



Closing the Massachusetts Skills Gap: Recommendations and Action Steps

April 2013



Commonwealth Corporation strengthens the skills of Massachusetts youth and adults by investing in innovative partnerships with industry, education, and workforce organizations. Its purpose is to meet the immediate and emerging needs of businesses and workers so they can thrive in Massachusetts's dynamic economy. Through its work, Commonwealth Corporation is known for its expertise in developing nationally recognized and innovative programming, creating multiple education and employment pathways for teens and young adults to succeed, and building the Commonwealth's workforce development capacity. Commonwealth Corporation is a quasi-public organization within the Massachusetts Executive Office of Labor and Workforce Development. For more information about Commonwealth Corporation, visit our website, www.commcorp.org.

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Recommendations and Action Steps

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Acknowledgements

This report is the culmination of an 18-month project to better understand labor demand and labor supply across the state. To this end, we collaborated with the New England Public Policy Center at the Federal Reserve Bank of Boston to produce eight regional labor market reports. We were truly fortunate to have the Center as our partner. In particular, we would like to thank Robert Clifford, Darcy Saas, and Yolanda Kodryzcki for their commitment to this project. While this statewide report is solely a Commonwealth Corporation product, we relied heavily on the Center's previous work for the data presented in this report.

Many other people contributed to this effort. In each of the eight regions of the state, we collaborated with local partners to present the regional data and engage local stakeholders in a dialogue about the future. Their comments and insights have strengthened our work.

We started this project with the belief that timely and comprehensive labor market information is critical to informed decision-making by regional policymakers and practitioners. We believe that labor market demand and supply data are essential tools in creating a common vision and strategy to better align training and education with job requirements. The feedback that we have received during the last 18 months confirms these beliefs.

We hope this report and the eight regional reports will continue to be such a resource. We welcome your feedback and invite you to become more involved with Commonwealth Corporation.



Commonwealth Corporation would like to thank Eastern Bank for generously supporting the production of this report.

Closing the Massachusetts Skills Gap: Recommendations and Action Steps

Executive Summary

Massachusetts Faces a Skills Gap

The Commonwealth has the most highly educated workforce of any state in the country. Driven by knowledge and innovation industries, much of our economy requires high levels of education and credentialing. We also have an aging workforce and many of our most highly educated workers are approaching retirement or reducing their working hours. While our educational attainment levels continue to rise, our emerging and incumbent workers require ongoing skill development, credentials, and work experience so that they can compete for jobs and meet the talent needs of the Commonwealth's employers.

All over the state, within each of its distinct regional economies, significant gaps exist between the skills and education of the workforce and the labor market demands of employers. This report aims to understand and address this issue in a way that is most useful to educators, businesses, employers in all industry sectors, and policy makers, and to recommend future policy and action steps.

This report defines a problem and issues a call to action. It serves as the final product of a project called ***Skills Gap: Supply and Demand in the Massachusetts Economy***, a joint venture of the New England Public Policy Center of the Federal Reserve Bank of Boston and Commonwealth Corporation. The collaboration has included a series of detailed profiles documenting labor market conditions in eight regions of the state, and eight regional convenings of business, education, workforce, and government leaders to discuss the data, share experiences and best practices, and consider action steps. Building on that regional work, this report documents statewide trends, placing the Massachusetts experience in the national context. It concludes with a set of recommended systems, innovation and policy action steps that local and state leaders can take.

Massachusetts's Labor Supply

Massachusetts's overall population is growing and becoming more diverse. Our labor force growth continues to depend on immigration, and the rates of growth and diversification of our population and workforce are substantially slower than those of the US as a whole. The state has an older population and an older workforce than the nation, and we are aging more rapidly than the country, as well. Although the Commonwealth's workforce is the best-educated of all the states and the levels of educational attainment have increased, a very high concentration of our most-educated workers are 45 years or older. Our younger workforce is neither large enough, nor well educated enough, to replace those who will soon retire, and young workers between the ages of 16 and 24 are disproportionately unemployed. Boston/MetroNorth is the exception to this pattern, with a large volume of younger workers, many of them highly educated.

Significant gaps exist between the skills and education of the workforce and the labor market demands of employers.

Labor Market Demand

While Massachusetts is enjoying a more rapid recovery from the Great Recession than the nation as a whole, much of the growth is in industry sectors that demand high levels of educational attainment: health services, education, and professional and technical services. Growth in employment has been greatest where the skill demands are highest. Even as educational attainment is rising in the population as a whole, the demand for skills and education keeps increasing. Younger workers and those with a high school degree or less face particularly harsh prospects.

The Massachusetts Pipeline

More certificates, associate's, and bachelor's degrees are being earned in Massachusetts, but our growth of associate's and bachelor's degrees trail the national rate. At the same time that part-time enrollments are growing nationally in bachelor's degree programs, Massachusetts is seeing a decline in these part-time enrollments. In a time in which additional post-secondary education drives employment opportunities, full-time workers in Massachusetts have difficulty earning a bachelor's degree. In addition, the certificates and degrees that are being earned often do not align closely to regional skill demand.

As a Commonwealth, we continue to struggle to build and expand effective pathways for younger and less well-educated workers to gain employment, although some emerging models show great promise in a small number of regions. Further, businesses and employers are making fundamental shifts in their models for hiring, seeking higher levels of productivity from existing employees, using "just-in-time" hiring practices, making greater use of temporary employees, and "trying out" workers in extended forms of probationary employment before hiring them. All these practices warrant changes in strategic approaches by the education and workforce development sectors in order to better connect job seekers with work opportunities.

Towards An Effective Pipeline: Strategies for Closing the Skills Gap

What is most crucially needed in the state, and within each region, is a pipeline – a set of linked, flexible, systemic steps through which people at various stages of educational attainment and work experience can progress, in order to build their skills and be able to respond to the demands of the labor marketplace. Pipelines are powerful tools because they can address both sides of the skills gaps issue: they can provide people in the workforce with the things they need to know and be able to do, and they can be built and shaped to respond to the changing nature of what employers are seeking and what employers need from their workers.

Current Action

There are a number of efforts in the Commonwealth that begin to strengthen the pipeline and build stronger connections between institutional sources of labor supply and the skill demands of businesses.

The secretaries of labor and workforce development, economic development, and education have joined forces in a regional planning approach to shape career pathways in key industries and create pipeline programs for youth and adults.

The Governor and the Legislature acted to strengthen the alignment of community college certificates and degrees with skill demands in the regional economy, and tie formula funding to performance.

Through a United States Department of Labor grant, the Commonwealth's community colleges are working collaboratively toward a "transformation agenda" that includes the development of "stackable" programming so that each credential builds upon prior certifications, toward future, higher levels of certification and diploma options.

Massive Online Open Courses (MOOCs) are being offered by elite national universities in partnership with secondary and post-secondary education to expand access to continued learning for students of all ages.

These efforts create a foundation on which to continue to build systems, policies, and programs that result in pathways that prepare emerging workers, unemployed workers, and incumbent workers for good jobs that are in demand in the Massachusetts economy.

Recommendations

Our research leads to recommendations that focus on innovations at the state, regional, and program level that draw on the successful efforts of others. These include:

Improve employment outcomes for young workers. Build more robust onramps for young workers beginning with teens and continuing through post-secondary education. Include work experiences, internships, and coaching for high school and post-secondary students and training for businesses on ways to be flexible, creatively adaptive, and nimble.

Expand the scale and intensity of Adult Basic Education and English language programs. Expand adult basic education and English language programs, align adult basic education programs and post-secondary institutions so that students can test into college level courses. Forge stronger and more strategic partnerships between industry and secondary and post-secondary education. Help teachers and professors understand industry shifts and the application of learning at the workplace.

Align education with persistent and emerging skill needs. Develop education and training that is closely linked to industry, can respond quickly to changing needs, and is offered in flexible and accelerated models that meet the needs of working adults. Improve access to labor market data and develop strong and effective regional partnerships between industry, education, and workforce organizations.

Craft more effective and accessible educational models that support ongoing skill development and lifelong learning. Provide existing workers with opportunities to develop their skills and acquire credentials. Develop an articulated education ladder with multiple, intersecting pathways through secondary and post-secondary education. Advance innovations in knowledge and skill transfer for companies and industries with older workforces.

Further Study

Finally, there is much that is not yet fully understood about the skills gaps in Massachusetts and how best to close them. It will benefit the state to study these issues further, document the most effective innovations in the state, understand better why some areas of education and training have not been growing to keep pace with labor market demand, and explore further the experiences of workers, educators, employers, and policymakers as they work together to solve this problem, and to close the gap.



I. Introduction

Skills Gap: Supply & Demand in the Massachusetts Economy is a joint venture of the New England Public Policy Center of the Federal Reserve Bank of Boston and Commonwealth Corporation. Its purpose is to provide education, workforce development, business, and government leaders in Massachusetts with data, analysis and ideas for policy innovation and action in the ongoing effort to close the skills gap in the Commonwealth.

In 2012, the Skills Gap Initiative published a series of reports profiling the labor supply, labor demand, and pipeline conditions in eight geographic regions of the state. In order to support and accelerate the examination and application of these in-depth data analyses, the Initiative convened eight regional meetings of education, workforce, government, and business leaders to share findings, focus on innovations and policies that help to close the skills gap, and promote ongoing collaboration and regional strategic work. Between June and December 2012 more than 1,000 people attended these sessions across the Commonwealth. Multiple workforce investment boards, chambers of commerce, higher education leaders, and regional nonprofit leaders contributed to the success of these meetings through their outreach and organizing efforts. The reports published for each of the regional sessions have been widely distributed to leaders and policy-makers; you can access them online at the New England Public Policy Center's website.

Robert Clifford, policy analyst at the New England Public Policy Center, was the author of the eight regional reports and he contributed much of the data analysis used in this report. All of the Initiative's reports, including this one, draw on the earlier work of Paul Harrington and Neeta Fogg, formerly at Northeastern University's Center for Labor Market Studies. Commonwealth Corporation staff have substantially guided the application of this data analysis, incorporating findings from the field and the eight regional convenings, to shape the report's recommendations for policy and action.

"Closing the Massachusetts Skills Gap" seeks to synthesize the key findings into a single statewide report that can be of use to policy makers, program innovators, businesses, and others in the state who are seeking to close skills gaps. While it is informed by the analysis in the regional reports, unlike them, it attempts to capture the core statewide issues on labor supply, labor market demand, and pipeline development in the Commonwealth as a whole. The report's recommendations were developed by the Commonwealth Corporation based on its experiences and complementary research. By highlighting promising innovations and pointing out policy opportunities and action steps going forward, the Commonwealth Corporation hopes this can serve as a tool for leaders who recognize the pressing need for additional policy change and innovation.

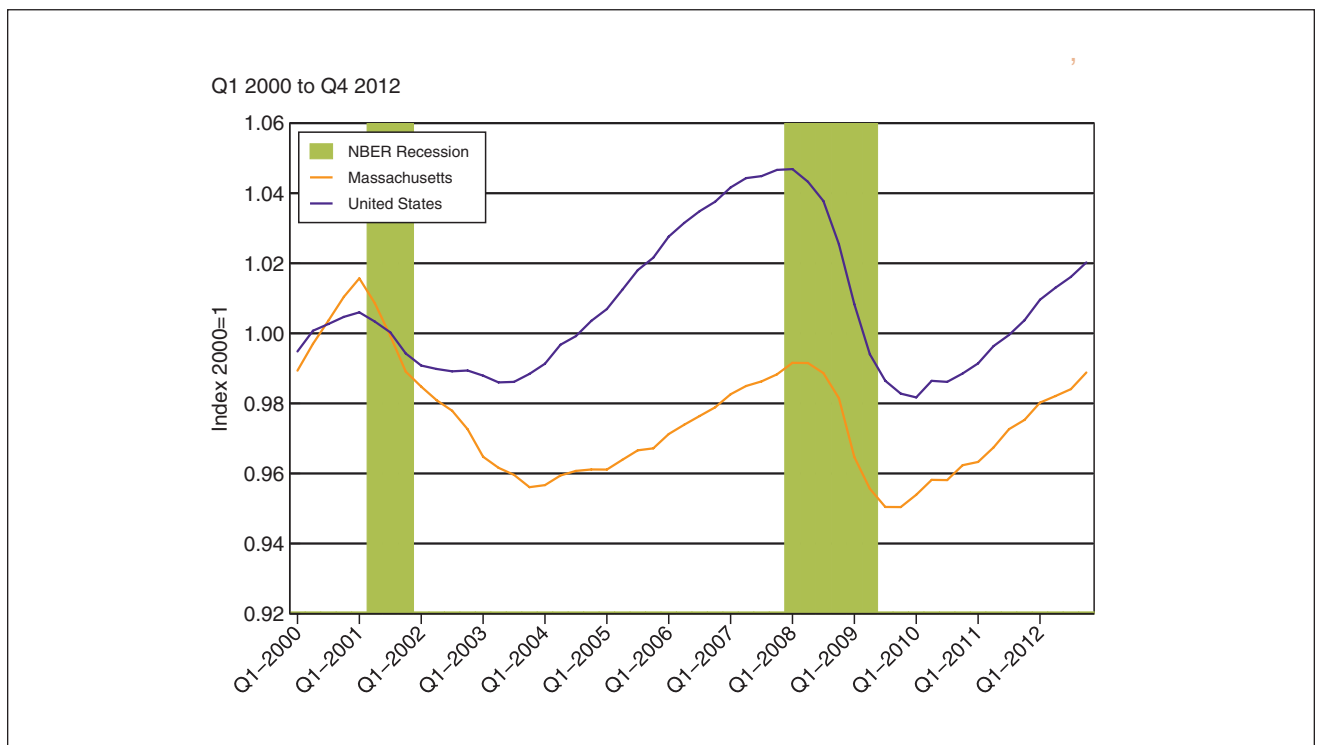
II. Understanding Massachusetts's Labor Supply

Employment Trends of Massachusetts

Massachusetts's employment trends contrast with those of the United States.

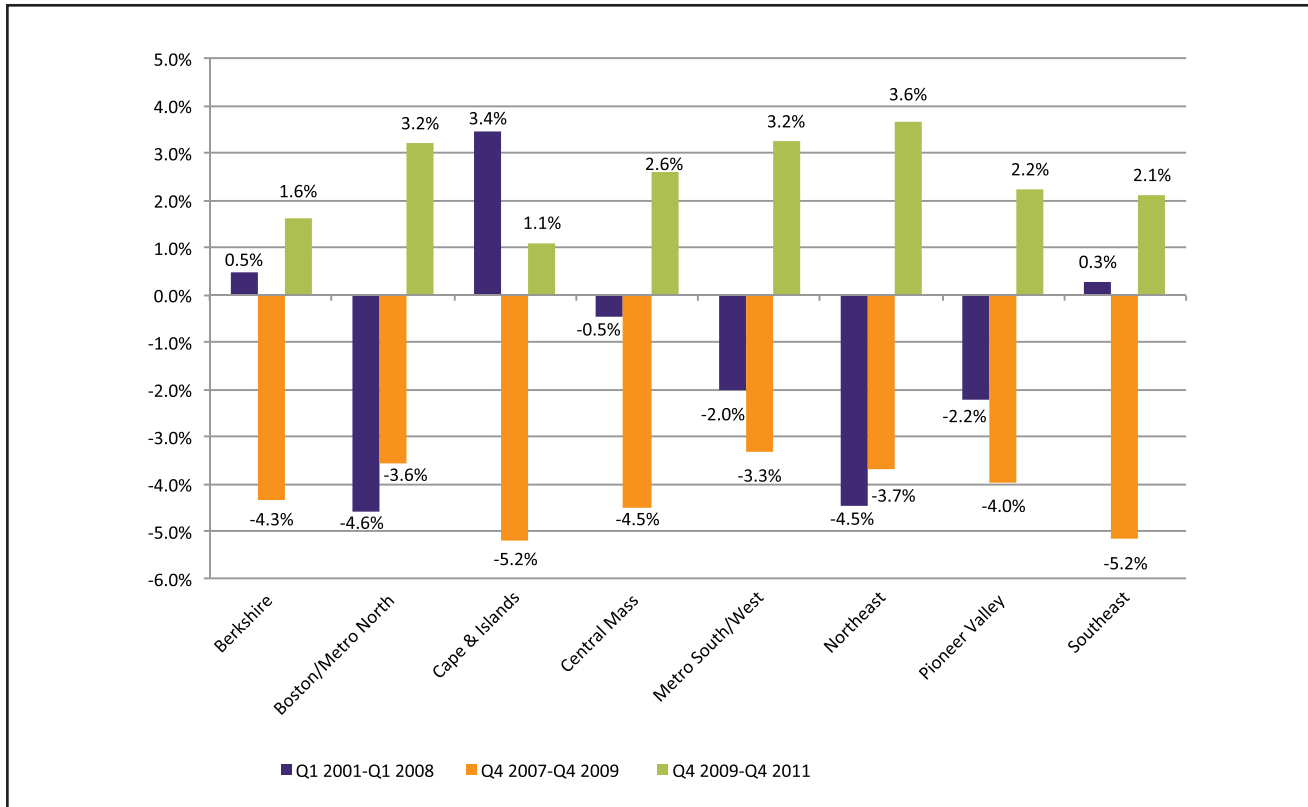
Although it was hit harder than the United States by the economic downturn at the start of the millennium, the Commonwealth took less of a blow than the US during the Great Recession and experienced a stronger initial recovery, but has started to fall behind the pace of the national recovery in recent years. Massachusetts reached peak employment in 2001 and still remained 2.6 percent below that mark (a loss of 89,500 jobs) at the end of 2012. Over the same period, total employment in the United States ended 1.4 percent above its 2001 peak (a gain of 1,878,300 jobs). One reason for the difference was that the short national recession at the beginning of the decade created a prolonged contraction and slow recovery in Massachusetts. By the start of the Great Recession, Massachusetts had still not recovered all of the jobs it had lost during the previous downturn. In contrast, the nation experienced a short labor market contraction in 2001, followed by a strong recovery that expanded employment up until the Great Recession. The Great Recession impacted the nation severely, while Massachusetts experienced a less pronounced downturn, with a slightly stronger recovery through 2010, followed by slower employment growth in 2011 and 2012. (Figure 1)

Figure I Non Agricultural Employment, Q1 2000 to Q4 2012



Within Massachusetts, the regions with the largest employment loss in the Great Recession of 2008 were the Cape & Islands and the Southeast, each experiencing job losses of 5.2 percent. Employment gains in the recovery (2009-2011) were uneven across regions of the state, with the Northeast experiencing the highest rate of employment gain at 3.6 percent and the Cape & Islands experiencing the lowest rate of employment gain at 1.1 percent. (Figure 2)

Figure 2 Changes in Total Employment



Massachusetts Population Demographics

Massachusetts's population is increasing and becoming more diverse, but at a slower pace than the United States.

The overall population of Massachusetts increased in the past decade, but at a significantly slower rate than the country as a whole. With annual growth rates of less than 0.3 percent over the 2000-2010 decade, the state lagged behind the national annual growth rate of nearly 1.0 percent in the same period. There were significant differences in growth rates across regions of the state, with the highest rate of growth over the decade in Central Massachusetts and declining populations in Berkshire and Cape & Islands. The Metro South/West region also experienced declining population in the second half of the decade. (Figure 3)

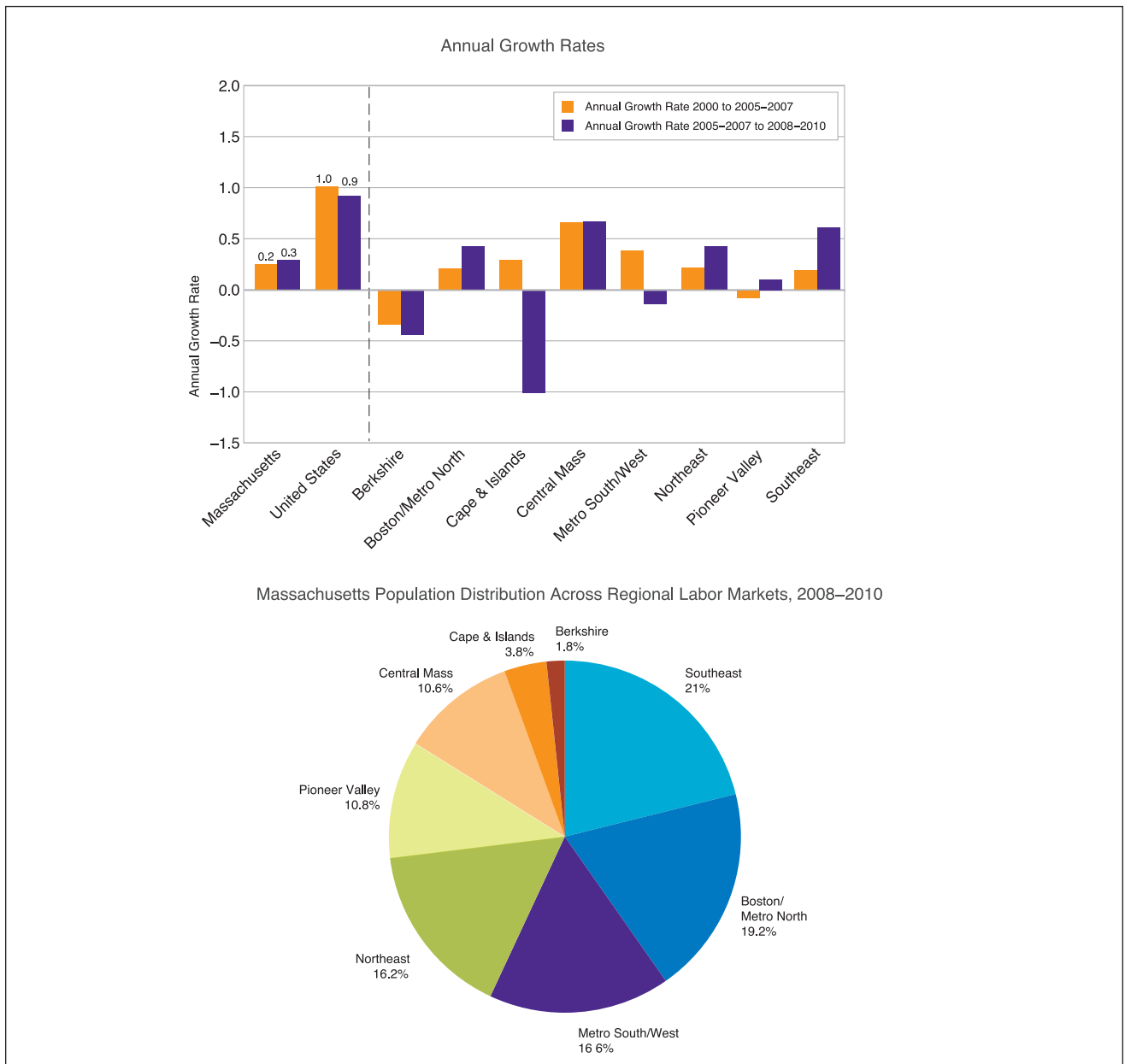
While it experienced only a modest 2.4 percent increase in its overall population, Massachusetts saw rapid growth in several populations of residents, becoming more diverse as a result of those changes. While the state remains less diverse than the nation as a whole, the overall population of white, non-Hispanic people dropped from nearly 82 percent to less than 77 percent. In the past decade, Black non-Hispanic Massachusetts residents went from 4.9 percent of the population to

6.1 percent, Asian non-Hispanic residents increased from 3.9 percent to 5.3 percent, and Hispanic residents grew from 6.7 to 9.4 percent of the population. Other, non-Hispanic residents declined from 2.7 to 2.3 percent. (Figure 4)

Massachusetts is growing older.

In the overall Massachusetts population, the two age cohorts that grew the most in the past decade were people aged 45-54, a cohort that increased by 14.3 percent, and people aged 55 to 64, whose numbers grew by 42.6 percent. Only one younger cohort grew in this period: those between 16 and 24 increased by 13.3 percent. The state saw declines in the populations of chil-

Figure 3 Annual Growth Rates and Mass. Population Distribution Across Regional Labor Markets



dren under 16 (-6.9 percent), young adults between 25-34 (-9.6 percent) and adults 35-44 (-14.8 percent). In total population, those 45 and over increased in number by 396,752, while those 44 and younger declined by 252,858. (Figure 4)

Massachusetts's immigrant population has grown substantially in the past decade, and accounts for virtually all population growth within the state.

In the past decade, the immigrant population of Massachusetts has grown at a pace of 2.3 percent annually, and 22.7 percent overall – a rate that far exceeds the overall growth in the population as a whole. Were it not for the growth in immigrant population, which topped 200,000, the Commonwealth would have decreased in total residents by over 55,000.

Immigration plays a similar role in the population of each of the regions of the state: growth in population has occurred in those regions which have experienced an increase in immigration. Regions attracting immigrants are growing; those without significant immigrant populations are either maintaining their size or declining in population. (Figure 5)

Interestingly, where diversity in racial and ethnic populations is concerned, a “rich get richer” dynamic is at work in the state. The regions that grew in population in the past decade (Central Mass, Boston/NorthMetro, Northeast, Southeast) were those that were already more ethnically

Figure 4 Population Characteristics in Massachusetts, 2000 to 2008-2010

	2000	2008-2010	Absolute Change	Percent Change	Annual Growth Rate
Total Population	6,131,752	6,275,646	143,894	2.35%	0.26%
Nativity					
Native Born	5,241,790	5,183,529	-58,261	-1.1%	-0.1%
Immigrant	889,962	1,092,117	202,155	22.7%	2.3%
Race/Ethnicity					
White, non-Hispanic	5,026,398	4,827,483	-198,915	-4%	-0.5%
Black, non-Hispanic	300,758	381,488	80,730	26.8%	2.7%
Asian, non-Hispanic	225,949	332,793	106,844	47.3%	4.4%
Hispanic	412,496	588,635	176,139	42.7%	4.0%
Other race, non-Hispanic	166,151	145,247	-20,904	-12.6%	-1.5%
Age					
Less than Age 16	1,338,283	1,246,135	-92,148	-6.9%	-0.8%
Age 16-24	623,676	706,303	82,627	13.3%	1.4%
Age 25-34	906,103	819,049	-87,054	-9.6%	-1.1%
Age 35-44	1,053,762	897,479	-156,283	-14.8%	-1.8%
Age 45-54	867,126	991,268	124,142	14.3%	1.5%
Age 55-64	540,381	770,443	230,062	42.6%	4.0%
Age 65+	802,421	844,969	42,548	5.3%	0.6%

Figure 5 Immigration Trends by Region, 2008-2010

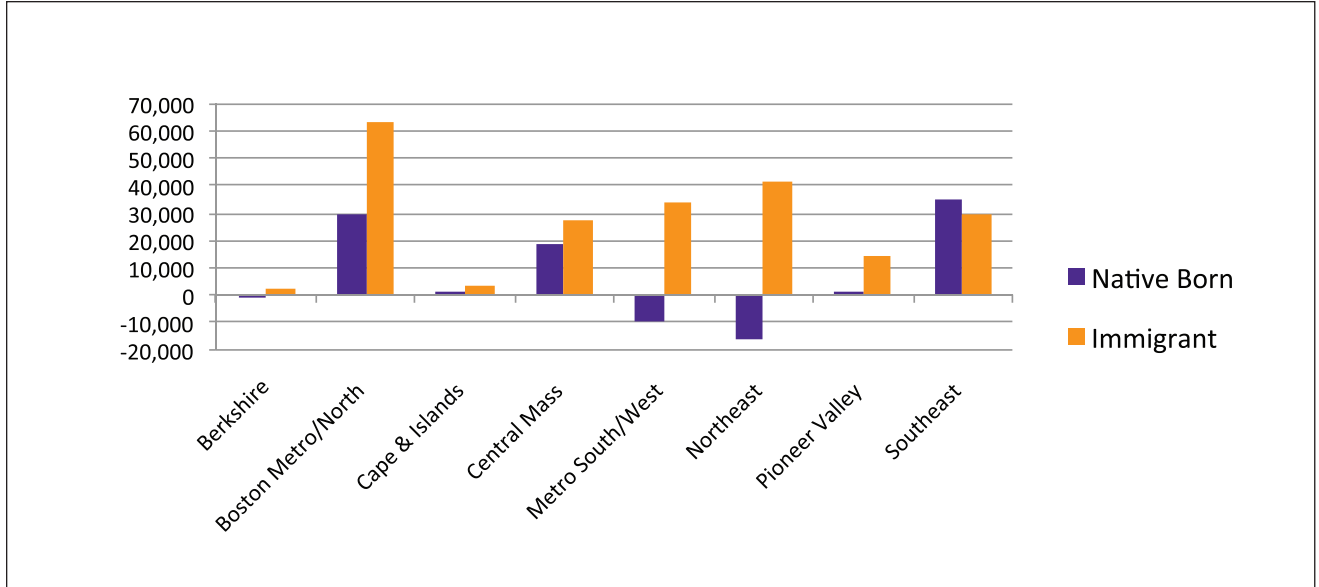
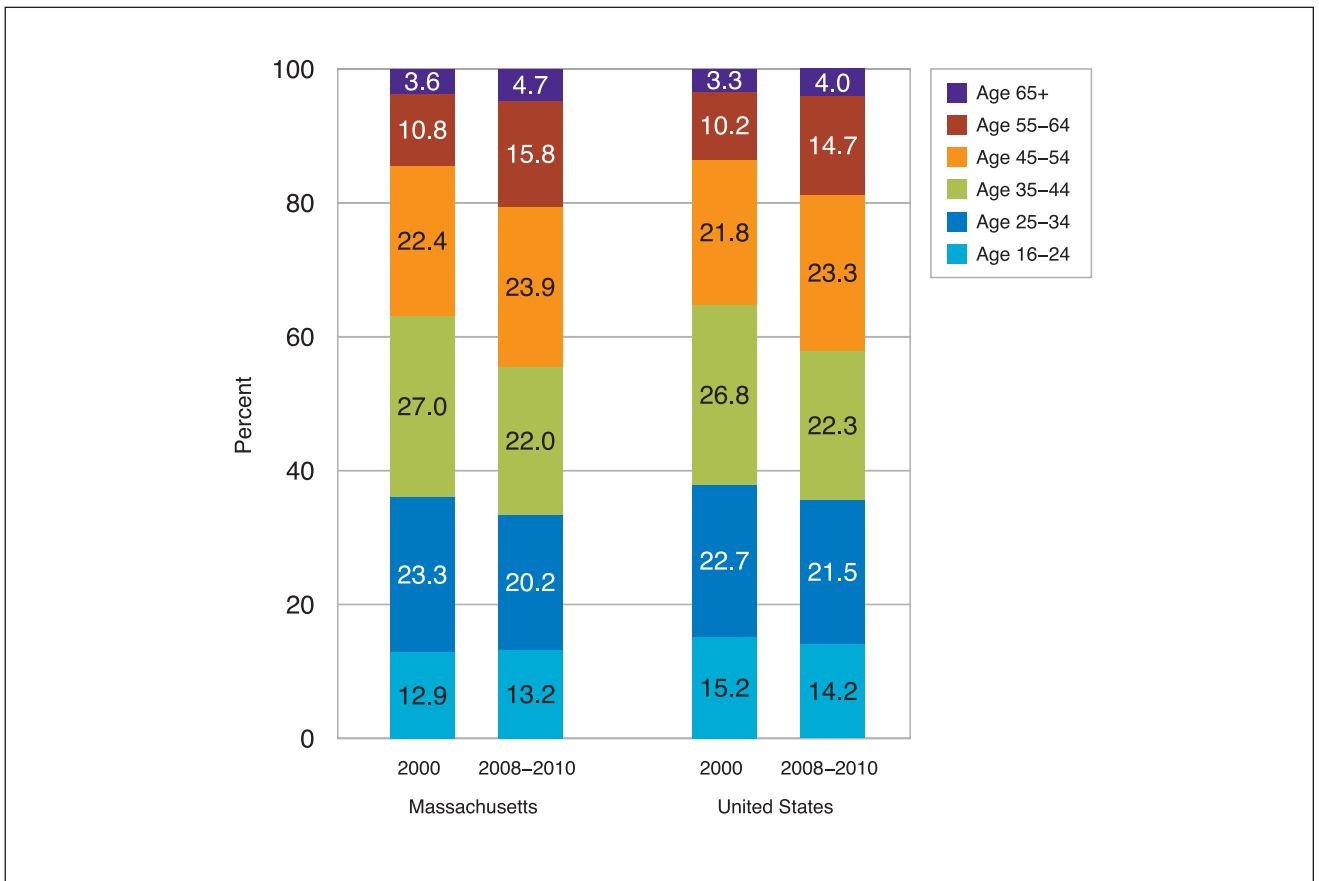


Figure 6 Age Distribution of the Civilian Labor Force, 2000 and 2008-2010



and racially diverse than other regions. By attracting new residents, who are often immigrants, these regions have become even more diverse. In distinct contrast, those regions that began the decade with limited diversity in their resident populations, Berkshire and Cape & Islands regions in particular, attracted the fewest immigrants, lost population overall, and remained the least diverse regions at the end of the decade.

Massachusetts Workforce Demographics

In turning our attention to the characteristics and dynamic changes in the Massachusetts workforce, we note some very clear trends, which both amplify and refine what we can learn from the population data reviewed above.

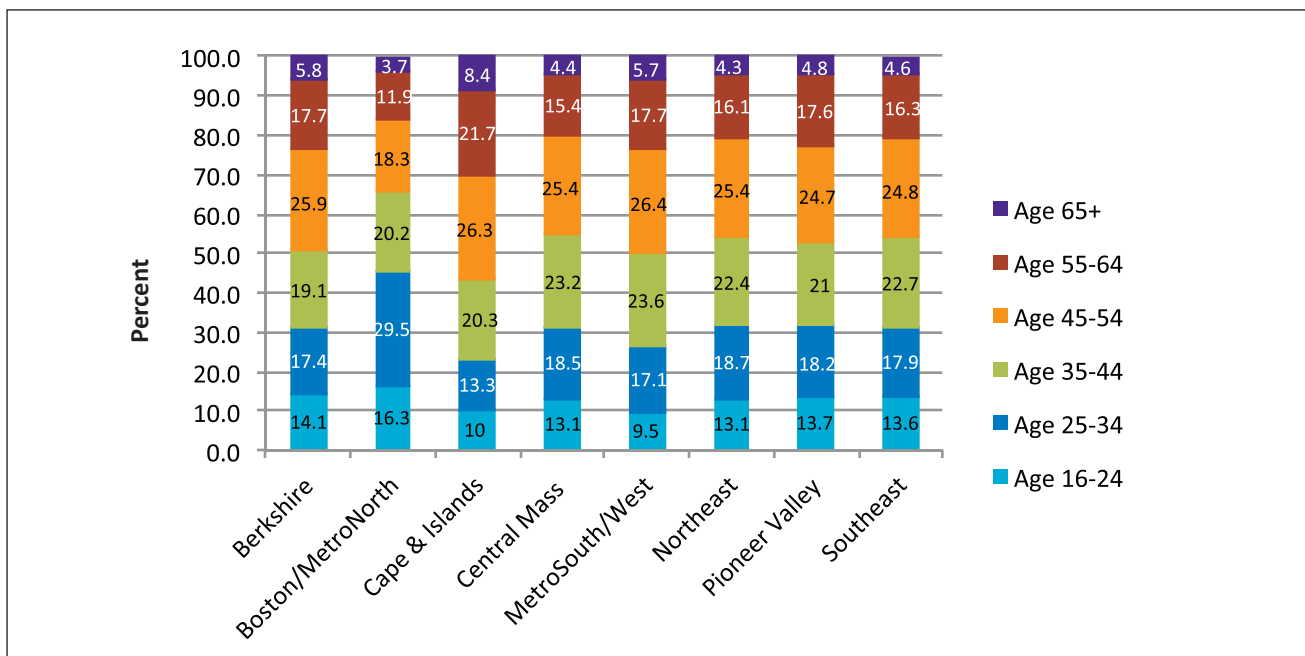
Compared with the workforce of the United States as a whole, Massachusetts workers are older, and aging more rapidly.

In 2000, 36.8 percent of the Massachusetts civilian workforce was 45 years old or older; ten years later, that proportion had climbed to 44.5 percent. By contrast, the US workforce was 35.3 percent 45 or older in 2000; although it also aged, it did so at a slower rate than Massachusetts, standing at 42.0 percent in 2010. (Figure 6)

The distribution of workers by age varies between the regions of the state, but all regions saw an increase in the age of their workforce. The proportion of workers who are 45 or older is very pronounced in three regions: in Berkshire, 49.4 percent of all workers are 45 or older, in Metro South/West, that proportion is 49.8 percent, and in the Cape & the Islands, fully 56.4 percent of all workers are 45 or older. (Figure 7)

One region stands out as exceptional. The workers of Boston/MetroNorth region are by far the youngest in the state, with 65 percent of the workforce under the age of 45 in 2010. But even

Figure 7 Age Distribution by Region, 2008-2010



in this much younger regional workforce, the aging of the working population is underway, with those over 45 growing steadily in number. Ten years earlier, the fraction of workers under the age of 45 in Boston/MetroNorth was even higher, at 70 percent.

Massachusetts has a slightly lower share of workers under the age of 35 than the US. The Boston/MetroNorth region has the highest share of workers under the age of 35 (46%) by a significant margin. The Cape & Islands at 23 percent and Metro South/West at 27 percent have the lowest shares of workers under the age of 35. This presents potential issues for each of these regions as older workers begin to retire. (Figure 8)

Massachusetts has among the most highly educated workforces in the United States, and the level of education attainment has increased in recent years.

The educational attainment of the Massachusetts workforce is higher than all but the District of Columbia, and much higher than the US as a whole. 41.2 percent of the Mass. workforce has a bachelor's degree or higher, as compared with 29.6 percent in the US; 39.2 percent have a high school degree or less in Mass.; that number is 45.2 percent nationally. (Figure 9)

Across the state, the proportion of people in the workforce who have attained Some College, Associate's degrees, or higher increased: 67.8 percent of the workforce is at this level, as compared to 61.9 percent of the US workforce. Furthermore, all regions of the state showed increases in overall educational attainment, from 2008 to 2012.

Educational attainment is concentrated among older workers.

In the state as a whole and in most of the regions, the largest concentration of educational attainment is in the older cohorts of workers, those 45 years and older. As more baby boomers retire, there is a particular concentration of high levels of educational attainment among people in the 45-54 age group. (Figure 10)

Figure 8 Share of Young Workers by Region, 2008-2010

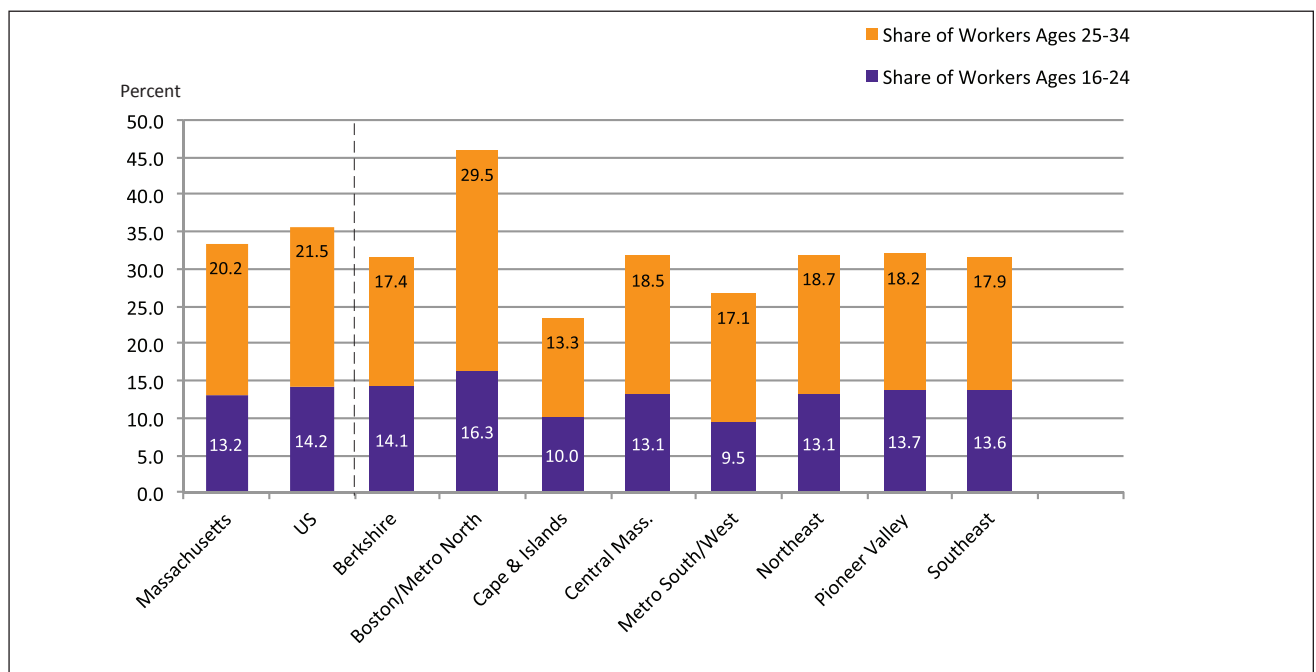


Figure 9 Educational Attainment of the Labor Force, 2000 & 2008-2010

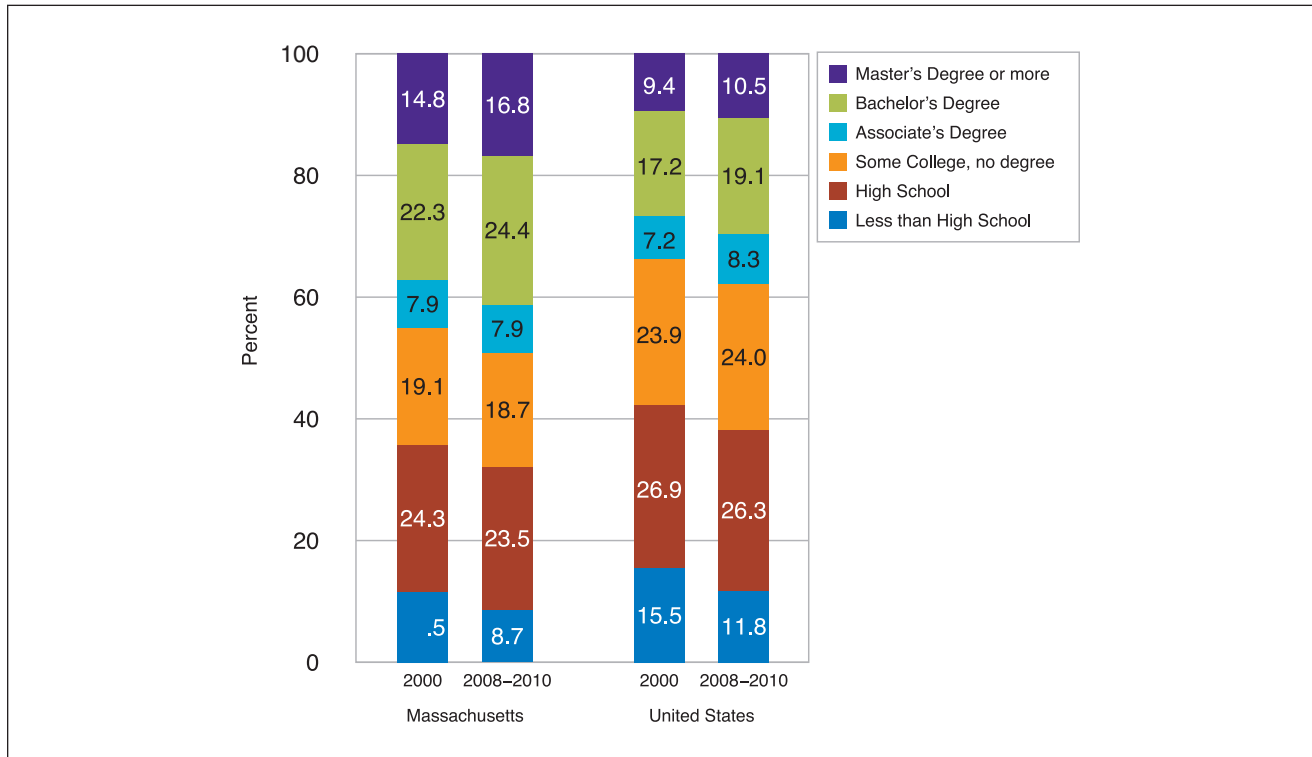
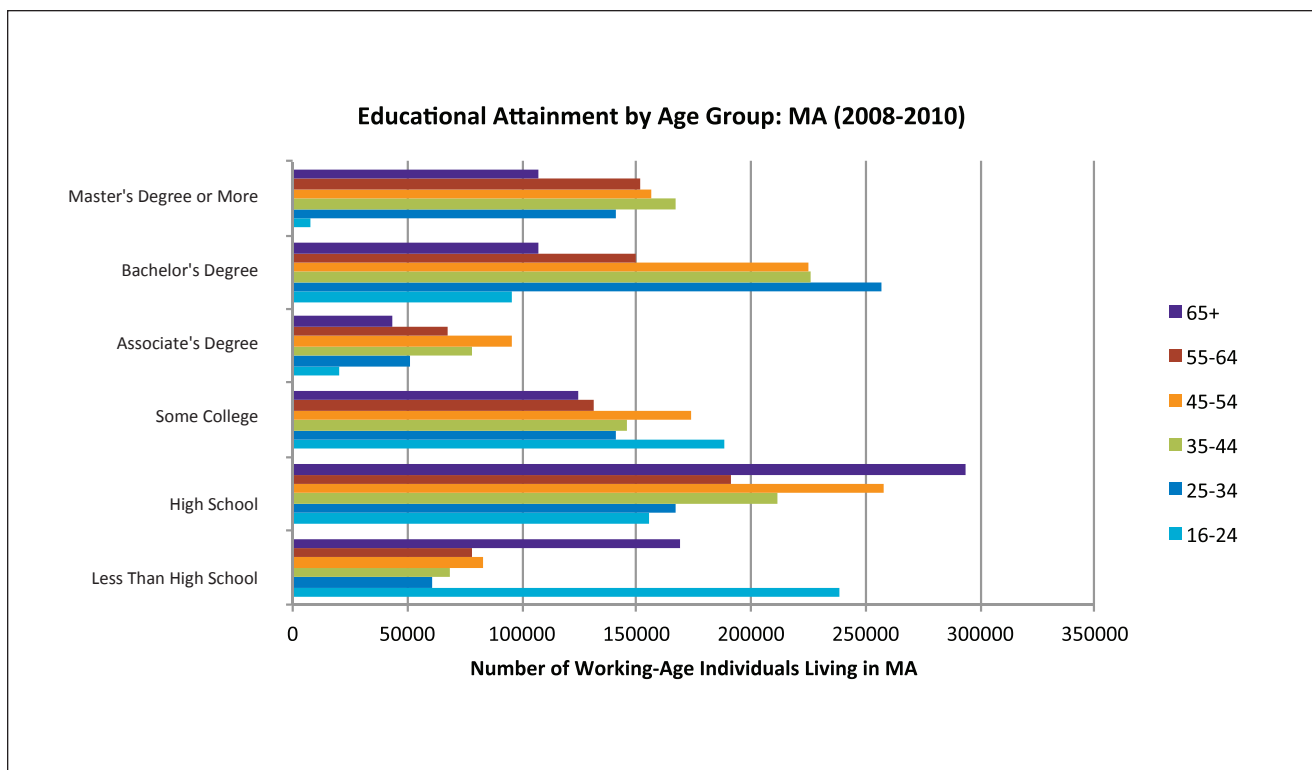


Figure 10 Educational Attainment by Age, 2008-2010



Looking forward, there could be a shortfall of workers in nearly every educational category – Some College, Associate’s Degree, Bachelor’s Degree. This pattern may not prevail, however, for workers with less education if industries and employers continue their recent trend of hiring employees with increasingly higher levels of education.

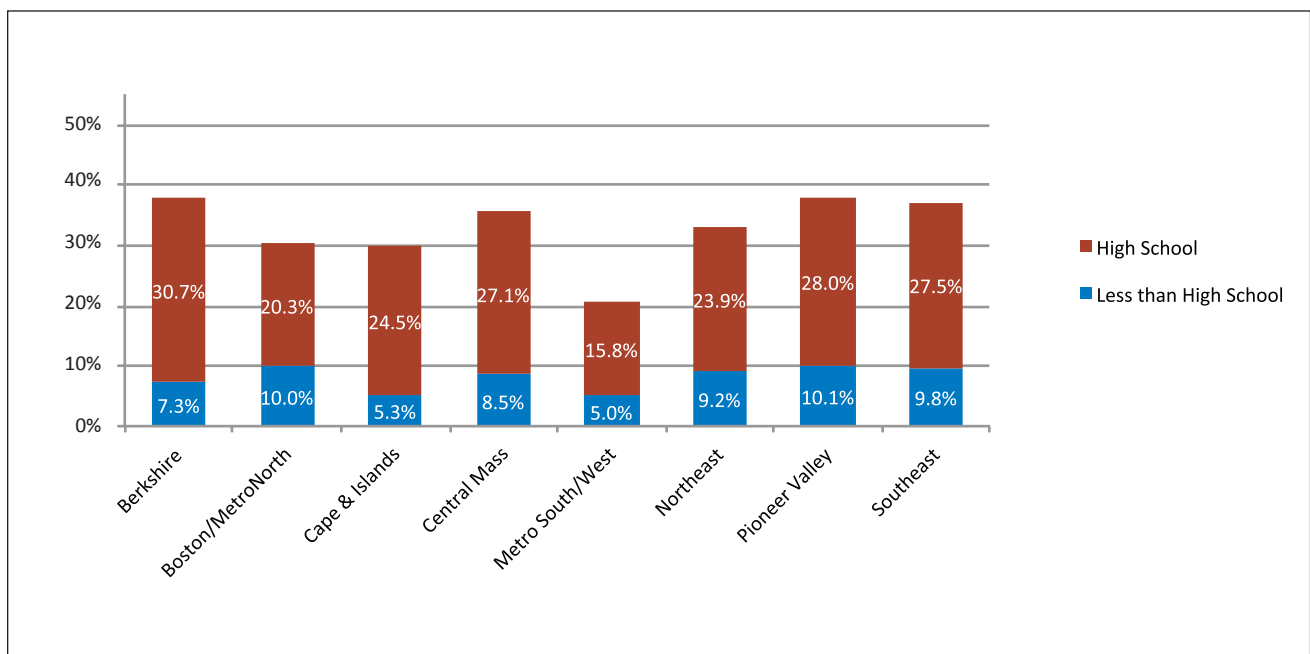
The high levels of educational attainment required by key industries in the Massachusetts economy means that workers with a high school diploma or less face significant challenges in the labor market. Massachusetts has a lower share of workers with a high school diploma or less than the US. Across regions of the state there is a significant difference in the share of workers with a high school diploma or less, with the Pioneer Valley and Boston/MetroNorth having the highest percent of workers with less than a high school diploma. Berkshire, the Pioneer Valley and the Southeast have the highest shares of workers with a high school diploma or less, with each of these three regions exceeding 35 percent. (Figure 11)

Unemployment in Massachusetts has stayed below national levels, and is concentrated among younger workers and workers with lower levels of educational attainment.

While very briefly and marginally exceeding national levels in 2006, the Mass. unemployment rate began the decade at 2.8 percent, compared to 4.0 percent nationally. In 2010, the Mass. rate was 8.5 percent, compared with 9.6 percent for the US.

Throughout the state, in region after region, unemployment concentrates among those workers who have the least education and the least work experience. Statewide those with a high school degree or less represent only 32.1 percent of the civilian workforce, but they represent 50.5 percent of the unemployed. Looked at from another perspective, this pool of workers could comprise

Figure 11 Share of Workers with a High School Degree or Less, 2008-2010



the core of the workforce needed to replace the state's aging workers, if they were offered strong supports and preparation opportunities to increase their skills and education levels. (Figure 12)

A similar pattern prevails with age. Workers aged 16-34 make up only 33.5 percent of the civilian workforce, but they represent 45.4 percent of all unemployed people. This disproportionate unemployment of younger workers prevails in virtually all regions of the state. For a state with an aging population, this trend of young workers facing disproportionate unemployment suggests that we may face significant replacement and productivity issues if we do not find a way to strengthen the connection of young workers to the job market. (Figure 13)

The requirements for educational attainment continue to rise among the employed, throughout the state.

Annual growth in the employed, by education attainment, reveals modest increases in the overall educational attainment of the workforce, with the largest increases at the extremes: workers with master's degrees expanded by 2.3 percent, and those with bachelor's degrees increased by 2 percent. Workers with less than high school declined by an annual rate of 2.2 percent. Workers with associate's degrees increased by barely 1 percent, those with some college grew by 0.7 percent, and those with high school grew by 0.6 percent. (Figure 14)

The Massachusetts workforce is increasingly diverse, with the fastest growth among Hispanics.

Massachusetts's workforce is less diverse than that of the nation as a whole, but the rate of its increasing diversity has picked up in the past decade. The fastest growing population in the workforce is Hispanics, with an annual growth rate of 6.1 percent, following by Asians, with an annual growth rate of 5.9 percent. From 2000 to 2008-2010, the population of White, non-Hispanic workers has declined from 85.0 percent to 79.0 percent, while the populations of Black, non-Hispanic workers are up from 4.2 percent to 5.9 percent, Asian, non-Hispanic workers increased from 3.5 percent to 5.3 percent, and Hispanic workers grew from 5.1 percent to 7.9 percent. (Figure 15)

Figure 12 Educational Attainment of the Civilian Labor Force and the Unemployed in Mass., 2008-2010

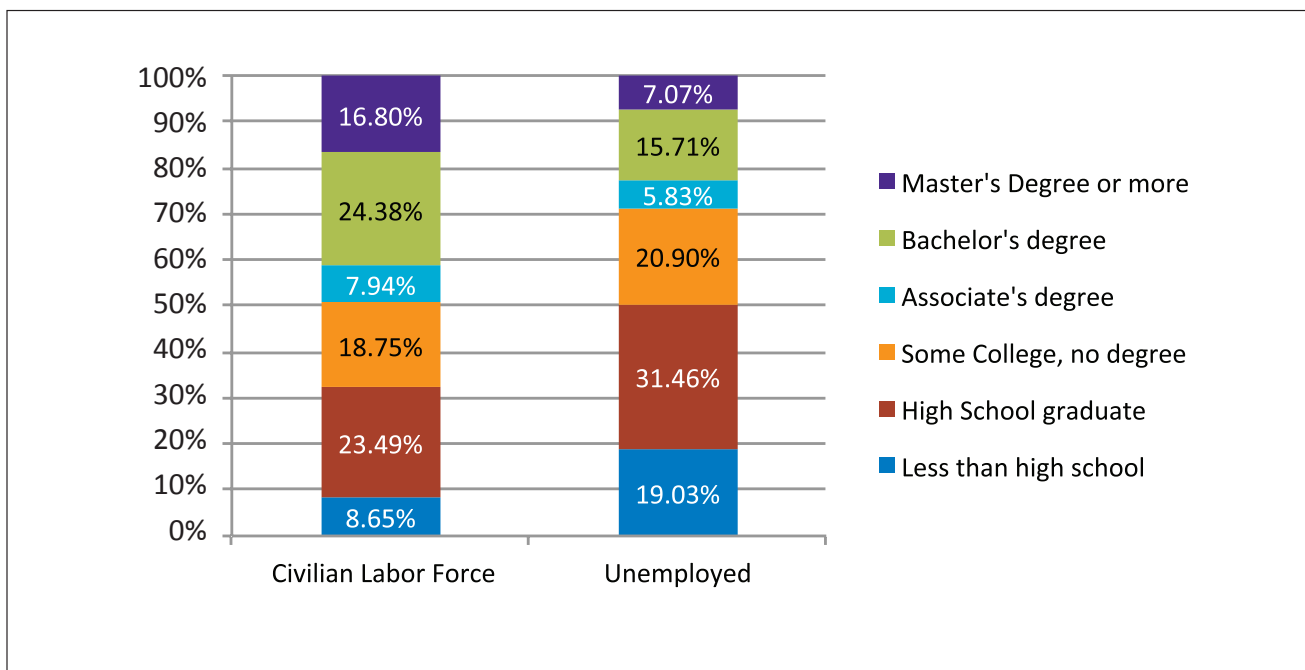


Figure 13 Age of the Civilian Labor Force and the Unemployed in Mass., 2008-2010

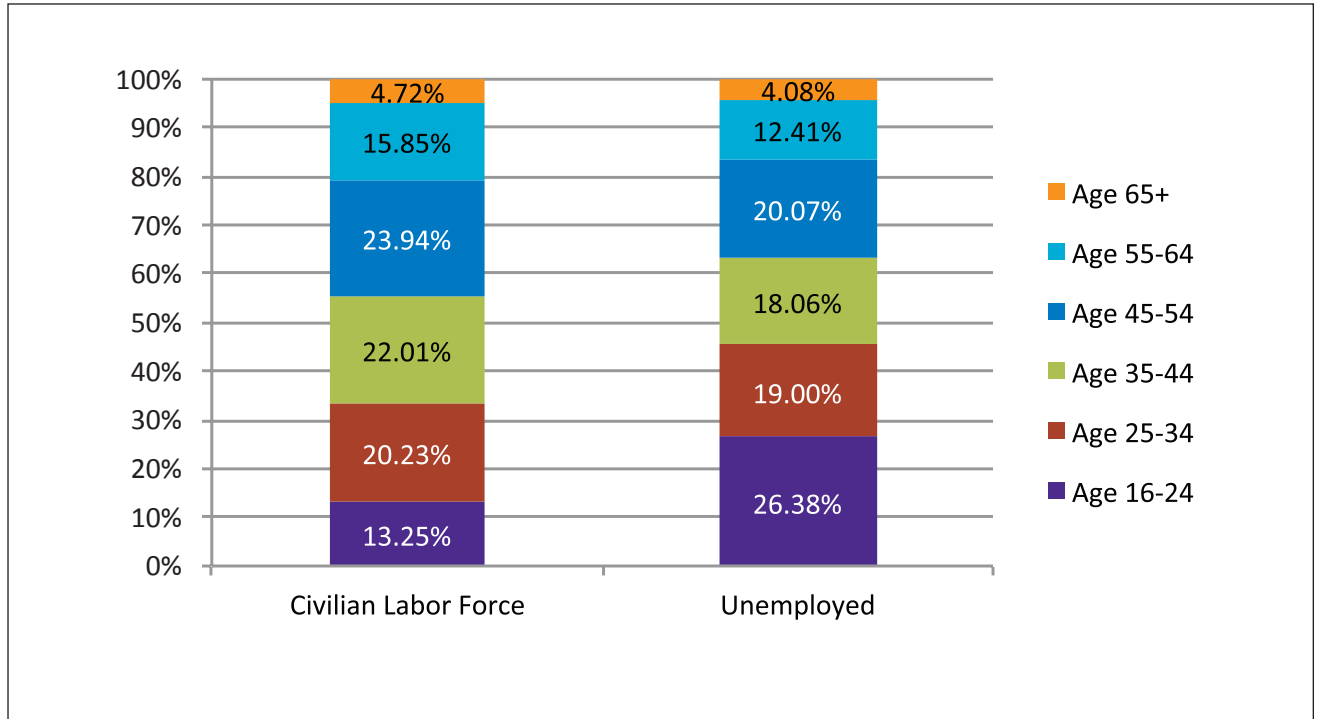


Figure 14 Annual Growth in the Civilian Labor Force by Education, 2000 to 2008-2010

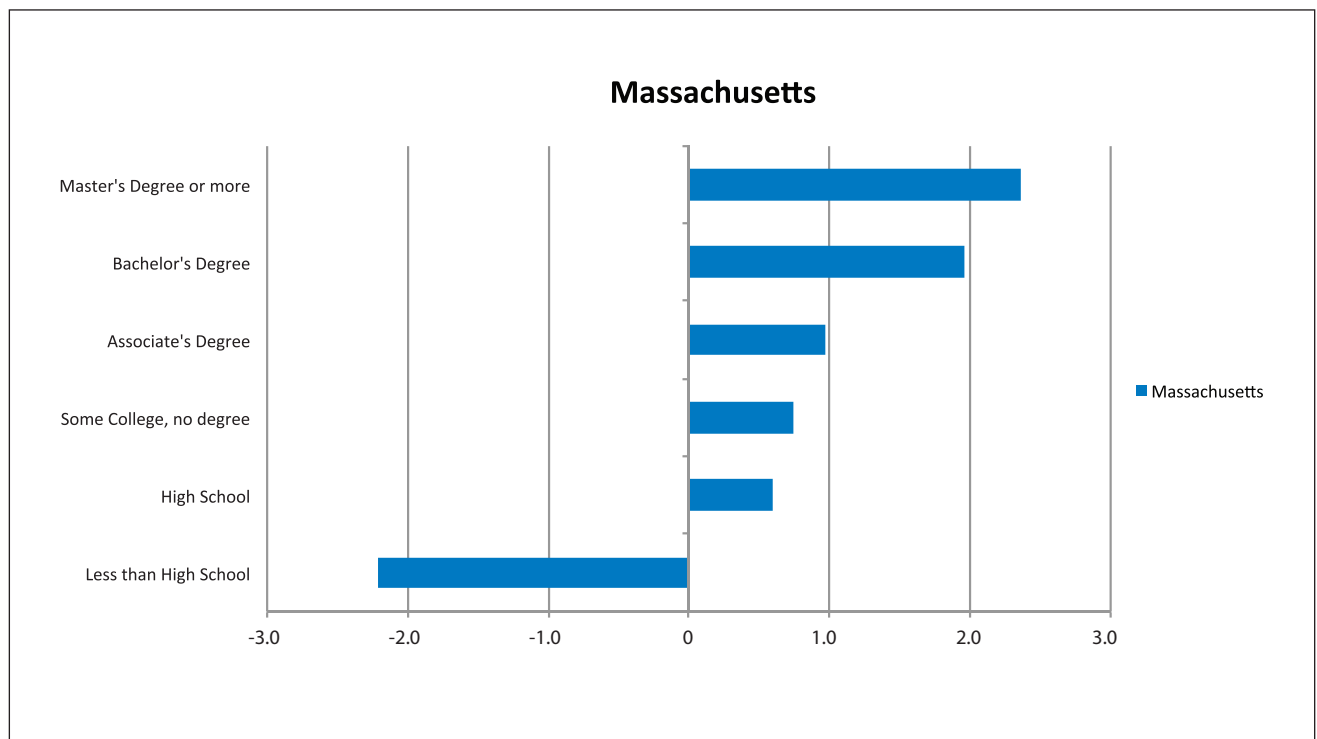


Figure 15 Diversity of Massachusetts Workforce 2000 to 2008-2010

Massachusetts Workforce is Increasingly Diverse, 2000 to 2008-2010					
Race/Ethnicity	2000	2008-2010	Absolute Change	Percent Change	Annual Growth Rate
White, non-Hispanic	2,750,945	2,788,823	37,878	1.4%	0.2%
Black, non-Hispanic	134,845	209,119	74,274	55.1%	5.0%
Asian, non-Hispanic	111,737	186,313	74,576	66.7%	5.9%
Hispanic	163,683	277,687	114,004	69.7%	6.1%
Other race, non-Hispanic	76,247	66,849	-9,398	-12.3%	-1.5%
Total	3,237,457	3,528,791			

Race/Ethnicity	2000	2008-2010			
White, non-Hispanic	85%	79.0%			
Black, non-Hispanic	4.2%	5.9%			
Asian, non-Hispanic	3.5%	5.3%			
Hispanic	5.1%	7.9%			
Other race, non-Hispanic	2.4%	1.9%			

Some regions' combined supply factors create substantial barriers to closing the skills gap. The Berkshire, Pioneer Valley, and Cape & Islands regions face more substantial barriers to closing the skills gaps than other regions. While the precise circumstances differ in each region, the populations in these parts of the state are declining or failing to grow, aging more rapidly than the state as a whole, and not seeing meaningful increases in the educational attainment of their residents or workforce.

Some regions are advancing more rapidly, through a combination of demographic and strategic factors. Central Mass region, for example, has a population that is growing, in part because of its success attracting immigrants. Its levels of educational attainment are also growing. Because of the deliberate efforts of post-secondary educational institutions to align their certificate and diploma programs with industry demand, the region's rate of growth in degree completions exceeds that of the state as a whole, and the increased output of graduates appears to be increasingly responsive to the needs of the local economy.

III. Understanding Massachusetts's Labor Demand

Massachusetts trailed the United States in employment for most of the past decade.

Massachusetts employment declined at a rate of 2.1 percent between 2001 and 2008, compared with a 4.1 percent gain nationwide. By contrast, the state experienced more modest employment losses than did the United States during the Great Recession, with employment in the state declining by 4.0 percent from 2007 to 2009, compared with a 6.1 percent drop nationwide. In the first year of the labor market recovery, employment in Massachusetts increased by 1.5 percent, exceeding the United States gains of 0.8 percent. (Figure 16)

Major Massachusetts industries saw substantial decline in employment during the economic downturn.

Massachusetts saw substantial employment losses in the downturn and a series of employment changes across industries. The state experienced significant losses in Administrative & Support Services (-12.8 percent), Manufacturing (-13.5 percent), and Construction (-20.5 percent). The state also experienced large losses in Retail Trade (-4.7 percent), Transportation & Warehousing (-7.3 percent), and Wholesale Trade (-9.3 percent). In five industries (Health Care, Utilities, Education, Other Services and Government), the state saw modest employment gains. The state's strongest employment gains came in the Health Care & Social Assistance industry (4.0 percent). (Figure 17)

Massachusetts's recovery from the Great Recession has been broad-based.

In the period between the fourth quarters of 2009 and 2010, Massachusetts enjoyed a broad-based recovery that touched multiple sectors and regions. The state expanded employment in industries ranging from a 0.1 percent increase in Information to a 5.4 percent increase in Administrative & Support Services. The Health Care & Social Assistance industry added over 12,100

Figure 16 Industry Employment, Q1 2001 & Percent Change in Employment, Q1 2001

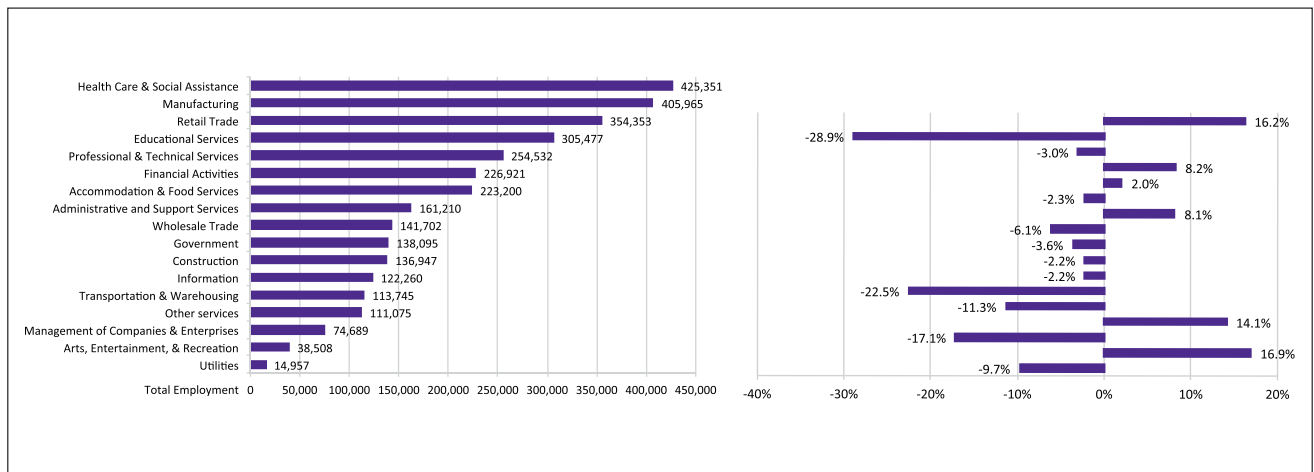
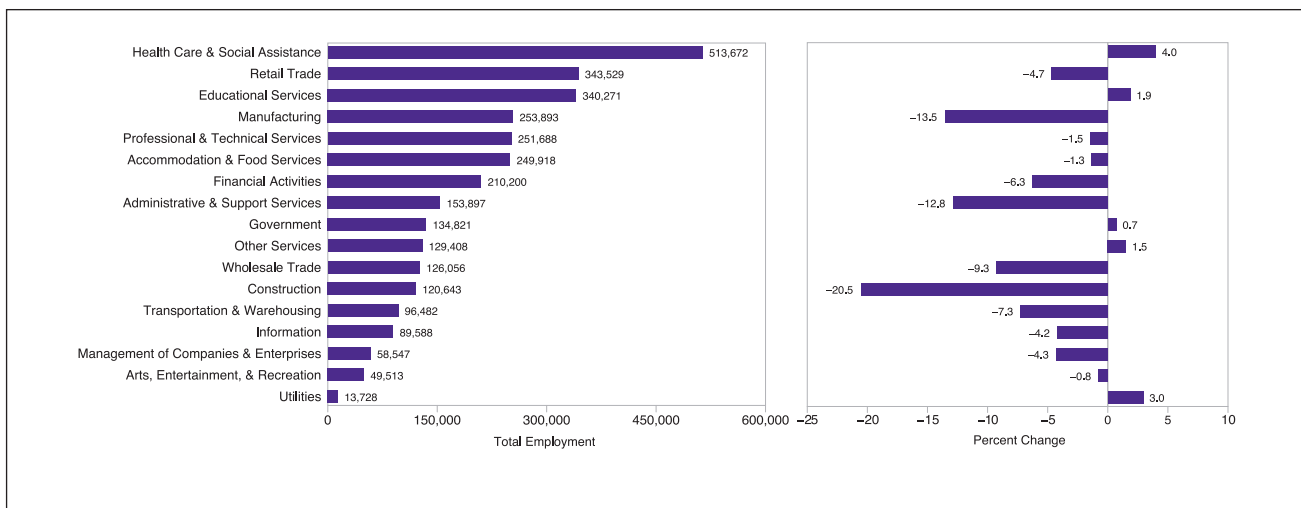


Figure 17 Industry Employment, 2009 & Percent Change in Employment, 2007-2009



jobs, an increase in employment of 2.4 percent. Job growth was spread across a number of the sub-industries that make up Health Care & Social Assistance, including: Social Assistance (3,200 jobs), Ambulatory Health Care Services (3,300 jobs), and Hospitals (5,600 jobs). In this period, the state experienced slight declines in three industries: Financial Activities, Wholesale Trade, and Management of Companies & Enterprises. In total, the state added over 47,000 jobs, increasing employment by 1.5 percent in the earliest stages of the recovery. (Figure 18)

Education and Health Services remains the largest industry in Massachusetts.

More than a quarter (27.2 percent) of the workers in the Commonwealth are employed by the education and health care sectors. This exceeds the national proportion of 24.3 percent, and reveals the very deep concentration of jobs and resources in these two sectors, which are so essential to the state. (Figure 19)

Figure 18 Percent Change in Employment, Q4 2009-Q4 2011

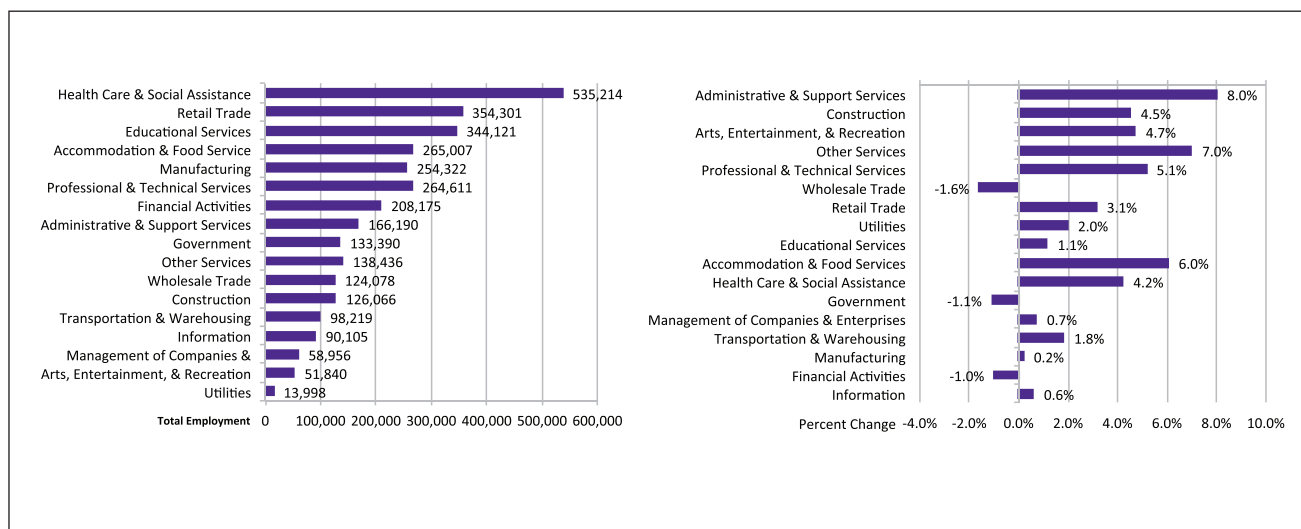
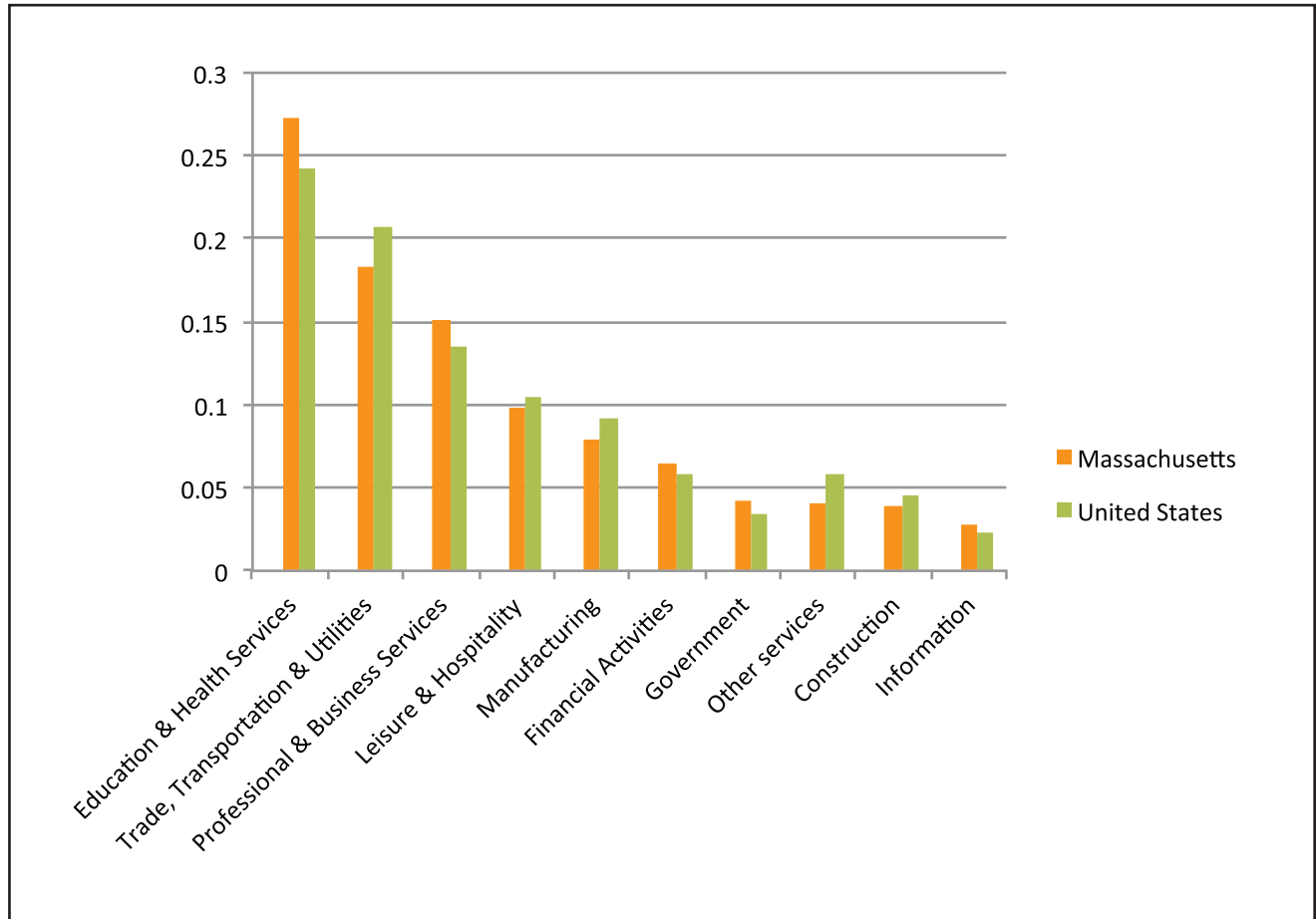


Figure 19 Employment Distribution by Supersector

Educational attainment of employees is high in Massachusetts.

Across industries, the educational attainment of employees in Massachusetts is high. Nine of 17 major Massachusetts industries had a workforce where the largest share of employees had a Bachelor's Degree or higher. (Figure 20) In particular, a number of the largest industries in Massachusetts have very large shares of workers with Bachelor's Degree or higher, including Health Care & Social Assistance (43.8 percent), Educational Services (72.7 percent), Professional & Technical Services (76.1 percent) and Financial Activities (57.1 percent). The educational attainment of employees in every industry has increased since 2000. (Figure 21)

The concentration of jobs is greatest where educational attainment is highest.

The largest sectors in Massachusetts are also sectors with the greatest demand for high levels of educational attainment: Health Services, Education, and Professional and Business Services. Three quarters of people in those fields have some postsecondary education or training.

Figure 20 Educational Attainment of Employed by Major Industry, 2008-2010

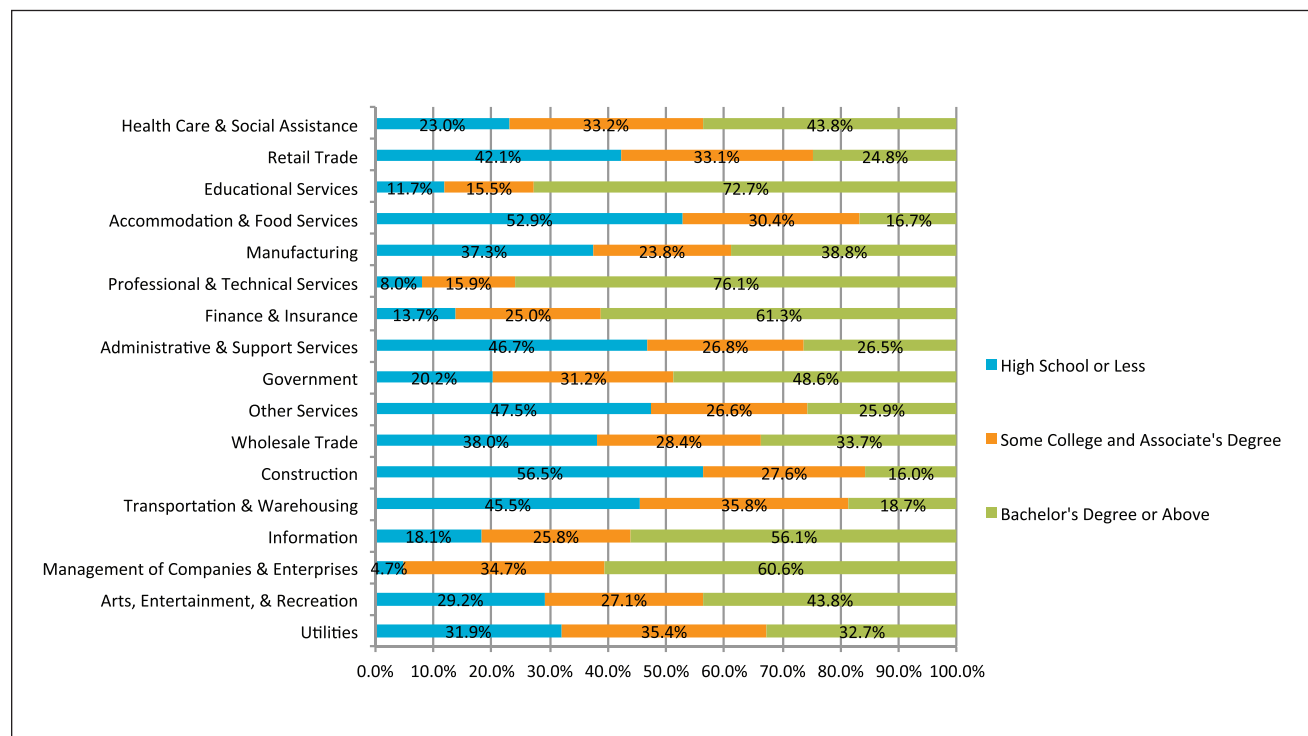


Figure 21 Educational Attainment of Employees by Major Industry, Massachusetts, 2000



IV. Understanding the Massachusetts Pipeline

The future supply of educated workers who are enrolled in higher education institutions in Massachusetts grew, but growth in associate's and bachelor's degrees enrollment lagged behind national rates.

Between 2000 and 2010, the number of full-time Massachusetts students enrolled in post-secondary educational programs increased across the board, at less-than-two-year, two-year, and four-year institutions. Massachusetts's growth rate for less-than-two-year institutions and certificates was nearly twice that of the nation (10.1 percent compared with 5.8 percent). However, in both two- and four-year institutions, Massachusetts total annual growth rates trailed those of the US (Two-year: Mass. 3.1 percent, US 4.1 percent; Four-year: Mass. 2.1 percent, US 3.5 percent). (Figure 22)

The roles of public and private institutions vary dramatically within the Commonwealth, and contrast with national trends. All of the robust growth in full-time enrollment in less-than-two-year institutions came from the private sector, as enrollment for public sector certificates declined slightly in this period. By contrast, in two-year institutions, all statewide full-time enrollment growth is accounted for by the growth in public institution enrollment, as the private sector declined in this period by 0.6 percent. Only at the four-year level does Massachusetts growth come from both sectors, with private sector enrollment growing at a rate of 2.0 percent and public en-

Figure 22 Full-Time Enrollment Trends in the Past Decade

		Less-Than-Two-Year Institutions		Two-Year Institutions		Four-Year Institutions	
		MA	US	MA	US	MA	US
PUBLIC	Enrollment 2000	382	43,504	31,002	2,008,336	58,489	3,733,341
	Enrollment 2010	316	42,117	44,278	2,922,622	73,940	4,904,272
	Absolute Change	-66	-1,387	13,276	914,286	15,451	1,170,931
	Annual Growth Rate (Percent)	-1.9	-0.3	3.6	3.8	2.4	2.8
PRIVATE	Enrollment 2000	3,427	138,260	5,796	259,071	125,640	1,863,471
	Enrollment 2010	9,609	277,341	5,457	457,134	153,139	3,000,813
	Absolute Change	6,182	139,081	-339	198,063	27,499	1,137,342
	Annual Growth Rate (Percent)	10.9	7.2	-0.6	5.8	2.0	4.9
TOTAL	Enrollment 2000	3,809	181,764	36,798	2,267,407	184,129	5,596,812
	Enrollment 2010	9,925	319,458	49,735	3,379,756	227,079	7,905,085
	Absolute Change	6,116	137,694	12,937	1,112,349	42,950	2,308,273
	Annual Growth Rate (Percent)	10.1	5.8	3.1	4.1	2.1	3.5

rollment at a rate of 2.4 percent, but the number of students enrolled in private four-year institutions was more than double the number of students in public four-year institutions.

Massachusetts's part-time enrollment trends lag behind those of the nation.

The majority of part-time enrollees in Massachusetts's post-secondary educational institutions are in public two-year institutions. Part-time enrollment at public two-year institutions increased at a sluggish annual rate of 1.4 percent between 2000 and 2010, compared with a national rate of 1.9 percent. Part-time enrollment in both public and private four-year Massachusetts institutions declined by 3.3 percent over the past decade, while growing nationwide by 3.5 percent. The fastest growth in part-time enrollment occurred at less-than-two-year institutions, where the annual rate of growth was 5.7 percent as compared with the US rate of 1.3 percent, but the overall volume of this enrollment in 2010 was only 2,698 people, less than 3 percent of the 97,570 part-time enrollees across the Commonwealth. Given the need ongoing skill development among incumbent workers and ladders for lower-skilled workers, there may be a need to create more flexible and stackable programs for working adults. (Figure 23)

Massachusetts's rate of degree completion lags substantially behind national rates

While degree completion rates grew in all three levels of educational attainment, and in both public and private sectors, the overall rates of growth for Massachusetts's post-secondary degree completion consistently trailed those of the nation. The strongest annual growth in completions over the course of the past decade came from the number of students earning Certificates (4.7 percent), trailing the rate of the United States by the slimmest margin (4.8 percent). However, in completions of Associate's Degrees, Mass.(2.3 percent) trailed the US (4.2 percent) substantially. And in four-year degree completion, Mass. (2.1 percent) also lagged behind the nation also (2.9 percent). (Figure 24)

Figure 23 Part-Time Enrollment Trends in the Past Decade

		Less-Than-Two-Year Institutions		Two-Year Institutions		Four-Year Institutions	
		MA	US	MA	US	MA	US
PUBLIC	Enrollment 2000	25	31,407	48,506	3,509,639	22,160	1,045,388
	Enrollment 2010	65	27,264	58,043	4,247,674	16,120	1,380,877
	Absolute change	40	-4,143	9,537	738,035	-6,040	335,489
	Annual growth rate (percent)	10.0	-1.4	1.8	1.9	-3.1	2.8
PRIVATE	Enrollment 2000	1,522	31,827	3,536	66,870	27,425	476,690
	Enrollment 2010	2,633	44,382	1,554	61,006	19,155	775,694
	Absolute change	1,111	12,555	-1,982	-5,864	-8,270	299,004
	Annual growth rate (percent)	5.6	3.4	-7.9	-0.9	-3.5	5.0
TOTAL	Enrollment 2000	1,547	63,234	52,042	3,576,509	49,585	1,522,078
	Enrollment 2010	2,698	71,646	59,597	4,308,680	35,275	2,156,571
	Absolute change	1,151	8,412	7,555	732,171	-14,310	634,493
	Annual growth rate (percent)	5.7	1.3	1.4	1.9	-3.3	3.5

Figure 24 Degree Completions Over the Past Decade, 2000-2010

		Certificates		Associate's Degrees		Bachelor's Degrees	
		MA	US	MA	US	MA	US
PUBLIC	Completions 2000	2,273	298,282	7,487	471,339	12,718	811,076
	Completions 2010	3,618	460,865	9,831	670,395	16,251	1,049,058
	Absolute Change	1,345	162,583	2,344	199,056	3,533	237,982
	Annual Growth Rate (Percent)	4.8	4.4	2.8	3.6	2.5	2.6
PRIVATE	Completions 2000	5,221	258,503	3,812	135,604	29,658	431,412
	Completions 2010	8,195	430,685	4,366	249,258	35,972	603,141
	Absolute Change	2,974	172,182	554	113,654	6,314	171,729
	Annual Growth Rate (Percent)	4.6	5.2	1.4	6.3	1.9	3.4
TOTAL	Completions 2000	7,494	556,785	11,299	606,943	42,376	1,242,488
	Completions 2010	11,813	891,550	14,197	919,653	52,223	1,652,199
	Absolute Change	4,319	334,765	2,898	312,710	9,847	409,711
	Annual Growth Rate (Percent)	4.7	4.8	2.3	4.2	2.1	2.9

In terms of growth rate, public institutions outperformed private ones at all three levels in Massachusetts, but in absolute terms, there were more four-year degrees completed at private institutions. There is a slim gap between public and private at the Certificate level (4.8 percent public, 4.6 percent private), a significant difference at the four-year level (2.5 percent public, 1.9 percent private), and a large gap at the Associate's level (2.8 percent public, 1.4 percent private).

More associate's degrees are being completed, but alignment with the state's areas of job growth, while marginally improving, is not strong.

The total number of associate's degrees awarded climbed by 25 percent in the 2000-2010 period. Two fields of study – health sciences and services – increased their total share of degrees awarded substantially, from 20.4 percent to 25.1 percent for health services and from 10.8 percent to 16.8 percent in services. Several areas of study saw their share of associate's degrees completed decline, including engineering and computer science, science and math, and legal. Arts, humanities and social sciences remained the largest field of study, but did not grow. Given the growth of the health and education sectors in the state, the growth in health sciences associate's degrees is encouraging. But statewide trends indicate that there is still work to do to improve the alignment of associate's degrees and the likely job market demands that the new degree recipients will face. (Figure 25)

More bachelor's degrees are being earned, with slight changes in fields of study over the decade.

The total number of bachelor's degrees awarded increased by about 25 percent in the ten year period from 2000-2010, but the proportion of degrees awarded among the disciplines varied very little, with very slight increases in business, science and math, and services, virtually no change in

Figure 25 Associate's Degrees Awarded by Field of Study, 2000 & 2010

Major field of study	MASSACHUSETTS			
	2000		2010	
	Associate's completed	Major's share of total (percent)	Associate's completed	Major's share of total (percent)
Arts, humanities, & social sciences	3,130	27.7	3,833	27.0
Health sciences	2,302	20.4	3,559	25.1
Services	1,216	10.8	2,389	16.8
Business	2,198	19.5	2,250	15.8
Engineering & computer sciences	1,561	13.8	1,162	8.2
Education	293	2.6	442	3.1
Science & mathematics	231	2.0	260	1.8
Legal	189	1.7	117	0.8
Other	179	1.6	185	1.3
Total	11,299	100.0	14,197	100.0

Figure 26 Bachelor's Degrees Awarded by Field of Study, 2000-2010

Major Field of Study	MASSACHUSETTS			
	2000		2010	
	Bachelor's Completed	Major's Share of Total (Percent)	Bachelor's Completed	Major's Share of Total (Percent)
Arts, Humanities, & Social Sciences	18,891	44.6	23,405	44.8
Business	7,596	17.9	9,990	19.1
Science & Mathematics	3,818	9.0	5,054	9.7
Engineering & Computer Sciences	3,726	8.8	3,997	7.7
Health Sciences	2,938	6.9	3,589	6.9
Services	2,495	5.9	3,170	6.1
Education	1,922	4.5	1,362	2.6
Legal	176	0.4	190	0.4
Other	797	1.9	1,466	2.8
Total	42,376	100.0	52,223	100.0

arts, humanities and social sciences, small declines in engineering and computer sciences, and a substantial drop only in education. Given the surges seen in the education and health sectors, the leading sectors of the economy of the state, there is no evidence of adjustment of educational focus to align with market demands, either by degree-seekers or the institutions they attend. (Figure 26)

V. Strategies for Closing the Skills Gap

Emerging Work on Closing Gaps: Practical Lessons for Future Work

This series of reports and events built on a similar process in 2008, led by Commonwealth Corporation, in partnership with the Center for Labor Market Studies at Northeastern University. The findings that stood out in 2008 revolved around the shifts in the Massachusetts economy over a 10-20 year period that concentrated job growth in industries and occupations with high skill demands. In addition, we saw an aging workforce throughout the state, with evidence that few regions or industries were prepared to weather the loss of older workers to retirement, and the resultant shortages in skills and knowledge. Finally, at the post-secondary level, enrollment and completion trends were not keeping up with the nation, in large part due to private institutions exiting the two-year degree market.

Four years later, in 2012, it is the demographic and labor supply challenges that stand out, and as the population has aged, there is an increased urgency to address the skills gap. The disproportionate unemployment among young workers 16-24, the continued dependence on immigration as our primary source of growth and the impending shortages of well-educated and seasoned workers are key findings in the 2012 data. The demographics of the workforce, unemployment patterns, and the post-secondary pipeline have therefore emerged as the critical dynamics to be understood and addressed. Labor market demand issues retain much of their earlier character, with the clear trend that those industries which are largest and growing most rapidly are also the ones that require the highest levels of educational attainment.

Participants in the Skills Gap Initiative regional convenings generated a wealth of ideas about what works and what is needed. Following is a selection of practical lessons that reflects the prevailing themes, and points toward the next stages of policy recommendations.

Success in bridging the skills gap is all about relationships.

Schools and institutions of higher education can do exhaustive amounts of training, and employers can work hard to communicate their labor demands and support their workers once they are hired. But helping people to develop the skills they need in their regional economy, successfully placing them in jobs that last, and ensuring their success in the workplace requires that educators, workforce specialists, and employers develop close, trusting ties to one another, ties that no state policy can drive. Those who are beginning to experience success in closing skills gaps are forging powerful relationship across traditional lines of communication and interaction.

Regions need to build the capacity to do more detailed local labor market analysis about current and emerging trends and potential mismatches.

The regional data from the Skills Gap Initiative is powerful, but it is only a start. While excellent progress is being made in some regions, no Massachusetts region currently has a system in place that generates data on the specific labor demands of current employers, tracks the educational programming and certificate and degree production of local high schools and higher education institutions, and systemically and consistently aligns the two. As a response to this need, the Legislature is requiring Commonwealth Corporation and the Massachusetts Workforce Investment Board to provide regional labor market data as part of regional planning processes that involve

education, economic development, and workforce players. Here is a small sampling of regional research questions that local teams could pursue:

- What are the current skill needs of employers/industries in our region?
- How are those skill needs likely to change in the next 3-5 years, as a result of technology or global competitive conditions?
- What is the age of each specific employer's workforce?
- When might each workforce begin to retire?
- What is the educational attainment requirement for each company, or agency?
- What are the certificate, associate's degree and bachelor's degree offerings and graduation rates of each certificate-granting institution, community college, college or university in our region? How can we help them to line up with labor market demand as we are mapping it?
- Such local data collection is essential to the success of any regional enterprise: it builds a data bank, grows the capacity of local leaders to generate and analyze data, and allows educators, workforce leaders and employers to build and maintain relationships, and marshal and steward resources.

Local leadership is critical to success.

Regional educators, workforce professionals, and employers have to lead their region's effort to close the skills gap. Local leaders can make good use of evidence of statewide trends, like the content of this report, or use detailed regional profiles like the eight reports generated by the Initiative. However, such externally generated resources can only go so far. Local leaders must fill in the gaps that such reports leave in the collection and use of specific local data. They must develop dynamic and trusting relationships and partnerships between educational institutions and employers. They must pursue shared, mutually agreed-on strategies that they can craft and implement. For all of the importance and utility of research like the work profiled in this Initiative and this report, closing skills gaps comes down to leaders of cities and towns, industries and non-profit sectors, and schools and colleges and employers. These are the players who can build the relationships, do the data collection, and craft the collaborative enterprises that will close the Commonwealth's skills gaps.

Regions need to invent new ways for incumbent workers to learn.

Many working adults cannot afford to take a regular college or graduate course, and lose work and pay as a result. Devising ways for people to advance their educational attainment while staying on the job is a key innovation in need of further development. For some, this may mean increasing access to the growing array of online opportunities, such as Coursera and EdX. For others, it is about creating opportunities for workers, educational institutions, and employers to innovate: new ways to advance the education of full time workers can be developed. It is critical that we continue to develop post-secondary and skills training programs that offer flexible and part-time scheduling, competency-based programs and stackable credentials.

Regions must adjust to new patterns in hiring and employment.

The labor market is fluid – new dynamics emerge often. Participants in the regional forums noted the tendency of employers increasingly to hire by “try-out.” They have prospective employees start as an intern or a provisional person, challenge them to show what they can do as a part of the employers' enterprise, and then make a hiring decision. This can be to retain the person in

some kind of part-time or conditional way, to hire them for full time work, or to release them. Local and regional and state actors need to develop the partnerships and program designs that build on the use of “try-out employment.”

Innovation is the key.

Those regions, sectors, companies, educational institutions, and workforce investment boards that continue to innovate are most likely to grow and thrive. Sometimes a crisis or challenge turns out to be an opportunity: it is incumbent on regions and their state allies to take this stance. For instance, finding replacements for the retiring older population gives workforce development and career and education leaders a good opportunity to develop resources and learning experiences for young workers that can help close the educational attainment gap.

A focus on developing a pipeline is essential to closing the skills gap.

Each region needs its own pipeline – a set of pathways that flow across educational institutions, disciplines, employers, workforce agencies, and sectors of the economy. When it is built, these are the components that will collectively form and sustain a pipeline. Building such a system is the key to closing the skills gap. While it is true that no Massachusetts community yet has a high functioning and full developed pipeline, it is also the case that every community has some building blocks for an eventual pipeline, and some regions are well on their way to constructing such a system. Figuring out how to design, strengthen and sustain a pipeline is a big job, and every community needs help making it happen.

VI. Recommendations for Policy and Innovation

Some of the most innovative and successful strategies to align pipelines with skill demands of employers are happening through regional partnerships, but for this work and those innovations to become systemic, we need state frameworks and policies to support and accelerate regional efforts. Likewise, the most constructive and intelligent statewide policy steps will lead to significant change only when they are leveraged by the coordinated and systems-altering efforts of local and regional leaders. Working together, state and local leaders have the best chance of designing and delivering pipelines that address the full range of challenges detailed in this report.

Emergent Systems Strategies & Statewide frameworks

New and emerging systemic efforts have the potential to create a foundation upon which to build targeted strategies to address specific demographic and labor supply issues facing the state. In addition, we are proposing strategies for consideration that focus on improving employment outcomes for young workers, expanding the scale and intensity of adult education and English language programs, and aligning education and training with persistent and emerging skill needs. Our overarching goal must be to build effective and accessible educational models that support ongoing skill development and promote lifelong learning opportunities that are tied to changing skill demands.

Build on current statewide policy and planning initiatives.

As noted in the executive summary, a series of recent public and private sector action steps are advancing efforts to close the skills gap. The major systemic efforts include:

- The secretaries of labor and workforce development, economic development and education have joined forces in a regional planning approach to shape career pathways in key industries and create pipeline programs for youth and adults. They will also develop a set of shared metrics to assess progress.
- The three secretariats have charged the Massachusetts Workforce Investment Board to develop career pathway frameworks for four key industries.
- The Governor and the Legislature enacted measures in the Fiscal Year 2013 budget to strengthen the alignment of community college certificates and degrees with skill demands in the regional economy, and to tie formula funding to performance.
- The Department of Elementary and Secondary Education is working with Commonwealth Corporation to pilot stronger linkages between adult education and post-secondary education, so that more adults can move successfully from ABE to community college, in high demand fields.
- The Commonwealth's fifteen community colleges are working together to implement a "transformation agenda". Their goal is to create programming that is "stackable", so that each increment of credentialing builds upon prior certifications, and toward future, higher levels of certification and diploma options. The agenda will also seek ways to offer more flexible scheduling

for unemployed and working adults, and develop more contextualized basic skills education.

- In a few regions of the state, there are robust industry-based partnerships in place to identify immediate and emerging skill needs of businesses and to create, adapt and expand education, training and work experience opportunities that prepare new workers for jobs in those industries.
- As a part of the 2012 Jobs Bill, the Governor and the Legislature included funding for the Workforce Competitiveness Trust Fund to support regional industry-sector partnerships that can prepare youth and adults for jobs in high demand industries and develop a shared strategy for meeting the skill needs of the targeted industry.
- Massive Online Open Courses (MOOCs) are being offered by elite national universities and in partnership with secondary and post-secondary education to expand access to continued learning for students of all ages. The growth in online courses and potential credentialing from online education is an important trend to watch and influence.

Improve employment outcomes for young workers.

The research clearly shows that in every region of the state young workers between 16 and 24 are struggling to connect to the job market. To reverse this trend we need to build more robust onramps for young workers, beginning with teens and continuing through post-secondary education. An effective system would include:

- High school level programs to train and coach young workers about how to find jobs and succeed in the job market;
- Work experiences for high school students through which they learn critical work readiness skills;
- Paid internships for post-secondary students in positions related to their field of study, with companies and institutions that are serious prospective employers;
- Coaching about the context of a changing labor market and the skills needed to thrive in an economy driven by technology; and
- Training for businesses and workers on ways to be flexible, creatively adaptive, and nimble.

Expand the scale and intensity of Adult Basic Education and English Language programs.

The research shows that adults with a high school diploma or less are disproportionately unemployed. In addition, our labor force growth is highly dependent on immigration: the integration of new immigrants into our economy is clearly a part of the success of those regions of the state that are experiencing growth. Our recommendations include:

- Expand adult basic education and English language programs for low-skilled adults and new immigrants: take advantage of technology; tap into potential pools of tutors who can be trained to support adult learners; continue to support community and work-based learning and credentialing.
- Align adult basic education programs and post-secondary institutions so that students can test into college level courses, receive more strategic career and college counseling, persist in demanding programs, and achieve higher and graduation rates from post-secondary programs.
- Forge stronger and more strategic partnerships between industry and secondary and post-secondary education. Building on industry-led efforts in health care and advanced manufacturing,

offer relevant curriculum and instructional materials, training on state-of-the-art equipment, and work experience and externships for teachers and professors that allow them to understand industry shifts and to see how learning is applied at the workplace. Leverage this investment in curriculum and instructional materials so that multiple institutions of higher education benefit, rather than developing curriculum and materials at individual institutions.

Align Education with Persistent & Emerging Skill Needs.

The skills gap results from the growth of industries in Massachusetts that require increasing skills and credentials and are constantly changing as technologies and global competitive conditions evolve. We need education and training that is closely linked to industry, can respond quickly to changing needs and is offered in flexible and accelerated models. Our recommendations include:

- Increase opportunities for flexible and accelerated post-secondary programs for working adults. Such programs support lifelong learning, skills acquisition and career advancement, including the ongoing development of online learning opportunities that lead to industry-recognized credentials and employment.
- Improve access to labor market data, including job vacancy data. Develop forums in which industry leaders can share information about strategic shifts in their industries that may lead to changes in their talent and skill needs and staffing structures.
- Support the convening and organizing necessary to build strong and effective regional partnerships between industry, education and workforce organizations: this may include targeted funding, technical assistance and planning tools and frameworks.

Build more effective and accessible educational models that support ongoing skill development and lifelong learning.

With a well-educated, aging workforce, we need systems in place to provide existing workers with opportunities to develop their skills and acquire credentials necessary to retain employment, advance in their careers and provide the changing and growing skills required by knowledge and innovation industries. Our recommendations include:

- Improve our understanding of the development of Massive Online Open Courses. Influence the development of these courses to increase access to skills and credentials for working adults and provide state of the art education in high demand fields through partnerships with high schools and community colleges.
- Develop an articulated education ladder, which includes multiple, intersecting pathways through secondary and post-secondary education, including alternative education, competency-based advancement, the use of stackable certificates, and secure, affordable access to credential, AA and BA programming.
- Advance innovations in knowledge and skill transfer for companies and industries whose older workforces are aging out, and who need strategies for knowledge capture, skill sharing, and retention and deployment of older workers in new coaching and mentoring roles.

VII. Conclusion

In one of the regional convenings, after the Initiative research team had made the presentation of their data and analysis, a discussion ensued in which the idea was introduced and re-affirmed, that the challenge for the region was to craft a shared vision and to build a system, or pipeline, for students and workers. Near the end of the conversation, a veteran workforce development leader stood up and gently but firmly reminded the assembled group, that they were not, in fact, starting from scratch. Years of work had produced a strong consensus on a range of issues related to closing the skills gap. The work of those in the room had resulted in policies, programs and practices that are getting improved results. These efforts were accelerated by things that many different actors had played a role in, from school district policy and practice, city hall and civic community leadership, a robust workforce development sector, increasingly effective collaboration with businesses and other large employers, and the involvement of all levels of K12 and post-secondary education and adult learning.

The message at that convening, and our message to you, is simple: here in Massachusetts, we are on our way. No community has it all figured out, but neither is there a single region in the Commonwealth that is not working with assets that can lead to successful, high impact innovation. The work to close our skills gaps is well underway, and the most effective approaches to achieving this ambitious goal are emerging. We need to learn from these successes, and ensure that they spread.

