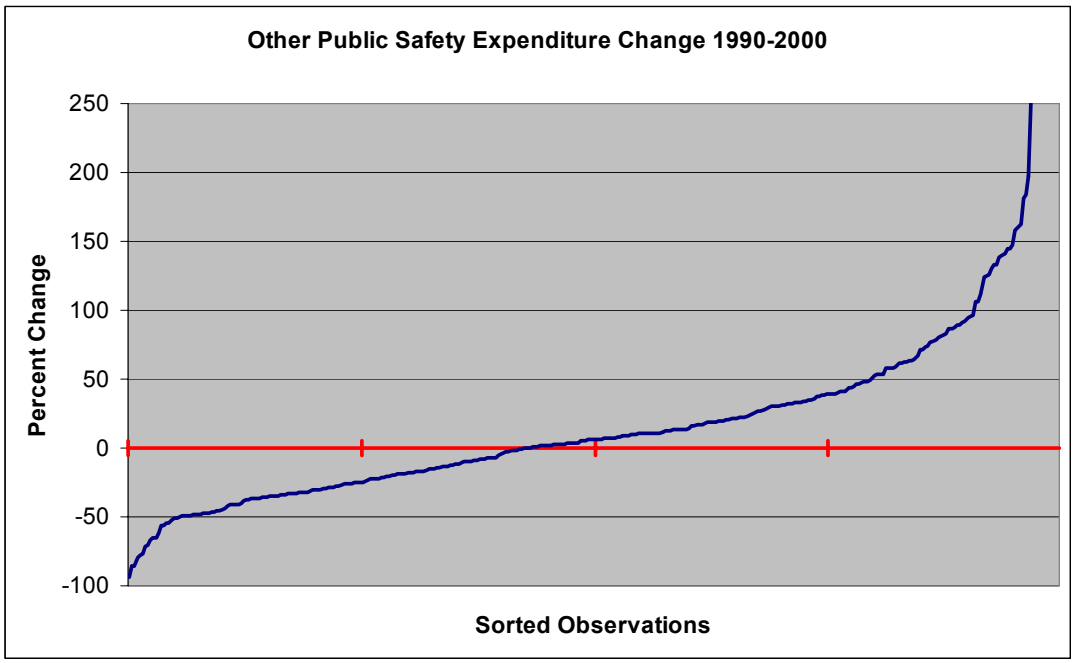
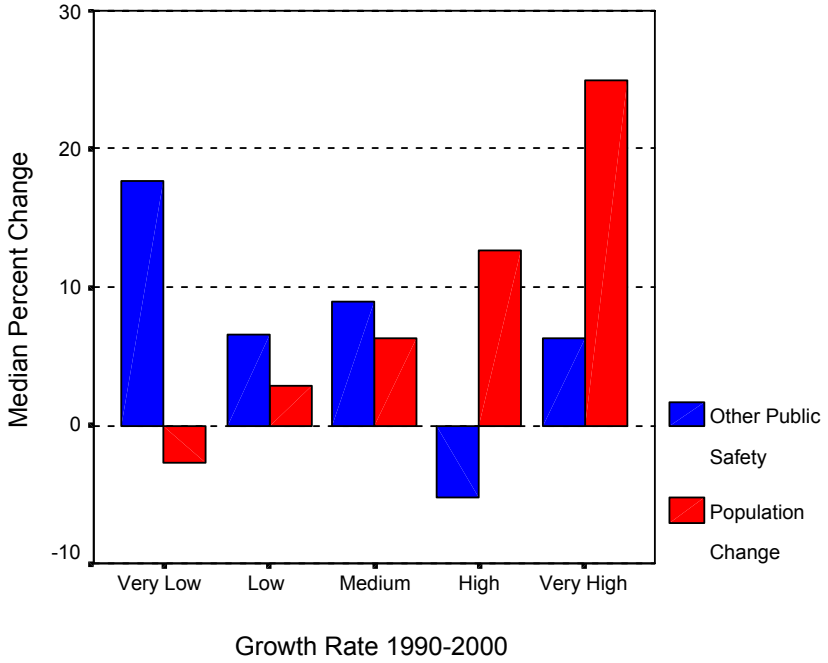
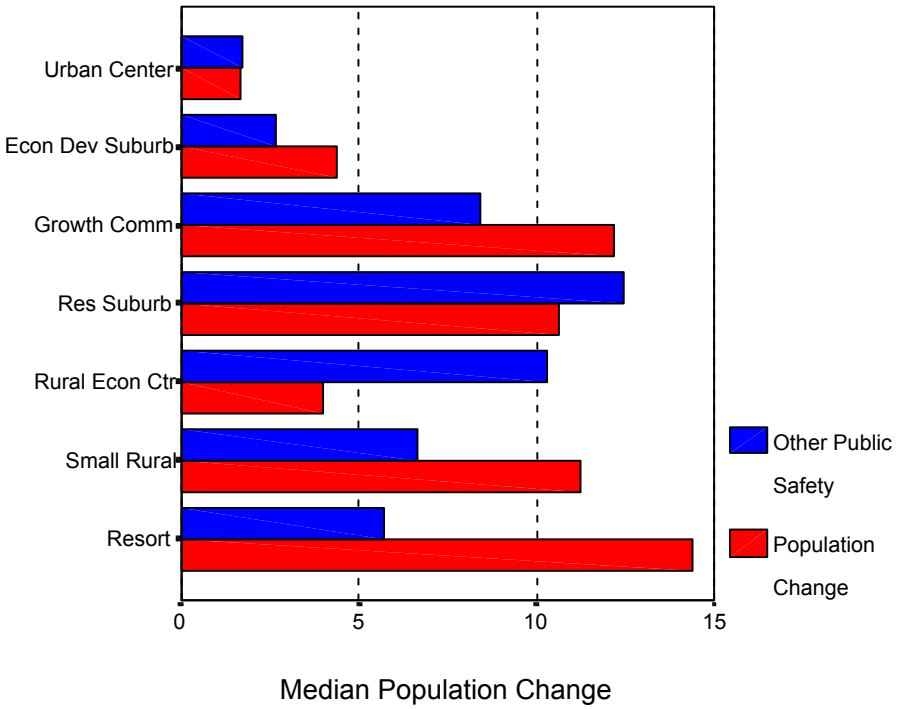


Figure 8.20 Median Percent Change in Per Capita Other Public Safety Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.21 Median Percent Change in Per Capita Other Public Safety Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.11 Education Expenditure Charts

Figure 8.22 Per Capita Education Expenditure Change

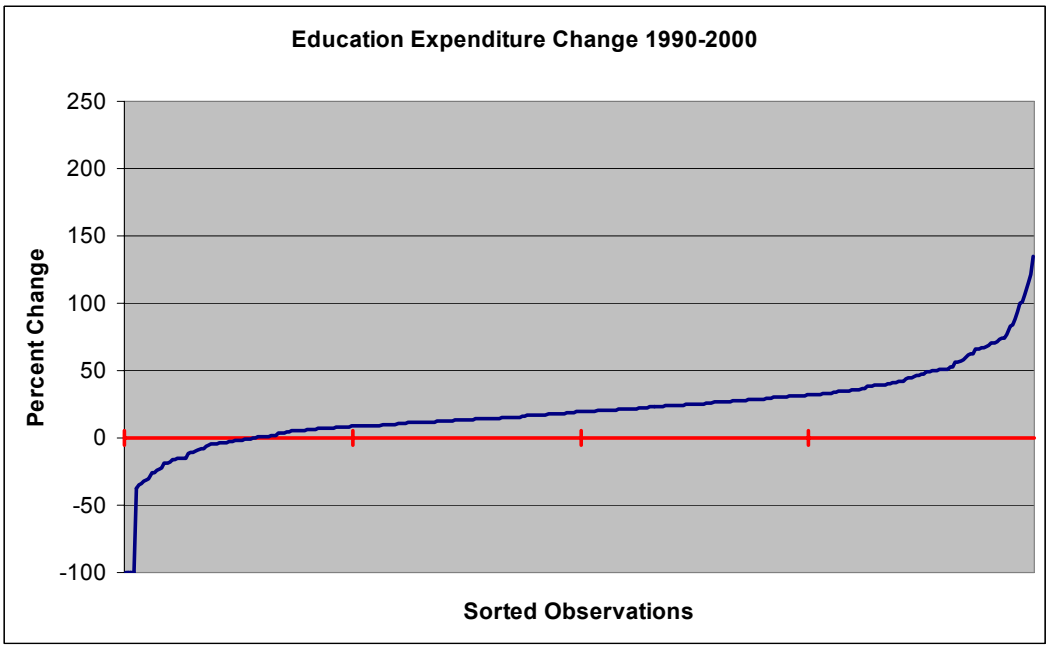
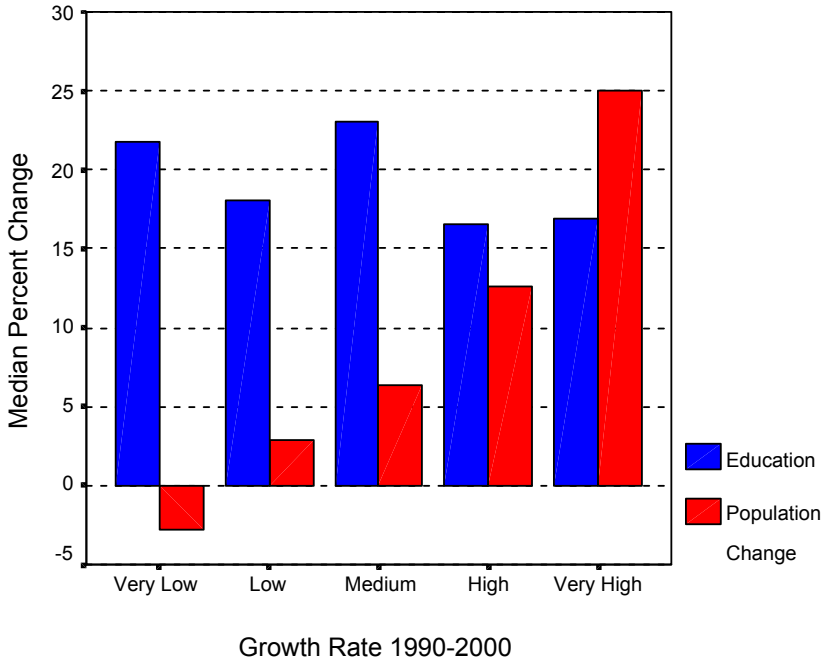
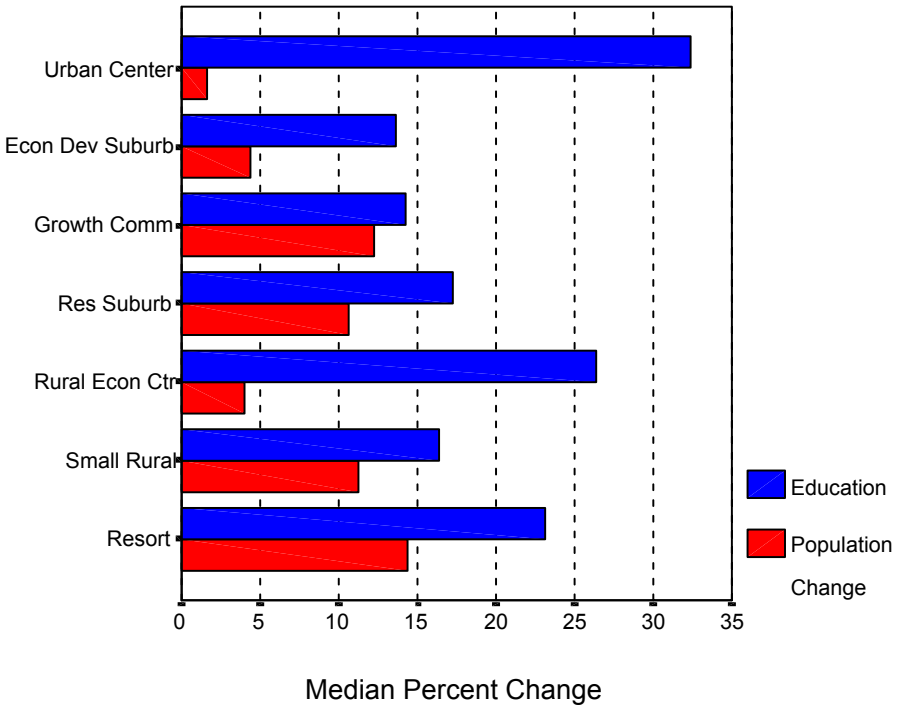


Figure 8.23 Median Percent Change in Per Capita Education Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.24 Median Percent Change in Per Capita Education Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.12 Public Works/Highway Expenditure Charts

Figure 8.25 Per Capita Public Works/Highway Expenditure Change

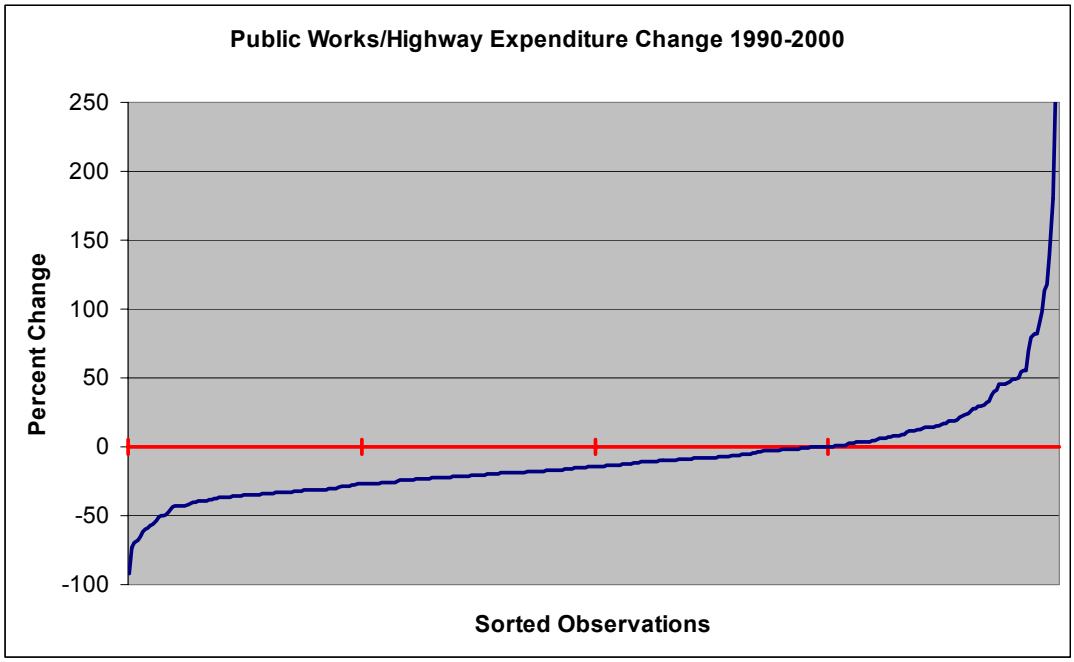
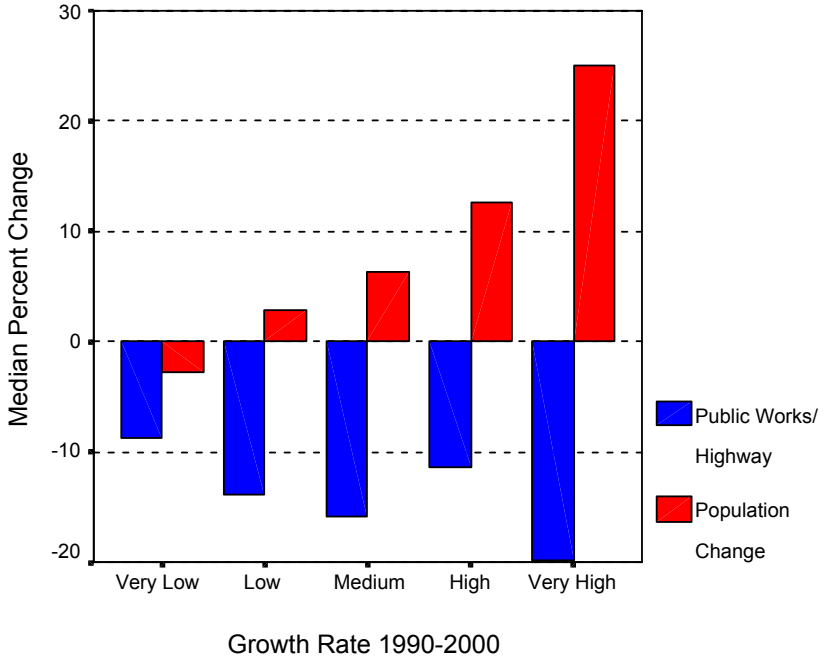
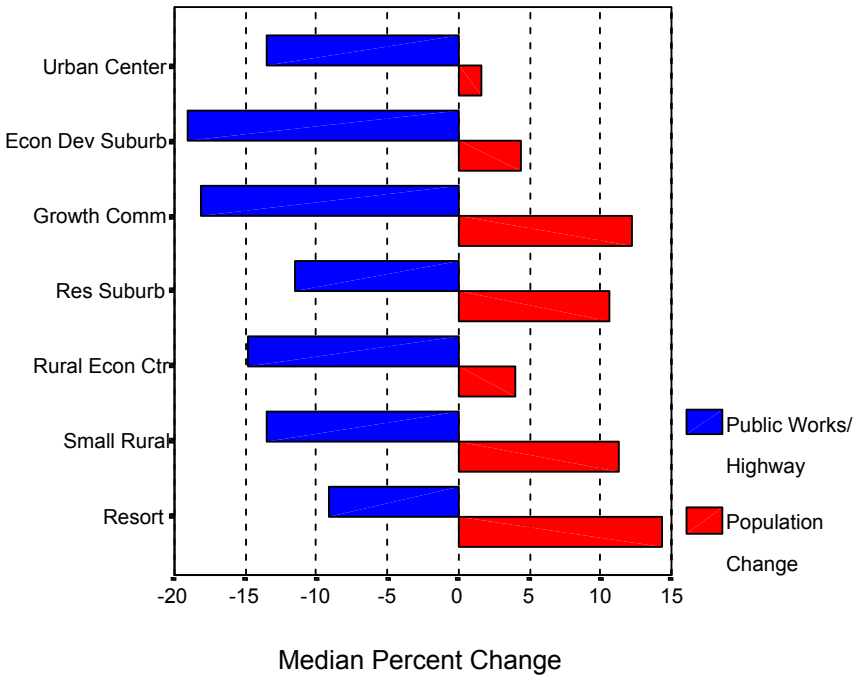


Figure 8.26 Median Percent Change in Per Capita Public Works/Highway Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.27 Median Percent Change in Per Capita Public Works/Highway Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.13 Other Public Works Expenditure Charts

Figure 8.28 Per Capita Other Public Works Expenditure Change

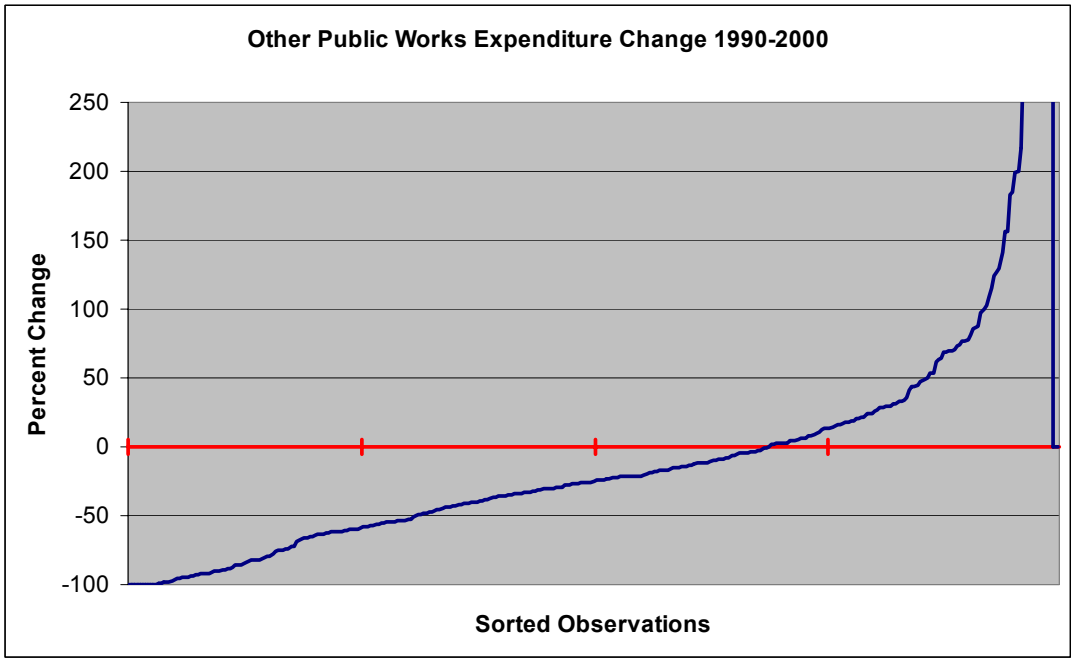
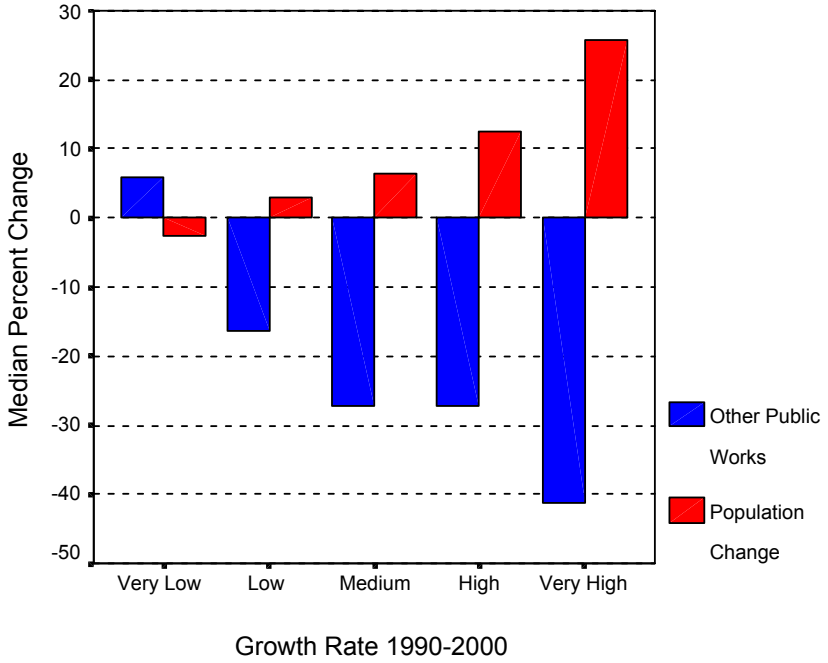
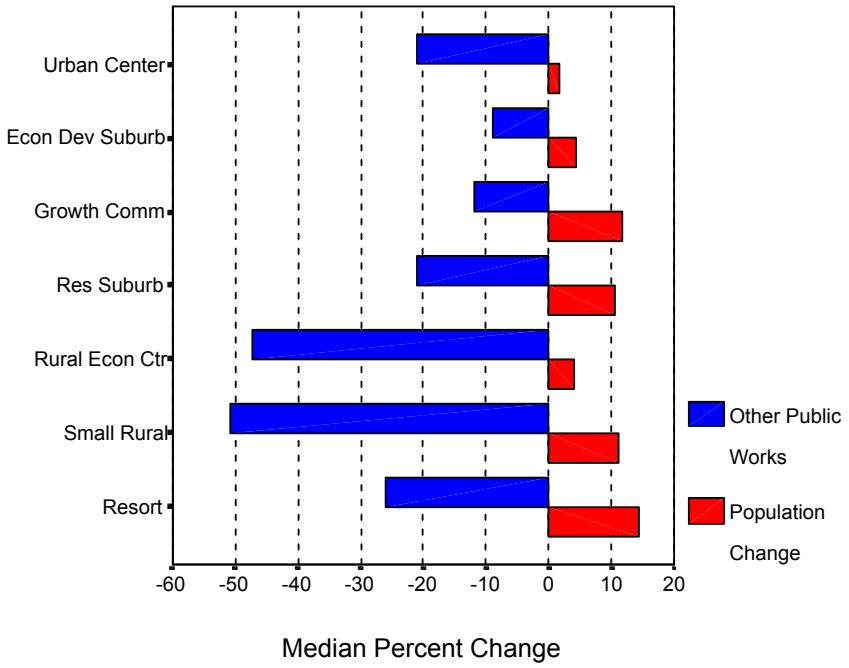


Figure 8.29 Median Percent Change in Per Capita Other Public Works Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.30 Median Percent Change in Per Capita Other Public Works Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.14 Health & Welfare Expenditure Charts

Figure 8.31 Per Capita Health & Welfare Expenditure Change

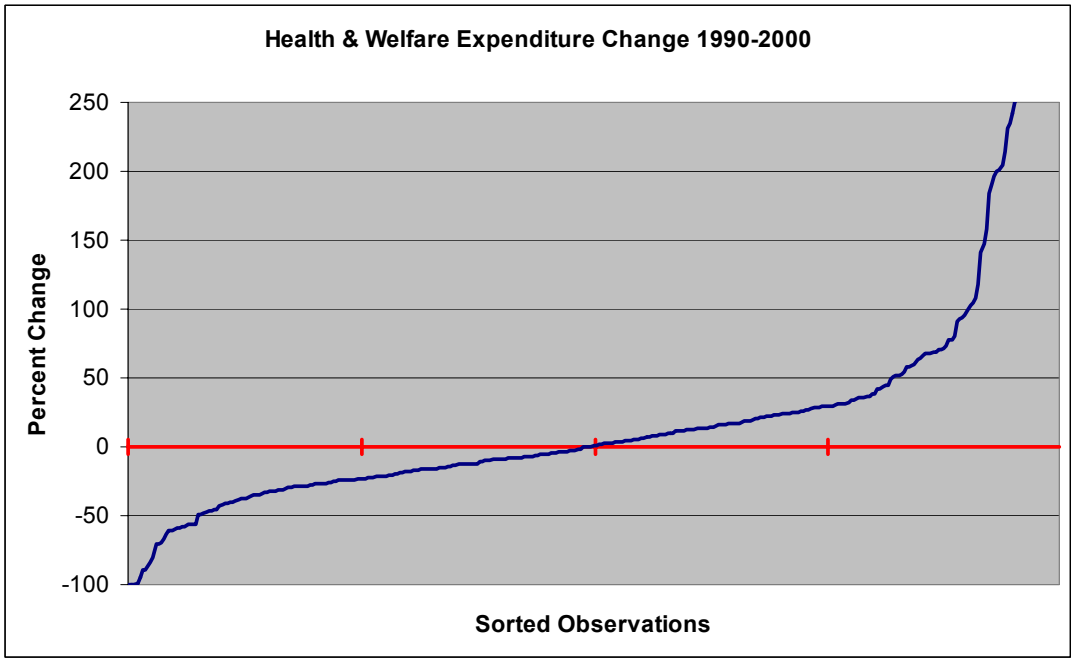
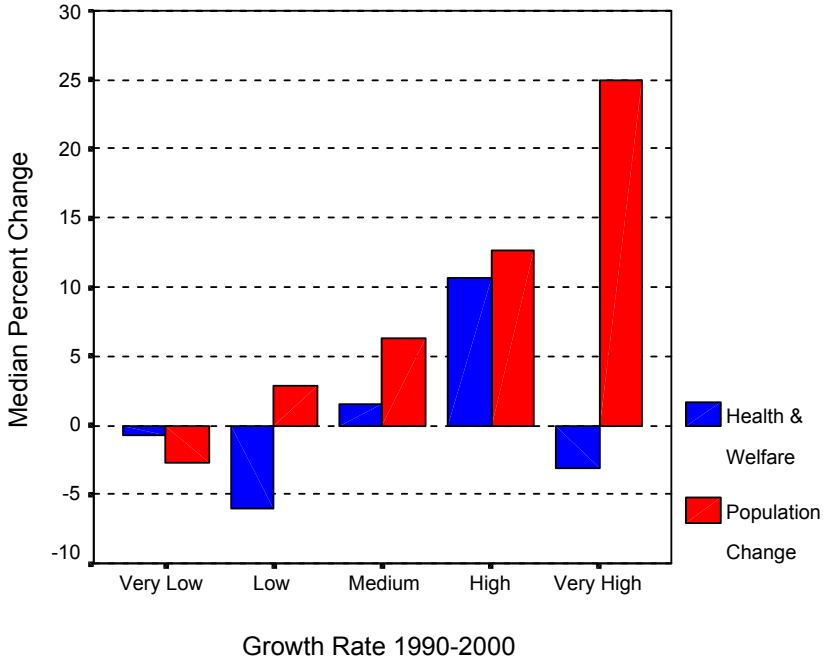
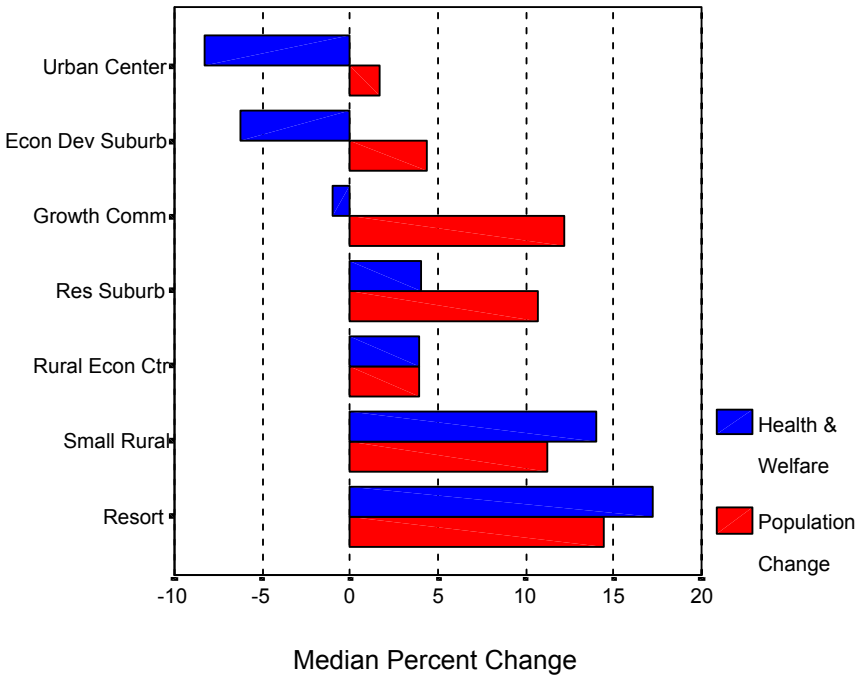


Figure 8.32 Median Percent Change in Per Capita Health & Welfare Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.33 Median Percent Change in Per Capita Health & Welfare Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.15 Culture & Recreation Expenditure Charts

Figure 8.34 Per Capita Culture & Recreation Expenditure Change

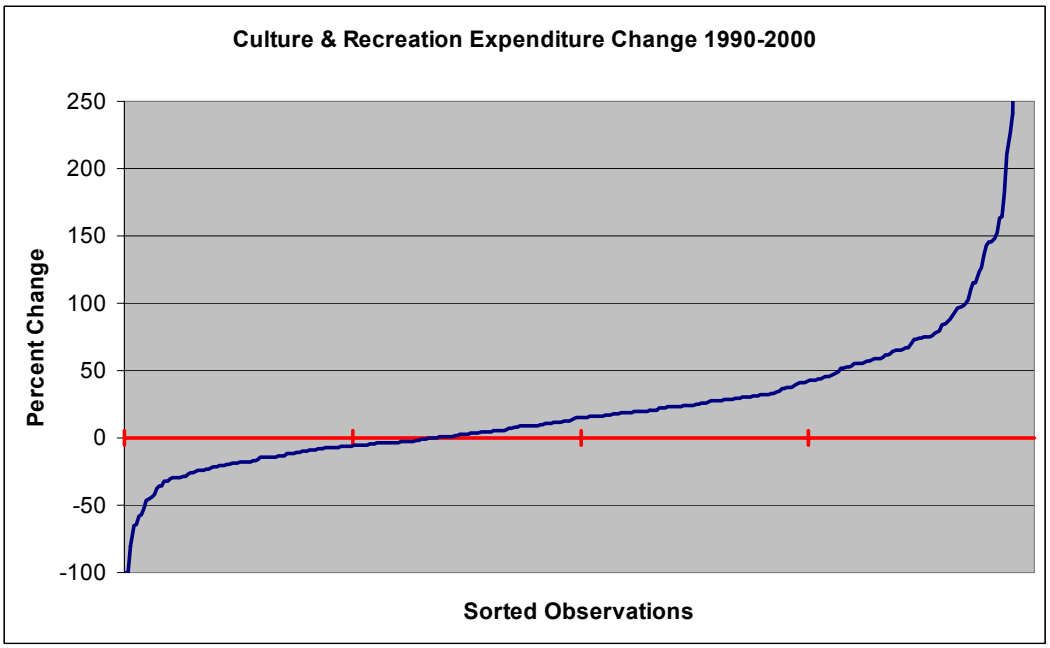
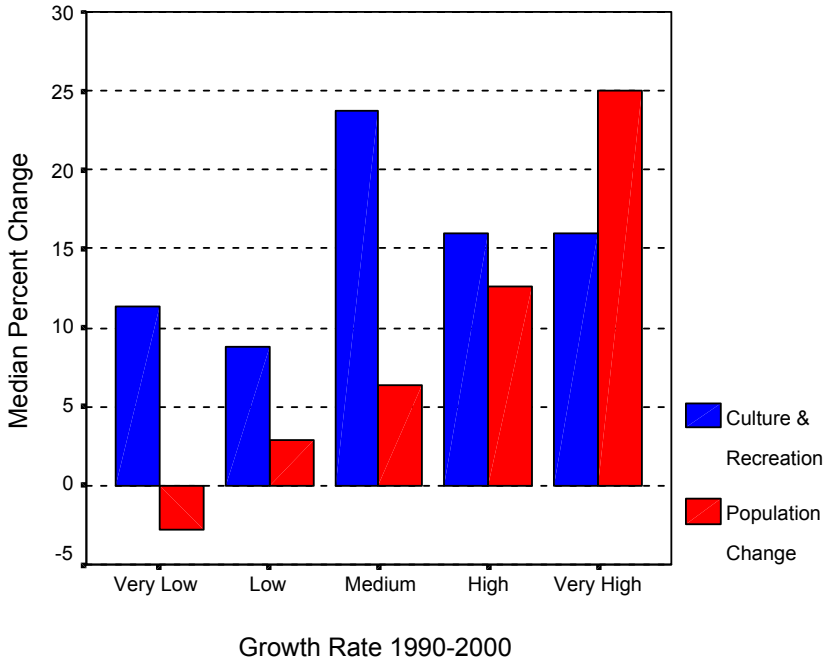
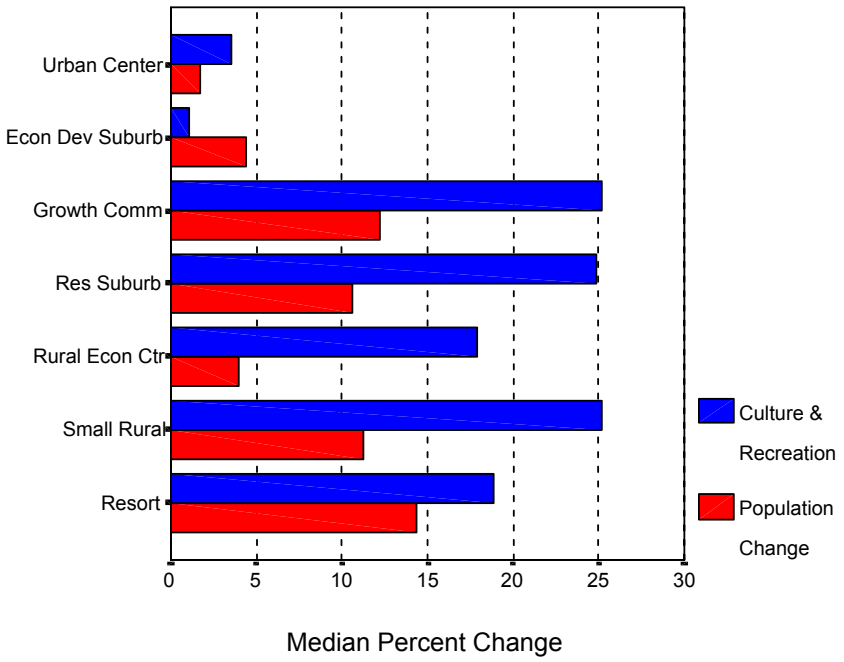


Figure 8.35 Median Percent Change in Per Capita Culture & Recreation Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.36 Median Percent Change in Per Capita Culture & Recreation Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.16 Debt Service Expenditure Charts

Figure 8.37 Per Capita Debt Service Expenditure Change

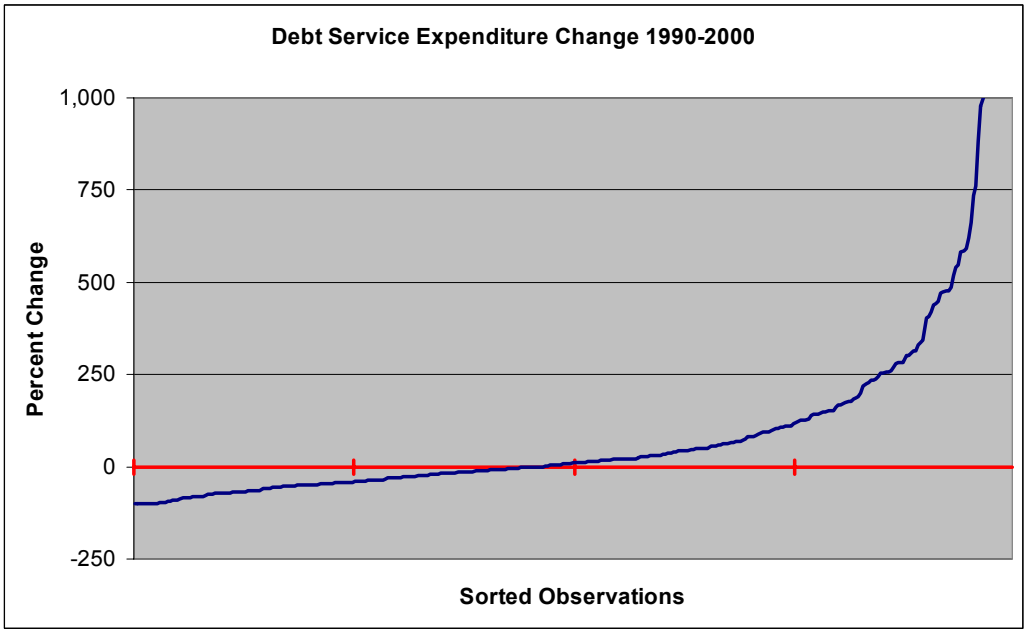
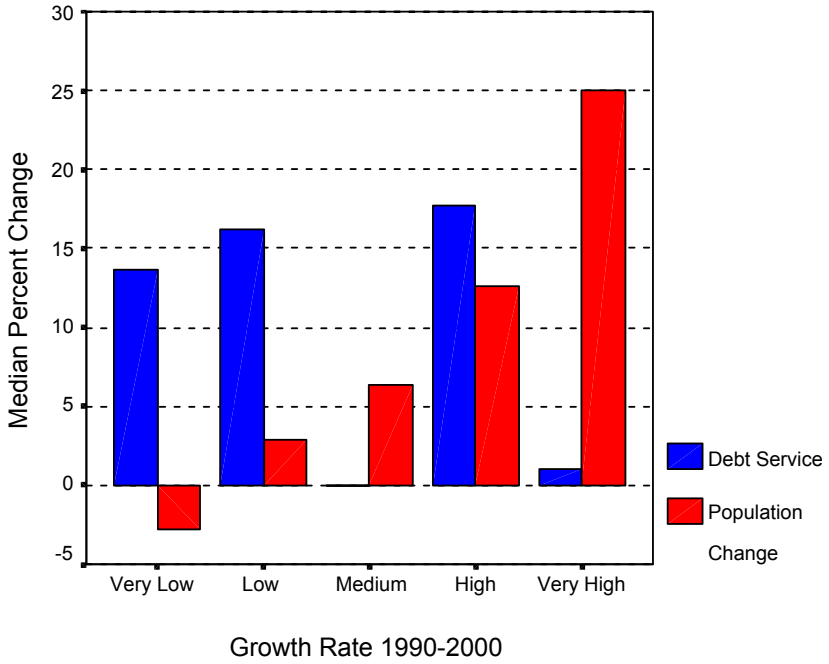
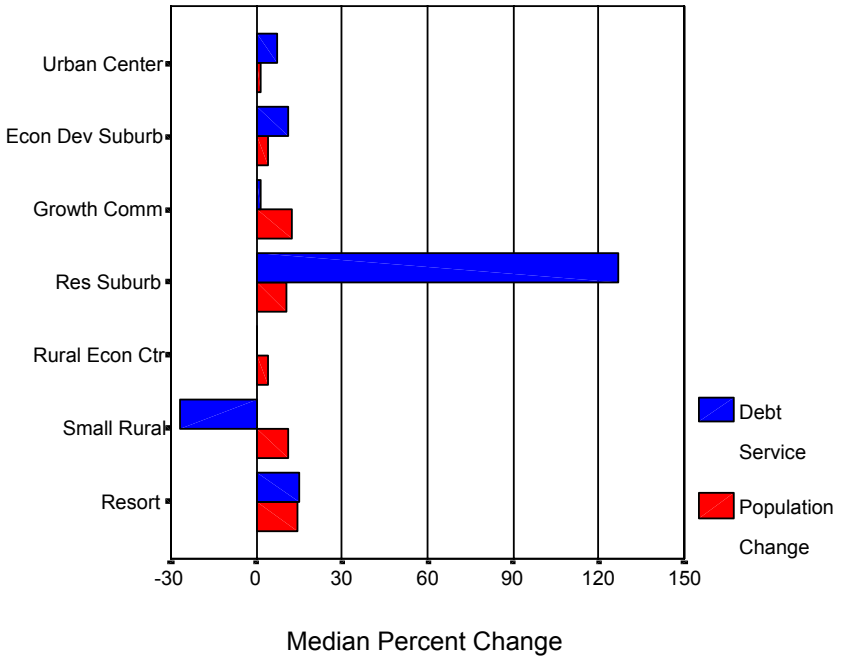


Figure 8.38 Median Percent Change in Per Capita Debt Service Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.39 Median Percent Change in Per Capita Debt Service Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.17 Fixed Costs Expenditure Charts

Figure 8.40 Per Capita Fixed Costs Expenditure Change

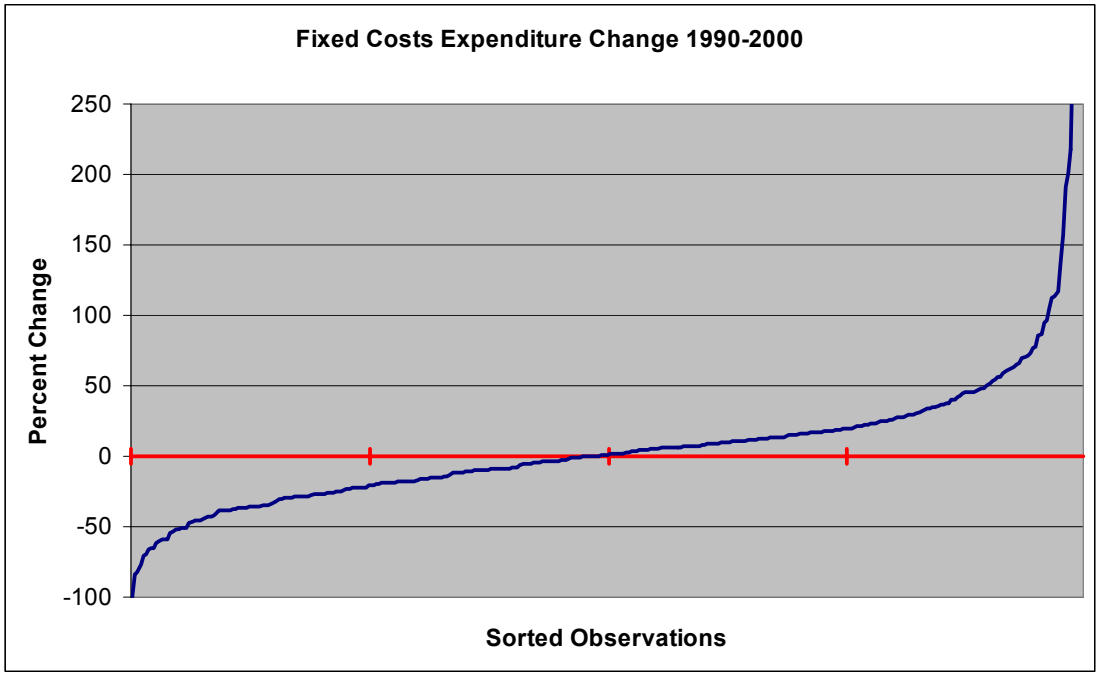
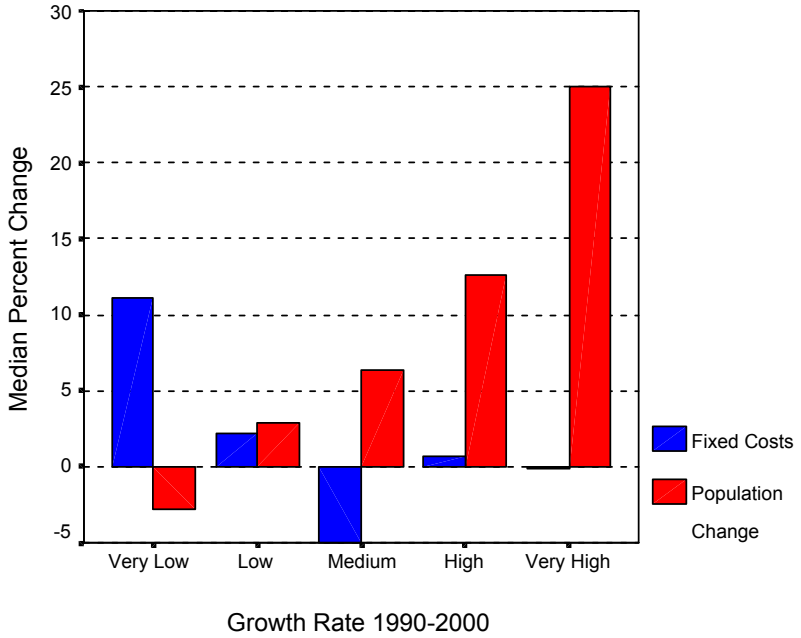
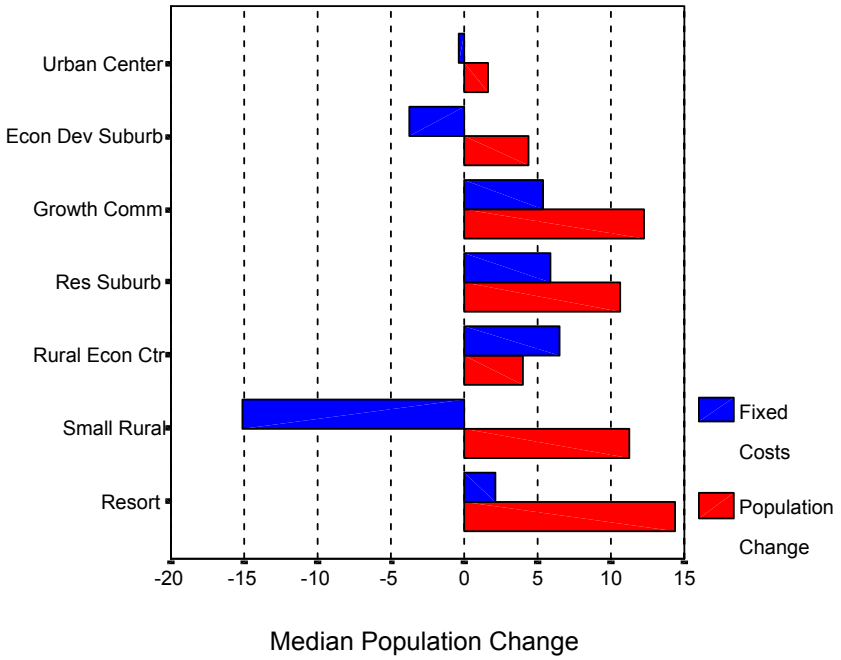


Figure 8.41 Median Percent Change in Per Capita Fixed Costs Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000 Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.42 Median Percent Change in Per Capita Fixed Costs Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.18 Intergovernmental Expenditure Charts

Figure 8.43 Per Capita Intergovernmental Expenditure Change

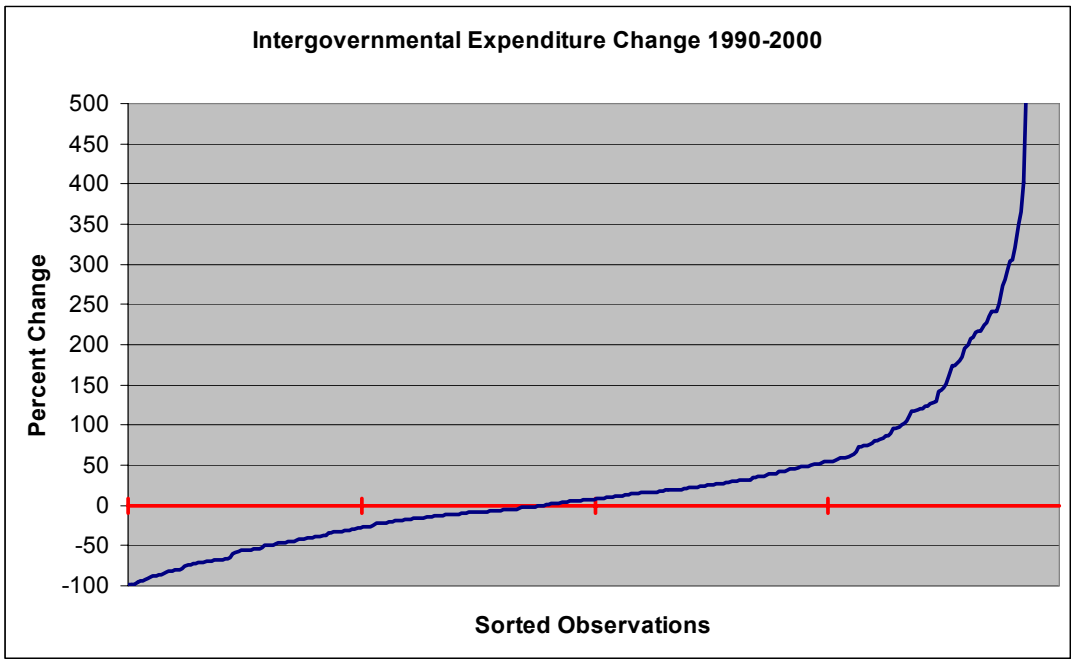
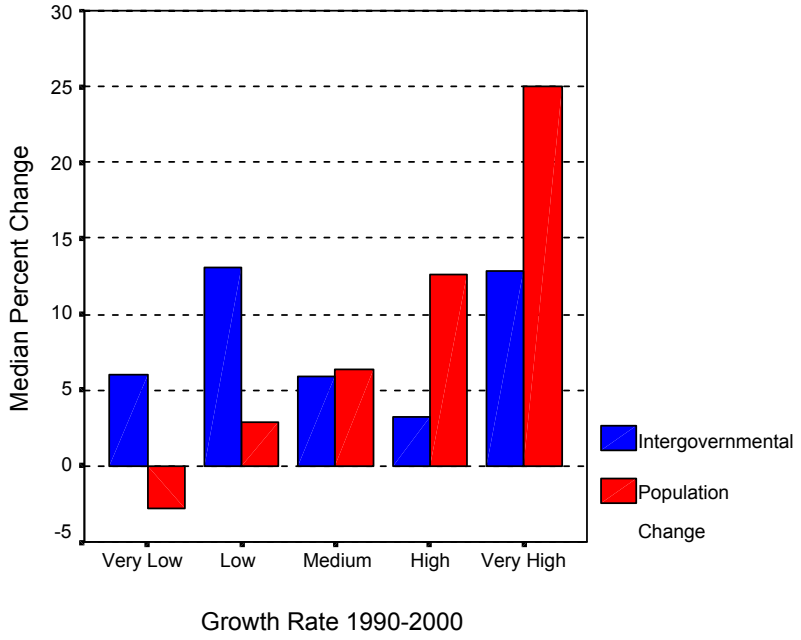
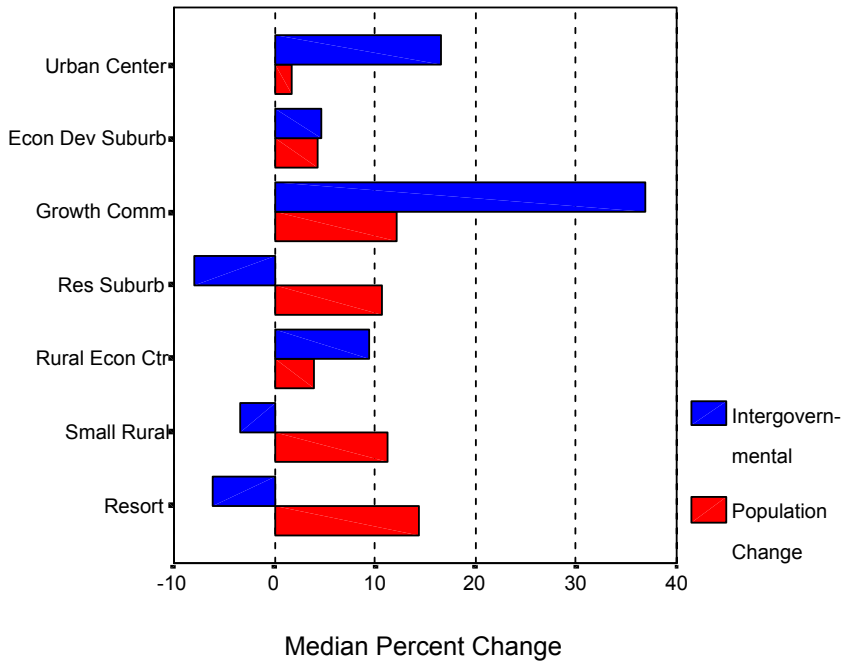


Figure 8.44 Median Percent Change in Per Capita Intergovernmental Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.45 Median Percent Change in Per Capita Intergovernmental Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

8.19 "Other" Expenditure Charts

Figure 8.46 Per Capita "Other" Expenditure Change

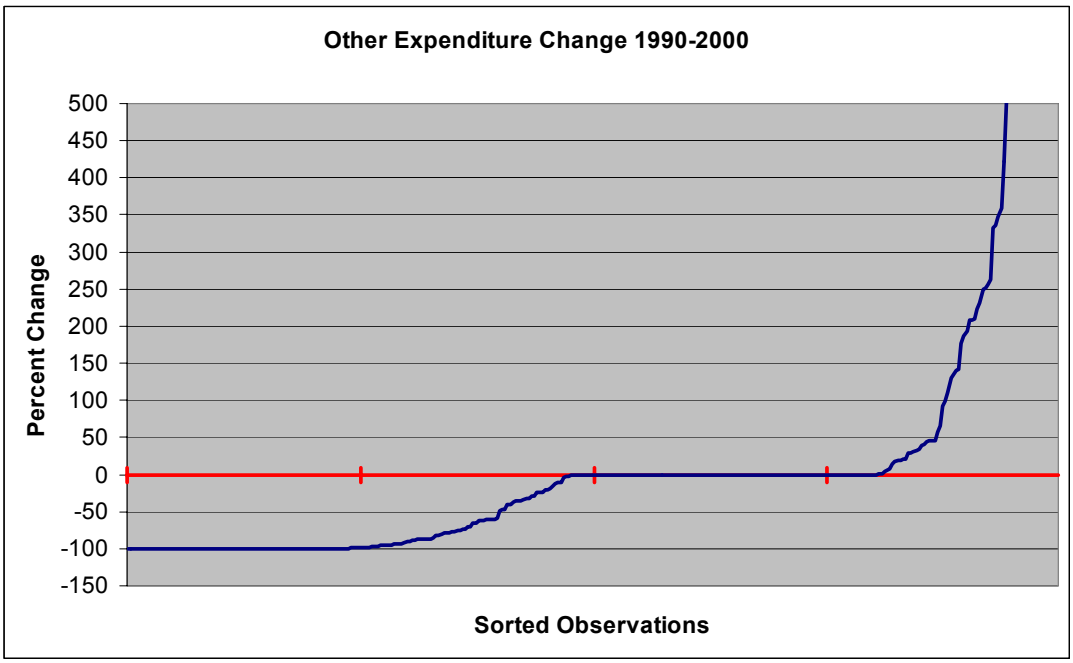
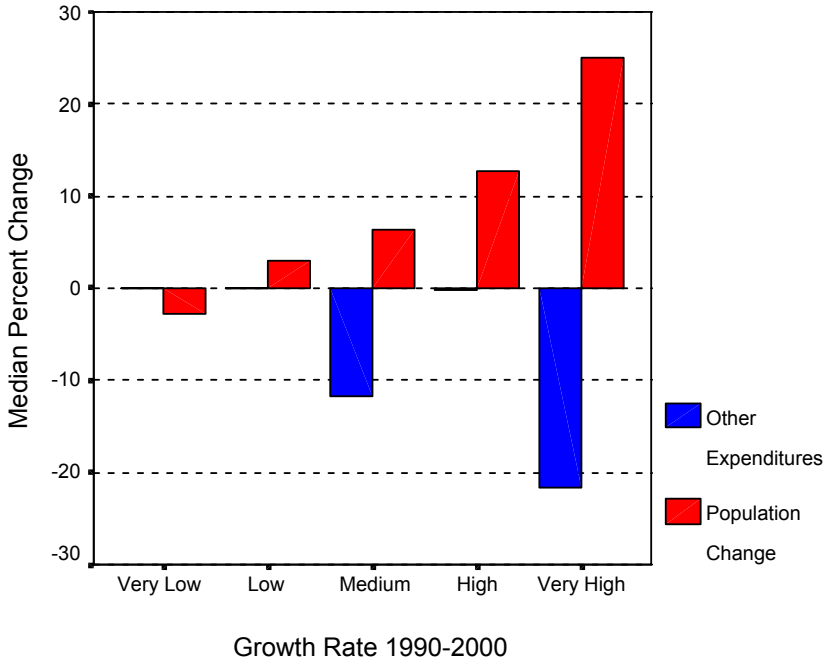
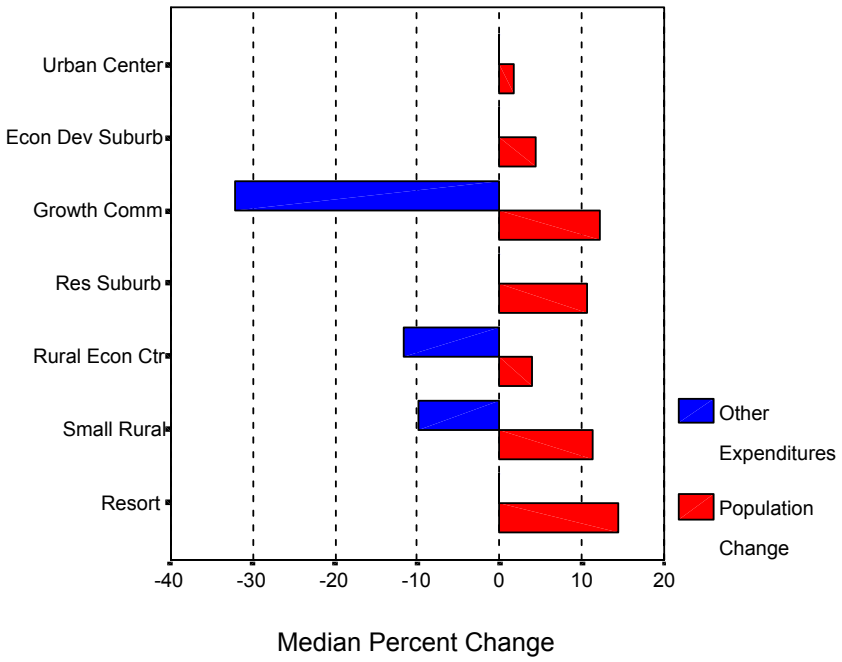


Figure 8.47 Median Percent Change in Per Capita "Other" Expenditures by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 8.48 Median Percent Change in Per Capita "Other" Expenditures by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

9 Revenue Analysis

Unlike expenditure data, which can exclude monies used for certain purposes such as capital projects, revenue data tracks all of the monies that a municipality has available to it for any purpose. The Division of Local Services (DLS) of the Massachusetts Department of Revenue separates municipal revenues into four different categories: "tax levies," "state aid," "local receipts," and "all other." [24] "Tax levies" consist of property taxes only, "state aid" contains all types of aid from all sources, "local receipts" consists mainly of excise taxes and fees, and "all other" includes miscellaneous items such as earnings on investments. We also examined the different types of state aid that went to cities and towns to look for patterns in aid disbursement.

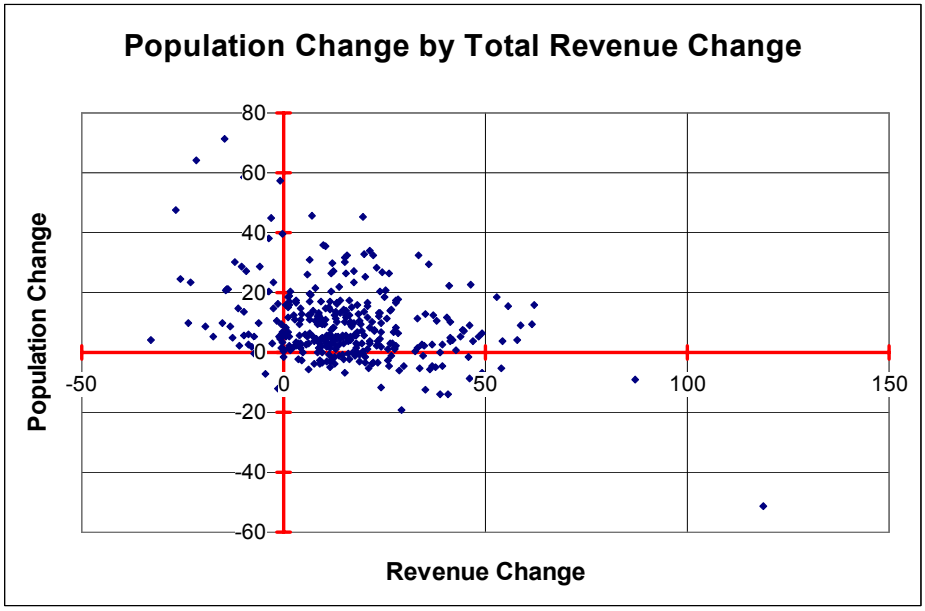
9.1 Municipal Revenue Per Capita

As with municipal expenditures, it is difficult to see the relationship between population change and per-capita revenue change (see figure 9.1). Some towns saw an increase in their population and a decrease in their per-capita revenues between 1990 and 2000, and some saw the opposite. As figure 9.2 shows, municipally-collected revenues increase as the population increases. However, this increase is not linear. The rate of total revenue change (indicated by the green bar) would be expected to decrease as the population change rate decreases, but does not. In fact, the lowest growing quintile of towns, which actually posted a negative median growth rate, has about the same revenue increase percentage as the next-highest quintile (16.8% vs. 17.3%). When looking at the data using per-capita expenditures, they show that per-capita revenues collected by municipalities increased most in the slowest-growing cities and towns and least in the highest-growing (See figure 9.8).

Figure 9.8 shows that the lowest growth municipalities had the highest percentage increase in total revenues per capita. Figures 9.9 shows that the tax levy change pattern is very similar to the total revenue pattern of growth, which is not surprising as tax levies make up most of the revenues collected by cities and towns. The state aid change pattern is interesting, as it shows that state aid has been growing for "high" growth towns at a slightly higher rate than for "very high" growth towns and at a much higher rate than "low" or "medium" growth municipalities. This is likely to be due to school aid levels, which will be discussed later in the report. Local receipts also show an interesting pattern, with large increases in "very low" and "low" growth municipalities, and small increases in the higher population growth categories. These cities and towns may be looking for new sources of income as they have no growth to drive their revenues, or they may have more local receipt income sources.

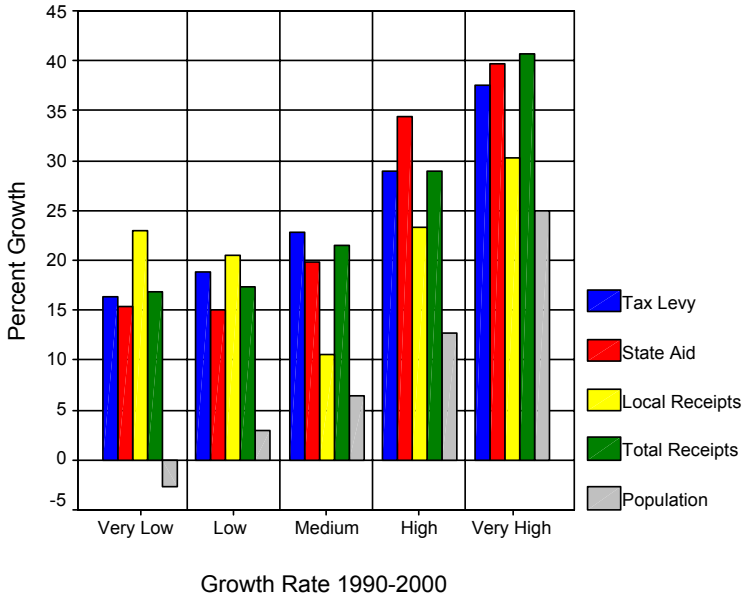
[24] http://www.dls.state.ma.us/databank.htm

Figure 9.1 Population Change by Per-Capita Total Revenue Change 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.2 Percent Median Revenue Growth By Population Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

An important fact to note is, even though most of the five growth categories show that a large percentage increase has occurred in state aid, the dollar figures show that this revenue source is much less important to cities and towns than property taxes. Figure

9.19 illustrates the Year 2000 reliance on different revenue sources for each growth category. The median share of tax levy revenue to total revenue for all growth levels of municipalities is over 50 percent, and it increases across population growth levels. In other words, higher population growth towns are more reliant on property taxes than lower growth ones are.

9.2 Municipal Revenue by Kind of Community

Per-capita revenue changes also vary among the different kinds of communities. Figure 9.6 shows that the highest median percentage change in total revenues was found in the residential suburb class of community (KOC 4). The lowest was in the economically developed suburbs (KOC 2). Interestingly, the second and third highest median increases were in Rural Economic Centers (KOC 5) and Urban Centers (KOC 1), even though these two kinds of communities posted the lowest population growth rates.

Residential suburbs also had the largest per-capita median tax levy percentage increase, but only the fourth-largest increase in state aid. The largest single revenue type change has been in the urban centers, where per-capita median state aid has increased over 25 percent. The changes in local receipt revenue seen in the previous section can also be seen here, with Urban Centers and Economically Developed Suburbs (KOC 2) showing large per-capita median increases and all other community types showing more moderate increases. Interestingly, the Resort, Retirement, and Artistic Communities (KOC 7) actually how a decrease in per-capita local receipt revenue. Separating out per capita total revenue change by kind of community and growth rate shows that the same general pattern of higher growth rate municipalities having less increase in per-capita revenues can be seen by community type, with Chelsea, as the only Urban Center in the "very high" growth category, being the one outlier.

Again, percentage changes do not directly reveal how important a revenue type is to a municipality. Urban Centers are by far the least reliant on tax levy revenue and Residential Suburbs are the most reliant. Urban Centers are also much more reliant on state aid than any other community type. Looking at community type by growth rate shows that reliance on tax levy revenue is fairly consistent across population growth categories.

9.3 Conclusions on Municipal Revenue Analysis

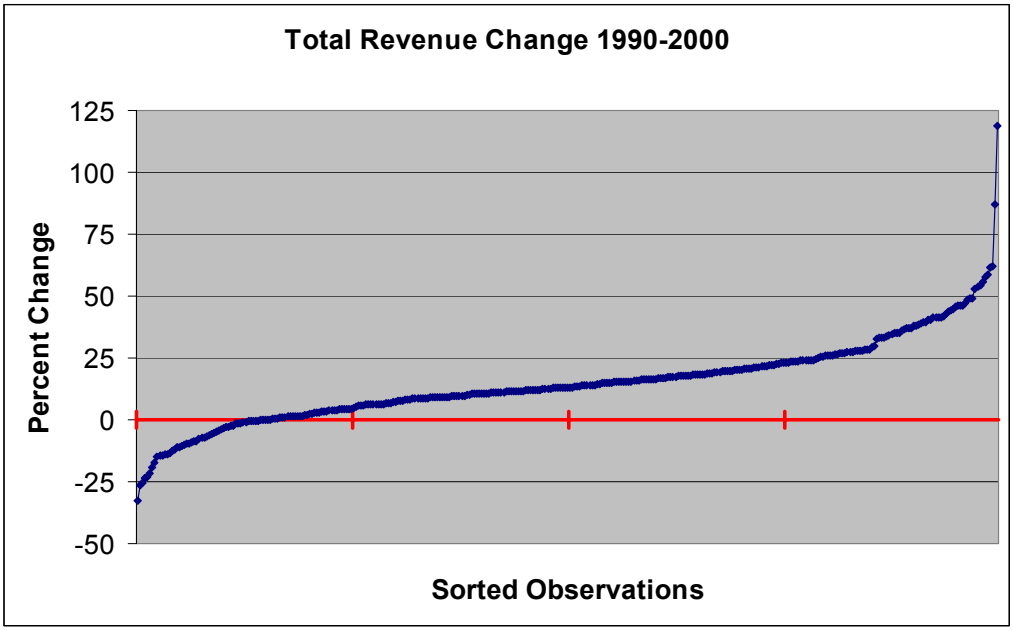
While overall revenues have increased in real dollars between 1990 and 2000, it is important to note that there was a large retrenchment in state aid after the collapse of the "Massachusetts Miracle" that took years for municipalities to recover from (See chapter one). The across-the-board increase in revenues from tax levies is very interesting, as we would expect Proposition 2½ to have a greater effect on the municipalities' ability to collect property taxes. This is likely due to the increase in value of real estate over time, especially in the metro Boston area.

While high-growth municipalities posted higher percentage gains in collected revenues, their per-capita gains are much less than those in the low-growth categories,

especially in the area of state aid. This implies either that these municipalities need less money for operating expenses and therefore collect less taxes or that they have less ability to collect taxes. This question is tested in a later section of the report.

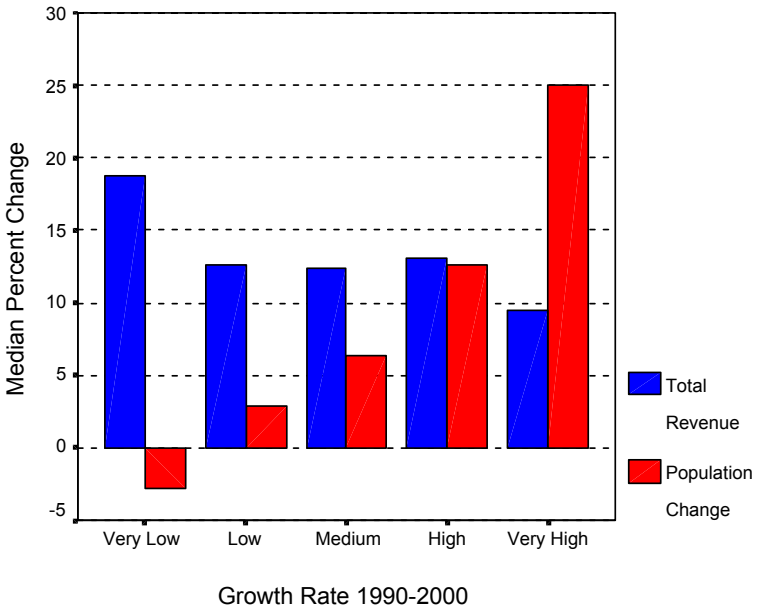
9.4 Per Capita Total Revenue Change 1990-2000

Figure 9.3 Per Capita Total Revenue Change



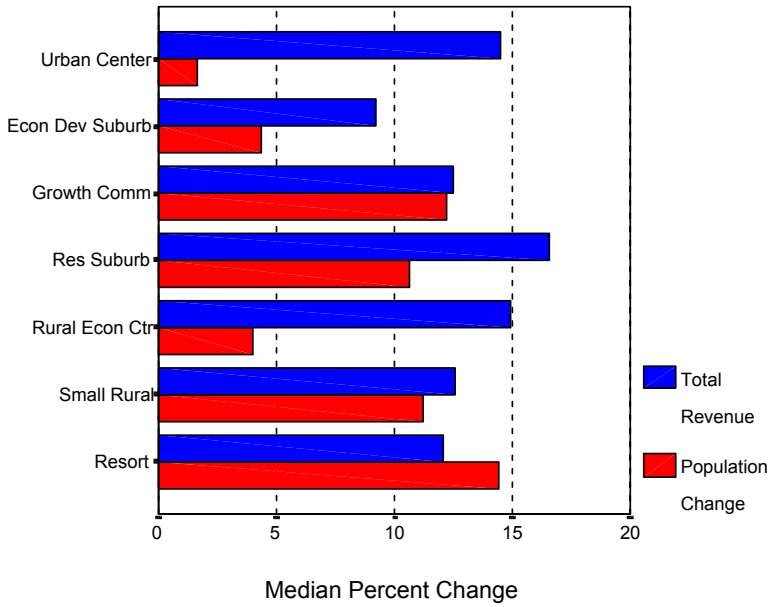
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.4 Median Percent Change in Per Capita Total Revenues by Growth Category, 1990-2000



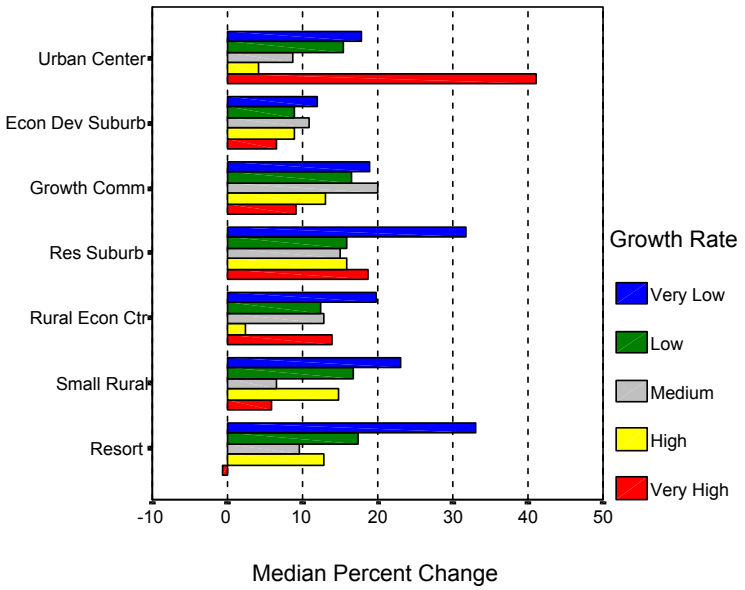
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.5 Median Percent Change in Per Capita Total Revenues by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

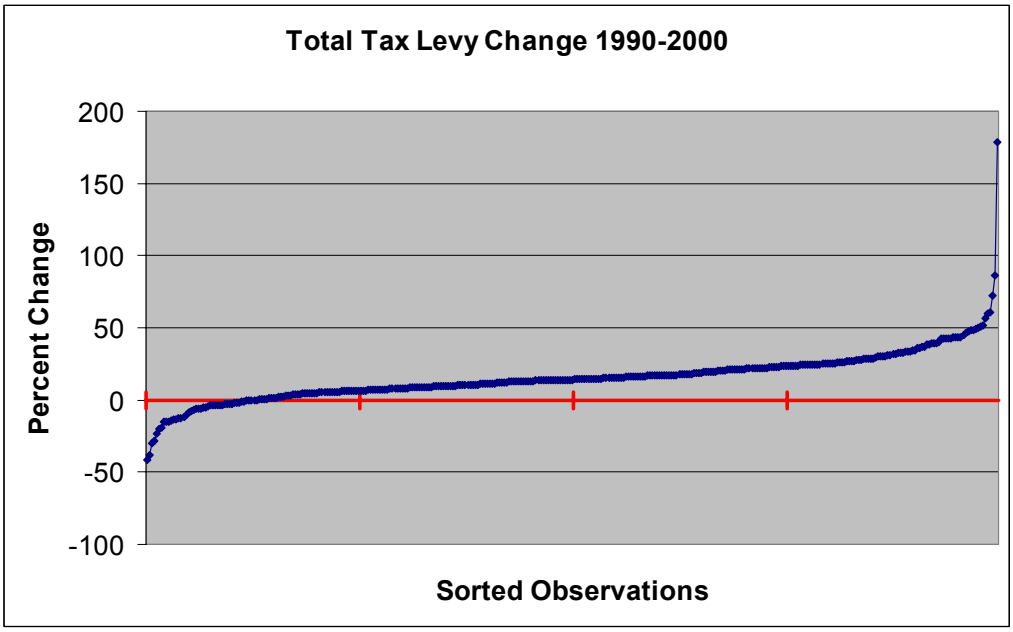
Figure 9.6 Median Percent Change in Per Capita Total Revenues by Kind of Community and Growth Rate, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

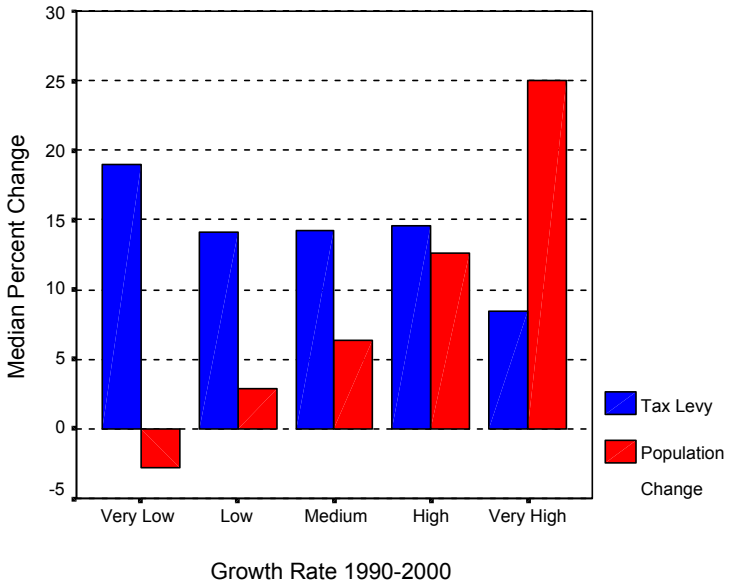
9.5 Per Capita Tax Levy Change 1990-2000

Figure 9.7 Per Capita Tax Levy Revenue Change



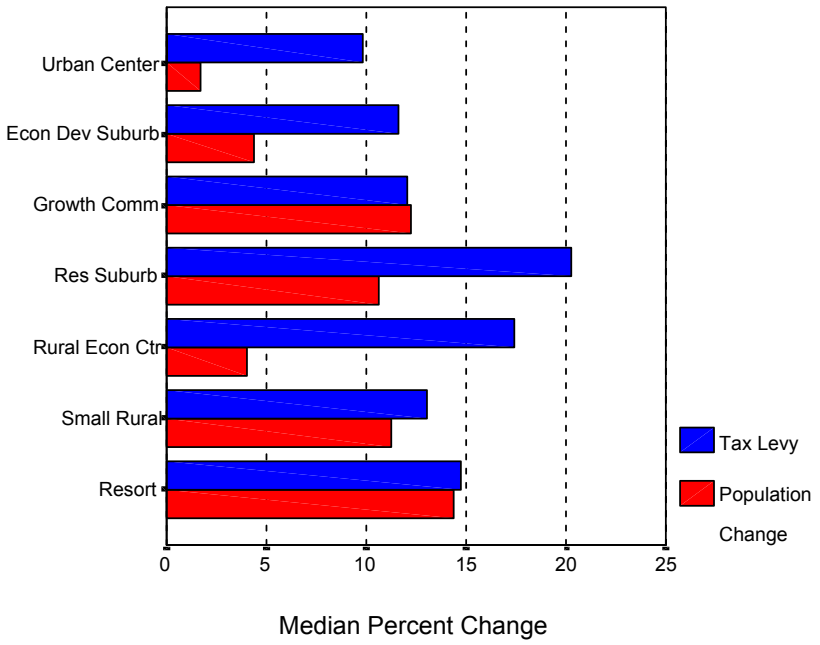
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.8 Median Percent Change in Per Capita Tax Levy Revenues by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

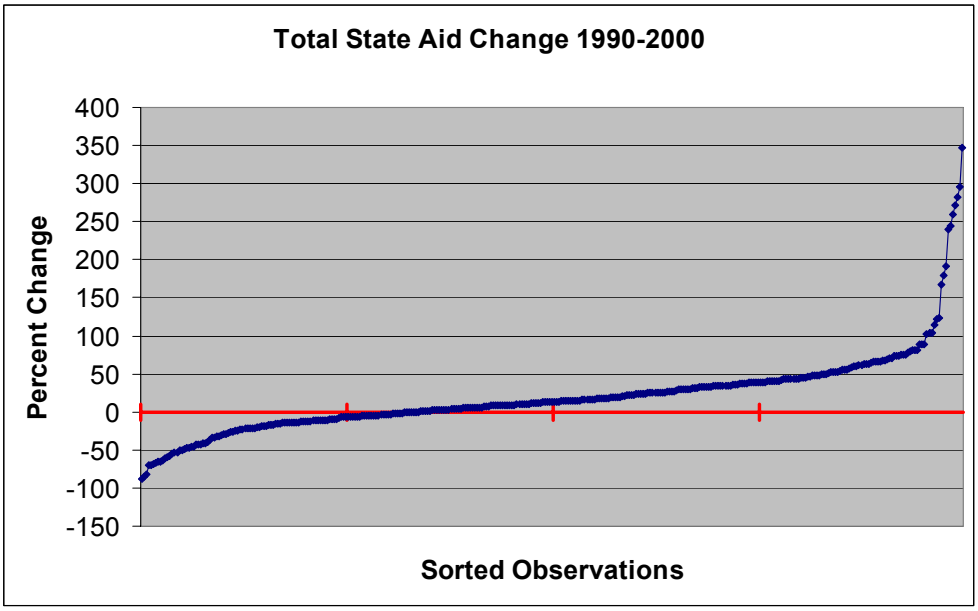
Figure 9.9 Median Percent Change in Per Capita Tax Levy Revenues by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

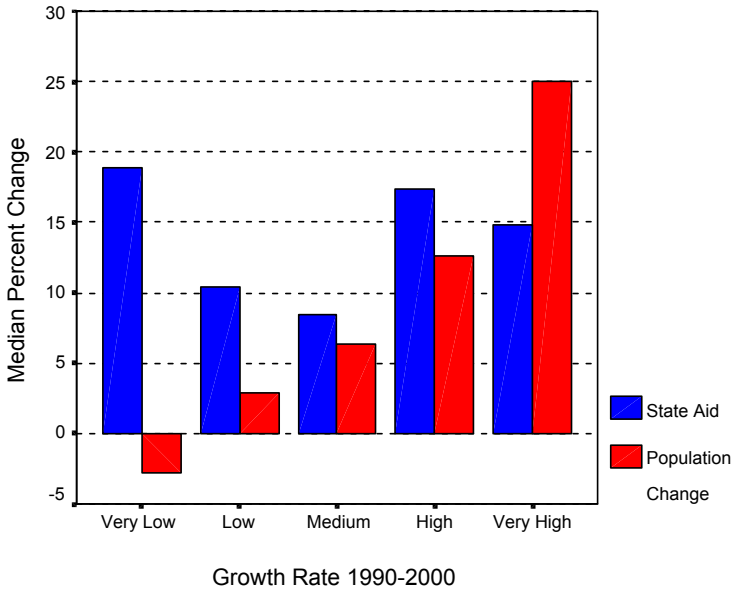
9.6 Per Capita State Aid Change 1990-2000

Figure 9.10 Per Capita State Aid Revenue Change



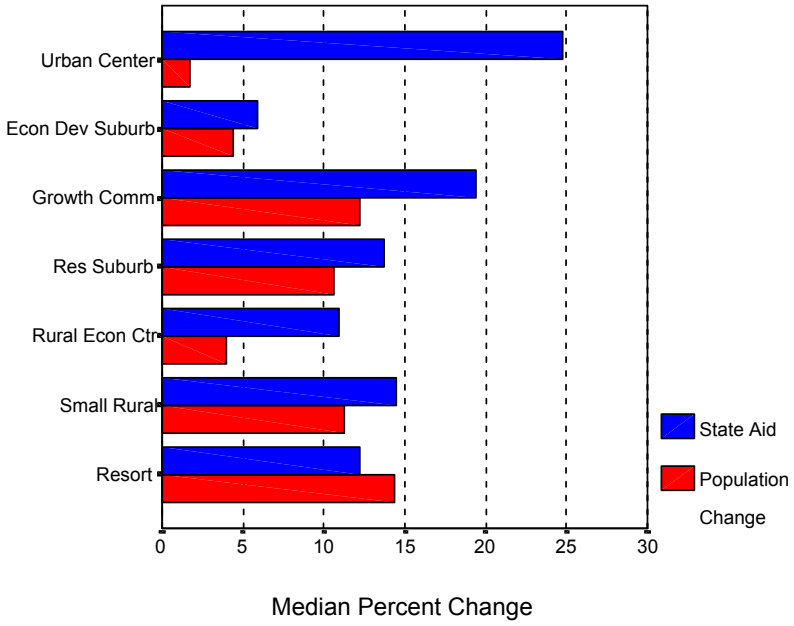
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.11 Median Percent Change in Per Capita State Aid Revenues by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

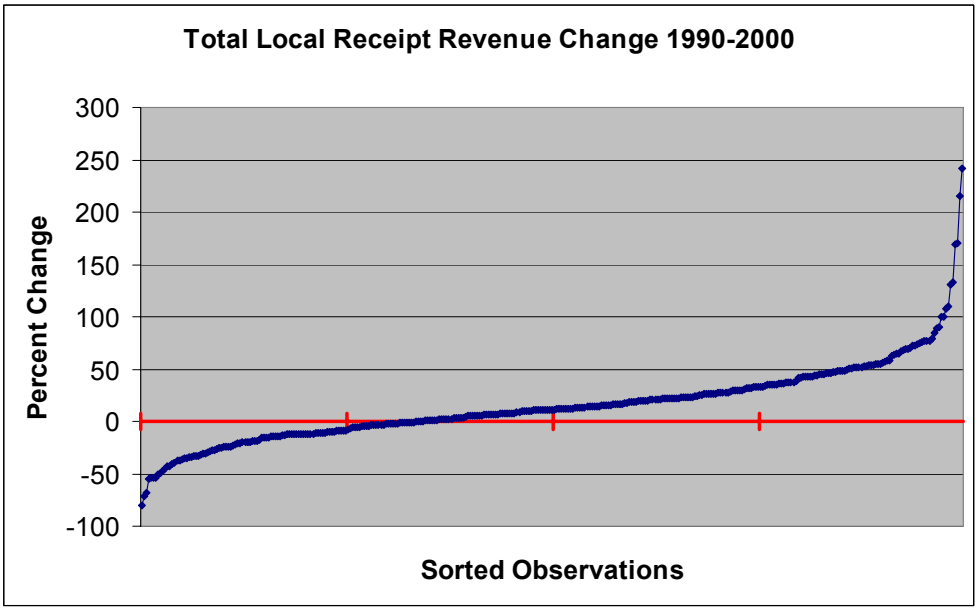
Figure 9.12 Median Percent Change in Per Capita State Aid Revenues by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

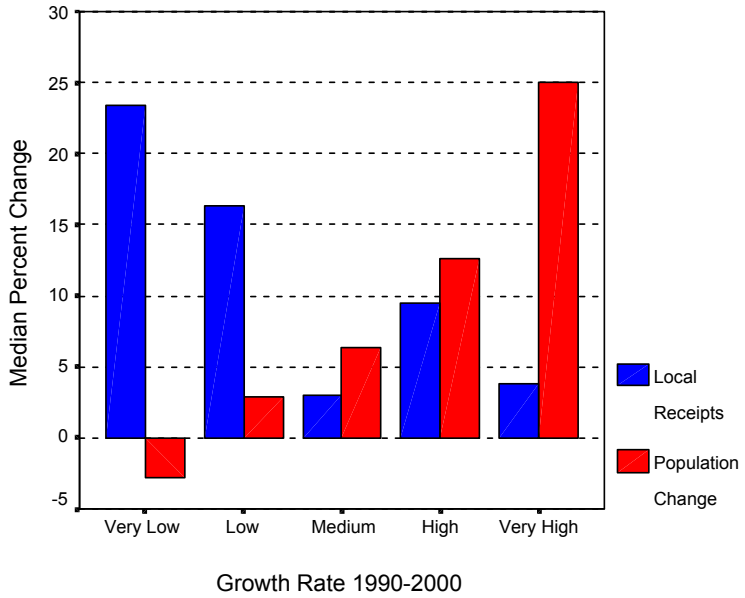
9.7 Per Capita Local Receipt Change 1990-2000

Figure 9.13 Per Capita Local Receipt Revenue Change



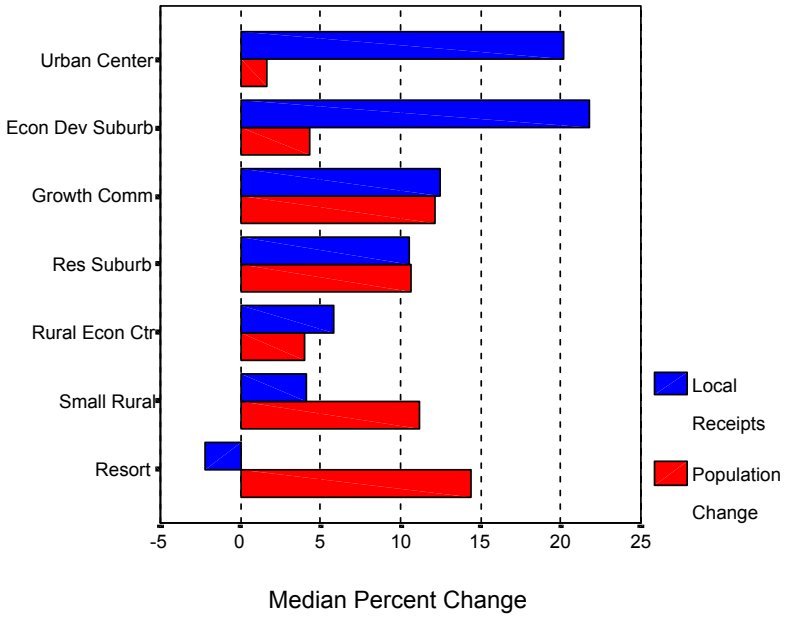
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.14 Median Percent Change in Per Capita Local Receipt Revenues by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

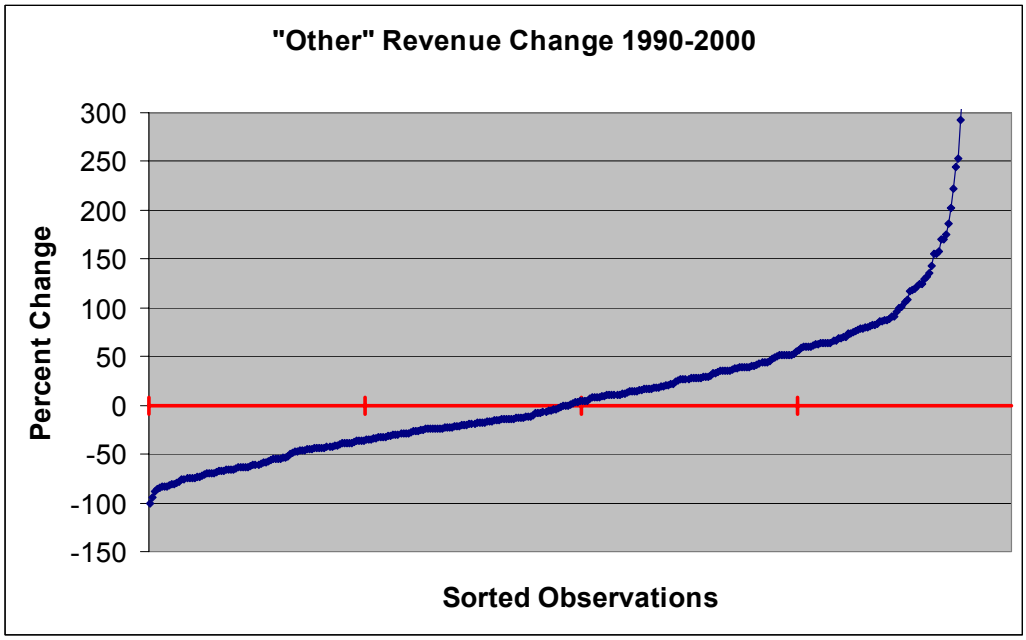
Figure 9.15 Median Percent Change in Per Capita Local Receipt Revenues by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

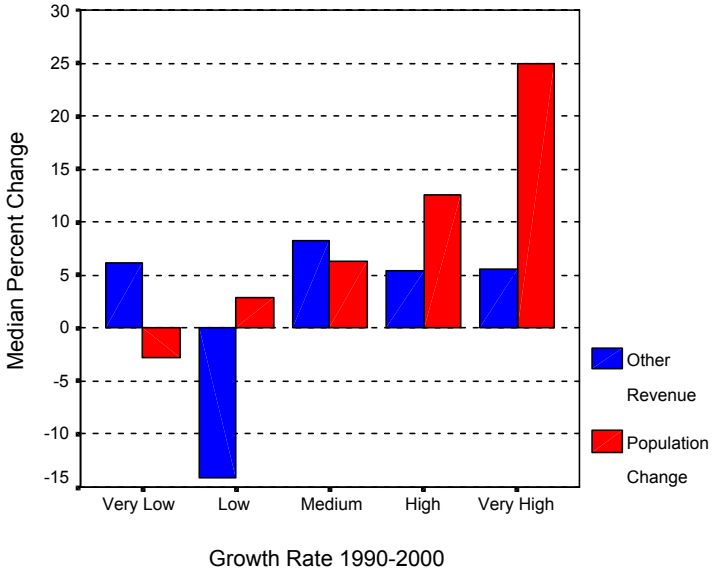
9.8 Per Capita "Other" Revenue Change

Figure 9.16 Per Capita "Other" Revenue Change



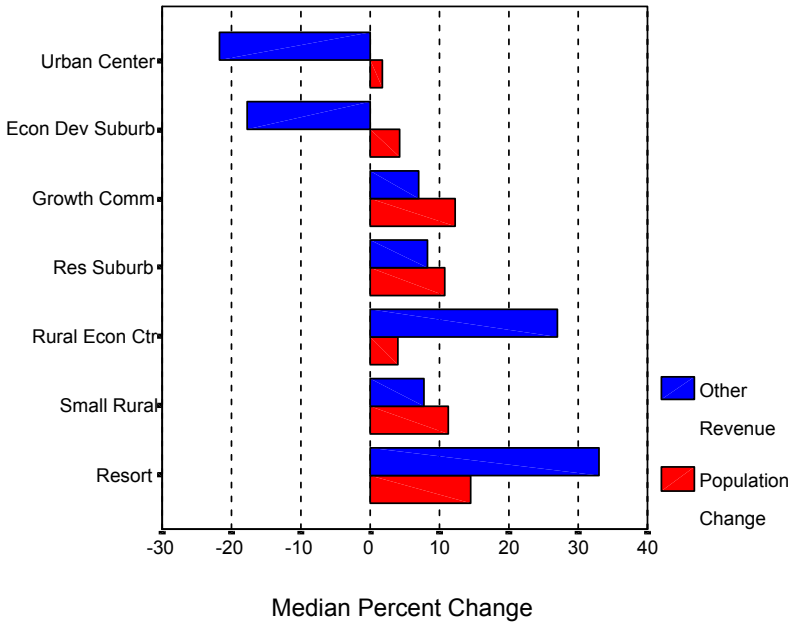
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 9.17 Median Percent Change in Per Capita "Other" Revenues by Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

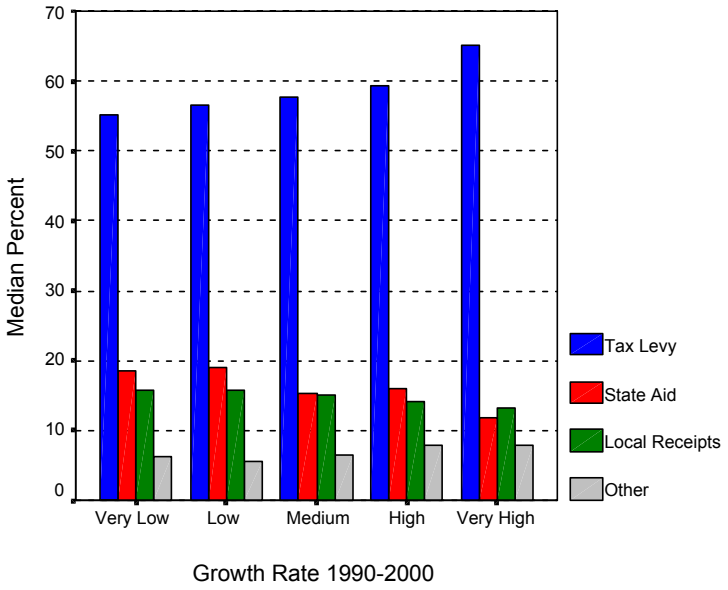
Figure 9.18 Median Percent Change in Per Capita "Other" Revenues by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

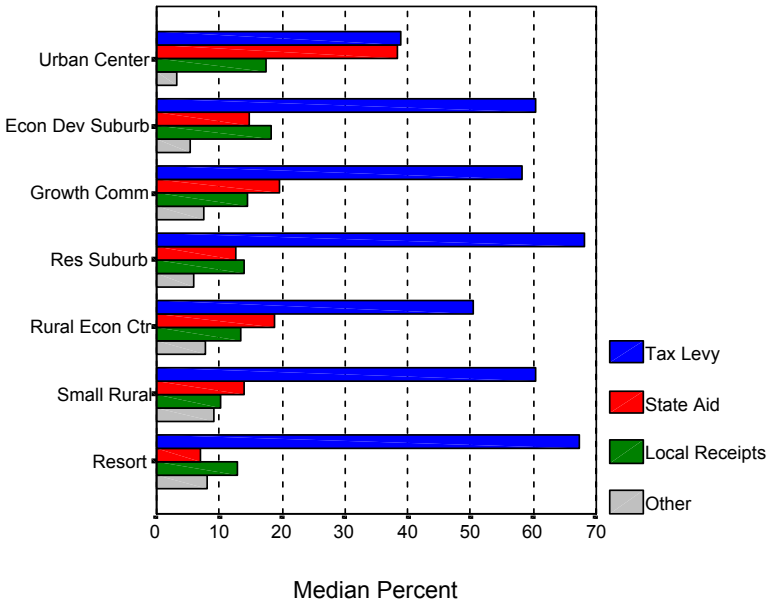
9.9 Reliance on Revenue Types

Figure 9.19 Median Reliance on Revenue Type by Growth Category, 2000



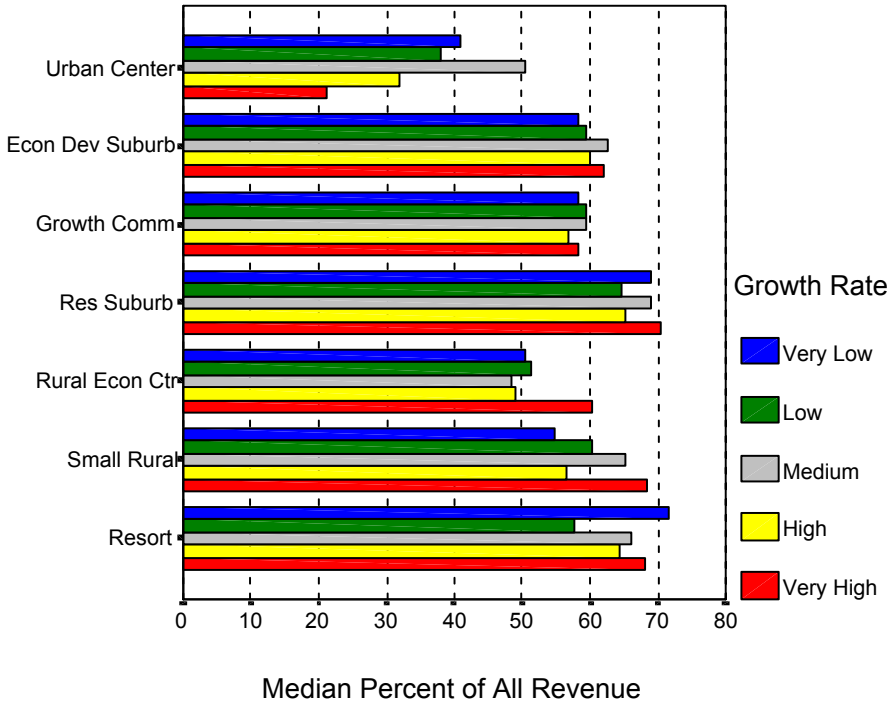
Source: Division of Local Services, Mass. Dept. of Revenue, 2000

Figure 9.20 Median Reliance on Revenue Type by Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 2000

Figure 9.21 Median Reliance on Tax Levy Revenue by Kind of Community and Growth Category, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 2000

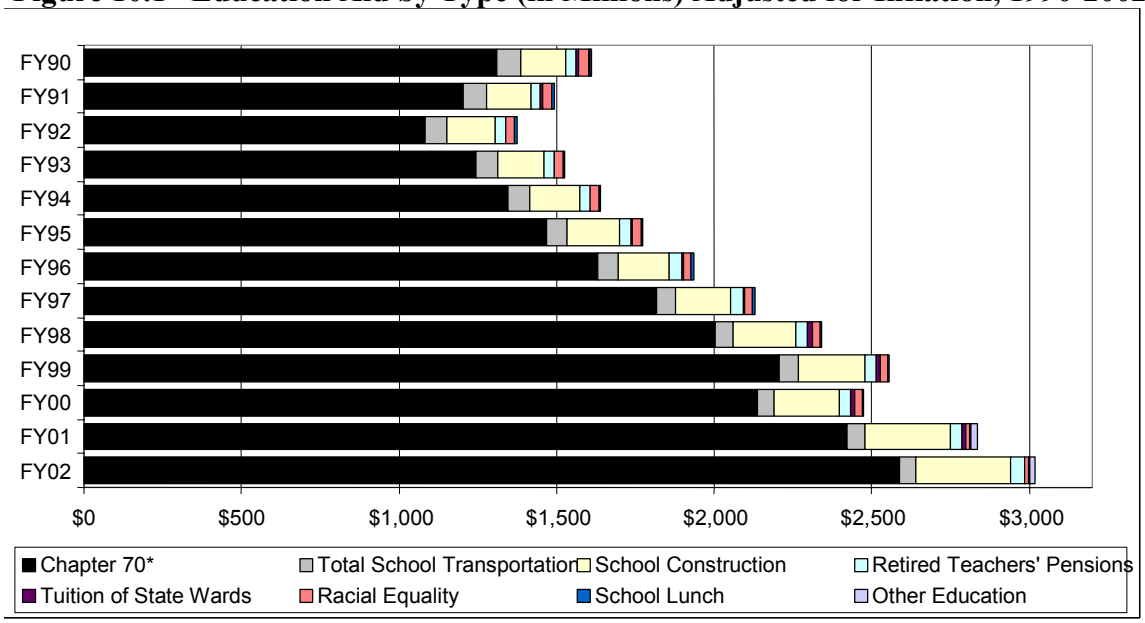
10 State Aid Analysis

State aid is an important component of municipal revenues. Certain types of communities are very reliant on this aid, especially Urban Centers. The Division of Local Services keeps records on many different aid programs, many of which are education-related. However, since the majority of state aid seems to fall into only three categories, UMDI has aggregated state aid into education and non-education expenditures for this analysis, and also analyzed trends in lottery and "additional assistance" aid. While we realize that there are cities and towns that use non-school aid for education purposes, the data available from the DLS does not track how general aid like additional assistance is used by municipalities. Even so, the trends in state aid changes over time show a distinct shift in focus from general support to education-specific support.

10.1 State Aid Trends 1990-2002

The general trend for state aid disbursement to municipalities can be seen in figures 2.4 and 2.5 in Chapter 2. Overall, aid decreased as the economy contracted during the early 1990's, and greatly increased through the mid- to late-1990s as the economy improved. However, the mix of aid types has changed during the last 12 years

Figure 10.1 Education Aid by Type (in Millions) Adjusted for Inflation, 1990-2002



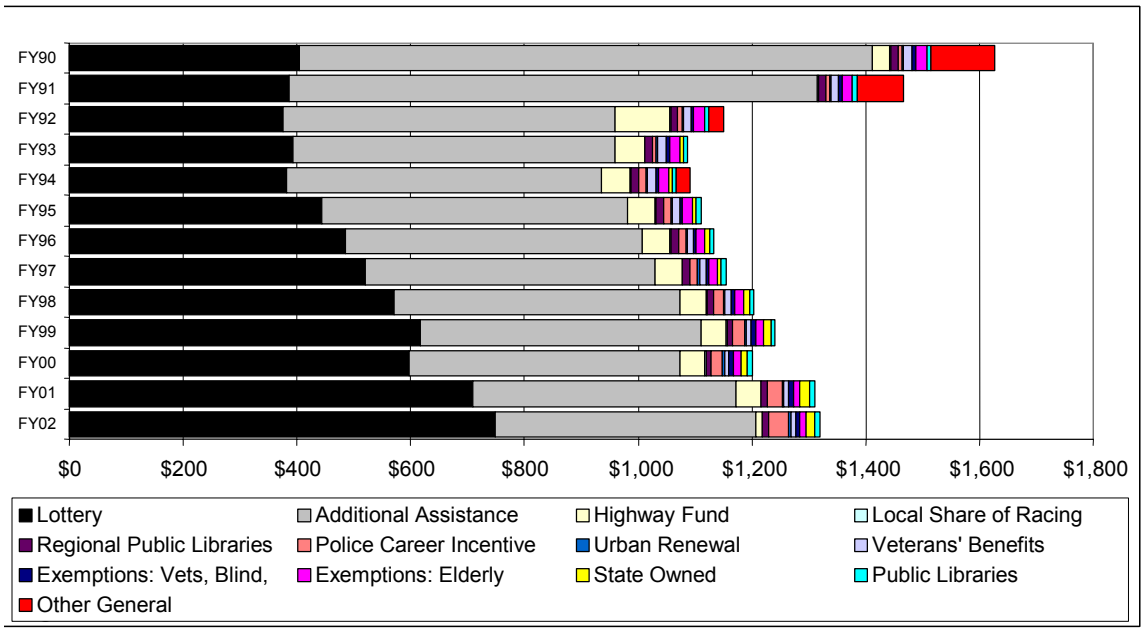
Source: Division of Local Services, Dept. of Revenue, FY 1990 through 2002

Aid intended specifically for school systems shrank at about the same rate as aid for other services in the early 1990's, and then grew much faster than non-school aid after that. Figure 10.1 shows the trend of school aid disbursements by type from 1990 to 2002. In 1990, about 50 percent of all aid going to cities and towns in aggregate was for education, while by 2002 about 70 percent was for education. Note that "Chapter 70"

school aid previous to 1994 was interpolated by the DLS by aggregating the different aid types available at that time into one "Chapter 70" equivalent number. Note also that Chapter 70 aid is the largest single type of school aid, and that it has increased in real dollars from about $1.3 billion in 1990 to almost $2.6 billion in 2002 (all dollars are 2000 equivalents for compatibility purposes).

Figure 10.2 below shows that non-school aid decreased greatly after 1991 and has remained below its previous levels. Note the increased reliance on lottery monies and decreased reliance on the so-called "additional assistance" over time. All dollars are adjusted for inflation to 2000 levels.

Figure 10.2 Non-School Aid by Type (in Millions) Adjusted for Inflation, 1990-2002



Source: Division of Local Services, Dept. of Revenue, FY 1990 through 2002

10.2 State Aid Per Capita

Because of the large number of aid types versus the large proportion of aid dollars emanating from only three programs (Chapter 70 school aid, Lottery disbursements and Additional Assistance), we decided to examine state aid by aggregating it into school aid and non-school aid by town. In addition, we also examined Lottery and Additional Assistance aid change over time.

When looking at cities and towns by their growth rate, the data showed that higher growth municipalities are generally receiving higher percentage increases per capita in state aid (see figure 10.3). However, the actual median per-capita aid in dollars for 2000 show that "low" growth rate municipalities receive the most aid (see figure 10.4). For non-school aid, the changes were quite different. The trend for lottery disbursements showed that lower-growth towns received the largest per-capita percent

increase and the largest number of dollars per-capita in 2000 (see figures 10.7 and 10.8). However, the profound negative change in additional assistance for all growth categories pushes the median total non-school aid change into negative territory. Median aid in dollars for 2000 shows the limited effect that additional assistance has on municipalities, and how only the lowest growth towns obtain any appreciable aid from this source. Interestingly, the pattern in dollars for lottery and total non-school aid also favors lower growth towns.

10.3 State Aid by Kind of Community

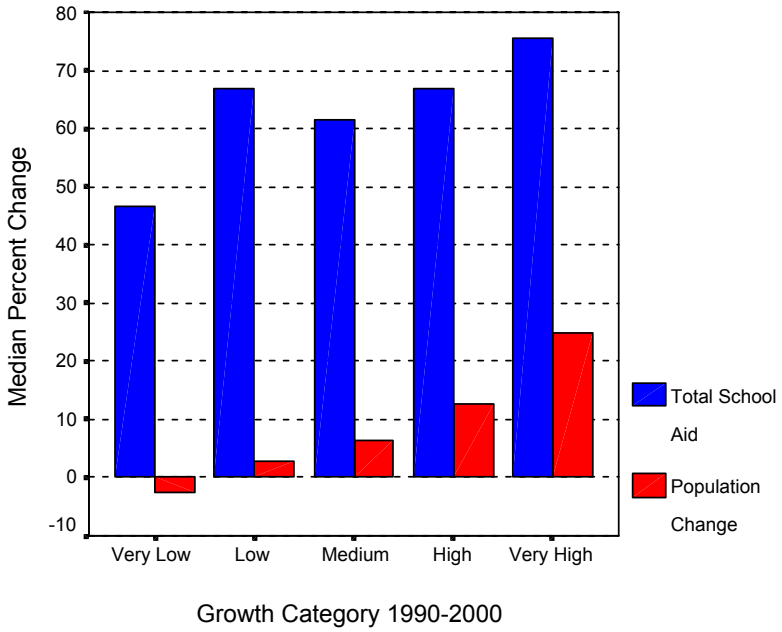
When we examined the data by the kind of community, it showed similar patterns as were seen in growth category analysis, with some exceptions. Figure 10.5 shows that per-capita education aid increased significantly in four community types, less in Growth Communities (KOC 3), Rural Economic Centers (KOC 5), and actually declined in Small Rural Communities (KOC 6). The explanation for that decline lies in the fact that many of these communities belong to regional school districts, which usually get their aid directly from the State. However, while many community types saw percentage increases, Urban Centers (KOC 1) received by far the highest amount of per-capita state education aid in 2000 (see figure 10.6). Like the growth category analysis above, the community type analysis shows an increase in lottery aid and a substantial decrease in additional assistance per capita for all community types, leading to a general median decrease per capita in non-school aid for every community type except Growth Communities and Small Rural Communities. Again, median per capita dollar amounts of non-school aid show that urban center still receive the highest share (see figure 10.10). Note also the reliance on lottery aid as a portion of all aid dollars by Rural Economic Centers (KOC 5).

10.4 Conclusions on State Aid

Over the decade from 1990 to 2000, the nature of state aid shifted to education aid and away from aid for general government activities. By 2000 about 70 percent of all municipal aid was earmarked for education purposes. Additional Assistance aid saw the largest decrease in both percent and dollar terms. While education aid generally showed high percentage increases, Urban Centers still receive the largest share per-capita in dollar terms.

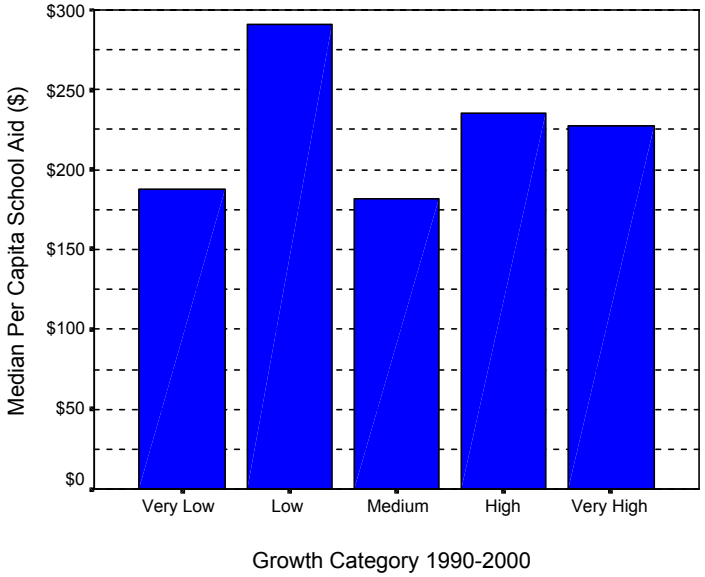
10.5 Education State Aid Charts

Figure 10.3 Median Education Aid Growth Percent Per Capita By Growth Category



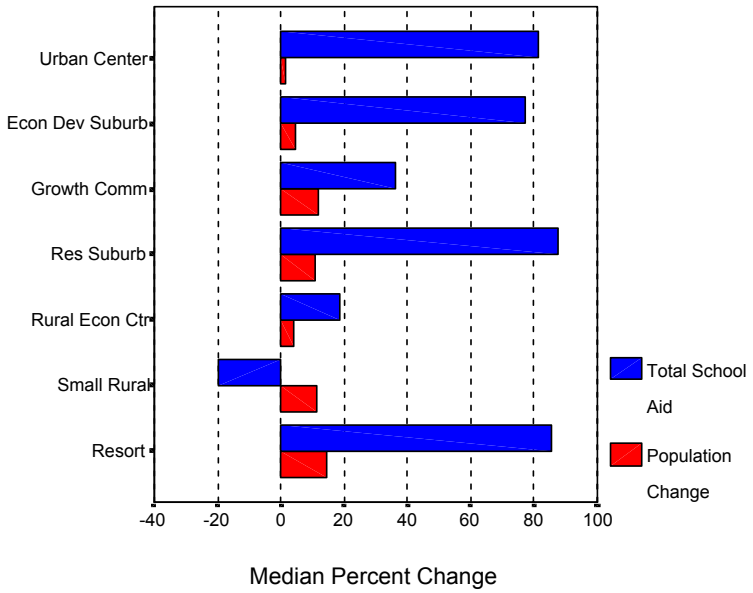
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000 Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 10.4 Median Education Aid Growth in Dollars Per Capita By Growth Category, 2000



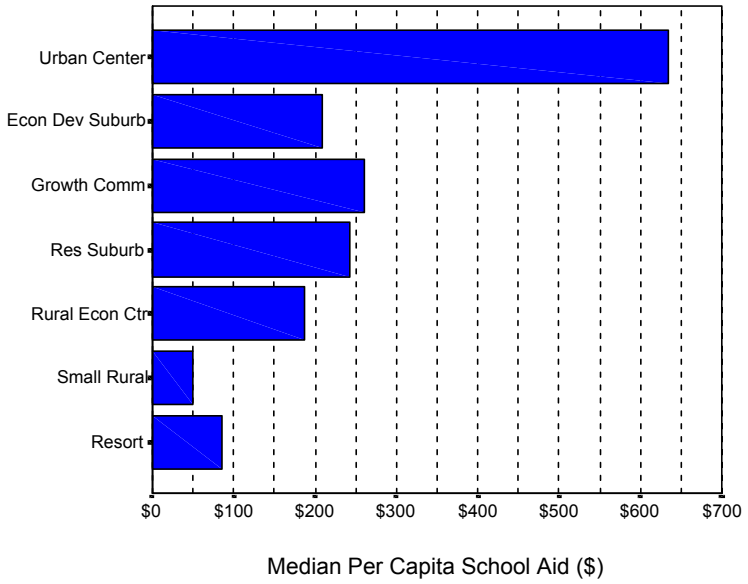
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000 Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 10.5 Median Percent Education Aid Growth Per Capita By Kind of Community



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

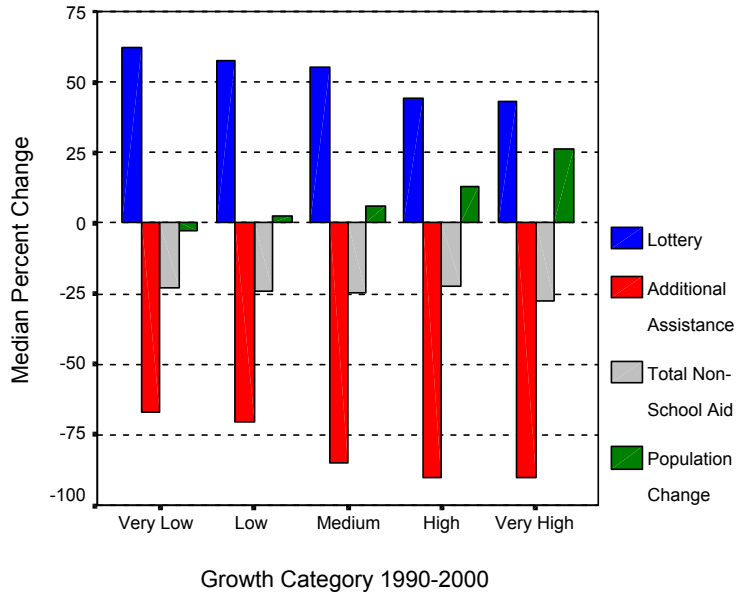
Figure 10.6 Median Dollar Education Aid Growth Per Capita By Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

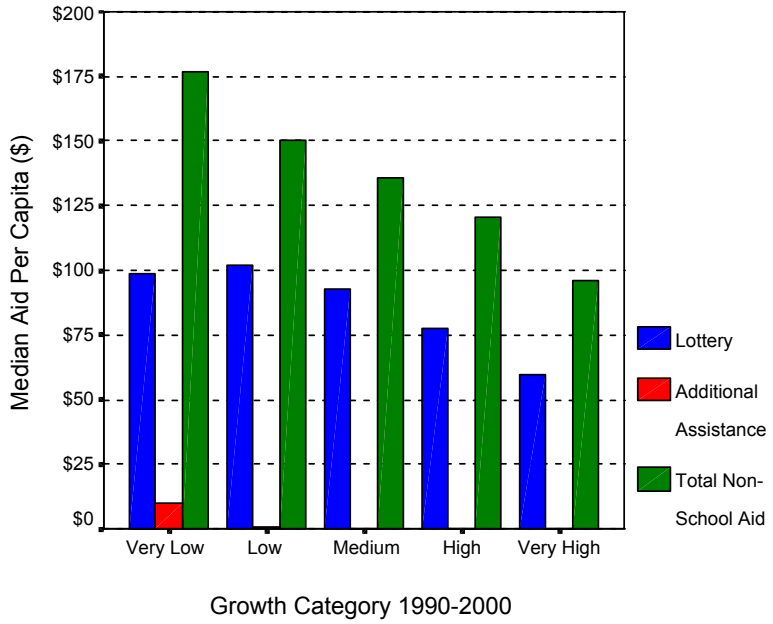
10.6 Non-School State Aid Charts

Figure 10.7 Median Percent Non-School Aid Growth Per Capita By Growth Category



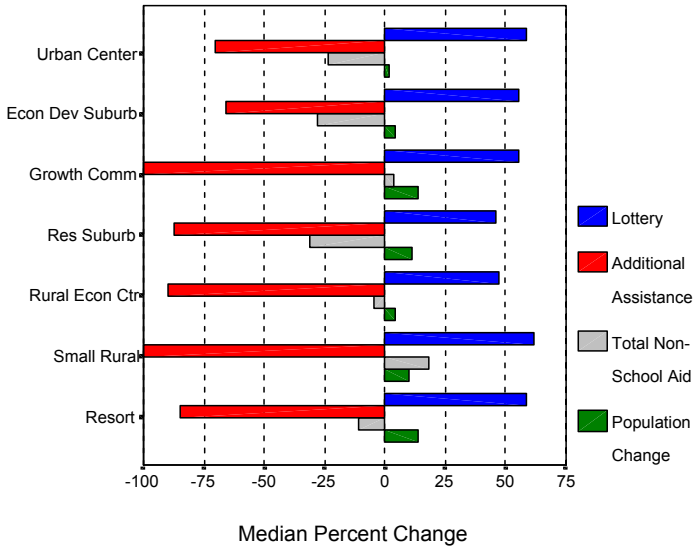
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 10.8 Median Non-School Aid Growth in Dollars Per Capita By Growth Category, 2000



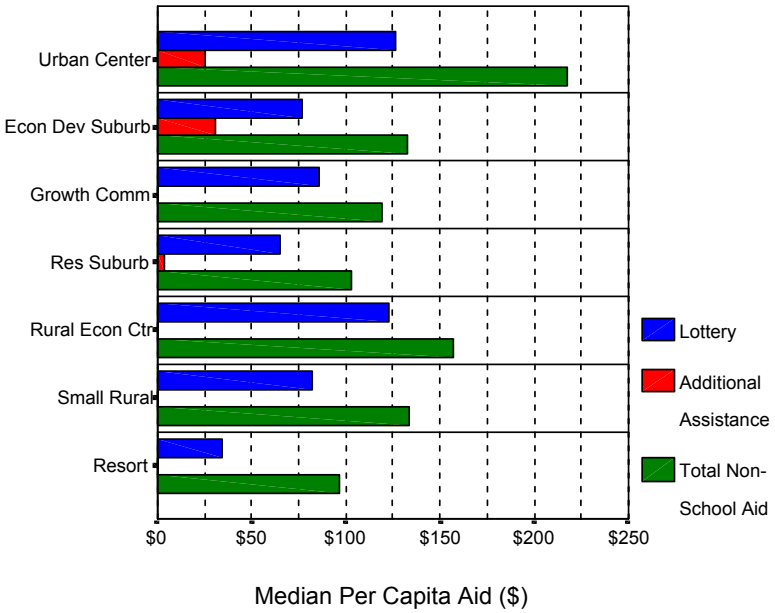
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 10.9 Median Percent Non-School Aid Growth Per Capita By Kind of Community



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 10.10 Median Dollar Non-School Aid Growth Per Capita By Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

11 School Cost Analysis

Education is the largest single municipal expense for all cities and towns in Massachusetts. In 2000, the combined total spending on school costs for all municipalities in Massachusetts was almost $5.9 billion, or 48% of the $12.2 billion expended that year. The lowest percentage expenditures were seen by towns that belong to regional school districts or certain cities where state aid flowed directly to the district (places like Heath and Springfield had no recorded education expenditures), while some towns saw school costs up to 78% of total municipal expenditures, such as Hancock (78.5%) and Belchertown (72.4%). While most of these expenditure figures include state aid, they still show the importance of education costs to school funding. In addition, the total number of pupils in Massachusetts school systems rose 18.7 percent from 1990 to 2000, according to data from the Massachusetts Department of Education.. The following analysis uses data from the Division of Local Services of the Massachusetts Dept. of Revenue along with data from the Mass. Dept. of Education to analyze changes in education expenditures from 1990 to 2000. Because the first time period is before the 1994 start date of the Massachusetts Education Reform Act (MERA), this analysis captures some of the changes brought about by that legislation.

11.1 School Cost Trends 1990-2000

This section uses different data than previous analyses. It uses *net average membership of pupils* in school and the *integrated operating cost* for each municipality in Massachusetts. The *net average membership of pupils* is a statistic created by the Massachusetts Department of Education that calculates the "average enrollment of local residents, pupils in regional school districts, and those being tuitioned to out-of-town schools averaged across the school year."[25] In other words, it is a measure of the number of pupils that each municipality sends to a school system, whether that system is regional or covers only one town. The *integrated operating cost* includes "a community's share of regional school district spending as well as that from its own local schools. This approach accounts for spending outside the school budget that benefits schools, such as insurance and pupil support services."[26]

Figure 11.1 shows a simple scatterplot of the change in *net average membership of pupils* in school versus the change in *integrated operating cost* for each municipality in Massachusetts. This simple measure shows that, while there was a very general relationship between increasing school populations and increasing school costs between

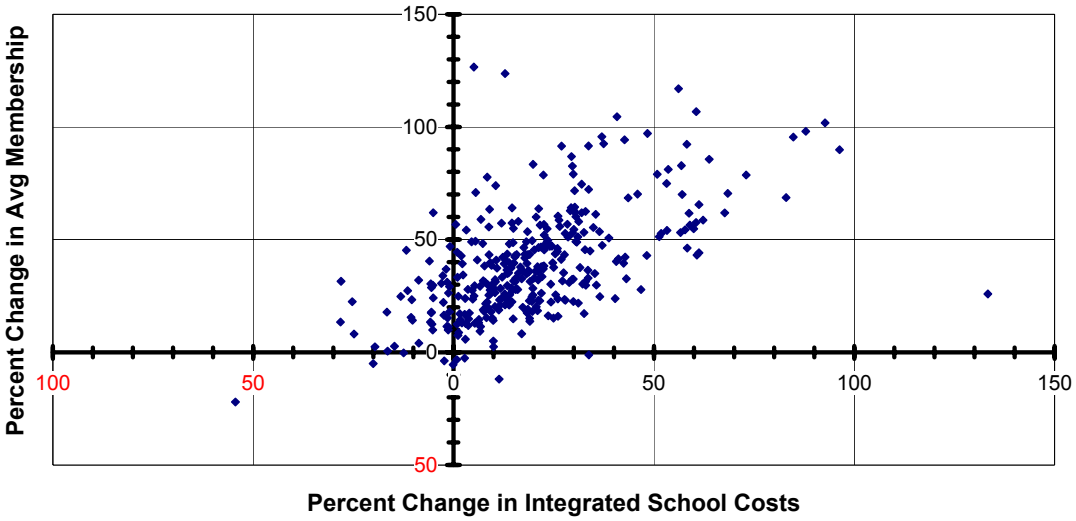
[25] Division of Local Services, Massachusetts Dept. of Revenue, Municipal Data Bank, Schv8601.xls. Non-residents are not counted in the Net Average Membership Pupils figure.

[26] Division of Local Services, Massachusetts Dept. of Revenue, Municipal Data Bank, Schv8601.xls. Integrated Operating Cost also includes EEO grant spending but does not include other non-general fund expenditures.

1990 and 2000, it is not as linear as one would expect. Much of this has to do with the Massachusetts Education Reform Act, or MERA.

Figure 11.1

School Cost Change by Municipality, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990 and 2000
Mass. Dept. of Education, 1990 and 2000

11.2 Per-Pupil Costs by Pupil Growth Category

One of the important factors that affects forecasting future education costs is the change in per-pupil expenditures. Generally, future education budgets are estimated using a per-pupil cost multiplier, with the assumption that these costs are consistent from year to year. Looking at the change in cost-per-pupil (calculated by dividing the integrated operating cost by the net average membership of pupils for each municipality) shows that there have been changes in the per-pupil expenditure rate over time for almost all municipalities. From 1990 to 2000, the median municipal per-pupil expenditure rose almost 16 percent for the state.

If net average membership growth rates are separated out into quintiles (in a similar fashion as population growth rates were in the previous chapters) then patterns in cost changes start to appear. Table 9.1 shows the growth rates in net average membership of pupils from 1990 to 2000 for each quintile and for the state as a whole. As before, each quintile contains 70 towns except for the third, which contains 71.

Table 11.1 Growth Rate by Quintile in Net Average Membership of Pupils

Change	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	Total
Median	**-2.1**	**9.2**	**17.5**	**26.1**	**46.4**	**17.5**
Mean	-5.4	9.1	17.2	26.2	50.5	19.5
Minimum	-54.4	4.5	13.4	21.2	31.9	-54.4
Maximum	3.9	13.3	21.1	31.6	133.3	133.3

Source: Mass. Dept. of Education

Table 11.2 shows the growth rate in the cost per pupil by pupil growth quintile from 1990 to 2000, adjusted for inflation. These numbers show that, on the whole, costs per pupil have risen regardless of the rate in pupil growth, but these costs have risen less in high-pupil-growth rate towns than in low growth rate towns. The median data is illustrated in figure 11.2 below. Note that the population growth rates shown here are different than the ones used in previous chapters, as they are based on the quintiles used to represent growth in net average membership of pupils.

Table 11.2 Growth Rate by Quintile in Cost Per Pupil in Real Dollars

Change	Very Low (1)	Low (2)	Medium (3)	High (4)	Very High (5)	Total
Median	**25**	**18.1**	**14.2**	**16.8**	**2**	**15.6**
Mean	28	22	15.1	15.8	6.9	17.6
Minimum	-5.4	-20.9	-7.5	-8	-46.1	-46.1
Maximum	82.8	115.6	53	50.8	45.3	115.6

Source: Mass. Dept. of Education

11.3 Per-Pupil State Education Aid by Pupil Growth Category

Per-pupil expenditures are not the whole story, however. Municipalities receive a significant amount of education aid from the State that helps to defray the cost of providing education services to residents. According to the Mass. Department of Education, financing schools is seen as a local responsibility, but ensuring fairness across communities is seen as a State responsibility. Fairness is achieved through the funding structure set up in the Massachusetts Education Reform Act of 1993, or MERA. The primary goals of MERA were to set a minimum spending level for each school district, calculate what the various municipalities could afford to pay, and use state funds to make up the difference.[27] It was originally intended to run from 1993 through 2000, but was extended after that time to continue providing State funds to local schools using the same aid formula.

Table 11.2 shows the median growth rate in the cost per pupil by pupil growth category from 1990 to 2000, adjusted for inflation. These numbers show that, on the whole, median costs per pupil have risen regardless of the rate of pupil growth, but these costs have risen less in high-pupil-growth rate towns. Note that the population growth

[27] http://finance1.doe.mass.edu/chapter70/formula98.html

rates shown here are different than the ones used in previous chapters, as they are based on the growth in net average membership of pupils instead of the population as a whole.

When looking at school aid per capita, it is more useful to examine median aid per pupil, as that more directly measures the effect of state aid on education costs. Like education costs, median aid per pupil has gone up from 1990 to 2000, but not consistently across pupil growth categories. Figure 10.2 in Chapter 10 shows the changes in state aid for public K-12 education from FY1990 through FY2002. The pattern of yearly change it shows is similar to the pattern seen in Figure 2.5, *Revenues by Type, 1981-2001*, in Chapter 2. There was a tapering off of aid for education in the early 1990's that was recovered from by 1995, and a general increase since that time.

The largest portion of state education aid is "Chapter 70" aid, which is distributed through a complex formula that was created in 1993 under the Massachusetts Education Reform Act. Note that the aid system in 1990, although not called "Chapter 70" at the time, was interpolated by the Division of Local Services from the different types of aid available at that time to create a comparable statistic to post-1993 data.

Figure 11.6 shows the median change in aid disbursement from 1990 to 2000 by growth in net average membership of pupils. Not surprisingly, municipalities with high growth rates showed the highest increases in state education aid, as well as other types of aid. However, when aid is broken down into dollars per pupil, the picture changes somewhat. While aid as a whole has gone up significantly since 1990, median per-pupil aid expenditures have actually decreased for most pupil growth rate categories. Looking at median dollar costs per pupil in 2000 shows a slight decrease in cost per pupil for higher pupil growth categories, and a bell-shaped curve of median aid per pupil, with the "medium" growth rate communities posting the largest per-pupil aid expenditure. This is partly because simple growth in pupils is not what causes more state aid to be disbursed to a municipality.

11.4 Per-Pupil Costs by Kind of Community

The results seen in the previous section do not explain the changes in state aid distribution that have occurred since 1990, because growth in the student population is not the only factor that would affect aid distributions. Changes are better illustrated by looking at the kind of community, as this can work as a proxy for the most important factor in education aid, which is a municipality's ability to pay.

Figures 11.7 and 11.8 illustrate percentage change over time and the current median cost per student and state aid per student by kind of community. As these figures show, urban centers (KOC 1) posted the second largest median percentage increase in aid per pupil after growth communities (KOC 3) and receive the highest median dollar amount of state aid per pupil. Interestingly, the median cost per pupil for each type of community hovers around $7,000 except for the resort, retirement, and artistic communities (KOC 7), which just break $8,000. Note that the statistics for many rural and small towns do not reflect aid that is received directly by multi-town school districts.

Looking at the data on dollar expenditures per pupil for total cost and for state aid by both community type and growth rate show a general consistency in per-pupil costs across the board, with small rural communities posting lower median expenditures due to their state aid mostly flowing towards regional school districts. For state aid, Urban Centers of all pupil growth categories show much higher median state aid numbers (generally from over $4,000 to over $5,000 per pupil), with only "low" growth rate Economically Developed Suburbs, "medium" growth rate Rural Economic Centers and "high" growth rate Growth Communities receiving over a median $2,000 in aid per pupil.

11.5 Conclusions on School Costs

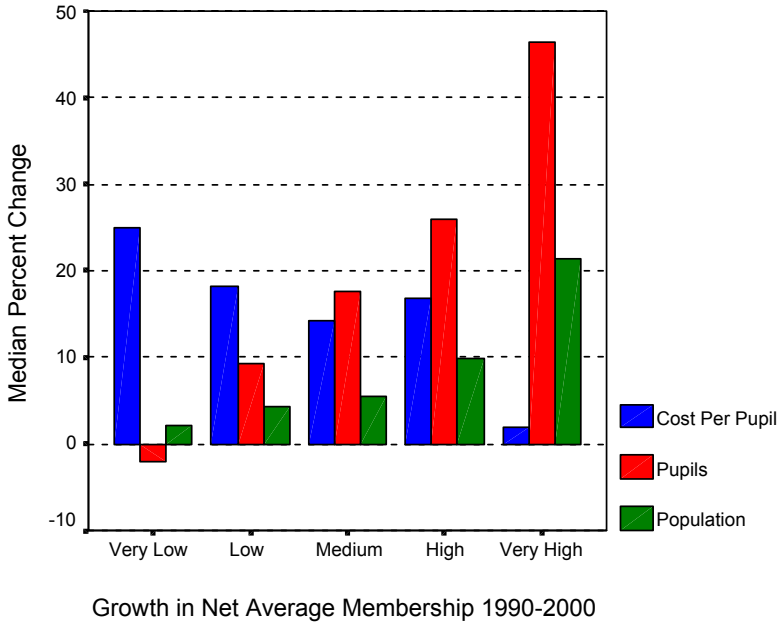
Education costs are the single most important expenditure a city or town makes. Both school costs and the number of pupils in Massachusetts' schools went up from 1990 to 2000. The total amount of integrated operating costs statewide rose 34.9 percent in that time, while the total net average membership of pupils rose only 18.7 percent. However, part of this increase is due to increasing school aid under the 1993 Education Reform Act.

When looking at school costs and school aid per student, some surprising findings become apparent. While all growth classifications of municipalities had per-pupil increases in total costs, these costs increased less in higher pupil growth categories. In this, per-pupil expenditures follow the trend in other expenditures. This makes sense because of the large share of total municipal expenditures covered by education costs.

In addition, certain types of municipalities showed median changes in per-capita state aid that were negative. This trend was explained by using community types to classify the data, which showed that Urban Centers were getting most of the benefit of state aid.

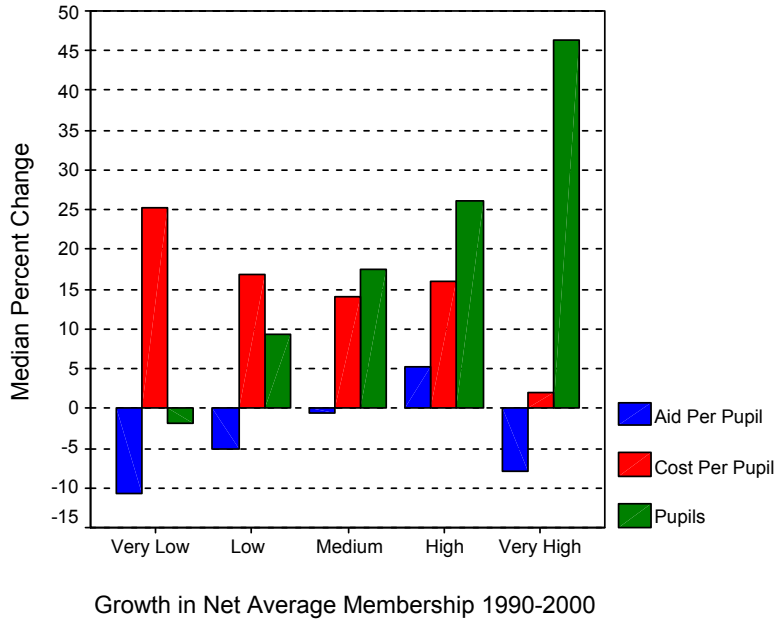
11.6 Charts for School Costs Per Pupil By Pupil Growth Category

Figure 11.2 Growth in Per-Pupil Expenditures 1990-2000 by Net Average Membership Growth Quintile (in Real Dollars)



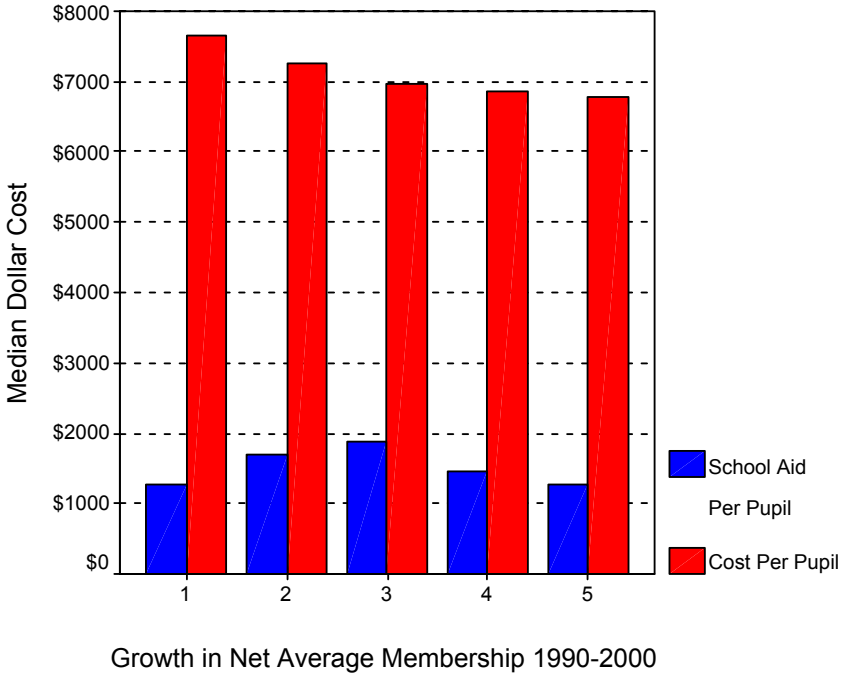
Source: Massachusetts Dept. of Education 1990-2000
Division of Local Services, Mass. Dept. of Revenue 1990-2000

Figure 11.3 Change in State Aid Per Pupil, Total Cost Per Pupil, And Net Average Membership of Pupils by Growth in Net Average Membership of Pupils, 1990-2000



Source: Division of Local Services, Dept. of Revenue, 1990-2000

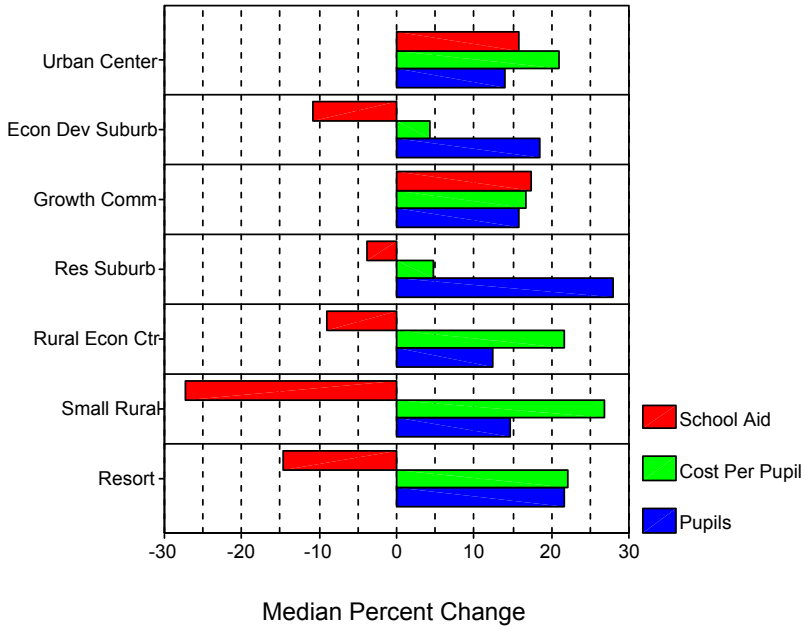
Figure 11.4 Median State Aid and Cost Per Pupil in 2000



Source: Division of Local Services, Dept. of Revenue, 1990-2000

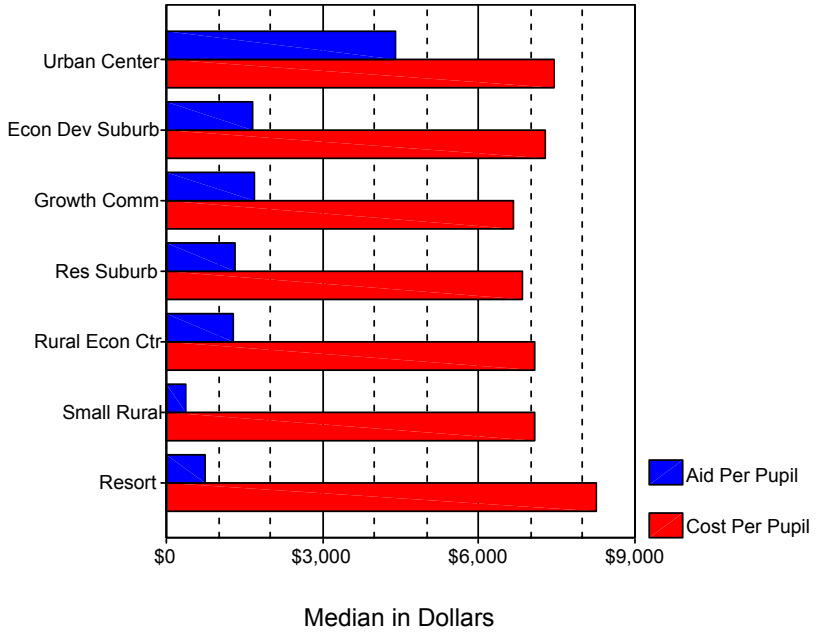
11.7 Charts for School Costs Per Pupil By Kind of Community

Figure 11.5 Change in State Aid Per Pupil, Total Cost Per Pupil, and Net Average Membership of Pupils by Kind Of Community, 1990-2000



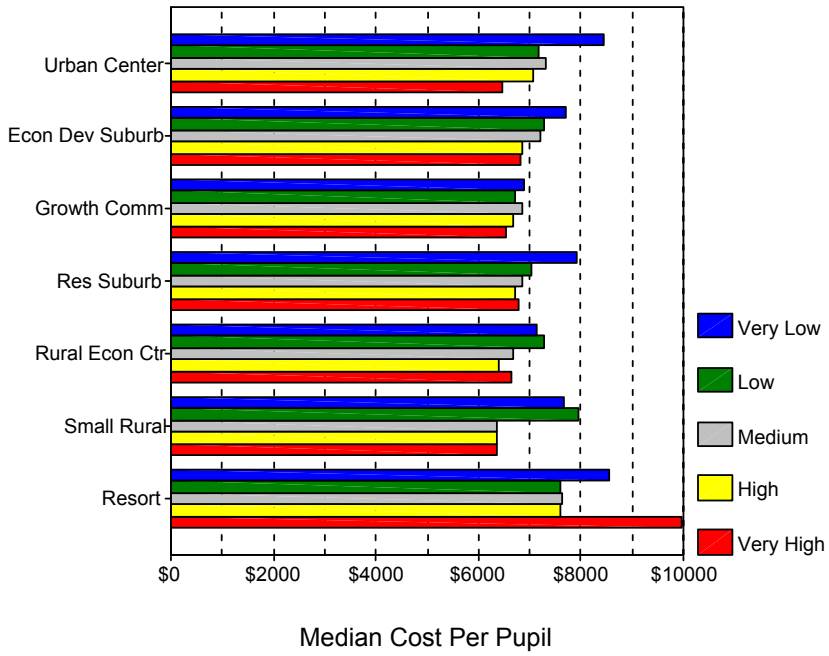
Source: Division of Local Services, Dept. of Revenue, 1990-2000

Figure 11.6 Median State Aid and Cost Per Pupil in 2000



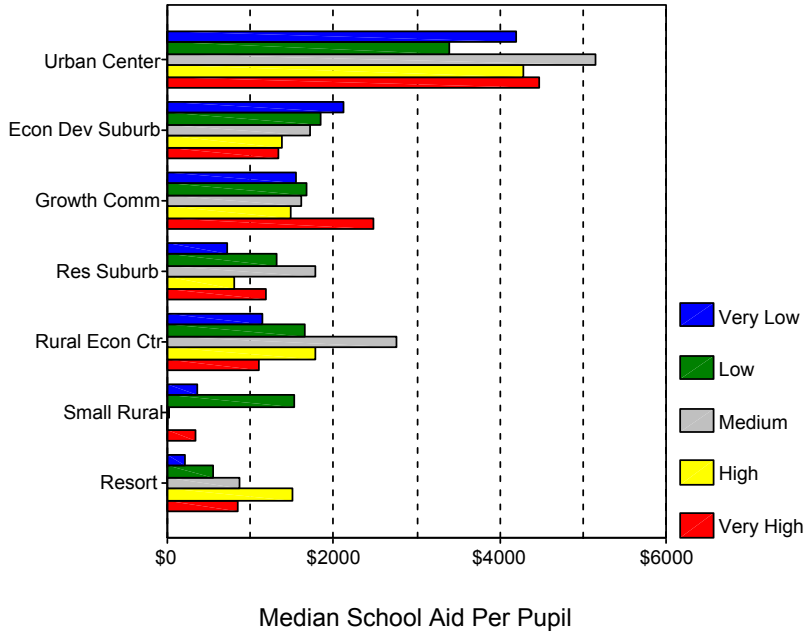
Source: Division of Local Services, Dept. of Revenue, 1990-2000

Figure 11.7 Median Cost Per Pupil by Kind of Community and Pupil Growth Category in 2000



Source: Division of Local Services, Dept. of Revenue, 1990-2000

Figure 11.8 Median State Aid Per Pupil by Kind of Community and Pupil Growth Category in 2000



Source: Division of Local Services, Dept. of Revenue, 1990-2000

12 Tax Collection Analysis

To see how cities and towns are dealing with their changing revenue picture, UMDI analyzed the adoption of split property tax systems which tax residential parcels at a lower rate than commercial and industrial parcels. This taxing scheme helps municipalities reduce costs on residents by shifting more of the burned on industrial and commercial land. We also examined trends in tax levy changes per capita and per parcel, as well as motor vehicle excise taxes, to see how change over time has affected property tax collection. In addition, we examined levy limits and levy ceilings mandated by Proposition 2½, bond ratings, and municipal debt levels over time, all to paint a more complete picture of what happened in Massachusetts' cities and towns between 1990 and 2000.

12.1 Tax System Analysis 1990 – 2000

One of the ways that cities and towns can collect more property taxes without adding an extra tax burden to residential households is to adopt a differential tax rate, or a two-tiered tax system. In this approach, residential property is taxed at one rate and other types of property (commercial, industrial, etc.) are taxed at another, higher rate. This allows more of the tax burden to be shifted onto non-residential property.

Even though many communities in Massachusetts have experienced financial pressures in recent years, there has been little change in the number of municipalities that use two-tiered taxing systems. In fact, there has been a slight decrease in the number of these communities. In 1990, there were 109 communities that used different tax rates for different types of property. This number decreased to 102 by 2000, and had not changed in 2002. Of these, most are either Urban Centers (KOC 1) or Economically Developed Suburbs (KOC 2). Further, the fastest-growing municipalities are the least likely to use two-tiered taxing systems.

Table 12.1: Two-Tiered Tax Systems by Kind of Community

Kind of Community	Tiered	Total	Percent
Urban Center	38	45	84%
Econ. Dev. Suburb	40	59	68%
Growth Community	7	46	15%
Res. Suburb	3	53	6%
Rural Econ Ctr	9	61	15%
Small Rural Comm.	1	46	2%
Resort, Retirement	4	41	10%
Total	**102**	**351**	**29%**

Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Table 12.2: Two-Tiered Tax Systems by Growth Rate, 1990-2000

Growth Rate	Tiered	Total	Percent
Very Low	27	70	39%
Low	34	70	49%
Medium	21	71	30%
High	10	70	14%
Very High	10	70	14%
Total	**102**	**351**	**29%**

Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

12.2 Per Capita Levy Change Analysis, 1990 – 2000

Tax levies from real property are the single most important revenue stream for most cities and towns in Massachusetts. We analyzed the components of municipal tax levies to track change over time and to see how much tax levy revenue was collected in 2000, both by community growth rate and kind of community. Generally, tax levy revenue is collected mostly from residential real property, and it is this property that has risen the most in value over time.

As we would expect, higher growth rate towns posted higher increases in total tax levy. Interestingly, the total tax levy change for all growth categories grew slower than the residential tax levy change, implying that other types of real property declined in value over the period of 1990-2000. Also interesting is that, even though "very low" growth towns posted a median population loss in that period, they show a fairly significant increase in total tax levy in inflation-adjusted dollars.Total tax levies by kind of community grew in a similar pattern to population change.

Per capita growth rates show a different picture. Median total tax levy growth per capita was highest in the "very low" growth rate towns and lowest in the "very high" growth rate towns, while higher population growth towns generally showed a greater median percentage divergence in residential property levies. Per capita patterns by kind of community are similar to the overall trend.

In dollar terms, the median per capita total tax levy ranged from about $1,000 to about $1,.200 in 2000, with the highest amounts seen in the "very low" growth and "very high" growth municipalities. All other types of levy revenue were quite low for each population growth category. Median per capita levy revenues showed much more variation by kind of community, with Urban Centers (KOC 1) collecting the smallest amount per capita (less than $800) and Resort, Retirement and Artistic communities (KOC 7) collecting the highest amount (almost $1600).

12.3 Per Parcel Levy Change Analysis, 1990 – 2000

Looking at tax levy revenue per parcel gives an entirely different picture. The median of the average tax levy per parcel for residential parcels has changed significantly in all growth categories, but was especially pronounced in "high" and "very high"

population growth municipalities, which recorded over 15 percent growth rates in real dollar value. The median of average commercial property tax levies also climbed more in these towns, posting about a 15 percent increase in value from 1990 to 2000, and less in lower growth cities and towns. Of interest is the negative median change in average industrial property tax levies. The median value of this levy type decreases more the higher the growth rate category.

This trend can also bee seen in the different community types, with a consistent decrease in median average industrial property tax levy in all community types except Small Rural Communities (KOC 6). Interestingly, median average commercial property tax levies in Urban Centers (KOC 1), Growth Communities (KOC 3), and Small Rural Communities (KOC 6) increased at a higher rate than residential properties. Residential Suburbs (KOC 4) and Resort, Retirement, and Artistic Communities (KOC 7) posted the highest median residential parcel tax levy growth rates (20%).

Although the percentage changes imply that there are sharp differences in the amount of money collected per parcel by community type, this is not really the case. Looked at by population growth category, the median average per parcel tax levy for 2000 hovered around $2,200 to $2,500 per parcel for all growth categories. The real differences were in commercial and industrial parcels, with "low" growth municipalities posting the highest median average tax levies for each type of parcel, and "very high" growth municipalities posting the lowest.

A similar trend can be seen in median average tax levies per parcel by kind of community. Except for Economically Developed Suburbs (KOC 2) and Residential Suburbs (KOC 4), the median average tax levy hovers around $2,000 to $2500. Economically Developed Suburbs have median tax levies of about $3,000 per parcel, and Residential Suburbs have median values of about $4,000.The real difference is in commercial and industrial parcels, where Economically Developed Suburbs have by far the highest median average tax levy per parcel and Urban Centers have the second highest.

12.4 Proposition 2½ Levy Limits and Levy Ceilings, 1990 – 2002

Proposition 2½ was enacted in 1980 and regulates both the amount that a municipality in Massachusetts can change its tax levy every year and the maximum percentage of total real and personal property value that that tax levy can be[28]. As the name suggests, both of these amounts are 2½ percent. We tracked the change in excess levy capacity and in percentage of current total levies to the levy ceiling from 1990 to 2000 to see if there were any identifiable trends. We found that, while communities had more excess capacity in 2000 than in 1990, they were closer to their levy ceilings in 2000.

[28] Division of Local Services, Undated. *Levy Limits: A Primer on Proposition 2½*. Boston, Massachusetts Department of Revenue p.2.

A levy limit is the total amount that a community is allowed to increase its tax rates every year. It is based on the previous year's limit plus whatever increases are allowed by law, such as new growth allowances and override votes.[29] The excess levy limit is the amount that a community could have added to their tax levy but did not, for whatever reason. The median excess levy as a percent of the total levy limit has increased for all categories of population growth level from 1990 to 2000. This means that the median town or towns in each category were not "bumping up" against the mandated levy limits as much in 2000 as they were in 1990. While the 2000 percentages are not high (they range from about 0.45 to 0.8 percent), they are higher than the 1990 median of less than 0.1 percent for each growth category. Interestingly, Economically Developed Suburbs, Growth Communities, and Residential Suburbs all have significantly lower excess percentages than other community types. Resort, Retirement, and Artistic Communities had the highest excess capacity in 2000 at a median of about 2.75 percent.

A levy ceiling is the theoretical maximum amount that a community can levy as taxes on property. It is calculated by taking 2.5 percent of the "total full and fair cash value of all taxable real and personal property" in a community.[30] It changes when the value of this property changes, either by new property being added or property values changing, so it is always being re-adjusted. The closer the total tax assessment of a community is to 2.5 percent of total property value, the less room a community has to raise taxes. At some point, a community may "bump into" the levy ceiling an have no more room to increase revenues short of a revaluation of property or addition of new property. When we analyzed the percentage of current tax levy of total municipal property assessment for each municipality, we found that the median for each category was much closer to 2.5 percent in 2000 than it was in 1990. Interestingly, while all growth categories of towns were in the 1.2 to 1.6 percent range of tax levy to levy ceiling, all kinds of communities but two were in this range. The exceptions were Urban Centers, which were higher at almost 1.7 percent of total assessment, and Resort, Retirement and Artistic Communities, which were much lower with a less than one percent median percentage of total assessments.

12.5 Proposition 2½ Override Votes, 1990-2000

One indicator of municipal financial stress is the number and type of override votes attempted in a fiscal year. Essentially, an override vote represents an instance where a municipality spent up to its levy limit in that fiscal year and needed to ask the voters for permission to spend over that limit for certain budget items. There have been significant changes in the number of override votes requested by municipal governments, which have declined drastically between 1990 and 2000.

In 1990, there were 442 override votes held by 131 separate municipalities. Of these, only 40 percent, or 178, were passed. While most of these 131 municipalities requested only one override vote, 58 of them held more than one. The town with the most override vote requests in Fiscal Year 1990 was Chatham, with 31 separate override

[29] Ibid., p.4.
[30] Ibid., p.4.

requests, 12 of which were successful. By 2000, the number of override votes had declined significantly to 56, held by 29 separate municipalities. Of these, Westminster held the largest amount of override votes, with six separate votes (two of which were successful). Overall, 27 of the 56 override votes in 2000, or 48 percent, were successful

Table 12.3 Override Votes by Population Growth Rank, 1990

Growth Rank	Culture Recreation	Employee Benefits	Funds	General Operating	Health and Human Services	Public Safety	Public Works	Schools	**Total**
Very Low	8	1	1	30	4	8	6	11	**69**
Low		1		27	1	9	6	2	**46**
Medium	1			31		4	2	11	**49**
High	5	1	1	56	6	12	21	22	**124**
Very High	15	2	3	65	3	22	30	14	**154**
Total	**29**	**5**	**5**	**209**	**14**	**55**	**65**	**60**	**442**

Table 12.4 Override Votes by Population Growth Rank, 2000

Growth Rank	Culture Recreation	General Operating	Public Safety	Public Works	Schools	**Total**
Very Low		1			3	**4**
Low	1	4		1	1	**7**
Medium	1	4			2	**7**
High	2	5	2	1	11	**21**
Very High	2	3	2	3	7	**17**
Total	**6**	**17**	**4**	**5**	**24**	**56**

Tables 12.3 and 12.4 above show the override vote requests by population growth category and type of override funding. They show that in both 1990 and 2000, the most votes were requested in higher growth rate municipalities. Interestingly, the most requested funding type in 1990 was for general government and general operating expenses, while in 2000 it was school funding.

Table 12.5 Override Votes by Kind of Community, 1990

Kind of Community	Culture Recreation	Employee Benefits	Funds	General Operating	Health Human Services	Public Safety	Public Works	Schools
Urban Center				4				
Econ. Dev. Suburb				10		2		4
Growth Community	10			41	2	13	13	13
Residential Suburb	4	1	1	72	2	9	11	16
Rural Economic Ctr				22		8	5	5
Small Rural Comm.	1			26		4	9	11
Resort, Retirement	14	4	4	34	10	19	27	11
Total	**29**	**5**	**5**	**209**	**14**	**55**	**65**	**60**

Table 12.6 Override Votes by Kind of Community, 2000

Kind of Community	Culture Recreation	General Operating	Public Safety	Public Works	Schools
Urban Center		1			
Economically Developed Suburb			1		4
Growth Community	2	8	2		8
Residential Suburb	2	4		4	7
Rural Economic Center				1	3
Small Rural Community	1				2
Resort, Retirement, and Artistic	1	4	1		
Total	**6**	**17**	**4**	**5**	**24**

When viewed by the kind of community, override votes in 1990 were most prevalent in the Resort, Retirement, and Artistic, Residential Suburb, and Growth Community categories. By 2000, the Resort Retirement and Artistic communities had vastly decreased their override vote requests, but the other two community types still accounted for the majority of override votes.

12.6 Moody's Bond Ratings, 1990-2000

A good measure of fiscal health is a community's bond rating. We have analyzed the Moody's bond ratings for each community in 1990 and in 2000 and tracked the changes over time. Overall, most communities in Massachusetts have either retained the same bond rating or have improved their bond rating over that time period. In addition, in FY2000 the vast majority of municipalities in Massachusetts carried favorable bond ratings.

For communities that had bond rating from Moody's in both 1990 and 2000, we found that there was a general increase in bond ratings across the board in all community types and population growth rate categories (see tables F.7 and F.8). We also found that the vast majority of communities carried A or above ratings in Massachusetts in 2000 (see tables 12.7 and 12.8). Note that we excluded the "2" and "3" sub-categories of bond rating from our analysis as they were adopted after 1990.[31]

Table 12.7 Change in Municipal Bond Ratings by Population Growth Rate For Municipalities Rated in Both 1990 and 2000

Growth Rate	Lowered	No Change	Raised
Very Low	7.5%	77.5%	15.0%
Low	14.0%	55.8%	30.2%
Medium	4.9%	56.1%	39.0%
High	0.0%	64.9%	35.1%
Very High	2.9%	62.9%	34.3%
Total	**6.1%**	**63.3%**	**30.6%**

[31] Division of Local Services, Department of Revenue.

Table 12.8 Change in Municipal Bond Ratings by Kind of Community For Municipalities Rated in Both 1990 and 2000

Kind of Community	Lowered	No Change	Raised
Urban Center	12.8%	59.0%	28.2%
Econ Dev Suburb	6.1%	55.1%	38.8%
Growth Comm	3.4%	79.3%	17.2%
Res Suburb	2.7%	45.9%	51.4%
Rural Econ Ctr	8.3%	79.2%	12.5%
Small Rural	0.0%	71.4%	28.6%
Resort	0.0%	90.9%	9.1%
Total	**6.1%**	**63.3%**	**30.6%**

Table 12.9 Bond Ratings by Population Growth Rate, 2000

Growth Category	Aaa	Aa1	Aa	A1	A	Baa	Baa1
Very Low	6.5%	2.2%	21.7%	13.0%	41.3%	6.5%	8.7%
Low	5.5%	1.8%	20.0%	9.1%	50.9%	5.5%	7.3%
Medium	3.8%	3.8%	17.3%	23.1%	42.3%	0.0%	9.6%
High	4.4%	4.4%	15.6%	28.9%	40.0%	6.7%	0.0%
Very High	0.0%	1.9%	18.9%	26.4%	49.1%	0.0%	3.8%
Total	**4.0%**	**2.8%**	**18.7%**	**19.9%**	**45.0%**	**3.6%**	**6.0%**

Table 12.10 Bond Ratings by Kind of Community, 2000

Kind of Community	Aaa	Aa1	Aa	A1	A	Baa	Baa1
Urban Center	2.2%	0.0%	4.4%	15.6%	48.9%	13.3%	15.6%
Econ Dev Suburb	12.3%	5.3%	40.4%	19.3%	21.1%	0.0%	1.8%
Growth Comm	0.0%	0.0%	12.8%	17.9%	66.7%	0.0%	2.6%
Res Suburb	4.3%	8.7%	32.6%	34.8%	13.0%	4.3%	2.2%
Rural Econ Ctr	0.0%	0.0%	0.0%	5.7%	80.0%	2.9%	11.4%
Small Rural	0.0%	0.0%	0.0%	16.7%	83.3%	0.0%	0.0%
Resort	0.0%	0.0%	11.8%	29.4%	52.9%	0.0%	5.9%
Total	**4.0%**	**2.8%**	**18.7%**	**19.9%**	**45.0%**	**3.6%**	**6.0%**

12.7 Municipal Debt, 1990-2000

Municipal debt has increased from 1990 to 2000. The total outstanding debt for all municipalities in Massachusetts increased from $3.7 billion in 1990 to $7.7 billion in 2000 in constant dollars. As these numbers imply, total outstanding debt per capita has increased as well. We found some interesting patterns in debt per capita across town growth categories and kinds of community.

Looking at median per capita debt change by population growth category shows us that median debt has changed inconsistently. However, it is notable that the median per capita debt change for "very high" growth communities was the smallest by far of all categories (less than 40 percent), while the median debt change for "high" growth communities was the highest (over 90 percent). When looking at per capita debt change by kind of community, a different pattern emerges. Urban Centers (KOC 1) had the highest median per capita change of almost 200 percent from 1990 to 2000. Residential

Suburbs (KOC 4) had the second-highest change of over 150 percent. The next highest median changes were Economically Developed Suburbs and Rural Economic Centers, both tied at slightly over 50 percent. Small Rural Communities (KOC 6) and Resort, Retirement, and Artistic Communities (KOC 7) both had negative changes in median per-capita debt.

Looking at the actual dollar amount per capita shows that the change patterns mask one reality., which is that "Very High" growth municipalities have the highest median per-capita debt, while "very low" growth municipalities have the lowest. By community type, Urban Centers have the highest median per capita debt in 2000 (almost $1500), which was not true in 1990.

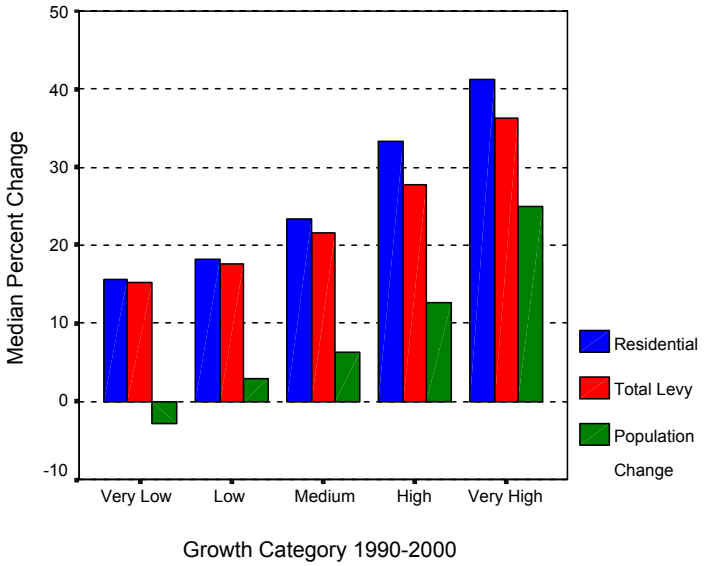
12.8 Conclusions

This section examines many different aspects of tax policy and fiscal health in Massachusetts' communities. The overall conclusion that we draw is that, overall, Massachusetts' cities and towns were in better fiscal shape in 2000 than they were in 1990. The slowdown of override votes, improvement in bond ratings, and increase in excess levy capacity all point to municipalities that were able to operate within the normal revenues that they collected in 2000. This is partly due to the improvement in residential tax values from 1990 to 2000 both raised levy limits and ceilings, allowing for more tax growth.

The dark clouds on the horizon are that municipalities are getting closer to the mandated 2.5 percent ceiling of property taxes to property values, and that municipal debt has increased significantly. Any downturn in property values could have a significant negative effect on municipal finances as levy ceilings lower and debt becomes harder to service.

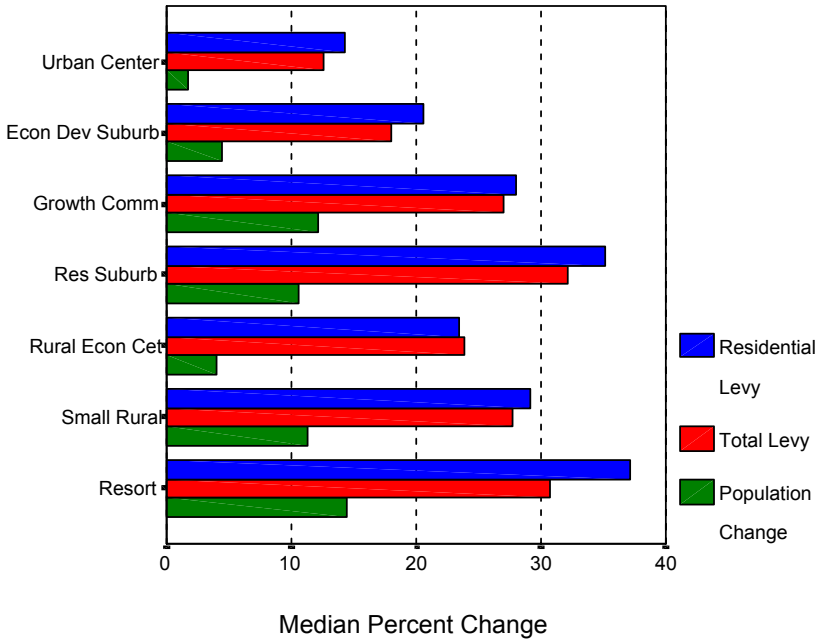
12.9 Tax Levy Change Charts

Figure 12.1 Tax Levy Change by Population Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

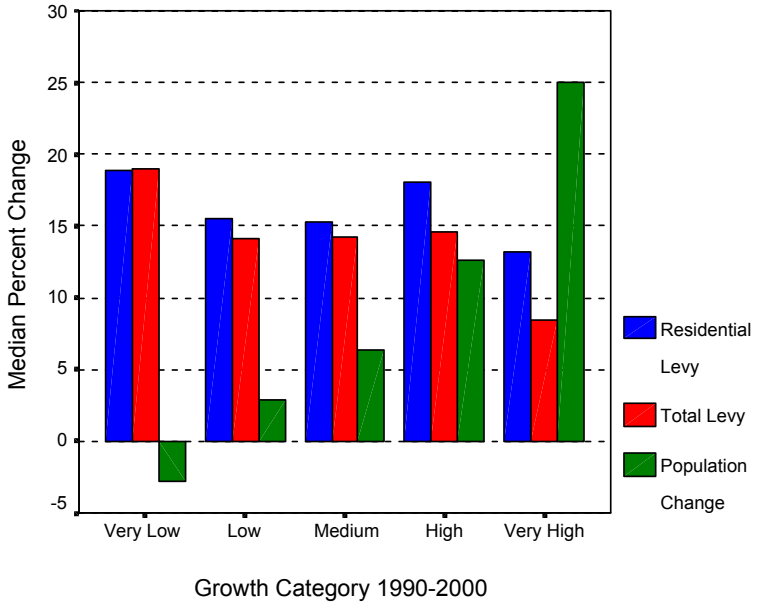
Figure 12.2 Tax Levy Change by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

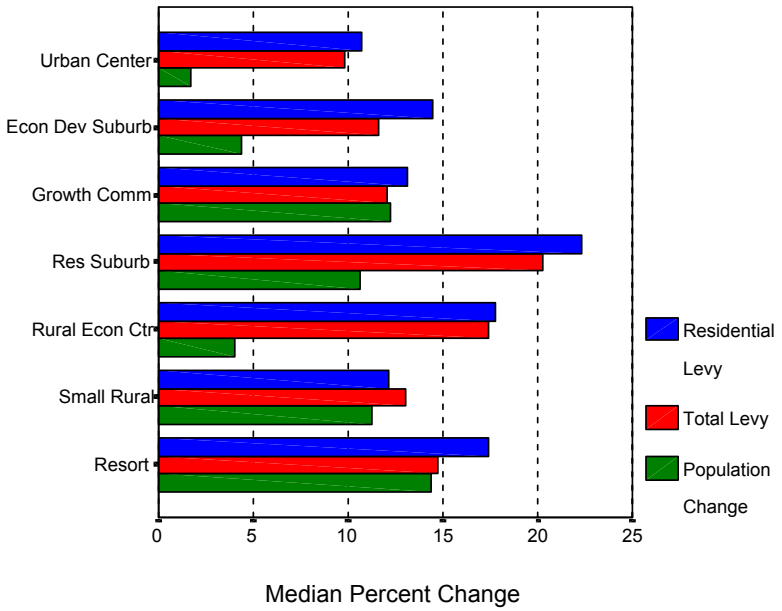
12.10 Per-Capita Tax Levy Change Charts

Figure 12.3 Per Capita Tax Levy Change by Population Growth Category, 1990-2000



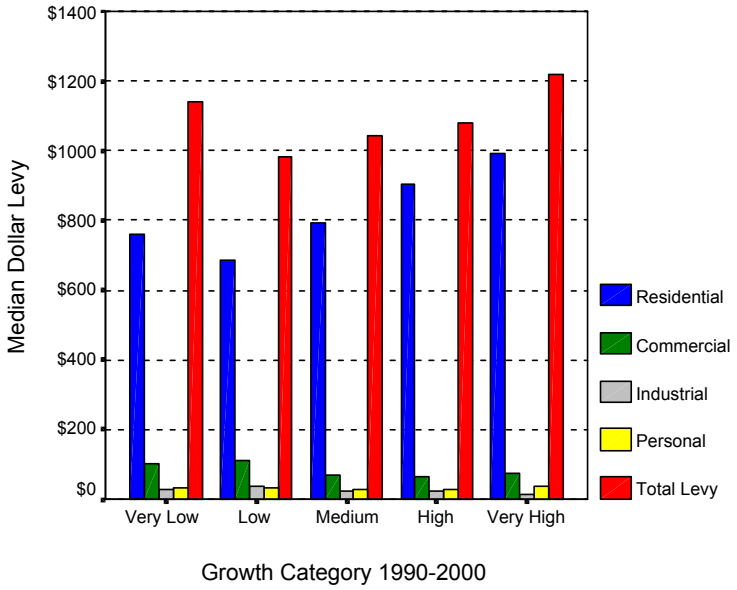
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.4 Per Capita Tax Levy Change by Kind of Community, 1990-2000



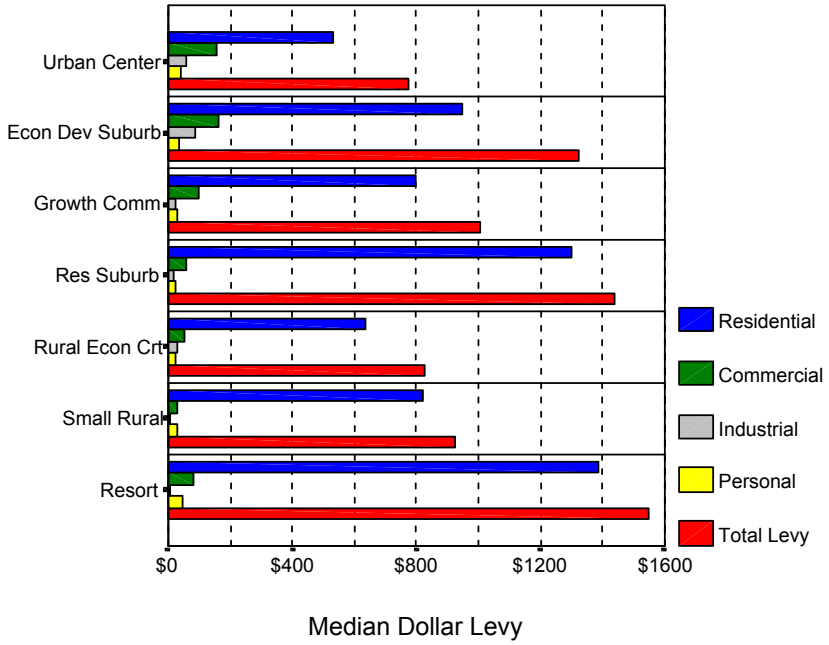
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.5 Per Capita Tax Levy by Population Growth Category, FY2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

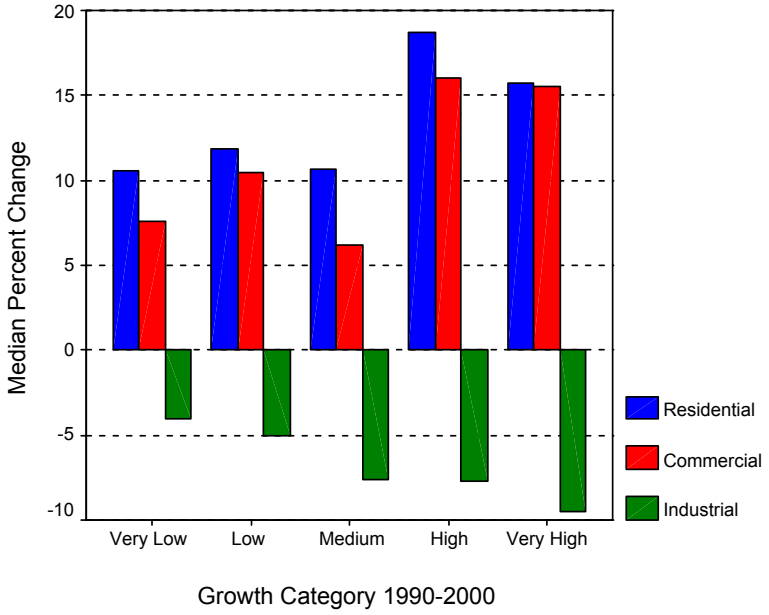
Figure 12.6 Per Capita Tax Levy by Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

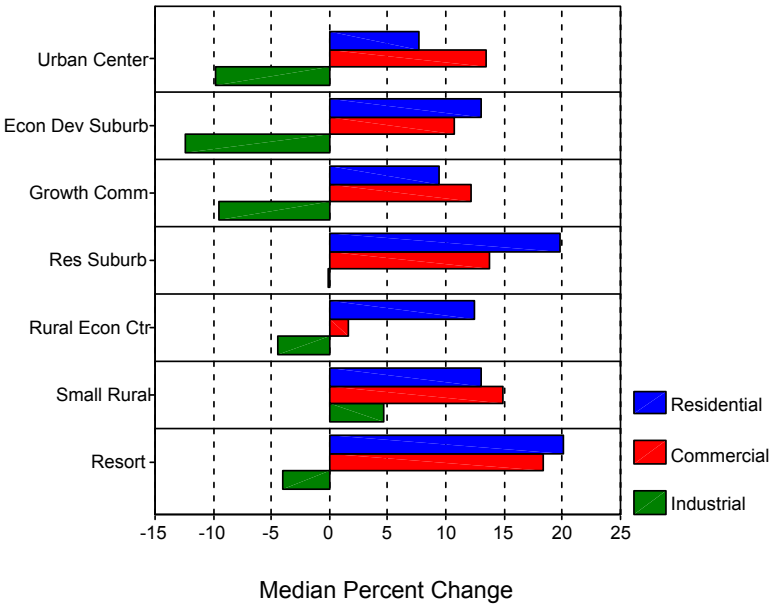
12.11 Per Parcel Tax Levy Change Charts

Figure 12.7 Per Parcel Tax Levy Change by Population Growth Category, 1990-2000



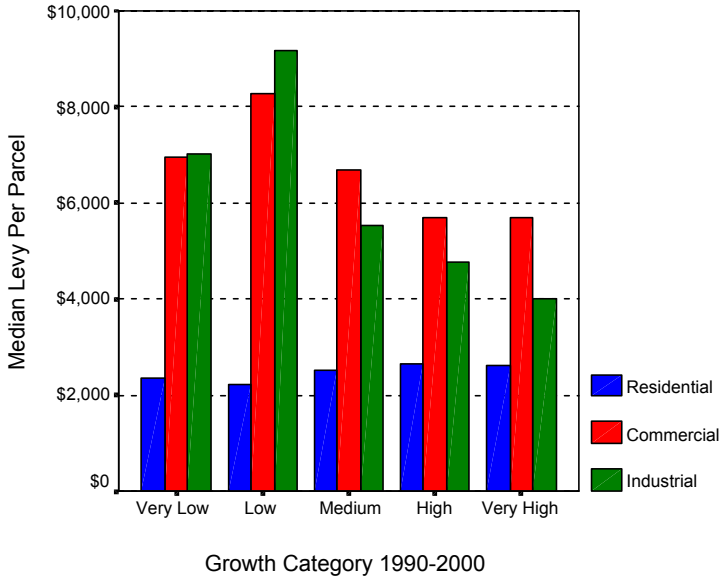
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.8 Per Parcel Tax Levy Change by Population Growth Category, 1990-2000



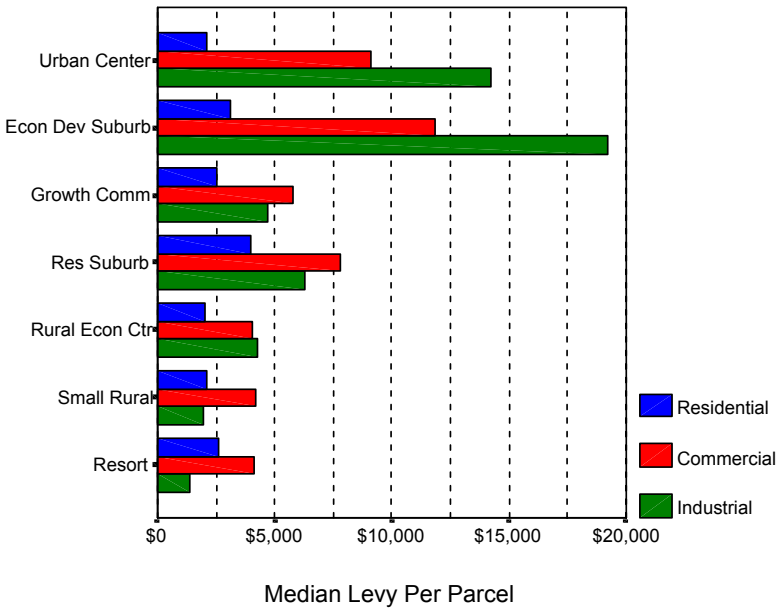
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.9 Median of Average Per Parcel Tax Levy by Population Growth Category, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

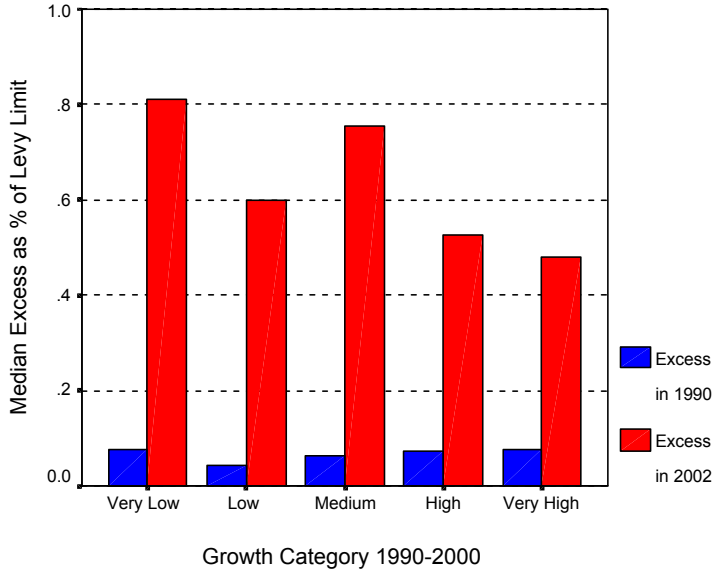
Figure 12.10 Median of Average Per Parcel Tax Levy by Population Growth Category, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

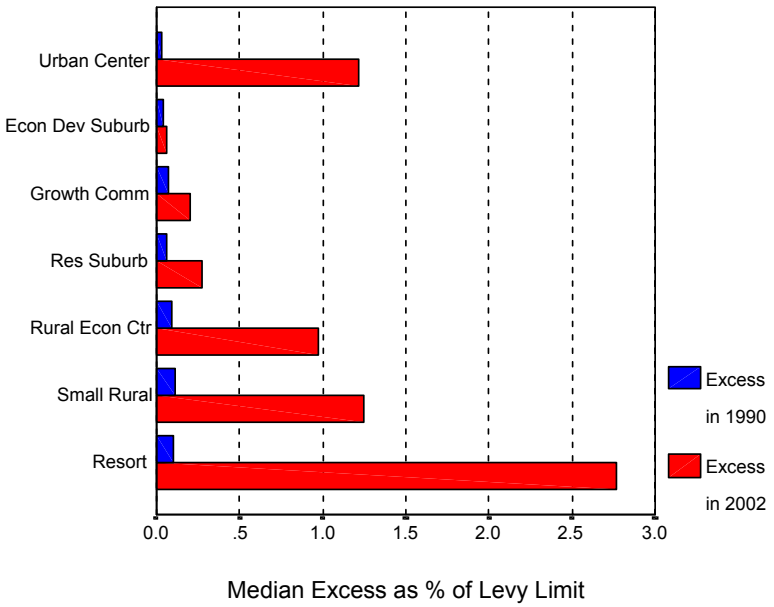
12.12 Proposition 2½ Levy Limits and Levy Ceilings Charts

Figure 12.11 Levy Limits as a Percent of Current Levy By Population Growth Category, 1990-2000



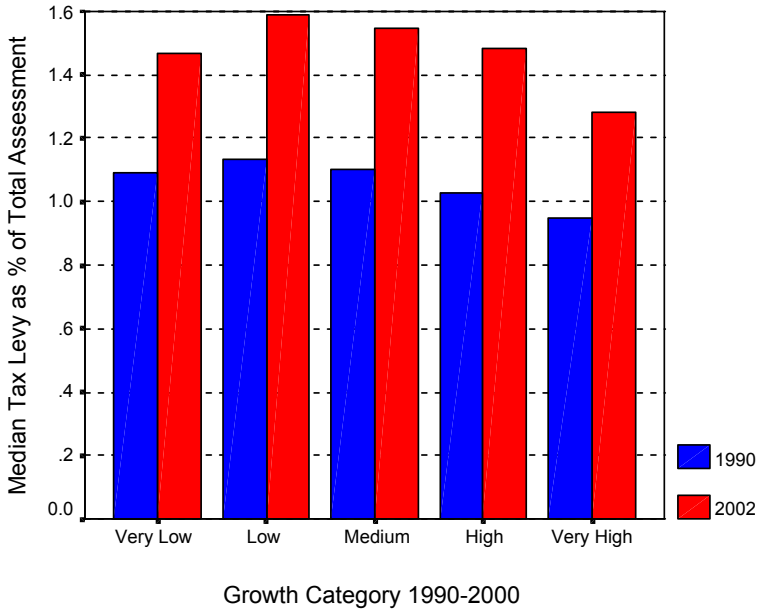
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.12 Levy Limits as a Percent of Current Levy By Kind of Community, 1990-2000



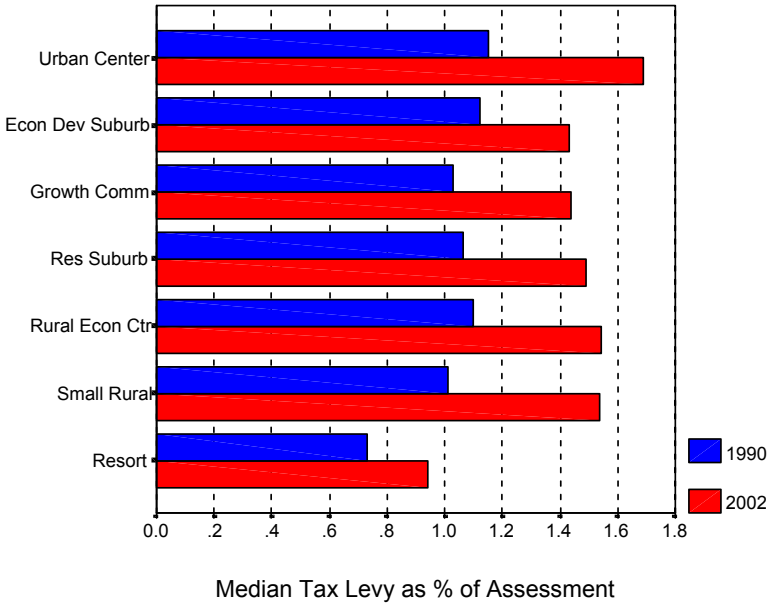
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

Figure 12.13 Current Levies as a Percent of Total Assessment By Population Growth Category, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

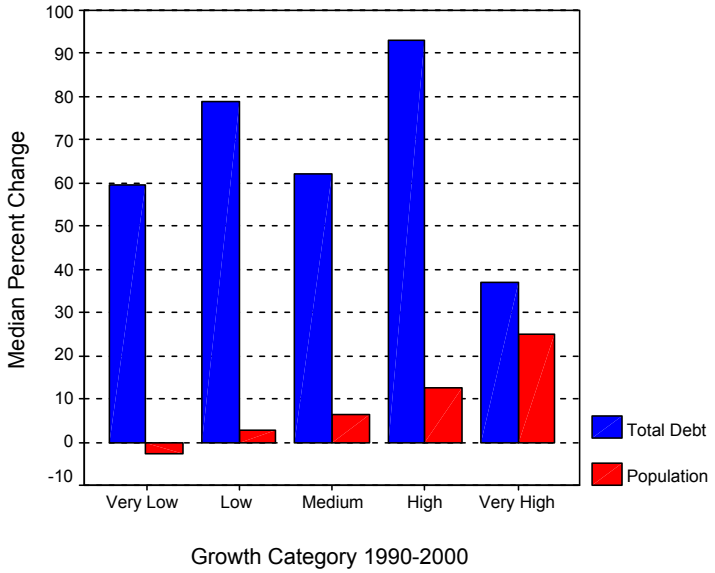
Figure 12.14 Current Levies as a Percent of Total Assessment By Kind of Community, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

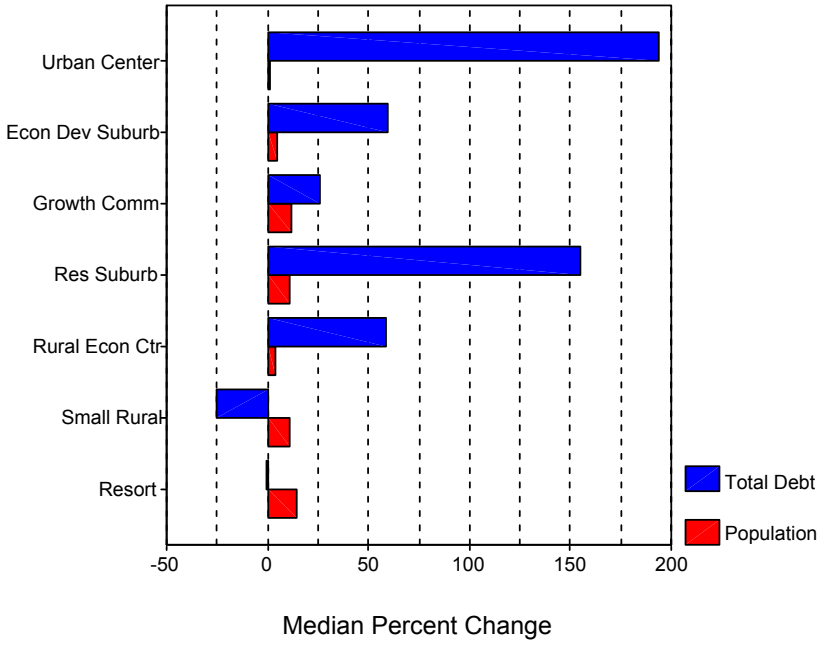
12.13 Municipal Debt Charts

Figure 12.15 Median Per Capita Debt Change By Population Growth Category, 1990-2000



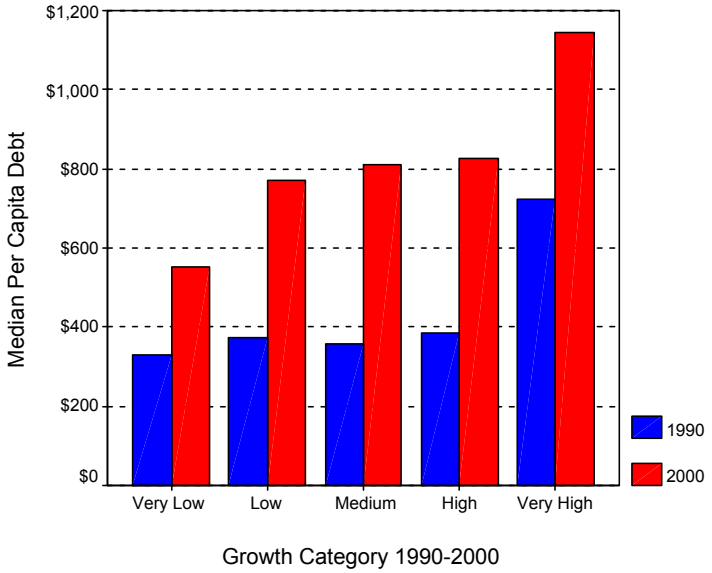
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.16 Median Per Capita Debt Change By Kind of Community, 1990-2000



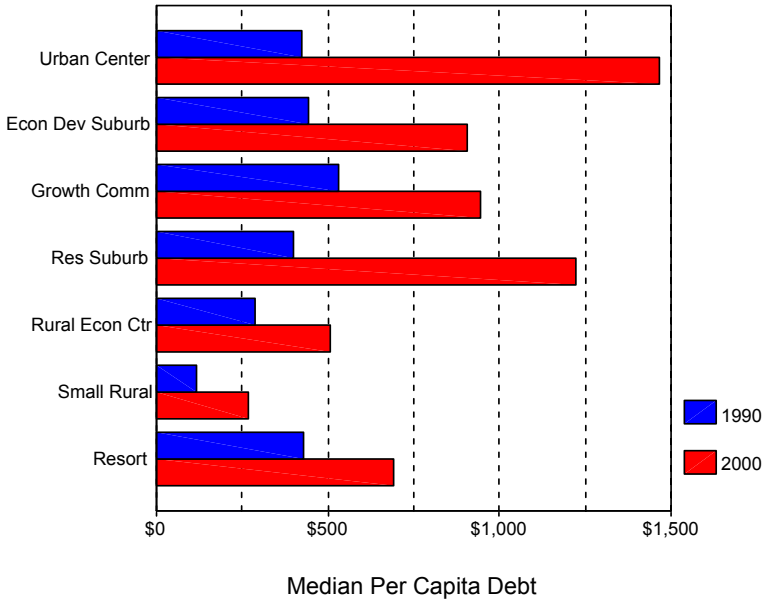
Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.17 Median Per Capita Debt in Dollars By Population Growth Category, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 12.18 Median Per Capita Debt in Dollars By Kind of Community, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

13 Regional Analysis

To give the reader an idea about the differences in municipal finance patterns across regions, we have prepared an analysis based on regional definitions used in *Massachusetts Benchmarks*, a publication of the University of Massachusetts and the Federal Reserve Bank of Boston. *Benchmarks* separates the Commonwealth into seven different regions: The Berkshires, Boston Metro, Cape and Islands, Central, Northeast, Pioneer Valley, and Southeast. We chose important findings from previous report sections and analyzed them to give a more complete picture of the changes in finances and demographics from 1990 to 2000.

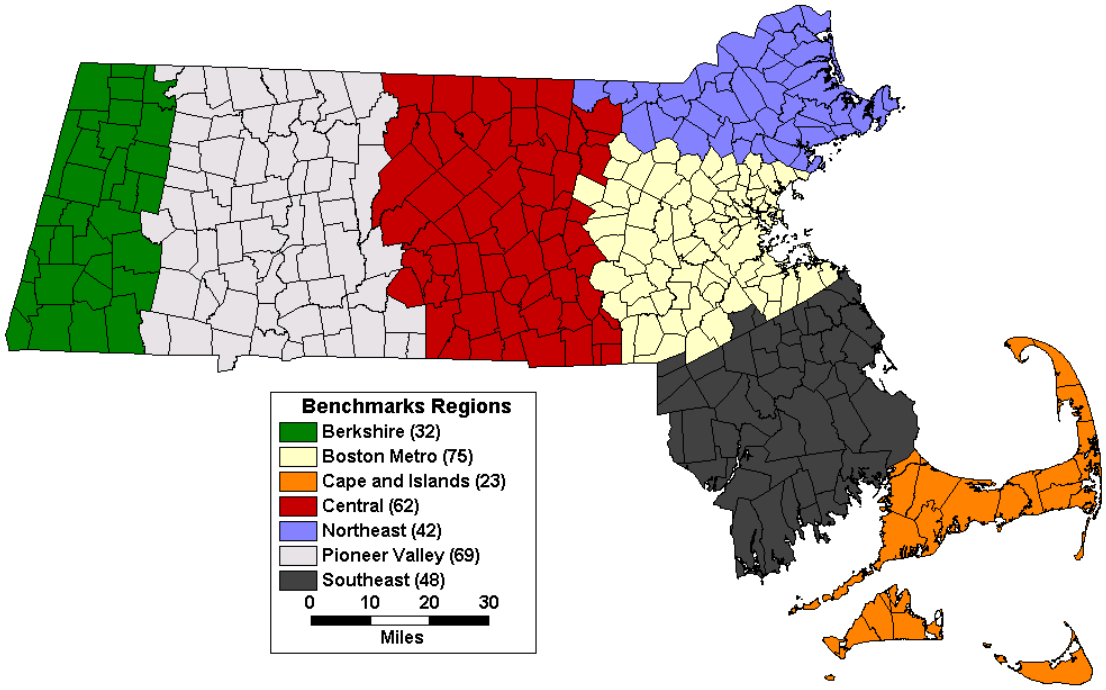
13.1 Town Categories by Benchmarks Region

Massachusetts Benchmarks, a publication of the University of Massachusetts and the Federal Reserve Bank of Boston, separates the Commonwealth into seven distinct regions for the purposes of analysis. These regions were created to reflect political, social, and economic realities within the Commonwealth. A map of these regions is in Figure 13.1.

Separating the two different categories of municipalities used in the previous analyses, population growth category from 1990 to 2000 and kind of community, shows some of the differences between each region. Table 13.1 shows the number of towns in each population growth rate category by Benchmarks region. It shows that each region has had different growth patterns between 1990 and 2000. In the Berkshires, for example, over half of the communities showed "very low" growth from 1990 to 2000, while in the Cape and Islands over two-thirds showed "very high" growth in that period.

The kinds of community in each Benchmarks region also differ substantially. In the Boston Metro region, the vast majority of the cities and towns fall into three categories. In fact, that region contains 31 percent of the Urban Centers, 38 percent of the Residential Suburbs, and 61 percent of the Economically Developed Suburbs in the Commonwealth. The nature of the Southeast region is implied by the fact that 46 percent of all Growth Communities are located there, while both the Berkshires and the Cape and Islands regions contain the majority of all Resort, Retirement, and Artistic communities (see table 13.2).

Figure 13.1 Regional Definitions for Massachusetts (Massachusetts Benchmarks)



Source: Massachusetts Benchmarks Project.

Table 13.1 Population Growth Categories by Benchmarks Region

Growth Category	Berkshire	Boston Metro	Cape and Islands	Central	Northeast	Pioneer Valley	Southeast
Very Low	18	20	3	8	2	14	5
Low	2	16		14	10	20	8
Medium	2	14	1	19	11	11	13
High	5	15	3	9	8	18	12
Very High	5	10	16	12	11	6	10
Total	32	75	23	62	42	69	48

Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000; Author Calculations

Table 13.2 Kinds of Community by Benchmarks Region

Kind of Community	Berkshire	Boston Metro	Cape and Islands	Central	Northeast	Pioneer Valley	Southeast
Urban Center	3	14	1	8	6	7	6
Econ Dev Suburb		36		6	12	2	3
Growth Comm	1	1	6	5	4	8	21
Res Suburb	1	20	1	8	11	6	6
Rural Econ Ctr	6	3		22	3	19	8
Small Rural	9			12	3	18	4
Resort	12	1	15	1	3	9	
Total	32	75	23	62	42	69	48

Source: Division of Local Services, Mass. Dept. of Revenue; Author Calculations

13.2 Conclusions

Most of the conclusions relative to this section have been made in previous chapters of the report. However, there are some region-specific findings that are of interest. The loose pattern of high population growth helping to hold down per-capita expenditure increases can be seen between the different regions, but it is not as prevalent as when it is seen in population growth rate categories. Even so, the Cape and Islands region saw the largest decrease in per-capita costs and the highest population growth, while lower population growth regions like the Berkshires, Boston Metro, and Pioneer Valley saw increases in per-capita expenditures minus education costs. The exception was the Southeast region, which had both robust population growth and increases in per-capita expenditures.

Revenues also changed by region, but there was little relationship between median population growth and median revenue growth. The Cape and Islands had the highest median population growth and the highest median state aid change per capita, but had a low median tax levy increase and a median local receipt decrease per capita between 1990 and 2000. The Central region, which had mid-level population growth overall, had a relatively high increase in all three charted revenue sources per capita, and higher median tax levy increases per capita than the Southeast region, which had a higher population change.

State aid has changed in some surprising ways by region. The Boston Metro and Northeast regions recorded a decrease in median non-school aid per capita, likely due to the lessening of additional assistance aid to the Urban Centers there. These regions also saw large per-capita increases in school aid, as did the Cape and Islands region. The Central region had the lowest median per capita school aid change, along with a positive change in non-school aid. Although the Central region contains Worcester, the second largest city in Massachusetts, it also contains many small towns whose aid increases would skew the median change results. In dollar terms, the Southeast region received the highest median amount of school aid per capita in 2000.

Median school cost changes by pupil show that there is little relationship between pupil population growth and cost per pupil growth across regions. In the Northeast, the median cost per pupil rose relatively little (about 7 percent), while the median pupil population rose almost 25 percent. Conversely, the Pioneer Valley region had a cost per pupil increase of about 27 percent and a pupil population increase of only about 9 percent. The Cape and islands, the highest growth rate region, had both a high cost per pupil increase and a high pupil population increase. Median dollar values per pupil were fairly consistent between regions, except for the Cape and Islands where they were significantly more.

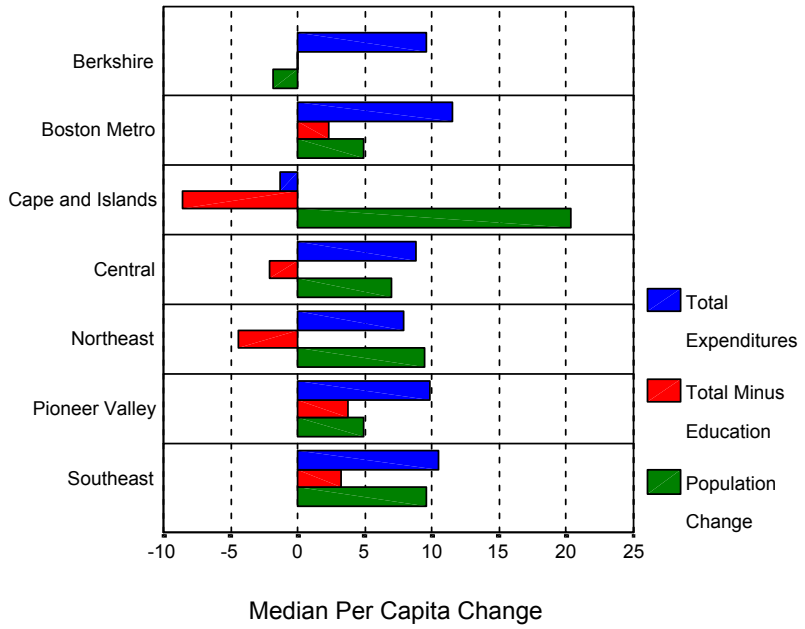
The most surprising finding in the regional analysis was the large difference between the median excess levy limit in the Berkshires region and in all other regions. As shown in figure 13.8, the median 10.3 percent excess is more than 7 times greater than

the next highest median excess percentage of levy limits in the Cape and Islands region. The Southeast, Northeast and Boston Metro regions all had significantly lower median excess percentages than other regions, but all regions had a larger excess percentage in 2000 than in 1990. Figure 13.9 shows that all regions also were closer to their levy ceilings in 2000 than they were in 1990, although there were variations in the median tax levy as a percentage of total property assessments. The Cape and Islands regions recorded the lowest percentage, much lower than other regions.

Demographically, the Boston Metro region has by far the largest population and the largest number of vacant housing units. However, the Boston Metro region also saw the largest decrease in vacant housing units from 1990 to 2000. This can partly be explained by the difference in new housing unit construction between 1985-1990 and 1995-2000, which shows a large drop-off in new units constructed in all regions of the Commonwealth.

13.3 Expenditure Change by Benchmarks Region

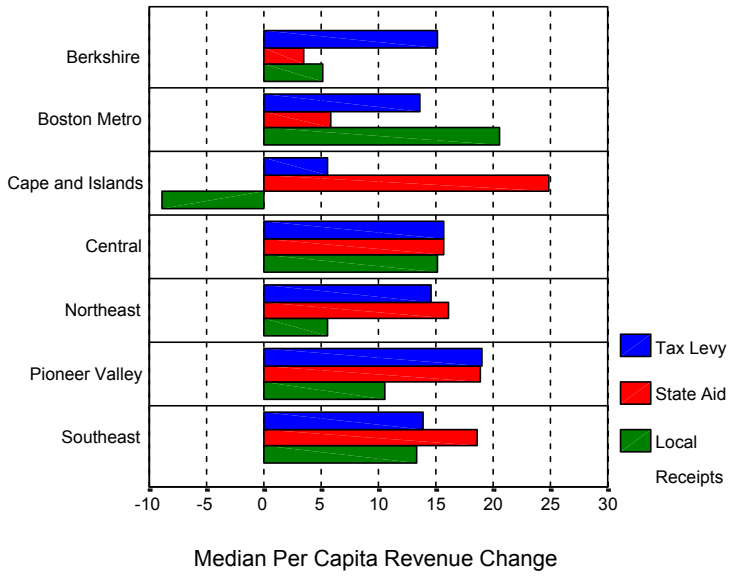
Figure 13.2 Median Expenditure Change Per Capita by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

13.4 Revenue Change by Benchmarks Region

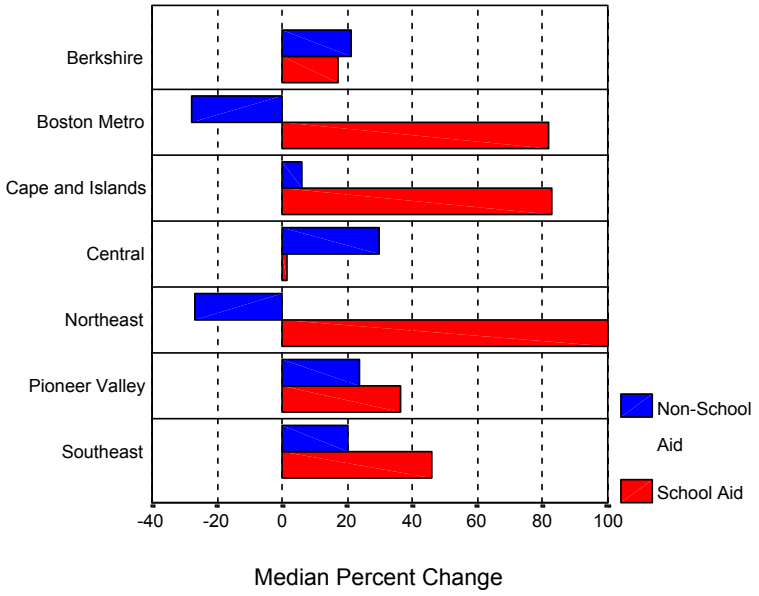
Figure 13.3 Median Revenue Change Per Capita by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

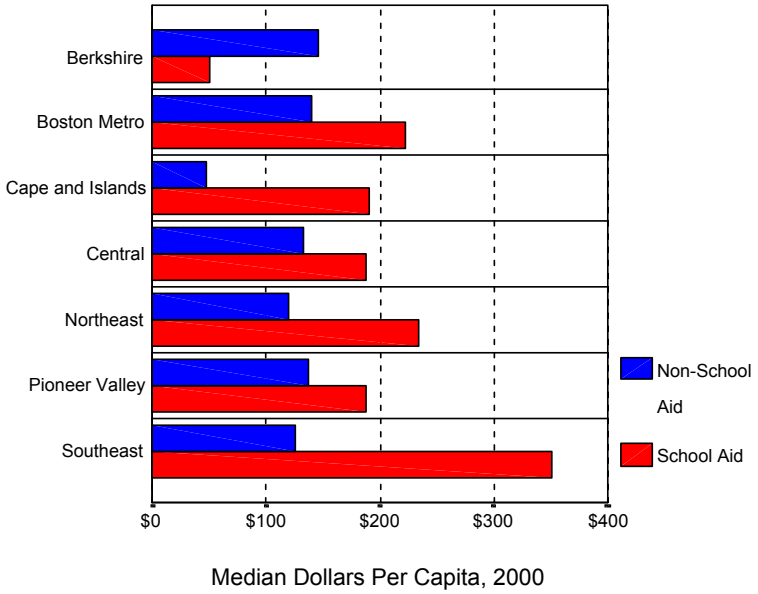
13.5 State Aid by Benchmarks Region

Figure 13.4 Median State Aid Change by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

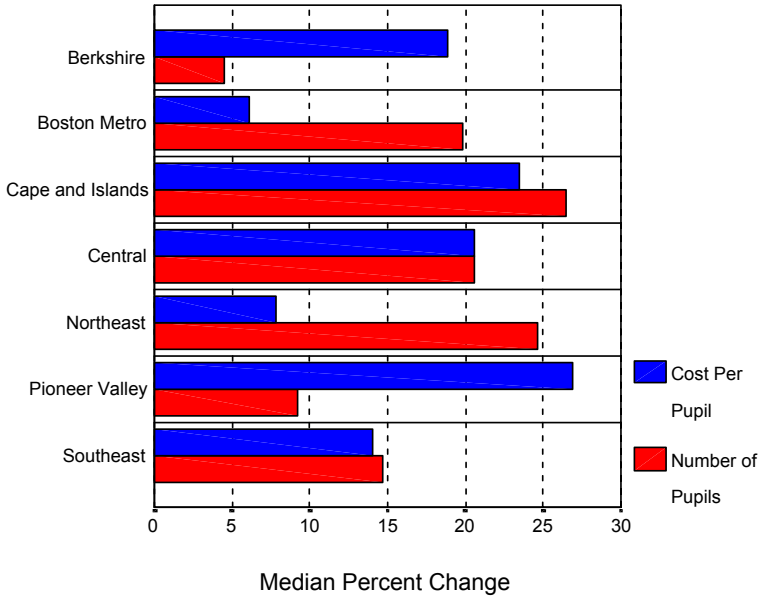
Figure 13.5 Median State Aid Per Capita by Benchmarks Region, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000
Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

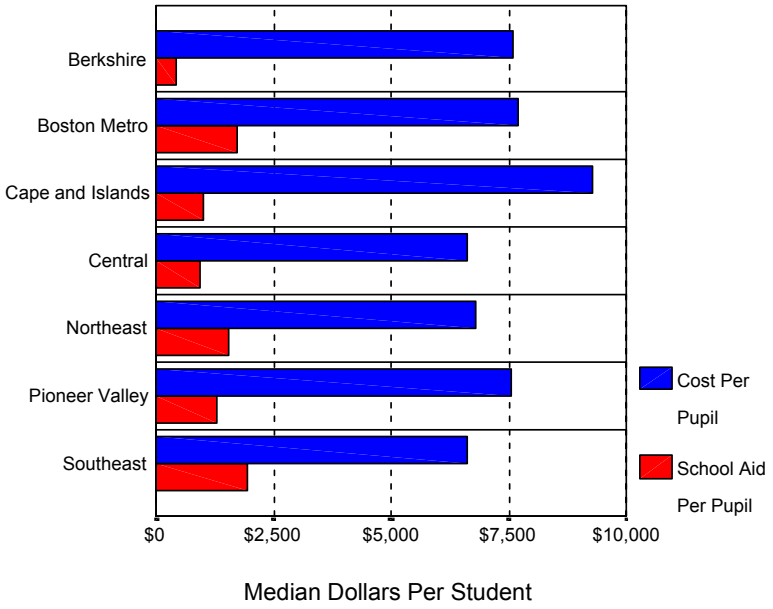
13.6 School Costs by Benchmarks Region

Figure 13.6 Median Change in Integrated Operating Costs Per Pupil by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

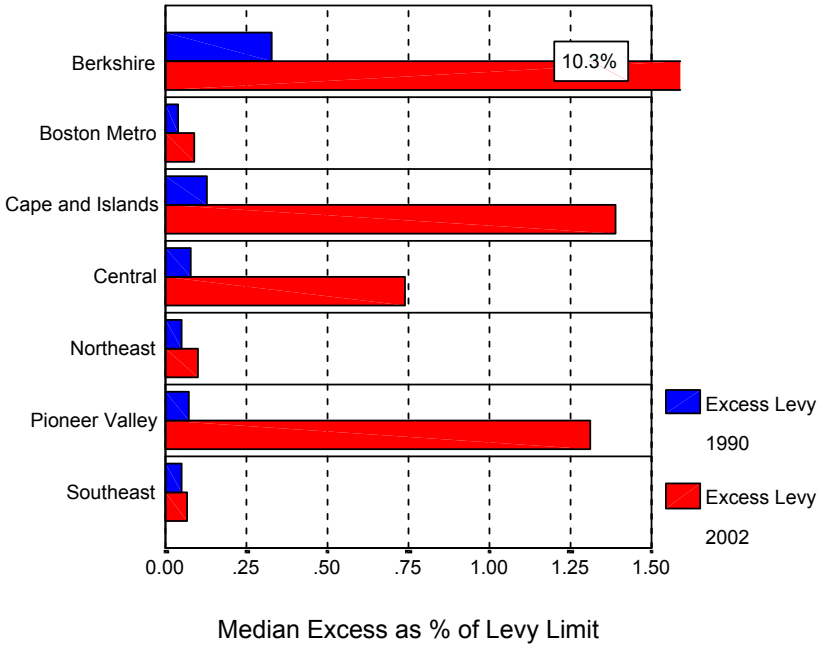
Figure 13.7 Median Integrated Operating Costs and School Aid Per Pupil by Benchmarks Region, 2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

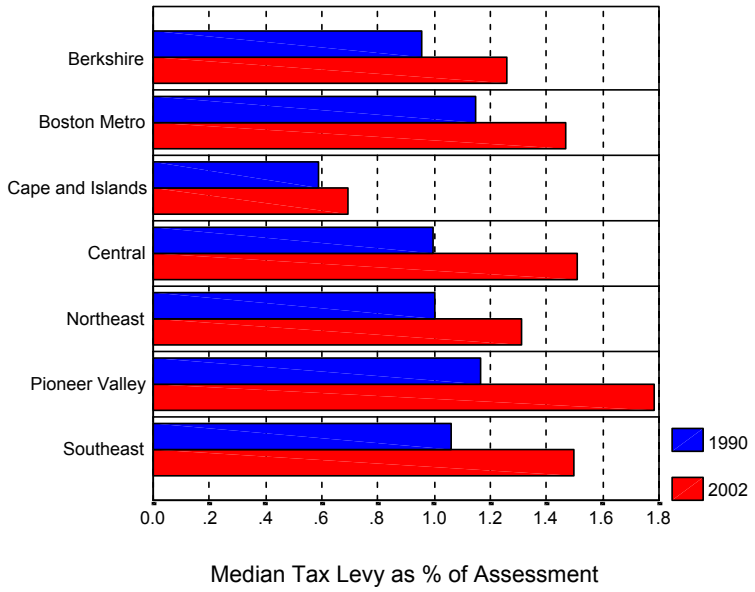
13.7 Tax Collection Issues by Benchmarks Region

Figure 13.8 Levy Limits as Percent of Current Levy by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

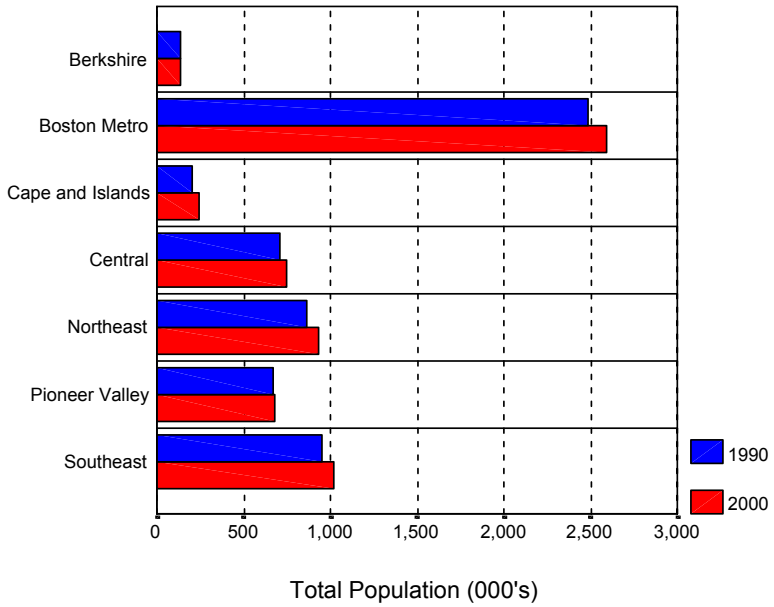
Figure 13.9 Current Levies as a Percent of Total Assessments by Benchmarks Region, 1990-2000



Source: Division of Local Services, Mass. Dept. of Revenue, 1990-2000

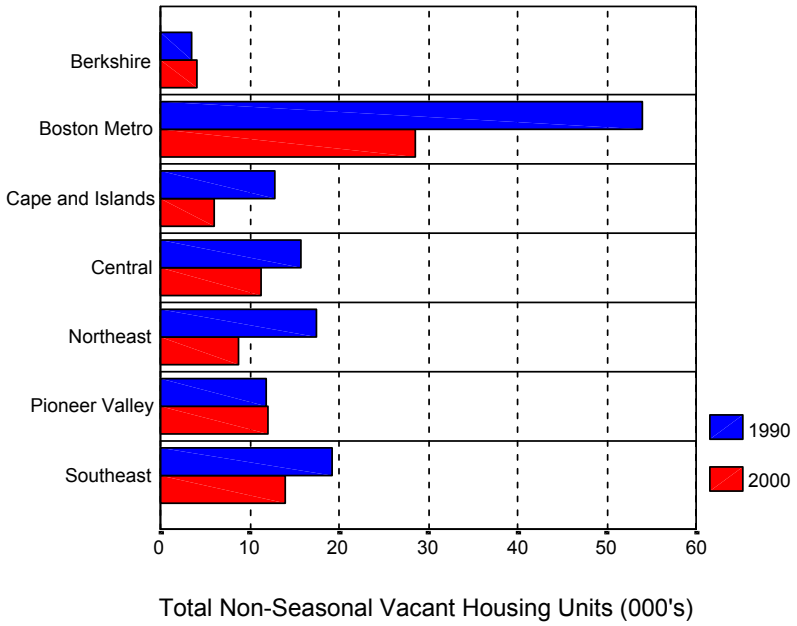
13.8 Demographics by Benchmarks Region

Figure 13.10 Total Population by Benchmarks Region, 1990-2000



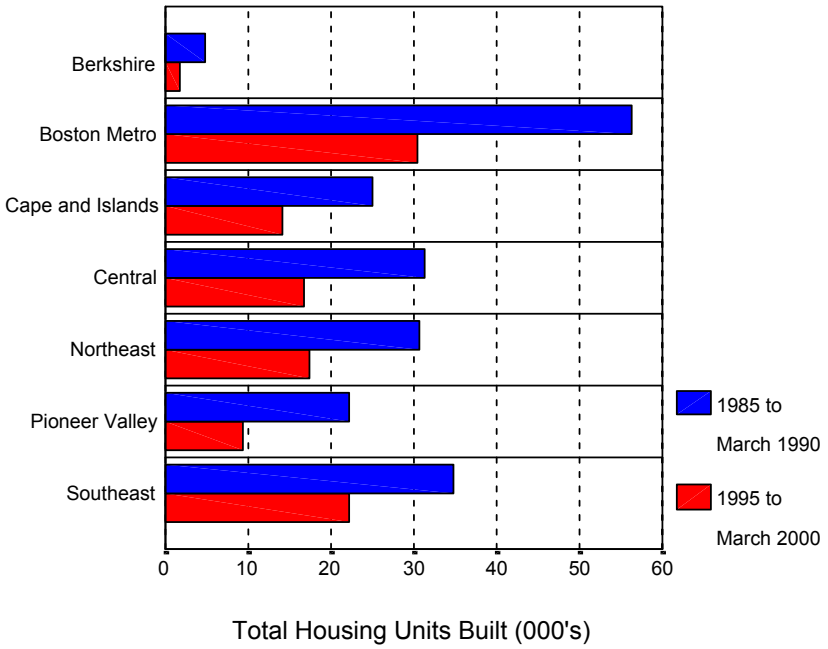
Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 13.11 Total Non-Seasonal Vacant Housing Units by Benchmarks Region, 1990-2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

Figure 13.12 Total Housing Units in the Previous Five Years by Benchmarks Region, 1990-2000



Source: Decennial Census (SF3), U.S. Bureau of the Census, 1990-2000

14 Other Issues Affecting Impact Analysis

14.1 Indirect Costs and Benefits of Housing Development

While this report has focused primarily on evaluating models that estimate direct costs and benefits incurred by municipalities, we should consider the limitations any fiscal impact model suffers from—that is, the ability to estimate the indirect costs and benefits of a proposed project. Cost-benefit analysis models only incorporate direct, quantifiable impacts, those which can be measured in economic and financial terms, in the analysis. However, communities experience a variety of indirect and long-term economic costs and benefits created by new households. In addition, they may enjoy many qualitative or immeasurable impacts as a result of a proposed project, but cost-benefit analysis is unable to include these factors.

To improve on a traditional cost-benefit assessment, analysts should supplement their hard numbers with 1) qualitative assessments of immeasurable effects and 2) quantitative assessments of the indirect economic impacts resulting from housing development.

14.1.1 Quality of Life

Evaluations of potential development projects should consider the changes in quality of life which may result from a proposed project. Those considering quality-of-life issues may have to address environmental effects (such as a possible increases in air or noise pollution), traffic congestion, historical preservation, aesthetics, social environment, and public safety, to name a few. Some of these effects can be estimated quantitatively—traffic, for instance—but even so, putting a dollar value on them is very difficult. An incremental change in traffic flow may not be noticeable to one person, while another may find it especially disagreeable and disruptive to his or her life. Some analysts measure environmental damage by estimating the cost of clean-up, as well as costs incurred by the local community, such as health and time lost at work, but most costs and benefits aren't nearly so readily quantifiable in economic terms. These indirect costs and benefits tend to be economically non-quantifiable because of their inherent subjectivity. What one may consider invigorating and exciting another may find hectic and stressful. As a result, it's difficult to place a value on indirect benefits and costs for the community at large.

The best way to get a sense of the quality of life within a community is to ask local residents what they like and dislike and what they want to see in their community 20 years from now. Only by going to the people can planners and other development decision-makers ascertain a community's priorities.

14.1.2 Economic Impact

The most commonly employed techniques of fiscal impact analysis often fails to consider the secondary or indirect economic benefits of residential development.

When a project is particularly costly or large-scale, municipalities have been known to hire consultants to conduct a regional economic impact analysis which estimates the multiplier effect—how much a project will promote the infusion of money into the local economy generally, creating more businesses and jobs and thus generating more tax revenue. For example, cities considering the construction of a new sports stadium have often relied on economic impact studies to assess how not just the team but the local economy will benefit. Such studies tend to be done to assess the impacts of large-scale commercial or industrial projects. But the systematic failure to consider the indirect or secondary economic benefits of housing growth is a major limitation of conventional approaches to the analysis of the fiscal impact of housing.

14.2 Secondary Benefits of Housing Development

According to development literature, there are a variety of beneficial indirect impacts of new housing development within a community and region: research has clearly demonstrated that in most regions housing has the potential of becoming an engine of economic growth because of its high yield on invested resources, a high multiplier effect, and a host of beneficial forward and backward linkages in the economy.[32] Some of the most important economic benefits are discussed in the sections below.

14.2.1 Population Stability

It is increasingly clear that a limited supply of affordable housing is limiting population growth in many communities in the Commonwealth. Due to the high cost of housing, households are being forced in increasing numbers to look outside of the Boston Metropolitan region for housing opportunities. A large number of the households that left Massachusetts were from counties in the metropolitan areas (Middlesex, Suffolk and Essex counties) and many relocated to New Hampshire where housing is more affordable. Impacts are being felt at the state level: currently, total out-migration of households exceeds total in-migration of households.[33]

As the median age in many towns increases, this phenomenon has potentially serious implications for local tax base stability. Population attrition in communities occurs in an ongoing way due to death, lower birth rates and out-migration. Without an age-diverse influx of households, the population will age and decline. Along with this

[32] Nordberg, Rainer. *Alleviating Poverty Through Housing Development.* In Global Overview, 2000, Vol. 6, No. 4. The United Nations Centre for Human Settlements (Habitat). http://216.239.51.100/search?q=cache:aFD8ROWE_rAC:www.unhabitat.org/HD/hdv6n4/alleviating_poverty.htm+multiplier+effect+%2B+housing+development&hl=en&ie=UTF-8

[33] *Street Signs*. Massachusetts Benchmarks. Summer 2002, Volume five, issue three, p. 21.

progression, public investments in infrastructure, public services and capital improvements are also likely to decline. In contrast, new and varied housing development within communities will enhance the ability of communities and regions to maintain steady-state, age-diverse population levels. This in turn will helps to ensure fiscal health and government stability at the local level.

14.2.2 The Household as an Economic Engine

Another indirect benefit of new housing development comes as a result of the buying-power of new households. Through its expenditures for household goods and services, a household represents a powerful engine for local and regional economic development. Purchasing by local households contributes to the health of the region's commercial economy which, in turn, supports the community directly through the commercial tax base and indirectly through state sales taxes.

Although it is common for communities to focus on the costs of supporting households with children, it is important to note that these households have the most purchasing power of all types of households with which to contribute to local and regional commerce. According to the most recent consumer expenditure survey by the Bureau of Labor Statistics,[34] the highest annual household expenditures are made by husband and wife households with children between the ages of newborn and 17. These husband/wife households with children spend 30% more in average annual expenditures than husband and wife households without children ($57,178 versus $43,946) and 107% more than single persons and other consumer units. The majority of purchases for this household type are for housing (32 percent), transportation (20 percent), and food (13 percent). All three types of expenditures have the potential to significantly enrich local and the regional economy.

14.2.3 The Household as a Civic and Social Resource

Another important contribution made by local households comes through public service and other volunteer activities. Massachusetts communities rely in innumerable ways on the activities of residents. Volunteer activities not only enrich the civic and social realms but they also result in tremendous cost savings for communities. In the majority of communities in the state, volunteers staff the town council, the planning board, the school board, the board of health and other critical governing bodies.

Recent studies illustrate that households of different ages volunteer in different ways. In fact, younger households of childbearing and rearing ages (particularly between the ages of 31 and 41) contribute very significantly. A poll done by the American Association of Retired Persons (AARP)shows that the 31-41 year old age-group is the primary force behind PTA, PTO, and other school organizations. Thirty-five percent of this group is active in school-related activities, versus 8.4 percent for adults between 50

[34] *The Consumer Expenditure Survey (CEX).* Bureau of Labor Statistics. http://www.bls.gov/cex/home.htm

and 70 or 2.4 percent for adults over 70.[35] Respondents between the ages of 31 and 49 are also far more likely to be active in professional and trade organizations (34 percent as compared to 25 percent or less for other age groups). The poll also shows that this age group is also one of the most likely age ranges to be active in environmental causes and neighborhood groups.

Clearly, the value of these households should not be underestimated and should be considered in local development decisions. The secondary benefits – both economic and social - of having younger families within a community are significant. Given this fact, it important that communities balance their fiscal-impact measures with a recognition of the secondary short and long-term benefits provided by an age-diverse population.

14.3 Costs and Benefits are an Unequal Benefit and Burden

While the majority of the costs of housing development seem to fall on municipal budgets in the form of services and education expenditures, the benefits of development are more diffuse. Income taxes and sales taxes are collected directly by the Commonwealth, as are gas taxes and many fees. Municipalities only get to collect property taxes and excise fees, and perhaps some one-time impact fees for new development. Even though the monetary benefits of even the most inexpensive housing are likely to be overwhelmingly positive, most of these benefits do not directly find their way into municipal budgets.

14.4 Minimizing the Impacts of Development using "Smart Growth"

According to a recent article in Commonwealth Magazine, a large number of Massachusetts communities are attempting to minimize population growth through large-lot zoning. A year 2000 study of sixteen Massachusetts communities showed that new construction was allowed at only half the density of existing residential districts.[36] But this strategy to limit population growth – mainly to prevent school cost increases - suggests that communities are ignorant of another factor with a critical impact on the local budget: the density and location of new development. The truth is, low density, dispersed development – otherwise known as sprawl - costs towns dearly.

A definition of sprawl:
An inefficient, scattered, auto dependent pattern of development that creates artificial geographic barriers between normal daily activities, wastes natural resources and taxes, underutilizes existing infrastructure in cities and other built up areas, broadens the geographic and psychological distance between different classes and races and stunts long term, quality economic growth.[37]

[35] America's Social Fabric – Joining the club(s). AARP Research Center. December 1997. http://research.aarp.org/general/civic_inv_toc.html

[36] Michael Jonas, *Anti-family values*. Commonwealth Magazine, Spring 2002, page 4.

[37] *The High Price of Urban Decay and Suburban Sprawl in Rhode Island*, Grow Smart Rhode Island web site, 2002. http://www.growsmartri.com/sprawl.html

14.5 Northeast Land Consumption Exceeds Population Growth

Nationally, land consumption is exceeding population growth by a great deal and related costs to communities are higher than ever. According to recent research, this pattern is particularly evident in the Midwest and Northeast.[38] In these regions, population movement tends to be from dense urban centers to lower-density suburban and rural places. The Massachusetts track record is particularly troubling. Despite its ranking as 47th in the nation in per capita issuance of new housing permits since 1992, Massachusetts ranked fifth in the nation for loss of land to development over the course of the 1990's.[39]

Through the process of dispersed development, previously undeveloped areas are built up, resulting in a wide-variety of cost impacts on the local community. The economic impacts are numerous, ranging from capital costs for transportation and public works infrastructure to ongoing operating costs to providing public services. In many cases, neither developers nor new residents adequately foot the bill adequately for development-related costs.[40] According to the Sierra Club, sprawl is, in fact, financed by taxpayers through local, state and federal subsidies: "These range from the obvious to the obscure and include big projects-like the billions we spend on new roads as well as smaller ones-like the tax-breaks that encourage businesses to move to the edge of town."[41]

Low-density development is particularly costly to communities in the following areas: roads and highways; schools; utilities and public works; fire, police and EMS services. Other local costs come in the form of adverse impacts on the environment as well as quality of life in the community. Local environmental impacts created by dispersed, low-density development include fragmented open space and wildlife habitat; loss of working farmland and forestland; air pollution, decline in water quality due to increased urban runoff; erosion; and noise. Personal costs to residents include increased auto dependency leading to decreased discretionary time; increased commuting times and costs; traffic accidents; and psychic costs related to the loss of sense of place, declines in social interaction; loss of open space and recreational space, and as well as the loss of cultural and historic character in a community.

The following paragraphs examine line items in local budgets that are most impacted by low density, dispersed development.

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38 *A Complex Relationship: Population Growth and Suburban Sprawl*, The Sierra Club, 2002. http://www.sierraclub.org/sprawl/population.asp

39 Jonas, ibid., page 4.

40 The Practice of Local Government Planning, p. 391.

41 Sierra Club website citing "The Cost of Sprawl," Maine State Planning Office, May 1997, p. 9.: http://www.sierraclub.org/sprawl/report00/police.asp

14.6 Roads, Highways and Transportation

Roads and highways allow dispersed development to take place and, in turn, increase the need for driving within communities. Initial and maintenance costs for road and highway infrastructure are steep with cost impacts are felt at the local, state and federal levels. Subsidies for new roads and highways come from the state and federal government, but development, upkeep and maintenance of local roads is funded locally.

Low-density, dispersed development requires the highest number of highway and road miles to serve it. A recent study in Rhode Island showed that, as of 1995, rural towns had three times as many miles of local roads per 1,000 housing units as urban communities.[42] According to calculations cited in the Rhode Island study, compact development as opposed to sprawl development would save 43% of projected local road construction costs over a twenty-year period. Standard planning estimates suggest that per unit capital costs vary widely with houses on one acre lots between 107 and 118 percent higher than per unit costs for houses in cluster developments or townhouse apartments.[43] Finally, in addition to the initial capital outlays for sprawling road networks, communities must also bear the burden of ongoing road maintenance, including seasonal plowing.

The operating costs of fire, police and EMS service also increase in proportion to the number of road miles in a community. Serving new dispersed development is more time-consuming and costly than serving locations in existing developed locations in town. According to a recent study by the Maine State Planning Office, even small towns face large cost increases to serve housing in outlying areas. According to their look at Kennebunk, Maine, new development 25 minutes outside of town created the need for another police patrol and the cruiser and officers needed for the patrol will cost the town an additional $175,000 per year.[44]

14.7 Schools

According to the Sierra Club, sprawl often forces communities to build new schools on the outskirts of town, while neglecting existing schools within the town's developed areas.[45] The impacts of this type of development pattern can be seen in the case of the state of Maine, which in a recent period in which it lost 27,000 students, it simultaneously spent $727 million on new school construction.[46]

According to recent planning guidebooks, per-dwelling capital costs for schools are 18 percent higher for housing units in large-lot, dispersed development (1 dwelling

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[42] H.C. Planning Consultants, Inc. and Planimetrics, LLP. *The Costs of Suburban Sprawl and Urban Decay in Rhode Island*, December, 1999, p. 7.

[43] The Practice of Local Government Planning, p.32.

[44] Sierra Club website citing "The Cost of Sprawl," Maine State Planning Office, May 1997, p. 9.: http://www.sierraclub.org/sprawl/report00/police.asp

[45] Sierra Club website: http://www.sierraclub.org/sprawl/report00/schools.asp

[46] "The Cost of Sprawl," Maine State Planning Office, May 1997, p. 8. As cited on the Sierra Club website: http://www.sierraclub.org/sprawl/report00/schools.asp

per acre) than for houses in compact developments.[47] In addition to costs related to new school construction, school systems built in sprawling towns incur higher transportation costs related to student busing.

14.8 Utilities

In most cases, local taxpayers pay the cost of hooking up a new development to water and sewer lines. The location as well as the density of a development affects these initial capital costs as well as ongoing maintenance costs: the more dispersed the housing the higher the cost to the town. In terms of per-dwelling capital costs for water, sewer and other utilities, large lot, dispersed housing (one dwelling per acre) costs 187 percent more to serve than moderate-density subdivisions (five dwellings per acre) ($25,187 versus $8,781), and between 191 percent and 305 percent more than compact forms of development like cluster housing, town houses and garden apartments.

Water consumption rates also vary with the type of development. According to standard planning estimates, low-density development consumes more due to lawn irrigation and water line leakage. The higher number of linear feet of water lines required to serve low-density development increases its exposure to leaks.[48]

14.9 Preventing Sprawl through Good Planning

According to the Sierra Club, sprawl in parts of the Midwest and Northeast is largely a product of poor land-use planning, irresponsible development and the migration of people out of the cities and into the suburbs. In these communities, poor planning and lack of regional cooperation play larger roles than net population growth than driving sprawl.[49]

In spite of these trends, a variety of tools are available to communities to help them plan in ways that provide housing and valuable tax resources while decreasing local sprawl. One useful tool is called build out analysis. Build out analysis is useful for assessing existing zoning patterns and other regulatory conditions within a community. A build out analysis quantifies the potential development impacts allowed by current conditions on a variety of levels including: infrastructure, service needs and demographics. In many cases, a build out analysis shows that existing master plans (including zoning) are inadequate to prevent disastrous and costly consequences of sprawl in a community.

A variety of build out analysis tools are available through the Massachusetts Executive Office of Environmental Affairs (EOEA) website: http://commpres.env.state.ma.us/. A GIS-based build out analysis like those done by EOEA, provides a way for a community to identify limitations in current zoning patterns

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47 The Practice of Local Government Planning, p.392.

48 The Practice of Local Government Planning, p.391.

49 *New Research on Population, Suburban Sprawl and Smart Growth.* Sierra Club website: http://www.sierraclub.org/sprawl/whitepaper.asp

and plan changes to the master plan to shape more cost-effective and environmentally sound development in the future.

Other information helpful to communities includes a range of Smart Growth Techniques including traditional neighborhood design (TND); conservation subdivision design; transfer of development rights (TDR);[50] the establishment of growth boundaries; pedestrian friendly and transit-oriented design; development impact fees; redevelopment of blighted areas and prevention of development in floodplains and coastal areas.[51] Additional information on Smart Growth methods available to communities can be found in the U.S. Environmental Protection Agency's Smart Growth Policy database.[52]

[50] Information about these Smart Growth techniques can be found on the EOEA website at http://commpres.env.state.ma.us/content/cptools.asp

[51] Information about these and other Smart Growth techniques can be found on the Sierra Club website at: http://www.sierraclub.org/sprawl/factsheet.asp#Solutions

[52] The EPA's Smart Growth Policy Database is available online at: http://cfpub.epa.gov/sgpdb/browse.cfm

15 Findings and Conclusions

15.1 Findings

Our first major finding is that population forecasing is an inaccurate science. It is affected by aggregation bias and is very dependent on the factors that are empohasized in the creation of the model. While it is important to have a model that gives planners and municipal officials some idea of the expected population that will occupy newly-built housing units, noone should expect that these models will give the user results that are reliable.

We also found that using average cost data to predict new municipal expenditures to support new residents are not reliable. While about 19 percent of all cities and towns had budget forecasts that were within a reasonable margin or error using the Per Capita Multiplier Method, the rest did not, and one-third were severely over- or underestimated. We cannot recommend using averaging models to predict future municipal costs, and instead recommend that marginal costing methods, specifically the Case Study method, be used to predict the fiscal impacts of new development. This includes projecting school costs, which are also not reliably estimated using average per-pupil data.

Another interesting finding was that costs for many municipalities are increasing regardless of population growth, or the lack of it. After adjusting for inflation we found a significant number of municipalities whose costs increased substantially over the last decade. There is something else occurring in municipal finance that affects the cost of services, and that factor or factors seem to be more relevant than simple population change. In addition, population growth seems to be negatively correlated with increases in per capita municipal spending. However, more research needs to be done in this area to make conclusions on the reasons for this observation.

The mix of state aid given to communities has changed over time. State aid for non-education purposes has decreased over time, especially in the "additional aid" categoy. State aid is becoming an important component of education funding for poorer communities and urban centers, but we found that per-pupil amounts are not increasing or are decreasing for many middle-and upper income communities.

We found that the fiscal health of municipalities generally imprved between 1990 and 2000. One of the reasons for this is that property tax revenues have increased over time in many parts of the state, expecially in the Boston Metro area. The significant increase in the value of land and housing units over the last decade has had a positive effect on municipal finance.

15.2 Next Steps

The findings in this report suggest that there are some additional studies that could be undertaken to clarify some perceived trends and create better methods for

municipal fiscal impact analysis. First, it may be possible to create better population forecasting models using data from the decennial Census. Detailed Public Use Microdata Sample (PUMS) data from the 2000 Census will be availabe in the near future. This data could eb used to make population forecasts based on Public Use Microdata Areas (PUMAs). Projecting population in all typs of housing units may not be possible for all PUMA areas, but aggregation bias could possibly be lessened with carefully created forecasts for as small a region as possible.

Also, it would be useful to examine further the relationship between growth and municpal cost increases, and to examine cost increases in general. Undertanding the mechanism or machanisms that cause many municipality's per-capita costs to rise faster than inflation may help control that trend.

Finally, municipalities would be greatly assisted by the creation of a straightforward method for performing marginal cost analysis (Case Study Method) for their communities. The Fiscal Impact Tool (FIT) from the Executive Office of Environmental Affairs would be a good starting point, as it alreasy has the ability to accept specific input on needs for new personnel, equipment, or capital investments and to create projections based on that data. The information collected for the past editions of the Growth Impact Handbook from the Department of Housing and Community Development is also helpful for creating case studies. What is needed is a method for easing the use of this type of analysis, which is somethimes complex and always requires a great deal of data.

15.3 Conclusions

Our analysis indicates that, for many Massachusetts communities, population growth associated with new housing is not inevitably followed by increased demand for services and higher municipal costs. Many of our fastest growing communities experienced the slowest growth in per capita tax burden during the 1990s. In fact, there seems to be little correlation between increases in per-capita costs and increases in population, and it seems that municipal services are generally increasing in cost regardless of growth. This strongly suggests that the standard models relied upon by cities and town to estimate the fiscal impact of development may be systematically overestimating these costs in many communities. Given the shortage of affordable housing throughout Massachusetts and that these estimates are frequently used as the basis for decision-making by local development agencies, it is clear that the methods communities use to estimate the costs of development must be reconsidered.

Specifically, it is evident that the population forecasting model commonly relied upon by many people to calculate the population impact of new housing does not fit well with the current reality of Massachusetts. It regularly overestimates the population of single-family detached housing, the most common type of new housing in Massachusetts, and underestimates other housing types. Consequently, development decision-makers and other users of fiscal impact models that rely on these population estimates, including the EOEA's Fiscal Impact Tool, may be making decisions based on outdated assumptions

about the size of households and the numbers of school-age children that follow the development of housing in Massachusetts.

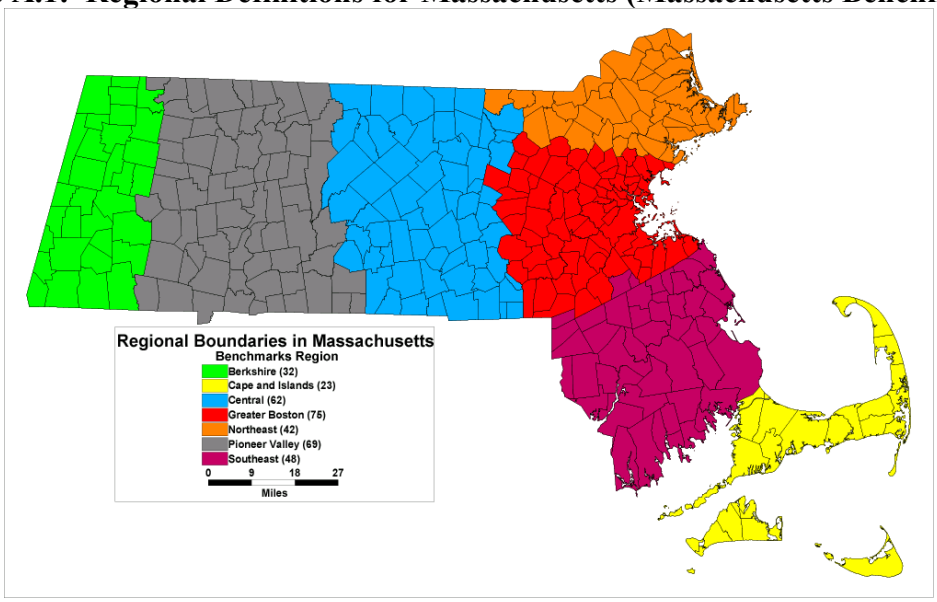
The fiscal landscape for Massachusetts is difficult to decipher, as the Massachusetts Education Reform Act and Proposition 2½ make growth-driven outcomes hard to distinguish from policy-driven outcomes. Even so, it seems that it is hard to make the argument that growth automatically costs towns more money. Our analysis seems to show that it is easier to claim that growth saves money by slowing down per-capita increases in costs. However, our data may also suggest that growth squeezes municipal budgets and makes certain mandated expenditure areas, such as education, take precedence over others, such as public safety.

A much more accurate method for forecasting the fiscal impact of housing development is the marginal cost method, although this method is more difficult to use and requires much more information than the per-capita method. Even so, because all municipalities have different priorities, histories, population mixes, and expenses, the only reliable way to forecast the effect of growth on a city or town is to analyze the specific data available for that specific town. Given the critical social need for and economic importance of housing development in Massachusetts, it is clear that a more accurate understanding of the true fiscal impacts of housing development is well worth the extra effort.

Appendix A: Detailed Population Tables

To see if there are household composition differences in different parts of Massachusetts, UMDI aggregated the various PUMA areas into the seven Massachusetts Benchmarks region that the Institute has created for regional analysis within the state. Figure 3.1 is a map of these regions.

Figure A.1: Regional Definitions for Massachusetts (Massachusetts Benchmarks)



Source: Massachusetts Benchmarks Project, map data from MassGIS.

This appendix contains extra tables that describe regional differences and differences between owner-occupied and renter-occupied housing units. The tables are:

- Table A.1: Population Forecasting by Housing Type and Bedrooms For the New England States for Housing built 1975 to 1980 (1980 Census Bureau Data) from *The New Practitioner's Guide to Fiscal Impact Analysis*
- Table A.2: Mean Population by Housing Unit Type and Region, 1990
- Table A.3: Mean School-Aged Children by Housing Unit Type and Region, 1990
- Table A.4: Mean Population and School-Aged Children (SAC) by Newly-Constructed Housing Units, 1990
- Table A.5: Mean Population and School-Aged Children (SAC) by Recent Movers in Owner-Occupied Housing Units by Unit Value, 1990
- Table A.6: Mean Population and School-Aged Children (SAC) by Recent Movers in Rental Housing Units by Monthly Rent, 1990

Table A.1: Population Forecasting by Housing Type and Bedrooms For the New England States for Housing built 1975 to 1980 (1980 Census Bureau Data)
from *The New Practitioner's Guide to Fiscal Impact Analysis*

Type of House	(A) Bedrooms	(B) Total People Per House	(C) School Age Children Per House
Single Family	2	2.417	0.243
	3	3.345	0.793
	4	4.141	1.470
	5+	4.853	2.052
	Blended (All BRs)	3.325	0.840
Townhouse	1	1.491	0.053
	2	2.098	0.147
	3+	3.000	0.676
	Blended (All BRs)	2.355	0.348
Duplex, Triplex, Quadplex	1	1.398	0.020
	2	2.326	0.288
	3+	3.430	0.824
	Blended (All BRs)	2.350	0.356
Garden Apartments	1	1.295	0.007
	2	2.142	0.203
	3+	3.074	0.883
	Blended (All BRs)	1.768	0.155
High Rise	Studio	1.067	0.000
	1	1.221	0.003
	2+	1.956	0.066
	Blended (All BRs)	1.376	0.022
Mobile Home	1	1.560	0.000
	2	2.127	0.167
	3+	3.444	0.917
	Blended (All BRs)	2.505	0.398

Source: Burchell, et. al, *The New Practitioner's Guide to Fiscal Impact Analysis*, pp. 64-65

Table A.2: Mean Population by Housing Unit Type and Region, 1990

Housing Type	Bedrooms	Berkshire	Cape & Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	State Avg.
Single family detached	No BRs	1.0000	1.2114	1.5765	1.9063	1.6667	1.4667	1.1745	1.5318
	1 BR	1.6560	1.4702	1.6427	1.7149	1.7794	1.6729	1.7105	1.6770
	2 BRs	1.9555	1.9730	2.1214	2.1302	2.1661	2.1211	2.1529	2.1166
	3 BRs	2.7559	2.5406	2.9307	2.8665	2.9389	2.8559	3.0481	2.8985
	4 BRs	3.0767	3.1564	3.4027	3.3938	3.5197	3.3428	3.5667	3.4241
	5+ BRs	3.6543	3.1445	3.6069	3.8460	4.0793	3.8126	4.0236	3.8470
	Blended								
Single family attached	No BRs	NA	1.0000	NA	2.2074	1.0000	1.4167	1.0000	1.5298
	1 BR	1.0000	1.6519	1.7937	1.9433	1.5712	1.9507	1.7422	1.8239
	2 BRs	2.2308	1.7524	2.2421	2.1469	2.2194	2.1985	2.2291	2.1782
	3 BRs	2.7760	2.9286	3.1154	3.0286	2.7580	3.3150	3.1841	3.0365
	4 BRs	3.4286	2.5171	3.8132	3.2431	3.4192	4.1677	4.0763	3.4651
	5+ BRs	NA	3.0200	3.8125	4.0053	4.2692	5.2390	4.0000	4.0867
	Blended								
Apt in 2- to 4-flat bldg	No BRs	1.3852	1.0659	1.3128	1.4389	1.3892	1.2169	1.1577	1.3679
	1 BR	1.3823	1.3984	1.4498	1.6594	1.5831	1.5079	1.4604	1.5744
	2 BRs	2.1370	1.9291	2.2469	2.2861	2.3308	2.2845	2.2980	2.2810
	3 BRs	2.8624	2.8076	3.0555	3.1280	3.3267	3.1126	3.1276	3.1351
	4 BRs	2.7103	2.3426	3.3818	3.4031	3.5338	3.2991	3.7673	3.4168
	5+ BRs	3.2821	1.5082	3.0258	3.6069	3.7589	3.3865	4.2063	3.5785
	Blended								
Apt in 5+-flat bldg	No BRs	1.0563	1.1932	1.1614	1.1942	1.2266	1.1604	1.0554	1.1812
	1 BR	1.1621	1.1228	1.3169	1.3770	1.3402	1.3374	1.3189	1.3503
	2 BRs	1.8824	1.8210	2.3280	2.0910	2.2652	2.3542	2.2286	2.1759
	3 BRs	3.0596	3.1049	3.7822	3.2884	3.4522	3.4458	3.5732	3.4010
	4 BRs	4.2091	NA	3.7045	4.0638	5.7182	5.4588	3.9762	4.2325
	5+ BRs	2.0000	NA	2.4000	4.0546	2.8913	3.4109	1.0000	3.4645
	Blended								
Mobile home	No BRs	1.0000	NA	2.0000	NA	NA	1.0000	NA	1.6379
	1 BR	1.1812	1.0000	1.3633	1.3763	1.5150	1.3322	1.5559	1.4093
	2 BRs	1.8743	1.5575	1.8463	1.6270	1.8164	1.7777	1.7072	1.7601
	3 BRs	2.3392	1.9091	2.8456	2.5920	3.1302	2.3983	2.4043	2.5835
	4 BRs	4.0000	1.4706	6.3500	NA	4.0588	3.4182	4.0000	3.6895
	5+ BRs	6.0000	NA	NA	3.0000	NA	8.0000	NA	5.2800
	Blended								

Source: Public Use Microdata Sample, 1990 Decennial Census and Author Calculations

Table A.3: Mean School-Aged Children by Housing Unit Type and Region, 1990

Housing Type	Bedrooms	Berkshire	Cape & Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	State Avg.
Single family detached	No BRs	0.0000	0.0000	0.2118	0.1161	0.2000	0.0000	0.0000	0.0856
	1 BR	0.0000	0.0287	0.0679	0.1470	0.0686	0.1204	0.0741	0.0863
	2 BRs	0.1510	0.1649	0.1819	0.1624	0.1958	0.1760	0.2025	0.1797
	3 BRs	0.5081	0.4219	0.5734	0.4362	0.5042	0.5167	0.5904	0.5062
	4 BRs	0.6691	0.7097	0.7992	0.6880	0.7872	0.7457	0.8391	0.7517
	5+ BRs	1.1051	0.7411	0.7561	0.7779	1.0169	0.8693	1.0042	0.8606
	Blended								
Single family attached	No BRs	NA	0.0000	NA	0.3185	0.0000	0.0000	0.0000	0.1280
	1 BR	0.0000	0.0000	0.2431	0.1524	0.0997	0.4008	0.1250	0.1846
	2 BRs	0.4000	0.0588	0.2575	0.2050	0.2119	0.3056	0.2521	0.2254
	3 BRs	0.5226	0.4471	0.8042	0.5452	0.5647	0.8161	0.6954	0.6163
	4 BRs	0.5857	0.4375	0.8713	0.5388	0.6967	1.2597	1.5085	0.7422
	5+ BRs	NA	0.3000	0.7188	0.5673	1.3357	2.2767	1.3025	0.7909
	Blended								
Apt in 2- to 4-flat bldg	No BRs	0.0000	0.0000	0.0000	0.0578	0.0942	0.1465	0.0000	0.0596
	1 BR	0.0296	0.0299	0.0538	0.0901	0.1164	0.1043	0.0544	0.0834
	2 BRs	0.2678	0.2330	0.2792	0.2647	0.3512	0.3210	0.3151	0.2890
	3 BRs	0.5893	0.6177	0.6931	0.6213	0.8524	0.8025	0.7504	0.6987
	4 BRs	0.5321	0.4781	0.8588	0.5876	0.8530	0.8257	0.9701	0.7021
	5+ BRs	0.4768	0.0000	0.4004	0.4996	0.6519	0.5910	1.0375	0.5651
	Blended								
Apt in 5+-flat bldg	No BRs	0.0188	0.0000	0.0130	0.0144	0.0286	0.0044	0.0000	0.0136
	1 BR	0.0408	0.0079	0.0376	0.0395	0.0533	0.0554	0.0335	0.0414
	2 BRs	0.1930	0.1584	0.3514	0.2239	0.2953	0.3850	0.2978	0.2703
	3 BRs	0.7747	0.9551	1.2603	0.7692	1.0715	1.2158	1.2234	0.9612
	4 BRs	1.6273	NA	1.0946	1.0666	2.1318	2.3960	1.0929	1.2649
	5+ BRs	0.0000	NA	0.2000	1.1006	0.0000	0.6589	0.0000	0.7599
	Blended								
Mobile home	No BRs	0.0000	NA	0.0000	NA	NA	0.0000	NA	0.0000
	1 BR	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0365	0.0116
	2 BRs	0.1020	0.0000	0.1193	0.1172	0.1477	0.0765	0.0442	0.0829
	3 BRs	0.2862	0.4546	0.5436	0.3520	0.6880	0.3167	0.2814	0.4008
	4 BRs	0.0000	0.0000	2.7000	NA	0.7059	0.7636	1.3333	0.9315
	5+ BRs	0.0000	NA	NA	2.0000	NA	5.0000	NA	3.1400
	Blended								

Source: Public Use Microdata Sample, 1990 Decennial Census and Author Calculations

Table A.4: Mean Population and School-Aged Children (SAC) by Newly-Constructed Housing Units, 1990 (Units constructed from January 1989 to March 1990)

Unit Type	Bedrooms	Pop	SAC	Unit Type	Bedrooms	Pop	SAC
Single family detached	No BRs	1.2867	0.0000	Unit in 10-19-flat bldg	No BRs	1.2005	0.0267
	1 BR	1.7553	0.1961		1 BR	1.5901	0.0851
	2 BRs	2.3246	0.2484		2 BRs	2.3867	0.2415
	3 BRs	2.9392	0.5055		3 BRs	3.7609	0.9890
	4 BRs	3.5776	0.8174		4 BRs	5.2847	1.3358
	5+ BRs	4.0596	0.9347		5+ BRs	3.7582	1.2637
Single family attached	No BRs	2.0000	0.0000	Unit in 20-49-flat bldg	No BRs	1.2671	0.0093
	1 BR	1.9737	0.1733		1 BR	1.5287	0.0401
	2 BRs	2.2678	0.2451		2 BRs	2.3325	0.2258
	3 BRs	3.2929	0.8048		3 BRs	3.3137	0.6118
	4 BRs	3.7297	1.0674		4 BRs	4.0000	0.0000
	5+ BRs	4.0961	0.7046		5+ BRs	8.0000	2.0000
Unit in 2- to 4-flat bldg	No BRs	1.3705	0.0417	Unit in 50+-flat bldg	No BRs	1.1452	0.0050
	1 BR	1.7287	0.0965		1 BR	1.3659	0.0110
	2 BRs	2.4314	0.3168		2 BRs	2.1004	0.1506
	3 BRs	3.4689	0.8579		3 BRs	3.3494	0.5791
	4 BRs	4.0858	0.9816		4 BRs	2.4179	0.0000
	5+ BRs	4.3670	0.7488		5+ BRs	1.0000	0.0000
Unit in 5-9-flat bldg	No BRs	1.3458	0.0364	Mobile home	1 BR	1.2732	0.0000
	1 BR	1.5516	0.0967		2 BRs	1.9736	0.1844
	2 BRs	2.5105	0.3959		3 BRs	2.7534	0.4959
	3 BRs	3.7918	1.1324		4 BRs	4.0000	1.0000
	4 BRs	4.1509	1.2727				
	5+ BRs	5.0000	2.0000				

Source: Public Use Microdata Sample, 1990 Decennial Census and Author Calculations

Table A.5: Mean Population and School-Aged Children (SAC) by Recent Movers in Owner-Occupied Housing Units by Unit Value, 1990

Value in 1990 Dollars		Less than $100,000		$100,000 to $149,999		$150,000 to $199,999		$200,000 to $299,999		$300,000+	
Unit Type	Bedrooms	Pop	SAC	Pop	SAC	Pop	SAC	Pop	SAC	Pop	SAC
Single family	1 BR	2.0039	0.2668	1.7974	0.0444	2.0509	0.2323	1.7391	0	1.7619	0
detached	2 BRs	2.3790	0.3250	2.3959	0.2174	2.3044	0.1866	2.3513	0.2209	2.3118	0.1939
	3 BRs	3.2144	0.7538	3.1768	0.6115	3.1083	0.5378	3.0447	0.5519	2.9670	0.5388
	4 BRs	3.9509	1.0707	3.6779	0.8904	3.7279	0.9369	3.6768	0.9260	3.6213	0.9658
	5+ BRs	4.9550	1.5105	4.7969	1.2711	4.2145	1.0910	4.3613	1.2077	4.1065	1.1482
	All BRs	2.9127	0.6017	3.0419	0.5471	3.1590	0.5888	3.3499	0.7295	3.5035	0.8664
Single family	1 BR	1.4882	0	1.6629	0	1.8684	0	1.7910	0		
Attached	2 BRs	2.2729	0.1945	2.2024	0.1482	1.9271	0.0940	1.8009	0.0567	1.8735	0
	3 BRs	2.8359	0.3739	2.8933	0.4699	2.6271	0.4047	2.8613	0.2446	2.4148	0.1875
	4 BRs	5.6000	3.6000	3.1900	0.6769	2.9755	0.4534	3.3803	0.8635	2.4150	0.4459
	5+ BRs	4	0	5	1	4.4294	0.6059	4.1233	1.4110	3.4538	0.6988
	All BRs	2.3554	0.2772	2.3951	0.2419	2.3403	0.2500	2.4914	0.2687	2.4330	0.2722
Unit in 2 to 4	1 BR	1.7214	0.2411	1.7098	0.1016	1.8665	0.2134	1.9269	0.0598	1.7064	0
unit bldg	2 BRs	1.9231	0.1503	2.1964	0.2750	2.3260	0.1988	2.2357	0.1977	2.2937	0.0769
	3 BRs	3.4974	1.0457	3.2683	0.7093	3.2526	0.6457	3.1893	0.5203	2.5200	0.2184
	4 BRs	3.8861	1.1055	3.1481	0.5358	3.5514	0.7065	3.0661	0.5225	3.3238	0.7910
	5+ BRs	2.8013	0.5563	3.9815	0.8349	3.6210	0.7137	3.3585	0.4234	3.7300	0.4037
	All BRs	2.4694	0.4807	2.6324	0.4394	2.7744	0.4217	2.7301	0.3542	2.6282	0.2281
Unit in 5 to 9	1 BR	1.2423	0	1.3832	0	1.5132	0	1.8092	0.0658	1.4643	0.2500
unit bldg	2 BRs	1.8731	0.0734	1.8237	0.0874	1.7684	0.0615	1.5935	0.0327	2.1795	0.1319
	3 BRs	3	0	2.4884	0.2047	2.7209	0.1008	1.5783	0.1807	1.7125	0
	4 BRs	1	0	3.8431	1.8039	3.4091	0.4091	6	1		
	All BRs	1.6673	0.0484	1.8157	0.1049	1.9026	0.0661	1.7890	0.0883	1.9448	0.1023
Unit in 10 to	1 BR	1.3192	0.0147	1.1606	0	1.6295	0.0837	1	0		
19 unit bldg	2 BRs	1.9902	0.0805	1.7479	0.1235	1.6797	0	1.8516	0	2.1171	0.1024
	3 BRs	4.1885	0.9754	2.3158	0.4079	2.0349	0.2093	2	0	2.2321	0
	All BRs	1.8114	0.0910	1.6055	0.0979	1.6991	0.0422	1.8053	0	2.2671	0.1217
Unit in 20 to	1 BR	1.3055	0.0356	1.3472	0	1.0625	0	1.1714	0		
49 unit bldg	2 BRs	1.9395	0.0862	1.7901	0.0285	1.7939	0.0557	1.8151	0.0679	2.0800	0
	3 BRs			2.5859	0.7071	2.6342	0.3659	1.4468	0	2.3922	0
	All BRs	1.6226	0.0596	1.6903	0.0399	1.6009	0.0502	1.6115	0.0432	2.1705	0
Unit in 50+	1 BR	1.3606	0	1.2261	0	1.2279	0	1.1694	0	1	0
unit bldg	2 BRs	1.7826	0.0435	1.7652	0.0418	1.5531	0.0266	1.7264	0	1.7976	0
	3 BRs			5	2	1.9438	0.2360	2.2583	0	1.7466	0
	4 BRs							3	0	2.3684	0
	All BRs	1.4531	0.0106	1.5482	0.0394	1.4477	0.0286	1.7254	0	1.7410	0
Mobile Home	1 BR	1.5648	0.0320	1.5294	0	3	0	2	0		
	2 BRs	1.8247	0.0866	1.6547	0.0583	1	0				
	3 BRs	3.0088	0.5307	2.5309	0.3580						
	4 BRs	4.5306	1.2653	2	0	3.5000	1.5000	4	2		
	All BRs	1.9057	0.1223	1.9447	0.1525	2.7313	0.8060	3	1		

Source: Public Use Microdata Sample, 1990 Decennial Census and Author Calculations

Table A.6: Mean Population and School-Aged Children (SAC) by Recent Movers in Rental Housing Units by Monthly Rent, 1990

Rent in 1990 Dollars		$0 to	$350	$350 to	$499	$500 to	$599	$600	$749	$750 &	Over
Unit Type	Bedrooms	Pop	SAC	Pop	SAC	Pop	SAC	Pop	SAC	Pop	SAC
Single family	1 BR	1.5153	0.0404	1.5229	0.0103	1.6423	0.1594	1.7311	0.0257	2.1516	0.6210
Detached	2 BRs	2.2760	0.3485	2.2600	0.3155	2.6141	0.3361	2.6219	0.4066	2.6903	0.3406
	3 BRs	3.0503	0.8213	2.9572	0.5722	3.1218	0.7860	3.3539	0.7985	3.3429	0.7565
	4 BRs	3.5361	1.2206	3.3120	0.7379	4.0208	1.4707	3.5660	1.0720	3.9332	0.9168
	5+ BRs	3.2760	1.0677	2.6261	0.2217	3.4000	0.6783	3.7514	1.5593	4.8479	1.0062
	All BRs	2.5675	0.5706	2.3975	0.3549	2.7726	0.5608	2.9700	0.6213	3.4647	0.7382
Single family	1 BR	2.1548	0.3772	1.6083	0.1127	1.5204	0.0974	1.6552	0	2.8497	0.3105
Attached	2 BRs	2.6857	0.6471	2.7957	0.5571	2.5935	0.4135	2.4624	0.3059	2.3776	0.3129
	3 BRs	3.7438	1.5082	4.0624	1.3273	3.4017	1.0155	3.5719	1.0940	3.4441	0.8050
	4 BRs	5.8662	2.5916	5.8882	2.5724	3.6286	0.6905	4.3377	0.9868	3.1330	0.4388
	5+ BRs			1.8400	0	7	2	5.1509	2.9528	5.5042	0.2185
	All BRs	3.1424	1.0189	3.0995	0.8088	2.6386	0.5102	2.8939	0.6078	2.8710	0.4914
Unit in 2 to 4	1 BR	1.4190	0.0928	1.5536	0.0813	1.7310	0.0891	1.9067	0.0894	2.1190	0.1947
unit bldg	2 BRs	2.3364	0.3721	2.4064	0.3454	2.5406	0.3980	2.5288	0.3287	2.3079	0.2070
	3 BRs	3.3628	0.9451	3.3690	0.9293	3.5845	1.0303	3.7911	1.0699	3.3314	0.6468
	4 BRs	4.4203	1.6622	4.2583	1.4081	4.2835	1.7225	4.5834	1.2937	4.1179	0.6455
	5+ BRs	4.8005	1.7048	3.5391	0.8107	2.7600	0.5867	5.6815	1.4569	4.6936	0.3694
	All BRs	2.3463	0.4580	2.3306	0.3874	2.6387	0.5074	2.8054	0.5044	2.8736	0.4066
Unit in 5 to 9	1 BR	1.3168	0.0726	1.5729	0.0991	1.5842	0.0795	1.6335	0.1129	1.6707	0.0141
unit bldg	2 BRs	2.5355	0.5612	2.7276	0.5727	2.6500	0.4921	2.4212	0.2858	2.2129	0.1359
	3 BRs	3.8343	1.5855	3.8875	1.3704	4.0280	1.4004	3.6996	1.1408	3.2901	0.4309
	4 BRs	5.0211	2.3905	4.8839	2.1419	3.5556	1.1852	5.5882	2.8824	4.5039	0.5465
	All BRs	2.0974	0.4677	2.2003	0.3900	2.2877	0.3977	2.2123	0.3043	2.3163	0.1687
Unit in 10 to	1 BR	1.3025	0.0775	1.5701	0.1144	1.4844	0.0629	1.5795	0.0708	1.5845	0.0460
19 unit bldg	2 BRs	2.4425	0.6053	2.6375	0.3809	2.4605	0.2707	2.3685	0.2986	2.2461	0.1450
	3 BRs	3.9329	1.5512	3.9509	1.3117	3.6101	1.3417	3.4982	0.8107	3.2008	0.4740
	4 BRs	5.9844	3.3385							5.1496	1.2756
	All BRs	1.8986	0.4003	1.9049	0.2373	1.9452	0.1900	1.9995	0.2010	2.2590	0.1776
Unit in 20 to	1 BR	1.1850	0.0269	1.3944	0.0508	1.5030	0.0433	1.5914	0.0456	1.6255	0.0748
49 unit bldg	2 BRs	2.1732	0.3247	2.2608	0.2866	2.1679	0.2458	2.4325	0.3144	2.2228	0.1829
	3 BRs	3.0049	0.8064	4.3365	1.9252	4	2.1818	3.2995	0.7754	3.1256	0.3562
	All BRs	1.4138	0.1075	1.6281	0.1268	1.6605	0.1061	1.9357	0.1610	2.1295	0.1630
Unit in 50+	1 BR	1.1241	0.0041	1.3242	0.0061	1.4203	0.0315	1.5432	0.0102	1.4688	0.0150
unit bldg	2 BRs	2.0380	0.1655	2.2797	0.2797	2.1678	0.2569	2.0705	0.2365	2.1418	0.1282
	3 BRs	3.2459	1.1803	5.1467	2.1067	4	1.1429	3.0862	0.6322	3.2428	0.4526
	4 BRs	7.1923	4.5962							2.4681	0
	All BRs	1.2280	0.0396	1.4858	0.0788	1.5990	0.0951	1.6494	0.0757	1.8937	0.0959
Mobile home	1 BR	1.2422	0	1.3689	0						
	2 BRs	2.2340	0.2151	2.6196	0.3623	1.2658	0	2.6400	0.8720	5.0625	1.6250
	3 BRs	1.8696	0	2.6735	0.2789	5	1	2	0		
	All BRs	1.9087	0.1370	2.2226	0.2242	1.4024	0.0366	2.5594	0.7622	5.0625	1.6250

Source: Public Use Microdata Sample, 1990 Decennial Census and Author Calculations

Appendix B: Towns by Classification

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Abington	Rural Economic Center (5)	Medium (3)	Low (2)	Southeast	5.70
Acton	Economically Developed Suburb (2)	High (4)	Very High (5)	Boston Metro	13.76
Acushnet	Rural Economic Center (5)	Medium (3)	Medium (3)	Southeast	6.35
Adams	Rural Economic Center (5)	Very Low (1)	Medium (3)	Berkshire	-6.73
Agawam	Growth Community (3)	Low (2)	Low (2)	Pioneer Valley	3.00
Alford	Resort, Retirement, Artistic (7)	Very Low (1)	Low (2)	Berkshire	-4.55
Amesbury	Rural Economic Center (5)	Medium (3)	Medium (3)	Northeast	9.69
Amherst	Growth Community (3)	Very Low (1)	Medium (3)	Pioneer Valley	-1.00
Andover	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Northeast	7.19
Arlington	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-5.02
Ashburnham	Small Rural Community (6)	Low (2)	Medium (3)	Central	2.08
Ashby	Small Rural Community (6)	Medium (3)	Medium (3)	Central	4.71
Ashfield	Resort, Retirement, Artistic (7)	Medium (3)	Medium (3)	Pioneer Valley	4.96
Ashland	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Boston Metro	21.61
Athol	Rural Economic Center (5)	Very Low (1)	Low (2)	Central	-1.33
Attleboro	Urban Center (1)	Medium (3)	High (4)	Southeast	9.60
Auburn	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Central	5.97
Avon	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Southeast	-2.52
Ayer	Urban Center (1)	Medium (3)	Very Low (1)	Central	6.05
Barnstable	Growth Community (3)	Very High (5)	High (4)	Cape&Islands	16.78
Barre	Rural Economic Center (5)	High (4)	High (4)	Central	12.47
Becket	Small Rural Community (6)	Very High (5)	Very Low (1)	Berkshire	18.50
Bedford	Economically Developed Suburb (2)	Very Low (1)	High (4)	Boston Metro	-3.09
Belchertown	Growth Community (3)	Very High (5)	High (4)	Pioneer Valley	22.58
Bellingham	Growth Community (3)	Low (2)	High (4)	Boston Metro	2.94
Belmont	Economically Developed Suburb (2)	Very Low (1)	Medium (3)	Boston Metro	-2.13
Berkley	Small Rural Community (6)	Very High (5)	Very High (5)	Southeast	35.69
Berlin	Residential Suburb (4)	Low (2)	Medium (3)	Central	3.79
Bernardston	Rural Economic Center (5)	Medium (3)	Low (2)	Pioneer Valley	5.22
Beverly	Economically Developed Suburb (2)	Low (2)	Low (2)	Northeast	4.36
Billerica	Economically Developed Suburb (2)	Low (2)	Medium (3)	Northeast	3.65
Blackstone	Rural Economic Center (5)	Medium (3)	High (4)	Central	9.73
Blandford	Small Rural Community (6)	Low (2)	Very Low (1)	Pioneer Valley	2.27
Bolton	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	32.35
Boston	Urban Center (1)	Low (2)	Medium (3)	Boston Metro	2.59
Bourne	Growth Community (3)	High (4)	Very Low (1)	Cape&Islands	16.54
Boxborough	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	45.62
Boxford	Residential Suburb (4)	Very High (5)	Very High (5)	Northeast	26.41
Boylston	Residential Suburb (4)	High (4)	Very High (5)	Central	13.96
Braintree	Economically Developed Suburb (2)	Very Low (1)	Low (2)	Boston Metro	-0.02
Brewster	Resort, Retirement, Artistic (7)	Very High (5)	High (4)	Cape&Islands	19.60
Bridgewater	Growth Community (3)	Very High (5)	High (4)	Southeast	18.52
Brimfield	Small Rural Community (6)	High (4)	Medium (3)	Pioneer Valley	11.26

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Brockton	Urban Center (1)	Low (2)	Medium (3)	Southeast	1.63
Brookfield	Rural Economic Center (5)	Low (2)	High (4)	Central	2.80
Brookline	Economically Developed Suburb (2)	Low (2)	Low (2)	Boston Metro	4.37
Buckland	Rural Economic Center (5)	Low (2)	Low (2)	Pioneer Valley	3.27
Burlington	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-1.83
Cambridge	Urban Center (1)	Medium (3)	Very Low (1)	Boston Metro	5.80
Canton	Economically Developed Suburb (2)	High (4)	Medium (3)	Boston Metro	12.12
Carlisle	Residential Suburb (4)	Medium (3)	Very High (5)	Boston Metro	8.86
Carver	Growth Community (3)	Medium (3)	Low (2)	Southeast	5.41
Charlemont	Small Rural Community (6)	Medium (3)	Very Low (1)	Pioneer Valley	8.73
Charlton	Small Rural Community (6)	Very High (5)	High (4)	Central	17.62
Chatham	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Cape&Islands	0.70
Chelmsford	Economically Developed Suburb (2)	Low (2)	Low (2)	Northeast	4.55
Chelsea	Urban Center (1)	Very High (5)	Very High (5)	Boston Metro	22.19
Cheshire	Rural Economic Center (5)	Very Low (1)	Very Low (1)	Berkshire	-2.24
Chester	Rural Economic Center (5)	Low (2)	Medium (3)	Pioneer Valley	2.19
Chesterfield	Small Rural Community (6)	High (4)	Very Low (1)	Pioneer Valley	14.60
Chicopee	Urban Center (1)	Very Low (1)	High (4)	Pioneer Valley	-3.49
Chilmark	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	29.69
Clarksburg	Rural Economic Center (5)	Very Low (1)	Very Low (1)	Berkshire	-3.38
Clinton	Urban Center (1)	Low (2)	Medium (3)	Central	1.61
Cohasset	Residential Suburb (4)	Low (2)	Medium (3)	Boston Metro	2.63
Colrain	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	3.19
Concord	Economically Developed Suburb (2)	Very Low (1)	Medium (3)	Boston Metro	-0.49
Conway	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Pioneer Valley	18.31
Cummington	Resort, Retirement, Artistic (7)	Very High (5)	Very Low (1)	Pioneer Valley	24.59
Dalton	Rural Economic Center (5)	Very Low (1)	Low (2)	Berkshire	-3.68
Danvers	Economically Developed Suburb (2)	Low (2)	High (4)	Northeast	4.29
Dartmouth	Growth Community (3)	High (4)	Low (2)	Southeast	12.56
Dedham	Economically Developed Suburb (2)	Very Low (1)	Low (2)	Boston Metro	-1.34
Deerfield	Rural Economic Center (5)	Very Low (1)	Low (2)	Pioneer Valley	-5.34
Dennis	Resort, Retirement, Artistic (7)	High (4)	Low (2)	Cape&Islands	15.21
Dighton	Rural Economic Center (5)	Medium (3)	High (4)	Southeast	9.66
Douglas	Small Rural Community (6)	Very High (5)	Very High (5)	Central	29.55
Dover	Residential Suburb (4)	High (4)	Very High (5)	Boston Metro	13.08
Dracut	Growth Community (3)	High (4)	High (4)	Northeast	11.60
Dudley	Rural Economic Center (5)	Medium (3)	High (4)	Central	5.20
Dunstable	Residential Suburb (4)	Very High (5)	Very High (5)	Northeast	26.52
Duxbury	Residential Suburb (4)	Low (2)	Low (2)	Southeast	2.54
East Bridgewater	Growth Community (3)	Very High (5)	Medium (3)	Southeast	16.84
East Brookfield	Rural Economic Center (5)	Low (2)	Very Low (1)	Central	3.15
East Longmeadow	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Pioneer Valley	5.48
Eastham	Resort, Retirement, Artistic (7)	Very High (5)	High (4)	Cape&Islands	22.21
Easthampton	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	2.94
Easton	Residential Suburb (4)	High (4)	Medium (3)	Southeast	12.58

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Edgartown	Resort, Retirement, Artistic (7)	Very High (5)	High (4)	Cape&Islands	23.42
Egremont	Resort, Retirement, Artistic (7)	Medium (3)	Very Low (1)	Berkshire	9.44
Erving	Rural Economic Center (5)	Medium (3)	Very Low (1)	Pioneer Valley	6.92
Essex	Resort, Retirement, Artistic (7)	Very Low (1)	High (4)	Northeast	0.21
Everett	Urban Center (1)	Medium (3)	Very High (5)	Boston Metro	6.54
Fairhaven	Urban Center (1)	Very Low (1)	Low (2)	Southeast	0.17
Fall River	Urban Center (1)	Very Low (1)	Very Low (1)	Southeast	-0.83
Falmouth	Growth Community (3)	Very High (5)	Medium (3)	Cape&Islands	16.81
Fitchburg	Urban Center (1)	Very Low (1)	Medium (3)	Central	-5.08
Florida	Small Rural Community (6)	Very Low (1)	Medium (3)	Berkshire	-8.89
Foxborough	Economically Developed Suburb (2)	High (4)	High (4)	Boston Metro	10.99
Framingham	Economically Developed Suburb (2)	Low (2)	Medium (3)	Boston Metro	2.96
Franklin	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Boston Metro	33.79
Freetown	Growth Community (3)	Very Low (1)	Very Low (1)	Southeast	-0.59
Gardner	Urban Center (1)	Low (2)	Medium (3)	Central	3.20
Gay Head	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	71.14
Georgetown	Residential Suburb (4)	High (4)	High (4)	Northeast	15.55
Gill	Rural Economic Center (5)	Very Low (1)	Low (2)	Pioneer Valley	-13.90
Gloucester	Urban Center (1)	Medium (3)	Medium (3)	Northeast	5.42
Goshen	Small Rural Community (6)	High (4)	Low (2)	Pioneer Valley	10.96
Gosnold	Resort, Retirement, Artistic (7)	Very Low (1)	Very High (5)	Cape&Islands	-12.24
Grafton	Economically Developed Suburb (2)	High (4)	Medium (3)	Central	14.26
Granby	Growth Community (3)	High (4)	Medium (3)	Pioneer Valley	10.19
Granville	Small Rural Community (6)	Medium (3)	Low (2)	Pioneer Valley	8.41
Great Barrington	Urban Center (1)	Very Low (1)	Very Low (1)	Berkshire	-2.56
Greenfield	Urban Center (1)	Very Low (1)	Very Low (1)	Pioneer Valley	-2.67
Groton	Residential Suburb (4)	Very High (5)	Very High (5)	Central	27.11
Groveland	Residential Suburb (4)	High (4)	Very High (5)	Northeast	15.80
Hadley	Resort, Retirement, Artistic (7)	High (4)	High (4)	Pioneer Valley	13.28
Halifax	Small Rural Community (6)	High (4)	Medium (3)	Southeast	14.92
Hamilton	Residential Suburb (4)	High (4)	High (4)	Northeast	14.22
Hampden	Residential Suburb (4)	High (4)	Very High (5)	Pioneer Valley	9.81
Hancock	Small Rural Community (6)	High (4)	Low (2)	Berkshire	14.81
Hanover	Residential Suburb (4)	High (4)	Medium (3)	Southeast	10.51
Hanson	Growth Community (3)	Medium (3)	Low (2)	Southeast	5.17
Hardwick	Rural Economic Center (5)	High (4)	High (4)	Central	9.94
Harvard	Growth Community (3)	Very Low (1)	Very High (5)	Central	-51.49
Harwich	Growth Community (3)	Very High (5)	High (4)	Cape&Islands	20.55
Hatfield	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	2.04
Haverhill	Urban Center (1)	High (4)	High (4)	Northeast	14.69
Hawley	Resort, Retirement, Artistic (7)	Medium (3)	Very High (5)	Pioneer Valley	5.99
Heath	Small Rural Community (6)	High (4)	Low (2)	Pioneer Valley	12.43
Hingham	Residential Suburb (4)	Very Low (1)	Low (2)	Boston Metro	0.31
Hinsdale	Rural Economic Center (5)	Very Low (1)	High (4)	Berkshire	-4.44
Holbrook	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-2.32

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Holden	Residential Suburb (4)	Medium (3)	Medium (3)	Central	6.79
Holland	Small Rural Community (6)	High (4)	Low (2)	Pioneer Valley	10.16
Holliston	Residential Suburb (4)	Medium (3)	Medium (3)	Boston Metro	6.77
Holyoke	Urban Center (1)	Very Low (1)	Very Low (1)	Pioneer Valley	-8.85
Hopedale	Rural Economic Center (5)	Low (2)	Low (2)	Central	4.25
Hopkinton	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	45.21
Hubbardston	Small Rural Community (6)	Very High (5)	Very High (5)	Central	39.76
Hudson	Economically Developed Suburb (2)	Medium (3)	Very Low (1)	Boston Metro	5.11
Hull	Rural Economic Center (5)	Medium (3)	Medium (3)	Boston Metro	5.58
Huntington	Small Rural Community (6)	Medium (3)	High (4)	Pioneer Valley	9.41
Ipswich	Resort, Retirement, Artistic (7)	Medium (3)	High (4)	Northeast	9.38
Kingston	Growth Community (3)	Very High (5)	Very High (5)	Southeast	30.24
Lakeville	Small Rural Community (6)	Very High (5)	High (4)	Southeast	26.15
Lancaster	Growth Community (3)	High (4)	High (4)	Central	10.79
Lanesborough	Small Rural Community (6)	Very Low (1)	Very Low (1)	Berkshire	-1.39
Lawrence	Urban Center (1)	Low (2)	High (4)	Northeast	2.62
Lee	Rural Economic Center (5)	Low (2)	Low (2)	Berkshire	2.33
Leicester	Rural Economic Center (5)	Low (2)	Medium (3)	Central	2.75
Lenox	Growth Community (3)	Very Low (1)	Low (2)	Berkshire	0.16
Leominster	Urban Center (1)	Medium (3)	Very High (5)	Central	8.28
Leverett	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Pioneer Valley	-6.83
Lexington	Economically Developed Suburb (2)	Medium (3)	Very High (5)	Boston Metro	4.77
Leyden	Small Rural Community (6)	High (4)	Medium (3)	Pioneer Valley	16.62
Lincoln	Residential Suburb (4)	Medium (3)	Very High (5)	Boston Metro	5.09
Littleton	Economically Developed Suburb (2)	High (4)	Very High (5)	Boston Metro	16.07
Longmeadow	Residential Suburb (4)	Low (2)	Low (2)	Pioneer Valley	1.07
Lowell	Urban Center (1)	Low (2)	Medium (3)	Northeast	1.67
Ludlow	Growth Community (3)	High (4)	Low (2)	Pioneer Valley	12.69
Lunenburg	Growth Community (3)	Low (2)	Medium (3)	Central	3.12
Lynn	Urban Center (1)	Medium (3)	High (4)	Boston Metro	9.61
Lynnfield	Residential Suburb (4)	Low (2)	Low (2)	Northeast	4.46
Malden	Urban Center (1)	Low (2)	Low (2)	Boston Metro	4.56
Manchester	Residential Suburb (4)	Very Low (1)	High (4)	Northeast	-1.10
Mansfield	Growth Community (3)	Very High (5)	Very High (5)	Southeast	35.28
Marblehead	Economically Developed Suburb (2)	Low (2)	Medium (3)	Northeast	2.03
Marion	Growth Community (3)	High (4)	High (4)	Southeast	13.95
Marlborough	Economically Developed Suburb (2)	High (4)	High (4)	Boston Metro	13.96
Marshfield	Residential Suburb (4)	High (4)	Medium (3)	Southeast	12.97
Mashpee	Growth Community (3)	Very High (5)	Very High (5)	Cape&Islands	64.21
Mattapoisett	Growth Community (3)	Medium (3)	Medium (3)	Southeast	7.15
Maynard	Urban Center (1)	Very Low (1)	Low (2)	Boston Metro	1.05
Medfield	Residential Suburb (4)	High (4)	Very High (5)	Boston Metro	16.54
Medford	Urban Center (1)	Very Low (1)	Low (2)	Boston Metro	-2.86
Medway	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	25.34
Melrose	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-3.61

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Mendon	Residential Suburb (4)	Very High (5)	Very High (5)	Central	31.82
Merrimac	Rural Economic Center (5)	Very High (5)	Very High (5)	Northeast	18.82
Methuen	Urban Center (1)	Medium (3)	High (4)	Northeast	9.50
Middleborough	Rural Economic Center (5)	High (4)	Low (2)	Southeast	11.61
Middlefield	Small Rural Community (6)	Very High (5)	High (4)	Pioneer Valley	38.27
Middleton	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Northeast	57.37
Milford	Urban Center (1)	Medium (3)	Low (2)	Boston Metro	5.70
Millbury	Rural Economic Center (5)	Low (2)	Medium (3)	Central	4.55
Millis	Residential Suburb (4)	Low (2)	Medium (3)	Boston Metro	3.80
Millville	Rural Economic Center (5)	Very High (5)	Very High (5)	Central	21.82
Milton	Economically Developed Suburb (2)	Low (2)	High (4)	Boston Metro	1.31
Monroe	Rural Economic Center (5)	Very Low (1)	Very High (5)	Pioneer Valley	-19.13
Monson	Rural Economic Center (5)	Medium (3)	Medium (3)	Pioneer Valley	7.50
Montague	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	2.08
Monterey	Resort, Retirement, Artistic (7)	High (4)	Very Low (1)	Berkshire	16.02
Montgomery	Residential Suburb (4)	Very Low (1)	Very Low (1)	Pioneer Valley	-13.83
Mount Washington	Small Rural Community (6)	Very Low (1)	Low (2)	Berkshire	-3.70
Nahant	Resort, Retirement, Artistic (7)	Very Low (1)	Low (2)	Boston Metro	-5.12
Nantucket	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	58.35
Natick	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Boston Metro	5.44
Needham	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Boston Metro	4.91
New Ashford	Resort, Retirement, Artistic (7)	Very High (5)	High (4)	Berkshire	28.65
New Bedford	Urban Center (1)	Very Low (1)	Low (2)	Southeast	-6.16
New Braintree	Rural Economic Center (5)	Medium (3)	Low (2)	Central	5.22
New Marlborough	Resort, Retirement, Artistic (7)	Very High (5)	Low (2)	Berkshire	20.48
New Salem	Small Rural Community (6)	High (4)	Low (2)	Pioneer Valley	15.84
Newbury	Small Rural Community (6)	Very High (5)	Medium (3)	Northeast	19.46
Newburyport	Rural Economic Center (5)	Medium (3)	Very Low (1)	Northeast	5.34
Newton	Economically Developed Suburb (2)	Low (2)	High (4)	Boston Metro	1.51
Norfolk	Residential Suburb (4)	High (4)	Very High (5)	Boston Metro	12.97
North Adams	Urban Center (1)	Very Low (1)	Very Low (1)	Berkshire	-12.60
North Andover	Economically Developed Suburb (2)	Very High (5)	High (4)	Northeast	19.35
North Attleborough	Rural Economic Center (5)	Medium (3)	High (4)	Southeast	8.41
North Brookfield	Rural Economic Center (5)	Very Low (1)	Very Low (1)	Central	-0.53
North Reading	Residential Suburb (4)	High (4)	High (4)	Northeast	15.29
Northampton	Urban Center (1)	Very Low (1)	Very Low (1)	Pioneer Valley	-1.06
Northborough	Economically Developed Suburb (2)	Very High (5)	High (4)	Central	17.47
Northbridge	Rural Economic Center (5)	Very Low (1)	High (4)	Central	-1.41
Northfield	Rural Economic Center (5)	Low (2)	Very High (5)	Pioneer Valley	3.98
Norton	Growth Community (3)	Very High (5)	Very High (5)	Southeast	26.44
Norwell	Residential Suburb (4)	Medium (3)	Medium (3)	Southeast	5.24
Norwood	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-0.39
Oak Bluffs	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	32.42
Oakham	Small Rural Community (6)	High (4)	Very High (5)	Central	11.31
Orange	Rural Economic Center (5)	Low (2)	Low (2)	Pioneer Valley	2.82

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Orleans	Resort, Retirement, Artistic (7)	Medium (3)	Low (2)	Cape&Islands	8.62
Otis	Small Rural Community (6)	Very High (5)	Very Low (1)	Berkshire	27.21
Oxford	Rural Economic Center (5)	Medium (3)	Very Low (1)	Central	6.07
Palmer	Rural Economic Center (5)	Low (2)	High (4)	Pioneer Valley	3.68
Paxton	Residential Suburb (4)	Medium (3)	Medium (3)	Central	8.38
Peabody	Economically Developed Suburb (2)	Low (2)	Medium (3)	Northeast	1.83
Pelham	Residential Suburb (4)	Low (2)	Low (2)	Pioneer Valley	2.18
Pembroke	Growth Community (3)	High (4)	Medium (3)	Southeast	16.38
Pepperell	Small Rural Community (6)	High (4)	High (4)	Northeast	10.34
Peru	Small Rural Community (6)	Medium (3)	High (4)	Berkshire	5.39
Petersham	Small Rural Community (6)	Low (2)	Very Low (1)	Central	4.33
Phillipston	Small Rural Community (6)	Medium (3)	High (4)	Central	9.16
Pittsfield	Urban Center (1)	Very Low (1)	Very Low (1)	Berkshire	-5.82
Plainfield	Small Rural Community (6)	Low (2)	Very Low (1)	Pioneer Valley	3.15
Plainville	Growth Community (3)	High (4)	High (4)	Southeast	11.82
Plymouth	Growth Community (3)	High (4)	Medium (3)	Southeast	13.36
Plympton	Growth Community (3)	High (4)	Low (2)	Southeast	10.61
Princeton	Residential Suburb (4)	Medium (3)	High (4)	Central	5.14
Provincetown	Urban Center (1)	Very Low (1)	Very Low (1)	Cape&Islands	-3.65
Quincy	Urban Center (1)	Low (2)	High (4)	Boston Metro	3.58
Randolph	Economically Developed Suburb (2)	Low (2)	Medium (3)	Boston Metro	2.89
Raynham	Growth Community (3)	Very High (5)	Low (2)	Southeast	18.97
Reading	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Northeast	5.19
Rehoboth	Small Rural Community (6)	Very High (5)	Medium (3)	Southeast	17.51
Revere	Urban Center (1)	High (4)	Medium (3)	Boston Metro	10.51
Richmond	Residential Suburb (4)	Very Low (1)	Very Low (1)	Berkshire	-4.35
Rochester	Growth Community (3)	Very High (5)	Low (2)	Southeast	16.83
Rockland	Rural Economic Center (5)	Medium (3)	Low (2)	Southeast	9.59
Rockport	Resort, Retirement, Artistic (7)	Low (2)	High (4)	Northeast	3.81
Rowe	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Pioneer Valley	-7.14
Rowley	Growth Community (3)	Very High (5)	Very High (5)	Northeast	23.54
Royalston	Small Rural Community (6)	Medium (3)	Very Low (1)	Central	9.33
Russell	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	3.95
Rutland	Small Rural Community (6)	Very High (5)	Very High (5)	Central	28.71
Salem	Urban Center (1)	Medium (3)	High (4)	Northeast	6.08
Salisbury	Growth Community (3)	High (4)	Very Low (1)	Northeast	13.73
Sandisfield	Resort, Retirement, Artistic (7)	Very High (5)	Very Low (1)	Berkshire	23.54
Sandwich	Residential Suburb (4)	Very High (5)	Very High (5)	Cape&Islands	30.00
Saugus	Economically Developed Suburb (2)	Low (2)	Very Low (1)	Boston Metro	2.07
Savoy	Small Rural Community (6)	High (4)	Low (2)	Berkshire	11.20
Scituate	Residential Suburb (4)	Medium (3)	Medium (3)	Southeast	6.42
Seekonk	Growth Community (3)	Low (2)	Very Low (1)	Southeast	2.91
Sharon	Residential Suburb (4)	High (4)	High (4)	Boston Metro	12.19
Sheffield	Resort, Retirement, Artistic (7)	High (4)	High (4)	Berkshire	14.60
Shelburne	Rural Economic Center (5)	Low (2)	Very Low (1)	Pioneer Valley	2.29

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Sherborn	Residential Suburb (4)	Medium (3)	Very High (5)	Boston Metro	5.29
Shirley	Rural Economic Center (5)	Low (2)	High (4)	Central	4.17
Shrewsbury	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Central	31.04
Shutesbury	Resort, Retirement, Artistic (7)	High (4)	High (4)	Pioneer Valley	15.95
Somerset	Economically Developed Suburb (2)	Low (2)	Very Low (1)	Southeast	3.28
Somerville	Urban Center (1)	Low (2)	Medium (3)	Boston Metro	1.66
South Hadley	Economically Developed Suburb (2)	Low (2)	Medium (3)	Pioneer Valley	3.06
Southampton	Small Rural Community (6)	Very High (5)	High (4)	Pioneer Valley	20.30
Southborough	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	32.48
Southbridge	Urban Center (1)	Very Low (1)	Very Low (1)	Central	-3.38
Southwick	Growth Community (3)	High (4)	High (4)	Pioneer Valley	15.23
Spencer	Rural Economic Center (5)	Very Low (1)	Very Low (1)	Central	0.40
Springfield	Urban Center (1)	Very Low (1)	High (4)	Pioneer Valley	-3.12
Sterling	Residential Suburb (4)	High (4)	Low (2)	Central	11.97
Stockbridge	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Berkshire	-5.48
Stoneham	Economically Developed Suburb (2)	Very Low (1)	Low (2)	Boston Metro	0.07
Stoughton	Economically Developed Suburb (2)	Low (2)	Low (2)	Southeast	1.39
Stow	Residential Suburb (4)	High (4)	Medium (3)	Boston Metro	10.77
Sturbridge	Growth Community (3)	Very Low (1)	Low (2)	Central	0.80
Sudbury	Residential Suburb (4)	Very High (5)	Very High (5)	Boston Metro	17.29
Sunderland	Growth Community (3)	High (4)	Low (2)	Pioneer Valley	11.12
Sutton	Small Rural Community (6)	Very High (5)	Very High (5)	Central	20.90
Swampscott	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Boston Metro	5.58
Swansea	Growth Community (3)	Low (2)	Very Low (1)	Southeast	3.18
Taunton	Urban Center (1)	High (4)	High (4)	Southeast	12.33
Templeton	Rural Economic Center (5)	Medium (3)	Low (2)	Central	5.61
Tewksbury	Economically Developed Suburb (2)	Medium (3)	Medium (3)	Northeast	5.81
Tisbury	Resort, Retirement, Artistic (7)	Very High (5)	High (4)	Cape&Islands	20.35
Tolland	Small Rural Community (6)	Very High (5)	Very High (5)	Pioneer Valley	47.40
Topsfield	Residential Suburb (4)	Medium (3)	Very High (5)	Northeast	6.73
Townsend	Small Rural Community (6)	Medium (3)	Medium (3)	Central	8.26
Truro	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	32.68
Tyngsborough	Growth Community (3)	Very High (5)	Very High (5)	Northeast	28.22
Tyringham	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Berkshire	-5.15
Upton	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Central	20.63
Uxbridge	Rural Economic Center (5)	Medium (3)	Very High (5)	Central	7.11
Wakefield	Economically Developed Suburb (2)	Very Low (1)	Low (2)	Boston Metro	-0.08
Wales	Small Rural Community (6)	High (4)	Very Low (1)	Pioneer Valley	10.92
Walpole	Economically Developed Suburb (2)	High (4)	Very High (5)	Boston Metro	12.86
Waltham	Urban Center (1)	Low (2)	Very Low (1)	Boston Metro	2.33
Ware	Rural Economic Center (5)	Very Low (1)	Low (2)	Pioneer Valley	-1.03
Wareham	Growth Community (3)	Medium (3)	High (4)	Southeast	5.74
Warren	Rural Economic Center (5)	Medium (3)	Medium (3)	Central	7.64
Warwick	Small Rural Community (6)	Low (2)	Very Low (1)	Pioneer Valley	1.35
Washington	Small Rural Community (6)	Very Low (1)	Very Low (1)	Berkshire	-11.54

Municipality	Kind of Community	Population Growth Rank	Pupil Growth Rank	Benchmarks Region	Pop Ch. 90-00 %
Watertown	Urban Center (1)	Very Low (1)	Low (2)	Boston Metro	-0.90
Wayland	Residential Suburb (4)	High (4)	Very High (5)	Boston Metro	10.33
Webster	Urban Center (1)	Low (2)	Low (2)	Central	1.35
Wellesley	Economically Developed Suburb (2)	Very Low (1)	Very High (5)	Boston Metro	-0.01
Wellfleet	Resort, Retirement, Artistic (7)	High (4)	Low (2)	Cape&Islands	10.27
Wendell	Growth Community (3)	Medium (3)	Very Low (1)	Pioneer Valley	9.68
Wenham	Residential Suburb (4)	Medium (3)	High (4)	Northeast	5.41
West Boylston	Economically Developed Suburb (2)	High (4)	Very High (5)	Central	13.16
West Bridgewater	Rural Economic Center (5)	Low (2)	Very Low (1)	Southeast	3.83
West Brookfield	Rural Economic Center (5)	Medium (3)	Medium (3)	Central	7.70
West Newbury	Small Rural Community (6)	Very High (5)	High (4)	Northeast	21.28
West Springfield	Urban Center (1)	Low (2)	Medium (3)	Pioneer Valley	1.31
West Stockbridge	Resort, Retirement, Artistic (7)	Very Low (1)	Very Low (1)	Berkshire	-4.52
West Tisbury	Resort, Retirement, Artistic (7)	Very High (5)	Very High (5)	Cape&Islands	44.78
Westborough	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Central	27.34
Westfield	Urban Center (1)	Low (2)	Low (2)	Pioneer Valley	4.43
Westford	Residential Suburb (4)	Very High (5)	Very High (5)	Northeast	26.61
Westhampton	Residential Suburb (4)	High (4)	Low (2)	Pioneer Valley	10.63
Westminster	Growth Community (3)	High (4)	Medium (3)	Central	11.57
Weston	Residential Suburb (4)	High (4)	Very High (5)	Boston Metro	12.44
Westport	Growth Community (3)	Low (2)	Low (2)	Southeast	2.39
Westwood	Economically Developed Suburb (2)	High (4)	Very High (5)	Boston Metro	12.42
Weymouth	Economically Developed Suburb (2)	Very Low (1)	Very Low (1)	Boston Metro	-0.14
Whately	Resort, Retirement, Artistic (7)	High (4)	Medium (3)	Pioneer Valley	14.40
Whitman	Rural Economic Center (5)	Medium (3)	Very Low (1)	Southeast	4.85
Wilbraham	Residential Suburb (4)	Medium (3)	High (4)	Pioneer Valley	6.63
Williamsburg	Rural Economic Center (5)	Very Low (1)	Very Low (1)	Pioneer Valley	-3.50
Williamstown	Resort, Retirement, Artistic (7)	Low (2)	Low (2)	Berkshire	2.48
Wilmington	Economically Developed Suburb (2)	Very High (5)	Very High (5)	Northeast	21.03
Winchendon	Rural Economic Center (5)	Medium (3)	High (4)	Central	9.15
Winchester	Economically Developed Suburb (2)	Low (2)	Low (2)	Boston Metro	2.68
Windsor	Resort, Retirement, Artistic (7)	High (4)	Low (2)	Berkshire	13.64
Winthrop	Rural Economic Center (5)	Very Low (1)	Low (2)	Boston Metro	0.97
Woburn	Economically Developed Suburb (2)	Low (2)	Low (2)	Boston Metro	3.66
Worcester	Urban Center (1)	Low (2)	High (4)	Central	1.70
Worthington	Small Rural Community (6)	High (4)	Very Low (1)	Pioneer Valley	9.86
Wrentham	Rural Economic Center (5)	Very High (5)	Very High (5)	Boston Metro	17.19
Yarmouth	Growth Community (3)	Very High (5)	Medium (3)	Cape&Islands	17.16