COMMUNITY AFFAIRS DISCUSSION PAPER

Towards a More Prosperous Springfield, MA: What Jobs Exist for People without a College Education?

Lynn E. Browne and the Federal Reserve Bank of Boston, Springfield Team – Marques Benton, Prabal Chakrabarti, DeAnna Green, Yolanda Kodrzycki, Ana Patricia Muñoz, David Plasse, Richard Walker, Bo Zhao

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ABSTRACT:
This paper analyzes projections of Massachusetts employment opportunities by occupation to address concerns about a shortage of jobs for those who lack a college education. While occupations requiring a college degree will grow more rapidly over the period 2006-2016 than occupations that do not require college, replacement needs will ensure large numbers of job openings that do not require college. Wage levels in jobs that do not require college are generally low, however. The exceptions usually require meaningful training of another sort, such as long-term on-the-job training or courses in postsecondary schools or community college. Additionally, some individuals who demonstrate the necessary qualities achieve higher wages through promotion. The distribution of occupations in the Springfield metropolitan area is sufficiently similar to that in Massachusetts that inferences from the Massachusetts projections should be relevant to Springfield.

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The Federal Reserve Bank of Boston has committed to supporting ongoing efforts to revitalize the City of Springfield. An earlier discussion paper highlighted the importance of developing strategies that would enable residents of Springfield's low-income neighborhoods to participate in the revitalization process.[1] In conversations with some of Springfield's civic leaders about how to improve the economic status of these residents, considerable concern was expressed about the lack of jobs for individuals who do not possess a college degree. This note discusses future employment opportunities in Massachusetts, with reference to the Springfield area.

Although occupations requiring a college degree are projected to grow considerably more rapidly over the period 2006-2016 than occupations that do not require college, there will continue to be large numbers of job openings for those without a college education. However, pay levels are generally low. Achieving a level of earnings sufficient to support a family requires some form of training – if not college, then vocational or on-the-job training of meaningful duration. Promotion to a supervisory position also offers the opportunity for higher earnings for workers who exhibit application and some degree of interpersonal skills. Future discussion papers will examine barriers that Springfield residents, particularly those with educational and other disadvantages, may face in securing and retaining these jobs. But the primary problem is not that there are no jobs for those without a college education.

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[1] Federal Reserve Bank of Boston, Springfield Team, "Towards a More Prosperous Springfield, Massachusetts: Project Introduction and Motiviation," Community Affairs Discussion Paper No. 2009-01, April 2009.

Employment Projections 2006-2016

Every two years, the Bureau of Labor Statistics (BLS) produces ten-year employment projections for the United States. As of mid-year 2009, the most current projections covered the period from 2006 to 2016.[2] The foundation for the BLS projections is the outlook for the overall economy, from which BLS develops projections of output by industry and then estimates the associated industry employment. A detailed industry-occupational matrix is applied to develop projections of the future distribution of occupations. The projections incorporate estimates of productivity gains and shifts in the distributions of occupations within industries.[3] BLS makes projections of both net job changes by occupation and total job openings, including replacement demand. State employment agencies develop their own projections based on the national estimates. Massachusetts released its own projections for 2006-2016 in March 2009. Because the Massachusetts projections were developed somewhat later than the BLS projections, they try to incorporate the effects of recent economic turbulence.[4]

Any long term projections are highly uncertain. However, these projections provide an indication of expert thinking about the broad trends affecting employment opportunities. Important factors influencing the 2016 occupational projections include (1) the aging of the baby boom and (2) differential productivity gains in different industries. The aging of

[2] The U.S. projections and a description of how they were derived, including assumptions about shifts in demand and productivity changes, may be found in Arlene Dohm and Lynn Shniper, "Occupational employment projections to 2016," in a special "Employment outlook:2006-16" issue of the *Monthly Labor Review,* November 2007.
[3]For a description of the occupational projections see United States Department of Labor *Employment Projections About the Numbers: National Industry-Occupation Employment Matrix* at www.bls.gov/emp/nioem/empioan.htm (accessed May 28, 2009.) Follow the links in the section on projection methodology.
[4] Executive Office of Labor and Workforce Development, Suzanne M. Bump, Secretary, Commonwealth of Massachusetts, "Commonwealth of Massachusetts Employment Projections 2006-2016" as accessed at http://lmi2.detma.org/lmi/pdf/MAprojectionsREPORT%202016.pdf on June 8, 2009 and "Current and Projected Employment for Industries and Occupations," (Projected Employment) as accessed on June 5, 2009 at http://lmi2.detma.org/lmi/pdf/MAprojections2006-2016.pdf.

the baby boom is expected to generate increased demand for health care and certain other services. Also, the retirement of older members of the baby boom will create replacement job opportunities. Meanwhile, high rates of productivity growth, in some cases in conjunction with slow demand, will reduce employment in many manufacturing industries.

As can be seen in Table 1, the fastest growing occupational groups and the groups that are expected to account for the largest numbers of new jobs in Massachusetts are professional and related occupations, on the one hand, and service occupations, on the other. More than half of the net increase in Massachusetts employment between 2006 and 2016 is expected to come from the professional group. Among the larger occupational clusters within this grouping are teachers and other education and training occupations; nurses, physicians and other health care practitioners and technicians; computer occupations; architects and engineers; community and social services occupations; and arts, design and entertainment occupations.

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Service occupations are expected to account for about a third of the net increase in jobs. The primary service occupational groupings are food preparation and serving occupations; nurses aides and other healthcare support occupations; building and grounds cleaning and maintenance occupations; personal care occupations; and protective service occupations.

Next in terms of growth are management, business and financial occupations, which are projected to increase at roughly the same rate as overall employment and to account for more than 10 percent of the

increase in employment. The remaining occupational groups are expected to grow relatively slowly or to decline. In the case of production occupations, the decline in employment is pronounced. Production occupations include assembly workers and others usually employed in manufacturing.

The rightmost column of Table 1 shows the average annual wage in each occupational group.[5] Comparing wages and growth rates, one can see that the highest rates of growth are projected for the highest paid occupations (management and professional) and for those paying the lowest wages (service occupations). The net effect is an upgrading in the average wage level. The occupational groups with earnings in the middle of the distribution – and most of these are in the lower middle - are expected to grow slowly or decline.

These patterns also suggest that occupations employing women will grow somewhat more rapidly than occupations that are more male oriented. U.S. data show women accounting for over half of those employed in professional and service occupations, but less than 30 percent of those employed in production occupations.[6] Men dominate in production occupations, which are expected to decline sharply, and construction and transportation jobs, where slight declines are expected.

[5] According to Massachusetts "Current and Projected Employment for Industries and Occupations," p. ii, annual wages are calculated by multiplying straight-time hourly earnings by 2080 hours (40 x 52). Since the normal workweek is less than 40 hours in many occupations, this approach may overstate annual wages generally and distorts the relationship between wages in occupations where part-time and part-year work is more or less common than the norm. Quartile rankings on prevalence of part-time employment were available for U.S. occupations in U.S. Department of Labor, Bureau of Labor Statistics, Employment Projections, Occupational Projections and Training Data, February 2008, Bulletin 2702, Table III-1. Occupational employment and job openings data, 2006-2016, and worker characteristics, 2006 as found on June 2, 2009 at http://www.bls.gov/emp/optd.pdf. (Occupational Projections and Training Data, Table III-1.)

[6] Data on occupation by sex from U.S. Bureau of Labor Statistics, Current Population Survey, Table 11. Employed persons by detailed occupation, sex, race and Hispanic or Latino ethnicity at www.bls.gov/cps/cpsaat11.pdf as visited on May 29, 2009.

Growth is not the only source of job opportunities. Replacement demand is also an important source of job openings.

Growth is not the only source of job opportunities. Replacement demand is also an important source of job openings. Replacement demand can arise because of retirements. And with the leading edge of the baby boom reaching age 65 in 2011, retirements will be especially important in the projection period. Additionally, people may change occupations. In particular, as workers acquire experience and additional training, they may move from occupations requiring less training to those that demand more and that offer correspondingly higher wages. This upward movement creates job openings in the occupations that are less training intensive.

In all the major occupational categories, job openings attributable to replacement demand are projected to exceed those attributable to growth. Taking replacement demand as well as growth into account, about 30 percent of job openings are projected to be in the professional group and 25 percent in service occupations. In addition, sales; office and administrative support; and management, business and financial occupations will all provide significant numbers of job opportunities. All are relatively large occupational groups and are projected to experience at least modest growth; additionally, replacement demand will be high in sales and office occupations.

Employment outlook and wages by education and training

Underlying these projections for major occupational groups are projections for more than 600 individual occupations. For each occupation, the "most significant source of postsecondary education or training" is identified. Table 2 shows projected growth and total net

openings (growth plus replacement demand) for different education and training requirements. Employment in occupations requiring a college degree is projected to grow much faster than jobs that do not require a college education; and about 60 percent of the net increase in employment in Massachusetts between 2006 and 2016 is expected to be in occupations requiring at least an associate's degree. Taking account of replacement demand, however, occupations requiring a college degree represent about 35 percent of total job openings between 2006 and 2016 – about the same fraction of total openings as jobs requiring only short-term on-the-job training. Short-term training can be acquired in a month or less. Occupations that require more training, but not college, account for 28 percent of projected job openings.

While there are – and will continue to be – job opportunities that do not require a college degree, wage levels in these jobs are on the low side. The average annual wage in occupations that required only short-term on-the-job training in 2007 was only $26,000 compared with $49,000 for all jobs. Additional training brings higher wages. Occupations requiring moderate on-the-job-training, defined as between four weeks and a year, or some form of postsecondary vocational training had an average annual wage in 2007 of roughly $37,000. Long-term on-the-job training, defined as training of more than a year in duration, brought wages up to the overall average of about $49,000.

A perspective on these wage levels is offered by the Living Wage Calculator (LWC) developed by Dr. Amy K. Glasmeir as part of the Poverty in America Project at Pennsylvania State University. According to the LWC web site, "The living wage shown is the hourly rate that an

individual must earn to support their family, if they are the sole provider and are working full-time (2080 hours per year)." It is based on the expenses for the specific geographic area. For the state of Massachusetts, the living wage required to support one adult in 2008 was estimated at $24,000. For two adults, almost $35,000 was required, and for two adults and one child, the living wage needed was $54,000.[7] For Hampden County and Springfield, the living wage needed was lower, primarily because of lower housing costs - about $19,000 for an individual, $28,000 for two adults, and $45,000 for a couple with a child. The LWC web site also shows typical hourly wage rates for various occupations; these were similar in Springfield and Massachusetts. However, according to Bureau of Labor Statistics data on wages by occupation, mean annual earnings in the Springfield metro area in 2006 averaged about 15 percent below those in Massachusetts as a whole. See the box, "Occupational Patterns in Massachusetts and the Springfield Metro Area" and the accompanying Table B-1, for a comparison of the distribution of major occupations in the Springfield area with that in Massachusetts, including a comparison of annual earnings in Springfield and Massachusetts.[8]

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Thus, the issue is not so much that there are no jobs for those who lack a college degree, but the low wages of many of the jobs that are available. The rest of this note looks at the nature of jobs that do not require college and considers how someone without a college degree might achieve higher wages.

[7] Poverty in America, Living Wage Calculator, Living Wage Calculation , as found on June 15, 2009 at http://www.livingwage.geog.psu.edu/states/25.

[8] The U.S. Census Bureau American Community Survey for 2005-2007 also shows median annual earnings in Springfield to be about 15 percent below those in Massachusetts. See 2005-2007 American Community Survey 3 Year Estimates, Table B24021 at http://factfinder.census.gov/servlet/DTTable?_bm=y&-context=dt&-ds_name=ACS_2007_3YR_G00_&-CONTEXT=dt&-mt_name=ACS_2007_3YR_G2000_B24021&-tree_id=3307&-redoLog=false&-_caller=geoselect&-geo_id=04000US25&-geo_id=31000US44140&-search_results=01000US&-format=&-_lang=en as accessed on August 17, 2009.

Jobs that do not require a college degree

Table 3 lists the individual occupations for which a college degree is not the most important training or educational requirement and that are projected to provide the greatest numbers of job openings in Massachusetts over the period 2006 to 2016. As noted, job openings may arise from growth in the number employed in the occupation and from the exit of current incumbents to retirement or another occupation (net replacement). Turnover within the occupation also creates opportunities for newcomers to enter the occupation but does not create a net increase in job opportunities. Occupations were included in the list if (a) the primary training qualification was something other than a college degree and (b) total openings due to growth and replacement were projected to exceed 2,000.

Occupations providing substantial numbers of job openings tend to be found in the food preparation and serving group; in building and grounds cleaning and maintenance; in sales occupations; and in office and administrative support. Other areas with sizable numbers of openings are healthcare occupations (licensed practical nurses and home health and nurses aides), protective services (security guards), and transportation and materials moving occupations (truck drivers and laborers.)

In most cases, job openings in these occupations are attributable to both growth in the occupation and net replacement demand, but replacement demand accounts for the bulk of the openings.

In most cases, job openings in these occupations are attributable to both growth in the occupation and net replacement demand, but replacement demand accounts for the bulk of the openings. For example, over the period 2006 to 2016, the number of waiters and waitresses is expected

to increase about 7 percent, but this growth accounts for just over 10 percent of the job openings projected. Most of the food preparation and servicing occupations are similar. In some cases, the occupation is actually shrinking, but the need to replace exiting workers will still create substantial job opportunities. Cashiers and laborers, movers, and handlers in the transportation grouping are examples.

For many of these occupations, the training requirements are limited to short-term on-the-job training, meaning that "the skills needed to be fully qualified in the occupation can be acquired during a short demonstration of job duties or during 1 month or less of on-the-job experience or instruction."[9] Notable exceptions are certain construction jobs that require moderate to long term on-the-job training, sometimes in the form of apprenticeships. Occupations in the installation, repair and maintenance category and drivers of heavy trucks also require lengthier periods of experience and training. In the former grouping, automotive service technicians and mechanics are projected to have the most job openings. Heating, air conditioning and refrigeration mechanics and installers and telecommunications equipment installers and repairers are also projected to provide sizable numbers of openings, although they do not meet the cutoff for inclusion in the table; in both cases, job openings are attributable to replacement demand rather than growth.

For certain other occupations, the key training requirement is experience in a related occupation. Examples are executive secretaries and supervisors of office and administrative support workers; in most cases, workers in these occupations have demonstrated a capacity to perform

[9] Dohm and Shniper, p.104, box.

well in a less demanding job and have been promoted into their current position. Although work experience is the primary training requirement, people who hold these positions tend to have some college education, although typically not a bachelor's degree (BA).[10] More generally, some college education is common among workers who hold jobs in office and administrative support functions, even if it is not considered a requirement to perform the job.

Achieving higher wages without a college degree

Many of these occupations pay relatively low wages. The exceptions require longer training and more experience. Table 4 shows job openings for occupations (a) for which the primary training requirement is not a college degree, (b) that paid wages above $44,000 in 2007 (an amount roughly equal to 90 percent of the average annual Massachusetts wage of $49,070), and (c) that were projected to exceed 500 job openings between 2006 and 2016. The table includes a number of occupations shown in Table 3, such as carpenters and supervisors and managers of office and administrative support workers; but since Table 4 has a lower threshold for job openings, it brings in additional occupations and provides a fuller picture of how someone who does not have a college degree might achieve higher wages.

In some cases, while a college degree is not the primary training requirement, most people in the occupation actually have a degree. This is particularly true of the more highly paid occupations. Thus, for

[10] Data on the educational attainment of U.S. workers aged 25 to 44 are available for specific occupations in Occupational Projections and Training Data, Table III-1 as found on June 2, 2009 at http://www.bls.gov/emp/optd.pdf. Education data are from the 2005-06 American Community Survey. There are three classifications – high school or less, some college and college or higher. Workers with associates degrees are classified in the "some college" category.

"managers, all other," with an average annual wage in excess of $90,000, experience in a related occupation is the most significant source of education or training, but national data indicate that over half of those in this occupation have a BA degree or higher and three-quarters have at least "some college," which in this classification includes associates degrees.[11] This is also true of sales representatives, wholesale and manufacturing, technical and scientific products. On the other hand, more than half of industrial production engineers and first-line supervisors and managers of non-retail sales workers do not have BA degrees, although they do have "some college."

A review of the occupations in Table 4 suggests two ways to achieve relatively high earnings without a college degree. One involves other training of at least moderate duration and frequently, longer. Moderate is defined by BLS as up to a year, while long-term training may last up to five years and may entail informal or formal apprenticeships combining classroom instruction and supervised on-the job training.[12] Examples include various construction trades, such as carpenters, electricians, and plumbers and pipefitters, as well as installation, maintenance, and repair occupations, such as automotive service technicians and heating, air conditioning, and refrigeration mechanics and installers. In a number of instances, particularly for the more highly paid occupations, a license or other exam-based certificate is required.

There are two ways to achieve relatively high earnings without a college degree. One involves other training of at least moderate duration and frequently, longer. The second way is through promotion.

Licensed practical nurse (LPN) is another example of a relatively well paid occupation that does not require a college degree but that does

[11] Occupational Projections and Training Data, Table III-1 and information on the education required in selected individual occupations as found in the Bureau of Labor Statistics O*NET data base at http://online.onetcenter.org on July 16, 2009.
[12] Dohm and Shniper, p. 104, box.

require post secondary training and passing a licensing examination. A majority of LPNs do have some college experience. More highly paid protective service occupations, such as police officers and firefighters, also require extensive training, as well as passing physical and written examinations. According to the Bureau of Labor Statistics' *Occupational Outlook Handbook,* which provides descriptions of the opportunities in most individual occupations, competition to be police officers and firefighters is strong; and applicants often take college courses to increase their chances of being hired. Once hired, they receive classroom instruction and practical training, frequently in state academies. Promotion requires scoring well on examinations, which are likely to require further study, including college courses.[13]

The second way that workers who lack a college education achieve higher wages is through promotion to supervisor and other positions of greater responsibility. Workers who have the initiative, discipline and interpersonal skills to become supervisors earn substantially more than those they supervise. Thus, annual earnings of supervisors or managers of landscaping, lawn service and groundskeeping workers were $47,600, while the landscaping and groundskeeping workers themselves averaged just over $30,000. The *Occupational Outlook Handbook* observes that opportunities for promotion are generally greater in larger establishments, which may provide training and management development programs. Sometimes, workers advance through starting their own business. Often workers who are supervisors have taken college courses. As they advance and assume additional responsibilities, supervisors may be required to take on additional tasks, involving record-

[13] U.S. Department of Labor, Bureau of Labor Statistics, "Protective Service Occupations," Reprinted from the Occupational Outlook Handbook, 2008-09 Edition, as found at http://www.bls.gov/oco/reprints/ocor011.pdf, on June 4, 2009.

keeping or purchasing, for which college courses are valuable. Those who aspire to their own business certainly can benefit from courses in business practices, as well as training in their specific field.

Conclusion

Springfield has a large, heavily minority population, many of whom possess limited formal education. Concern has been expressed that few jobs exist for this population and that most job openings require a college education. A review of Massachusetts employment projections suggests that jobs requiring less than a college education are not in short supply. Rather, the problem is that many of these jobs pay relatively low wages.

While it is possible to achieve average to above-average wages without a college degree, most of the occupations offering higher wages require training of another sort – either moderate or long-term on-the-job training, possibly through apprenticeships, or courses in postsecondary vocational schools and community colleges. Additionally, workers who demonstrate the necessary qualities may be candidates for promotion to supervisory positions. Some may start their own businesses. As they take on more responsibility, however, workers often acquire some college experience.

Jobs exist for those with limited skills. These jobs provide an opportunity to learn the demands of the working environment, and they may pay enough to support an individual worker or a couple. But achieving earnings sufficient to support a family requires more than skills that can be learned on-the-job in less than a month. If college is not an option,

workers who aspire to higher earnings must seek other forms of training or must demonstrate sufficient initiative, judgment and interpersonal skills that they can advance.

Occupational Patterns in Massachusetts and the Springfield Metro Area

This note focuses on projected growth in occupations in Massachusetts. Are these patterns likely to be relevant for Springfield?

While we do not have Springfield-specific occupational projections, the Bureau of Labor Statistics does produce occupational employment and wage estimates for metropolitan areas and states that allow us to compare the occupational distribution for the Springfield Metropolitan Statistical Area with that for Massachusetts (Table B-1). These data do not include the self-employed, but as can be seen from comparing Tables 1 and B-1, the occupational distributions for Massachusetts are quite similar with and without the self-employed. The data in Table B-1 are for May 2006. Data for May 2008 are available, but these will reflect the effects of the current recession and, thus, be less comparable to the employment base used in projecting future growth and replacement demand in Massachusetts.

As can be seen in Table B-1, the fraction of jobs in management, business and financial occupations is considerably smaller in the Springfield metro area than in the state as a whole. The fraction in professional occupations is also smaller. Production occupations and occupations involving transportation and material moving are correspondingly larger in the Springfield area

Applying projected 2006-2016 growth rates from Table 1 to the occupational distributions in B-1 provides an indication of future employment patterns in Springfield. Given Springfield's current occupational mix, this exercise suggests that growth may be slightly slower in the Springfield area than for Massachusetts as a whole (5.3 percent compared to 6.3 percent.) A smaller share of professional jobs, which are expected to grow rapidly, and a larger share of production jobs, which are expected to decline, account for most of the difference.

In both Massachusetts and the Springfield area, professional occupations will account for well over half of the net increase in employment. Service occupations will account for the bulk of the remainder.

Of course, as discussed in the text, employment opportunities also arise because of replacement demand. Substituting projected total openings for the net change in employment, professional and related occupations and service occupations will each account for more than a quarter of the job openings in the Springfield area. These shares are similar to those for Massachusetts as a whole, although Massachusetts will have relatively more professional opportunities. Sales occupations will account for about 12 percent of job openings and office and administrative support will account for about 14 percent at the both the state level and in the metropolitan area. Although these occupations are projected to grow slowly, they are large and replacement demand should be substantial. Management, business and financial occupations are projected to account for about 9 percent of openings in Massachusetts and 6 percent in Springfield. Transportation and material moving occupations should also account for about 6 percent of the job openings in the Springfield area, according to this exercise. The remaining occupations will offer relatively small numbers of job openings.

On balance, the current distribution of occupations in the Springfield area is sufficiently similar to that in Massachusetts that sources of future job openings in the Springfield area are likely to be generally consistent with those projected for Massachusetts. Thus, the inferences drawn in the text should apply to Springfield. Jobs are available for workers lacking a college education. But those who aspire to good wages will need some form of training or they will need to demonstrate qualities that warrant promotion.

Table 1. Massachusetts Employment by Major Occupational Group (000's)

Occupational Group	Employment 2006		Growth 2006-2016 (%)	Change 2006-2016		Total Openings: Change + replacements		Employment 2016		Annual wage 2007 ($)
	Number	Share (%)		Number	Share (%)			Number	Share (%)	
Management, business, financial	412.8	11.9	6.6	27.1	12.5	88.8	9.0	439.9	12.0	95554
Professional & related	856.2	24.8	13.9	119.0	54.9	292.0	29.6	975.2	26.6	67956
Service	653.1	18.9	11.4	74.3	34.3	243.7	24.7	727.4	19.8	28212
Sales & related	361.9	10.5	2.2	8.0	3.7	116.0	11.8	369.9	10.1	40550
Office & admin support	568.0	16.4	1.3	7.6	3.5	127.3	12.9	575.6	15.7	35870
Farming, fishing, forestry	2.3	0.1	6.0	0.1	0.1	0.6	0.1	2.4	0.1	24990
Construction & extraction	136.1	3.9	-0.6	-0.9	-0.4	23.1	2.3	135.2	3.7	50690
Installation, maintenance, repair	109.3	3.2	1.3	1.4	0.6	19.6	2.0	110.7	3.0	45400
Production	181.5	5.3	-10.5	-19.1	-8.8	16.6	1.7	162.4	4.4	34170
Transportation & material moving	173.3	5.0	-0.5	-0.9	-0.4	37.2	3.8	172.4	4.7	33090
Total	**3454.4**	**100.0**	**6.3**	**216.7**	**100.0**	**985.0**	**100.0**	**3671.1**	**100.0**	**49070**

Note: Massachusetts groups business and financial occupations with professionals, but U.S. Bureau of Labor Statistics groups them with management. This table follows the BLS approach.

Source: Commonwealth of Massachusetts, Executive Office of Labor and Workforce Development, "Commonwealth of Current and Projected Employment for Industries and Occupations," Rev.03/09, Section 2. Massachusetts Employment Projections 2006-2016: Current and Projected Employment for Industries and Occupations," Rev.03/09, Section 2.

Table 2: Massachusetts Employment 2006-2016 by Training Level (000's)

Training Level	Employment 2006		Growth 2006-16	Change 2006-2016		Total Net Openings		Employment 2016		Annual wage
	Number	Share (%)	%	Number	Share (%)	Number	Share (%)	Number	Share	2007 ($)
First professional degree	49,500	1.5	9.5	4,690	2.2	13,730	1.5	54,190	1.5	133,554
Doctorate	36,860	1.1	19.1	7,050	3.3	14,420	1.6	43,910	1.2	82,764
Master's degree	79,000	2.4	15.6	12,350	5.8	27,500	3.0	91,350	2.6	65,109
Exp. Plus BA or higher	178,230	5.4	6.7	11,980	5.7	49,630	5.4	190,210	5.4	104,306
Bachelor's degree	504,080	15.2	12.7	64,060	30.2	162,800	17.6	568,140	16.1	71,024
Associate's degree	174,440	5.3	15.3	26,740	12.6	60,530	6.5	201,180	5.7	62,753
Postsecondary vocational	176,310	5.3	9.8	17,330	8.2	30,480	3.3	193,640	5.5	37,968
Exp in related occupation	320,340	9.7	4.5	14,480	6.8	74,610	8.1	334,820	9.5	57,101
Long-term OJT (year plus)	204,090	6.2	0.4	900	0.4	46,430	5.0	204,990	5.8	48,633
Moderate-term OJT	503,460	15.2	2.6	13,120	6.2	103,460	11.2	516,580	14.7	36,829
Short-term OJT (<4 wks)	1,080,350	32.7	3.6	39,280	18.5	341,550	36.9	1,119,630	31.8	26,029
With college degree	**1,022,110**	**30.9**	**12.4**	**126,870**	**59.8**	**328,610**	**35.5**	**1,148,980**	**32.7**	**78,411**
Without college degree	**2,284,550**	**69.1**	**3.7**	**85,110**	**40.2**	**596,530**	**64.5**	**2,369,660**	**67.3**	**35,707**
Total	**3,306,660**	**100.0**	**6.4**	**211,980**	**100.0**	**925,140**	**100.0**	**3,518,640**	**100.0**	**48,907**

Note: Employment in detailed occupations (with training and wage data) does not add up to total employment as shown in Table 1.

Source: Author's calculations based on detailed tables in Massachusetts Employment by Occupation and Education and Training, Current and Projected, as found on June 12, 2009 at http://lmi2.detma.org/lmi/Fplmiforms.asp in "2006-2016 Employment Projections Detailed Excel Tables."

Table 3. Massachusetts Occupations for which College Degree is not Primary Training Requirement: Most Openings

Occupation	Occupational group	Employ-ment 2006	Change 2006 - 2016	Total openings Change + replacements	Annual wage 2007 ($)	Required education or training
Management, business, and financial occupations(MBF)						
Food service managers	MBF	9,860	390	2,720	52,440	Exp in related occupation #
Managers, all other	MBF	11,260	330	2,570	92,430	Exp in related occupation *
Claims adjusters	MBF	8,280	120	2,230	57,590	Long-term OJT #
Professional and related occupations (Prof)						
Social & human service assistants	Prof	16,080	4,330	6,190	31,030	Moderate-term OJT *
Pre-school teachers	Prof	14,410	2,670	5,050	29,510	Postsecondary vocational #
Self-enrichment education teachers	Prof	8,450	1,640	2,540	38,280	Exp in related occupation *
Teacher assistants	Prof	34,960	2,350	8,040	24,500	Short-term OJT #
Pharmacy technicians	Prof	5,740	1,660	3,410	29,480	Moderate-term OJT #
Licensed practical & vocational nurses	Prof	17,450	2,050	6,810	48,790	Postsecondary vocational #
Service occupations						
Home health aides	Service	17,330	5,820	7,370	25,290	Short-term OJT
Nursing aides, orderlies, attendants	Service	41,620	5,590	9,320	27,920	Postsecondary vocational
Dental assistants	Service	6,430	1,310	2,430	37,550	Moderate-term OJT #
Medical assistants	Service	9,630	2,300	3,500	32,940	Moderate-term OJT #
Firefighters	Service	12,710	530	5,160	48,500	Long-term OJT #
Police & sheriff's patrol officers	Service	16,480	600	5,010	52,760	Long-term OJT #
Security guards	Service	21,920	1,890	6,340	26,350	Short-term OJT #
Lifeguards, ski patrol, other recreation protective	Service	3,040	280	2,530	22,990	Short-term OJT #
Supervisors/Mgrs, food preparation & serving	Service	16,890	1,320	2,590	34,410	Exp in related occupation
Cooks fast food	Service	7,010	410	2,310	20,360	Short-term OJT
Cooks institution	Service	6,620	550	2,340	28,840	Moderate-term OJT
Cooks restaurant	Service	17,390	1,390	6,100	26,140	Long-term OJT
Food preparation workers	Service	25,690	3,340	12,250	21,560	Short-term OJT
Bartenders	Service	17,820	1,280	7,760	23,910	Short-term OJT #
Combined food preparation & serving, incl. fast	Service	52,880	7,760	17,790	19,170	Short-term OJT
Counter attendants	Service	19,670	1,230	14,880	19,480	Short-term OJT
Waiters & waitresses	Service	54,200	3,980	33,430	24,220	Short-term OJT
Dining room attendants	Service	8,630	680	4,290	20,900	Short-term OJT

Dishwashers	Service	14,940	990	6,100	19,230	Short-term OJT
Janitors & cleaners	Service	60,040	5,330	16,820	27,020	Short-term OJT
Maids & housekeeping cleaners	Service	20,750	2,520	6,430	22,950	Short-term OJT
Landscaping & groundskeeping	Service	25,200	3,370	6,700	30,130	Short-term OJT
Amusement & recreation attendants	Service	3,250	410	2,010	21,370	Short-term OJT #
Hairdressers, stylists, cosmetologists	Service	16,270	3,110	5,050	30,470	Postsecondary vocational
Child care workers	Service	16,280	3,470	8,150	22,500	Short-term OJT #
Personal & home care aides	Service	11,190	4,010	5,910	23,860	Short-term OJT
Fitness trainers & aerobics instructors	Service	7,090	940	2,270	43,020	Postsecondary vocational #
Sales and related occupations						
Suprvisors/Mgrs, retail sales workers	Sales	36,500	-70	7,590	40,890	Exp in related occupation #
Cashiers	Sales	75,250	-4,540	31,240	19,900	Short-term OJT
Counter & rental clerks	Sales	8,930	850	4,250	27,660	Short-term OJT
Retail salesperson	Sales	110,750	5,290	39,390	25,320	Short-term OJT #
Sales representatives, services, all other	Sales	11,780	2,500	5,270	65,700	Exp in related occupation #
Sales reps, W&M, technical & scientific products	Sales	19,230	2,280	6,520	88,550	Exp in related occupation *
Sales reps, W&M, ex technical & scientific products	Sales	32,960	1,380	8,650	68,630	Exp in related occupation *
Office and administrative support occupations (Office)						
Supervisors/Mgrs, office & admin support	Office	33,060	-360	6,460	52,820	Exp in related occupation #
Bill & account collectors	Office	7,970	820	2,030	37,410	Short-term OJT #
Bookkeeping clerks	Office	51,300	2,950	10,980	37,590	Moderate-term OJT #
Tellers	Office	15,400	1,440	8,180	26,920	Short-term OJT #
Customer service representatives	Office	53,660	8,390	23,330	37,090	Moderate OJT #
Hotel, motel & resort clerks	Office	3,670	510	2,000	24,300	Short-term OJT #
Receptionists & information clerks	Office	26,440	2,870	9,340	26,610	Short-term OJT #
Postal service carriers	Office	8,970	-530	2,100	44,330	Short-term OJT #
Shipping clerks	Office	18,670	-500	3,970	32,030	Short-term OJT
Stock clerks	Office	38,360	-4,730	4,370	24,890	Short-term OJT
Executive secretaries & admin assistants	Office	49,840	3,880	11,820	45,930	Exp in related occupation #
Medical secretaries	Office	18,600	1,700	4,660	34,780	Moderate-term OJT #
Secretaries, ex medical,legal, executive	Office	41,820	-2,020	4,640	35,650	Moderate-term OJT #
Office clerks, general	Office	65,060	3,540	15,480	30,050	Short-term OJT #
Construction and extraction occupations (C&E)						
Carpenters	C&E	29,140	80	4,020	50,960	Long-term OJT
Electricians	C&E	14,420	-310	3,400	54,850	Long-term OJT
Plumbers, pipefitters, steamfitters	C&E	11,650	-60	2,340	57,460	Long-term OJT
Installation, maintenance and repair occupations (IMR)						
Automotive service technicians & mechanics	IMR	16,640	480	3,820	40,100	Postsecondary vocational
Production occupations (Product)						

Team assemblers	Product	15,990	-610	2,710	27,870	Moderate-term OJT
Transportation and material moving occupations (T&MM)						
Bus drivers, school	T&MM	10,040	810	2,130	29,530	Moderate-term, OJT
Truck drivers, heavy & tractor trailer	T&MM	27,190	1,010	5,830	41,980	Moderate-term OJT
Truck drivers, light & delivery	T&MM	21,190	350	4,110	33,370	Short-term OJT
Cleaners, vehicles	T&MM	4,690	220	2,010	24,190	Short-term OJT
Laborers, movers, handlers	T&MM	39,990	-1,420	11,380	27,040	Short-term OJT

@ Hourly wage in Massachusetts is multiplied by year-round full-time hours (2080) to calculate annual wage. Part-time employment is common in many activities, however.

Although experience in a related occupation is the most significant source of training, a majority of those employed in the United States have some college (including associates degree) or higher.

* Although experience in a related occupation is the most significant source of training, a majority of those employed in the United States have a bachelors degree or higher.

Source of U.S. information: U.S. Department of Labor, Bureau of Labor Statistics, Employment Projections, Occupational Projections and Training Data, Table III-1. (as accessed at http://www.bls.gov/emp/optd.pdf on June 2, 209)

Source: Executive Office of Labor and Workforce Development, Commonwealth of Massachusetts, "Commonwealth of Massachusetts Employment Projections, 2006-2016: Current and Projected Employment for Industries and Occupations" Section 2, (as accessed at http: //lmi2.detma/lmi/pdf/MAprojections2006-2016.pdf on June 5, 2009)

Table 4. Massachusetts Occupations for which College Degree is not Primary Training Requirement: Highest Wages
(Annual wage in 2007 is at least $44,000 & total job openings exceed 500)

Ranked high wage to lower

Occupation	Group	Employment 2006	Change 2006-2016	Total openings Change + replacements	Median wage 2007 ($)	Required education or training
Industrial production managers	MBF	3,530	-200	1,020	95,350	Exp in related occupation #
Managers, other	MBF	11,260	330	2,570	92,430	Exp in related occupation *
Sales reps, wholesale & manu, technical & scientific products	Sales	10,230	2,280	6,520	88,550	Exp in related occupation *
Supervisors/mgrs, non-retail sales workers	Sales	11,390	-60	1,580	83,150	Exp in related occupation #
Transportation, storage, distribution managers	MBF	1,890	100	660	79,550	Exp in related occupation #
Supervisors/mgrs, police & detectives	Service	2,800	60	940	79,280	Exp in related occupation #
Supervisors/mgrs, fire fighting workers	Service	1,800	70	630	70,910	Exp in related occupation #
Supervisors/mgrs, construction trades & extraction	C&E	12,120	-80	1,610	70,280	Exp in related occupation
Sales reps, wholesale & manu, ex tech & scientific products	Sales	32,960	1,380	8,650	68,630	Exp in related occupation *
Real estate sales agents	Sales	3,650	-40	540	68,270	Postsecondary vocational #
Flight attendants	Service	2,340	170	580	65,940	Long-term OJT #
Sales representatives, services, other	Sales	11,780	2,500	5,270	65,700	Exp in related occupation #
Electric power line installers & repairers	IMR	1,700	20	560	63,880	Long-term OJT
Purchasing agents	MBF	7,450	-340	1,250	62,880	Long-term OJT #
Supervisors/mgrs, mechanics, installers & repairers	IMR	8,430	-20	1,960	62,610	Exp in related occupation #
Compliance officers	MBF	5,810	50	730	60,500	Long-term OJT *
Telecom equipment installers & repairers, ex line installers	IMR	4,870	90	1,290	59,770	Postsecondary vocational #
Advertising sales agents	Sales	3,400	640	1,240	58,870	Moderate OJT *
Telecommunications line installers & repairers	Install	4,660	-570	640	58,590	Long-term OJT #
Claims adjusters, examiners	MBF	8,280	120	2,230	57,590	Long-term OJT #
Wholesale & retail buyers	MBF	5,680	-380	890	57,590	Long-term OJT #
Plumbers, pipefitters, steamfitters	C&E	11,650	-60	2,340	57,460	Long-term OJT
Supervisors/mgrs, transportation & material moving	T&MM	3,640	190	930	57,050	Exp in related occupation #
Operating engineers & construction equip operators	C&E	5,180	-20	980	56,020	Moderate OJT
Supervisors/mgrs, production workers	Product	13,590	-1,240	1,030	55,720	Exp in related occupation
Electricians	C&E	14,420	-310	3,400	54,850	Long-term OJT

Sheet metal workers	C&E	4,290	-170	870	53,180	Long-term OJT
Correctional officers & jailers	Service	5,290	800	2,010	53,030	Moderate-term OJT #
Supervisors/mgrs, office & administrative support workers	Office	33,060	-360	6,460	52,820	Exp in related occupation #
Police & sheriff's patrol officers	Service	16,480	600	5,010	52,760	Long-term OJT #
Electrical & electronics repairers, commerical & industrial eq	IMR	1,830	80	700	52,550	Postsecondary vocational #
Food service mgrs	MBF	9,860	390	2,720	52,440	Exp in related occupation #
Heating, AC & refrigeration mechanics & installers	IMR	7,090	-300	940	51,260	Long-term OJT
Roofers	C&E	2,030	40	500	51,080	Moderate OJT
Carpenters	C&E	29,140	80	4,020	50,960	Long-term OJT
Architectural & civil drafters	Prof	2,820	-20	790	49,810	Postsecondary vocational #
Licensed practical & vocational nurses	Service	17,450	2,050	6,810	48,790	Postsecondary vocational #
Construction & building inspectors	C&E	2,790	270	790	48,640	Exp in related occupation #
Fire fighters	Service	12,710	530	5,160	48,500	Long-term OJT #
Supervisors/mgrs, landscaping, lawn service, groundskeeping	Service	4,740	590	910	47,620	Exp in related occupation
Industrial machinery mechanics	Product	3,550	140	730	47,510	Long-term OJT
Production, planning, expediting clerks	Office	6,400	-120	1,620	47,120	Moderate OJT #
Sales and related workers, other	Sales	3,440	220	530	46,750	Moderate OJT *
Executive secretaries & admininstrative assistants	Office	49,840	3,880	11,820	45,930	Exp in related occupation #
Chefs & head cooks	Service	4,040	150	660	44,440	Exp in related occupation #
Postal service carriers	Office	8,970	-530	2,100	44,330	Short-term OJT #

Although experience in a related occupation in the most significant source of training, a majority of those employed have some college or higher.
* Although experience in a related occupation is the most significant source of training, a majority of those employed have a college degree or higher.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Employment Projections, Occupational Projections and Training Data, Table III-1.
(as accessed at http://www.bls.gov/emp/optd/ on June 2, 209)

Table B-1. Comparison of Employment by Major Occupational Group, Massachusetts and Springfield Metropolitan Statistical Area , May 2006

Occupational Group	Employment share (%)		MA Growth	Change 2006-2016 Share (%)		Total openings Share (%) (change + replacements)		Employment 2016 Share (%)		Mean annual wage 2006
	MA	Spring-field	2006-2016 (%)	MA	Spring-field	MA	Spring-field	MA	Spring-field	Springfield/ MA (%)
Management, business, financial	11.2	8.1	6.6	12.0	10.1	8.6	6.4	11.2	8.2	85.3
Professional & related	24.5	21.1	13.9	55.1	55.7	30.0	26.5	26.3	22.8	86.0
Service	19.0	19.7	11.4	35.1	42.6	25.4	27.1	19.9	20.9	94.0
Sales & related	10.3	10.2	2.2	3.7	4.3	11.9	12.1	9.9	10.0	85.8
Office & administrative support	17.3	17.1	1.3	3.6	4.2	13.9	14.1	16.5	16.5	91.7
Farming, fishing, forestry	0.1	0.0	6.0	0.1	0.0	0.1	0.0	0.1	0.0	125.0
Construction & extraction	3.7	3.1	-0.6	-0.4	-0.4	2.2	2.0	3.4	3.0	87.4
Installation, maintenance & repair	3.2	4.0	1.3	0.7	1.0	2.1	2.6	3.0	3.8	91.8
Production	5.6	8.5	-10.5	-9.5	-16.9	1.8	2.9	4.7	7.2	98.2
Transportation & material moving	5.2	8.1	-0.5	-0.4	-0.8	4.0	6.4	4.9	7.7	96.2
Total	**100.0**	**100.0**	**6.3**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**100.0**	**84.1**

Note: These data do not include the self-employed.

Source: Author's calculations based on U.S. Bureau of Labor Statistics, Occupational Employment Statistics, May 2006, Metropolitan and Nonmetropolitan Area Occupational Employment and Wage Estimates,
Massachusetts and Springfield, MA-CT, as found on July 24 at http://www.bls.gov/oes/2006/may/oes_ma.htm and www.bls.gov/oes/2006/may/oes_78100.htm