

Health Care Employment, Structure, and Trends in Massachusetts

Chapter 224 Baseline Study

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Introduction

In 2012, the Commonwealth enacted Chapter 224 An Act Improving the Quality of Health Care and Reducing Costs Through Increased Transparency, Efficiency and Innovation. In the context of cost containment, the legislation aims to slow the growth in health spending in the Commonwealth primarily through the adoption of industry and organization health care spending benchmarks or caps. The legislation largely relies on alternative payment systems that are designed to shift health care finance away from a fee for service funding approach to approaches that provide incentives for health care providers to reduce health care costs and remain within a budget level based on the size and characteristics of the population served.¹ The legislation also seeks to slow growth in spending by expanding the role of physician assistants (PAs) and nurse practitioners (NPs) as primary care providers. PAs or NPs could serve as alternatives to physicians in a number of specific diagnostic and treatment roles.

Section 251 of Chapter 224 requires that the Auditor of the Commonwealth undertake a study of the impact of Chapter 224 “...(O)n the health care workforce, including, but not limited to, health care worker recruitment and retention, health care worker shortages, training and education requirements and job satisfaction...”²

The legislature’s concern about the impacts of the health care reform legislation on the health care workforce at the state and local level is readily understood. At the time that Chapter 224 was enacted, the health care industry, including ambulatory care providers, hospitals and nursing and residential care facilities, accounted for a substantial share of jobs located in the state. During 2012 the state’s health care industry had monthly average payroll employment of 464,000, equal to about 14 percent of total non-farm wage and salary employment in the Commonwealth. One in seven jobs in the state was in firms that were engaged in the direct delivery of health care services across Massachusetts.

Following developments in state and local labor markets is an essential task for elected officials, business and labor leaders, and educators who need to understand the basic structure of

¹ Anna Gosline and Elizabeth Rodman, *Summary of Chapter 224 of the Acts of 2012*, Blue Cross and Blue Shield of Massachusetts Foundation, 2012

² The Commonwealth of Massachusetts, *An Act Improving the Quality of Health Care and Reducing Costs Through Increased Transparency, Efficiency and Innovation*, Senate No.2395, Sec 251, July 31, 2013

employment opportunities and trends in the size of those opportunities at both the state and local level. Just as “all politics is local”, it might be argued that all labor markets have important local dimensions. Household and family earnings and incomes, occupations and social status, family structure and birth rates, the tax base and tax rates and personal and community wealth are just a few of the characteristics of communities around the state that are determined by the strengths and characteristics of local labor markets. Indeed, even the size and the very existence of the population of a community is heavily dependent on the health of the local labor market, with employment growth and decline influencing migration across states and regions at an accelerated pace in recent years.³

Defining the Health Care Workforce

A wide variety of methods exist to define exactly what is meant by the health care workforce. For example, a narrow definition for a health care workforce measure might include all persons employed in occupations involved in the provision of medical and health care services to patients. Such a measure might include persons who work in health diagnosing and treatment practitioner positions, including occupations such as physician, dentist, pharmacist and registered nurse. It would also include persons engaged in health technician occupations including medical laboratory technologist, licensed practical nurse, radiologic technologist and emergency medical technician. Finally, it would include health care support occupations such as home health aides, phlebotomists, medical assistants and nursing assistants. During 2012 about 334,000 jobs were in health occupations. These jobs were in virtually every major industry sector in the Commonwealth including manufacturing, wholesale and retail trade, insurance, information, education and government in addition to the health care and social assistance industries.

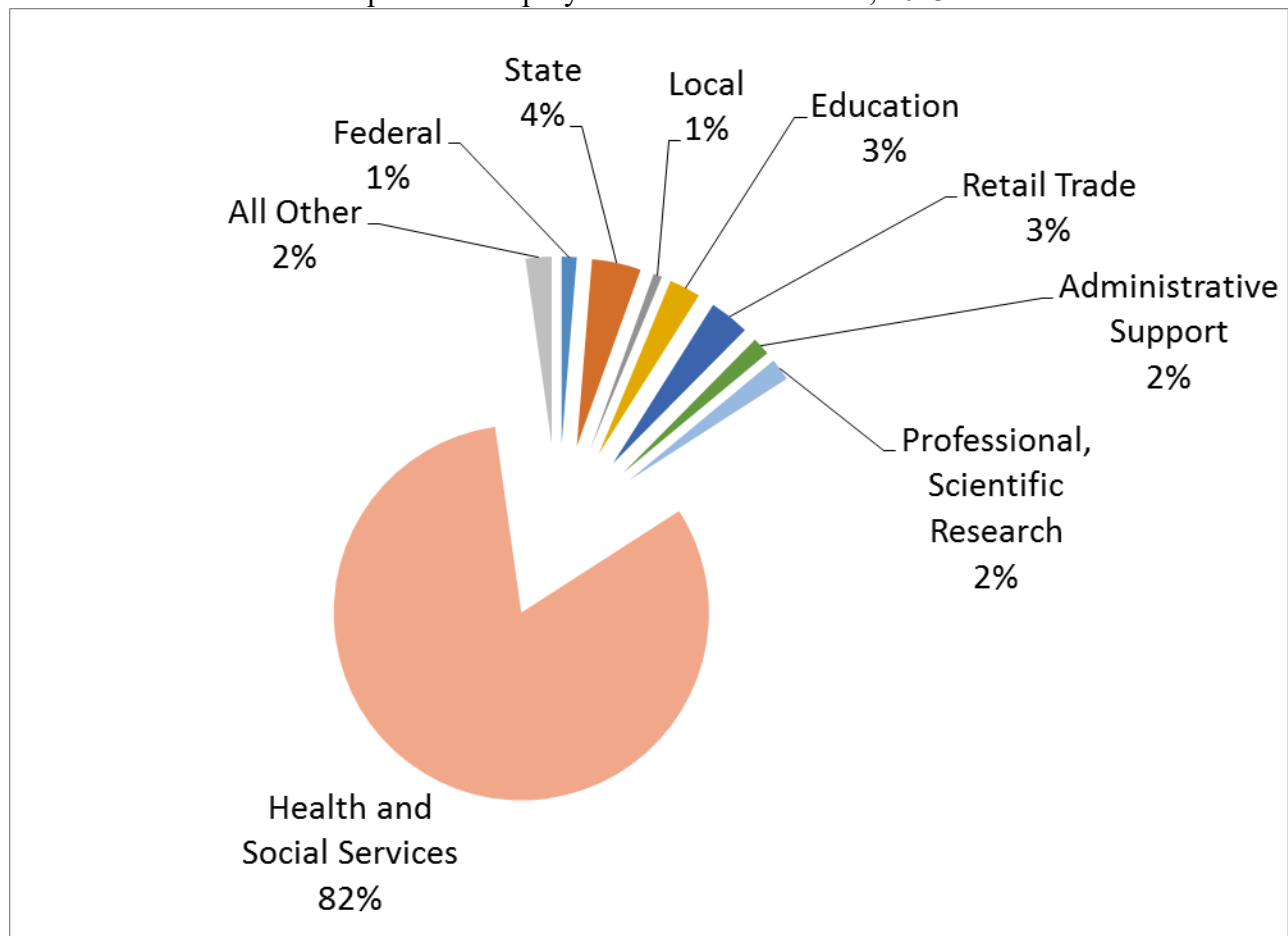
This occupational approach to measuring the health care workforce includes a substantial number of persons who, while engaged in the occupations providing health care diagnostic, treatment and support services, are employed in industries where the primary economic activity is far removed from the provision of health care. We reviewed 2013 data on the industry

³ Neeta Fogg and Paul Harrington, *Growth and Change in South Dakota Labor Markets: An Assessment of the State's Labor Market Imbalances in a Weak National Recovery*, Office of the Governor, Pierre, South Dakota, February, 2014

distribution of persons who worked in health care practitioner, technical and support occupations in Massachusetts and found that about 82 percent of those employed in these occupations worked in an industry devoted to the provision of health or related social services (Chart 1). Therefore, nearly 20 percent of all persons employed in the health care occupation workforce (more than 60,000 individuals) work in industries whose primary economic purpose is not connected to health services.

Federal, state and local government (excluding state and local schools and hospitals) was another major non-health care industry source of employment, accounting for about 6 percent of the state's direct care

Chart 1
The Industrial Distribution of Health Care Service
Occupational Employment in Massachusetts, 2013*



Source: U.S. Bureau of Labor Statistics, OES Research Estimates by State and Industry, Occupational Employment Statistics, May 2013, http://www.bls.gov/oes/2012/may/oes_research_estimates_2012.htm

*The OES survey classifies state and local hospitals in the education and health care industry.

health care workforce. State government health care occupational employment was characterized by especially large numbers of psychiatric technicians and psychiatric aides, along with registered nurses. Educational institutions, including private and state and local public sector schools, accounted for about 3 percent of direct care providers, as did the retail trade industry. Administrative support services, including temporary health agencies, accounted for about 2 percent of the all health care occupational employment in Massachusetts along with the professional, scientific research industry which also employed about 2 percent of those working in healthcare occupations in the state.

As discussed above, using as the measure of the health care workforce the employment of those who provide direct health care services, regardless of the industry in which they work, would result in the inclusion of more than 60,000 workers who do not work in business establishments whose primary activity is the provision of health care services. While clearly an important source of demand for health care workers, health care is only a minor or even trivial part of the business offerings of these industries. Moreover, the provisions of Chapter 224 do not appear to be primarily targeted at industries outside of the state's health care and social assistance sector such as public administration or retail trade. Indeed, one of the objectives of Chapter 224 is to shift resources within the state's health care delivery system from those functions not directly connected to patient care toward those more closely aligned with improving patient outcomes and reducing costs.

All of this suggests that a more useful way to define the health care workforce for the purposes of this study is to focus on employment measures in industries that are primarily engaged in the provision of health care services. This means using employment measures that are organized on an industry basis, those that classify business establishments (and their employment) on the basis of the primary economic activity of that organization. The North American Industry Classification System (NAICS) is the taxonomy adopted by most government and private statistical organizations to measure economic activity (as well as labor market activity) on the basis of the products and services produced by business establishments.

One of the most important sources of data on developments in industry employment at the state and local level comes from the Quarterly Census of Employment and Wages (QCEW) statistics program conducted jointly by the U.S. Bureau of Labor Statistics and the Massachusetts

Department of Labor and Workforce Development. As its name implies, the QCEW is a complete enumeration of non-farm payroll employment and wages paid to workers among firms and organizations (business establishments) across the state.

The QCEW data are a by-product of the Commonwealth's unemployment insurance tax collection system that collects data each quarter on the total and taxable wages of any employees who were on a given business' payroll in any month during that quarter. Each business establishment is assigned an industry code that, among other things, allows analysts to examine employment developments in specific components at the state and local level. Because the QCEW is a complete enumeration of payroll employment the employment data can be organized for very specific components of the state's economy, including particular elements of the health care industry in the state. In addition, the data can also be used to gain insight into sub-state employment developments in the state. These and other issues are discussed in greater detail below.

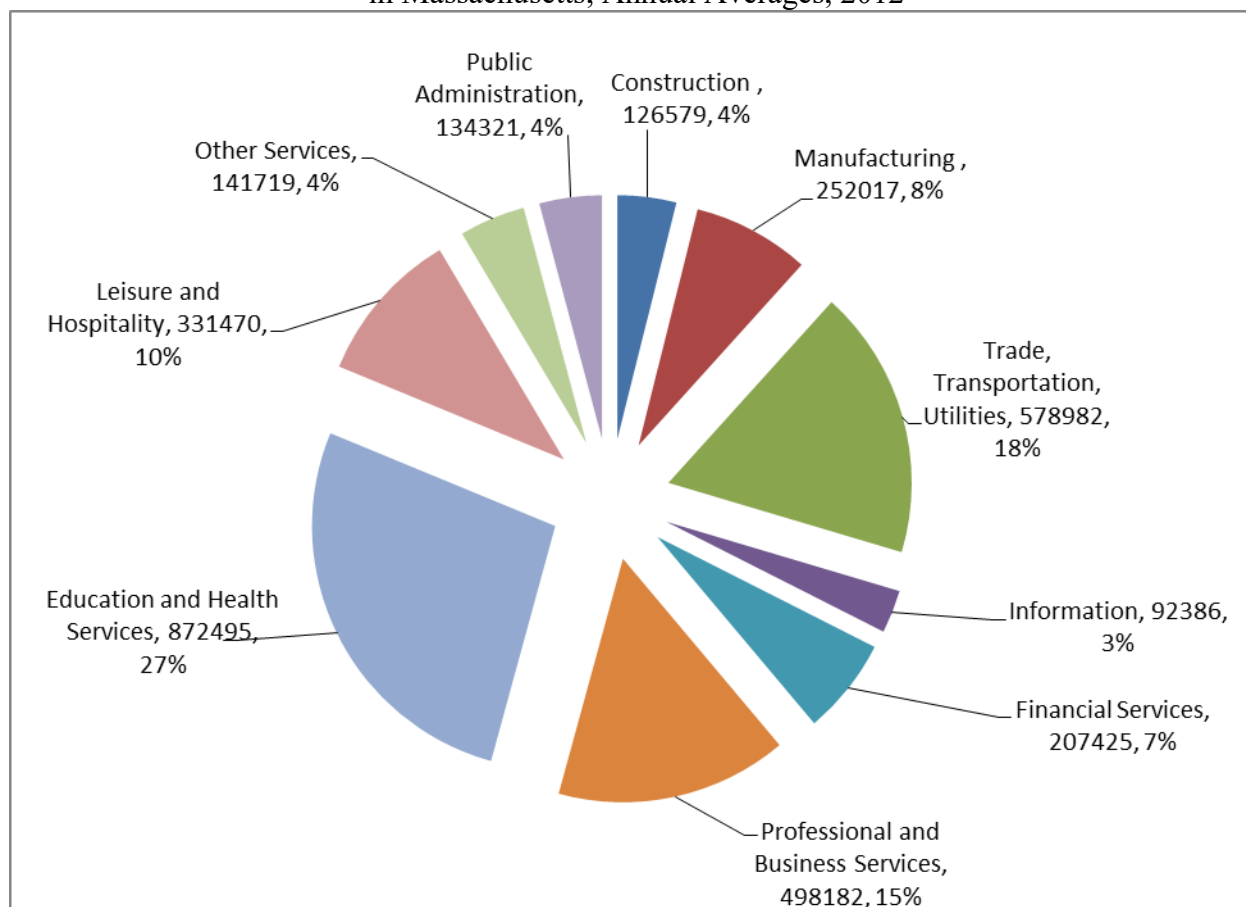
Industry Classification and the Industrial Structure of Employment

The QCEW organizes data on non-farm payroll employment in Massachusetts using the NAICS industry classification, assigning firms into specific industry groups based on the primary products and services that they produce. The NAICS taxonomy is composed of a hierarchy of industries that begins at the broadest level, sometimes called super sectors, to a more refined level of detail that assigns measures of economic activity and employment to increasingly more narrow kinds of economic activity. As discussed in the previous section, the data in Chart 1 provide information about the distribution of jobs across highly aggregated industry super sectors, offering a depiction of how labor is allocated across major sectors of the Commonwealth's economy at the time that Chapter 224 was signed into law.

Goods producing industries, largely composed of construction and manufacturing, once accounted for a very substantial share of non-farm employment during the days of the high technology boom of the late 1970s and 1980s. At that time, goods producing industries accounted for about one in three payroll jobs in the state, but since then losses in manufacturing and strong growth in service producing industries meant that by 2012 construction and manufacturing producers accounted for just 12 percent of payroll employment in the Commonwealth. The education and health sectors have emerged as the leading source of jobs

among all of the state's super-sectors. Together the education and health industry, including both public and private sector education and health organizations, employed more than 872,000 workers, on average,

Chart 2
The Industrial Composition of Non-Farm Covered Employment
in Massachusetts, Annual Averages, 2012



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

during 2012, accounting for more than one quarter of all covered⁴ payroll employment in the state. The trade, transportation and utilities super sector is the second largest jobs component of the state's labor market, accounting for about 18 percent of employment. Professional and business services is composed of a mix of high end professional and scientific organizations such as engineering, accounting and scientific research services, along with lower end business and

⁴ Covered employment includes employment in industries subject to state and/or federal unemployment insurance laws and coverage.

administrative support services including services to buildings, security services and temporary help agencies. This super sector employed nearly 500,000 workers on average during 2012, equal to about 15 percent of covered employment in the state. The leisure and hospitality super sector, composed of accommodation and food services and entertainment and recreation industries accounted for about 10 percent of the state's covered employment during 2012.

The education and health super sector, as mentioned above, includes for-profit, non-profit and federal, state and local government firms and organizations engaged in the production of education and health services in the state. Unlike the Current Employment Statistics (CES) survey (CES statewide job counts are released each month along with the state unemployment rate data), QCEW data used in this study classify government employment in a variety of industry sectors, depending on the kind of product or service generated by a particular unit of government. For example, public elementary and secondary schools are classified as part of the education industry by the QCEW program. Similarly, federal government Veterans Administration hospitals are classified in the health care industry by the QCEW. In contrast, the CES classifies all federal, state and local government employment including public schools and federal hospitals as part of the government super sector. The QCEW does not have a government super sector per se; instead it classifies some government functions that cannot be allocated to industries like education and health to a public administration super sector. This would include certain executive, legislative, judicial and public safety functions of government.⁵

Disaggregating the Education and Health Services Super Sector

The education and health services super sector is actually composed of three distinct types of services that are provided by both private sector business establishments as well as public sector organizations. The education sector is composed of elementary, secondary and postsecondary education and related schools of instruction (but not early education). The health industry is composed of ambulatory health care services, hospitals and nursing and residential

⁵ During 2012 the public administration super sector under the QCEW accounted for 4 percent of statewide total non-farm payroll employment. The more broadly inclusive government sector definition used by the CES program accounted for about 12 percent of statewide non-farm payroll employment. The difference is largely the result of the QCEW program classifying government payroll jobs in education and hospitals within the education and health services super sector, while the CES classifies government and education and health service employment as part of the Government super sector and thus does not include that employment in education and health services job counts.

care services. The social services industry is composed of individual and family services, community food and housing services, vocational rehabilitation services and child day care services including pre-K centers and Head Start programs. Although part of the education and health services super sector, it is clear that the education services industry is distinct and largely unrelated to the health care sector especially with respect to the provisions of Chapter 224. Ambulatory care, hospitals and nursing and residential care facilities are all strongly associated with the provision of health care and clearly belong in any definition of the health care workforce. More ambiguous, however are some elements of the social services industry.

Generally, social services are excluded from any analysis of the health care industry, in part because their staffing structure is quite different from health care. In the health care sector, medical and health care professional and support workers predominate while the social services sector provides very different services with a much different staffing structure. Additionally, the methods of finance are quite distinct between the two industries with health insurance playing only a very minor role in social service finance in the state. While we agree that most of the social services sector should not be included in the any measure of the health care workforce in the state, we think that the individual and family service components of the social service sector should be included as part of the measure. These components should be included because the Wage and Hour Division and the Bureau of Labor Statistics (BLS) of the U.S. Department of Labor have both taken actions in the last year with respect to the way that direct care workers are treated under the Fair Labor Standards Act (FLSA) and how they are counted by BLS in its establishment surveys. These changes are discussed in detail below.

FLSA, Direct Care Workers and Individual and Family Services

Over the last year the Wage and Hour Division has changed its interpretation of the FLSA and eliminated the exemption from its minimum wage and overtime provisions for home health direct care workers. The new interpretation now requires that these workers be treated like all other payroll workers. The elimination of this exemption has meant that BLS employment measures needed to include these direct care workers in their establishment payroll data collection programs instead of treating them solely as household workers who were not included in the establishment surveys. The following provides more information about the reasons for this change and its implications.

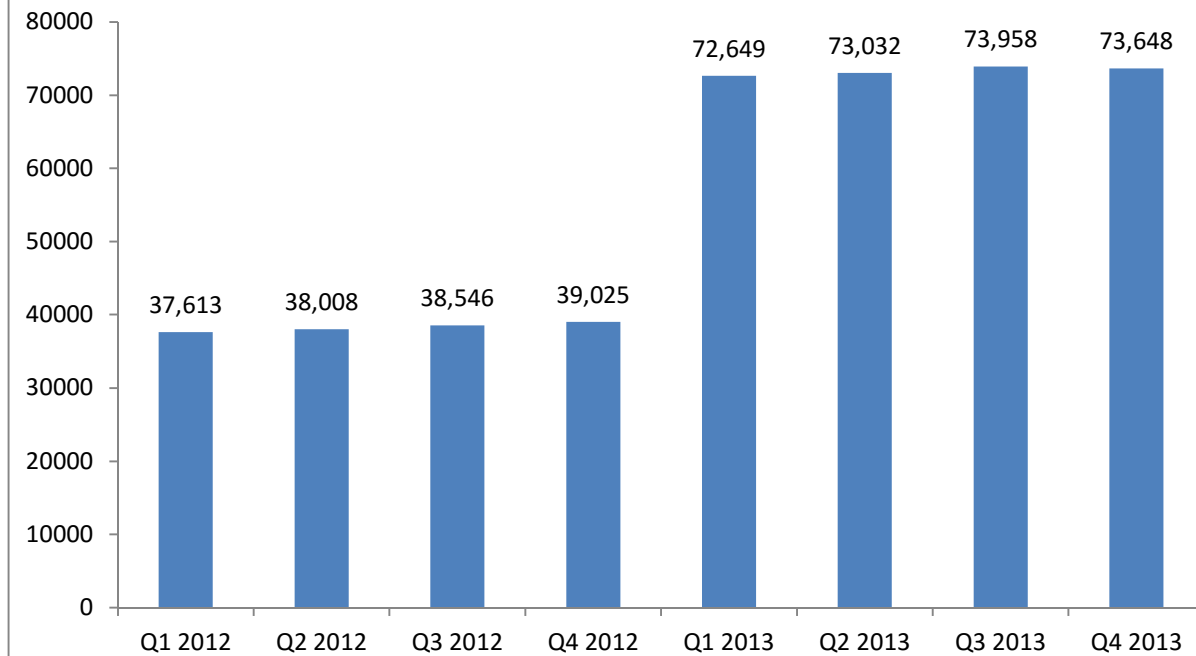
Until January of 2013, home health care workers were not included in any employment counts from either the QCEW or CES business establishment surveys. Instead, their employment was counted as that of a private household worker such as a maid or domestic helper in the Current Population Survey's monthly household survey. Beginning in January 2013, these home health workers were classified as direct care workers in the individual and family services industry sub-sector of the social service sector. The decision to change the FLSA exemption and to reclassify home health worker employment was based on the changing roles and responsibilities of these workers in recent years. U.S. Secretary of Labor Thomas Perez when announcing the end of the exemption observed that:

"The home care industry has grown dramatically over the last several decades as more Americans choose to receive long-term care at home instead of in nursing homes or other facilities. Despite this growth and the fact that direct care workers increasingly receive skills training and perform work previously done by trained nurses, direct care workers remain among the lowest paid in the service industry."

This determination by the Secretary essentially acknowledges that employment as a direct care worker has evolved from one of domestic service and companionship to one of a position where direct care workers "...perform medically-related services for which training is typically a pre-requisite."

Our interviews with some of the leading business, organized labor and health professionals in Massachusetts have all pointed to a growing reliance on home health care workers as health care services are increasingly shifted from hospitals and nursing homes toward services provided on an outpatient basis through ambulatory care providers and increasingly at home by home health aides. The shift of direct care home health workers from the household survey counts to the QCEW and CES employment measures added more than 34,000 jobs to the

Pre and Post Addition of Direct Care Home Health Workers to Individual and Family Social Services Industry Employment



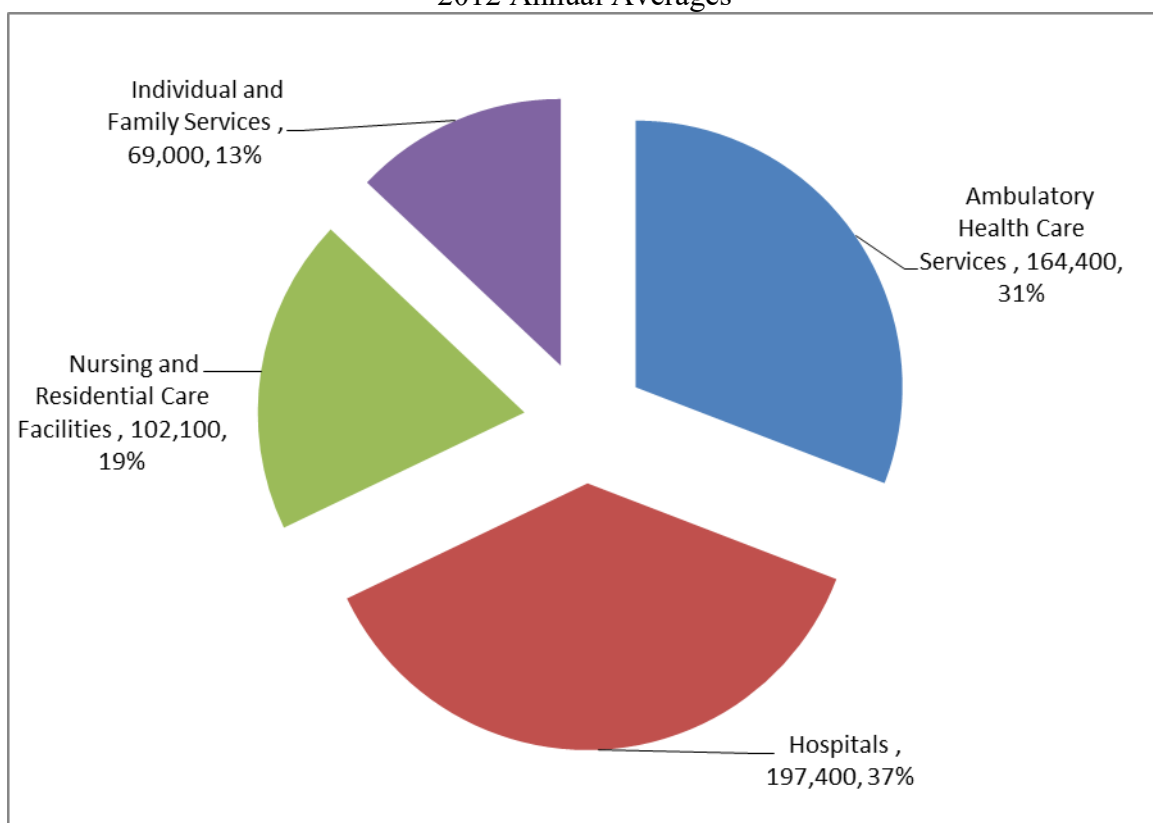
Source: U.S. Bureau of Labor Statistics, Current Employment Statistics Survey Program, State and Metro Area Employment Hours and Earnings <http://www.bls.gov/sac/>

state's payroll employment levels between December 2012 and January 2013 when this employment was reclassified by the Bureau of Labor Statistics. This addition increased payroll employment levels in the individual and family services sector from around 38,300 jobs during 2012 to 73,300 jobs during 2013, an 85 percent increase. These data suggest that these direct care workers now account for about 45 percent of total employment in the individual and family services industry. This proportion justifies inclusion of the individual and family services industry into a new and emerging health care workforce measure that is more reflective of technological, financial and regulatory developments that have altered and likely will continue to alter the delivery of health services both at medical and health facilities as well as at home.

The Industrial Composition of the Massachusetts Health Care Workforce Jobs Measure

Monthly employment in the Massachusetts health care industry accounted for one of six payroll jobs in the state during 2012 (the year Chapter 224 was enacted), employing an average of almost 533,000 workers over the course of the year. Employment in the industry at that time was most heavily concentrated in hospitals including

Chart 3
The Distribution of Health Care Payroll Employment by Industry Component,
2012 Annual Averages



Sources: Data for ambulatory health care services, hospitals, and nursing and residential care facilities are derived from the Quarterly Census of Employment and Wages statistics program. The data for individual and family services industry are derived from the Current Employment Statistics Survey. U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012 <http://www.bls.gov/cew/> and U.S. Bureau of Labor Statistics, Current Employment Statistics Survey Program, State and Metro Area Employment Hours and Earnings <http://www.bls.gov/sac/>

medical surgical organizations, psychiatric hospitals and other hospital organizations.

Ambulatory care health service organizations had employment levels of 164,400, equal to about 31 percent of all jobs in the state's health care delivery system. Nursing and residential care

facilities, which include nursing care facilities, community care facilities and other residential facilities employed just over 102,000 workers, accounting for 19 percent of health care employment in Massachusetts. Finally, the individual and family services sector in Massachusetts, which includes child and youth services and services for the elderly and persons with disabilities, employed 69,000 workers on average during 2012, or 13 percent of the Commonwealth's health care workforce.

Inside Ambulatory Care

Employment within the ambulatory care industry during 2012 was concentrated in the offices of professional medical practitioners including physicians and dentists. These offices accounted for nearly one half (48 percent) of ambulatory care employment in the state. Other health care practitioners (including non-physician mental health practitioners and physical, occupational and speech/audiology practitioners) accounted for an additional 15,500 jobs, or about 9 percent of the ambulatory care industry's employment. Outpatient care facilities, including family planning centers, outpatient mental health facilities and HMO medical centers and freestanding surgical and emergency centers, employed 24,800 workers, accounting for 15 percent of all jobs in the ambulatory care services sector.

Table 1:
The Distribution of Employment in the Massachusetts Ambulatory Care Sector, Annual Average, 2012

Industry Name	Employment	Percent Distribution
Offices of Physicians	55572	34%
Offices of Dentists	22402	14%
Offices of Other Health Practitioners	15518	9%
Outpatient Care Centers	24768	15%
Medical and Diagnostic Laboratories	5028	3%
Home Health Care Services	33063	20%
Other Ambulatory Health Care Services	8037	5%
Total	164387	100%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Home health care services firms employed about one in five workers in the ambulatory care sector. These firms deliver skilled nursing, various therapy services including physical

therapy, and dietary and nutritional services in the home. Employment in this industry is primarily focused on medical home care.

Inside the Hospital Sector

Hospital employment in Massachusetts is primarily concentrated in medical and surgical hospitals that provide diagnostic and medical treatment to inpatients with a range of medical conditions. Medical/surgical hospitals may also provide ancillary outpatient services as well as clinical laboratory and pharmacy services. These medical/surgical hospitals employed an average of nearly 168,900 workers during 2012.

Table 2:
The Distribution of Employment in the Massachusetts Hospital Sector, Annual Average, 2012

Industry Name	Employment	Percent Distribution
General Medical and Surgical Hospitals	168815	85%
Psychiatric & Substance Abuse Hospitals	8971	5%
Specialty Hospitals	19586	10%
Total	197373	100%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Psychiatric and substance abuse hospitals differ from medical/surgical hospitals insofar as their primary activities are associated with diagnosing, treating and monitoring inpatients who experience mental illness or substance abuse problems. These facilities serve patients who often remain in a hospital for an extended period. Psychiatric and substance abuse hospitals may also provide ancillary medical/health services including imaging and laboratory services.

Employment in psychiatric and substance abuse hospitals in Massachusetts averaged about 9,000 during 2012, accounting for 5 percent of overall hospital sector employment.

Some specialty hospitals provide inpatient diagnostic and treatment services to persons with specific medical conditions. Other specialty hospitals provide inpatient rehabilitation services as well as long-term care inpatient services to the chronically ill. Examples include rehabilitation hospitals, cancer hospitals, eye, ear, nose and throat hospitals and children's specialty hospitals. During 2012, specialty hospitals in Massachusetts employed about 19,600 workers, accounting for about 10 percent of employment within the state's overall hospital services sector.

Inside the Nursing and Residential Care Facilities Sector

Nursing care facilities are the largest component of the nursing and residential care sector, employing 58,500 workers and accounting for 57 percent of employment in the nursing and residential care industry sub-sector. The distinguishing feature of nursing care facilities is that they provide extended care to individuals who require nursing care and have a primary staff of registered nurses, licensed practical nurses and certified nursing assistants to manage patient care. Nursing care facilities include establishments such as nursing homes, convalescent homes, and group homes for the disabled with nursing care, in-patient hospice care and skilled nursing facilities.

Table 3:
The Distribution of Employment in the Nursing and Residential Care Sector,
Annual Average, 2012

Industry Name	Employment	Percent Distribution
Nursing Care Facilities	58516	57%
Residential Mental Health Facilities	20927	20%
Community Care Facilities for the Elderly	16892	17%
Other Residential Care Facilities	5754	6%
Total	102089	100%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Residential mental health facilities employed nearly 21,000 workers during 2012, accounting for about one in five jobs in the nursing and residential care sub-sector. Residential mental health facilities include facilities such as group homes and hospitals for the intellectually and developmentally disabled. They may provide some health care, but the primary focus is on the daily living activities of residents. Residential mental health facilities also include residential establishments that provide counseling and mental health services and incidental medical services for residents with substance abuse or mental health disabilities. These establishments also provide a wide range of social services in addition to counseling. The mental health facilities include halfway houses for substance abuse and mental illness, drug addiction rehabilitation facilities and residential alcoholism rehabilitation facilities.

Community care facilities for the elderly employed about 16,900 workers in Massachusetts during 2012, equal to about 17 percent of all nursing and residential care

employment in the state. Community care facilities include establishments that provide residential and personal care primarily for the elderly and others who are unable or do not wish to live independently. Community care facilities provide assistance with daily living activities including supervision and housekeeping such as those services found in assisted living communities, soldiers' homes and retirement homes without nursing care.

The other residential care facilities component of the nursing and residential care sector provides supervision and group residential care services to delinquent/ex-offender youth, foster children, unwed mothers, and the visually and hearing impaired. This component also includes orphanages. Employment levels statewide in these specialized residential care facilities averaged about 5,800 during 2012, equal to about 6 percent of nursing and residential health care employment.

Inside the Individual and Family Services Sector

The individual and family services sector in Massachusetts is composed of three elements. The largest component of the sector is made up of establishments engaged in the provision of non-residential services to the elderly and persons with disabilities. These establishments collectively employ about 44,600 workers in Massachusetts. Workers in this industry sector provide for the welfare of these individuals largely through the provision of social services (including day-care and homemaker services) to improve their wellbeing.

Table 4:
The Distribution of Employment in the Individual and Family Services Sector
Annual Average, 2012

Industry Name	Employment	Percent Distribution
Child and Youth Service	7042	10.2%
Services for the Elderly and Persons with Disabilities	44573	64.6%
Other Individual and Family Services	17385	25.2%
Total	69000	100.0%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

As we discussed above, the recent inclusion of direct care worker employment in this industry now indicates some minimal medical activities, although this is not the primary service provided by establishments.⁶

The child and youth service component of the individual and family services industry sub-sector employed about 17,400 workers in Massachusetts during 2012. These organizations provide nonresidential services, including adoption, foster care and drug prevention and include foster care agencies, adoption agencies and youth centers.

Finally, the ‘other’ individual and family service component of this sector includes a wide range of self-help organizations including those for the treatment of alcoholism and drug addiction, rape crisis centers, neighborhood multi-service centers and crisis intervention centers. This component accounted for one quarter of overall employment levels in the state’s individual and family services sector.

The Geographic Distribution of Health Care Industry Employment

Changes in the laws and regulations that govern various parts of the state’s health care industry will have considerably different impacts on the workforce of various regions across the Commonwealth. Regulatory activity aimed at reducing the use of hospitals and nursing homes may have less of an impact on the health care workforce of a region where ambulatory care organizations and individual and family services are more important sources of health care employment and earnings. Conversely, such changes may exert powerful adverse employment and earnings impacts in regions of the state where these organizations are concentrated.

In this section of our baseline study we examine the geographic distribution and differences in the regional industry mix of the state’s health care industry. In order to accomplish this we are using a slightly modified version of the seven regions adopted by the Workforce Competitiveness Trust Fund (WCTF) Advisory Committee. This has been used by Commonwealth Corporation since 2007 to allocate employment and training program grant

⁶ Direct care workers were not included in the QCEW data during 2012. However, the CES survey program did revise its historical estimates to include the direct care workers in the individual and family services sub-sector. We have used these revised 2012 CES estimates for Massachusetts to adjust the 2012 data for services to elderly and persons with disabilities by about 31,700 jobs, reflecting the inclusion of direct care workers in the industry employment count during 2012.

funding from the Workforce Competitiveness Trust Fund. The regions are composed of workforce investment board regional jurisdictions that are used to manage local workforce development program activities. We have modified the WCTF regional definition by breaking the Boston Metropolitan region into two separate regions, sorting out the City of Boston proper from its surrounding suburban communities. We chose to separate Boston from the suburbs since the city's medical institutions play a national and international role in health care delivery and perhaps more practically because 22 percent of all health care employment in the state was located in the City of Boston during 2012. In addition, the industrial and occupational composition of these jobs is significantly different from those in the rest of the state.

Perhaps the most notable feature of the health care industry is the central role it plays in the overall structure of employment in each region. At the state level, the Massachusetts health care industry covered employment during 2012 averaged about 533,000 workers, accounting for one in six of 3.243 million total covered average jobs. The findings in Table 5 reveal

Table 5:
Share of Total Covered Non-Farm Payroll Employment in the Health Care Industry, by
Geographic Region of Massachusetts, 2012

	Health Care Workforce	Total Non- Farm	Health Care Share of Total
Massachusetts, total	532849	3243632	16.4%
Berkshire	11787	60568	19.5%
Pioneer Valley	56335	286752	19.6%
Central Massachusetts	59139	321386	18.4%
Northeast	69224	420609	16.5%
City of Boston	120272	570888	21.1%
Boston Suburbs	108456	920117	11.8%
Southeast	86674	514392	16.8%
Cape & Islands	16080	104647	15.4%

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

high concentrations of health care employment in Boston and western Massachusetts. In Boston more than one in five jobs located in the city are in the health care industries with similarly high proportions found in Berkshire County and in the Pioneer Valley (consisting of Franklin, Hampden and Hampshire counties). With the exception of the Boston suburbs, the remaining regions of the state all have at least one in six of their payroll jobs concentrated in the health care

industry. In the suburban communities surrounding Boston (composed of the Metro North and Metro South/West workforce regions) about one in eight payroll jobs are in the area's health care industry.

Sharp differences exist in the distribution of health care employment across the various geographic regions of the state. Table 6 presents findings on the geographic distribution of overall health care industry employment in Massachusetts and compares this with the geographic distribution of total wage and salary employment during 2012. The data reveal, unsurprisingly, that employment in Massachusetts is heavily concentrated in Greater Boston. Together, the city of Boston and the Boston suburbs have nearly 1.5 million jobs in establishments located in this area of the state, equal to about 47 percent of all jobs in Massachusetts during 2012. Employment among all establishments in the City of Boston accounted for 571,000 jobs during 2012, equal to 18 percent of the state's overall payroll employment, while the Boston suburbs accounted for 29 percent of jobs in the state. However, we find that the city accounted for about 23 percent of all health care industry employment in the state. In this instance, Boston had a disproportionately large share of the state's health care industry employment, about 1.28 times the city's share of statewide total non-farm employment. A look at the data in Table 6-A reveals that Boston's well above average share of health care employment relative to other regions of the state is the result of an extraordinarily high concentration of hospital jobs in the city.

Table 6:
The Distribution of Covered Non-Farm Total and Health Care Industry Payroll Employment
across Geographic Regions of Massachusetts, 2012

Region	Health Care Services		Total Non-Farm Covered Employment		Ratio of Health Care Share to Total Covered Share
	Number	Percent Distribution	Number	Percent Distribution	
Berkshire	11787	2.2%	60568	1.9%	1.18
Pioneer Valley	56335	10.7%	286752	9.0%	1.19
Central Massachusetts	59139	11.2%	321386	10.0%	1.12
Northeast	69224	13.1%	420609	13.1%	1.00
Boston	120272	22.8%	570888	17.8%	1.28
Boston Suburbs	108456	20.5%	920117	28.8%	0.71
Southeast	86674	16.4%	514392	16.1%	1.02
Cape & islands	16080	3.0%	104647	3.3%	0.93
Massachusetts	532849	100.0%	3243632	100.0%	1.00

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The data reveal that in 2012 nearly 85,000 hospital jobs were in facilities located in Boston, equal to about 45 percent of overall hospital employment in the state, and nearly double the share of the state's hospital share of health care industry employment. However, Boston's share of employment in each of the other three specific health care industry sub-sectors was disproportionally small relative to the statewide shares. For example, ambulatory care jobs located in the city equaled just 12 percent of the state's employment level in that industry, while Boston accounted for 22 percent of overall health care employment, yielding a ratio of ambulatory care share to health care industry share of just .53. This means that Boston had just over one half of its proportionate share of statewide ambulatory health care employment. Nursing and residential care facilities are much less likely to be found in Boston than in other regions of the state. Boston had only one quarter of its proportionate share of nursing and residential facilities. Indeed, a look at the data reveals that this employment is disproportionately concentrated in the Berkshire region (1.67 times state proportion,) Central Mass (1.29 x state proportion,) the Southeast region (1.29 x state proportion) the Northeast (1.25 x state proportion) and especially the Cape and Islands where nursing homes accounted for 1.44 x its proportion of overall statewide health care employment.

Table 6-A:

The Distribution of Covered Non-Farm Total and Specific Health Care Industry Payroll
Employment across Geographic Regions of Massachusetts, 2012

Industry	Ambulatory Care			Hospital		
			Ratio of Industry Share to Total Health Care			Ratio of Industry Share to Total Health Care
Region	Number	Percent Distribution	Share	Number	Percent Distribution	Share
Berkshire	3023	1.9%	0.83	3492	1.8%	0.81
Pioneer Valley	17684	10.8%	1.01	14484	7.5%	0.70
Central Massachusetts	18180	11.1%	0.99	18658	9.6%	0.86
Northeast	25562	15.6%	1.19	18091	9.3%	0.71
Boston	19623	12.0%	0.53	84852	43.8%	1.92
Boston Suburbs	41385	25.3%	1.23	30873	15.9%	0.78
Southeast	31965	19.6%	1.19	19258	9.9%	0.60
Cape & islands	5938	3.6%	1.19	4188	2.2%	0.71
Total, All Regions	163360	100.0%	1.00	193895	100.0%	1.00
Industry	Nursing and Residential			Individual and Family Services		
			Ratio of Industry Share to Total Health Care			Ratio of Industry Share to Total Health Care
Region	Number	Percent Distribution	Share	Number	Percent Distribution	Share
Berkshire	3793	3.7%	1.67	1480	2.1%	0.96
Pioneer Valley	12062	11.9%	1.11	12105	17.6%	1.65
Central Massachusetts	14650	14.4%	1.29	7651	11.1%	0.99
Northeast	16700	16.4%	1.25	8870	12.9%	0.98
Boston	5936	5.8%	0.26	9860	14.3%	0.63
Boston Suburbs	22626	22.2%	1.08	13573	19.7%	0.96
Southeast	21524	21.2%	1.29	13927	20.2%	1.23
Cape & islands	4459	4.4%	1.44	1494	2.2%	0.71
Total, All Regions	101750	100.0%	1.00	68961	100.0%	1.00

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

An unexpected finding of our analysis of the geographic distribution of health care industry employment is the considerable disproportions of individual and family services industry employment in the Southeast region and especially in the Pioneer Valley. The Pioneer Valley had 12,100 individual and family services jobs during 2012. This accounted for nearly 18

percent of the state's employment level in that industry. In contrast, the Pioneer Valley employed only 10.7 percent of health care workers statewide, yielding 1.65 times the share of individual and family services employment in the region compared to its statewide share of health care jobs.

The variations in the distribution of employment in the specific health care industries across the state mean that the relative importance of various specific industry components of the health care sector in the individual regional labor markets will also vary considerably. The specifics of the mix of health care industry sub-sectors in a region exert a strong impact on the characteristics of employment in the area's overall health care industry. Staffing patterns, ability, knowledge and skill requirements, educational attainment, occupational licensing, annual pay, weeks and hours of work are just a few of the most important factors that vary considerably across specific parts of the health care industry. Indeed, the pace of job growth within a region's health care industry (and a potentially important source of overall regional job creation) will vary considerably depending on the mix of specific health care employment found in a given region.

The findings provided in Table 7 examine the industry mix of health care employment within each of the eight geographic regions of the state. At one extreme we find that health care employment is overwhelmingly concentrated in hospitals, with 70 percent of Boston's health care sector jobs located in hospitals. This means that the characteristics of health care jobs in the city will be dominated by employment found in hospital staffing structures, which tend to have substantial education and training requirements and pay above-average wages. In contrast, the Berkshire region and the Cape and Islands have health care industries with well above-average shares of employment in the nursing and residential care industry sub-sector. Staffing patterns in nursing and residential care facilities are generally characterized by fewer education and training requirements and pay below-average wages compared to some other elements of the health care industry. Areas with high shares of nursing and residential care employment in their health care industry will have somewhat different education and training requirements for their workforce and the wages and rate of net new job creation will differ from those areas where other kinds of health care service providers dominate the health care industry landscape.

Table 7:
The Specific Industry Structure of Health Care Employment
by Geographic Region of Massachusetts, 2012

	Ambulatory Care	Hospital	Nursing and Residential	Individual and Family Services	Health Care Services
Massachusetts	30.9%	37.0%	19.2%	12.9%	100%
Berkshire	25.6%	29.6%	32.1%	12.6%	100%
Pioneer Valley	31.4%	25.7%	21.4%	21.5%	100%
Central Massachusetts	30.7%	31.5%	24.8%	12.9%	100%
Northeast	36.9%	26.1%	24.1%	12.8%	100%
Boston	16.3%	70.6%	4.9%	8.2%	100%
Boston Suburbs	38.2%	28.5%	20.9%	12.5%	100%
Southeast	36.9%	22.2%	24.8%	16.1%	100%
Cape & islands	36.9%	26.0%	27.7%	9.3%	100%

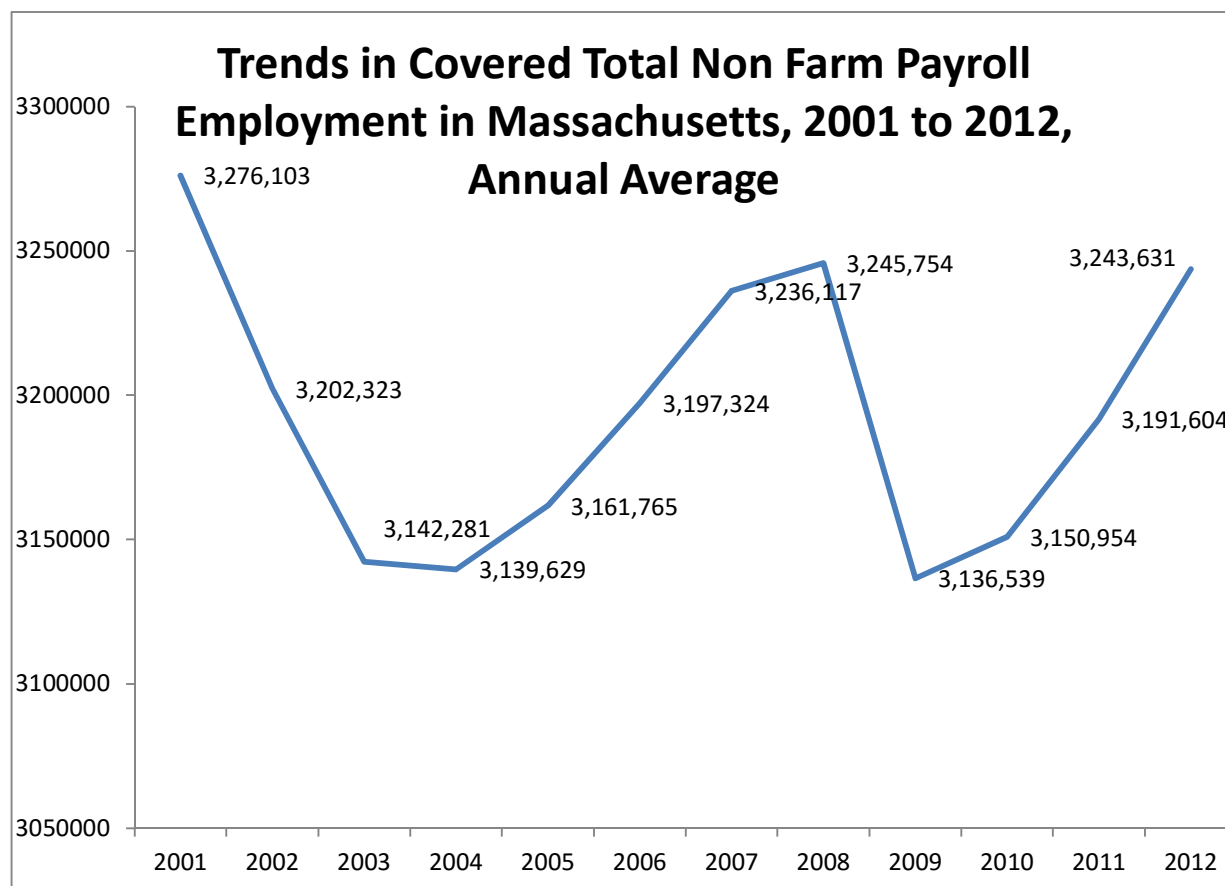
Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

In the next section of this paper we will explore the pace of new job creation in the state's health care industry and identify the specific industry components of health care job creation in the state.

Job Growth and Change in the Health Care Industry in Massachusetts

At the end of the 1980s Massachusetts experienced massive declines in payroll employment levels resulting in skyrocketing unemployment and declining labor force participation. By 1992 unemployment rates in the state exceeded 9 percent, yet by 2000 the state's unemployment rate had dropped to the 2.6 percent level and state labor markets were characterized by serious labor shortages in a large number of industries and occupations, including in many health care industry and occupation areas. Indeed, the 1990s were the period of the greatest job creation in Massachusetts over the entire post World War II period. Since that time the state economy has experienced two substantial economic recessions that have both been followed by a sluggish labor market recovery. Similar to the nation as a whole, the Massachusetts labor market has been characterized by sharp cyclical swings in payroll employment levels, with sharp and likely permanent job losses from the state's goods producing firms and increasing cyclical instability among service producing industries. The only exception to this condition of extensive labor market turbulence has been the state's health care industry,

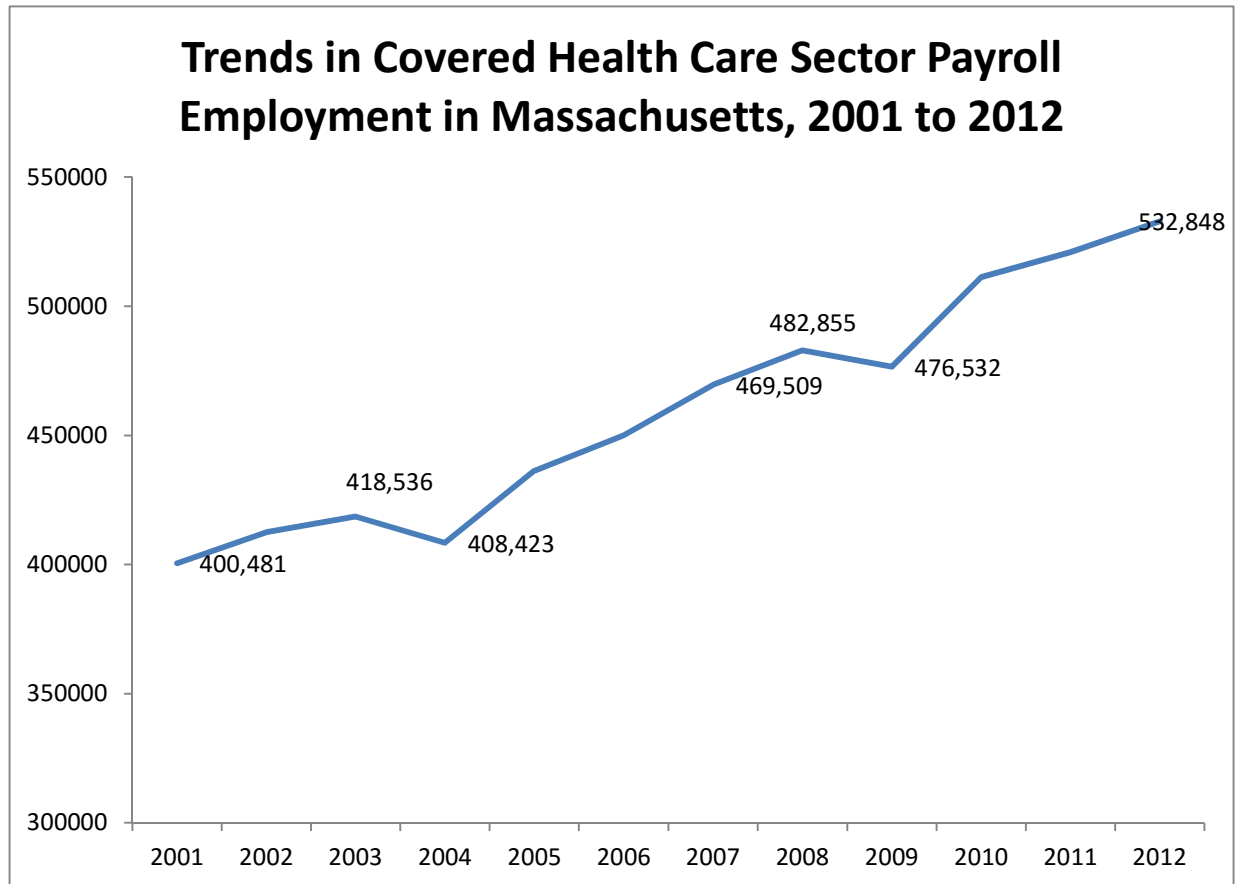
that over the 2001 to 2012 period has displayed a steady and sustained path of new job creation in the state and plays an increasingly important role in generating job stability in communities across the state.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Over the 2001 to 2012 period covered payroll employment in the state has experienced a net decline in total employment levels. During 2001 the overall payroll employment level averaged 3.27 million jobs, but over the next 11 years, through two economic recessions and recoveries, the state lost a net of about 32,000 jobs, a 1 percent net decrease. Total employment levels stood at 3.24 million during 2012. In contrast, the state's health care industry saw covered payroll employment levels increase considerably over the same period of time. The health care industry had an annual average employment level of about 400,500 during 2001. By 2012, the annual average number of covered jobs in the state's health care industry had increased to 532,800, a rise of about 132,000 jobs, a one third increase in employment over the period.

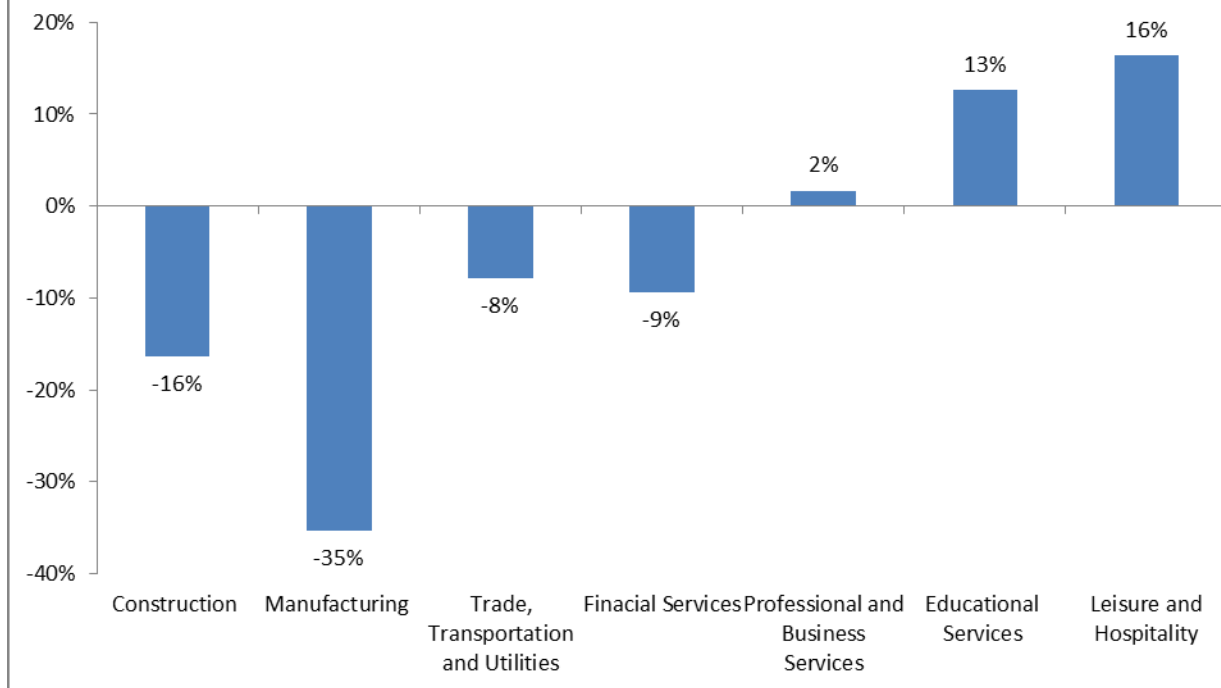
The health care industry exhibited considerably more stability over the business cycle than the state's job market as a whole. During the period of job loss following the dot.com recession of 2001, annual average employment in the state fell by about 4.2 percent between 2001 and 2004. In contrast, employment in the state's health care sector rose modestly by 2 percent



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

over the same time period. The jobs expansion between 2004 and 2008 saw payroll employment rise by about 3.4 percent while health care sector employment increased by 18 percent. The Great Recession saw statewide annual average employment decline between 2008 and 2009 by 3.4 percent, while health care sector employment in Massachusetts fell by just 1.3 percent. During the

Percent Change in Covered Payroll Employment in Selected Massachusetts Industry Sectors, 2001 to 2012



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

recovery annual average employment rebounded by 3.4 percent through 2012 while health care sector employment in the state rose by 11 percent.

The sluggish performance of the Massachusetts economy, at least with respect to its ability to create jobs, was heavily associated with a dramatic decline in employment in the state's goods producing industries. Between 2001 and 2012 the Massachusetts construction sector saw annual average covered payroll employment fall by 16 percent while the state's manufacturing sector employment experienced a 35 percent reduction. Together these two industries saw their payroll employment levels fall by about 162,000 jobs between 2001 and 2012. Substantial net job gains were posted in both the state's educational services and leisure and hospitality sectors, which together added about 84,000 jobs.

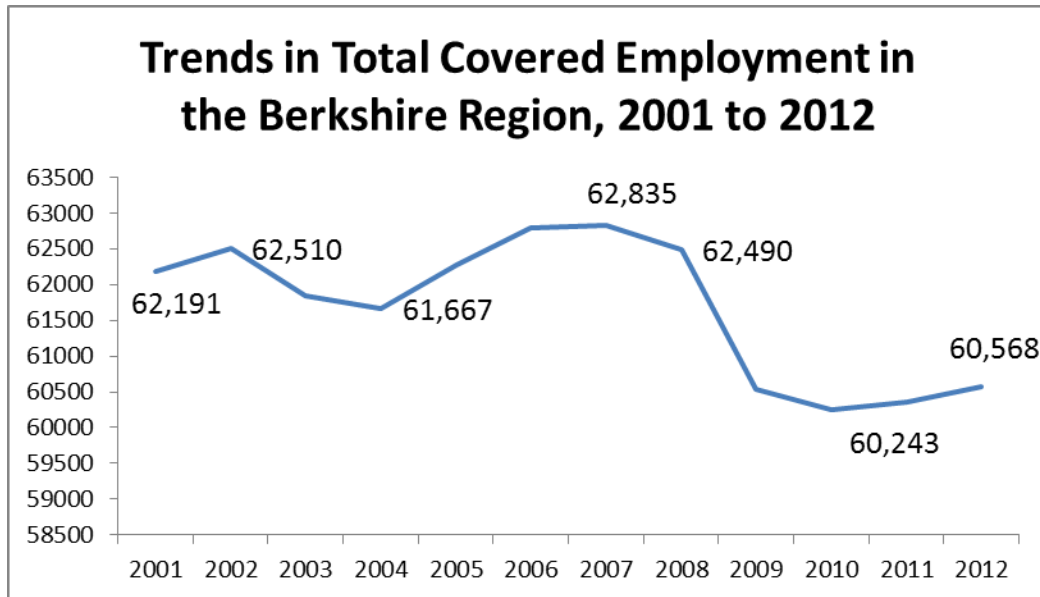
The Local Role of Health Care Employment in Job Growth

As we noted earlier, the health care sector accounts for a substantial share of total covered employment not only statewide, but also within each of the major regions of the Commonwealth. In this section we will examine trends in total covered employment and health care industry employment over the 2001 to 2012 period in each region of the state. The data showing reclassification of home health workers from household domestic workers to payroll employment workers while available at the statewide level is not available at the sub-state level at the time of this study. Therefore, in this section we will use a more conservative measure of the health care sector that does not include individual and family services employment. As a result, our estimates of health care size and trends in employment are more conservative than if we used the broader definition of health care employment. Nonetheless, even this more conservative measure of health care sector employment reveals the large role that the health care industry played in generating economic stability during a time of turbulence in communities across the state.

Berkshire

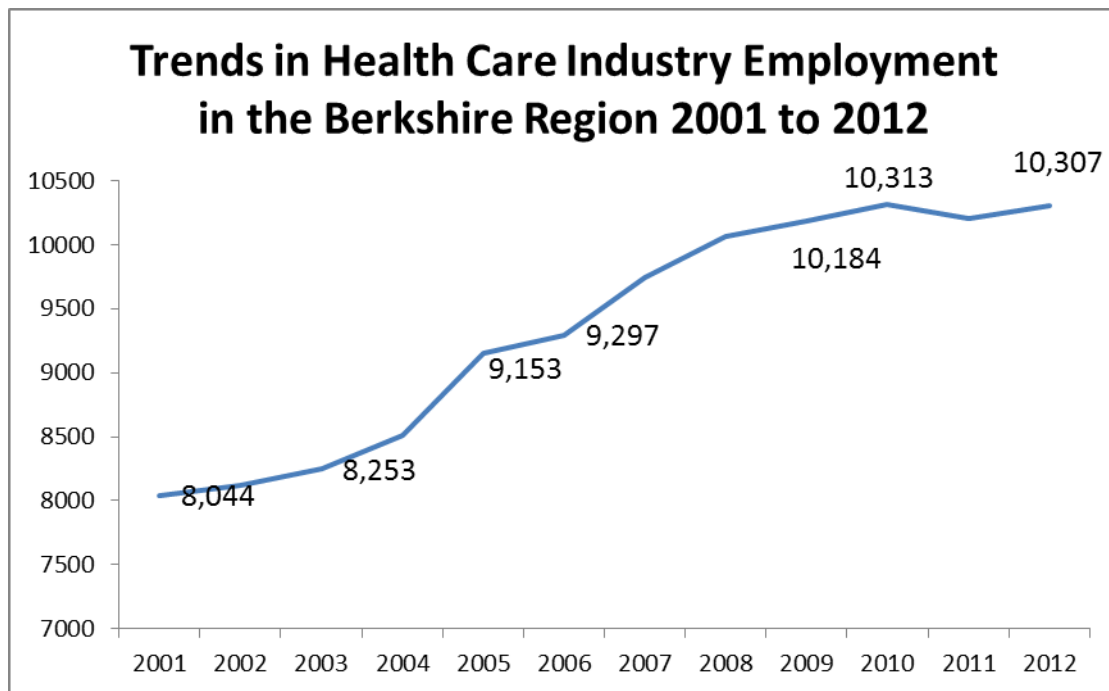
The Berkshire region, located in far western Massachusetts and composed of Berkshire County and its two major cities of Pittsfield and North Adams, has struggled with respect to job creation over the 2001 to 2012 period. Like the state as a whole covered payroll employment in the Berkshire region has fluctuated with cyclical changes in overall business conditions. Modest jobs losses occurred in the region during the dot.com recession followed by a more serious decline in employment associated with the Great Recession. Moreover, the recovery from the downturn that occurred beginning in 2008 was very slow with few new job opportunities created in the region through 2012. Large scale losses in the region's manufacturing sector along with declining construction employment have offset job gains made in other industry sectors of the Berkshire labor market. Overall covered payroll employment levels declined from about 62,200 during 2001 to 60,600 by 2012, a net loss of about 1,600 jobs over the eleven year period, a relative decline of 2.6 percent.

The single most important source of new job creation over the 2001 to 2012 period within the Berkshire region has been in the health care industry. Health care industry employment



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

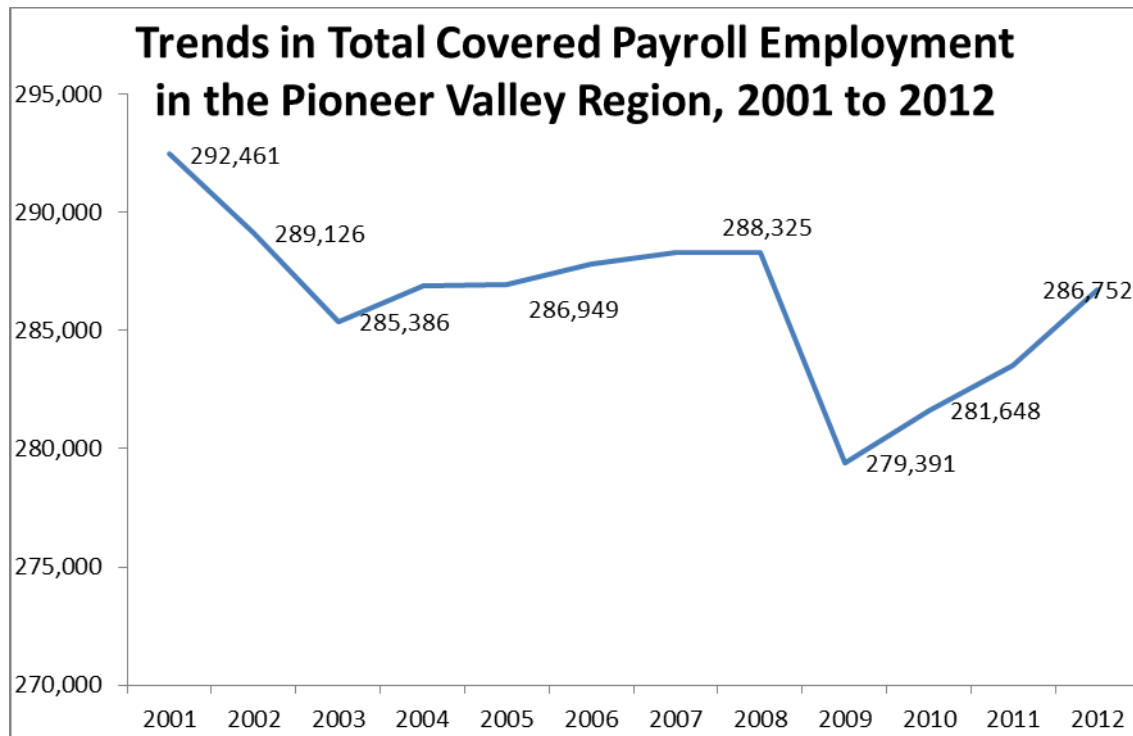
(excluding individual and family services) rose from about 8,000 during 2001 to 10,300 by 2012, a relative increase of 28 percent over the period. The gain of 2,300 health care industry jobs helped offset about 60 percent of the extraordinary decline that occurred in the region's manufacturing sector over the 2001 to 2012 period. Health care is a very important component of the Berkshire labor market. Using our broader definition of health care industry employment (that includes individual and family services) about one in five covered payroll jobs in the region were concentrated in the region's health care industry during 2012 (Table 5).



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Pioneer Valley

The Pioneer Valley region is largely composed of three counties that are located just east of the Berkshire region along the Interstate Route 91 corridor. The region includes Franklin County with Greenfield serving as its county seat, Hampshire County including the communities of Amherst and Northampton, and Hampden County including the Greater Springfield area. Over the 2001 to 2012 period employment here has declined from 292,500 to 286,800, a net loss in jobs of about 5,700 jobs or about 2 percent over the period. The job losses that occurred in the region were heavily associated with declines in employment among regional manufacturing producers who saw their payroll employment levels fall by about 14,000 jobs or by about one third over the eleven year period.

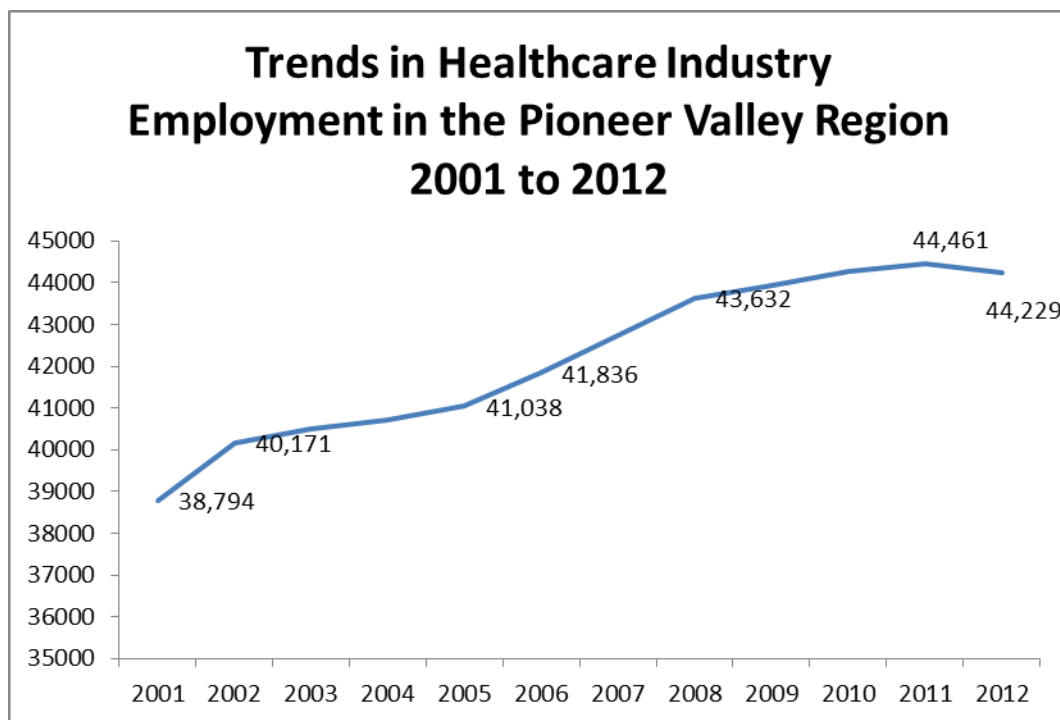


Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The health care industry (less individual and family services) in the Pioneer Valley added substantial numbers of new employment opportunities between 2001 and 2012. Ambulatory care, hospitals and nursing and residential care facilities had employment of about 38,800 during 2001 that rose to 44,200 by 2012, a rise of 14 percent. This rate of increase was well below the statewide rate of job creation in these three health care sub-sectors, which had increased employment levels by 25 percent over the same period. However, the individual and family services sub-sector is quite large in the Pioneer Valley region and so may have contributed to greater gains in a more broadly defined health care industry compared to the more limited measure we have adopted in our review of regional health care industry employment trends.⁷

⁷ The pre-post shift of home health care providers from their classification as FLSA exempt to covered had a very large impact in the Pioneer Valley on the size of the QCEW employment measure for the individual and family services sector between 2012 when these workers were not counted in the industry and 2013 when they were counted in the industry. We are now trying to develop a method to approximate what each regions' employment in the individual and family services sub-sector would have been if these workers had been covered by the FLSA and included in the scope of the QCEW data back to 2001.

The health care industry has served as an important source of new job creation in the Pioneer Valley. Using our broader definition of health care sector employment, about one in five covered payroll jobs located in the region are in the health care industry (Table 5).

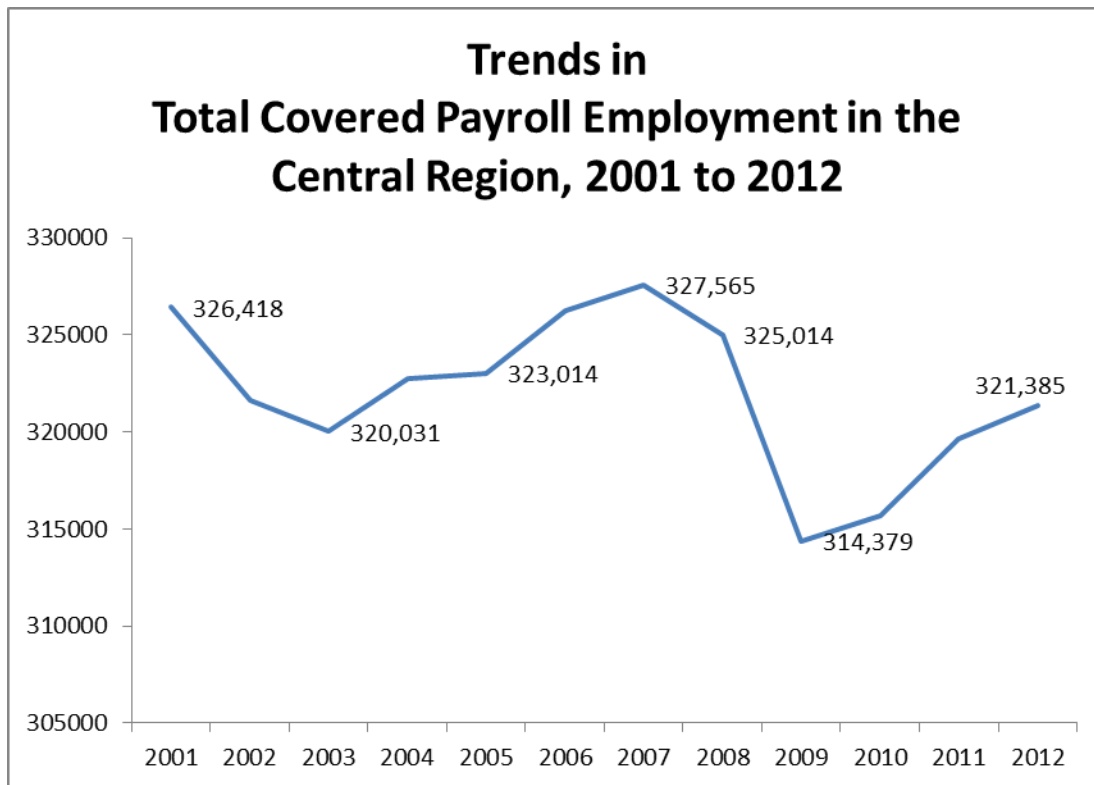


Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Central

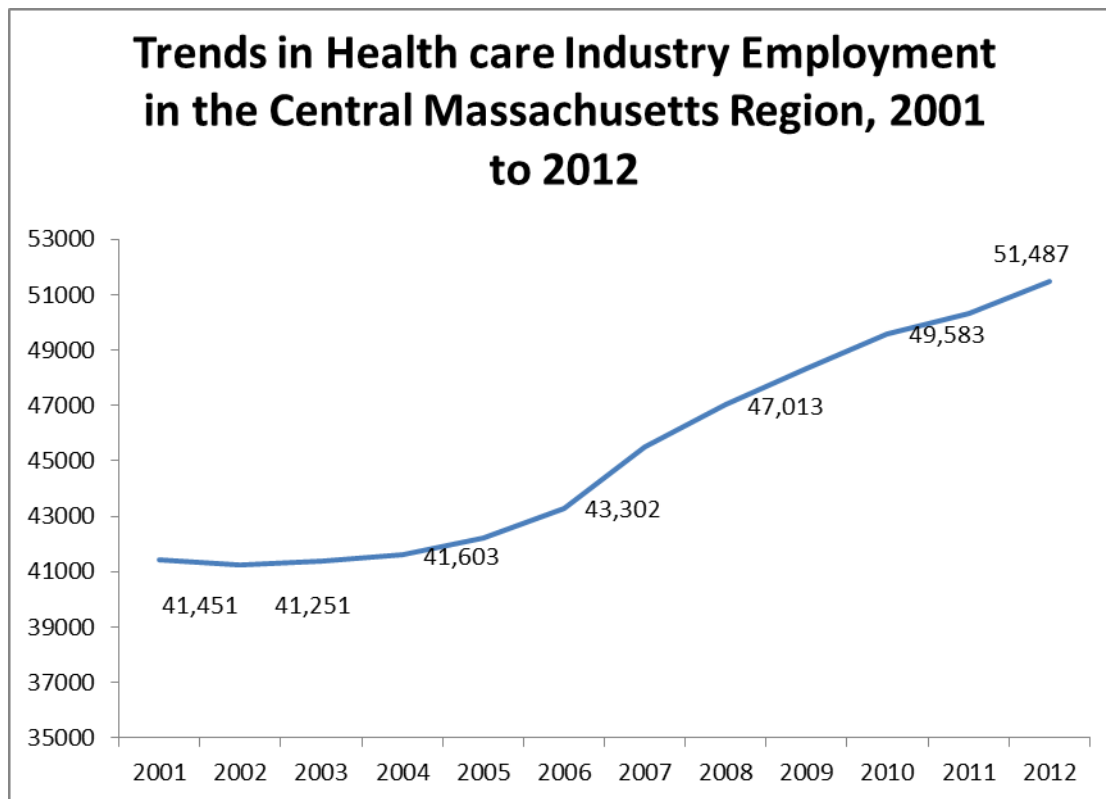
The Central region is composed largely of Worcester County anchored in the north by the cities of Fitchburg and Leominster and in the south by the city of Worcester, the county seat. Like Massachusetts as a whole the Central region has experienced considerable employment instability associated with large swings in the level of national economic activity since 2001. The dot.com recession of 2001 had only a modest adverse impact on the region's covered payroll employment level. Between 2001 and 2003 annual average total covered employment in the region fell from 326,400 to 320,000, a loss of just 2 percent over the period. The jobs recovery in Central Massachusetts following the dot.com recession saw employment levels rebound to a point slightly above its pre-recession peak. However, the job losses in the region between 2007 and 2009 were substantial, with annual average covered employment declining by 4 percent between the two years. The jobs recovery in Central Massachusetts since the end of the Great Recession has been somewhat slow paced. Between 2009 and 2012 annual average employment

in Central Massachusetts rose from 314,400 to 321,400, a level well below its pre-recession jobs peak in 2007.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Over the entire 2001 to 2012 period covered employment in the Central region declined from 326,400 to 321,400, but this modest decline of 1.5 percent in employment masks considerable change in the nature of employment growth and decline in the region. Similar to other regions in the state, the Central Massachusetts goods producing sectors experienced substantial job losses over the 11 year period. Construction payrolls in the region fell from 15,100 to 13,500 by 2012, an 11 percent net loss. The region's manufacturing sector, especially goods producing manufacturing, experienced extraordinary job losses. Specifically, durable manufacturing employment fell from 33,700 jobs to 20,900, a 38 percent decline between 2001 and 2012. During this same period, non-durable manufacturing employment fell from 20,200 during 2001 to 13,300 by 2012. Overall, the region's manufacturers lost more than 19,000 jobs, a 36 percent reduction in just 11 years.

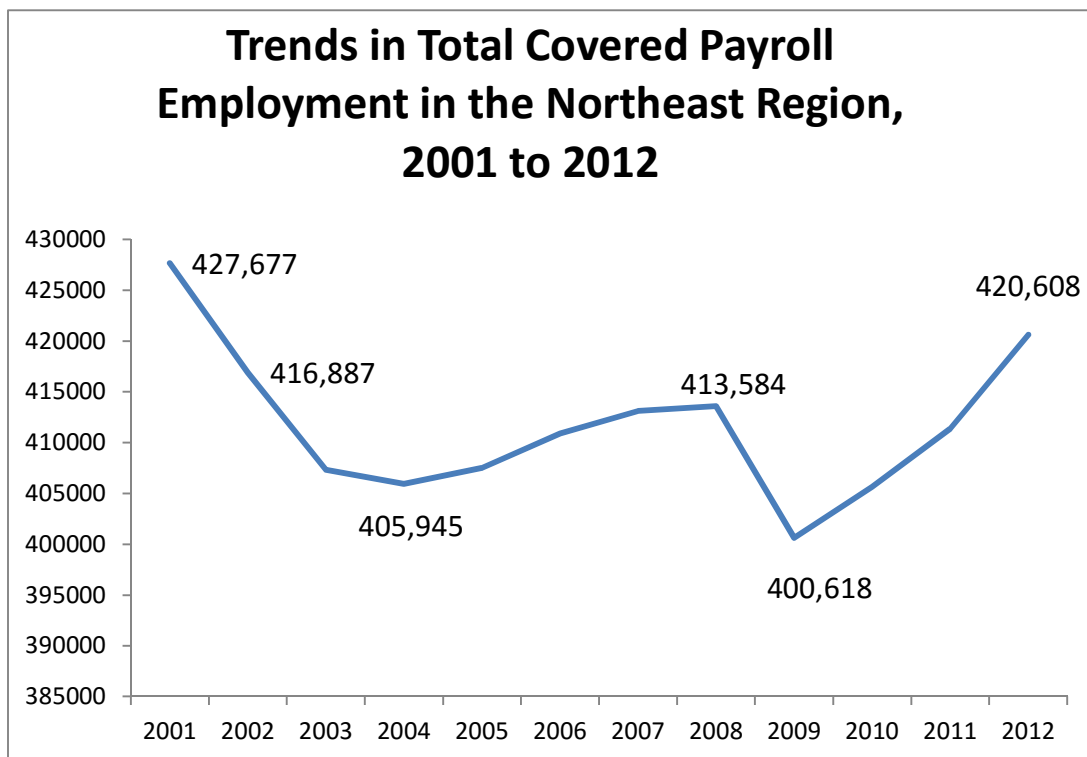


Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

While many major industries in the Central region experienced job losses between 2001 and 2012, the region's education industry was able to add about 5,000 jobs and the leisure and hospitality sector saw employment rise by about 3,600 jobs. The more narrowly defined health care industry (excluding the individual and family services sector) in Central Massachusetts did not display the cyclical volatility that characterized overall employment trends in the region over the last decade. Instead, health care employment in the region remained a stable and strong source of new job creation in the region. Employment among ambulatory care, hospital and nursing home service providers rose from about 45,500 on average during 2001 to 51,500 by 2012, an increase of 6,000 jobs over the period. As we observed earlier, by 2012 the region's broader health care industry that also includes individual and family service providers accounted for more than 18 percent of total covered payroll employment in Central Massachusetts.

Northeast

The Northeast region includes the Greater Lowell and Greater Lawrence areas and the North Shore cities and towns located in the Essex County area. The region's job market has experienced considerable cyclical changes in covered employment especially as a consequence of the dot.com recession of 2001. Employment levels in the Northeast region fell from 427,700 during 2001 to 405,900 by 2004, a loss of 21,700 jobs, representing a decline of 5.1 percent from its pre-recession employment peak. Job losses in the region at that time were especially severe among durable goods manufacturing producers who saw employment fall by nearly one quarter (about 15,300) between 2001 and 2003. Sharp losses were also registered in the information industry (including telecommunications) where employment fell by about 2,000 (about one in seven) jobs over the same period of time.

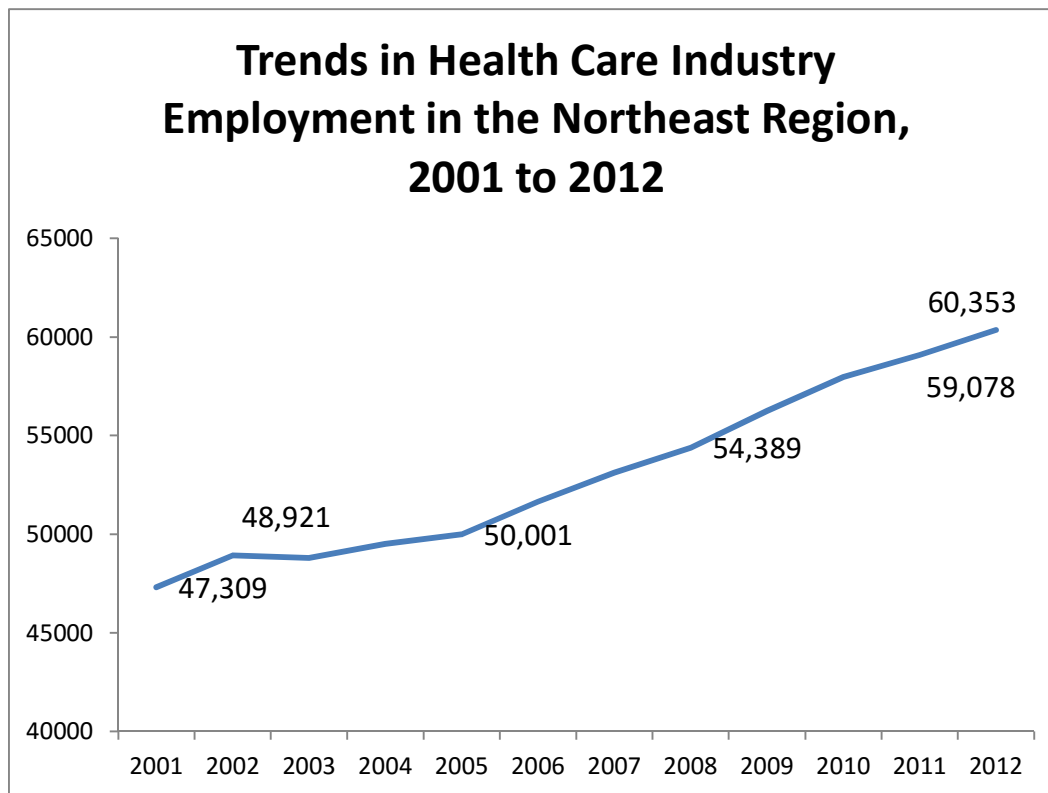


Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The recovery from the dot.com recession was not strong with employment rising by just 1.8 percent over the four year period of recovery from that downturn. Heading into the Great Recession in 2008, the region's employment level was still about 14,100 jobs below its 2001

peak. The recession that began in 2008 resulted in a decline in payroll employment levels among covered employers in the region of just under 13,000, a relative loss of 3 percent – a pace of decline similar to the state as a whole. The jobs recovery in the Northeast between 2009 and 2012 added about 20,000 jobs to regional payroll employment levels.

The recovery from the recession was insufficiently strong through 2012 to return the level of employment in the Northeast region to its 2001 level. Between 2001 and 2012 employment declined in the Northeast from 427,700 to 420,600, a decline of about 7,100 jobs. The industry composition of employment in the region did change considerably over that period



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

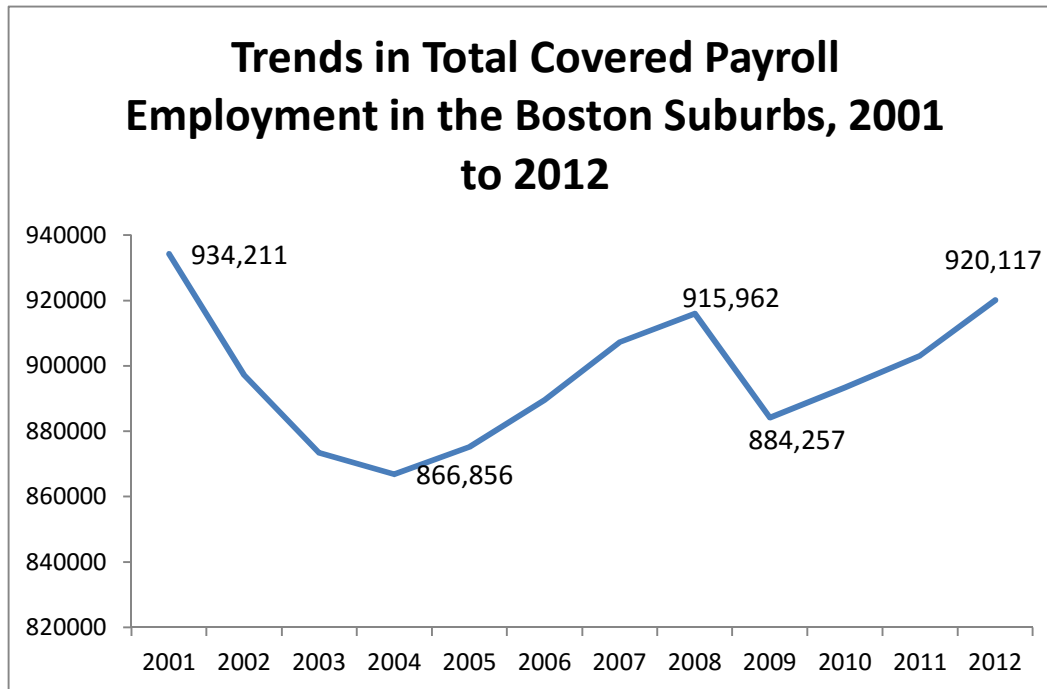
of time. Manufacturing industry employment lost 26,600 jobs, a net relative decline of 31 percent. The region's information industry also saw its employment fall by 31 percent losing 5,000 payroll jobs over the period. Partially offsetting these losses were gains in the high end professional and technical services industry that added 4,600 jobs, a near one fifth increase over the period. Additionally, the education sector saw employment increase by 4,800 jobs.

Certainly, the single most important industrial source of employment in the region over the 2001 to 2012 period has been the narrowly defined health care industry (that excludes employment among individual and family services providers). Employment among ambulatory, hospital and nursing care providers increased from 47,300 during 2001 to 60,300 by 2012, with little cyclical change in the overall employment trend. Health care employment rose by 28 percent in the region, adding 13,000 jobs between 2001 and 2012. By 2012, the more broadly defined measure of health care employment accounted for one in six covered payroll jobs in the Northeast region (Table 5).

Boston Suburbs

The suburban communities surrounding the City of Boston are primarily composed of cities and towns in Middlesex County (except the Greater Lowell area) and most of Norfolk County except its easternmost communities ranging from Randolph/Stoughton to the Quincy area.

Establishments located in the Boston Suburbs employed an average of 920,000 workers during 2012, accounting for 28 percent of the state's covered payroll employment. The Boston Suburbs region experienced sharp cyclical changes in its covered payroll employment levels over the 2001 to 2012 period. The dot.com recession of 2001 resulted in a very large drop in covered employment levels between 2001 and 2004 with employment declining by 67,000 jobs or 7.2 percent over the period.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Like the rest of the state, the Boston Suburbs experienced considerable decline in manufacturing payroll employment levels. Manufacturers located in the Boston Suburbs region shed about 25,700 jobs between 2001 and 2004, a loss of nearly 22 percent. Unlike other regions of the state, the Boston Suburbs posted large declines in the professional and technical services industry, part of which was closely associated with the computer systems design industry, a component of the American economy closely associated with the dot.com bust.⁸ Between 2001 and 2004, this industry saw payroll employment fall by 13,300, a 12 percent decline. The temporary help industry spurred major employment losses in the administrative and business support sector of the region's job market, losing 8,500 jobs or about one in six positions after the dot.com bust of 2001.

The recovery from the dot.com recession saw employment in the Boston Suburbs rise by about 49,000 jobs or about 5.6 percent. This recovery was led by a very strong rebound in the professional and technical services industry that added more than 21,000 jobs, a relative rise of

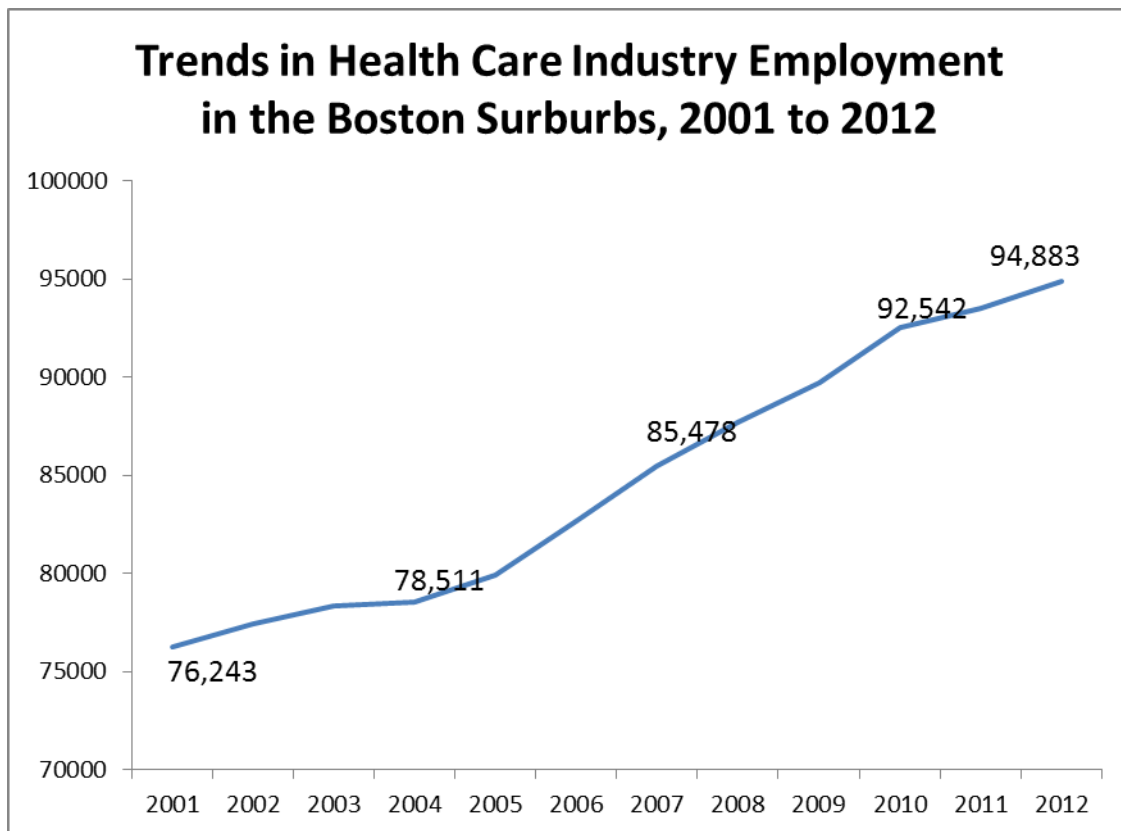
⁸ Neeta Fogg and Paul Harrington, *Understanding the Cyclical Nature of Demand for Computer and Information Technology Undergraduate Degrees*, Center for Labor Markets and Policy, Drexel University, April 2014

22 percent. This increase over four years more than offset the earlier losses in that sector associated with the dot.com bust.

The impact of the Great Recession on the Boston Suburban region was about the same as on the state as a whole with covered payroll employment levels falling by 31,700, a more than 3 percent decline. However, the recovery from the downturn saw the region recover all of the jobs lost during the downturn by 2012 with payroll employment climbing by 51,100 jobs, a relative rise of 4 percent between 2009 and 2012.

Employment levels in the Boston Suburbs declined from 934,200 to 920,100 between 2001 and 2012, a decline of about 1.5 percent in the overall level of covered payroll employment. However, the area's construction sector shed 11,200 jobs (a 24.5 percent decline) while manufacturing payroll employment fell by 40,500, a 35 percent decline, with much of this loss in the durable goods component of the manufacturing sector. Substantial net employment gains occurred in the professional and technical industry that added 8,300 jobs (7.4 percent increase), the education industry that added 10,300 jobs (11 percent increase), and the leisure and hospitality industry which expanded by 13,700 jobs, a 20 percent rise over the 11 year period.

The narrowly defined health care industry located in the Boston Suburban region was an important source of new job creation adding 18,600 jobs and increasing payroll employment levels by about 25 percent over the period. The health care sector within the region exhibited virtually no change in its employment trend over the period despite otherwise sharp changes in the overall level of economic activity in the state and in the nation associated with the two economic recessions that occurred over this period.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

Despite this strong job growth, the Boston Suburbs had a uniquely low share of overall covered employment in the more broadly defined health care industry, which also includes individual and family services, compared to the other regions of the Commonwealth. Only about one in eight covered jobs in the Boston Suburban region were in health provider organizations compared to an average of one in six statewide (Table 5). However, part of the reason health care employment accounts for fewer jobs in the Boston Suburbs is the low proportion of hospital employment in the area.

The City of Boston

Boston plays a unique role in the Massachusetts and New England labor markets. The city serves as the center of regional economic activity, providing an economy of scale for the New England region around very high end services including finance, professional and technical services, educational services and health services that are themselves based in part on access to extraordinary and continuous sources of labor supply. In addition, access to highly

complementary and sophisticated research, development and consulting expertise from the city's concentration of colleges and universities and associated consulting and research organizations also plays a key role in influencing the concentration of sophisticated service industries that serve regional, national and international markets.

As we noted earlier, Boston has a very intense concentration of covered jobs distributed over quite a small geographic area reflecting its role as the urban center of the New England economy and labor market. This is especially the case with respect to the city's health care institutions and the jobs found in these organizations. Simply using our narrow definition of health care employment that includes ambulatory care, hospitals and nursing and residential care services (but excludes individual and family services), Boston's health care industry accounted for 24 percent of all health care employment in the state, on average, during 2012. Given this extraordinary concentration of health care employment in Boston we chose to produce separate discussions of health care employment in the city and its suburbs instead of only discussing the larger metropolitan area as a whole.

Over the last decade, Boston, like much of the state, experienced considerable swings in overall employment levels. The dot.com recession of 2001 had a strong adverse impact in the city with total covered payroll employment in Boston falling from 578,500 to 533,900 between 2001 and 2004, a relative decline of 7.7 percent. While the city's already small manufacturing sector did lose a relatively large number of jobs (it fell in size by 25 percent) the service producing industries led the pace of job loss in Boston at that time. Very large losses occurred in the city's financial services industry that shed 11,000 jobs or about 12 percent of 2001 employment by 2004. Similarly, the professional and technical services industry experienced a decline of 7,900 jobs representing a relative employment decline of 12.7 percent. The information industry that includes telecommunications businesses (along with print publications) shed 5,600 jobs over the period.

By 2008, Boston was able to recover about three-quarters of the jobs it had lost as a consequence of the dot.com recession, adding 34,300 jobs. Part of the jobs recovery in the city was fueled by a rebound in financial services and in professional and technical services. Strong growth in the city's leisure and hospitality industry also played an important role in the recovery from the dot.com recession.



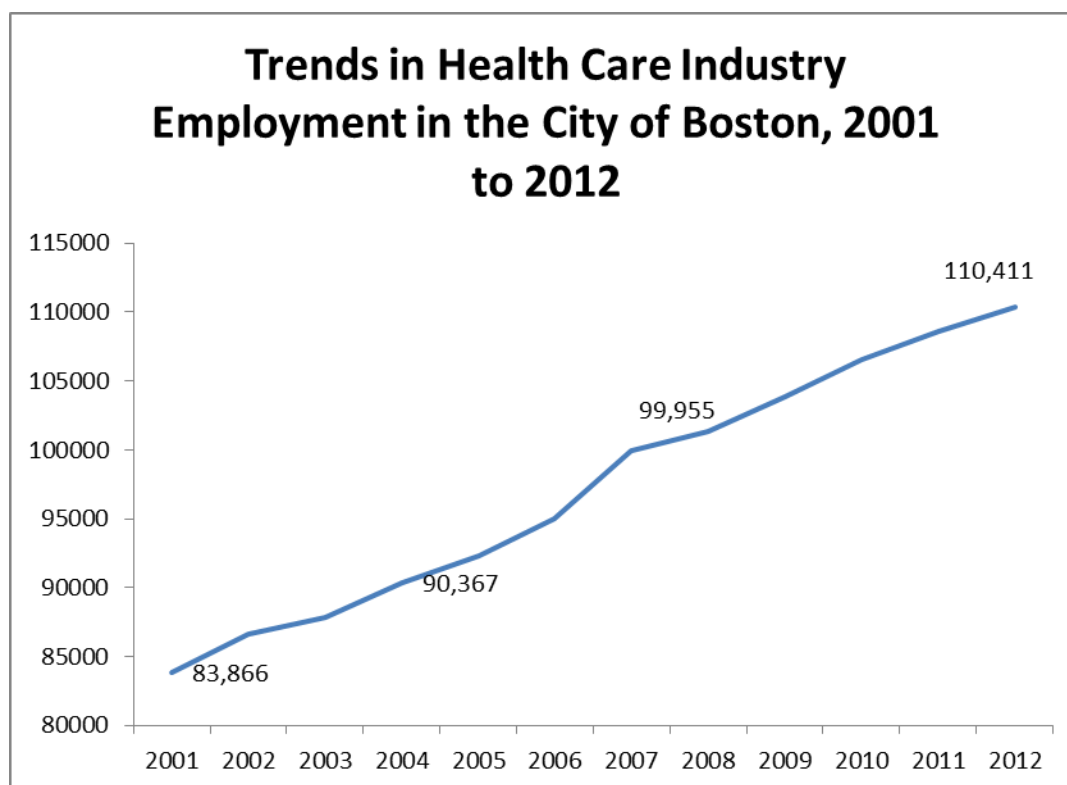
Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The Great Recession that began in 2008 resulted in a loss of about 18,800 jobs in Boston, a decline of 3.3 percent through 2010. Large losses were concentrated in the administrative services industry that includes temporary help workers. This industry lost 10,000 over the course of the recession. Additionally, the financial services industry experienced a very sharp decline in employment during that time as well (and continued to lose jobs through 2012). Boston recovered from the recession adding 21,500 net new jobs over the 2010 to 2012 period. Employment in the professional and technical services industry surged over that time period adding 7,100 jobs. Boston's leisure and hospitality sector also generated large employment gains during the recovery with employment rising by 7,300 jobs between 2010 and 2012.

Over the entire 2001 to 2012 period net payroll employment levels declined slightly as the two economic recessions generated large volumes of job losses that were followed by sluggish recoveries in the city's job market. Large losses in the city's goods producing industries, information industry, financial services industry and administrative support industry would have pushed payroll employment levels down dramatically; but they were largely offset by

employment gains between 2001 and 2012 in leisure and hospitality (13,800) education (5,400) and especially health care services.

The narrowly defined health care services industry (excluding individual and family services) has been a powerful source of employment stability and new job creation in the city between 2001 and 2012.



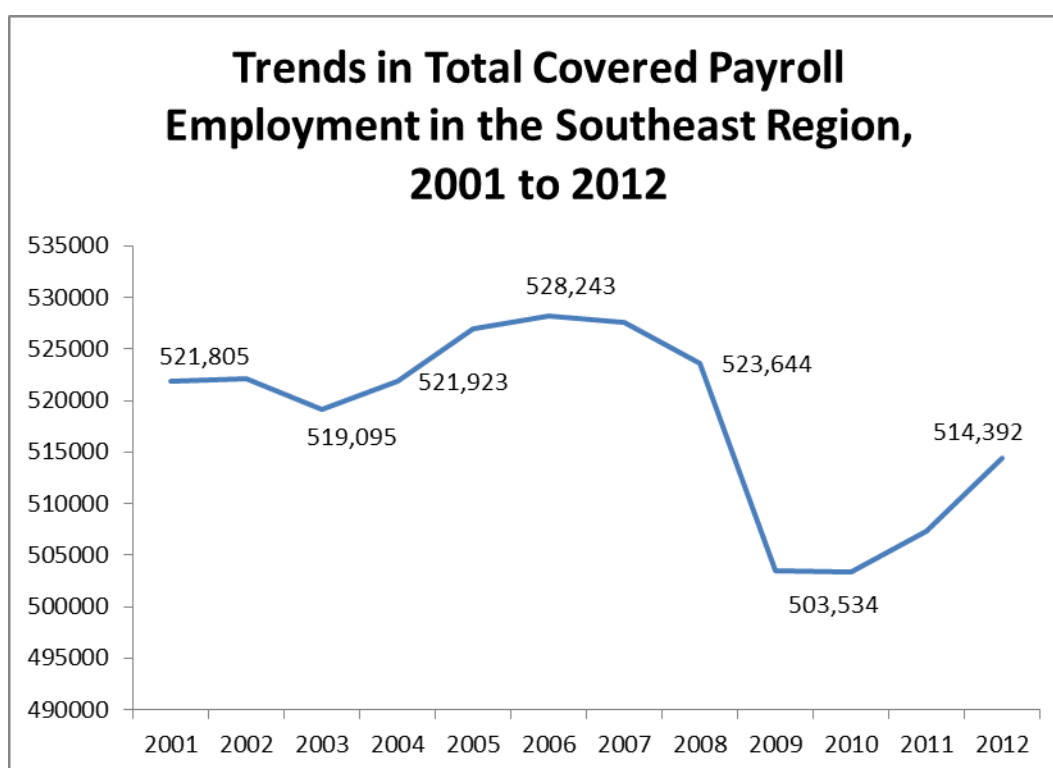
Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

While Boston experienced sharp swings in employment levels associated with two economic recessions, the health care industry in the city added to its payroll employment levels. Through the dot.com recession, as employment in the city fell by 7.7 percent the health care sector increased its employment level by 7.8 percent. Similarly strong job gains occurred during the recession of 2008 and its recovery. Over the entire 2001 to 2012 period Boston's health care sector added 26,500 jobs, about a one third increase in employment over the 11 year period. As we noted earlier the health care industry in Boston is very different than that of most other regions in the state because of its extraordinary concentration of jobs in the hospital sub-sector of the industry. Thus, it is unsurprising that the overwhelming source of new job creation in

Boston's health care sector over the 2001 to 2012 period was concentrated in its hospitals, even as employment in the city's nursing homes and assisted living facilities fell.

Southeast

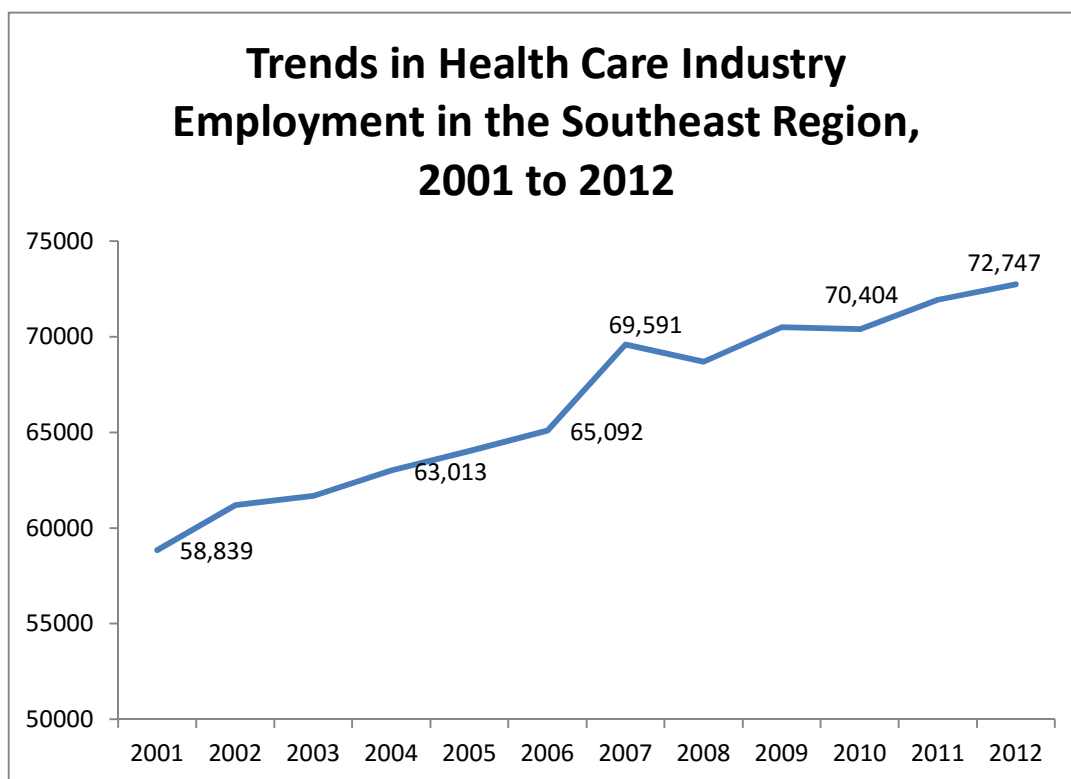
The Southeast region includes most of Bristol and Plymouth Counties and a small part of Norfolk County that is not included in the Boston Suburbs region. Job growth in the region since 2001, like the rest of the state, has been sluggish with total covered payroll employment within the region declining from 521,800 jobs during 2001 to 514,400 by 2012. The region did experience cyclical employment change although the region's moderate losses from the dot.com recession of 2001 were moderate through 2004 (just 0.5 percent of 2001 employment or about 2,700 jobs). A more serious decline occurred between 2006 and 2010. Employment fell by nearly 25,000 jobs, a drop of about 5 percent that is closely associated with the beginnings of the Great Recession. Between 2010 and 2012 the Southeastern region recovered about 11,100 jobs, with employment rebounding slowly with a rise of just 2.2 percent over the period.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The Southeast labor market experienced sharp changes in the industrial structure of its jobs between 2001 and 2012. Construction companies saw their payroll employment levels plunge by 37 percent over the 11 year period. Manufacturers located in the region shed half of their jobs, with employment in the region's manufacturing industries falling from 17,300 during 2001 to just 8,700 by 2012. Very large jobs losses were also posted in the transportation and warehousing industry in the region. Administrative support firms including temporary help companies experienced substantial employment losses over the period, as well.

Partially offsetting the job losses in the region's goods producing and related warehousing and transportation industries were job gains in Southeastern Massachusetts education and leisure and hospitality industries. Employment in the education sector rose by more than 5,400 jobs over the decade, while leisure and hospitality firms saw employment rise from 49,600 during 2001 to 64,400 by 2012, a rise of 30 percent.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The health care industry in the Southeast served as a very important source of net new job generation between 2001 and 2012. The health care industry including ambulatory care, hospitals

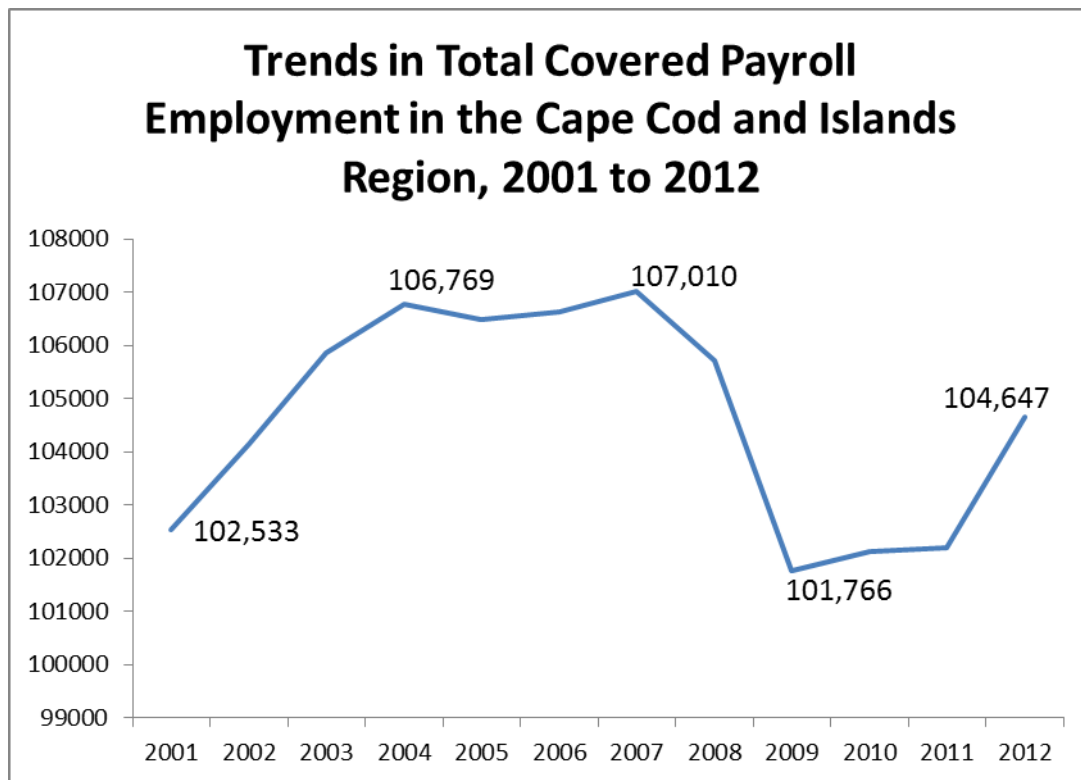
and nursing and residential care facilities (but excluding individual and family services) saw employment grow steadily over the course of the eleven year period, despite the two economic recessions that caused considerable overall employment losses in the region. During the dot.com recession, the health care industry in the Southeast region was able to add an additional 4,200 jobs, growing by 7 percent, even as overall covered payroll employment declined.

The path of job growth for the health care industry in the region through 2012 has been continuous, with health care employment rising throughout the period. Even during the Great Recession when the Southeast lost 5 percent of its jobs, health care payroll added an additional 5,300 positions. Between 2010 and 2012 the region's health care industry has added an additional 2,300 jobs, accounting for about one in four net new jobs created in the region during that period of jobs recovery. The growth in the region's health care industry has meant that a rising share of all payroll jobs in the region reside in health care. Excluding individual and family service providers, the health care industry accounted for 11.3 percent of total covered employment in the Southeast, rising to 14.1 percent of the total by 2012.

Cape Cod and Islands

The Cape Cod and Islands region is composed of Barnstable (Cape Cod), Dukes and Nantucket (Islands) Counties of Massachusetts and is a region of the state most notable for its heavy concentration of employment in the retail and the leisure and hospitality sectors associated with a robust, but highly seasonal, tourist trade. Indeed, these two industries accounted for about 37 percent of all covered employment in the region compared to about 20 percent of total employment in the rest of the state. The Cape and Islands manufacturing sector is quite small, accounting for just 2 percent of the region's employment during 2012.

The Cape Cod and Islands region felt little of the adverse impact of the dot.com recession of 2001 since its mix of jobs, concentrated in tourism, was largely removed from those industries in other regions of the state (most notably in Boston and its suburbs) most vulnerable to the job losses associated with that downturn. Indeed, over the 2001 to 2004 period as payroll employment declined in the rest of the state, the Cape and Islands were able to add about 4,200 jobs, a 4.1 percent rise, in part fueled by gains in construction and retail trade employment. However, the Great Recession had a substantial negative impact on overall payroll employment in the region resulting in a decline of 4,900 jobs between 2007 and 2010, a relative job loss of

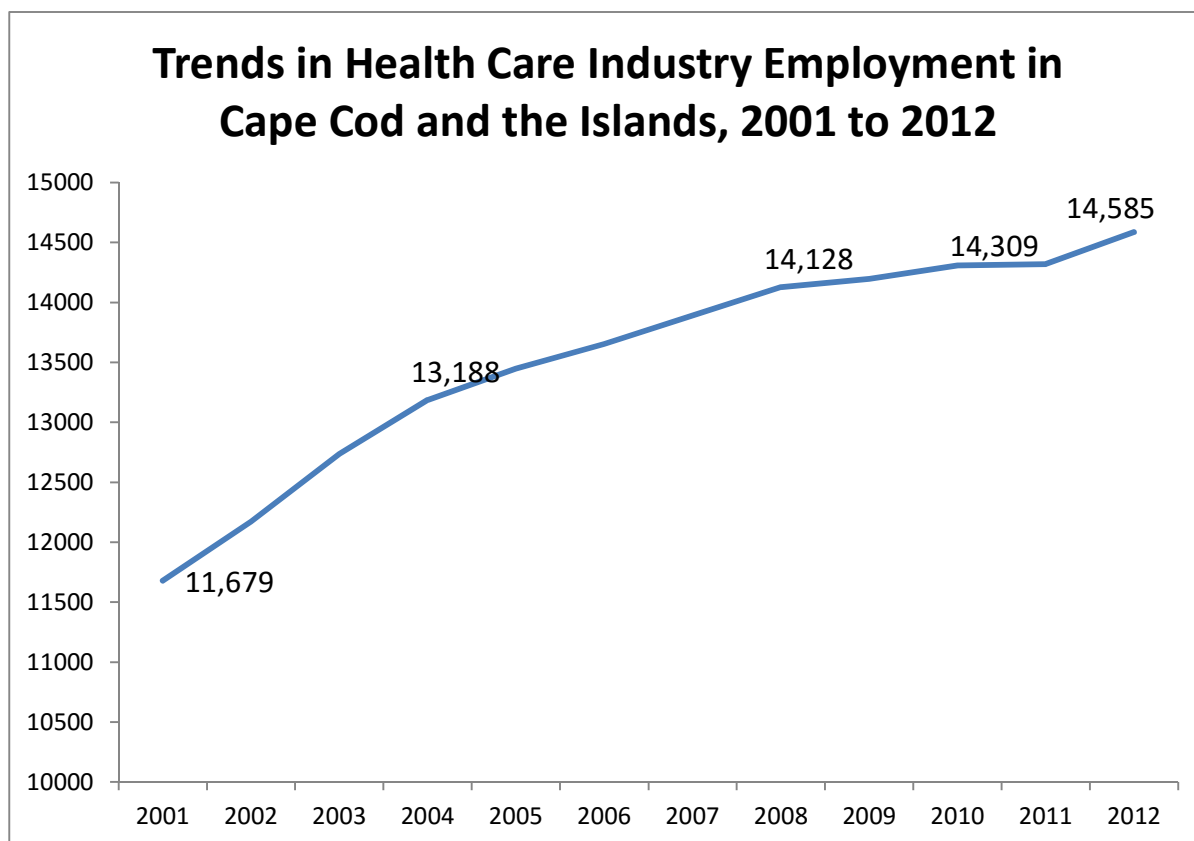


Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

4.6 percent. These losses were the product of sharp reversals in construction (-22 percent) and retail trade (-9 percent). The recovery from that recession through 2012 was slow, with employment rising by 2,500 jobs, with leisure and hospitality generating the bulk of new jobs created in the Cape and Islands region.

The health care industry, excluding individual and family services, in the Cape and Islands region played a central role in helping create cyclical stability and job creation in the region during the 2001 to 2012 period. The Cape and Islands, unlike most of the balance of the state, was able to increase total payroll employment levels since the end of the 1990s economic expansion. Covered employment in the region increased by about 2,500 jobs over the 2001 to 2012 period, but the health care industry was central to this overall increase in the Cape and Islands payroll employment level. During 2001, the health care industry (including ambulatory care, hospitals and nursing homes and residential care facilities only) on the Cape and Islands employed 11,700 workers, accounting for 11.3 percent of the region's overall payroll

employment levels. By 2012, this figure had increased to 14,600, a rise of 2,900 jobs, a relative increase of about 25 percent over the period. The health care industry accounted for about 14 percent of the Cape and Islands overall employment by 2012.



Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages, CSV State Files, 2012
<http://www.bls.gov/cew/>

The Sub-Sectors of an Expanding Massachusetts Health Care Industry

This section of our study examines the specific sources of health care sector employment on a statewide basis over the 2001 to 2012 period. Since this analysis is at the statewide level, we are able to use the broader definition of the health care industry that includes individual and family services in addition to ambulatory care, hospitals and nursing and residential care facilities sub-sectors. The pace of new job creation within the four specific industry sub-sectors that make up the Commonwealth's health care industry has varied considerably over the last twelve years. We examine employment developments in each of the four health care component industries during the two economic recessions and their associated recoveries that occurred

between 2001 and 2012. The data on annual average employment developments reveal that while overall health care employment levels increased sharply over the period the most important sources of this growth have changed considerably over time.

The dot.com recession of 2001 caused considerable employment losses in the state through 2004, but three of the four health care sub-sectors were able to add jobs over this period of time. The individual and family services sector, with its emphasis on providing home services to elderly and disabled persons living at home, accounted for most of the increase (85 percent) in overall health care industry employment, adding 6,700 jobs, a more than 20 percent increase in just three years. Both hospitals and nursing and residential care providers experienced little new job creation during this time, each only growing by a total of less than 1 percent over the three year period. The ambulatory care services component of the state's health care industry lost a small number of jobs declining by 0.8 percent between 2001 and 2004.

Table 8:
Trends in the Covered Annual Average Payroll Employment within the Massachusetts
Health Care Industry, 2001 to 2004

	2001	2004	Absolute Change	Relative Change
Ambulatory Health Care Services	124600	123600	-1000	-0.8%
Hospitals	156000	157400	1400	0.9%
Nursing and Residential Care Facilities	89100	89900	800	0.9%
Individual and Family Services	30800	37500	6700	21.8%
Total, All Health care	400500	408400	7900	2.0%

Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sae/>

The jobs recovery from the dot.com recession over the 2004 to 2008 period saw overall health care industry employment in the state rise sharply, with all four sub-sectors of the health care industry adding substantial numbers of jobs. The hospital sector was the most important source of new job creation, adding 32,000 positions and expanding its covered payroll employment levels by 20 percent in four years. Ambulatory care providers posted a strong rebound from the modest job losses of the earlier period growing covered payroll employment by one-sixth, adding 20,600 jobs during the recovery. The individual and family services sub-sector was once again the most rapidly growing source of new job creation in the health care industry,

with employment rising from 37,500 during 2004 to 51,500 by 2008, a remarkable 37 percent rise in just four years. Nursing and residential care facilities added an additional 7,900 jobs growing by 8.8 percent between 2004 and 2008.

Table 9:
Trends in the Covered Annual Average Payroll Employment within the Massachusetts Health Care Industry, 2004 to 2008

	2004	2008	Absolute Change	Relative Change
Ambulatory Health Care Services	123600	144200	20600	16.7%
Hospitals	157400	189400	32000	20.3%
Nursing and Residential Care Facilities	89900	97800	7900	8.8%
Individual and Family Services	37500	51500	14000	37.3%
Total, All Health Care	408400	482900	74500	18.2%

Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sae/>

The Great Recession caused considerable net losses in overall covered employment in Massachusetts between 2008 and 2010, but once again we see that the state's health care industry was able to add more than 28,000 jobs increasing overall health care employment by nearly 6 percent in two years. Ambulatory care providers were the most important source of new job creation adding 9,700 jobs, a rise of 6.7 percent over the period. Once again, employment in the

Table 10:
Trends in the Covered Annual Average Payroll Employment within the Massachusetts Health Care Industry, 2008 to 2010

	2008	2010	Absolute Change	Relative Change
Ambulatory Health Care Services	144200	153900	9700	6.7%
Hospitals	189400	196600	7200	3.8%
Nursing and Residential Care Facilities	97800	100200	2400	2.5%
Individual and Family Services	51500	60500	9000	17.5%
Total, All Health care	482900	511200	28300	5.9%

Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sae/>

individual and family services sector rose at a very rapid pace, increasing by 17.5 percent and adding 9,000 jobs during the 2008 to 2010 downturn. The Massachusetts hospital sector continued to expand its covered payroll employment level although at a slower pace (discussed in more detail below) adding 7,200 jobs during the downturn. Finally, the nursing and residential care sector continued to grow at a slower pace than other components of the health care industry adding 2,400 jobs and increasing employment levels by 2.5 percent between 2008 and 2010

The economic recovery that occurred in Massachusetts over the 2010 to 2012 period saw health care payroll employment levels rise by 21,700, an increase of 4.2 percent. Most of the jobs increase was derived from employment growth in outpatient and home based firms. The ambulatory care sub-sector saw employment rise by 10,500 accounting for about half the total rise in health care employment in the state. The individual and family services sector continued its record of being the most rapid source of new job creation adding 8,500 jobs and growing by 14 percent between 2010 and 2012. In contrast, covered payroll employment in the state's hospital sector was essentially flat from 2010 to 2012 growing by just 0.4 percent or about 800 jobs. The nursing and residential care sector also grew at a well below average pace with employment rising from 100,200 during 2010 to 102,100 by 2012, an increase of 1.9 percent over the period.

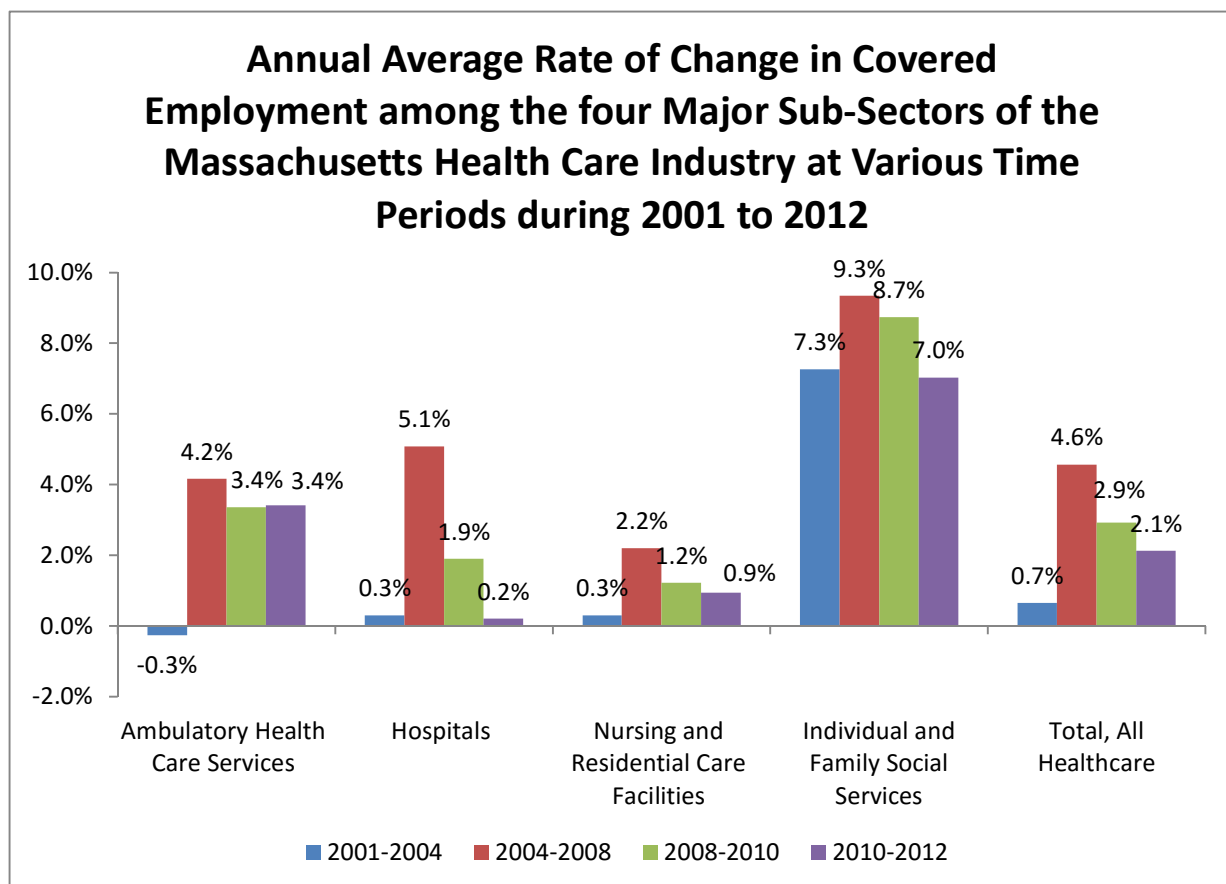
Table 11:
Trends in the Covered Annual Average Payroll Employment within the Massachusetts
Health care Industry, 2010 to 2012

	2010	2012	Absolute Change	Relative Change
Ambulatory Health Care Services	153900	164400	10500	6.8%
Hospitals	196600	197400	800	0.4%
Nursing and Residential Care Facilities	100200	102100	1900	1.9%
Individual and Family Services	60500	69000	8500	14.0%
Total, All Health Care	511200	532900	21700	4.2%

Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sac/>

The data and discussion provided above reveals that the sources of employment growth within the Massachusetts health care industry varied considerably between 2001 and 2012 with the exception of the individual and family services sector which posted very strong growth in

each of the four time periods. Indeed, the chart below, which examines the annual average rate of change for each sub-sector of the health care industry over the four time periods reveals that the individual and family services sector had annual average growth that was at least 7 percent per year (during the 2010 to 2012 recovery) up to 9.3 percent (during the 2004 to 2008 recovery.) The hospital sector had a more mixed record with respect to its pace of new job creation in the state. During the 2004 to 2008 period hospital employment grew at a very strong pace increasing payroll employment by an average of 5.1 percent during that time period. However, since then the pace of hospital sector employment growth has slowed substantially. Between 2008 and 2010, the state's hospital sector's pace of new job creation fell to 1.9 percent and by 2010 to 2012, the annual rate of new job creation had slowed to just 0.9 percent.

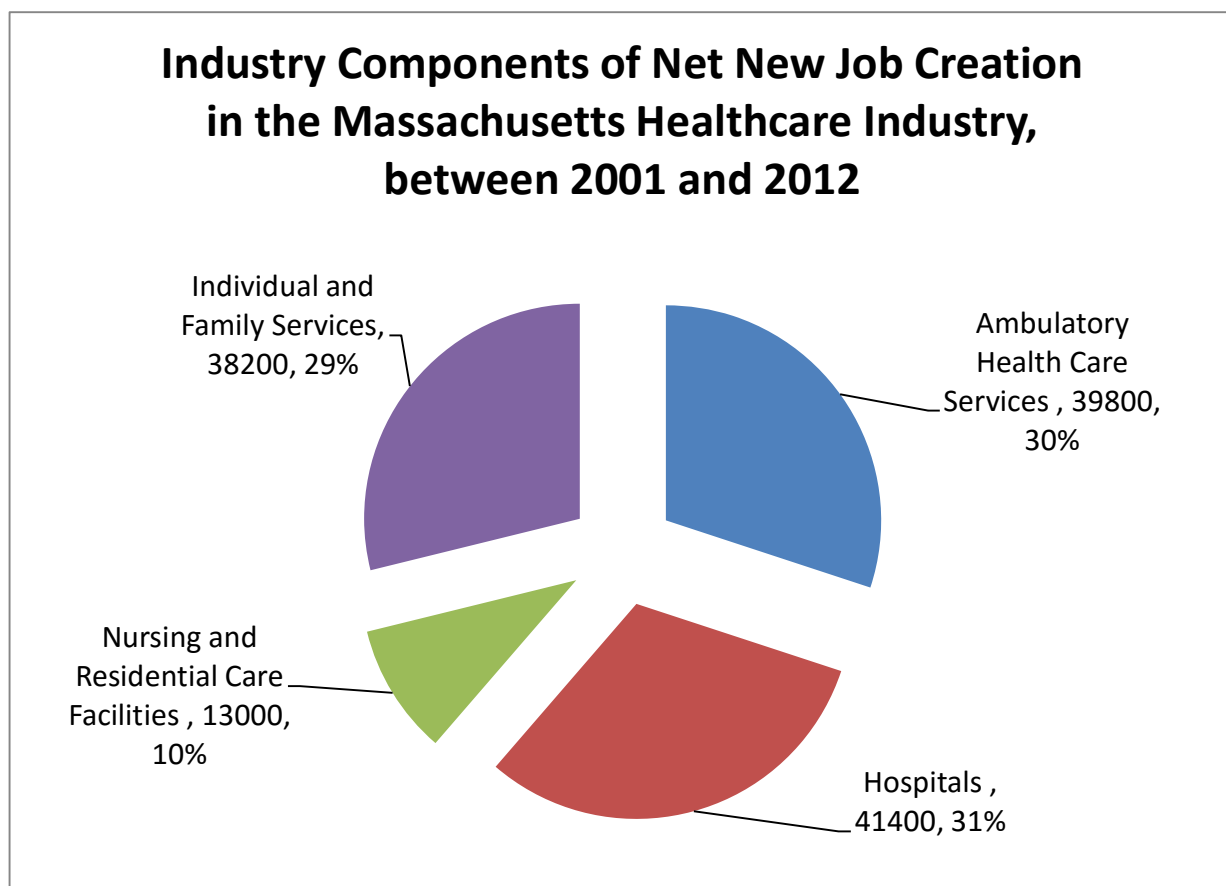


Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sae/>

The nursing and residential care services sector, like the hospital sector has experienced a slowdown in its pace of new job creation falling from a 2.2 percent annual average rate of

increase during 2004 to 2008 to an annual employment growth rate of 0.9 percent. Ambulatory care providers saw a slight decline in their pace of growth during the dot.com recession period, but since then the annual average pace of growth among these providers has remained in the 3 to 4 percent range.

Over the entire 2001 to 2012 period the health care industry has been able to add more than 132,000 jobs to its payrolls. Three of the four sub-sectors each accounted for about 30 percent of the overall expansion of health care payroll employment. Only the nursing and residential care sector lagged the other sectors in net new job creation accounting for just 10 percent of the net rise in employment.



Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sac/>

Differences in the pace and level of growth in the individual industry sub-sectors of the health care industry will exert a powerful impact on the occupational composition of

employment across the industry in the state. Closely related to changes in occupational staffing patterns are the education and training requirements associated with a changing industry and occupational mix of jobs. This will be examined in more detail in the following section of this study.

Occupational Impacts of Employment Change in the Massachusetts Health Care Industry

Over the 2001 to 2012 period the industrial structure of the state's health care sector changed sharply with covered employment in the individual and family services sector rising by 124 percent over the period, while nursing and residential care facilities saw employment rise at less than one tenth that rate of new job creation. These large differences in the pace of job creation can mean potentially large changes in the nature of health care employment if occupational staffing structures and closely related skills requirements differ across the four health care industry sub-sectors. Perhaps of equal importance, different staffing and skill requirements often signal differences in the characteristics of jobs including hourly pay, hours of work and other traits important to both workers and public policy leaders.

Table 12:
Trends in the Covered Annual Average Payroll Employment within the Massachusetts Health Care Industry, 2001 to 2012

	2001	2012	Absolute Change	Relative Change
Ambulatory Health Care Services	124600	164400	39800	31.9%
Hospitals	156000	197400	41400	26.5%
Nursing and Residential Care Facilities	89100	102100	13000	14.6%
Individual and Family Services	30800	69000	38200	124.0%
Total, All Health Care	400500	532900	132400	33.1%

Source: Ambulatory Health Care Services, Hospitals and Nursing and Residential Care Data are from the Massachusetts Department of Labor and Workforce Development, Employment and Wages by Industry and Area, <http://www.mass.gov/lwd/economic-data/employment-jobs/>, the data for individual and family services are from U.S. Bureau of Labor Statistics, Current Employment Statistics Survey, State and Metro Area Employment, Hours and Earnings, <http://www.bls.gov/sae/>

We use the findings from the American Community Survey (ACS), a large scale survey of about 37,000 households and an additional 3,800 group quarter residences⁹ across Massachusetts, to produce measures of the occupational distribution of employment within each

⁹ A group quarters is a place where people live or stay, in a group living arrangement that is owned or managed by an entity or organization providing housing and/or services for the residents. This is not a typical household-type living arrangement.

of the four sub-sectors of the health care industry in Massachusetts. To produce this occupational data analysis we used the ACS public use microdata sample (PUMS) files for Massachusetts that are derived from the ACS survey administered each month to households and group quarters across the state.

In order to ensure that we have sufficient sample size to produce accurate measures of employment by occupation for each industry at the sub-state level we combine 5 years of sample data covering the 2007 to 2011 period. It is important to note that the ACS survey is a household survey and that much of the employment data derived from household surveys, including the ACS, is based on the place of residence of the household. However, the ACS survey questionnaire does collect data on the geographic location of the place of work of the employed. We use these place-of-work responses to organize data to reflect the place of work of the respondents, not their place of residence. In this way, we are able to produce accurate estimates of health care industry staffing patterns in each of the regions in the state as well as on a statewide basis.

In an earlier section of this paper we discuss the reclassification of home health workers under the FLSA to non-exempt and fully covered under the wage and hours provisions of federal law. An important result of this change was that these workers were reclassified as covered payroll workers at the federal and state level beginning in January of 2013. Prior to that time, they were classified as domestic workers and their employment status was measured in the household employment survey. One of the impacts of this change is that none of the occupational studies (either those derived from the ACS or the business establishment Occupational Employment Statistics (OES) Survey) include those home care providers that were previously classified as household workers prior to January 2013.

We have produced a set of modified estimates of the staffing structure of the individual and family services sector in Massachusetts by including home care provider employment that was reclassified to wage and salary worker status in January 2013 to the health care support occupational group within the individual and family services sub-sector. These modified staffing pattern data will provide us with a more realistic depiction of the staffing structure of this industry as home health care employment is recognized with the attributes of payroll employment rather than household/domestic work. As future industry-occupational staffing

pattern data are updated based on the inclusion of home health care workers in covered payroll employment counts, then more systematic and likely more accurate depictions of the staffing arrangements reflecting the emerging role of home health workers will become available. Until that time, we will rely on modified staffing pattern data adjusted by including the newly designated home health care worker payroll employment now classified in the individual and family services sector as part of that industry sector's health care support occupational category.¹⁰

The findings in Table 13 depict the occupational distribution of employment within each of the four major industry segments of the Massachusetts health care industry. These data reveal that the staffing patterns within these sectors vary considerably across industries, even when measured at very highly aggregated occupational levels as used in the table. For example, the ambulatory care sector is the most intensive employer of occupations in health diagnosis and treatment. This occupational area includes physicians, dentists and many therapeutic providers (such as physical therapy and audiology). These high end medical practitioners account for about one in six workers within the ambulatory care sector.

Health technologists and technicians including imaging technicians and laboratory technicians, diagnostic related technicians, and dental hygienists account for about 9 percent of employment in this outpatient oriented industry sector. Registered nurses are also an important part of the ambulatory care sector accounting for about 9 percent of its staff. The registered nurse category is itself fairly wide ranging, including nurse midwives with a considerable number employed in the advance nurse practitioners occupation. Health care support occupations that include dental assistants, medical assistants, phlebotomists, nursing aids, psychiatric assistants and home health care workers account for about 18 percent of employment within the ambulatory care sector. Together, the nursing health practitioner, technician and support occupations accounted for about 53 percent of employment within the ambulatory care industry sub-sector.

A large fraction of employment in the ambulatory care sector in Massachusetts is concentrated in administrative support and related clerical occupations. These include receptionists, medical secretaries, financial and billing clerical positions, as well as information

¹⁰ Adjusted staffing pattern estimates at the sub-state level can also be produced using the ACS and QCEW data at the sub-state level.

and record clerks, and customer service representatives. Management and professional occupations excluding those primarily engaged in a particular health care specialty employ more than one in five workers in the ambulatory care sector in Massachusetts. These include management executives, medical and health services supervisors, business managers and IT specialists. Staff in this category also includes persons engaged in a variety of social service activities including mental health counseling and employment as health care social workers.

Table 13:
The Distribution of Employment by Major Occupational Groupings with the Four Major Sub-Sectors of the Massachusetts Health Care Industry, Mean Staffing Ratios, 2007-2011

	Ambulatory Care	Hospitals	Nursing and Residential Care Facilities	Individual and Family Services
Management, professional, and related occupations, except health care	21%	19%	14%	35%
Registered nurses	9%	24%	11%	1%
Licensed practical/vocational nurses	2%	2%	8%	0%
Health diagnosing and treating practitioners (excluding RN)	16%	13%	2%	1%
Health technicians and technologist occupations (excluding LPN)	9%	10%	0%	0%
Health care support occupations	18%	10%	31%	46%
High level sales	0%	0%	0%	0%
Low level sales	1%	0%	0%	0%
Office and admin. support occupations	20%	13%	6%	6%
Service occupations, except health care	4%	6%	26%	8%
Natural resources, construction, and maintenance occupations	0%	1%	0%	0%
Production, transportation, and material moving occupations	1%	1%	2%	1%
Total	100%	100%	100%	100%

Source: U.S. Bureau of the Census, American Community Survey, Public Use Microdata Sample Files, Massachusetts, 2007 through 2011, estimates prepared by the Center for Labor Markets and Policy, Drexel University

Comparing the hospital sector with other elements of the Massachusetts health care system reveals the central role that registered nurses play in the delivery of hospital services, with one quarter of the staff working in some type of registered nurse capacity. Most of these individuals are employed as registered nurses but a growing number work as advanced nurse practitioners within hospitals. Health diagnosticians account for about 13 percent of employment

in Massachusetts hospitals. Physicians with various specialties make up a considerable fraction of health diagnostic and treatment occupations in hospitals, as do physical and respiratory therapists.

About 10 percent of Massachusetts hospital staff are employed in health care technician/technologist occupations, with employment concentrated in medical and clinical laboratory occupations as well as radiologic and related imaging technicians. A considerable share of health care techs are employed as medical records and health information technicians in the state's hospitals. Health care support occupational employment also makes up about 10 percent of the hospital sector's overall staff. These workers are primarily employed as nursing assistants, orderlies and medical assistants.

The health specialties including nursing, health diagnostic, treating, health tech and health support account for about 60 percent of employment in the Massachusetts hospital industry sector with about 21 percent of employment in managerial and professional positions and 13 percent in administrative support positions. The managerial fields are dominated by medical and health services managers, and business and financial operations staff. The non-health professional fields (staff not engaged in direct clinical services in the hospital) include heavy concentrations of workers in information technology and life sciences, especially medical research scientists. Community and social service occupations are also a major component of non-health professional staffing in the state's hospitals. Administrative support occupations in hospitals are primarily composed of staff engaged as medical secretaries, customer service representatives and financial and billing clerical positions.

The staffing structure of the nursing and residential care facilities and individual and family services components of the state's health care system differ markedly from the staffing of ambulatory care providers and hospitals. Both the nursing home and residential care and individual and family services providers employ very few health diagnostic and treatment workers or health care technicians. Instead, their staffing patterns are dominated by very large shares of employment in low-end health care support occupations and non-health service occupations.

Staffing at Massachusetts nursing homes and assisted living centers is dominated by health care support occupations. These workers, primarily working as nursing assistants, make

up 31 percent of overall employment in the industry. The findings in Table 13 further reveal that an additional 26 percent of those employed in the nursing and residential care sector work in service occupations outside of the health care fields. These workers are primarily employed in food preparation and service occupations, and as personal care providers in nursing homes and assisted living residences.

The individual and family services sector employs just 2 percent of its staff in registered nursing, health diagnosis and treatment occupations or health technician positions. In contrast, we estimate that nearly one half of the staff in this industry work in health care support occupations, primarily as home health workers or personal care workers. However, about 35 percent of employment in the industry is engaged in non-health managerial and professional activities. These include a large share of professional workers employed in a range of community and social work occupations including child and family social workers, and mental health and substance abuse social workers.

Education, Training and Work Experience Requirements in the Massachusetts Health Care System

The characteristics of employment with respect to key labor market outcomes like hourly wages, hours of work, annual earnings and associated non-wage benefits are heavily influenced by the industry/occupation labor market segment in which a given worker is employed. Some health care occupations have very favorable compensation characteristics in some sectors relative to that occupation in other sectors of the health care industry. More commonly understood is that compensation and working conditions vary sharply across occupations within industries and especially across industries. Part of the reason for this high degree of variability in wages and working conditions is associated with the education, training, and work experience requirements to become employed in a particular occupation.

We have re-organized the staffing pattern data provided in Table 14 by reclassifying all of the specific occupational employment found in each of the four industry sub-sectors of the Massachusetts health care industry into the U.S. Department of Labor's Occupational Information Network, commonly referred to as O*NET. Our purpose is to understand the nature of skill content and preparation requirements for employment in each of the four sectors of the state's health care system.

Figure 1: Description of O*NET Job Zones

Requirement		Job Zone 1: Little or No Preparation Needed
Overall Experience		No previous work-related skill, knowledge, or experience needed
Job Training		Few days to a few months
Education		May require a high school diploma or GED; some may require a formal training course to obtain a license
Requirement		Job Zone 2: Some Preparation Needed
Overall Experience		Some previous work-related skill, knowledge, or experience may be helpful but is usually not needed
Job Training		Few months to one year
Education		Usually require a high school diploma and may require some vocational training or job-related course work
Requirement		Job Zone 3: Medium Preparation Needed
Overall Experience		Previous work-related skill, knowledge, or experience required
Job Training		One to two years
Education		Usually require training in vocational schools, related on-the-job experience, or associate's degree; some may require bachelor's degree
Requirement		Job Zone 4: Considerable Preparation Needed
Overall Experience		Minimum of two to four years of work-related skill, knowledge, or experience is needed
Job Training		Usually require several years of work-related experience, on-the-job training, and/or vocational training
Education		Usually require four-year bachelor's degree, but some do not
Requirement		Job Zone 5: Extensive Preparation Needed
Overall Experience		Extensive skill, knowledge, and experience are needed; many require more than five years of experience
Job Training		May require some on-the-job training, but most of these occupations assume that the person will already have the required skills, knowledge, work-related experience, and/or training
Education		Bachelor's degree is the minimum formal education required; however, many also require graduate school—for example, may require master's degree, and some require Ph.D., M.D., or J.D. (law degree).

Source: National Center for O*NET Development. (2008). *Procedures for O*NET Job Zone Assignment*. Raleigh, NC: the Center. Appendix (pp. 11-13). Available from http://www.onetcenter.org/dl_files/JobZoneProcedure.pdf

The O*NET system provides a Job Zone classification for each occupation that we have included in our analysis. Based on data gathered from occupational experts and incumbent workers from a sample of 110,000 respondents regarding levels of education, experience, and training required to work in each occupation, O*NET classifies occupations into five levels of the Job Zone system. Each occupation in the O*NET system is assigned to one of the five Job

Zone levels that define the level of education, experience, and specific vocational training required to perform work in each occupation. Figure 1 contains descriptions of the five Job Zones in the O*NET system. Job Zones serve as a shorthand way of identifying the education, training and experience required to perform work in an occupation and has been used to help identify key segments of the American labor market.¹¹

Figure 1 provides a brief summary of the education, training and experience required to work in each of the five Job Zones developed by the O*NET system. Job Zones 4 and 5 are composed of occupations that require a four year college education and are used as the basis for defining the occupations that comprise the college labor market. Job Zone 3 is composed of those occupations that require a considerable amount of some combination of education, training and work experience. Some occupations in this group are also considered to be part of the college labor market since the knowledge and skills utilized in these occupations are heavily drawn from a college education (for example, the nursing and engineering technologists occupations). But other Job Zone 3 occupations are not included in the definition of the four year college labor market, since proficiencies required to work in these occupations are primarily developed through job training and work experience. Concierges, crane operators, plumbers and secretaries are examples of occupations classified in Job Zone 3 where much of the knowledge and skills requirements are developed through job training and work experience rather than through a college education.

Occupations included in Job Zone 2 are characterized by relatively low levels of educational attainment, generally just a high school diploma, and comparatively limited levels of occupational preparation. Auto glass installers, bill collectors, bus drivers and childcare workers represent the kinds of occupations classified in Job Zone 2. The lowest level on the O*NET Job Zone hierarchy is Job Zone 1 which is composed of occupations that require little schooling and minimal training or work experience. By definition one could consider Job Zone 1 occupations as entry level insofar as they require little preparation for employment. Examples of occupations in Job Zone 1 include food service counter attendants, cab drivers and cashiers.

¹¹ For example, the Job Zone hierarchy was recently used to develop a more objective definition of college labor market occupations in the U.S. that focused on the skills, abilities, and education required to perform work in these occupations. See: Neeta P. Fogg and Paul E. Harrington, Mal-Employment Problems among College Educated Immigrants in the United States, Center for Labor Markets and Policy, Drexel University, U.S. Department of Education Contract ED-VAE-11-0-0018, October 2012

We began our discussion of the occupational employment section of the paper by discussing trends in new job creation among the four sectors of the Massachusetts health care industry. The data on staffing structures within each industry sector presented in that section reveal that the nature of work in the overall health care industry will vary considerably depending on the nature of industry employment growth and decline. The rapid growth in employment in the individual and family services sector suggests growth in a much different set of occupations, than say job growth in the ambulatory care sector. This means that the skill and preparation requirements for the employment in the health care industry and the associated earnings and working conditions within the health care sector can change considerably as different components of the industry grow more rapidly than others, or some parts of the industry begin to shed substantial numbers of positions.

The findings in Table 14 reveal that the overall health care industry has few entry level positions (Job Zone 1). Occupations in Job Zone

Table 14:
The Distribution of Employment within the Four Industry Components of the Massachusetts Health Care Sector, by O*NET Job Zone Category

	Ambulatory Care	Hospitals	Nursing and Residential Care Facilities	Individual and Family Services	Total Health Care
Job Zone 5	28%	24%	10%	19%	23%
Job Zone 4	8%	10%	4%	13%	9%
Job Zone 3	37%	43%	31%	11%	35%
Job Zone 2	26%	20%	47%	55%	31%
Job Zone 1	1%	3%	7%	1%	3%

Source: U.S. Bureau of the Census, American Community Survey, Public Use Microdata Sample Files, Massachusetts, 2007 through 2011, estimates prepared by the Center for Labor Markets and Policy, Drexel University

1 have essentially no education, training or work experience pre-requisites. Most working age labor force participants would be able to work productively in these occupations with very little or no training. In Massachusetts, about 10 percent of all overall employment is found in Job Zone 1 occupations, but just 3 percent of health care industry employment is in entry level positions. This is one of the reasons that relatively few teens work in the health care industry. Teen employment tends to be much more heavily concentrated in entry level occupations with few skill, training or work experience requirements. The Job Zone 3 category includes the largest share of health care employment (35 percent). Within the health care system, the share of

employment in Job Zone 3 is highest in ambulatory care (37 percent) and hospitals (43 percent), primarily because these health care segments employ large proportions of registered nurses. The registered nurse occupation generally requires an associate's degree along with some associated work experience in the field.

The data on trends in covered employment in the four sectors of the health care industry revealed that the individual and family services sub-sector was by far the most rapidly growing source of employment in the health care system in the state with employment rising by 124 percent between 2001 and 2012. This gain of 38,000 jobs was concentrated in lower level Job Zone 2 occupations (55 percent of employment). This shift has important implications about working conditions, hours of work and annual pay within the state's health care system. In contrast, less than one in four workers in the state's hospital sector work in lower level Job Zone 1 or Job Zone 2 occupations. Sustained growth in employment in the state's hospitals will result in growth in higher level occupations that have much different wage and working condition traits than those found in the individual and family services sector. Indeed, some individuals have concluded that cost containment efforts, a major feature of Chapter 224, that shift the provision of services from higher cost hospitals (characterized by higher skilled staffing structures) to lower cost home health provision (characterized by lower cost staffing structures) will alter the distribution of employment among the four sub-sectors of the state's health care industry.

The nature of health care staffing structures and associated skill requirements also varies systematically across the major geographic regions of Massachusetts. Part of this variation is associated with differences in the distribution of employment across the four sub-sectors of the health care industry. The findings in Table 15 examine the occupational composition of the overall health care industry's employment in each of the eight geographic regions of Massachusetts. Even at this high level of industry and occupational aggregation we find some substantial differences in health care employment staffing patterns across the state. We noted earlier that Boston's health care employment is heavily concentrated in the hospital sector and that hospital staffs have well above-average shares of registered nurses on their payrolls compared to other sectors of the state's health care industry.

Table 15:
The Occupational Distribution of Health Care Sector Employment
Across Geographic Regions of Massachusetts

Area	Berkshire	Pioneer Valley	Central	Northeast
Management, professional, and related occupations, except health care	18%	19%	19%	20%
Registered nurses	13%	13%	15%	13%
Licensed practical/vocational nurses	3%	3%	3%	4%
Health diagnosing and treating practitioners (excluding RN)	9%	9%	9%	10%
Health technicians and technologist occupations (excluding LPN)	7%	8%	7%	7%
Health care support occupations	20%	19%	19%	19%
Service occupations, except health care	14%	12%	11%	11%
High level sales	0%	0%	0%	0%
Low level sales	0%	0%	0%	0%
Office and admin. support occupations	13%	14%	14%	14%
Natural resources, construction, and maintenance occupations	0%	1%	1%	1%
Production, transportation, and material moving occupations	2%	2%	2%	2%
Total	100%	100%	100%	100%
Area	City of Boston	Greater Boston ex. City of Boston	Southeast	Cape Cod & Islands
Management, professional, and related occupations, except health care	28%	25%	19%	20%
Registered nurses	18%	13%	14%	15%
Licensed practical/vocational nurses	1%	2%	3%	3%
Health diagnosing and treating practitioners (excluding RN)	15%	13%	9%	11%
Health technicians and technologist occupations (excluding LPN)	8%	7%	7%	7%
Health care support occupations	9%	14%	21%	18%
Service occupations, except health care	7%	9%	10%	8%
High level sales	0%	0%	0%	0%
Low level sales	0%	0%	0%	0%
Office and admin. support occupations	11%	14%	15%	16%
Natural resources, construction, and maintenance occupations	1%	1%	1%	1%
Production, transportation, and material moving occupations	1%	1%	1%	1%
Total	100%	100%	100%	100%

Source: U.S. Bureau of the Census, American Community Survey, Public Use Microdata Sample Files, Massachusetts, 2007 through 2011, estimates prepared by the Center for Labor Markets and Policy, Drexel University

The data on Boston health care industry employment provided in Table 15 reflect this with 18 percent of the city's health care workforce employed in the registered nurse occupation, substantially above the 13.5 percent mean staff share in the other regions of the state. Other regions of Massachusetts have higher concentrations of their health care employment concentrated in individual and family services, itself dominated by health care support workers primarily engaged in home services for the elderly and disabled. Only about 9 percent of Boston's health care workforce is employed in a health care support occupation, while in the rest of the state workers in these lower-end health occupations make up 18 percent of the staff—double the Boston share.

One of the anticipated impacts of the implementation of Chapter 224 as well as other federal and state level health care access, finance, and staffing legislation is that it will alter the overall level as well as the industry sector and occupational composition of employment within the Massachusetts health care industry. As we noted earlier, a slowdown in the pace of growth in hospital and nursing employment in Massachusetts had occurred in recent years, while ambulatory care and individual and family services continued comparatively strong rates of growth even before the enactment of Chapter 224. This trend has continued through 2013, with neither hospitals or nursing homes and residential care facilities adding any jobs at all between 2012 and 2013, while both ambulatory care and individual and family services continued their robust growth. These developments will continue to alter both the geographic and occupational skill composition of health care employment in the Commonwealth, which in turn will impact wages, hours of work, non-wage compensation and other job characteristics—as well as the demographic composition of who is employed in the health care industry.