



UMASS DONAHUE INSTITUTE



Foundation for Growth: **Housing and Employment in 2020**

Technical Report

Prepared for the Massachusetts Housing Partnership
Foundation for Growth Initiative

Lindsay Koshgarian, UMass Donahue Institute
Alan Clayton-Matthews, Northeastern University
Michael Goodman, UMass Dartmouth
Michael Johnson, UMass Boston



Contents

Overview	6
Two Cases of Economic Growth for the Coming Decade	6
Methodology	8
Supply Methodology	8
Demand Methodology.....	9
Demand for Primary Residences	9
Demand for Seasonal and Vacant Residences	10
Tax Methodology	10
State Income Tax	10
State Sales Tax.....	10
Local Property Taxes	11
Findings	12
History of Housing Construction in Massachusetts	12
Recent Housing Supply and Demand: Housing Shortages in 2008	13
Baseline Forecast: Housing Shortages in 2020	15
Population Changes in the Baseline Forecast	15
Employment Changes in the Baseline Forecast.....	16
Housing Demand in the Baseline Forecast	18
Housing Supply in the Baseline Forecast.....	18
Housing Surpluses and Shortages in the Baseline Forecast.....	20
Stronger Growth Forecast: A Balanced Housing Market.....	21
Population Changes in the Stronger Growth Forecast	22
Employment Changes in the Stronger Growth Forecast	22
Housing Demand in the Stronger Growth Forecast	24
Housing Supply in the Stronger Growth Forecast.....	25
Tax Impacts: Benefits of Growth.....	27
Income Taxes	27
Property Taxes	28
Sales Taxes.....	28
Conclusion.....	29
Appendix A: Baseline Forecast Maps	30
Appendix B: Stronger Growth Forecast Maps	42
Appendix C: Projected Housing Demolition and Conversion.....	48
Appendix D: Housing Demand Technical Methodology.....	49

Data Sources, Targets, and Methodology	49
Baseline Projection Targets	49
Population Targets, Baseline Scenario	50
Employment Targets, Baseline Scenario	50
Stronger Growth Projection Targets.....	50
Employment Target, Stronger Growth Scenario	50
Stronger Growth Population and In-Migration	51
Reweighting the ACS	51
Appendix E: Tax Revenue Technical Methodology	53
State Income Tax	53
State Sales Tax.....	54
Local Property Taxes	54
References.....	56

Tables and Figures

Figure 1. Massachusetts Monthly Housing Permits, January 1969 through November 2009	12
Table 1. Massachusetts Housing Supply, 2008.....	13
Table 2. Massachusetts Housing Demand, 2008	13
Table 3. Massachusetts Housing Shortages, 2008.....	14
Table 4. Massachusetts Vacancy Rates, 2008	15
Table 5. Massachusetts Population Growth, Baseline Forecast.....	16
Table 6. Massachusetts Employment Growth by Occupation, Baseline Forecast.....	17
Table 7. Massachusetts Employment Growth by Industry, Baseline Forecast	18
Table 8. Massachusetts Housing Unit Demand, 2020, Baseline Forecast.....	18
Figure 2. New Residential Construction for Single and Multi-Family Units in Massachusetts	19
Table 9. Massachusetts Housing Construction, 2010 through 2020, Baseline Forecast.....	20
Table 10. Massachusetts Housing Unit Supply, 2020, Baseline Forecast	20
Table 11. Baseline Forecast for Massachusetts Housing Unit Supply Gap by Unit Type, 2020	20
Figure 3. Massachusetts Housing Unit Supply Gap, Baseline Scenario, 2020.....	21
Table 12. Massachusetts Population Changes, Stronger Growth Forecast.....	22
Table 13. Massachusetts Employment Growth by Occupation, Stronger Growth Forecast.....	23
Table 14. Massachusetts Employment Growth by Industry, Stronger Growth Forecast.....	24
Table 15. Massachusetts Housing Unit Demand in 2020, Stronger Growth Forecast	24
Table 16. Massachusetts Housing Construction, Stronger Growth Scenario.....	25
Figure 4. Massachusetts Housing Unit Construction, Stronger Growth Scenario, 2020.....	26
Table 17. Massachusetts Income Tax Revenue, Baseline Scenario	27
Table 18. Massachusetts Income Tax Revenue, Stronger Growth Scenario.....	27
Table 19. Massachusetts Property Tax Revenues, Baseline and Stronger Growth Scenarios (Millions of dollars)	28
Table 20. Massachusetts Sales Tax Revenues, Baseline and Stronger Growth Scenarios (Millions of dollars)	28
Figure A-1: Massachusetts Housing Construction, <i>MassBenchmarks</i> Region: All Units, Baseline Scenario, 2010 to 2020.....	30
Figure A-2: Massachusetts Housing Construction, <i>MassBenchmarks</i> Region: Single Family Units, Baseline Scenario, 2010 to 2020.....	31
Figure A-3: Massachusetts Housing Construction, <i>MassBenchmarks</i> Region: Multi Family Units, Baseline Scenario, 2010 to 2020.....	32

Figure A-4: Massachusetts Housing Construction, Public Use Microdata Area: All Units, Baseline Scenario, 2010 to 2020..... 33

Figure A-5: Massachusetts Housing Construction, Public Use Microdata Area: Single Family Units, Baseline Scenario, 2010 to 2020..... 34

Figure A-6: Massachusetts Housing Construction, Public Use Microdata Area: Multi Family Units, Baseline Scenario, 2010 to 2020..... 35

Figure A-7: Massachusetts Housing Unit Shortage, MassBenchmarks Region: All Units, Baseline Scenario, 2020 36

Figure A-8: Massachusetts Housing Unit Shortage, MassBenchmarks Region: Single Family Units, Baseline Scenario, 2020 37

Figure A-9: Massachusetts Housing Unit Shortage, MassBenchmarks Region: Multi Family Units, Baseline Scenario, 2020 38

Figure A-10: Massachusetts Housing Unit Shortage, Public Use Microdata Area: All Units, Baseline Scenario, 2020 39

Figure A-11: Massachusetts Housing Unit Shortage, Public Use Microdata Area: Single Family Units, Baseline Scenario, 2020 40

Figure A-12: Massachusetts Housing Unit Shortage, Public Use Microdata Area: Multi Family Units, Baseline Scenario, 2020 41

Figure B-1: Massachusetts Housing Construction, MassBenchmarks Region: All Units, Stronger Growth Scenario, 2010 to 2020..... 42

Figure B-2: Massachusetts Housing Construction, MassBenchmarks Region: Single Family Units, Stronger Growth Scenario, 2010 to 2020..... 43

Figure B-3: Massachusetts Housing Construction, MassBenchmarks Region: Multi Family Units, Stronger Growth Scenario, 2010 to 2020..... 44

Figure B-4: Massachusetts Housing Construction, Public Use Microdata Area: All Units, Stronger Growth Scenario, 2010 to 2020..... 45

Figure B-5: Massachusetts Housing Construction, Public Use Microdata Area: Single Family Units, Stronger Growth Scenario, 2010 to 2020..... 46

Figure B-6: Massachusetts Housing Construction, Public Use Microdata Area: Multi Family Units, Stronger Growth Scenario, 2010 to 2020..... 47

Table C-1. Annual Housing Units Lost to Demolition or Conversion in Massachusetts..... 48

Overview

Two Cases of Economic Growth for the Coming Decade

In 2009, the Massachusetts Housing Partnership launched the *Foundation for Growth* initiative to examine and promote housing policies that would sustain and encourage economic growth in Massachusetts. A major research goal of the initiative has been to identify housing production benchmarks that would provide optimal economic benefits for the state. To this end, the Foundation for Growth Scope A team were asked to project housing construction needs for the state under a variety of possible economic scenarios through the year 2020.

An adequate housing supply has far-reaching implications for economic growth. Optimal levels of housing production can support sustainable workforce growth by mitigating increases in housing prices.¹ An adequate housing supply can help to ensure that employers continue to see Massachusetts as a good place to do business and create jobs. The opposite is also true: a constrained housing supply can lead to reductions in the rate of employment growth.² In recent history, employment growth in Massachusetts has been consistently slower than in the U.S. overall, with a brief exception as the national and state economies plunged into the current recession. An analysis of current economic trends suggests that without intervention, continued slow housing growth in Massachusetts will lead to housing supply gaps through the year 2020, if healthy market vacancy rates are taken into account. The economic and fiscal implications of this housing supply gap, and the means for rectifying it, are the subject of later installments of the *Foundation for Growth* research series.

In this paper, we project housing supply and demand for two alternative and plausible employment growth scenarios over the next decade. The first is a baseline scenario that assumes that current economic trends will hold, and that employment growth in Massachusetts will lag the expected rate for the U.S. over the next 10 years. The second is a stronger growth scenario that assumes that through a set of unspecified pro-growth policies, Massachusetts achieves a rate of employment growth closer to, though still below, the expected national rate of growth during this same period.

This report presents data for these two growth scenarios at the statewide and regional levels of analysis using the seven regions tracked in *MassBenchmarks*, the quarterly economic journal published by the University of Massachusetts in cooperation with the Federal Reserve Bank of Boston. The regions were defined by the UMass Donahue Institute in 1998, based on an analysis of the geographies used by the Massachusetts Office of Business Development (MOBD) and the state's Regional Planning Agencies, with modifications based on reviews by regional experts and entities. The seven regions are: Berkshire, Cape and Islands, Central, Greater Boston, Northeast, Pioneer Valley and Southeast.³

¹ Sasser, A. "Voting with Their Feet? Local economic conditions and migration patterns in New England." New England Public Policy Center at the Federal Reserve Bank of Boston, Working Paper series.

² Saks, R.E. "Job Creation and Housing Construction: Constraints on Employment Growth in Metropolitan Areas." Joint Center for Housing Studies Working Paper Series. December 2004.

³ The boundaries of the Berkshire, Pioneer Valley, and Cape and Islands regions are co-terminus with county boundaries. The other four regions approximate, but do not correspond precisely to the following counties: Northeast – Essex County; Greater Boston – Suffolk, Middlesex, and Norfolk Counties; Central – Worcester County; and Southeast – Bristol and Plymouth Counties.

This analysis results in the following key findings:

- New housing permits in Massachusetts have remained historically low for two decades, since the residential construction boom of the 1980s. During the current recession, housing permits plunged to the lowest levels on record, with only 391 permits issued statewide in March of 2009.
- In 2008, Massachusetts had a shortage of 20,116 housing units statewide, if vacancy rates needed for healthy markets are considered (1.5 percent for owner-occupied housing and 7.4 percent for renter-occupied housing). Vacancy rates for owner-occupied housing were lowest for single family units in Metro Boston (0.8 percent), the Northeast (0.8 percent), and Pioneer Valley regions (0.8 percent), and for multi-family units in the Berkshire region (zero percent). Rental vacancy rates were lowest for single family housing in the Metro Boston (3.4 percent) and Southeast (0.8 percent) regions, and for multi-family housing in the Metro Boston (4.5 percent), Pioneer Valley (5.5 percent) and Berkshire (1.7 percent) regions.
- If Massachusetts continues current trends for construction, employment and population growth:
 - Total employment can be expected to grow 2.7 percent from 2006-2008 to 2020, adding 87,000 jobs to the Massachusetts economy.
 - Housing construction from 2010 to 2020 is expected to result in 170,496 new homes.
 - The statewide shortage of housing units is expected to reach 29,926 units by 2020. Current trends will lead to mismatched housing supply and demand across regions, with a projected shortage of 46,124 units in Metro Boston, partially balanced by overbuilding in the Central and Southeast *MassBenchmarks* regions. Such mismatches could be met by ever-higher prices in high-demand regions like Metro Boston, and increasingly long commute times as much-needed housing is built farther and farther from employment centers.
- If economic growth rises above current levels to match the more robust levels of employment growth that were frequently seen before the year 2000:
 - Massachusetts could add three times as many jobs by 2020 as current trends would predict.
 - A healthy construction response, with no housing shortages, would require 340,196 new housing units between 2010 and 2020. This is 169,700 more housing units (including 52,737 additional single family and 113,863 additional multi-family units) than current construction trends predict by 2020.
 - Tax revenues would be markedly higher than if the Commonwealth continues under the status quo: income tax revenues could grow by twice as much from 2006 to 2020; property tax revenues could grow by 27 percent more from 2006 to 2020; and sales tax revenues could grow by 83 percent more from 2006 to 2020.

The two scenarios for growth depicted in this report offer a tool for thinking about what the future of the Commonwealth could and ought to look like. It is the task of the remaining Foundation for Growth report series to further consider that future and how the Commonwealth might get there.

Methodology

The supply and demand projections presented in this report rely on the following components:

Supply:

- 1) Existing housing units
- 2) Projected unit loss due to demolitions or conversions
- 3) Projected construction of new units

Demand:

- 1) Permanent, primary residences for the projected workforce and population
- 2) Seasonal, sold or rented but unoccupied, or otherwise unavailable units
- 3) Vacancies required for optimal market functioning.

This study's methodology is partially adapted from that of the Harvard Joint Center study, "Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future."⁴ This report is also the source for the optimal market vacancy rates, or natural vacancy rates, used in this report.

Supply Methodology

Current housing stock for 2006 through 2008 was estimated using the American Community Survey (ACS) Public Use Microdata Sample (PUMS). The number of total housing units in the ACS is controlled to updated Decennial Census housing unit counts from the Census' Intercensal Population Estimates. This estimate forms the basis for our methodology. New construction and units lost to demolition, conversion or other causes are then taken into account.

The New England Economic Partnership (NEEP) projects new residential building permits for single and multi-family buildings through 2013. NEEP's projected building permits, the Census Manufactured Housing Survey, and Census of Construction data provide the basis to estimate the addition of new units above 2008 levels by region. Several assumptions are necessary to estimate the contribution of new housing units to the overall housing stock:

1. That 98 percent of residential building permits result in a completed housing unit, in keeping with the assumptions used by the U.S. Census for its housing unit estimates.
2. That the rate of addition of mobile homes in Massachusetts occurs at the same rate observed from 2000 to 2008, according to the Census Manufactured Housing Survey.
3. That each region will retain the same proportion of new statewide residential construction as during the period from 2000 through 2008, according to the Census of Construction.
4. That NEEP's projected, moderate rate of new residential permitting for 2013 will continue from 2014 through 2020.

⁴ Belsky, E., Drew, R., and McCue, D. "Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future." Joint Center for Housing Studies, Harvard University. November 2007.

Unit loss due to demolition, conversion or other causes is projected using historical unit loss rates from 1990 to 2000. Different rates of loss for mobile homes and for all other units are estimated by annualizing a loss rate for pre-1990 units between 1990 and 2000. An assumption is then made that the loss of units built after 1990 is negligible. The strength of this methodology is that it avoids the use of unreliable data on precise unit age as a predictor of unit loss.

Demand Methodology

Demand for Primary Residences

Housing demand is a function of demand for primary residences, secondary or other residences, and a steady supply of vacant units available for rent and sale. To project demand for primary residences, forecasts of population by age and employment by industry and occupation are used to reweight the 2006-2008 American Community Survey (ACS) for Massachusetts. The ACS asks questions of a national sample of people and households, and assigns weights based on current population estimates to these people and households so that estimates for the entire population may be calculated from the survey sample. To calculate housing demand in the future for this study, existing ACS weights on person and household records have been systematically factored up or down until the reweighted survey reflects the relevant forecasts for population and age, and industry and occupation, rather than the current population estimates. For example, the recalculated weights for people over the age of 65 are likely to be higher on average than the original ACS weights, reflecting the growing numbers of people over the age of 65 in the population.

The methodology is consistent with reasonable assumptions about the location and composition of households in 2020. These assumptions include:

1. That economic activity is geographically fixed in the medium term. Financial activity, for example, will continue to be concentrated in downtown Boston, manufacturing facilities will continue to be located where they currently exist, etc.
2. That commuting patterns and related location decisions of households will be stable and reflect current behavior. Downtown office workers, for example, will want to live in the same communities that they do presently, families with school-age children and from a particular economic class will continue to exhibit preferences for towns that similar present-day families have chosen, elderly households will want to live in the same types of housing and locations that currently elderly households do, etc.

This methodology should yield the same patterns of demand for location and housing types that a careful econometric analysis would yield if it were conditioned on the industry and occupation of employment and the age composition of households. Its advantage is in its simplicity. An econometric analysis would not only be costly in terms of time to undertake, but it would also be difficult, if not impossible, to avoid specification errors; and there would still be the problem of constraining the model predictions to meet the population and employment projections. The reweighting methodology presented here, on the other hand, preserves the geographic distribution of population and distribution of housing types conditioned on the age and employment distribution – by industry and occupation, that existed in 2006-8.

For the baseline scenario, population targets are derived from official Census projections for Massachusetts, and employment targets are derived from projections of labor force participation for the United States from the Bureau of Labor Statistics (BLS). The distribution of employment by industry and occupation for the baseline scenario is from the BLS/Massachusetts Division of Unemployment Assistance (DUA) industry by occupation matrix for 2016.

For the stronger growth scenario, the aggregate employment target is derived from the 2018 estimate for the U.S., from the BLS, projected to 2020. The Massachusetts employment target for 2020 is set to achieve a rate of employment growth from 2006-8 to 2020 that is 75 percent of the U.S. rate of growth over the same period. The extra employment over and above the baseline employment target is met by additional in-migration into the state.

Demand for Seasonal and Vacant Residences

Seasonal, unoccupied but unavailable, and vacant units required for proper market functioning are a significant addition to the demand for permanent residences. To project the need for these units in the future, the following assumptions were employed:

1. That regional demand for second homes, sold or rented but not occupied units, and other unavailable units will be in the same proportion to permanent residences as exhibited in the 2006-2008 ACS.
2. That natural vacancy rates of 7.4 percent for rental units and 1.5 percent for owner units, based on the 2007 Joint Center for Housing study, are ideal for healthy market functioning.
3. That ownership rates by geography remain constant based on the 2006-8 ACS PUMS.⁵

Tax Methodology

State Income Tax

The Massachusetts state income tax was estimated from a micro tax simulator applied to the 2006-8 ACS, using tax law for 2005. Future incomes and tax liabilities do not assume real income growth. Changes in aggregate income and tax liability in the baseline and stronger growth scenarios reflect growth in the population, and changes in the distribution of income related to changes in the distribution of age, employment, and industry and occupation of employment. For purposes of counting tax filers, filing units who have no tax liability because they are eligible for “no-tax status” (those who are not required to file) are not counted. Income and tax liability amounts are in 2008 dollars.

State Sales Tax

The Massachusetts sales tax paid by consumers was estimated from a micro tax simulator applied to the 2006-8 ACS, using tax law for 2006, but the new sales tax rate of 6.25 percent. A significant portion of sales taxes are paid by businesses. The estimates provided for 2006-8, the baseline, and the stronger growth scenarios only include the portion of sales taxes paid by households.

Each household's expenditures on taxable items are estimated for 16 categories of expenditures, as expected values of expenditures given by econometrically estimated consumption functions for Northeast consumer units from the 2006 Consumer Expenditure Survey (U.S. Bureau of Labor Statistics, 2008). Expected

⁵ For this purpose, geographies are the Public Use Microdata Areas used for data reporting for the ACS PUMS.

expenditures are conditioned on household income (including food stamps) and demographics of the household.

Future incomes and expenditures and tax liabilities *do not* include income or price growth. The aggregate estimates *do* reflect growth in the population, and changes in the distribution of income related to changes in the distribution of age, employment, and industry and occupation of employment. Expenditures and taxes are in 2008 dollars.

Local Property Taxes

Local property tax payments were estimated for each household from information available on the ACS.

Homeowners on the ACS are asked about the amount of property taxes they paid in a 68-category item. Each homeowner is assigned the midpoint of the category range they selected.

The property tax question was not asked for renters, so property taxes are based on their monthly net rent. Property taxes are estimated to be 0.951 percent of the value of their unit, where the tax rate is the statewide average property tax on real estate in 2007 (Massachusetts Taxpayers Foundation, 2008). The value of each unit is estimated by applying the price to rent ratio of 221 for the Boston/Quincy Metro Division (HousingTracker.net, 2008). Monthly rents are available on the ACS. When utilities are included in rents, the estimated monthly value of these utilities are subtracted from the reported rent. These estimates were obtained from a regression of the utility payments on the number of rooms, where the regressions were estimated on renters for whom the utility payments were not included in rent, and therefore were reported separately.

Property tax payments are in 2006-8 dollars.⁶ Future property tax estimates *do not* include changes in housing values or property tax rates. Future aggregate property tax payments *do* reflect growth in the population, and changes in the distribution of housing related to changes in the distribution of age, employment, and industry and occupation of employment.

⁶ The adjustment factors provided in the ACS for income and household dollar items were *not* applied for property taxes.

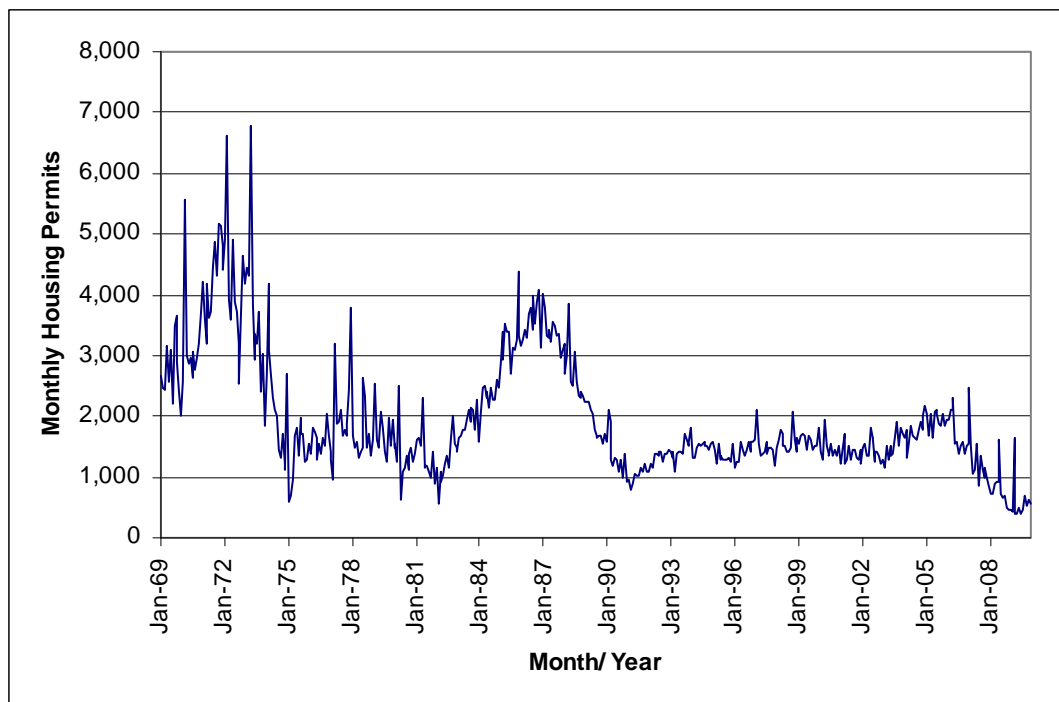
Findings

History of Housing Construction in Massachusetts

While housing permits and resulting construction have declined drastically in the current recession, the trend of decreasing construction goes back much further. Figure 1 shows that housing permits in Massachusetts have remained historically low for two decades. Massachusetts experienced major housing permit booms in the 1970s and late 1980s, with permits peaking at 6,783 units per month in March of 1973. Since the boom of the 1980s ended, monthly permits have been much lower, never exceeding the high of 2,484 monthly permits reached in January 2007 – just over a third of the 1973 high value.

During the current recession, housing permits plunged to the lowest levels on record, with only 391 permits issued statewide in March of 2009. Two decades of extremely slow construction have taken a toll on the state, with house prices skyrocketing and population stagnating as current and potential residents choose to live and work elsewhere. This pattern of low housing permits lays the groundwork for continuing housing shortages in the state.

Figure 1. Massachusetts Monthly Housing Permits, January 1969 through November 2009



Source: U.S. Census Bureau

Recent Housing Supply and Demand: Housing Shortages in 2008

For two decades, the Massachusetts housing supply has increased at a consistently slow rate, with none of the production spikes seen in previous decades. Despite simultaneous slow population growth, construction rates have not kept up with increases in housing demand in recent years.

The housing supply and demand projections in this section compare available housing supply to total housing demand, including demand for primary residences, seasonal or other residences, and a “healthy” vacancy rate. This healthy vacancy rate is defined as the rate at which prices neither rise nor fall, and has been estimated by the Harvard Joint Center for Housing Studies for the purposes of national housing projections to be 1.5 percent for owner-occupied housing and 7.4 percent for rental housing.⁷ Therefore, projected shortages rarely reflect absolute shortages, but rather reflect a market with a lower than optimal vacancy rate. This “shortage” can be expected to contribute to higher prices, greater out-migration and lower realized employment growth than might otherwise have been the case in the absence of the housing unit shortfall.

Table 1 shows the total available housing supply in Massachusetts in 2008 (the most recent year data were available from the American Community Survey), including permanent residences, second homes, and units for sale or rent. Thirty percent of single-family homes and over 50 percent of multi-family homes in the state were in the Boston Metro area in 2008.

Table 1. Massachusetts Housing Supply, 2008

	Berkshire	Cape and Islands	Central	Boston Metro	Northeast	Pioneer Valley	Southeast	Total
Single-Family	38,786	155,387	182,841	437,305	205,789	170,810	256,085	1,447,004
Multi-Family	25,398	26,389	133,648	648,092	165,278	110,773	157,649	1,267,225
Mobile	1,627	1,587	3,075	2,382	1,690	3,301	7,178	20,841
Total	65,811	183,363	319,563	1,087,779	372,757	284,885	420,912	2,735,070

Source: American Community Survey PUMS 2008

Housing demand is more complicated, and includes permanent homes based on current households, seasonal and other part-time homes, and a healthy vacancy rate as defined by the Harvard Joint Center. Table 2 shows regional demand for housing units in 2008, with the greatest demand in the Boston Metro region.

Table 2. Massachusetts Housing Demand, 2008

	Berkshire	Cape and Islands	Central	Boston Metro	Northeast	Pioneer Valley	Southeast	Total
Single-Family	38,691	154,591	183,468	441,382	207,852	172,664	257,966	1,456,614
Multi-Family	26,585	26,346	132,809	658,431	163,793	111,956	157,871	1,277,790
Mobile	1,654	1,603	3,076	2,309	1,753	3,370	7,016	20,782
Total	66,929	182,540	319,353	1,102,122	373,398	287,990	422,854	2,755,186

Source: American Community Survey PUMS 2008

⁷ Belsky, E., Drew, R., and McCue, D. “Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future.” Joint Center for Housing Studies, Harvard University. November 2007.

Comparing supply to demand yields relative housing shortages, which can be understood as places where the vacancy rate is so low that it contributes to increased competition for housing and higher prices. Table 3 shows relative housing shortages in different regions. In 2008, the Boston Metro region had a shortage of 14,343 units, reflecting shortages in both single and multi family housing units. The Pioneer Valley also had significant shortages of both single and multi family units. The Northeast and Southeast regions had shortages of single family units, while the Berkshires had a shortage of multi family units. The Central region and the Cape and Islands both had relatively balanced housing supply and demand. Table 3 shows housing shortages across the state in 2008.

Table 3. Massachusetts Housing Shortages, 2008

	Berkshire	Cape and Islands	Central	Boston Metro	Northeast	Pioneer Valley	Southeast	Total
Single-Family	96	796	-628	-4,077	-2,062	-1,853	-1,881	-9,610
Multi-Family	-1,187	43	838	-10,339	1,485	-1,183	-222	-10,565
Mobile	-27	-16	-0	73	-63	-69	162	59
Total	-1,118	823	210	-14,343	-641	-3,106	-1,942	-20,116

Source: American Community Survey PUMS 2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

These shortages reflect low vacancy rates. The owner vacancy rate should be near 1.5 percent to avoid price inflation. Vacancy rates for single family housing were low in the Boston Metro, Northeast and Pioneer Valley regions, all with 0.8 percent vacancy rates for owner-occupied single family housing. The Cape and Islands region had a 2.5 percent vacancy rate, higher than needed. High vacancy rates for owner-occupied multi-family housing was the norm across the state, except in the Berkshire region, where the rate was effectively zero, and the Cape and Islands, where it was 1.2 percent. Elsewhere, the vacancy rate for owner-occupied multi-family units ranged from 2.7 percent in the Southeast region to 6.2 percent in the Central region.

The rental vacancy rate should be close to 7.4 percent to avoid unnecessary price inflation. Vacancy rates for single-family rental housing are low across the state, except in the Berkshire and Cape and Islands regions, ranging from 0.8 percent in the Southeast region to 3.4 percent in the Boston Metro region. The Berkshires is the only region with a significantly higher than desirable vacancy rate for single-family rental units, at 12.5 percent. The multi-family rental vacancy rate is low at the ends of the state: 4.5 in the Boston Metro region, 5.5 percent in the Pioneer Valley and only 1.7 percent in the Berkshire region. Table 4 shows the vacancy rates for various types of housing in each of the regions.

Table 4. Massachusetts Vacancy Rates, 2008

	Berkshire	Cape and Islands	Central	Boston Metro	Northeast	Pioneer Valley	Southeast	Total
Owner Units								
Single-Family	1.4%	2.5%	1.5%	0.8%	0.8%	0.8%	1.2%	1.1%
Multi-Family	0.0%	1.2%	6.2%	3.1%	3.0%	3.5%	2.7%	3.3%
Total	1.2%	2.4%	2.3%	1.5%	1.3%	1.1%	1.5%	1.6%
Renter Units								
Single-Family	12.5%	7.3%	1.9%	3.4%	1.1%	1.7%	0.8%	2.9%
Multi-Family	1.7%	7.9%	6.5%	4.5%	7.9%	5.5%	6.8%	5.5%
Total	3.0%	7.6%	6.1%	4.4%	7.2%	5.0%	5.9%	5.3%

Source: American Community Survey PUMS 2008

Baseline Forecast: Housing Shortages in 2020

The baseline scenario projects the likely relationship between housing supply and demand in 2020, if current trends in employment growth, population and housing construction continue, and in the absence of any policy intervention to increase employment or the production of housing.

The housing supply and demand projections in this section rely on employment projections by the Bureau of Labor Statistics for 2016, population projections from the U.S. Census through 2030, and housing permit projections through 2013 from NEEP. While state-level employment projections are available only for the BLS terminal projection year (2016), NEEP provides annual employment, population and housing permit forecasts for Massachusetts through 2013. Employment and population projections from the BLS and Census were adjusted to make them consistent with the NEEP forecast for 2013. These projections were extended through the final projection year, 2020. The NEEP forecasts an economic recovery expected to take place during the first three years of the housing projections.

Population Changes in the Baseline Forecast

The baseline population forecast relies on population forecasts from NEEP and the U.S. Census. Between the baseline of 2006-2008 and the end year of 2020, these sources forecast 4.3 percent population growth, or an annual growth rate of about 0.3 percent. This is the same as the average annual growth rate the state experienced from 2000 to 2007, the midyear of the 2006-2008 projections base.

As shown in Table 5, the largest growth is expected among 65 to 74 year olds, at 56.9 percent, followed by 55 to 64 year olds at 26.3 percent, as the baby boomers age. There will also be considerable population growth among 75 to 94 year olds (10.7 percent) and 25 to 34 year olds (11.6 percent).

Significant declines in population are expected among 35 to 44 year olds (down 15.8 percent) and 45 to 54 year olds (down 10.7 percent). Expected population decline of 3.8 percent among 16 to 24 year olds is relatively moderate. Significantly, the population of under 16 year olds is expected to remain steady.

Table 5. Massachusetts Population Growth, Baseline Forecast

Age	2006-2008	2020 Baseline	Percentage Change
Under 16	1,264,428	1,264,184	-0.0%
16-24	834,626	802,791	-3.8%
25-34	820,733	915,535	11.6%
35-44	973,100	819,385	-15.8%
45-54	988,931	883,609	-10.7%
55-64	725,944	916,934	26.3%
65-74	417,264	654,694	56.9%
75-94	444,744	492,470	10.7%
Total	6,469,770	6,749,601	4.3%

Sources: NEEP Forecast Fall 2009, U.S. Census Projections, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Employment Changes in the Baseline Forecast

Employment growth projections are based on NEEP and Bureau of Labor Statistics projections. According to NEEP’s fall 2009 forecast, Massachusetts employment will reach its nadir in 2010, at 3.1 million jobs. Job growth is expected to resume in 2011, with employment not expected to reach 2008 levels until 2013. In the baseline forecast, total employment can be expected to grow 2.7 percent from 2006-2008 to 2020, adding 87,000 jobs to the Massachusetts economy.

Employment growth by occupation type is shown in Table 6. The greatest growth can be expected among computer and mathematical occupations (16.0 percent), followed closely by health care support occupations (15.1 percent), personal care and service occupations (14.4 percent), and community and social service occupations (14.2 percent). These occupations account for an additional 53,000 jobs, or more than half of the net new jobs in the Massachusetts economy.

Double digit growth is also expected among healthcare practitioners and technical occupations (12.7 percent) and life, physical and social science occupations (11.6 percent), which together account for another 32,000 new jobs.

At the other end of the spectrum, production occupations are expected to continue a long-term decline, losing 22,000 additional jobs by 2020, a 13.4 percent decrease. No other occupational group comes close, with construction and extraction (down 4.3 percent) and transportation and material moving (down 3.8 percent) losing a combined 12,000 jobs. Office and administrative support occupations are projected to decline 2.4 percent, or almost 11,000 jobs.

Table 6. Massachusetts Employment Growth by Occupation, Baseline Forecast

Occupation	2006-2008	2020 Baseline	Percent Change
Computer and Mathematical	114,151	132,358	16.0%
Healthcare Support	77,928	89,710	15.1%
Personal Care and Service	106,311	121,612	14.4%
Community and Social Services	58,219	66,489	14.2%
Healthcare Practitioners and Technical	203,186	228,914	12.7%
Life, Physical and Social Science	57,594	64,273	11.6%
Education, Training and Library	225,483	242,998	7.8%
Business and Financial Operations	177,891	189,614	6.6%
Building and Grounds Cleaning and Maintenance	114,436	121,964	6.6%
Food Preparation and Serving Related	170,437	180,153	5.7%
Legal	48,938	51,634	5.5%
Arts, Design, Entertainment, Sports and Media	70,405	72,848	3.5%
Protective Service	68,561	70,423	2.7%
Architecture and Engineering	77,190	78,463	1.6%
Farming, Fishing and Forestry	6,917	6,903	-0.2%
Management	358,676	357,650	-0.3%
Sales and Related	361,232	357,109	-1.1%
Office and Administrative Support	456,631	445,684	-2.4%
Installation, Maintenance and Repair	83,441	81,253	-2.6%
Transportation and Material Moving	139,328	134,019	-3.8%
Construction and Extraction	166,396	159,299	-4.3%
Production	165,202	143,105	-13.4%
Total	3,308,553	3,396,475	2.7%

Sources: NEEP Forecast Fall 2009, Bureau of Labor Statistics, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Similar patterns are reflected in projections of employment by industry, shown in Table 7. The greatest growth is projected in professional and business services (13.6 percent) and education and health services (10.3 percent), which together account for nearly 144,000 new jobs. Moderate growth is projected in leisure and hospitality (4.7 percent) and other services (4.3 percent, including services such as equipment maintenance and repair, personal care services, and religious and civic organizations). Together, these account for an additional 18,000 new jobs.

Significant job losses are projected in manufacturing (down 15.4 percent), with a projected loss of over 51,000 jobs, as well as in construction (down 5.5 percent and 11,000 jobs) and trade, transportation and utilities (down 2.3 percent and 13,000 jobs). Natural resources and mining is projected to lose 17.7 percent, though with only 1,400 jobs to begin with, this represents a loss of only 248 jobs.

Table 7. Massachusetts Employment Growth by Industry, Baseline Forecast

Industry	2006-2008	2020 Baseline	Percent Change
Professional and business services	414,854	471,144	13.6%
Education and health services	852,529	940,181	10.3%
Leisure and hospitality	263,452	275,947	4.7%
Other Services	143,848	150,052	4.3%
Information	94,449	97,239	3.0%
Agriculture	11,991	12,285	2.4%
Financial activities	273,600	275,100	0.5%
Government and military	129,435	126,971	-1.9%
Trade, Transportation and Utilities	577,383	563,936	-2.3%
Construction	212,289	200,528	-5.5%
Manufacturing	333,319	281,936	-15.4%
Natural resources and mining	1,404	1,156	-17.7%
Total	3,308,553	3,396,475	2.7%

Sources: NEEP Forecast Fall 2009, Bureau of Labor Statistics, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Housing Demand in the Baseline Forecast

Population and employment estimates drive the housing demand projections. Table 8 shows total housing demand in 2020, including seasonal homes and the vacant units required to maintain healthy vacancy rates. Forty percent of housing demand is projected to be in the Greater Boston region, about the same as in 2006-2008. Another 15 percent of housing demand is projected to be in the Southeast, making those two regions accountable for more than half of the housing demand in the state. With the notable exception of the Greater Boston region, the greatest demand in most regions is for single family homes.

Table 8. Massachusetts Housing Unit Demand, 2020, Baseline Forecast

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	42,398	170,071	189,028	483,431	224,211	175,918	269,071	1,554,128
Multi-Family	27,437	28,191	134,590	682,444	166,137	120,928	163,318	1,323,045
Mobile	1,483	1,589	3,945	2,484	2,151	4,729	8,636	25,017
Total	71,319	199,851	327,563	1,168,359	392,498	301,575	441,026	2,902,190

Sources: NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Note: Demand includes vacancy rates of 1.5 percent for owner units and 7.4 percent for rental units.

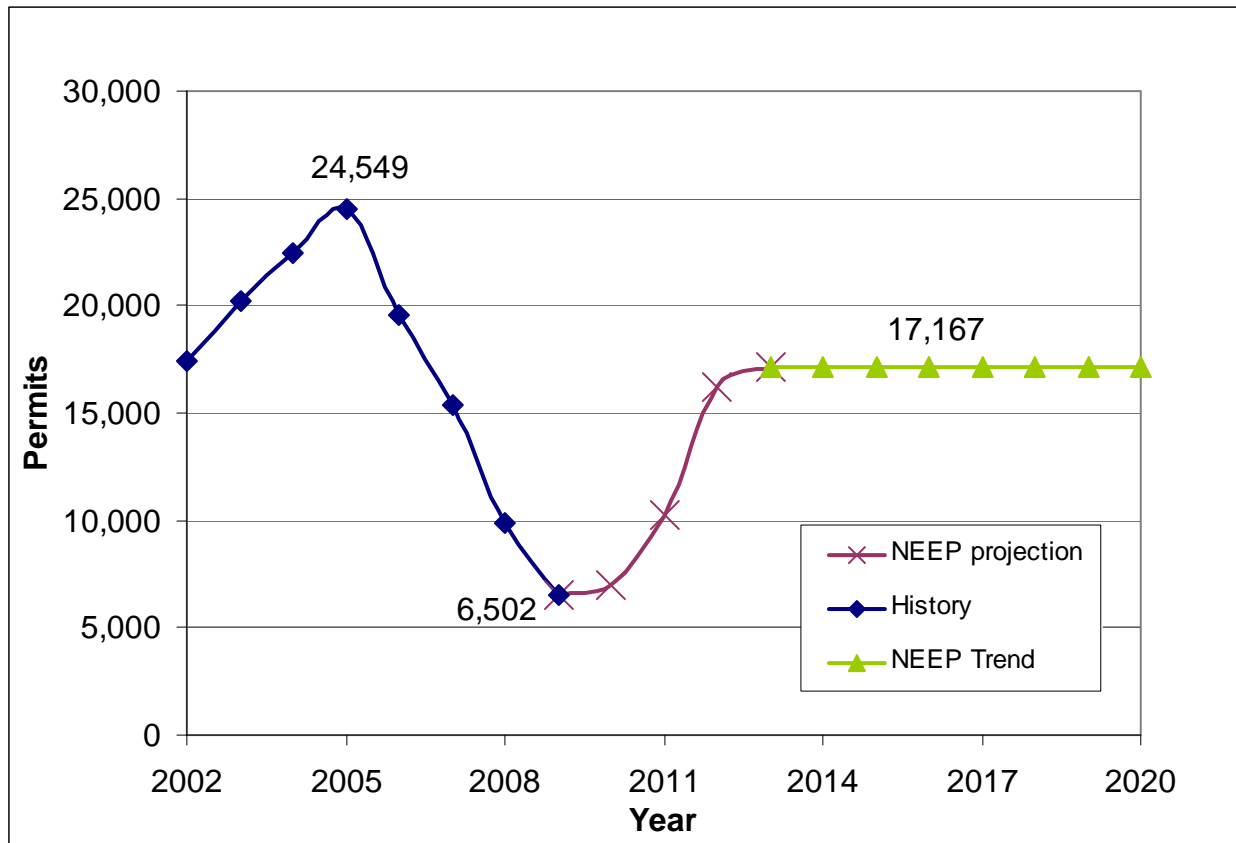
Housing Supply in the Baseline Forecast

As described above in the methodology section, current housing stock for 2006 through 2008 was estimated using the American Community Survey (ACS) Public Use Microdata Sample (PUMS), which controlled to the Census' Intercensal Population Estimates. To project housing supply, new construction is added and housing unit losses are subtracted from the ACS 2006-2008 starting point.

According to NEEP, new housing permits through 2011 are projected to be considerably below pre-recession levels, when the growth rate of new residential unit production hovered near one half of one percent

per year. A housing recovery beginning in 2010 is expected to increase to 17,167 housing permits projected in 2013, the highest housing permit level since 2006. Figure 2 shows the statewide projected trajectory of residential building permits in Massachusetts through 2020.

Figure 2. New Residential Construction for Single and Multi-Family Units in Massachusetts



Sources: NEEP Forecast Fall 2009, Census of Construction 2000-2008

According to the extended projections, all told, over 170,000 new housing units are expected to be built statewide between 2010 and 2020, about the same number as were built from 2000 to 2009. The largest numbers of units will be added in the Greater Boston, Southeast, and Central regions. Table 9 shows the number of total new units projected to be built in each region of the state between 2010 and 2020. Table 10 shows the resulting housing supply in 2020, after demolitions and conversions are taken into account.

Table 9. Massachusetts Housing Construction, 2010 through 2020, Baseline Forecast

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	2,817	16,214	25,965	26,084	16,893	13,871	27,729	129,572
Multi-Family	400	900	2,377	21,735	7,441	1,326	3,706	37,884
Mobile	237	231	449	347	247	482	1,047	3,040
Total	3,454	17,345	28,790	48,166	24,580	15,679	32,482	170,496

Sources: Census of Construction 2000-2008, NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Table 10. Massachusetts Housing Unit Supply, 2020, Baseline Forecast

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	41,121	170,054	207,248	457,886	220,322	182,675	281,273	1,560,580
Multi-Family	25,431	26,992	134,281	661,793	170,903	110,532	159,337	1,289,269
Mobile	1,737	1,731	3,308	2,556	1,840	3,524	7,718	22,415
Total	68,288	198,777	344,837	1,122,235	393,066	296,732	448,329	2,872,264

Sources: Census of Construction 2000 to 2008, NEEP Forecast Fall 2009, American Community Survey 2006-2008

Housing Surpluses and Shortages in the Baseline Forecast

As shown in Table 11, inadequate construction levels can be expected to contribute to housing shortages in four of the seven *MassBenchmarks* regions in 2020, with the worst shortages experienced in the Greater Boston region. Greater Boston is projected to experience shortages of tens of thousands of units among both single and multi-family homes. Despite the widespread greater demand for single family homes, shortages are projected to be both more common and more severe for multi-family homes, highlighting a key disconnect between current demand and building practices. Statewide, Massachusetts would need to build an additional 29,926 units over the projected building levels to meet demand and reduce unnecessary price inflation and resulting out-migration. Figure 3 shows a map of overall shortages and surpluses by region.

While the Central and Northeast *MassBenchmarks* regions have projected surpluses in 2020 in the baseline scenario, it is important to note that broad regional estimates of surpluses or shortages may mask local housing surpluses and shortages for smaller geographies within each region.

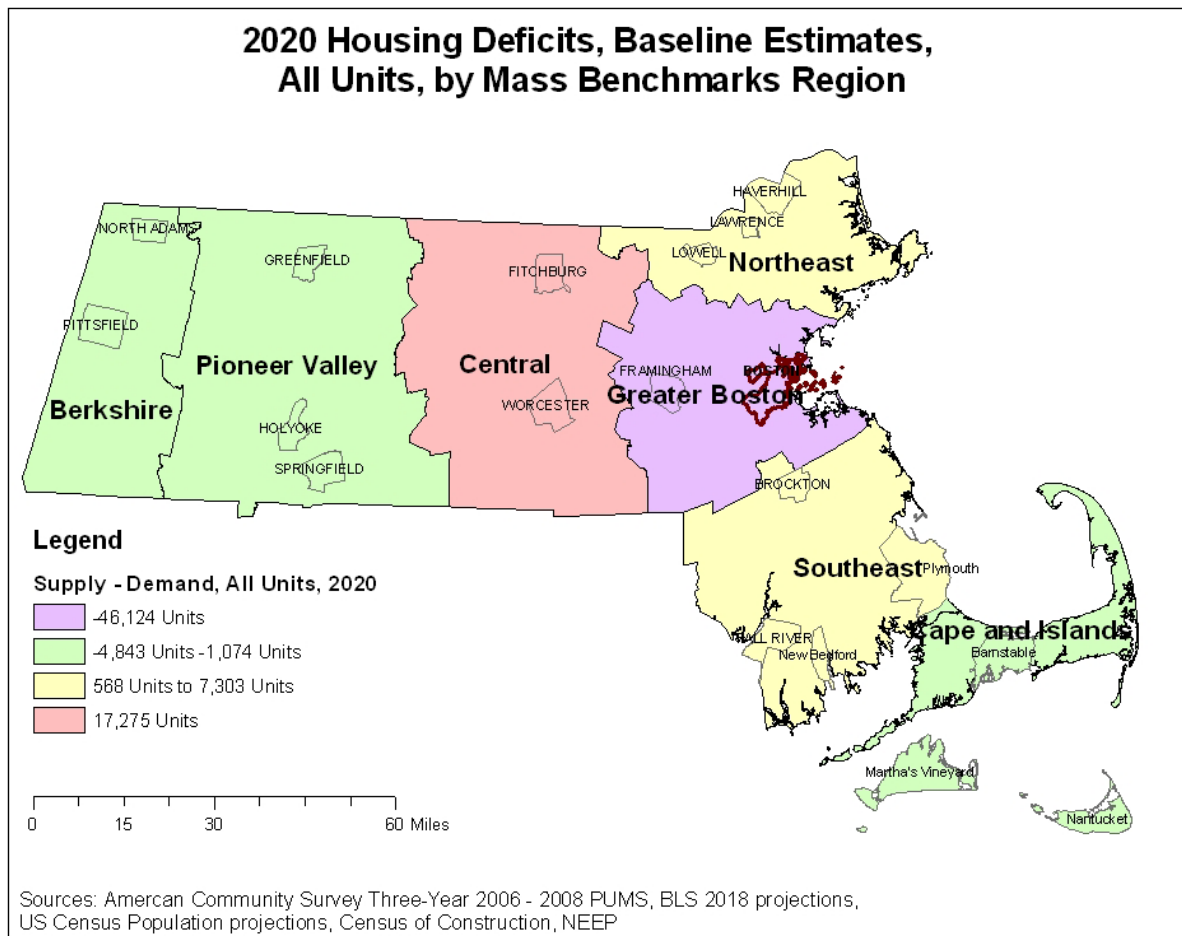
Table 11. Baseline Forecast for Massachusetts Housing Unit Supply Gap by Unit Type, 2020

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	-1,277	-17	18,220	-25,545	-3,889	6,757	12,202	6,452
Multi-Family	-2,007	-1,198	-309	-20,651	4,767	-10,396	-3,981	-33,775
Mobile	253	141	-636	72	-311	-1,205	-918	-2,603
Total	-3,031	-1,074	17,275	-46,124	568	-4,843	7,303	-29,926

Sources: Census of Construction 2000-2008, NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Figure 3. Massachusetts Housing Unit Supply Gap, Baseline Scenario, 2020



Sources: Census of Construction 2000-2008, NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Stronger Growth Forecast: A Balanced Housing Market

The stronger growth scenario projects housing supply and total demand in the event that the state were to achieve a higher rate of job growth than expected by the baseline scenario – specifically a rate that is 75 percent of the projected national employment growth rate. The Bureau of Labor Statistics projects national employment growth from 2008 to 2018 at approximately 12 percent, resulting in an assumed growth of nine percent for the Massachusetts stronger growth scenario. By comparison, the employment growth for the same period in the baseline scenario is only 2.7 percent.

The growth rate assumed for the stronger growth scenario, while significantly higher than the relatively flat growth of the baseline scenario, is comparable to growth seen in recent years in Massachusetts. The 2000s were a turbulent decade in Massachusetts, with overall employment losses in 2002 through 2004 and again in 2009, and employment growth in the positive years averaging a moderate 0.7 percent. The stronger growth

scenario assumes that with the right set of pro-growth policies, a similar annual average growth rate of approximately 0.7 percent from 2006-2008 to 2020 is achievable. This scenario does not explore what policies would be needed to achieve this growth rate, but it projects the total housing demand (allowing for a “healthy” vacancy rate) in the event this target employment growth rate was achieved.

The stronger growth scenario models a future where housing supply and demand are in balance by 2020. This requires housing construction to occur at a faster rate than expected by the baseline scenario. The 2020 forecast under this stronger growth scenario further reflects a housing market where vacancy rates across the state are a healthy 1.5 percent for owner units, and 7.4 percent for renter units. If this scenario is realized, more stable prices and lower out-migration than in the baseline scenario could be expected.

Population Changes in the Stronger Growth Forecast

In the stronger growth scenario, between the baseline of 2006-2008 and the end year of 2020, the forecast is for 10.4 percent population growth, or an annualized growth rate of about 0.8 percent, more than twice as fast as in the baseline scenario and faster than any recent population growth the state has experienced.

As shown in Table 12, population growth under the stronger growth scenario is still the greatest among 65 to 74 year olds (58.6 percent) and 55 to 64 year olds (28.8 percent, similar to the baseline scenario). However, population growth among 25 to 34 year olds increases dramatically, from 11.6 in the baseline scenario to 26.6 percent (in keeping with this group’s relative prevalence in the labor market), and population growth for 16 to 24 year olds increases from a 3.8 percent decline under the baseline scenario to a 5.7 percent increase. Finally, a stagnant under-16 population in the baseline scenario becomes a 5.6 percent increase in the stronger growth scenario.

Table 12. Massachusetts Population Changes, Stronger Growth Forecast

Age	2006-2008	2020 Stronger Growth	Percentage Change
Under 16	1,264,428	1,334,727	5.6%
16-24	834,626	882,054	5.7%
25-34	820,733	1,038,999	26.6%
35-44	973,100	874,534	-10.1%
45-54	988,931	912,846	-7.7%
55-64	725,944	934,912	28.8%
65-74	417,264	661,963	58.6%
75-94	444,744	502,393	13.0%
Total	6,469,770	7,142,429	10.4%

Sources: NEEP Forecast Fall 2009, U.S. Census Projections, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Employment Changes in the Stronger Growth Forecast

In the stronger growth forecast, total employment can be expected to grow 9.0 percent from 2006-2008 to 2020, adding 296,000 jobs to the Massachusetts economy -- triple the growth of the baseline scenario.

Employment growth by occupation type for the stronger growth scenario is shown in Table 13. While in the baseline scenario, the greatest growth is among computer and mathematical occupations (16.0 percent), in

the stronger growth scenario, the greatest growth is among life, physical and social sciences occupations (32.1 percent and 18,000 jobs). Computer and mathematical occupations are projected to grow by 27.3 percent, or 31,000 jobs. Healthcare practitioners and technical occupations account for over 40,000 new jobs, while education, training and library occupations account for another nearly 35,000. In this scenario, the top 13 occupations are projected to experience double digit job growth, accounting for a net 258,000 new jobs.

Even in the stronger growth scenario, production jobs are projected to decline by 8.2 percent, losing 13,000 jobs, compared to 22,000 in the baseline scenario.

Table 13. Massachusetts Employment Growth by Occupation, Stronger Growth Forecast

Occupation	2006-2008	2020 Stronger Growth	Percent Change
Life, Physical and Social Science	57,594	76,092	32.1%
Computer and Mathematical	114,151	145,281	27.3%
Community and Social Services	58,219	71,543	22.9%
Healthcare Practitioners and Technical	203,186	244,079	20.1%
Healthcare Support	77,928	93,314	19.7%
Personal Care and Service	106,311	126,430	18.9%
Education, Training and Library	225,483	260,467	15.5%
Business and Financial Operations	177,891	203,661	14.5%
Arts, Design, Entertainment, Sports and Media	70,405	79,984	13.6%
Legal	48,938	55,129	12.7%
Building and Grounds Cleaning and Maintenance	114,436	128,472	12.3%
Food Preparation and Serving Related	170,437	191,339	12.3%
Architecture and Engineering	77,190	84,944	10.0%
Management	358,676	378,590	5.6%
Protective Service	68,561	72,280	5.4%
Sales and Related	361,232	379,036	4.9%
Farming, Fishing and Forestry	6,917	7,218	4.3%
Office and Administrative Support	456,631	466,127	2.1%
Transportation and Material Moving	139,328	140,469	0.8%
Installation, Maintenance and Repair	83,441	83,891	0.5%
Construction and Extraction	166,396	165,153	-0.7%
Production	165,202	151,616	-8.2%
Total	3,308,553	3,605,113	9.0%

Sources: NEEP Forecast Fall 2009, Bureau of Labor Statistics, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Similar patterns are reflected in projections of employment by industry, shown in Table 14. Professional and business services (up 22.7 percent) and education and health services (up 6.8 percent) show much stronger growth than in the baseline scenario, adding a combined 236,000 jobs.

Significant job losses remain in manufacturing (down 12.4 percent), with a projected loss of over 33,000 jobs, compared to 51,000 in the baseline scenario. Natural resources and mining is projected to lose 12.4 percent, or 174 jobs.

Construction losses are mitigated in the stronger growth scenario, with a decline of 1.5 percent, or 3,200 jobs, compared to over 11,000 jobs lost in the baseline scenario. Trade, transportation and utilities, down 2.3 percent and 13,000 jobs in the baseline scenario, gains 18,000 jobs in the stronger growth scenario.

Table 14. Massachusetts Employment Growth by Industry, Stronger Growth Forecast

Industry	2006-2008	2020 Stronger Growth	Percent Change
Professional and business services	414,854	508,831	22.7%
Education and health services	852,529	995,354	16.8%
Leisure and hospitality	263,452	294,951	12.0%
Other Services	143,848	158,673	10.3%
Information	94,449	103,378	9.5%
Agriculture	11,991	12,971	8.2%
Financial activities	273,600	292,293	6.8%
Trade, Transportation and Utilities	577,383	595,802	3.2%
Government and military	129,435	132,481	2.4%
Construction	212,289	209,087	-1.5%
Manufacturing	333,319	300,061	-10.0%
Natural resources and mining	1,404	1,230	-12.4%
Total	3,308,553	3,605,113	9.0%

Sources: NEEP Forecast Fall 2009, Bureau of Labor Statistics, American Community Survey 2006-2008

Note: Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Housing Demand in the Stronger Growth Forecast

Due to this higher assumed population and employment growth, the stronger growth scenario requires over 3 million housing units statewide, as shown in Table 15. The distribution of housing unit demand statewide remains about the same as in the baseline scenario, with 40 percent of demand in the Greater Boston region and 15 percent in the Southeast region.

Table 15. Massachusetts Housing Unit Demand in 2020, Stronger Growth Forecast

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	43,713	175,410	196,720	503,109	233,286	182,249	278,831	1,613,317
Multi-Family	28,956	28,776	142,432	727,965	175,022	127,921	172,061	1,403,132
Mobile	1,571	1,612	4,042	2,473	2,255	4,800	8,760	25,514
Total	74,239	205,798	343,193	1,233,548	410,562	314,970	459,652	3,041,963

Sources: NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Note: Demand includes vacancy rates of 1.5 percent for owner units and 7.4 percent for rental units.

Housing Supply in the Stronger Growth Forecast

In most areas, construction in the stronger growth scenario surpasses that in the baseline scenario. Table 16 shows total construction needed between 2010 and 2020 under the stronger growth scenario. Since housing supply and demand are balanced by definition in this scenario, construction levels rise to account for increased population and job growth, but also to eliminate the presupposed shortages that exist currently and are projected to worsen in the baseline forecast.

Under the stronger growth scenario, the state would need to build 340,196 housing units between 2010 and 2020. This is 169,700 more housing units (including 52,737 additional single family and 113,863 additional multi-family units) than are projected to be built under the baseline scenario, a near doubling of construction. If decision makers pursue increased rates of job growth, a correspondingly higher rate of housing production would be necessary to avoid worsening housing shortages, higher prices, greater out-migration, and a resulting reduction in realized job growth.

To realize a balanced housing market in 2020, construction increases over the “status quo” baseline scenario would be seen in Greater Boston (a 231 percent increase over baseline), the Berkshire region (172 percent above baseline), the Pioneer Valley (116 percent above baseline), the Northeast region (71 percent above baseline), the Cape and Islands (40 percent above baseline), and the Southeast region (35 percent above baseline). Only the Central region would experience *less* construction to make up for a projected surplus in the baseline scenario that is not balanced by increased population growth in the stronger growth scenario. There, construction is somewhat counter intuitively projected to be six percent lower in the stronger growth scenario. It is worth noting again that this projection reflects the needs of an entire region. While the Central region is projected to need less construction than projected in the baseline scenario on balance, some individual townships or housing types may exhibit greater need for more housing, which is offset by projected overbuilding in others.

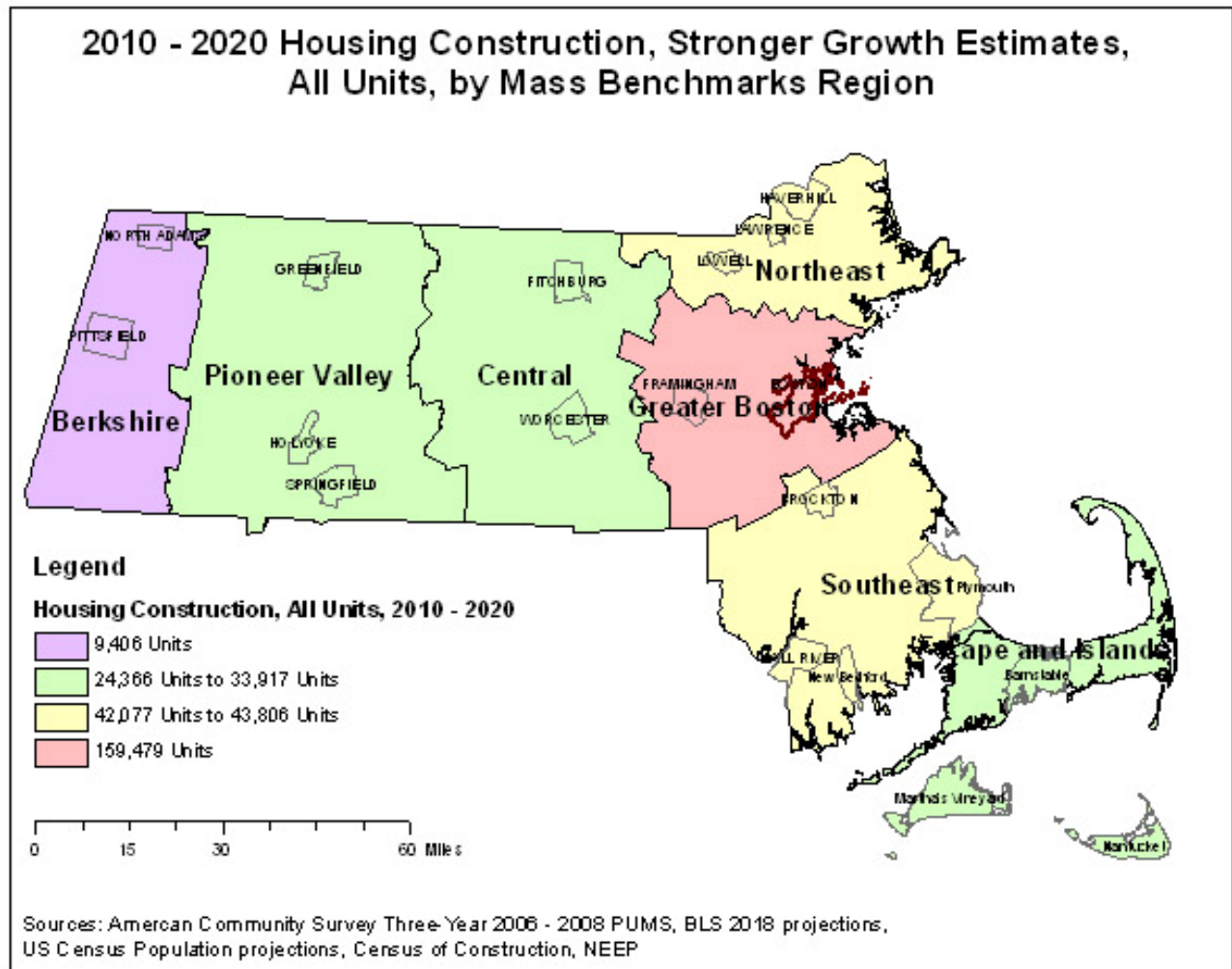
Statewide, the stronger growth scenario calls for over 52,000 additional single family units and 113,000 additional multi family units, compared to the baseline scenario. Figure 4 shows a map of housing construction for all units by *MassBenchmarks* region in the stronger growth scenario.

Table 16. Massachusetts Housing Construction, Stronger Growth Scenario

	Berkshire	Cape and Islands	Central	Greater Boston	Northeast	Pioneer Valley	Southeast	Total
Single-Family	5,409	21,569	15,436	71,307	29,856	13,445	25,288	182,309
Multi-Family	3,925	2,684	10,528	87,907	11,560	18,715	16,430	151,747
Mobile	72	113	1,182	265	661	1,757	2,089	6,139
Total	9,406	24,366	27,146	159,479	42,077	33,917	43,806	340,196

Sources: Census of Construction 2000-2008, NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Figure 4. Massachusetts Housing Unit Construction, Stronger Growth Scenario, 2020



Sources: Census of Construction 2000-2008, NEEP Forecast Fall 2009, BLS Projections 2006-2016, U.S. Census Projections, American Community Survey 2006-2008

Tax Impacts: Benefits of Growth

For the baseline and stronger growth scenarios, projected Massachusetts property, sales and income taxes were estimated. This analysis provides insight into the likely scale of enhanced tax revenues if the state experienced greater employment and population growth.

Income Taxes

Income tax receipts were estimated using a tax simulator, and projected characteristics of future residents based on the 2006-8 ACS. As shown in Tables 17 and 18, Massachusetts income tax receipts in 2020 are projected to be 5.1 percent higher than in 2006 under the baseline scenario, and 10.2 percent higher than in 2006 under the stronger growth scenario. The difference between the two scenarios is due almost entirely to the larger number of filers in the stronger growth scenario.

Table 17. Massachusetts Income Tax Revenue, Baseline Scenario

	Income tax (millions)	Income Tax Per Capita	Number of Tax Filers (thousands)	Income Tax per Tax Filer	Population
2006	\$9,877	\$1,534	2,772	\$3,563	6,437,760
2020	\$10,378	\$1,539	2,931	\$3,541	6,744,570
Change	5.1%	0.3%	5.7%	-0.6%	4.8%

Sources: American Community Survey, 2006-2008

Notes: Dollar figures are in 2007 dollars and assume no real income growth conditional on age, industry, and occupation of employment. Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Table 18. Massachusetts Income Tax Revenue, Stronger Growth Scenario

	Income tax (millions)	Income Tax Per Capita	Number of Tax Filers (thousands)	Income Tax per Tax Filer	Population
2006	\$9,877	\$1,534	2,772	\$3,563	6,437,760
2020	\$10,881	\$1,550	3,072	\$3,542	7,018,392
Change	10.2%	1.1%	10.8%	-0.6%	9.0%

Sources: American Community Survey, 2006-2008

Notes: Dollar figures are in 2007 dollars and assume no real income growth conditional on age, industry, and occupation of employment. Shortages are denoted by negative numbers and red text; surpluses appear as positive numbers and black text.

Property Taxes

Property tax revenues were also estimated based on the number and types of projected residences in the baseline and stronger growth scenarios. Table 19 shows Massachusetts property tax receipts for 2006, the baseline scenario and the stronger growth scenario. The baseline scenario for 2020 projects a 7.9 percent increase in property tax revenues, while the stronger growth scenario projects an 11.7 percent increase.

Table 19. Massachusetts Property Tax Revenues, Baseline and Stronger Growth Scenarios (Millions of dollars)

	2006	2020		Change from 2006 to 2020	
		Baseline	Stronger Growth	Baseline	Stronger Growth
Property Tax	\$7,016	\$7,568	\$7,834	7.9%	11.7%

Sources: American Community Survey, 2006-2008

Note: Dollar figures are in millions of 2006 dollars and assume no change in property values or tax rates conditional on age, industry, and occupation of employment.

Sales Taxes

Sales taxes were projected based on projected income characteristics for the baseline and stronger growth scenarios. Table 20 shows sales tax estimates for 2006, and for 2020 under the baseline and stronger growth scenarios. Once again, sales taxes are projected to be higher under the baseline scenario than in 2006 by 5.2 percent, while under the stronger growth scenario, sales tax receipts increase by 9.5 percent. Under both the baseline and stronger growth scenarios, sales tax receipts increase due to increased incomes, even though a smaller share of incomes go to expenditures than in 2006.

Table 20. Massachusetts Sales Tax Revenues, Baseline and Stronger Growth Scenarios (Millions of dollars)

	2006	2020		Change from 2006 to 2020	
		Baseline	Stronger Growth	Baseline	Stronger Growth
Income	\$198,338	\$210,314	\$219,954	0.0%	4.6%
Expenditures	\$137,304	\$144,951	\$150,949	0.0%	4.1%
Sales Taxes	\$2,876	\$3,025	\$3,150	0.0%	4.1%

Sources: American Community Survey, 2006-2008

Notes: Dollar figures are in millions of 2007 dollars and assume no real income growth conditional on age, industry, and occupation of employment. Income includes food stamps. Sales Taxes includes regular sales and use, cigarette, alcohol, and gasoline excise taxes. Assumes sales tax rate of 6.25 percent.

Conclusion

Taken together with the forthcoming installments in the Foundation for Growth research series, the two scenarios presented in this report provide food for thought for Massachusetts policy makers to actively pursue types and levels of growth that are deemed most beneficial to the people – present and future – of Massachusetts. As has been shown in other studies, operating with the kinds of housing shortages seen in 2008, and projected to continue through 2020 under current conditions and policies, has real consequences, including inflated prices and difficulty retaining a competitive workforce. The two scenarios considered in this report take a first look at how housing construction and resulting tax revenues might look if Massachusetts follows the status quo, or adopts effective pro-growth policies.

Appendix A: Baseline Forecast Maps

Figure A-1: Massachusetts Housing Construction, *MassBenchmarks* Region: All Units, Baseline Scenario, 2010 to 2020

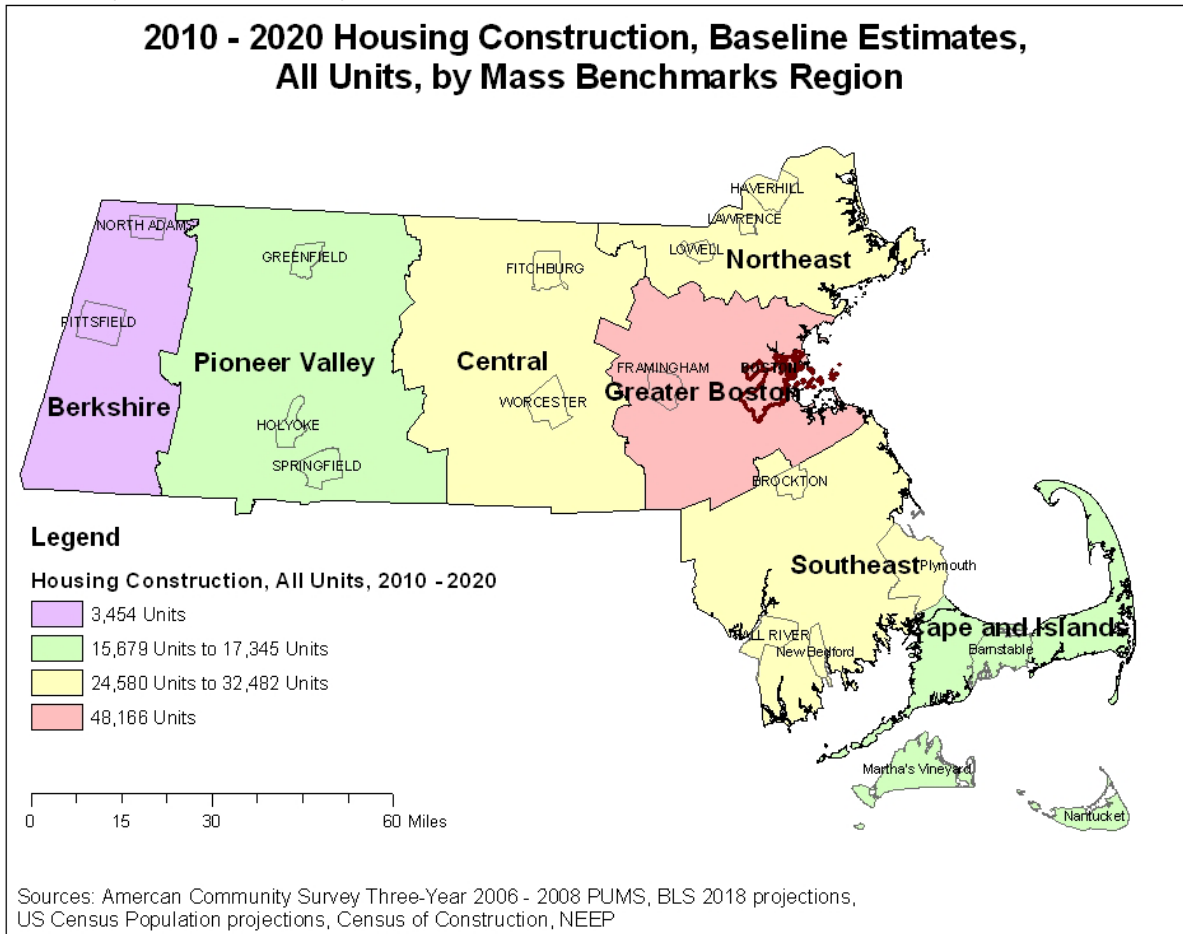
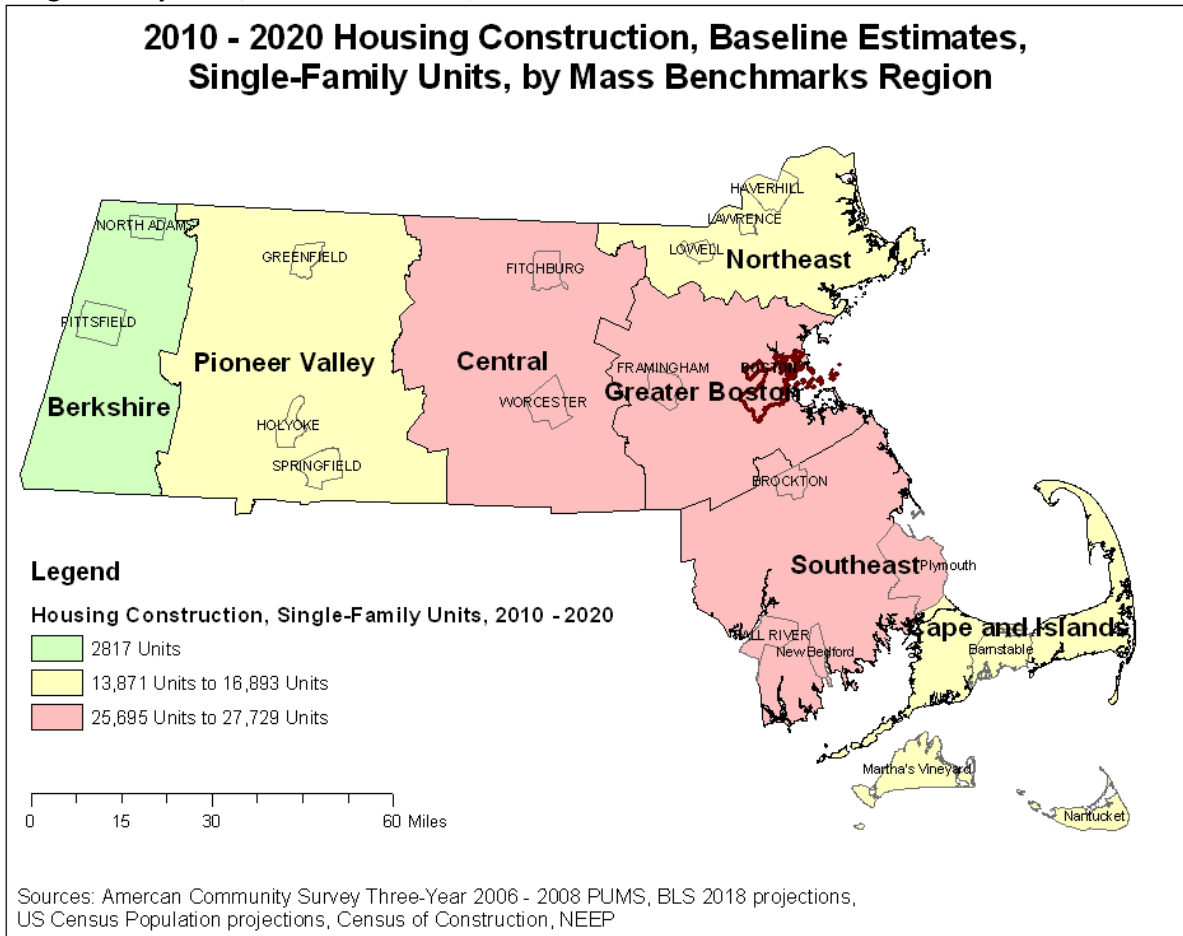
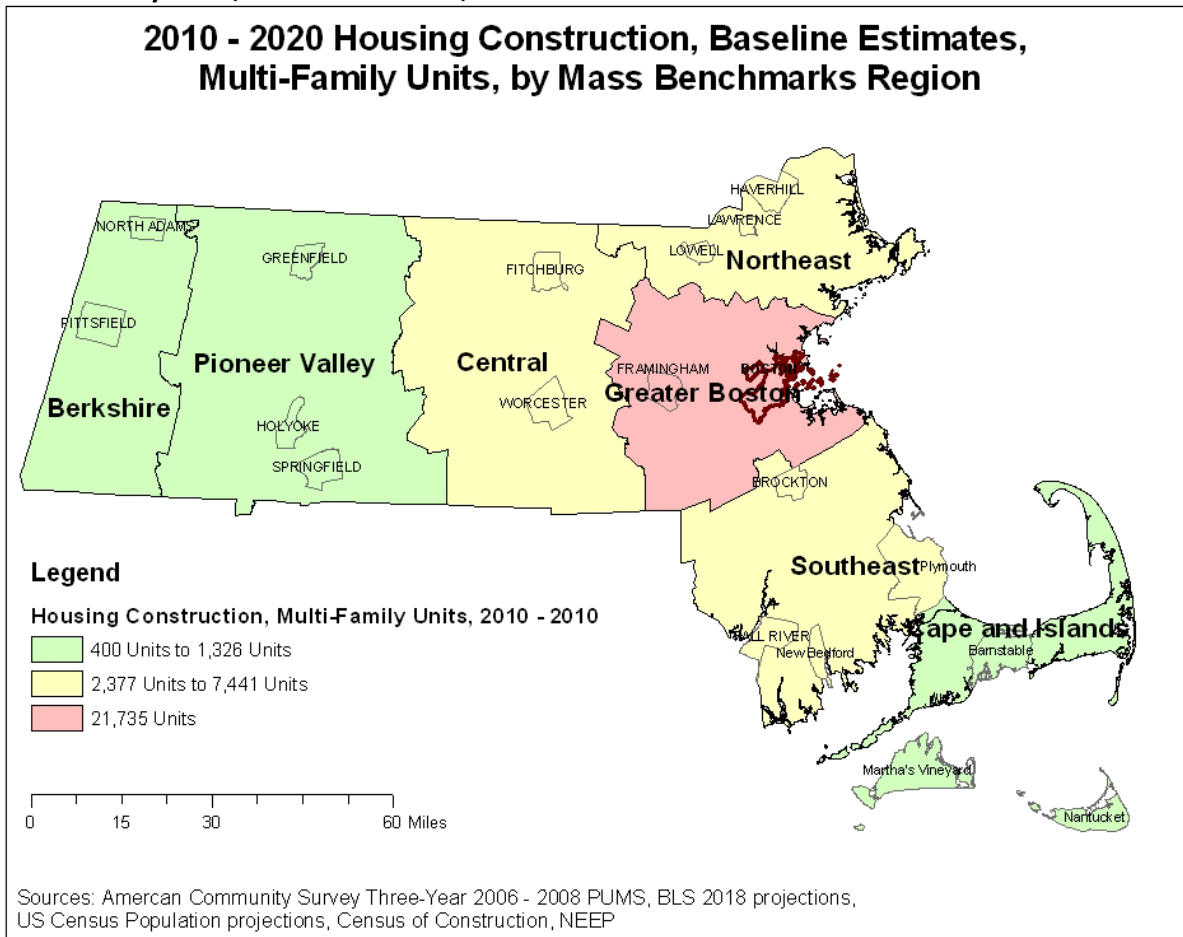


Figure A-2: Massachusetts Housing Construction, MassBenchmarks Region: Single Family Units, Baseline Scenario, 2010 to 2020



**Figure A-3: Massachusetts Housing Construction, MassBenchmarks Region:
Multi Family Units, Baseline Scenario, 2010 to 2020**



**Figure A-4: Massachusetts Housing Construction, Public Use Microdata Area:
All Units, Baseline Scenario, 2010 to 2020**

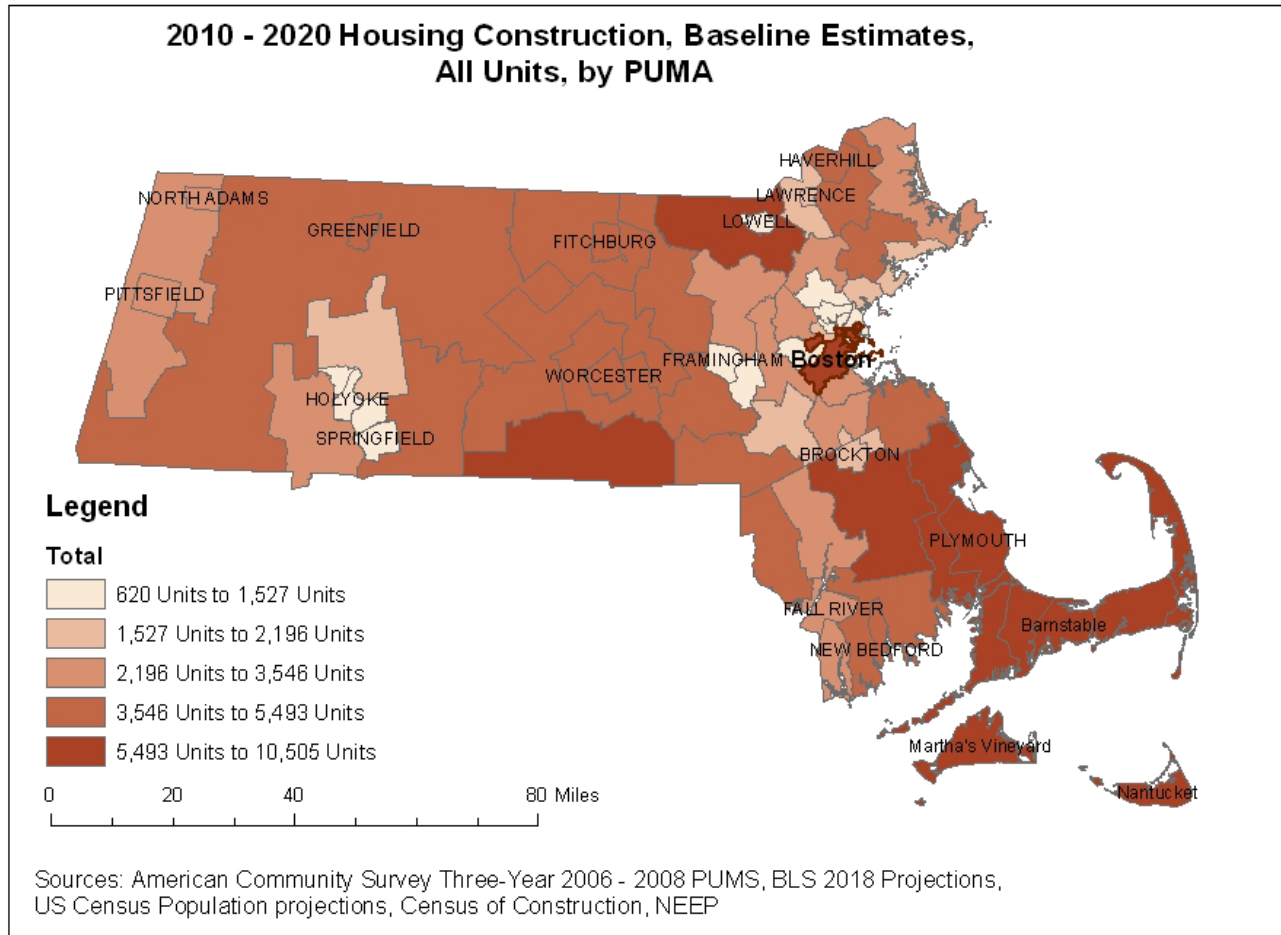


Figure A-5: Massachusetts Housing Construction, Public Use Microdata Area: Single Family Units, Baseline Scenario, 2010 to 2020

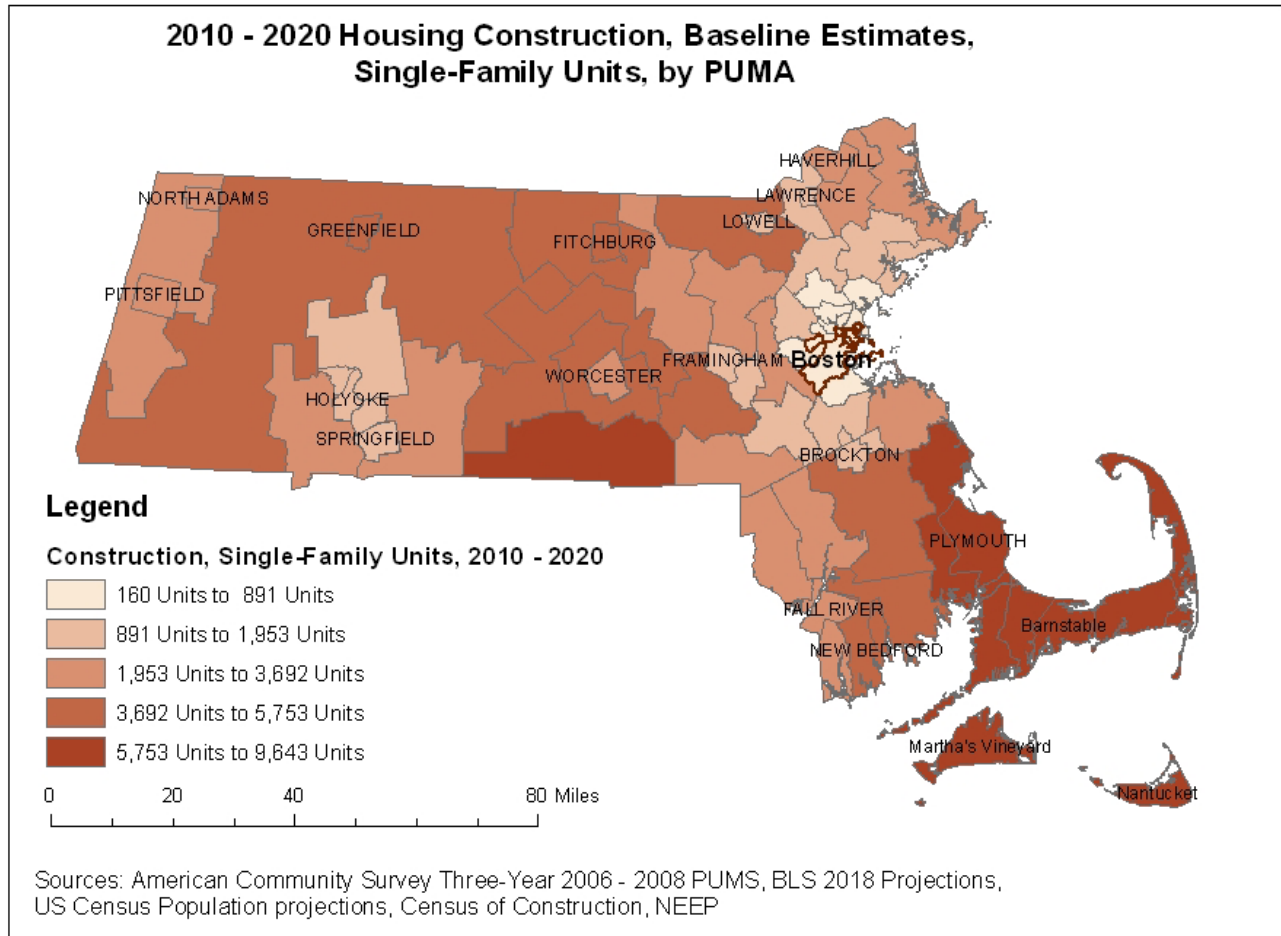


Figure A-6: Massachusetts Housing Construction, Public Use Microdata Area: Multi Family Units, Baseline Scenario, 2010 to 2020

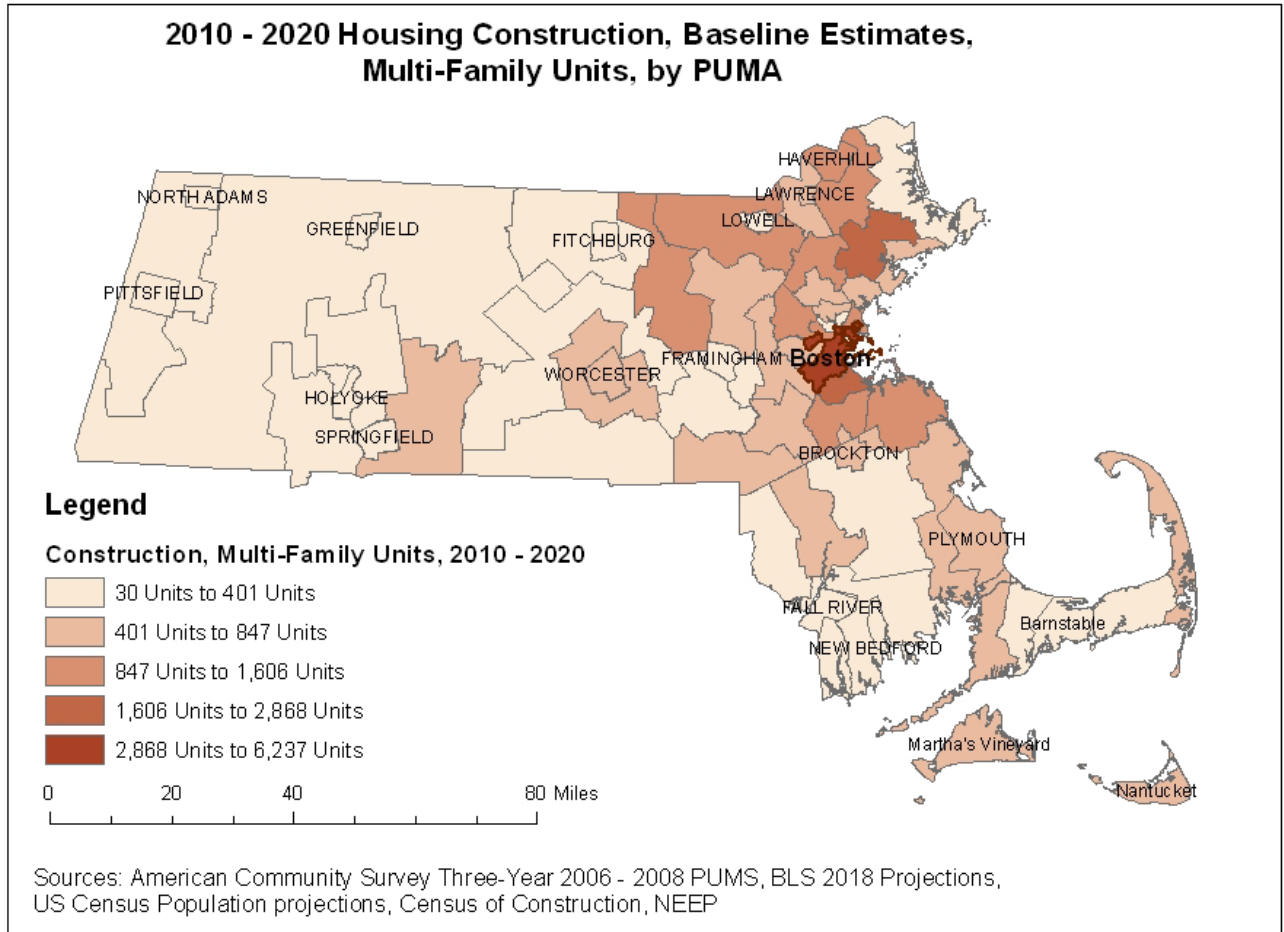


Figure A-7: Massachusetts Housing Unit Shortage, MassBenchmarks Region: All Units, Baseline Scenario, 2020

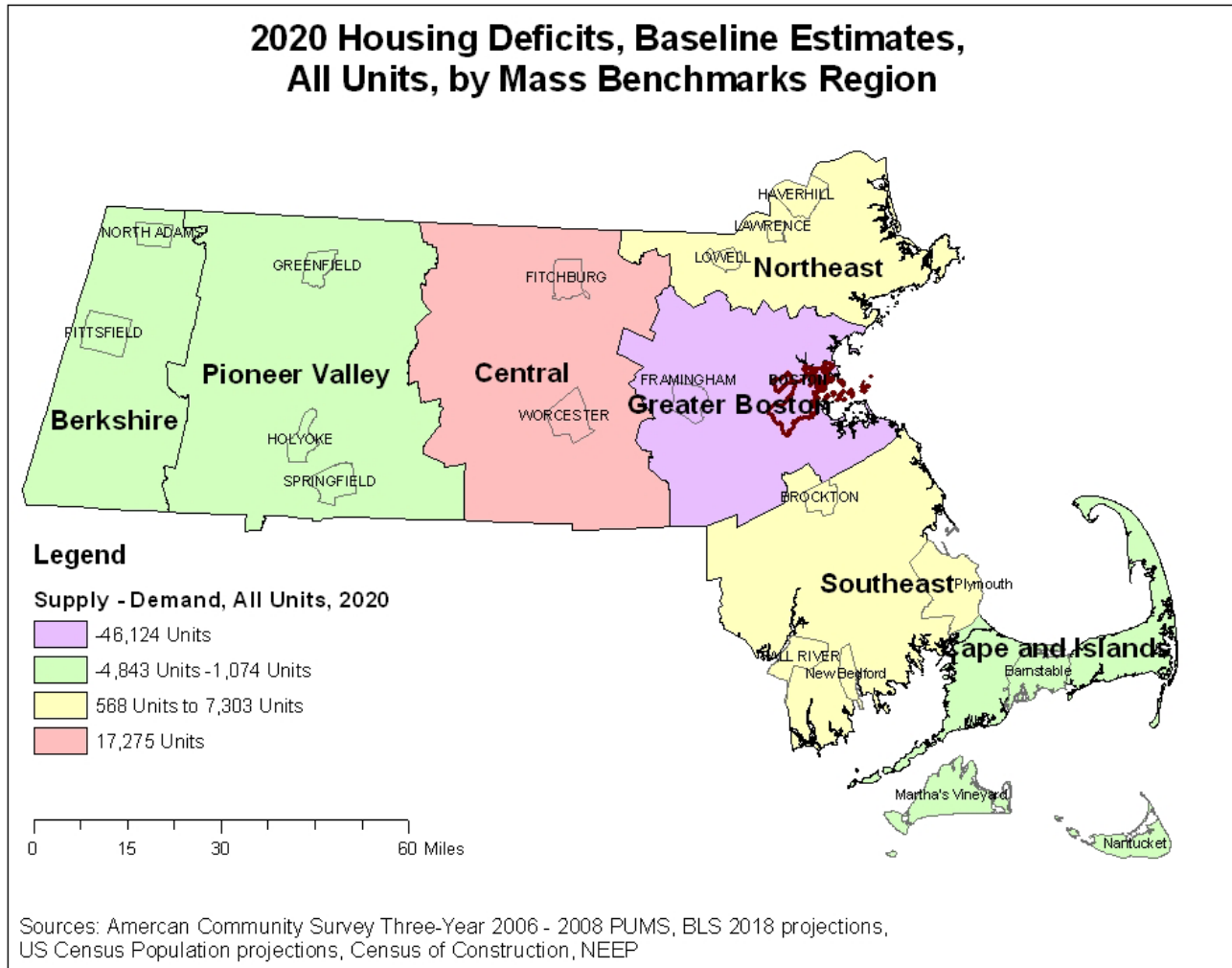


Figure A-8: Massachusetts Housing Unit Shortage, MassBenchmarks Region: Single Family Units, Baseline Scenario, 2020

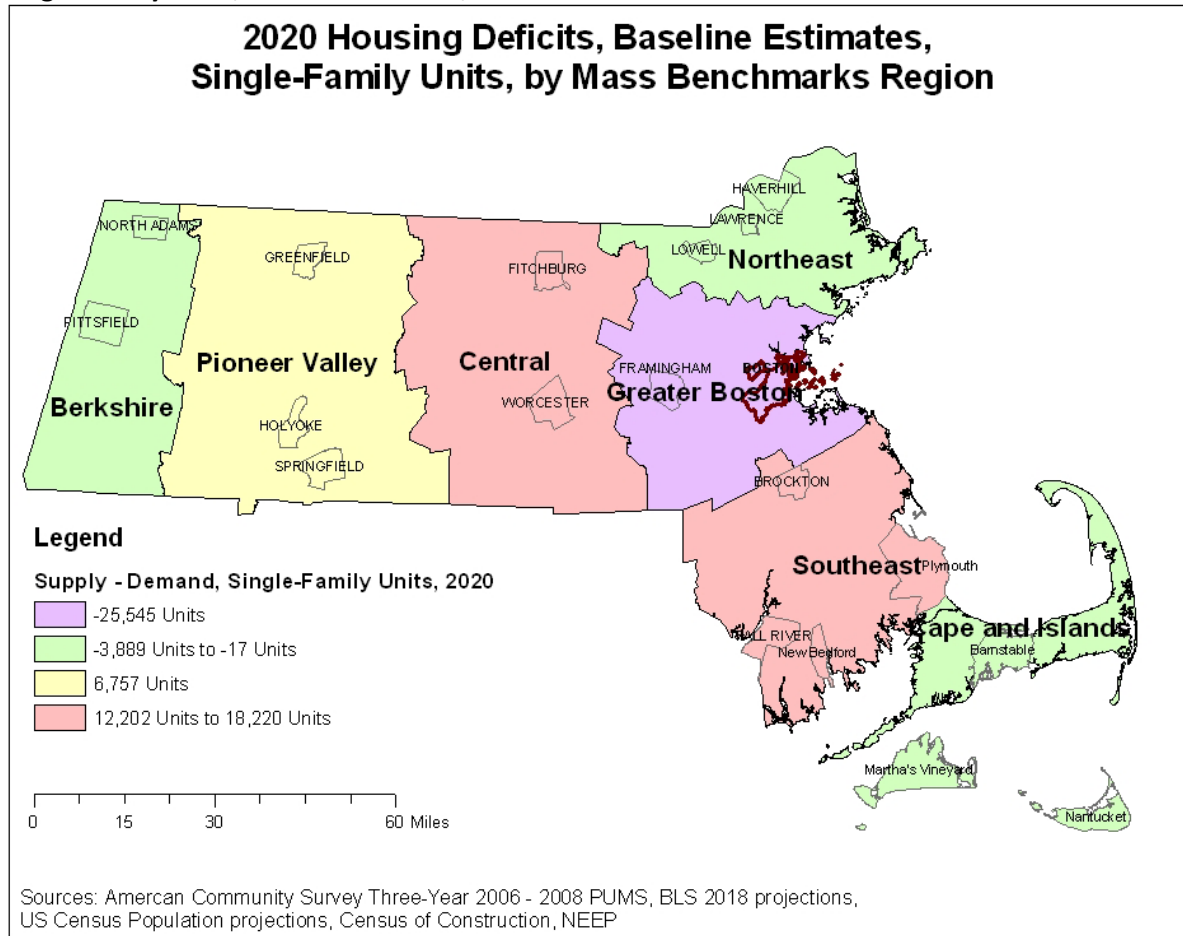


Figure A-9: Massachusetts Housing Unit Shortage, MassBenchmarks Region: Multi Family Units, Baseline Scenario, 2020

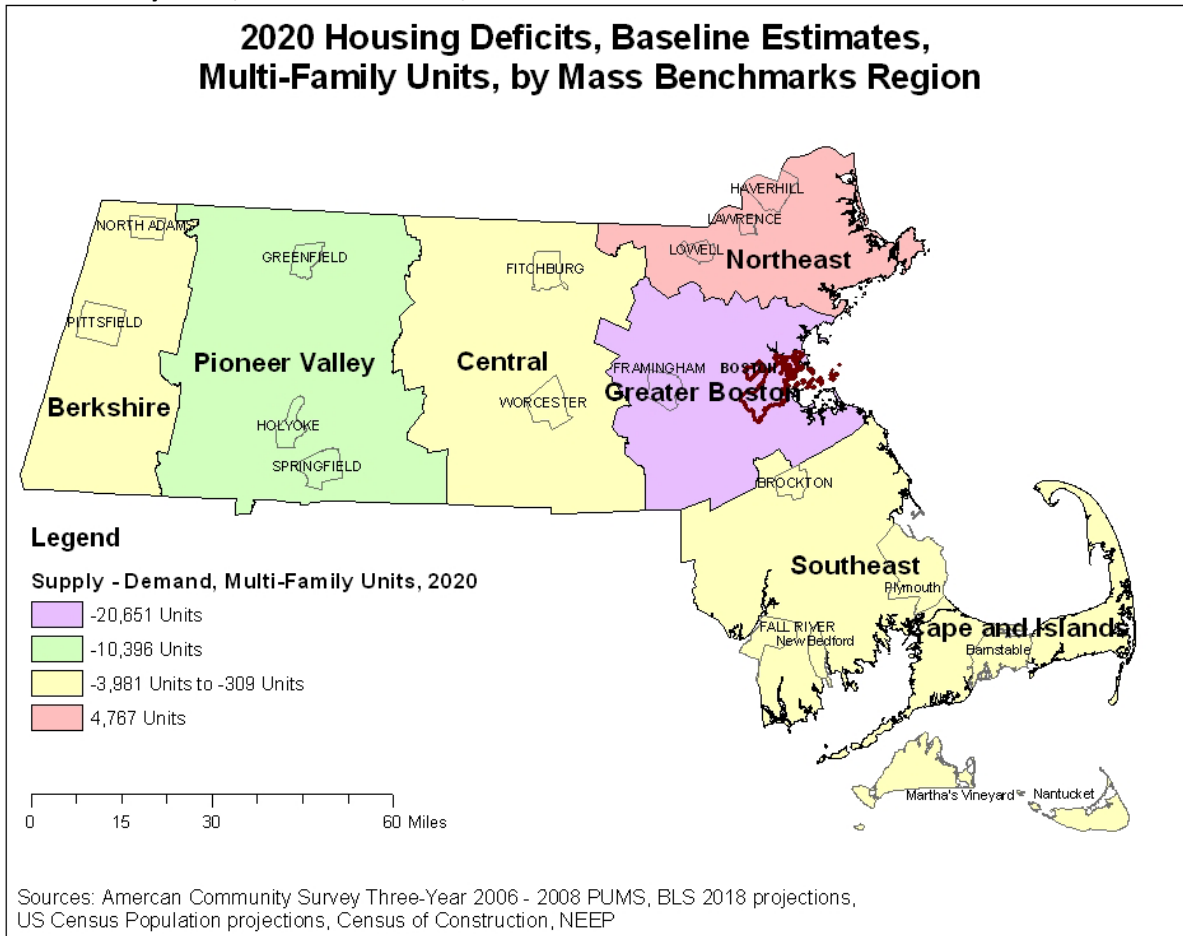


Figure A-10: Massachusetts Housing Unit Shortage, Public Use Microdata Area: All Units, Baseline Scenario, 2020

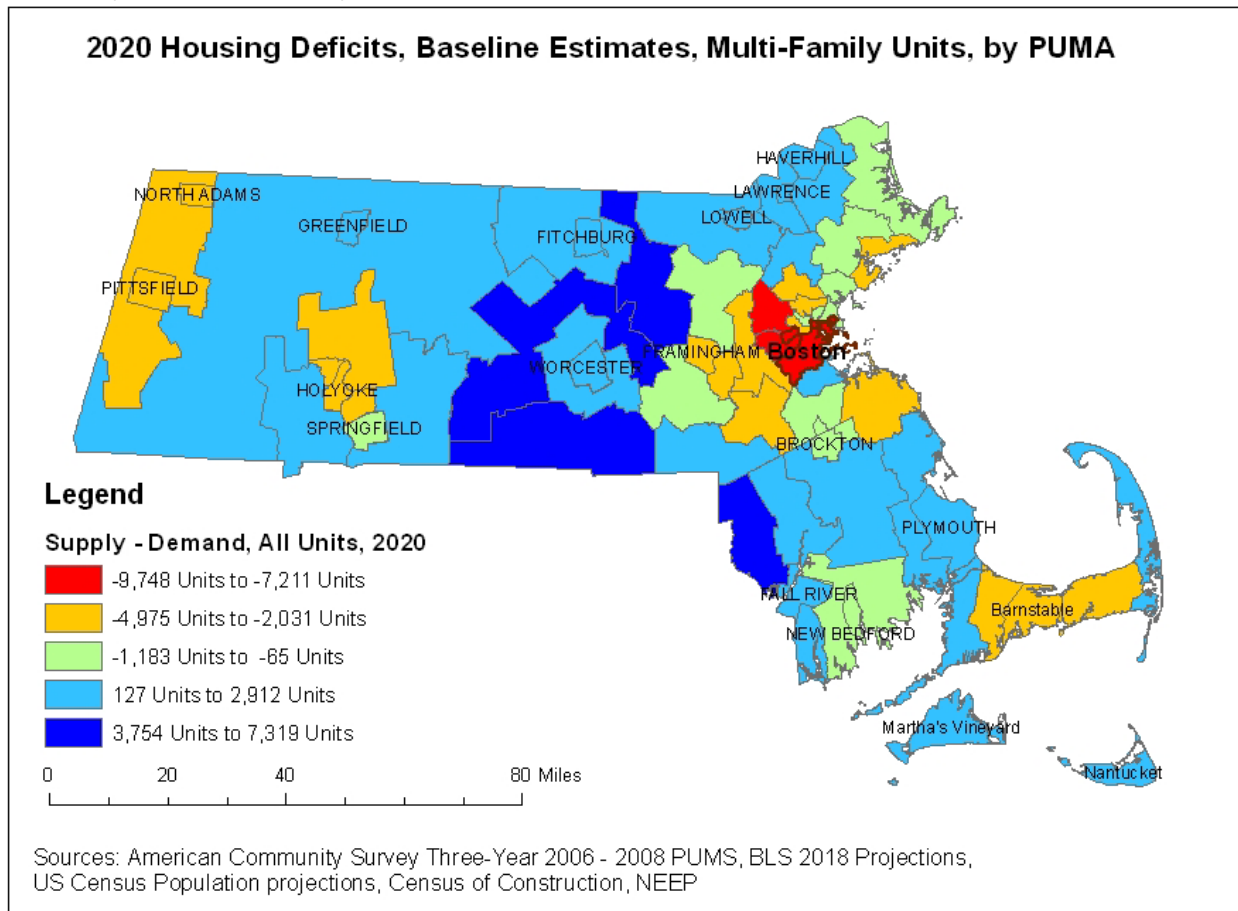


Figure A-11: Massachusetts Housing Unit Shortage, Public Use Microdata Area: Single Family Units, Baseline Scenario, 2020

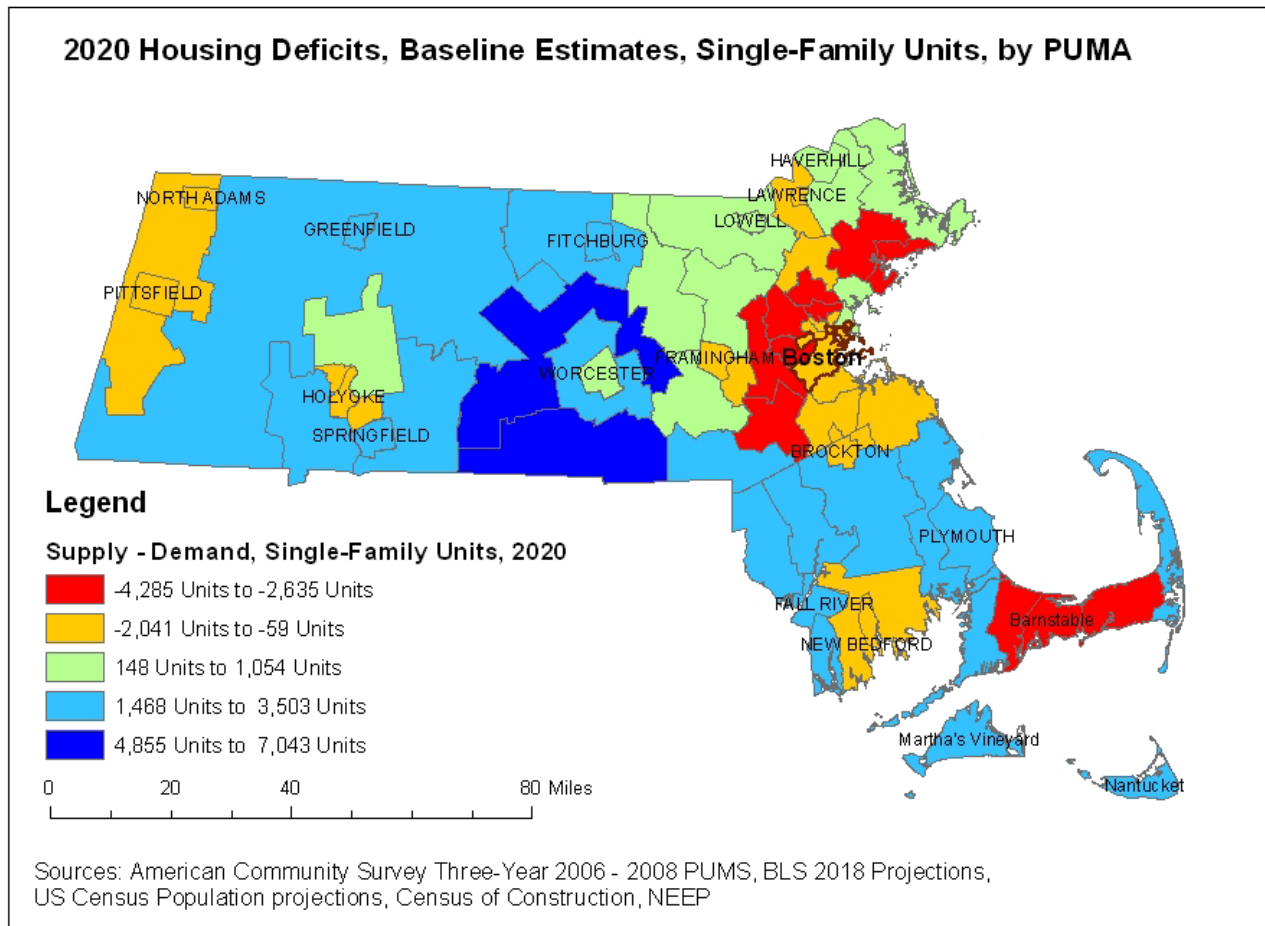
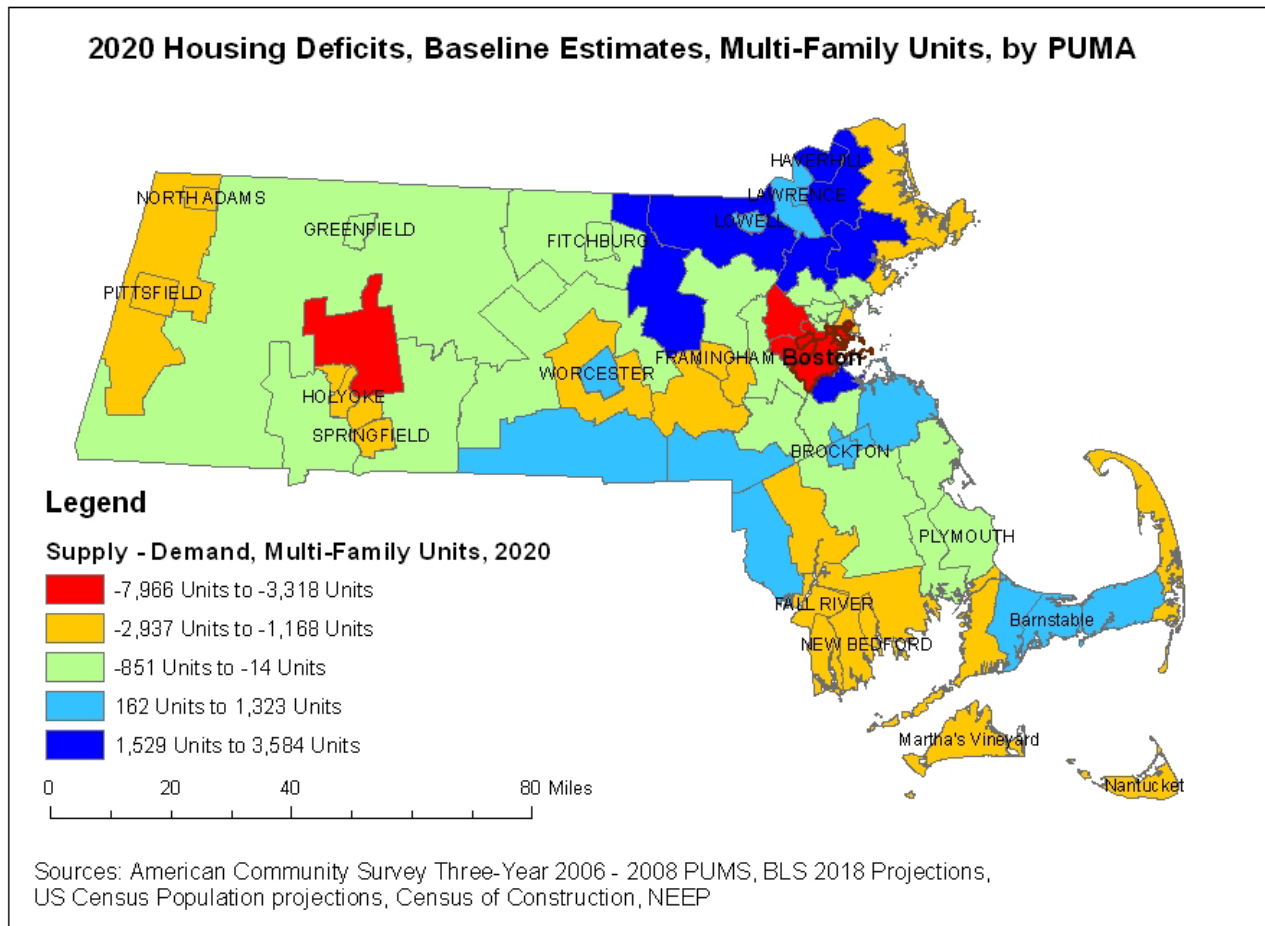


Figure A-12: Massachusetts Housing Unit Shortage, Public Use Microdata Area: Multi Family Units, Baseline Scenario, 2020



Appendix B: Stronger Growth Forecast Maps

Figure B-1: Massachusetts Housing Construction, *MassBenchmarks* Region: All Units, Stronger Growth Scenario, 2010 to 2020

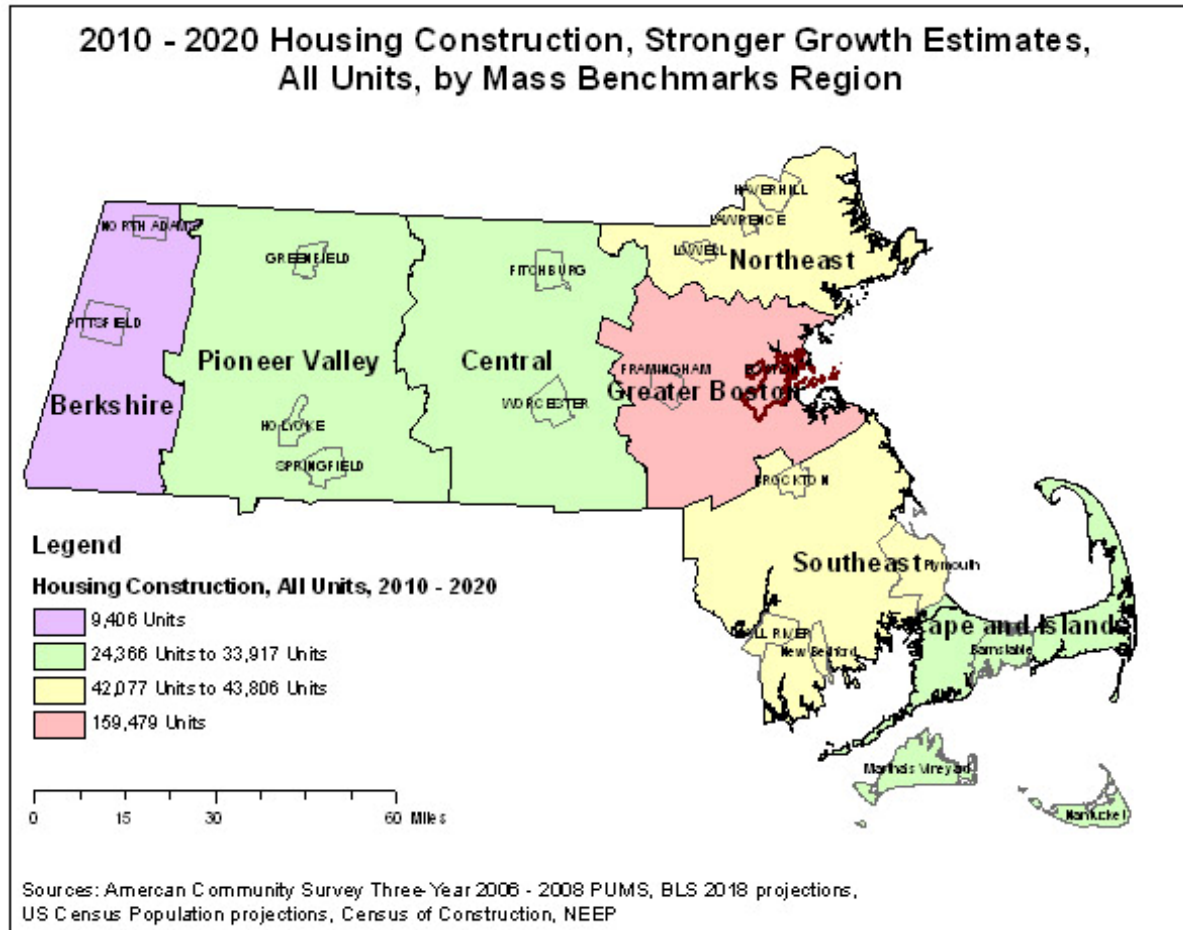


Figure B-2: Massachusetts Housing Construction, MassBenchmarks Region: Single Family Units, Stronger Growth Scenario, 2010 to 2020

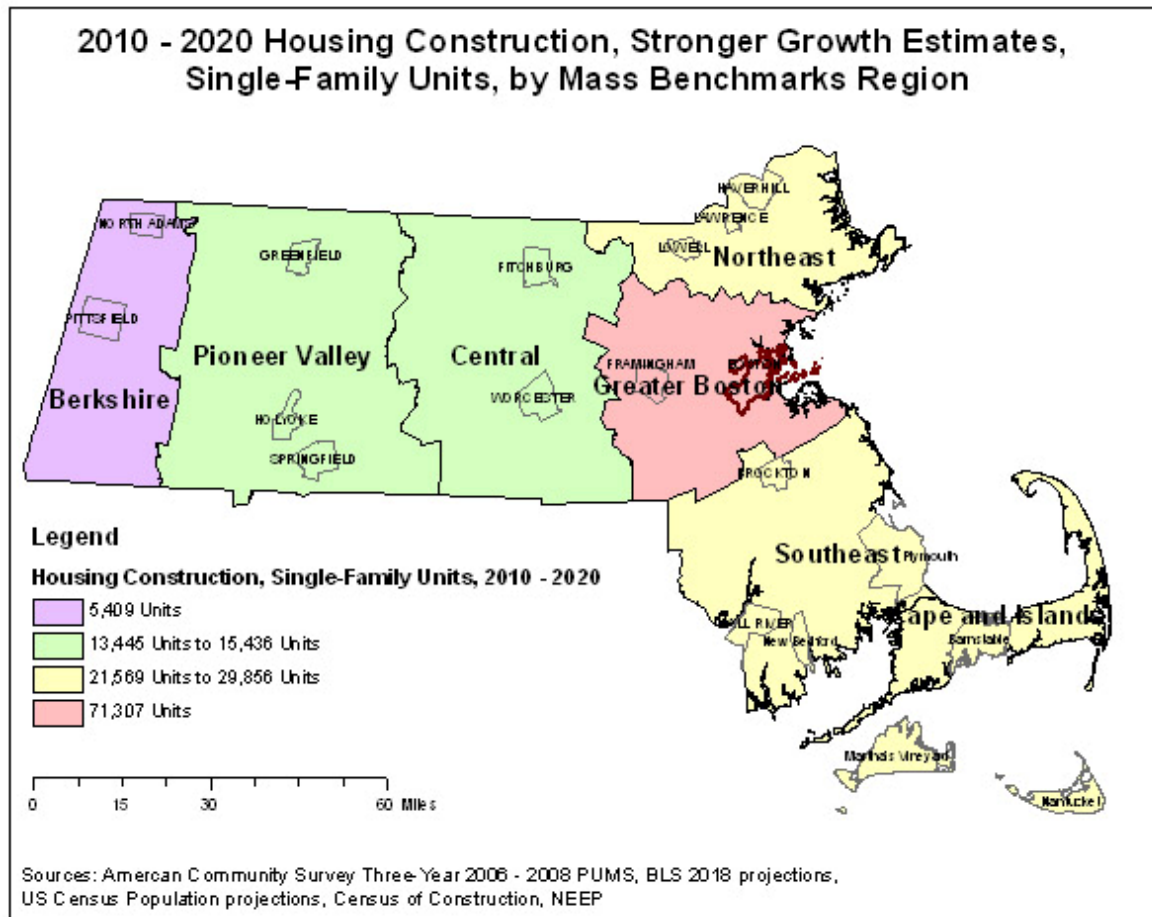
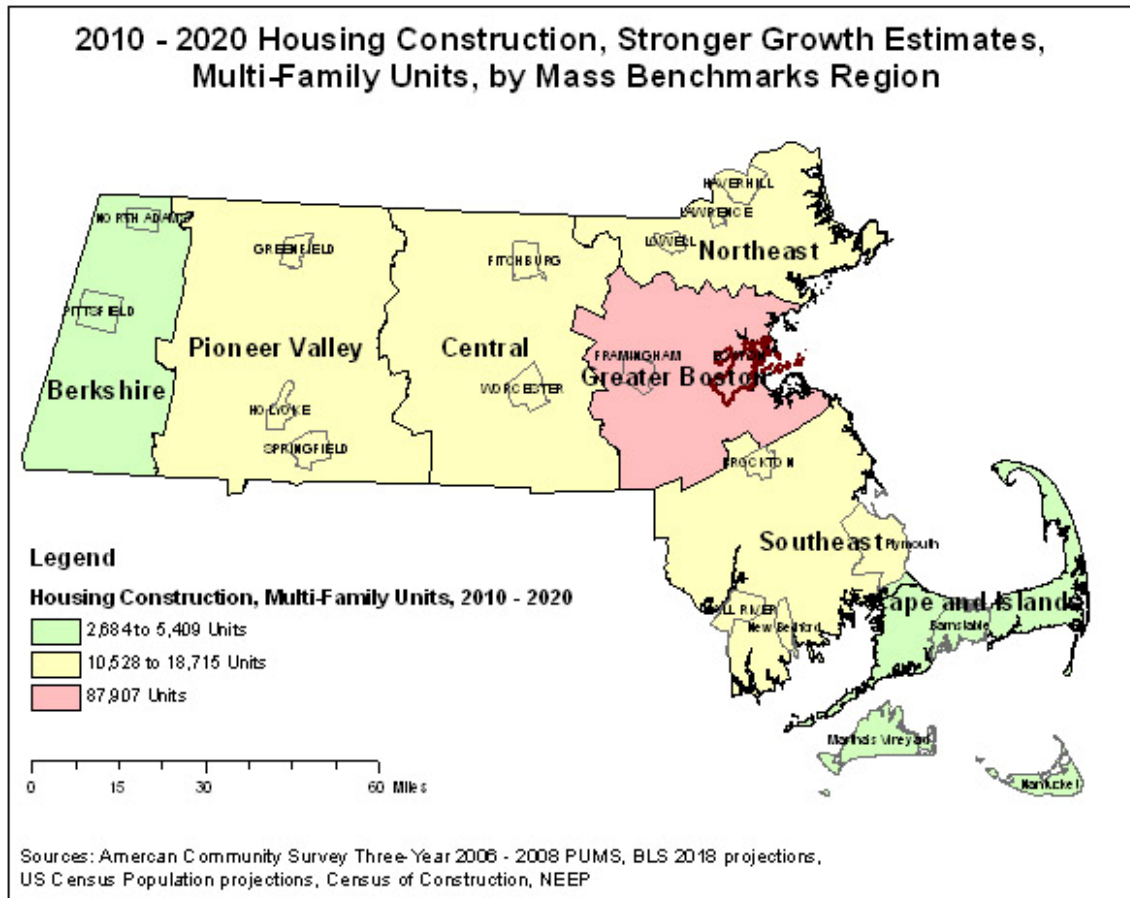


Figure B-3: Massachusetts Housing Construction, *MassBenchmarks* Region: Multi Family Units, Stronger Growth Scenario, 2010 to 2020



**Figure B-4: Massachusetts Housing Construction, Public Use Microdata Area:
All Units, Stronger Growth Scenario, 2010 to 2020**

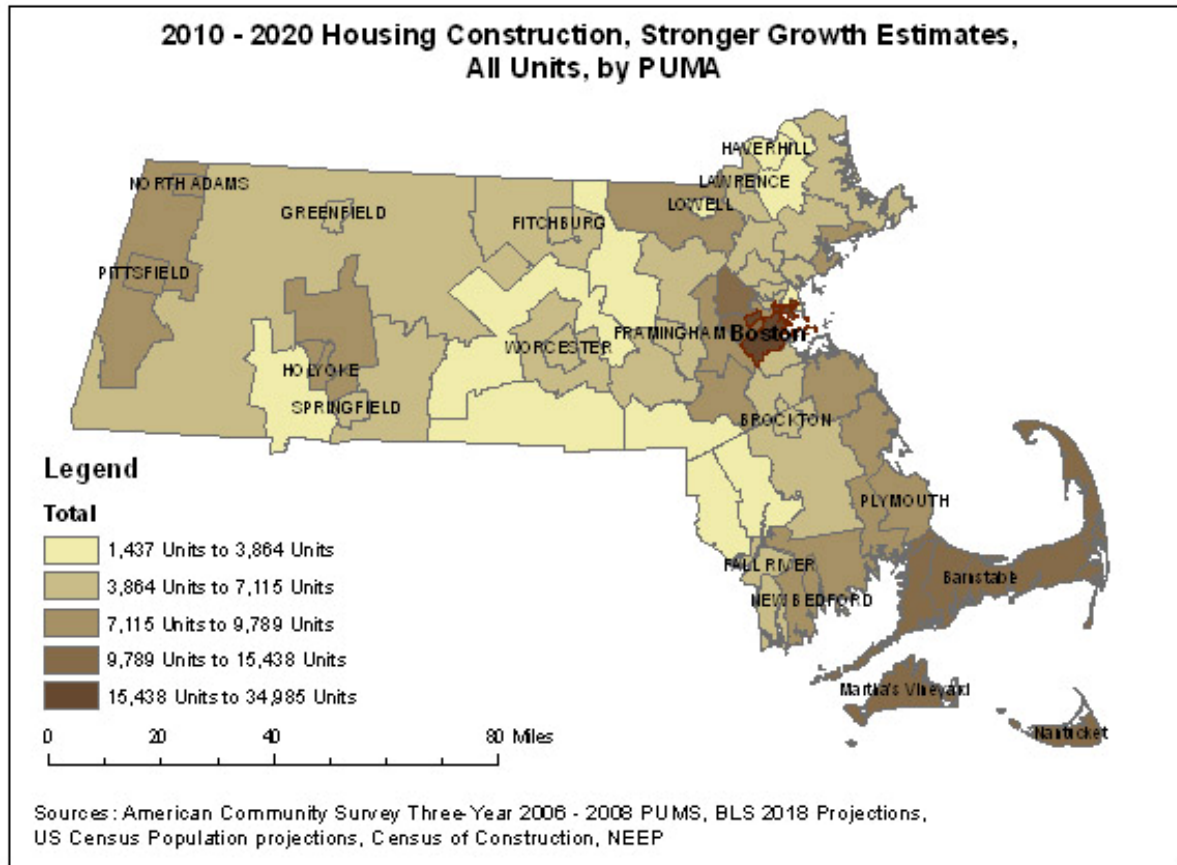
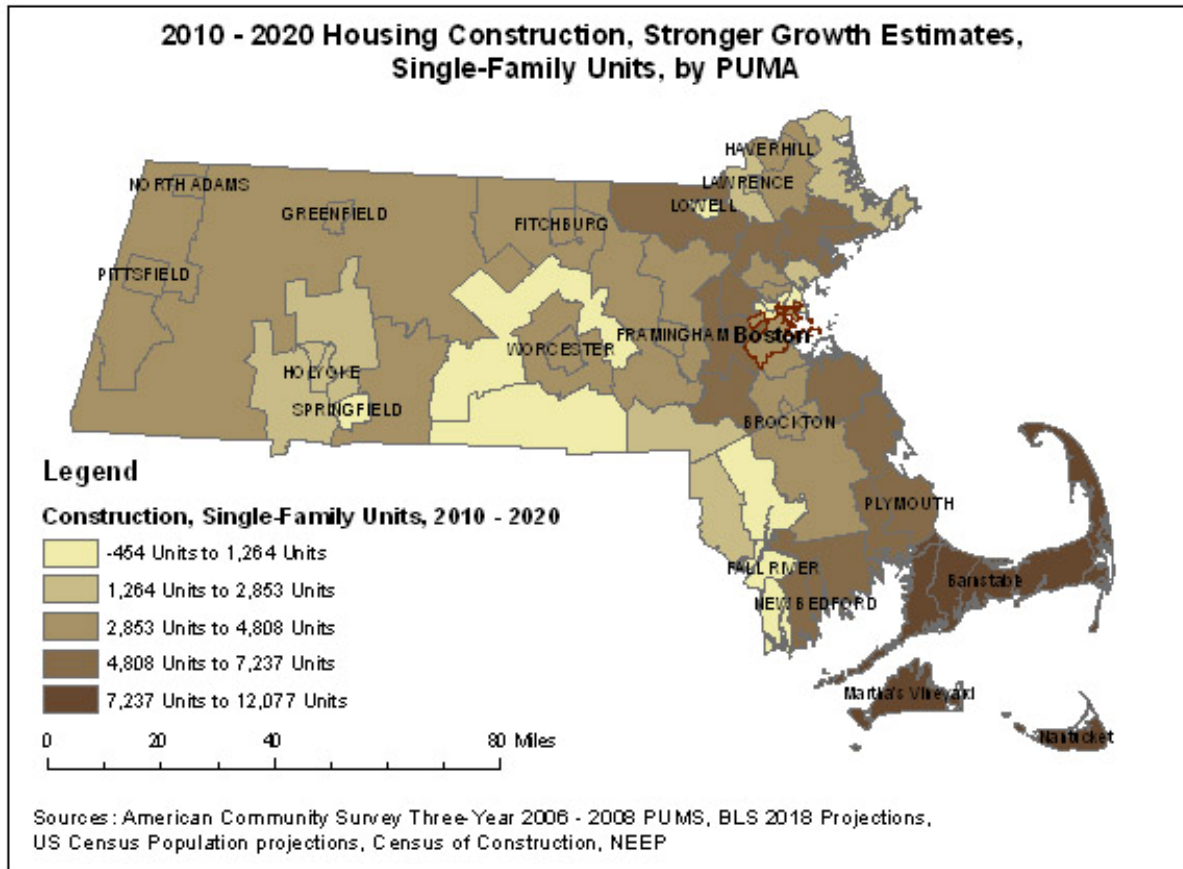
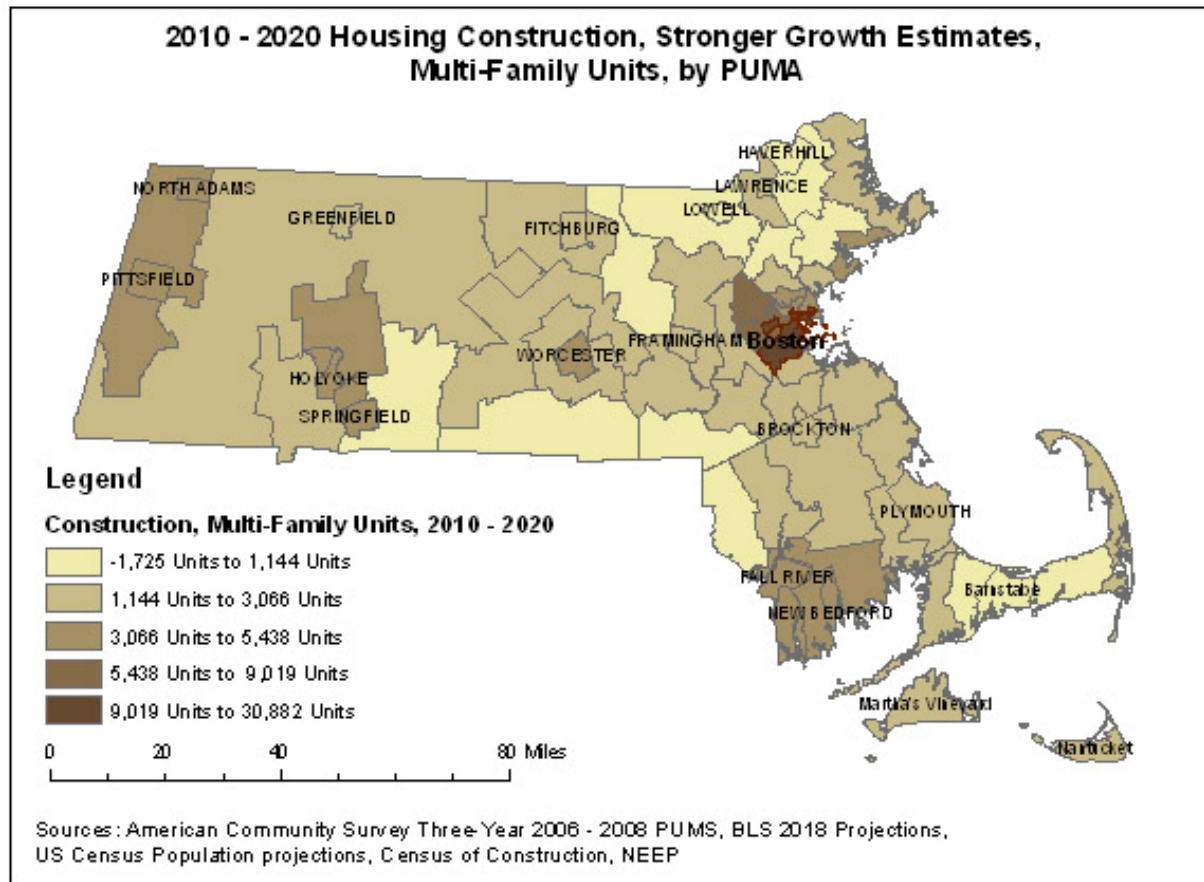


Figure B-5: Massachusetts Housing Construction, Public Use Microdata Area: Single Family Units, Stronger Growth Scenario, 2010 to 2020



**Figure B-6: Massachusetts Housing Construction, Public Use Microdata Area:
Multi Family Units, Stronger Growth Scenario, 2010 to 2020**



Appendix C: Projected Housing Demolition and Conversion

Table C-1. Annual Housing Units Lost to Demolition or Conversion in Massachusetts

	Single-Family	Multi-Family
Annual Loss Per 1,000	1.36	1.36
2010	1,674	1,529
2011	1,672	1,527
2012	1,670	1,525
2013	1,668	1,523
2014	1,665	1,521
2015	1,663	1,519
2016	1,661	1,517
2017	1,658	1,515
2018	1,656	1,513
2019	1,654	1,511
2020	1,652	1,508

Sources: U.S. Census 1990 and 2000, American Community Survey 2008

Appendix D: Housing Demand Technical Methodology

Data Sources, Targets, and Methodology

Demand for housing is estimated from the 2006-8 multiyear American Community Survey (ACS). For population and housing units, weighted totals from the ACS are controlled to the corresponding estimates derived from the Census Bureau's Population Estimates Program. Housing demand estimates should be interpreted as the average for the 2006-8 period. The ACS indicates, for each sample household, the type of housing (single-unit versus multi-unit, for example) and location by Public Use Microdata Area (PUMA).

For demand projections to 2020, the ACS is reweighted to meet certain population and employment targets, and the reweighted ACS is then used to estimate housing demand for 2020.

For the baseline scenario, population targets are derived from official Census projections for Massachusetts, and employment targets are derived from projections of labor force participation for the United States from the Bureau of Labor Statistics (BLS). The distribution of employment by industry and occupation for the baseline scenario is from the BLS/ Massachusetts Division of Unemployment Assistance (DUA) industry by occupation matrix for 2016. This matrix is referred to below as the IO matrix.

For the stronger growth scenario, the aggregate employment target is derived from the 2018 estimate for the U.S., from the BLS, projected to 2020. The Massachusetts employment target for 2020 is set to a level that yields a rate of employment growth from 2006-8 to 2020 that is 75 percent of the U.S. rate of growth over the same period. It is assumed that the extra employment over and above the baseline employment target is met by additional in-migration into the state.

Population targets are set for eight age categories (<16, 16-24, 25-34, 35-44, 45-54, 55-64, 65-74, and 75+) by two employment statuses (employed during the reference period versus not). The employed population is distributed to industry by occupation targets (12 industries by 22 occupations). Weights on the ACS are adjusted by an iterative process to meet these targets.

Baseline Projection Targets

The baseline population and employment forecasts were derived from two separate and independent official population and employment projections, and adjusted as necessary to make them consistent with one another and with the NEEP forecast from the spring of 2009. The Census Bureau's population forecast for Massachusetts is through 2030, and the BLS's employment by industry and occupation forecast is through 2016. The NEEP forecast is through 2013.

Population Targets, Baseline Scenario

Population growth rates for Massachusetts are calculated by age category, 2006-8 average to 2020, from the Census projections for Massachusetts. These growth rates are applied to the population by age category from the ACS to get the baseline population targets.

Employment Targets, Baseline Scenario

Using the estimated change in labor force participation rates for the U.S. by age category from the BLS for 2006-16 and 2008-18⁸, changes are interpolated and extrapolated to the study period, 2007-2020. Labor force participation rates for 2007 are interpolated by averaging the 2006 and 2008 labor force participation rates. Labor force participation rates for 2018 to 2020 are extrapolated using the average annual change from 2007 to 2018. The change in Massachusetts employment to population rates from 2007 to 2020 are estimated using the change in U.S. labor force participation rates from 2007 to 2020. The 2020 estimated employment is applied to population rates and to the 2020 population targets to yield employment baseline targets by age group. This yields the baseline population by employment targets. The baseline employment target -- the sum of the employment targets by age group -- is distributed to industry and occupation using the industry occupation matrix.

In order to make the employment projection plausible and consistent with the population forecast and with the NEEP employment forecast, reasonable assumptions about employment to population rates were applied to the population forecast by age cohort. It was assumed that employment to population rates for those 54 years of age and younger would be the same in 2020 as in 2006-8, while employment to population rates for those 55 and older would increase by three percentage points. An increase in participation rates for older persons during this period of time is plausible considering the improved health and longevity that would allow persons to work more years, and the economic incentive for this generation to replace wealth lost in the current recession.

Stronger Growth Projection Targets

The stronger growth scenario projects housing supply and total demand in the event that the state were to achieve a higher rate of job growth than expected by the baseline scenario, specifically a rate that is 75 percent of the projected national employment growth. This rate was chosen because it is high compared to growth rates in recent decades in Massachusetts, but could be achieved with the right set of pro-growth policies.

Employment Target, Stronger Growth Scenario

The employment growth rate for the U.S., 2006-8 to 2020 is estimated. Employment for 2018 from the BLS 2008-2018 employment projections is projected to 2020 by applying an annual growth rate of 0.8 percent -- the projected average annual growth of the U.S. labor force, 2008-18 -- from 2018 to 2020. The growth from the three-year average employment during 2006-8 (from the BLS household employment series) to the 2020

⁸ Toosi M. "Labor force projections to 2018: older workers staying more active." U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, November 2009; 30-51. Toosi M. "Labor force projections to 2016: more workers in their golden years." U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, 2007; 11:33-52.

estimate is then calculated. The stronger growth employment target for Massachusetts for 2020 is calculated by applying 75 percent of the U.S. growth rate from the prior step to the 2006-8 average Massachusetts employment from the ACS.

Stronger Growth Population and In-Migration

It is assumed that additional employment needs in the stronger growth scenario are met by in-migration. The stronger growth population by employment status targets are based on the baseline targets plus the additional population due to increased in-migration. The stronger growth employment by industry and occupation target is based on the baseline targets plus the additional employment due to increased in-migration.

The number of in-migrants by age category by employment status, and the number of working in-migrants by industry by occupation are estimated from the ACS. The results are normalized by dividing by the number of working in-migrants to get the age by employment status and industry by occupation per working in-migrant. The extra working in-migrants needed to fill the higher employment target (the stronger growth employment target minus the baseline employment target) are then calculated. The extra in-migration to age by employment status and industry by occupation for employed in-migrants is calculated using the normalized matrices.

Reweighting the ACS

The 2006-8 ACS was reweighted to meet the population by age and employment status targets for employment by industry and occupation targets. In all, there were 280 targets to achieve, 12 industry by 22 occupation targets, and eight age by two employment status targets ($280 = 12 \times 22 + 8 \times 2$). The method involved several iterations of nudging the weights for each household and household member up or down so that the targets were approximately met.

In the first iteration, each household in the ACS was processed in the following manner. The household weight and the weight for each person in the household was either increased by one percent, decreased by one percent, or left unchanged, depending on whether the new weights represented an improvement in meeting the targets. Improvement was defined by lowering a sum of squares objective function, composed by summing the squares of each of the 280 deviations of the newly weighted ACS from their respective targets. (Person weights were used in evaluating the objective function.) For two alternative weighting schemes for the ACS, the one with the lower value of the objective function is better. In the best case, where each target is met exactly, each deviation is zero, giving a value of the objective function of zero. In order to mitigate any effect on the outcome of the way the sample households were ordered in the Massachusetts ACS, the households were shuffled by means of a random assignment of order before the first iteration.

In evaluating each household, the household weight and each person's weight were first increased by one percent. If these new weights lowered the value of the objective function, then they were accepted as the new weights for this household in the first iteration. If these new, larger weights did not lower the objective function, then the household weight and each person's weight were *decreased* by one percent, and the objective function was re-evaluated. If these lower weights improved the value of the objective function, then *they* were accepted as the new weights for this household in the first iteration. If neither increasing nor lowering the weights improved the objective function, then the household and each person's weights were left unchanged in the first iteration.

In each subsequent iteration, each household was evaluated again, starting with the weights from the prior iteration. The household weight and each person weight from the prior iteration was nudged up or down by one percent of the original weight, or left unchanged, depending on the effect on the objective function.

Iterations were continued until the targets were approximately met. The rule for terminating the iterations involved forming two matrices of deviations, one an eight-by-two matrix of deviations from targets by age category and employment status, another a 12 by 22 matrix of deviations from targets by industry and occupation employment. Smaller deviations, that is, deviations closer to zero, are better. One measure of how close a matrix is to zero is the L2 norm. The L2 norm of a matrix is determined by forming the column sums of the absolute values of each element of the matrix. The L2 norm is the largest such column sum. When the L2 norm of each deviation matrix was less than 1,000, the targets were deemed to be sufficiently met and the iterations were stopped. This stopping rule was applied at the end of each iteration.

The choice of 1,000 for an L2 norm, rather than say, 10,000 or 1, was determined by the rate of improvement in the measure as well as by its smallness. The number of iterations was also a factor because it seems reasonable that a better solution, everything else being the same, is one that involves smaller changes in household and person weights. Fortunately, it appears that the resulting reweighted ACS was not sensitive to the decision of when to stop.

Appendix E: Tax Revenue Technical Methodology

State Income Tax

The Massachusetts state income tax was estimated from a micro tax simulator applied to the 2006-8 ACS, using tax law for 2005.

Household members are organized into filing units according to their relationships and the following assumptions. Each subfamily, if any, is treated as a separate household for filing unit formation. Married couples who are both living in the household file a joint return. Married persons whose spouse is not present in the household file as married filing separately. All other persons who are not dependents on someone else's form file individually as single filers, unless they are single parents with dependent children, who file as a head of household. Children who are under 18 or whose income does not exceed the "no tax status" amount of \$8,000 are considered dependents on their parents' form; else they file as single filers. Parents of the household head whose income does not exceed \$8,000 are considered to be dependents on their child's form. Children of the household head who are heads of subfamilies and whose income does not exceed \$8,000 are dependents on the household head's form. Grandchildren whose parents are dependents on the household head's form or who are in the care of the household head for more than half a year are also dependents on the household head's form.

Each filer fills out the Form 1 tax form using their income and demographic information from the ACS. Mostly, this involves straightforward assignments and calculation directly from the ACS to the tax form. However, there are a few exceptions. Some pension income – essentially government pension income – is tax exempt. The determination for each filer is made by random assignment, with the probability of such income being exempt – 13 percent – set equal to the percent of jobs in government in 2005. Dividend, interest, and rental income comprise a single income component on the ACS, but need to be allocated to separate categories for calculating tax liability. The allocation is made using a multinomial model estimated from the Current Population Survey – for which all three of these income components are separately available – conditioned on age. Half of interest income is then allocated to Massachusetts banks, and half to non-Massachusetts banks. Capital gains income is not reported on the ACS. Receipt of long-term capital gains, and the amount of long term capital gains is determined from tables provided by the Massachusetts Department of Revenue from tax year 2005 filers. Receipt of long term capital gains, conditional on eight income classes, is randomly assigned based on the filer's income. Filers receiving capital gains are then assigned the average capital gains reported for such filers in their income class. Short-term capital gains – the much smaller capital gains component – is not estimated in this simulator. Credits and voluntary contributions are also not estimated in this simulator.

The output of the simulator is a micro data set of tax filers with values for each of the lines on Form 1, including tax liability. The person weight of the tax filer is used to obtain aggregate tax liability for 2006-8, the baseline, and the stronger growth scenarios. Income and tax liability amounts are in 2008 dollars. Future incomes and tax liabilities do not include real income growth. Changes in aggregate income and tax liability in the baseline and stronger growth scenarios reflect growth in the population, and changes in the distribution of income related to changes in the distribution of age, employment, and industry and occupation of employment. For purposes of counting tax filers, filing units who have no tax liability because they are eligible for "no-tax status" – which means that they are not required to file – are not counted.

State Sales Tax

The Massachusetts sales tax paid by consumers was estimated from a micro tax simulator applied to the 2006-8 ACS, using tax law for 2006, but the new sales tax rate of 6.25 percent. A significant portion of sales taxes are paid by businesses. The estimates provided for 2006-8, the baseline, and the stronger growth scenarios only include the portion of sales taxes paid by households.

Each household's expenditures on taxable items are estimated for 16 categories of expenditures, as expected values of expenditures given by econometrically estimated consumption functions for Northeast consumer units from the 2006 Consumer Expenditure Survey (U.S. Bureau of Labor Statistics, 2008). Expected expenditures are conditioned on household income (including food stamps) and demographics of the household, including sex, age, marital status, race, ethnicity, and educational status of the household head, the size and age distribution of household members, the number of working persons in the household, the tenure status (home owned or rented), and vehicle ownership.

Each category of expenditure is classified as totally or partially taxable under the sales tax. Expenditures are not estimated for categories that were not taxable. In categories classified as partially taxable, it is assumed that 75 percent of expenditures were taxable. Taxable items include items taxable under the sales and use tax, motor vehicles, gasoline, cigarettes, and alcohol.

The output of the simulator is a micro data set of households with values for expenditures and taxes for each of the 16 categories of expenditure. The household weight is used to obtain aggregate sales taxes for 2006-8, the baseline, and the stronger growth scenarios. Expenditures and taxes are in 2008 dollars. Future incomes and expenditures and tax liabilities *do not* include income or price growth. The aggregate estimates *do* reflect growth in the population, and changes in the distribution of income related to changes in the distribution of age, employment, and industry and occupation of employment.

Local Property Taxes

Local property tax payments were estimated for each household from information available on the ACS.

Homeowners on the ACS are asked about the amount of property taxes they paid in a 68-category item. Each homeowner is assigned the midpoint of the category range they selected.

The property tax question was not asked for renters, so property taxes are based on their monthly net rent. Property taxes are estimated to be 0.951 percent of the value of their unit, where the tax rate is the statewide average property tax on real estate in 2007 (Massachusetts Taxpayers Foundation, 2008). The value of their unit is estimated by applying the price to rent ratio of 221 for the Boston/Quincy Metro Division (HousingTracker.net, 2008). So property taxes are estimated by multiplying monthly net rents by a factor of 2.10171 (= 221 x .00951). Monthly rents are available on the ACS. When utilities are included in rents, the estimated monthly value of these utilities are subtracted from the reported rent. These estimates were obtained from a regression of the utility payments on the number of rooms, where the regressions were estimated on renters for whom the utility payments were not included in rent, and therefore were reported separately.

These estimates are available in a micro data set of households. The household weight is used to obtain aggregate sales taxes for 2006-8, the baseline, and the stronger growth scenarios. Property tax payments are in 2006-8 dollars. (The adjustment factors provided in the ACS for income and household dollar items were *not* applied for property taxes.) Future property tax estimates *do not* include changes in housing values or property tax rates. Future aggregate property tax payments *do* reflect growth in the population, and changes in the distribution of housing related to changes in the distribution of age, employment, and industry and occupation of employment.

References

- Belsky, E., Drew, R., and McCue, D. Projecting the Underlying Demand for New Housing Units: Inferences from the Past, Assumptions about the Future. Joint Center for Housing Studies, Harvard University. November 2007.
- HousingTracker.net. (2008). Price/rent ratio. Retrieved December 23, 2008, from <http://www.housingtracker.net/affordability/massachusetts/boston>
- Massachusetts Taxpayers Foundation. (2008, November). Municipal financial data (38th ed.). Boston: Massachusetts Taxpayers Foundation.
- Toosi M. Labor force projections to 2016: more workers in their golden years. U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review. 2007;11:33–52.
- Toosi M. Labor force projections to 2018: older workers staying more active. U.S. Department of Labor, Bureau of Labor Statistics, Monthly Labor Review, November 2009;30-51.
- U.S. Bureau of Labor Statistics. (2008). 2006 Consumer Expenditure Interview Survey Public Use Microdata documentation. 2008, February 19. Washington, DC: Bureau of Labor Statistics, Division of Consumer Expenditure Surveys, U.S. Department of Labor.
- U.S. Census (2009). American Community Survey Public Use Microdata 2006-2008. Retrieved March 14, 2010 from http://factfinder.census.gov/home/en/acs_pums_2008_3yr.html.