

May 01, 2007

A Profile of the Demographic, Socioeconomic, and Job Characteristics of the Employed in Biopharmaceutical and All Industries of Massachusetts and the U.S.

Andrew Sum

Northeastern University - Center for Labor Market Studies

Ishwar Khatiwada

Northeastern University - Center for Labor Market Studies

Joseph McLaughlin

Northeastern University - Center for Labor Market Studies

Paulo Tobar

Northeastern University - Center for Labor Market Studies

Sheila Palma

Northeastern University - Center for Labor Market Studies

Recommended Citation

Sum, Andrew; Khatiwada, Ishwar; McLaughlin, Joseph; Tobar, Paulo; and Palma, Sheila, "A Profile of the Demographic, Socioeconomic, and Job Characteristics of the Employed in Biopharmaceutical and All Industries of Massachusetts and the U.S." (2007). *PhRMA Research Reports*. Paper 1. <http://hdl.handle.net/2047/d10015541>

A Profile of the Demographic, Socioeconomic, and
Job Characteristics of the Employed in Biopharmaceutical
and All Industries of Massachusetts and the U.S.

PhRMA Research Paper No. 11

Prepared by:

Andrew Sum

Ishwar Khatiwada

with

Joseph McLaughlin

Paulo Tobar

Sheila Palma

Center for Labor Market Studies
Northeastern University
Boston, Massachusetts

Prepared for:

**The Pharmaceutical Research and Manufacturers of America
(PhRMA)**

May 2007

Table of Contents

Introduction.....	2
Data Sources for the Estimates of the Demographic, Socioeconomic, and Job Characteristics of Biopharmaceutical Industry Workers in Massachusetts and the U.S.	3
Number of Workers in Biopharmaceutical Industries of Massachusetts and the U.S., 2003-2005	4
Median Age.....	9
The Nativity Status of Biopharmaceutical Industry Workers in Massachusetts.....	11
The Educational Attainment of Workers in Biopharmaceutical Industries of Massachusetts, 2000 – 2005.....	13
The Employment of Workers with Ph.D. or Professional Degrees in Biopharmaceutical Industries.....	16
The Occupational Structure of Jobs in Biopharmaceutical Industries and All Industries of Massachusetts, 2005.....	19
Distribution of Workers in Biopharmaceutical Industries of Massachusetts by Class of Worker.....	23
In-Commuting and Out-Commuting of Workers in Biopharmaceutical Industries in 2005.....	24
Median Annual Earnings, Full-Time, Year-Round Job Characteristics, and Health Insurance Pension Coverage of All Workers (16+) and Workers in Biopharmaceutical Industries of Massachusetts and the U.S., 2004-2005	26

Introduction

Knowledge of the demographic (age, gender, race-ethnic) and socioeconomic (educational attainment) characteristics of workers in a given industry and the occupational characteristics, skill requirements, and annual earnings of those workers is essential for career counseling and guidance and for workforce development policymaking and program planning. The annual earnings of workers in an industry also will help determine the size of the industry's multiplier effects since the induced spending of these workers and owners on locally produced goods and services will help influence the number of jobs indirectly created by the industry.¹

This research paper is designed to provide a fairly detailed demographic and socioeconomic profile of resident workers employed by biopharmaceutical industries in Massachusetts and to compare the characteristics of these workers with those of their counterparts across all industries of the state and their peers in similar industries across the nation.² Among the demographic and socioeconomic characteristics examined are the gender, age, race-ethnic status, nativity status, and educational attainment of the employed, including the types of college degrees held by these workers in recent years (2003-2005). We will also describe the characteristics of the jobs held by these workers, including their occupational characteristics, class of worker status, annual earnings, full-time, year-round status of their jobs, and health insurance/pension coverage. We will begin our analysis with an overview of the key data sources used to generate all of the estimates of the demographic/socioeconomic characteristics of workers in biopharmaceutical industries and key quality characteristics of their jobs.

¹ The overall output and employment multiplier effects of an industry are dependent on both the purchases of the firms in the industry on goods and services produced by other state firms and by the induced spending of the workers and owners on goods and services in the state.

² The bulk of the analyses are focused on Massachusetts' residents employed in biopharmaceutical industries regardless of the locations of their jobs. One section of the paper will identify the numbers and characteristics of workers who commute into Massachusetts for their jobs in biopharmaceutical industries. The state attracts more workers from other states in New England to work in biopharmaceutical industries here in Massachusetts than the number of residents who commute outside the state to work in biopharmaceutical firms in the rest of the region.

Data Sources for the Estimates of the Demographic, Socioeconomic, and Job Characteristics of Biopharmaceutical Industry Workers in Massachusetts and the U.S.

The bulk of the data on the demographic, socioeconomic, and job characteristics (industries, occupations, class of worker status, annual earnings) of biopharmaceutical industry workers and all workers in Massachusetts and the U.S. appearing in this research report are based on the findings of the American Community Surveys (ACS) for calendar years 2003 through 2005. The ACS household surveys have been conducted annually by the U.S. Census Bureau since 2000. These household surveys utilize a questionnaire very similar in format to that used in conducting the 2000 Census of Population and Housing.³ The ACS questionnaire collects information on the demographic and socioeconomic characteristics of all persons living in sample households at the time of the survey as well as information on the occupations, industries, class of worker status, weeks and hours of employment, and annual earnings of the employed. The job characteristics information is collected from household members ages 16 and older.

The number of sample households included in the ACS survey in Massachusetts and the U.S. has increased substantially in the past few years. In calendar year 2004, slightly more than 12,700 households in Massachusetts completed an ACS questionnaire while more than 37,000 did so in 2005. During the latter year, approximately 1.9 million households in the U.S. completed an ACS questionnaire.

A second source of data used to generate estimates of the health insurance and pension coverage of workers in biopharmaceutical industries and all industries of Massachusetts during 2004 and 2005 is the March Current Population Surveys' (CPS) work experience and income supplements for March 2005 and March 2006. The CPS survey is a monthly household survey conducted by the U.S. Census Bureau for the U.S. Bureau of Labor Statistics.⁴ The March CPS survey contains a supplementary set of questions that collect data on the labor force,

³ The specific elements of the ACS questionnaire can be obtained from the U.S. Census Bureau web site. See: www.census.gov, click on the American Community Survey.

⁴ For a review of the design features and purposes of the monthly Current Population Survey, See: U.S. Bureau of Labor Statistics, Employment and Earnings, January 2006, U.S. Government Printing Office, Washington, D.C., 2006.

employment, and earnings experiences of all household members (15 and older) in the prior calendar year and their health insurance and pension coverage on jobs held in the prior year.

Number of Workers in Biopharmaceutical Industries of Massachusetts and the U.S., 2003-2005

To produce our profile of the demographic and socioeconomic characteristics of the biopharmaceutical industry workforce in Massachusetts and the United States and some of the characteristics of their jobs, we combined three years of findings from the 2003, 2004, and 2005 American Community Surveys (ACS). Nearly 62,000 households in Massachusetts completed ACS questionnaires over this three year period.⁵ By combining the findings for all three years, we obtained a larger sample of workers in biopharmaceutical industries upon which to base our estimates of their personal and job characteristics. The findings in the tables and charts below represent simple three year annual averages for the 2003-2005 time period.

The ACS surveys collected information on the labor force status of all household members ages 16 and older.⁶ For those persons classified as employed at the time of the survey, including wage and salary workers, the self-employed, and unpaid workers in family owned businesses, information was collected on the type of businesses operated by their employers, the geographic locations of their jobs, their job titles, and a brief description of their job duties.⁷ Our analysis of the characteristics of workers in biopharmaceutical industries is based on the sample of employed Massachusetts' residents regardless of the locations of their jobs.⁸ The U.S. Census Bureau assigned industry codes (NAICS) and occupational codes to the jobs held by the employed at the time the questionnaires were completed.⁹

⁵ The ACS household sample for Massachusetts in 2005 was more than 37,000, nearly three times as high as the number of households interviewed annually during 2003 and 2004.

⁶ The ACS surveys for 2003-2005 included only persons living in households including single detached units or multiple unit living quarters. Persons living in group quarters, such as college dormitories, fraternities, sororities, prisons, jails, and nursing homes, were excluded from coverage by the survey.

⁷ The employed include persons working for one or more hours for pay or profit in the week preceding the survey, those with a job but not at work for reasons such as temporary illness, vacation, or weather related conditions, and those who worked without pay in a family owned business for 15 or more hours.

⁸ As will be noted below, approximately 7,200 workers from other states primarily Connecticut, New Hampshire, and Rhode Island commuted into Massachusetts from other states. They will not be represented in the estimates of the count of resident employed workers in Massachusetts' biopharmaceutical industries.

⁹ NAICS is the acronym for the North American Industrial Classification System, which can be used to assign increasingly detailed codes to a firm from two digits to the more detailed six-digit classification.

The NAICS codes representing the following three industries were used to represent the biopharmaceutical industries in both the state and nation:

- NAICS 3254 Pharmaceutical and medicine manufacturing
- NAICS 3391 Medical equipment and supplies manufacturing
- NAICS 5417 Scientific research and development services

According to the findings of the 2003 to 2005 ACS surveys, there were 62,224 employed residents of Massachusetts who worked in a biopharmaceutical industry.¹⁰ They represented about 2.0% of all employed residents of the Commonwealth over this three year period. The largest share of these biopharmaceutical industry workers (45%) was employed in scientific research and development industries, followed by 31% in medical instruments and supplies manufacturing, and nearly 24% in pharmaceutical and medicine manufacturing industries (Table 1). A higher share of the workers in the state’s biopharmaceutical industries reported that they were employed in scientific research and development industries than across the entire country (45% vs. 37%).

Table 1:
The Number and Percentage Share of Workers in Biopharmaceutical Industries of
Massachusetts and the U.S., 2003-2005 Averages
(Numbers in 1000's)

Industry	Massachusetts		U.S.	
	(A) Number	(B) % of all Biopharm aceutical Workers	(C) Number	(D) % of all Biopharmace utical Workers
All biopharmaceutical industry	62,224	100.0	1,380,280	100.0
• Pharmaceutical and medicine mfg.	14,694	23.6	403,708	29.2
• Medical equipment and supplies mfg.	19,205	30.9	469,733	34.0
• Scientific research and development industries	28,325	45.5	506,839	36.7

Source: 2003, 2004, and 2005 American Community Surveys, public use files, tabulations by authors.

¹⁰ There were another 7,200 employed persons in biopharmaceutical industries in other states who reported that they commuted to Massachusetts for work during 2005. A few thousand of these Massachusetts workers commuted to biopharmaceutical jobs outside of the state.

The number of resident workers in each biopharmaceutical industry in Massachusetts during the 2003-2005 period was compared to the total number of workers in such industries across the country to identify the degree to which Massachusetts' workers were over-represented in these industries. Shares of employment in an industry above the state's overall percentage share of national employment implies that the state is an exporter of such goods and services to other states and to other countries.¹¹ Overall, Massachusetts was home for 3.175 million resident workers, 2.34% of all employed persons across the nation in 2003-2005 (Table 2). The 62,224 resident employed workers in biopharmaceutical industries accounted for 4.51% of all biopharmaceutical industry workers across the nation, a share nearly twice as high as that for other industries in the state. This finding implies that a relatively high share of Massachusetts' workers in biopharmaceutical industries were engaged in export-oriented activities, generating other jobs across the state via the export base multiplier.¹² Massachusetts contained an above average share of the nation's workers in each of the three biopharmaceutical industries, with these employment shares ranging from 3.63% in pharmaceutical and medicine manufacturing industries to a high of just under 5.6% in scientific research and development industries.

Table 2:
Massachusetts' Number and Share of All U.S. Workers in Biopharmaceutical
Industries and All Industries, 2003-2005 Averages
(Numbers in 1000's)

Industry	(A) Number	(B) % of all Biopharmaceutical Workers
All biopharmaceutical industry	62,224	4.51
• Pharmaceutical and medicine mfg.	14,694	3.63
• Medical equipment and supplies mfg.	19,205	4.09
• Scientific research and development industries	28,325	5.59
All Industries	3,175,198	2.34

Source: 2003, 2004, and 2005 American Community Surveys, public use files, tabulations by authors.

¹¹ One of the techniques used by urban economists and business location analysts to estimate export-based employment is known as the location quotient methodology. To the extent that the industry is also an exporter to other countries, as is the case for biopharmaceutical industries, the location quotient will underestimate true export employment.

¹² Estimates of an array of earnings, employment, and output multipliers for biopharmaceutical industries in Massachusetts will be presented in a forthcoming research paper.

The Gender, Age, Race-Ethnic, and Nativity Characteristics of Biopharmaceutical Industry Workers in Massachusetts

The ACS surveys of 2003-2005 for Massachusetts were analyzed to identify key demographic characteristics of the employed workforce in the biopharmaceutical industries and to compare them to the employed in all other industries. The gender composition of the biopharmaceutical industry workforce in Massachusetts and the entire population of the employed in the state is displayed in Table 3 and Chart 1. Women comprised nearly 45 percent of all workers in biopharmaceutical industries of the state in 2003-2005, with their share of the employed ranging from slightly under 41 percent in scientific research and development industries to a high of 49 percent in pharmaceutical and medicine manufacturing (Table 3)¹³. The female share of the biopharmaceutical industry workforce in Massachusetts was statistically identical to that for the entire nation (45%), but it was slightly below that of all industries in Massachusetts. Statewide, women accounted for nearly 48% of all workers in the state in 2003-2005.

¹³ The scientific R&D industries contain a relatively high share of Ph.D. degree holders in the physical and life sciences, a high fraction of whom are foreign immigrants. Males are disproportionately represented among these groups.

Table 3:
The Gender, Age and Race-Ethnic Characteristics of Employed Resident Workers in
Biopharmaceutical Industries and All Industries of Massachusetts, 2003-2005 Averages
(in percent)

	(A)	(B)	(C)	(D)	(E)
Characteristic	All Industries	All Biopharmaceutical	Pharmaceutical and Medicine Mfg.	Medical Instruments and Supplies Mfg.	Scientific Research and Development
Gender					
• Men	52.3	55.2	50.9	52.8	59.2
• Women	47.7	44.8	49.1	47.2	40.8
Age					
• 16-19	3.5	.8	.5	1.4	.6
• 20-24	8.0	4.6	5.3	2.7	5.6
• 25-34	21.8	27.6	32.5	22.4	28.5
• 35-44	25.8	30.1	34.1	27.3	29.8
• 45-54	23.7	24.0	22.1	30.0	20.9
• 55-64	13.3	11.1	5.4	14.3	12.0
• 65+	3.8	1.9	.2	2.0	2.7
Race-Ethnic Group					
• Asian	4.6	11.3	13.2	11.5	10.1
• Black	5.0	4.9	7.5	6.3	2.5
• Hispanic	6.1	3.6	1.2	7.5	2.2
• Other	1.5	1.8	3.2	2.7	.5
• White	82.6	78.5	74.9	72.1	84.6

Source: 2003, 2004, and 2005 American Community Surveys, public use files, tabulations by authors.

Chart 1:
The Gender Composition of the Employed Workforce in All Industries and
Biopharmaceutical Industries of Massachusetts, 2003-2005



A substantial majority (82%) of all workers in biopharmaceutical industries of the state in 2003-2005 were in the prime-aged group (25-54 years old). This age group accounted for a very high share of the workforce in each of the three biopharmaceutical industries in the state, with the size of these shares ranging from 79 to 89 percent. Statewide, 71 percent of all of the employed in 2003-2005 were in the prime-aged group. Teens, young adults (20-24), and the elderly (65+) were under-represented in biopharmaceutical industries. For example, only 5 percent of biopharmaceutical workers were in the 16-24 age group versus nearly 12 percent of all workers in the state, and the elderly accounted for only 2 percent of biopharmaceutical workers versus nearly 4 percent of all of the employed across the state. As will be revealed below, a relatively high share of biopharmaceutical industry workers possess college degrees, including a substantial number with advanced degrees (Master's or higher). One would thus, anticipate that teens and young adults (20-22) still in college would be under-represented in these industries.¹⁴ Nevertheless, firms in biopharmaceutical industries could play a role in expanding both teen and young adult employment through paid internships, cooperative education program hires, and summer employment opportunities. Exposing more teens and college students to jobs in these industries could help expand the future supply of labor in the state. Since 2000, job opportunities for teens in Massachusetts have declined considerably, and the resident labor force has shown no growth.¹⁵

Median Age

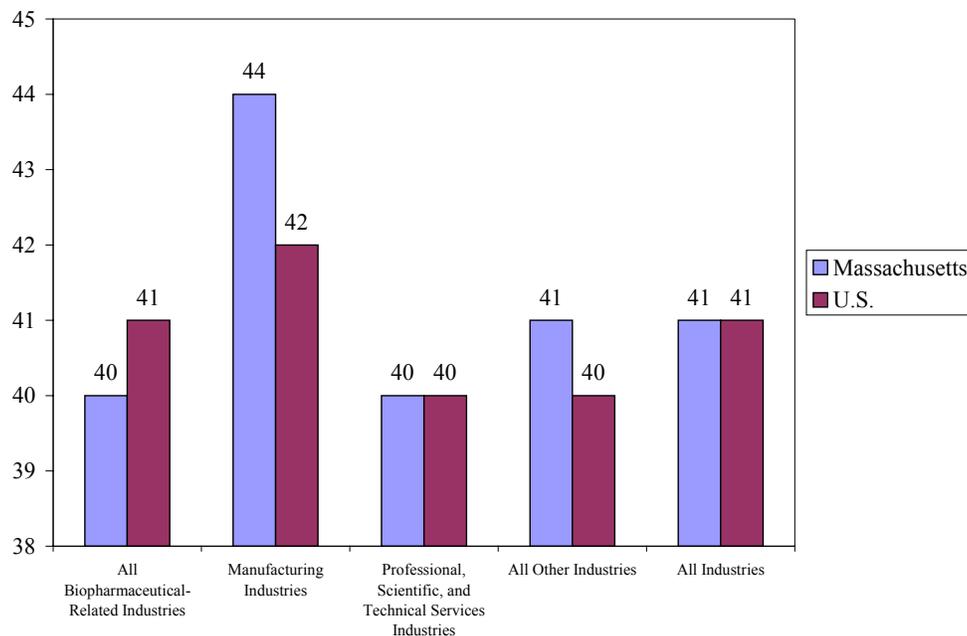
The distributions of workers in biopharmaceutical industries, all manufacturing industries, professional and technical services industries, and all industries of Massachusetts by single age group also were examined to estimate the median age of workers in each of these

¹⁴ Due to the exclusion of young adults in-group quarters (college dormitories, fraternities, sororities) from the ACS universe, the survey may slightly underestimate the number of young adults who are employed in biopharmaceutical industries.

¹⁵ See: Andrew Sum, Joseph McLaughlin, Ishwar Khatiwada, Tracking and Assessing the Steep Declines in the Massachusetts Teen Labor Force and the Employed Teen Population, Report Prepared for the Commonwealth Corporation, Boston, 2007.

industries (Chart 2).¹⁶ The median age of all workers in biopharmaceutical industries in Massachusetts in 2005 was 40. The median age of these workers was one year below that of all workers in the state (41) and all workers in biopharmaceutical industries across the entire nation. A smaller share of biopharmaceutical industry workers in Massachusetts was 55 and older than in all industries across the state in 2003-2005 (13% vs. 17%). Thus, replacement demand due to retirements and deaths should be somewhat lower in biopharmaceutical industries than in all industries across the state over the coming decade.

Chart 2:
Median Age of Workers 16 and Older in Biopharmaceutical Industries and
Other Industries of Massachusetts and the U.S., 2005



Self reported ACS information on the race/ethnic characteristics of Massachusetts workers was used to assign them into one of the following five, mutually exclusive race-ethnic categories:

- Asian, not Hispanic
- Black, not Hispanic
- Hispanic¹⁷

¹⁶ The median age is that age which divides the distribution of workers by age into two equal groups. One-half of the workers will be younger than the median age and one-half will be above the median age.

¹⁷ Hispanics can be members of any race group.

- Other, not Hispanic¹⁸
- White, not Hispanic

In 2003-2005, nearly 79 percent of the employed in biopharmaceutical industries of Massachusetts were white, non-Hispanic versus nearly 85 percent in all industries of the state. Members of each race-ethnic minority group, except Hispanics, are either as well represented in biopharmaceutical industries as they are in all industries of the state or over-represented. For example, Black workers accounted for 5% of all workers in biopharmaceutical industries combined and for 5% of all workers in the state in 2003-2005.¹⁹ Asian workers were represented in biopharmaceutical related industries at a rate nearly two and a half times as high as that of than their share of all of the employed in the state (11.3% vs. 4.6%). The higher degree of representation of Asian workers in biopharmaceutical industries is primarily attributable to their high rates of college completion and their over-representation in science and engineering fields which are important sources of labor in these industries. The below average share of Hispanics in biopharmaceutical industries is a consequence of two sets of forces: the sharply below average share of Hispanic workers with college degrees and the high share of immigrants among the Hispanic employed. A disproportionate share of Hispanic immigrants have very limited formal schooling with many lacking a high school education from their countries of origin.²⁰

The Nativity Status of Biopharmaceutical Industry Workers in Massachusetts

During the past few decades, Massachusetts has become overwhelmingly dependent on new foreign immigrants for its population and labor force growth.²¹ All of the state's labor force growth in the 1990's was attributable to new foreign immigrants, and the resident labor force of the state would have declined considerably over the 2000-2006 time period in the absence of new immigrant inflows. Foreign-born workers also play a key role in staffing positions in the state's biopharmaceutical industries. Over the 2003-2005 time period, nearly one-fourth of the

¹⁸ The "other" race group includes American Indians, Alaskan Natives and persons of mixed race.

¹⁹ Black workers are more heavily represented in the manufacturing industries of biopharmaceutical than in scientific research and development.

²⁰ For a recent analysis of the educational backgrounds and English-speaking proficiencies of adult immigrants in Massachusetts, see Andrew Sum, Johan Uvin, Ishwar Khatiwada, et al., The Changing Face of Massachusetts, Massachusetts Institute for A New Commonwealth, Boston, 2005.

²¹ For a comprehensive review of the changing size, demographic characteristics, and labor market behaviors of the state's immigrant population, See: Andrew Sum, Johan Uvin, Ishwar Khatiwada, et al, The Changing Face of Massachusetts, Massachusetts Institute for A New Commonwealth, Boston, 2005.

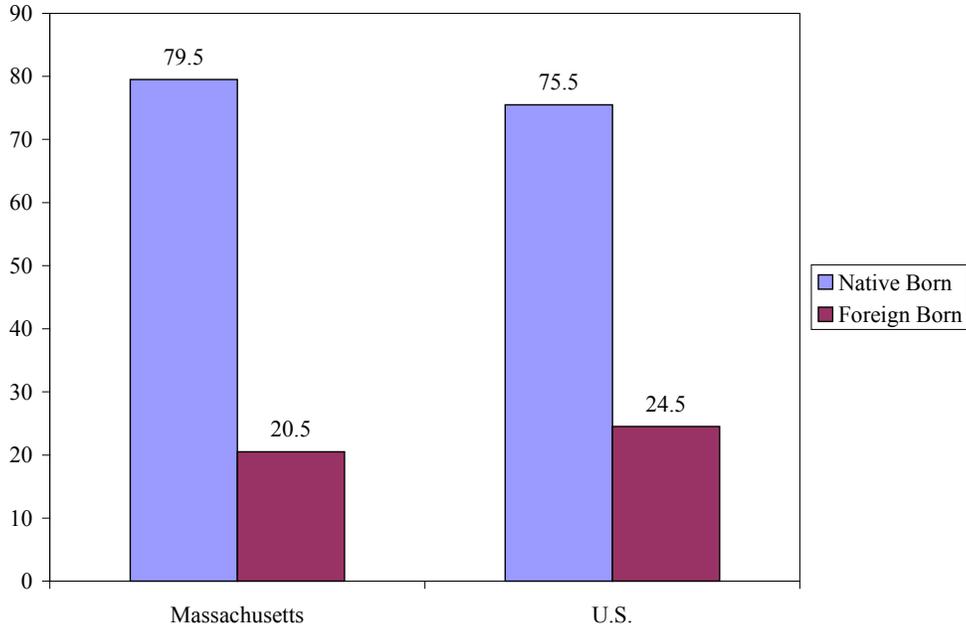
resident employed in biopharmaceutical industries of Massachusetts were foreign born (Table 4). The foreign born share of the employed ranged from slightly over 20 percent in scientific research and development industries to nearly 30 percent in medical equipment and supplies manufacturing industries. The foreign-born share of the work force in biopharmaceutical industries exceeded that for all industries of the state (24.5% vs. 18%)

Table 4:
The Distribution of the Employed in Biopharmaceutical and
All Industries of Massachusetts by Nativity Status, 2003-200
(in Percent)

Industry	(A)	(B)
	Native Born	Foreign Born
All biopharmaceutical industry	75.5	24.5
• Pharmaceutical and medicine mfg.	74.6	25.4
• Medical equipment and supplies mfg.	70.4	29.6
• Scientific research and development industries	79.5	20.5
All Industries	81.9	18.1

The state’s employers in biopharmaceutical industries were more dependent on foreign born workers than their national counterparts, both overall and in each of the three sub-sectors. Nationally, slightly over 20 percent of the workers in biopharmaceutical industries were foreign born versus nearly one-fourth of those in Massachusetts (Chart 3). As was the case in our state, the foreign born in the U.S. accounted for a higher share of workers in biopharmaceutical industries than they did for all industries combined (20% vs. 15.3%).

Chart 3:
The Nativity Status of the Employed in Biopharmaceutical Industries of
Massachusetts and the U.S., 2003-2005
(In percent)



The Educational Attainment of Workers in Biopharmaceutical Industries of Massachusetts, 2000 – 2005

Firms in most of the biopharmaceutical industries employ a large number of professional, management, high level sales, and technical workers for whom post-secondary schooling is typically required for entry into the occupation. The ACS questionnaires collected information from each household member on the amount of schooling that they had completed including the highest degree attained by the time of the survey. In Table 5 and 4, we present the distribution of the employed in biopharmaceutical industries and all industries of the state over the 2003-2005 time period in the following five educational subgroups:

- Less than 12 or 12 years, no high school diploma or GED certificate
- High School diploma or GED, no completed years of college
- 13-15 years, including Associate degree holders
- Bachelor’s degree
- Master’s or higher degree

Findings in Table 5 and Chart 4 reveal that very few workers (2.8%) in biopharmaceutical industries of the state in 2003-2005 lacked a high school diploma or a GED certificate while nearly 9% of the employed across the entire state did so.²² Approximately 82% of all of the employed in biopharmaceutical industries had completed some post-secondary schooling versus only 66% of all state workers in 2005. Biopharmaceutical industry workers also were considerably more likely than all workers in the state to have obtained a Bachelor's or higher degree (64% versus 40%), and they were twice as likely to have received a Master's or higher degree (34% versus 17%).

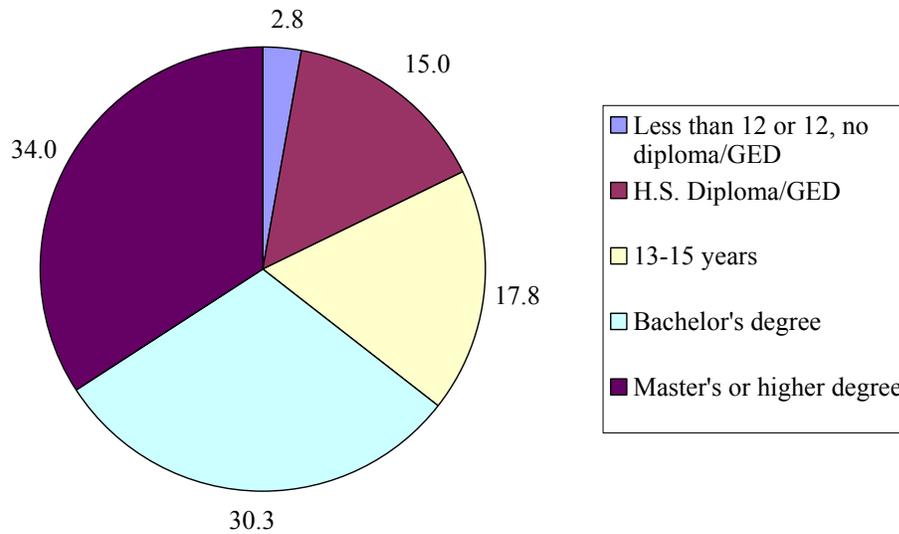
Table 5:
Percentage Distribution of the Employed (16+) in All Industries and Biopharmaceutical
Industries in Massachusetts by Educational Attainment, 2003-2005

	(A)	(B)	(C)
Educational Attainment	All Industries	Biopharmaceutical Industries	Biopharmaceutical, All
Less than 12 or 12, no diploma/GED	8.5	2.8	.33
H.S. diploma/GED	25.3	15.0	.60
13-15 years	25.9	17.8	.67
Bachelor's degree	23.5	30.3	1.29
Master's or higher degree	16.8	34.0	2.03

Source: 2003-2005, American Community Surveys, public use files, tabulation by authors

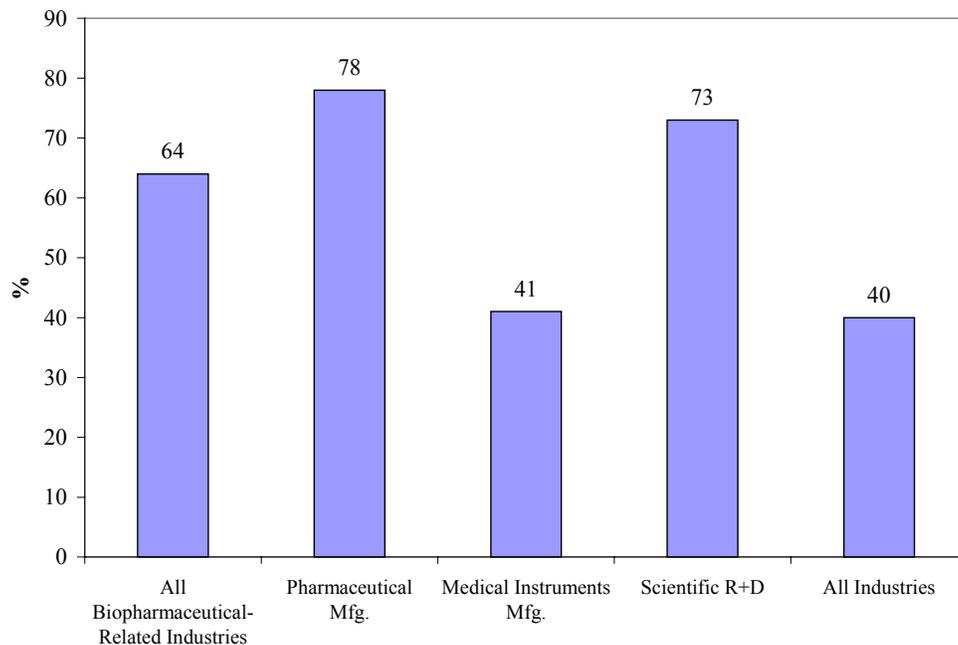
²² The 9% ratio for all industries in the state includes some high school students.

Chart 4:
Percentage Distribution of the Employed in Biopharmaceutical
Industries in Massachusetts by Educational Attainment



The share of biopharmaceutical industry workers with a Bachelor’s or higher degree varied fairly widely across the three industrial sub-sectors, ranging from a low of 41% in medical instruments and supplies manufacturing to a high of 78% in pharmaceutical manufacturing (Chart 5). In all three sub-sectors, the share of workers with at least a four year college degree either matched or substantially exceeded the average for all industries. Thus, biopharmaceutical industries are a key source of jobs for college graduates in Massachusetts. Their continued growth could play a key role in keeping newer college graduates in the state and help reduce the high levels of domestic out-migration of relatively young well educated workers that have plagued the state over the past five years.

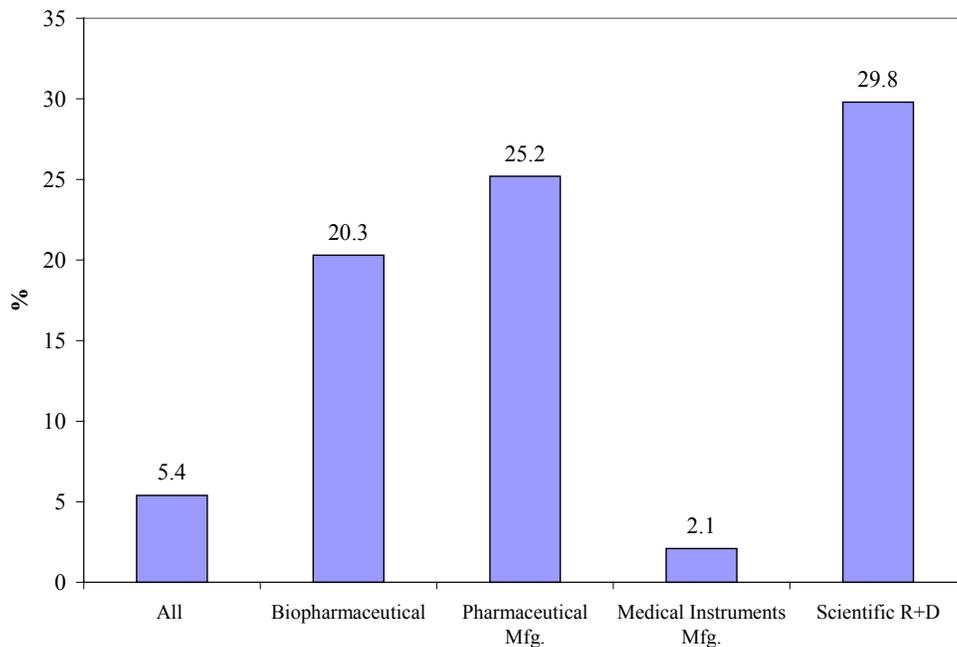
Chart 5:
Percent of Workers, 16 and older in Biopharmaceutical Industries and All Industries of
Massachusetts with a Bachelor's or Higher Degree, 2003-2005



The Employment of Workers with Ph.D. or Professional Degrees in Biopharmaceutical Industries

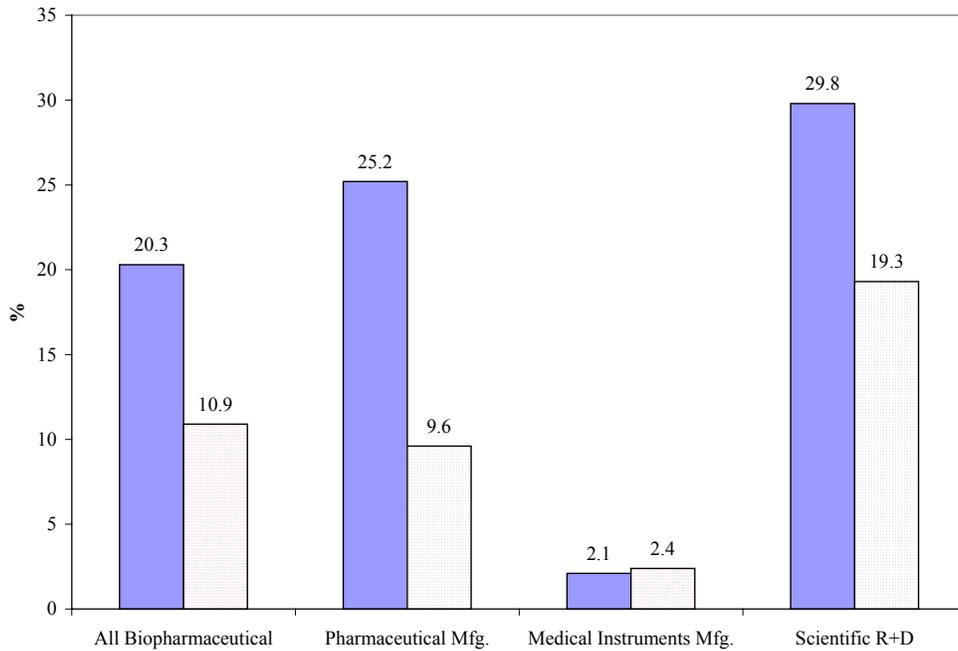
Findings in the preceding section revealed that the biopharmaceutical industries of Massachusetts employed workers with Bachelor or higher degrees at above average rates in comparison to all other industries across the state. The ACS surveys also collected information on the types of college degrees held by workers. We have identified all workers in Massachusetts with a Ph.D. or professional degree (medicine, law) at the time of the 2005 ACS surveys and the industries of their employers. In 2005, slightly more than one of five workers in the state's biopharmaceutical industries held a Ph.D. or a professional degree (Chart 6). The share of workers with a Ph.D. or professional degree in biopharmaceutical industries exceeded the statewide average by a multiple of four. The share of workers with such an advanced degree varied widely across the three biopharmaceutical sub-sectors, ranging from a low of 2 percent in medical equipment and supplies manufacturing to a high of nearly 30 percent in scientific R&D industries.

Chart 6:
Percent of the Employed (16+) in All Industries of Massachusetts and Biopharmaceutical Industries with a Professional or Ph.D. Degree, 2005 (In %)



Workers in Massachusetts' biopharmaceutical industries in 2005 also were considerably more likely than their U.S. counterparts to hold a Ph.D. or a professional degree. Slightly more than one of five biopharmaceutical workers in Massachusetts in 2005 had obtained a Ph.D. or a professional degree versus only 11 percent of their U.S. counterparts in the same industries, a relative difference of nearly two to one (Chart 7). Much of this difference can be attributed to the employment patterns in two of the three biopharmaceutical industries: Pharmaceutical and medicine manufacturing, where Massachusetts workers were two and one-half times as likely as U.S. workers to hold an advanced degree, and scientific research and development industries where 30 percent of the workers in Massachusetts held a Ph.D. or a professional degree in 2005 versus only 19 percent of their U.S. peers.

Chart 7:
Comparisons of the Percent of the Employed (16+) in Biopharmaceutical
Industries of Massachusetts and the U.S. with a Professional or Ph.D. Degree, 2005



Earlier, we noted that foreign born workers represented an above average share of the employed in the state’s biopharmaceutical industries. In 2005, the foreign born accounted for one of every four workers in biopharmaceutical industries of the state versus approximately one of every six workers in all other industries of the state. An analysis of the educational backgrounds of native-born and foreign-born workers in the state’s biopharmaceutical industries revealed that immigrant workers were considerably more likely than native-born workers to have held Ph.D. or professional degrees (Table 6). For all biopharmaceutical industries combined, 35 percent of the foreign-born workers in Massachusetts held a Ph.D. or a professional degree versus only 15 percent of native born workers, a relative difference of 2.3 times. In the state’s pharmaceutical manufacturing and scientific research and development services industries, 45 to 62 percent of immigrant workers held a Ph.D. or professional degree. Nearly one-half of the workers with Ph.D. degrees in the state’s research and development industries were foreign born. Well-educated immigrants account for an indispensable share of the state’s most highly skilled workers in biopharmaceutical industries. The competitive position of Massachusetts in these industries is closely linked to its ability to attract and retain the most highly educated immigrants. The ability of the state’s colleges and universities, both private and public, to produce additional

graduates in biopharmaceutical occupational fields will influence our ability to remain a national leader in these key industries.

Table 6:
Percent of the Employed in Biopharmaceutical Industries of Massachusetts with a Professional or Ph.D. Degree by Nativity Status, 2005

	(A)	(B)	(C)	(D)
Industry	All Workers	Native Born	Foreign Born	Foreign/Native
All biopharmaceutical industry	20.3	15.4	35.3	2.3
• Pharmaceutical and medicine mfg.	25.2	20.4	45.4	2.2
• Medical equipment and supplies mfg.	2.1	1.7	2.9	1.7
• Scientific research and development industries	29.8	20.7	62.4	3.1

Source: 2005 American Community Surveys, public use files, tabulations by authors.

The Occupational Structure of Jobs in Biopharmaceutical Industries and All Industries of Massachusetts, 2005

The occupational structure of employment in an industry has a major influence on the educational and skill requirements of those jobs and on the annual earnings of its workers. The 2005 ACS surveys collected information on the occupational characteristics and titles of the jobs held by the employed. Research staff in the U.S. Census Bureau assigned SOC-based occupational codes to those workers. We have analyzed the distribution of the employed in biopharmaceutical industries and all industries of Massachusetts in 2005 in 18 major occupational groups (Table 7).

Table 7:
Distribution of the Employed in Biopharmaceutical Industries and
All Industries in Massachusetts During 2005 by Major Occupational Group
(in Percent)

Occupational Group	(A) Pharmaceutical and Medicine Manufacturing	(B) Medical Instrument and Supplies Mfg.	(C) Scientific Research and Development Services	(D) All Biopharmaceutical	(E) All Industries
Management	13.1	11.3	21.9	16.7	10.1
Business and Financial Operations	10.2	7.1	3.6	6.1	5.2
Computer and Mathematical	6.1	2.9	8.1	6.1	3.4
Architecture and Engineering	2.0	12.5	11.8	9.9	2.5
Life, Physical, and Social Science	35.3	3.1	31.0	23.3	1.6
Legal	0.8	0.4	1.3	0.9	1.4
Education, Training, and Library	1.1	0.0	1.1	0.8	6.7
Arts, Design, Entertainment, Sports, and Media	1.0	0.7	2.3	1.5	2.1
Healthcare Practitioner and Technical	1.3	1.2	1.0	1.1	6.1
Building and Groups Cleaning	0.5	0.0	0.0	0.1	3.6
Food Preparation and Serving	0.0	1.1	0.0	0.3	4.8
Personal Care and Service	0.0	0.0	0.9	0.4	3.0
Sales and Sales- Related	4.4	2.8	1.9	2.7	11.4
Office and Administrative Support	8.7	14.6	10.5	11.4	13.6
Construction and Extraction	0.0	0.0	2.0	0.9	5.5
Installation, Maintenance, and Repair	2.5	2.4	0.3	1.4	2.8
Production	12.4	37.7	2.2	15.4	5.4
Transportation and Material Moving	0.4	2.2	0.0	0.8	4.1
Total	100.0	100.0	100.0	100.0	100.0

Within the biopharmaceutical industries of the state, one-third of all of the employed held a life, physical science, or engineering occupation. This high concentration of employment in these higher level professional occupations was more than eight times higher than the state as a whole (33% versus 4%). Biopharmaceutical industries also employed an above average share of workers in management, business, financial and computer-related occupations (29% versus 19%).

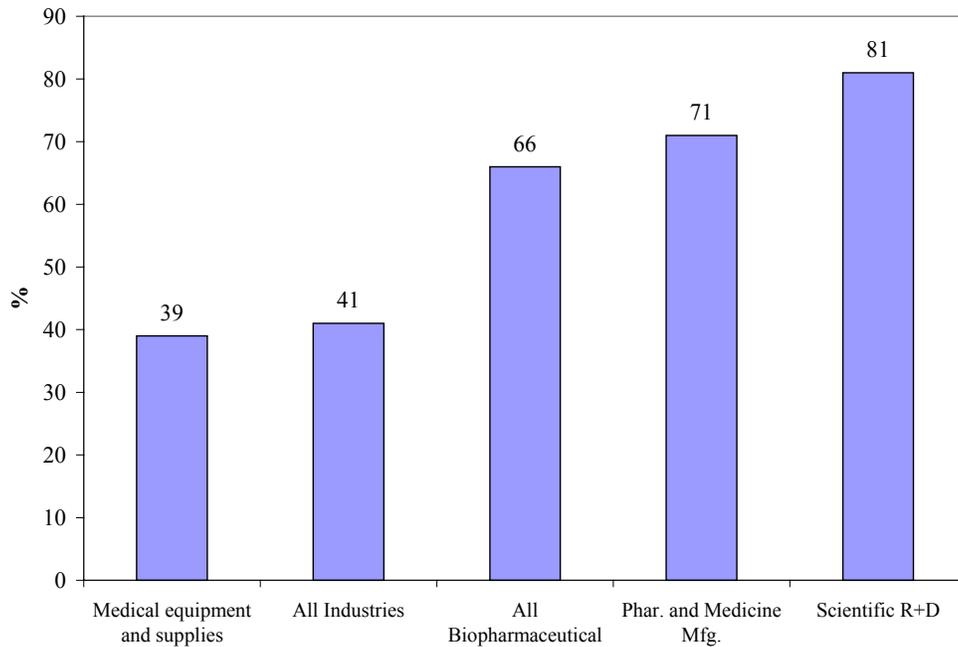
Blue-collar production, maintenance, and repair workers also were over represented in biopharmaceutical industries (17% versus 8%). Firms in the biopharmaceutical industries also were much less likely than their counterparts in other industries to employ workers in health practitioner, lower level sales, food prep and personal care, and transportation and material moving occupations.

Nearly two-thirds of all resident workers in biopharmaceutical industries of the state held professional, technical, or management related positions in 2005 versus only 41% of all workers in the state (Table 8 and Chart 8). Within the biopharmaceutical sector, the share of jobs in the professional, technical and managerial ranks ranged from a low of 39% for medical instruments and supplies manufacturing to highs of 71% in pharmaceutical manufacturing and 81% in scientific research and development industries. The last occupational ratio was twice as high as that for all industries in the state during 2005.

Table 8:
Percent of the Employed (16 and Older) in Massachusetts Holding Professional, Technical or Management Positions in 2005 in Biopharmaceutical and All Industries

Occupational Group	(A) All Biopharmaceutical	(B) Pham. and medicine Mfg.	(C) Medical Instruments and supplies	(D) Scientific R+D	(E) All Industries
Management, business, financial	22.8	23.3	18.4	25.5	15.2
Professional and technical	43.6	47.6	20.8	55.6	25.7
Management, Professional or technical	66.4	70.9	39.2	81.1	40.9

Chart 8:
Percent of the Employed in Biopharmaceutical Industries and All Industries of
Massachusetts with a Professional, Technical, or Managerial Occupation



To provide more detailed insight into the specific nature of the occupations held by employed biopharmaceutical industry workers, we ranked each individual occupation by the number and percent of workers in that occupation in biopharmaceutical industries of the state in 2005. There were 14 individual occupations that accounted for at least two percent of employment in these industries. They are displayed in Table 9 together with their estimated shares of employment in the biopharmaceutical industries. Five of these 14 occupations were professional, engineering, or science occupations, including medical scientists and biological scientists. Another three involved technician related occupations, and three were in the management and supervisory categories, including sales managers and production supervisors. Thus, 11 of the 14 individual occupations accounting for the highest shares of workers in the state's biopharmaceutical industries involved professional, technical, or managerial occupations, which constitute the heart of the college labor market. The industry is a very desirable source of jobs for college-educated adults in Massachusetts.

Table 9:
A Listing of the Fourteen Individual Occupations Accounting for Two Percent or
More of Employment in Biopharmaceutical Industries in Massachusetts, 2005

Occupation	Percent of Employment
Physical Scientists, All Other	6.0
Managers, All Other	5.9
Medical Scientists	5.1
Assemblers and Fabricators	4.6
Miscellaneous Engineers	3.1
Supervisors of Production	2.8
Inspectors, Testers, Samplers	2.8
Chemist and Material Scientists	2.8
Other Life and Physical Technicians	2.5
Biological Scientists	2.5
Marketing and Sales Managers	2.3
Chemical Technicians	2.2
Engineering Technicians	2.1
Secretaries and Administrative Assistants	2.0
Total, Above Fourteen Occupations	46.7

Distribution of Workers in Biopharmaceutical Industries of Massachusetts by Class of Worker

The number of employed workers in a given industry can be placed into one of five class of worker categories: private sector wage and salary workers²³; public sector wage and salary workers; self-employed, not incorporated; self-employed, incorporated; and unpaid family workers.²⁴ During calendar year 2005, the overwhelming majority (95%) of all workers in biopharmaceutical industries of Massachusetts were private sector wage and salary workers, of whom 88% were employed by private for profit firms (Table 10). Public sector wage and salary workers employed by federal, state, and local governments in the Commonwealth accounted for only 2.5% of all biopharmaceutical industry workers. The self-employed, including those who had incorporated their own business, accounted for only 2.1% of all workers in the state's biopharmaceutical industries in 2005, a share well below the near 10% share for all industries across the state. Nationally, 3.6% of all biopharmaceutical industry workers were self-employed.

²³ Private sector wage and salary workers can be further divided into the following two groups: private, for-profit and private, non-profit.

²⁴ To be counted as an unpaid family worker, an individual must have worked for 15 more hours without pay in a family-owed business.

Among the unincorporated, self-employed in biopharmaceutical industries of the state, approximately 4 of 10 were employed in life, physical, and social science occupations and another 18 out of 100 were working in management and financial occupations.

Table 10:
The Distribution of Workers in Biopharmaceutical Industries and All Industries of
Massachusetts by Class of Worker, 2005
(in %)

Class of Worker	(A) Biopharmaceutical Industries	(B) All Industries
Private Sector Wage and Salary	95.4	77.0
Public Sector Wage and Salary	2.5	12.8
Self-Employed	2.1	9.9
• Unincorporated	1.3	6.8
• Incorporated	.8	3.1
Unpaid family worker	.0	.2

Source: 2005 American Community Surveys, public use files, tabulations by authors.

In-Commuting and Out-Commuting of Workers in Biopharmaceutical Industries in 2005

Our above analyses of the demographic, socioeconomic, and occupational characteristics of workers in biopharmaceutical industries of the state were based on residents of Massachusetts. Persons who daily commuted into Massachusetts to work in these biopharmaceutical industries were excluded from the analysis. Overall, Massachusetts receives a substantially larger number of commuters into the state to work in Massachusetts firms than the number of residents who out-commute to work in other states in the region. For example, in 2004, net in-commuting into Massachusetts from the other five New England states and New York was equal to slightly more than 60,000.²⁵ We have analyzed the findings of the 2005 American Community Surveys to estimate the number of workers from all other states across the country who commuted into Massachusetts to work in a biopharmaceutical industry and the number of Massachusetts' residents who commuted outside the state to work in biopharmaceutical industries.

²⁵ For an earlier analysis of overall trends in in-commuting into Massachusetts from other New England states and out-commuting from Massachusetts, See: Andrew Sum, Ishwar Khatiwada, Joseph McLaughlin, et al., Mass. Economy: The Labor Supply and Our Economic Future, MassINC, Boston, 2006

In 2005, nearly 7,200 workers commuted into Massachusetts to work in a biopharmaceutical industry while slightly under 2,600 Massachusetts residents commuted to biopharmaceutical industry jobs in other states across the country. This represented a net positive inflow of approximately 4,600 workers, adding about 7 to 8 percent more workers to the count of the resident employed in these industries (Table 11). The vast majority (80%) of the in-commuters were from the five New England states, with New Hampshire, Rhode Island and Connecticut accounting for the largest numbers. In-commuters into Massachusetts for work in biopharmaceutical industries from each of the New England states exceeded the number of out-commuters with the majority of net in-commuters coming from New Hampshire.

Table 11:
In-Commuters and Out-Commuters Employed in Biopharmaceutical Industries by State of Origin or Destination, 2005

State	(A)	(B)	(C)
	In-Commuters Into Massachusetts	Out-Commuters from Massachusetts	In – Out Commuters
New Hampshire	3,510	623	2,887
Rhode Island	1,130	768	362
Connecticut	823	313	510
Maine	167	0	167
Vermont	135	0	135
All Others	1,427	865	562
Total	7,192	2,569	4,623

The educational attainment of in-commuters and out-commuters in biopharmaceutical industries in 2005 also was examined. As expected, a very high fraction (61%) of the in-commuters in biopharmaceutical industries had Bachelor or higher degrees, and three of every four in-commuters had completed at least some post-secondary schooling (Table 12). The number of in-commuters into Massachusetts exceeded the number of out-commuters in each of the five educational subgroups. The largest net in-commuting group consisted of workers with Bachelor degree holders among whom in-commuters exceeded out-commuters by more than 2,200.

Table 12:
Educational Attainment of In-Commuters and Out-Commuters
Employed in Biopharmaceutical Industries, 2005

Educational Attainment	(A) In-Commuters in Massachusetts	(B) Out-Commuters from Massachusetts	(C) In – Out Commuters
Less than 12 or 12, no diploma/GED	501	280	221
H.S. diploma/GED	1,195	415	780
13-15 years, including Associate's	1,083	507	576
Bachelor's degree	2,849	614	2,235
Master's or higher degree	1,564	753	811

Median Annual Earnings, Full-Time, Year-Round Job Characteristics, and Health Insurance Pension Coverage of All Workers (16+) and Workers in Biopharmaceutical Industries of Massachusetts and the U.S., 2004-2005

Knowledge of the annual earnings, annual weeks and hours of work, and employee benefits received by workers in biopharmaceutical industries and all industries of the state would be helpful in gauging the comparative economic well-being of workers in these industries. Our first measure of worker well-being is their median annual earnings from employment. The median annual earnings is that earnings level which divides the distribution of earnings into two equal parts. One-half of the employed make more than the median and the other half make less.

Estimates of the median annual earnings of all employed persons (16+) in biopharmaceutical industries and all industries of Massachusetts and the U.S. in 2004-2005 are displayed in Table 13. The earnings' estimates are based on the findings of the 2005 American Community Survey and apply to the entire pool of employed persons regardless of their weeks or hours of employment during the year. Earnings estimates are presented for workers in all biopharmaceutical industries combined, in the three subsets of biopharmaceutical industries, and all industries combined in both the state and the nation.

The median annual earnings of all employed persons (16 and older) in biopharmaceutical industries of the state in 2004-2005 were estimated to be \$56,000, which was 75% higher than

the median annual earnings of \$32,000 for all workers in the state during the same time period.²⁶ Within the biopharmaceutical sector, median annual earnings ranged from a low of \$40,000 among workers in the medical equipment and supplies manufacturing industries to a high of \$66,000 for those employed in the scientific research and development services industries.

Table 13:
Median Annual Earnings of Employed Persons (16+) in Biopharmaceutical
Industries and All Industries of Massachusetts and the U.S.; 2004-2005

Industry	(A)	(B)
	Massachusetts	U.S.
Biopharmaceutical Industries	\$56,000	\$46,000
Pharmaceutical and medicine manufacturing	60,000	55,000
Medical equipment and supplies manufacturing	40,000	36,000
Scientific research and development	66,000	50,000
All Industries	32,000	26,000
Biopharmaceutical/All Industries	1.75*	1.77*

Source: 2005 American Community Surveys, public use files, tabulations by authors.

In our earlier review of the educational backgrounds of biopharmaceutical industry workers, we noted the considerably higher share of workers in these industries with a Bachelor’s or higher degree. As a consequence of their higher levels of educational attainment, workers in biopharmaceutical industries of the state would be expected to obtain higher median annual earnings than their peers in all other industries across the state. Formal education tends to yield high earnings payoffs. Yet, findings in Table 14 also reveal that biopharmaceutical industry workers in each of the five educational attainment groups substantially out-earned their peers in all industries combined across the state in 2004-2005. The median annual earnings of biopharmaceutical industry workers exceeded those in all industries of Massachusetts by 35% among high school graduates, 48% among Bachelor and advanced degree holders, by 60% among those with 13-15 years of school, and by 138% among those workers lacking a high school diploma of a GED certificate.²⁷ The typical biopharmaceutical industry worker in each

²⁶ The 2005 ACS questionnaire asked respondents to report their wages and salaries (or net self-employment income) for the 12 month period immediately preceding the survey. Since ACS questionnaires were completed by households throughout all 12 months of 2005, the reporting period would have covered some months in 2004 and 2005 for the vast majority of respondents. Thus, we refer to these earnings as “2004-2005” earnings data.

²⁷ Those workers without high school diplomas/GED’s will include some employed high school students who typically work only part-time or part-year. Their limited annual earnings will bring down the estimated median earnings for all workers in this educational attainment subgroup.

educational subgroup obtained substantially higher annual earnings than their employed counterparts across the entire state. These higher earnings of biopharmaceutical industry employees increase the standard of living of their families, boost their annual expenditures on locally produced consumption goods and services and housing, and thereby help generate jobs in other industries across the state through the multiplier process. As will be shown in a following paper. Several of the biopharmaceutical industries in our state have very high earnings and employment multipliers.

Table 14:
Median Annual Earnings of Employed Persons (16+) in All Industries and
Biopharmaceutical Industries of Massachusetts by Educational Attainment, 2004-2005
(in Current Dollars)

Educational Attainment	(A)	(B)	(C)
	All Industries	Biopharmaceutical Industries	Biopharmaceutical/All (in %)
Less than 12 or 12, no diploma	\$13,100	\$31,200	238
H.S. graduate/GED	26,000	35,000	135
13-15 years	30,000	48,000	160
Bachelor's degree	44,000	65,000	148
Masters or higher degree	60,000	89,000	148
All	32,000	56,000	175

Source: 2005 American Community Surveys, public use files, tabulations by authors.

The number of weeks and hours of work of the employed during a year is an important determinant of their annual earnings, and full-time and full-year work also increases the likelihood that these jobs will provide workers with health insurance and pension coverage. The 2005 American Community Surveys collected information from employed respondents on their number of weeks of paid employment during the prior 12 month period and their average weekly hours of work.²⁸ We have combined the data on weeks and average weekly hours of work to identify those workers who were employed for 40 or more weeks on a full-time basis. The standard U.S. Bureau of Labor Statistics' definition of full-time employment was used.²⁹ A

²⁸ Paid employment includes weeks of paid vacation and sick leave.

²⁹ For a review of part-time and full-time definitions of the U.S. Bureau of Labor Statistics, See: U.S. Bureau of Labor Statistics, Employment and Earnings, January 2006, "Appendix A," Washington, D.C., 2006.

worker is categorized as full-time if average weekly hours of work were equal to or greater than 35.

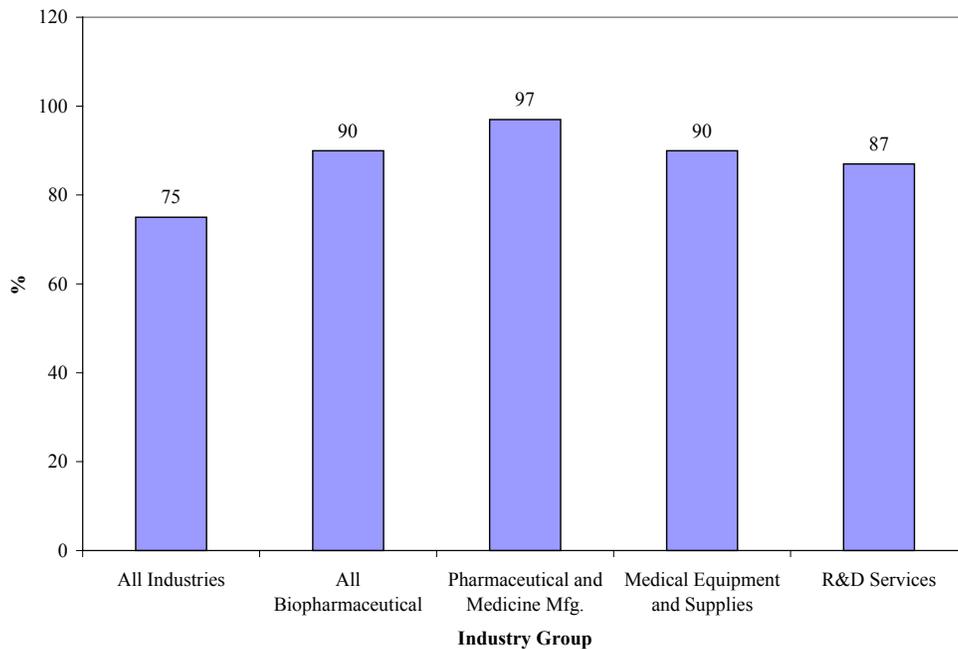
Table 15 displays our estimates of the number and percent of the employed in Massachusetts who worked full-time for 40 or more weeks during 2005. Estimates are provided for all employed workers and for those in biopharmaceutical industries. In all industries combined, 2.331 million employed persons worked full-time, year round, representing nearly 3 of every 4 workers across the state in 2005 (Chart 9). Biopharmaceutical industry workers were more likely than their counterparts in all industries to work full-time, year round. Just under 90% of the workers in this industrial sector did so, with the share of biopharmaceutical employees working full-time, year round ranging from a low of 86% in the scientific and research development services industry to a high of over 97% in pharmaceutical and medicine manufacturing industries of the state. In each of the three subsectors of biopharmaceutical, the employed were more likely to work full-time, year round than their peers in all industries across the Commonwealth.

Table 15:
Number and Percent of Employed Persons (16+) Working Full-Time for 40 or More Weeks in Massachusetts in All Industries and Biopharmaceutical Industries, 2005

Industry	(A) All Employed	(B) Employed, Full-Time, 40+ weeks	(C) % Employed Full-Time, Year Round
All industries	3,120,617	2,331,203	74.7
Biopharmaceutical industries	62,711	56,402	89.9
Pharmaceutical and medicine mfg.	13,519	13,162	97.4
Medical equipment and supplies mfg.	19,386	17,451	90.0
Scientific research and development services	29,806	25,789	86.5

Source: 2005 American Community Surveys, public use files, tabulations by authors.

Chart 9:
The Percent of Employed Person (16+) Who Worked Full-Time for 40 or More Weeks in All Industries and Biopharmaceutical Industries of Massachusetts, 2005



Among the most important employee benefits available to workers are health insurance and pension coverage. Information on the health insurance coverage and employer-based pension coverage of workers in Massachusetts and the U.S. is available annually from the March CPS work experience and income supplements.³⁰ We have analyzed the findings of the March 2005 and March 2006 CPS surveys to estimate the fraction of workers in biopharmaceutical industries who received health insurance coverage from a plan financed at least in part by their employers. It should be noted that workers not receiving employer-financed health insurance coverage may be covered by a health insurance plan of another family member or by a self-purchased plan. In Massachusetts, just under 70 percent of the workers in the state’s biopharmaceutical industries in 2004-2005 reported that they were covered by a health insurance plan at work. This health insurance coverage rate at work was 18 percentage points higher than that for all employed

³⁰ The Current Population Survey (CPS) is a monthly household survey conducted by the U.S. Census Bureau for the U.S. Bureau of Labor Statistics. The CPS is the source of the monthly labor force, employment, and unemployment statistics for the nation. In March of each year, the CPS contains a work experience and income supplement that collects data on the employment and earnings experiences of all working-age household members in the prior calendar year and on their health insurance and pension coverage on jobs held in the prior year.

persons in the state. Nationally, biopharmaceutical industry workers were somewhat better covered by health insurance plans at work than their Massachusetts counterparts (75% vs. 70%).

Table 16:
Percent of Massachusetts and U.S. Workers with Employer Provided Health Insurance in
Biopharmaceutical and All Industries of Massachusetts and the U.S., Average 2004-2005
(in %)

	(A)	(B)
Industry Group	Massachusetts	U.S.
Pharmaceutical and Medicine Manufacturing Industry	58.4	82.3
Medical Equipment and Supplies Manufacturing Industry	82.3	72.9
Scientific Research and Development Services Industry	68.9	71.7
All Biopharmaceutical Industry	69.8	75.3
Total	51.8	52.8

The March CPS surveys also ask each employed respondent to report whether he/she was covered by a pension plan at their jobs in the prior calendar year. In 2004 and 2005, two-thirds of all biopharmaceutical industry workers in Massachusetts reported that they were covered by a pension plan at work (Table 17). The pension plan coverage rate of biopharmaceutical industry workers exceeded that for all workers in the state by eighteen percentage points (66% vs. 48%). The pension coverage rate of Massachusetts workers in biopharmaceutical industries of the state was several percentage points below that of their counterparts in biopharmaceutical industries across the nation (66% vs. 68%); however, the estimated difference in pension coverage rates between these two groups of workers was not large enough to be classified as statistically significant.

Table 17:
Percent of Massachusetts and U.S. Workers with
An Employer Provided Pension Plan, Average 2004-2005
(in %)

Industry Group	(A) Massachusetts	(B) U.S.
Pharmaceutical and Medicine Manufacturing Industry	54.5	77.2
Medical Equipment and Supplies Manufacturing Industry	73.5	65.0
Scientific Research and Development Services Industry	68.0	65.0
All Biopharmaceutical Industry	66.3	68.6
Total	48.0	47.0

The above findings on the annual earnings, annual weeks and hours of work, and health insurance/pension coverage of biopharmaceutical industry workers in Massachusetts reveal quite clearly and consistently the many desirable characteristics of jobs in this set of industries. These job characteristics do not yield economic benefits for the workers themselves, but also for employees in other industries who benefit from the induced spending generated by biopharmaceutical industry workers, and the tax paying public who benefit from the high, positive net fiscal contributions of biopharmaceutical workers. As will be revealed in a forthcoming research paper in this series, the average biopharmaceutical worker contributes far more in federal, state, and local taxes than he/she receives in cash and in-kind transfers from the government, including TANF welfare benefits, unemployment insurance benefits, disability payments, rental subsidies, food stamps, energy assistance, and Medicaid/Medicare benefits.