

**Recent Trends in the Levels Distribution and
Adequacy Of the Annual Earnings of Massachusetts
Workers: Implications for the Boston Workforce
Development Initiative**

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Introduction

A number of workforce development programs in Massachusetts and the U.S. in recent years have attempted to improve the efficiency with which labor markets operate by more effectively matching workers seeking jobs with available job openings in state labor markets. The current Boston Workforce Development Initiative is designed to address perceived skills gaps in Massachusetts labor markets that leave workers unemployed, underemployed, or in low wage situations while some employers continue to face difficulties in filling their existing job openings.¹ One of the primary goals of the above initiative is to improve the effectiveness of the city's and state's workforce development system in upgrading the skills and earnings of workers through investments in education and training both on and off the job. Over time, these human capital investments hopefully will improve the annual earnings of these workers sufficiently to enable them to obtain family incomes high enough to raise them out of poverty and into jobs that provide family supporting incomes.²

To build public support for future workforce development initiatives, the Workforce Solutions Group has been engaged in a systematic set of efforts to document the need for workforce development services among current Massachusetts adults and help identify the economic factors that influence the ability of workers to obtain jobs that provide family sustaining incomes. A variety of research activities have been undertaken in order to accomplish the above goals. In this paper, we will examine the recent annual earnings experiences of Massachusetts adult workers and seek to obtain answers to the following questions:

- How well did year-round, full-time workers in Massachusetts fare in improving their real annual earnings during the 1990s? How did the 1990s earnings experiences of Massachusetts workers compare to those of the 1980s?

¹ See: The Boston Funders Group, *Boston Workforce Development Initiative*, "Request for Proposals: Public Policy Advocacy", Boston, 2003.

² The Request for Proposals used several different labels in describing its income goals, sometimes referring to "poverty", low incomes", and "family supporting incomes". The income levels associated with those three adequacy standards vary quite considerably across different types of families and geographic areas of the state.

See: Andrew Sum, Neeta Fogg, Ishwar Khatiwada, et. al., *A New Look at Income Inadequacy Challenges in Massachusetts*, Report Prepared by the Center for Labor Market Studies, Northeastern University, Boston, Prepared for the Workforce Solutions Group, Boston Workforce Development Initiative, Boston, August 2004.

- How did the gains (losses) in the median annual earnings of Massachusetts workers vary across gender, educational attainment, race-ethnic, and nativity subgroups? Which groups fared the best and which ones fared the worst in improving their real annual earnings?
- How did the 1999 median annual earnings of Massachusetts workers vary across geographic areas of the state and across major industrial sectors?
- How did the distribution of annual earnings among Massachusetts workers change during the 1990s? Did the earnings distribution become more unequal over the decade? How did rising inequality developments in Massachusetts compare to those in the nation as a whole and in the other 49 states?
- How successful were Massachusetts full-time, year-round workers in 1999 in obtaining annual earnings that exceeded the low-income threshold for a family of four?³ How did the share of workers with annual earnings above two times the poverty line vary across gender, educational attainment, and race-ethnic groups?
- How did the likelihood of Massachusetts workers obtaining annual earnings above the low income threshold for a family of four vary with their gender, age, educational attainment, race-ethnic characteristics, nativity characteristics, the industry of their employer, and the geographic location of their residence across the state?⁴

An Overview of the Organization of the Study's Findings

The study will begin with a brief review of the key annual earnings concepts, measures, and data sources. The emphasis of the study is on the annual earnings experiences of 20-64 year old workers who were employed full-time for at least 40 weeks during a given calendar year; e.g., 1999, 1989, etc. The discussion of earnings concepts and measures will be followed by a

³ The definition of "low income" is that of two times the official poverty line. This definition has been used by a number of poverty/welfare reform researchers in the U.S.

See: (i) Gregory Acs, Katherine Ross Phillips, and Daniel McKenzie, *Playing by the Rules but Losing the Game: America's Working Poor*, Urban Institute, Washington, D.C., May 2000; (ii) Jennifer Miller, Lisa Grossman, et. al., *Building Bridges to Self-Sufficiency: Improving Services for Low Income Working Families*, Manpower Demonstration Research Corporation, New York City, 2004.

⁴ These findings are based upon a multivariate statistical analysis (using logit regression models) of the probability of individual workers achieving the given earnings threshold.

review of the median annual earnings of year-round, full-time workers in 1999 and comparisons with their annual earnings experiences in calendar year 1989. These annual earnings estimates then will be used to generate estimated growth rates in the median real annual earnings of all workers and those in key gender, educational attainment, race-ethnic, and nativity status subgroups (native born, immigrants) over the decade of the 1990s. The growth rates of the annual earnings of these workers in the 1990s will be compared to those in the preceding decade to determine the degree of recent progress in improving the real earnings of the state's workers.

The 1999 annual earnings of all workers and of men and women in each county of the state will be estimated and reviewed to identify the degree of geographic variation in these earnings levels at the end of the decade. A similar earnings analysis will be performed for workers in major industrial sectors of the state both for all workers and those in selected educational attainment subgroups.

The analysis of annual earnings levels and growth rates in those earnings will be followed by an analysis of changes in the distribution of annual earnings among Massachusetts workers over the decade. How did the distribution of annual earnings change over the past decade? The earnings inequality analysis will be undertaken for all men and women and for men and women in selected educational subgroups. Findings on the degree of earnings inequality among full-time, year-round male and female workers in Massachusetts in 1999 will be compared to those for the nation and for workers in each of the other 49 states.

As noted earlier, one of the key objectives of the Boston Workforce Development Initiative is to expand and upgrade education and training opportunities for Massachusetts workers to improve their chances for securing family sustaining earnings. To expand upon our existing knowledge base of the ability of Massachusetts' workers to obtain annual earnings high enough to raise families above "low income" thresholds and selected Family Economic Self-Sufficiency (FESS) budgets, we have generated estimates of the share of workers in selected gender, educational attainment, and race-ethnic groups with 1999 annual earnings above the "low income" threshold for a four person family. Changes in the percent of full-time, year-round workers in key demographic subgroups with annual earnings above the low-income threshold over the decade of the 1990s also will be reviewed and assessed.

Multivariate statistical models using logistic regression techniques were developed to estimate the influence of a worker's demographic and human capital traits, industrial sector of employment, and geographic locations of their residences on the likelihood that they would have obtained 1999 annual earnings above the low income threshold for a four person family. These models were estimated for all full-time, year-round workers, for men and women separately, and for those workers with no formal schooling beyond the Associate Degree level. Findings of the results of these models and their potential implications for the design and administration of the Workforce Development Training Initiative will be presented. The final section of the report will summarize key findings of the research and their consequences for the training initiative.

Annual Earnings Concepts, Measures and Data Sources

The decennial Censuses of the United States have been used to collect data on the annual earnings of a large sample of household members ages 16 and older who were employed in the calendar year prior to the Census. For example, on the 2000 Census long form questionnaire that was completed by approximately 1 of every 6 households across the nation, respondents were asked to report their earnings in 1999 from all wage and salary jobs and from self-employment. Those persons employed in 1999 also were asked to report their weeks of paid employment and their average hours of work per week. Since the annual earnings of workers are substantially influenced by their weeks and hours of paid employment during the calendar year, we have restricted our analysis of annual earnings data to those workers who were employed for at least 40 weeks, full-time (35 or more hours per week) during 1999 or in 1989 and 1979 for trend analysis. We refer to this group of workers as year-round, full-time workers. Our definition of this group of workers is slightly more liberal than that of the U.S. Census Bureau, which requires a worker to have been employed for 50 or more weeks to be classified as a year-round worker. This more stringent U.S. Census Bureau definition will exclude those full-time workers who only worked 40-49 weeks during the year due to seasonal factors (weather, tourism) or to lengthy summer vacations (teachers). We prefer including the above groups of workers in our analysis of earnings levels and earnings inequality given their substantial commitment to the labor market during the year. To be included in the analysis, a person had to have at least 1,400 hours of paid employment during the year. A majority had more than 2,000 hours of paid employment.

Our earnings analysis is restricted to those full-time, year-round workers who were between 20 and 64 years of age at the time of the 2000, 1990, or 1980 Census. Teenagers and workers 65 and older were excluded from the analysis due to lower rates of career jobs among many of the members of both age groups. In addition, few teens are family heads, a group of primary interest to us. The Public Use Microdata Samples (PUMS files) from the 1980, 1990, and 2000 Censuses were used to conduct the analysis. The 5-100 PUMS samples from the 1990 and 2000 Censuses were used to perform this analysis. The large number of cases from the 5-100 samples allow us to conduct the earnings analysis for a diverse array of demographic and socioeconomic subgroups of workers.

Converting the 1989 and 1979 Nominal Annual Earnings Data for Massachusetts Workers into their Constant 1999 Dollar Equivalents

The annual earnings data for Massachusetts workers from the 1990 and 1980 Censuses were measured in current dollars; i.e., they were not adjusted for inflation. To compare the 1989 and 1979 annual earnings data for Massachusetts workers with those for 1999, we must convert the 1989 and 1979 earnings data into their 1999 constant dollar equivalents. One standard approach for making these adjustments is to utilize the national Consumer Price Index for All Urban Consumers, more widely known by its acronym the CPI-U, to estimate price changes faced by the average urban consumer over time. The changes in prices from the CPI-U over time are then used to convert nominal earnings data for a given year, e.g., 1989, into their constant dollar equivalents. There is a national CPI-U index and a CPI-U index for the Greater Boston area, but no specific CPI-U index for the state as a whole.⁵

Estimates of the CPI-U price index for the U.S. and the Greater Boston area in 1989 and 1999 are displayed in Table One.⁶ The base years for both price indices are 1982-84. Between 1989 and 1999, the CPI-U price index for the U.S. rose from 124.0 to 166.6, representing an

⁵ The U.S. Bureau of Labor Statistics also estimates CPI-U price indices for the four major geographic regions, including the Northeast, but the Northeast region's price index will be dominated by price changes in New York, New Jersey, and Pennsylvania.

⁶ The CPI-U index for Greater Boston and the U.S. cannot be used to estimate the comparative cost-of-living for residents in Greater Boston. The Boston CPI-U only measures price changes over time for goods and services purchased by residents of the area. They do not represent differences in price levels between Boston and the U.S. at a given point in time. For a discussion of regional and state cost-of-living differences, See: Andrew Sum, Anwiti Bahuguna, Neeta Fogg, et al. *The Road Ahead: Emerging Threats to Workers, Families, and the Massachusetts Economy*, Massachusetts Institute for A New Commonwealth, Boston, 1998.

increase of 34.3%. Over the same ten year period, the CPI-U index for the Greater Boston area (which covers a multi-state geographic area going well beyond the boundaries of the Boston PMSA and including areas in parts of New Hampshire, Maine, Connecticut, and Rhode Island) increased at essentially an identical rate (34.1%). Lower inflation in the Boston area during the economically depressed years of the early 1990s was offset by a more rapid rate of inflation than the nation from 1994 through the end of the decade. To convert 1989 annual earnings data for Massachusetts workers into their constant 1999 dollar equivalents, we have used the change in the national CPI-U index of 34.3%.⁷ Similar procedures were adopted in converting 1979 earnings data into constant 1999 dollars to allow estimates of the growth of annual earnings of Massachusetts workers over the decade of the 1980s to be compared to those for the 1980s.

Table 1:
Trends in the Consumer Price Index for All Urban
Consumers in the U.S. and the Greater Boston Area, 1989 – 99
(1982 – 84 = 100)

	(A)	(B)
Year	U.S.	Greater Boston Area
1989	124.0	131.3
1999	166.6	176.0
Percent Change, 1989 – 99	34.3	34.1

Source: U.S. Bureau of Labor Statistics, web site, www.BLS.gov.

Trends in the Median Real Annual Earnings of Year-Round, Full-Time Workers in Massachusetts and the U.S., 1989-1999

Estimates of the 1989 and 1995 median real annual earnings (in constant 1999 dollars) of 20-64 year old, year-round full-time workers in Massachusetts and the U.S. for all workers and by gender are displayed in Table 2. The median annual earnings is that earnings level which divides the distribution of annual earnings into two equal parts. One half of the workers will earn more than the median and one half will earn less. Unlike the mean earnings level, the value of the median is not affected by earnings values on either tail of the distribution. The mean annual earnings of Massachusetts workers increased more rapidly than the median over the past decade,

⁷ The U.S. Bureau of Labor Statistics has recently experimented with a new consumer price index known as the CPI-URS index, which is based on changes in methodologies for measuring price changes adopted by the Bureau of Labor Statistics in the late 1990s. This price index produces a change in prices slightly lower than that of the CPI-U over the 1989-99 period.

indicating a sharp rise in earnings inequality over the decade. The rising degree of earnings inequality will be examined more fully in a following section of this paper.

Between 1989 and 1999, the median real annual earnings of all 20-64 year old full-time, year-round workers in Massachusetts increased from \$36,276 to \$37,500, a gain of \$1,224 or 3.4 percent. While this earnings gain was quite modest, especially in comparison to the much stronger earnings performance of state workers during the decade of the 1980's, it exceeded the growth in median real annual earnings of workers in the U.S. During the 1990's, there was no increase in the median real annual earnings of all year-round, full-time workers in the nation (Table 2). Women in Massachusetts obtained larger absolute and relative gains in their annual earnings than their male counterparts did over the decade. The median real earnings of Massachusetts women rose by \$2,440 or 8.3 percent versus a gain of only 1.6 percent for men. In the U.S., only women achieved a gain in their median real earnings over the decade. The median annual earnings of U.S. women rose by 10% over the decade while men's median earnings declined by two percent over the 1990s.

Table 2:
Trends in the Median Real Annual Earnings of 20-64 Year Old
Full-Time, Year-Round Workers (16+) in Massachusetts, and the U.S. by Gender, 1989 – 99
(in 1999 Dollars)

Geographic Area	(A) 1989	(B) 1999	(C) Absolute Change	(D) Percent Change
<u>Massachusetts</u>				
• All	\$36,276	\$37,500	\$1,224	+3.4
• Men	41,322	42,000	+678	+1.6
• Women	29,555	32,000	+2,442	+8.3
<u>U.S.</u>				
• <u>All</u>	30,889	31,000	+11	0
• <u>Men</u>	36,261	35,500	-711	-2
• <u>Women</u>	24,174	26,500	+2,326	+10

Source: 1990 and 2000 Census PUMS data files, tabulations by authors.

The growth rates in the annual earnings of Massachusetts workers over the decade of the 1990s fell well below those experienced in the previous decade. Between 1979 and 1989, the

median real annual earnings of 20-64 year old workers in Massachusetts increased by \$5,871 or 19.3% (Table 3). This rate of growth was nearly six times higher than that of workers in the 1990s. Males fared considerably better in the 1980s, with a rate of growth of 13% versus less than two percent in the past decade. Women obtained even sharply higher gains in their median real annual earnings in the 1980s (31% vs. 8% in the 1990s). These substantially higher improvements in the median annual earnings of Massachusetts adult workers in the 1980s were the key factor underlying the much greater rate of growth in median family incomes during the 1980s in comparison to the 1990s (25% vs. 3%).⁸ Family income growth in Massachusetts ranked third highest among the 50 states during the decade of the 1980s; however, the 3% growth rate in median real family income during the 1990s ranked only 41st highest among the 50 states, representing a steep deterioration in the state's absolute and comparative economic performance. Rising earnings and income inequality in the 1990s was a contributing factor to the mediocre growth in median family incomes.

Table 3:
Trends in the Median Real Annual Earnings of 20-64 Year Old,
Full-Time Year-Round Workers in Massachusetts, Total and by Gender, 1979 to 1989
(in Constant 1999 Dollars)

	(A)	(B)	(C)	(D)
Gender	1979	1989	Absolute Change	Percent Change
All	\$30,405	\$36,276	\$5,871	19.3
Men	\$36,483	\$41,322	\$4,839	13.3
Women	\$22,525	\$29,558	\$2,442	31.2

Trends in the Annual Earnings of Massachusetts Workers by Educational Attainment in the 1990s

During the past few decades, annual earnings differences among U.S. workers by educational attainment have risen in favor of the best-educated workers. This changing earnings distribution by schooling level was substantially influenced by changes in the industrial structure

⁸ For further details on the growth of median real family incomes in the 1980s and 1990s, See: Andrew Sum, Ishwar Khatiwada, and Mykhaylo Trubs'kyy, with Sheila Palma, *Family Income Developments in Massachusetts During the 1990s: Mediocre Growth for the Average Family Amidst Sharply Rising Income*

of jobs and the impacts of technological change and corporate restructuring have that shifted the demand for labor toward workers in professional, managerial, and high level sales positions while lowering the demand for many blue collar workers and clerical workers. The decline in manufacturing employment particularly lowered the demand for most blue collar production workers, including skilled blue collar employees.

Employment changes by major occupational group in the state over the decade of the 1990s, especially the above average growth in professional, management, and high level sales positions, should have favored workers with higher levels of formal schooling. To identify how well more highly educated workers fared in the state's labor markets over the 1990s decade, we estimated changes in the median real annual earnings of year-round, full-time workers by educational attainment category and by gender between 1989 and 1999. All Massachusetts workers were classified into one of the following six educational subgroups:

- No high school diploma or GED certificate
- A high school diploma or GED, but no completed years of post-secondary schooling
- 13-15 years of schooling, but no post secondary degree
- An associate's degree
- Bachelor's degree only
- Master's or higher degree

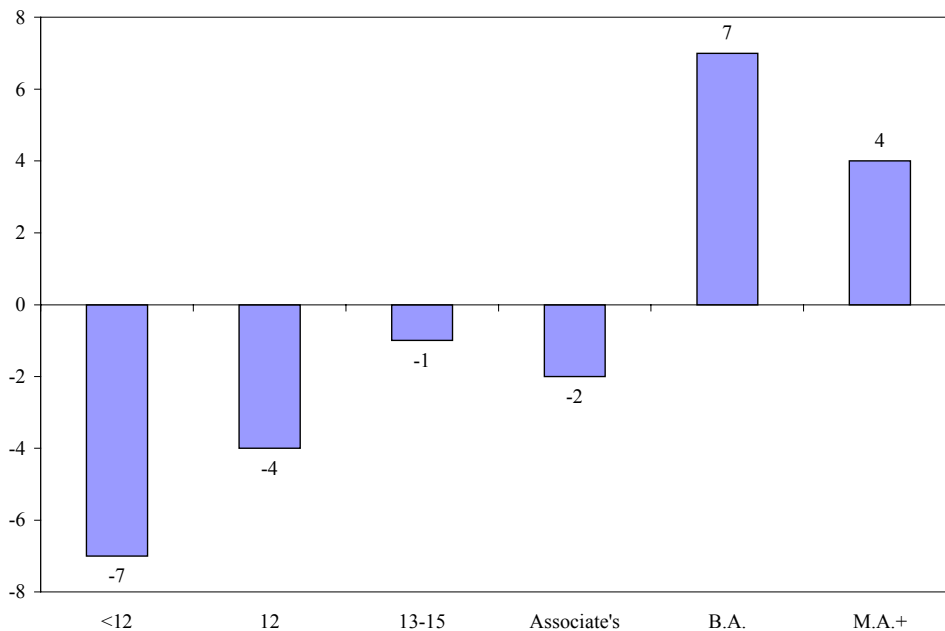
Among men, both the absolute and relative size of the changes in the median real annual earnings of full-time, year-round workers over the past decade varied quite widely by schooling level (Table 4 and Chart 1). The absolute sizes of these annual earnings changes ranged from -\$2,129 for those men lacking a high school diploma/GED to a high of +\$3,289 for those men holding a Bachelor's degree (Table 4). In relative terms, the size of these annual earnings' changes ranged from -2% for high school dropouts to +7% for those men with a bachelor's or higher degree (Table 4 and Chart 1). The only groups of male workers who improved their real annual earnings over the decade were those holding a bachelor's or more advanced academic degree. Even male Associate Degree holders experienced a two percent decline in their median real annual earnings over the past decade.

Table 4:
Trends in the Median Real Annual Earnings of 20-64 Year Old Full-Time,
 Year Round Workers in Massachusetts by Educational Attainment and Gender, 1989-99
 (in 1999 Dollars)

	(A)	(B)	(C)	(D)
Gender/Educational Group	1989	1999	Absolute Change	Percent Change
<u>Men</u>				
• <12	\$30,129	\$28,000	-2,129	-7
• 12	36,276	34,700	-1,576	-4
• 13-15, no degree	40,306	40,000	-306	-1
• Associate's degree	42,976	42,000	-976	-2
• Bachelor's only	49,711	53,000	+3,289	+7
• Master's or higher	67,178	70,000	+2,823	+4
<u>Women</u>				
• <12	21,467	20,000	-1,467	-7
• 12	25,527	25,000	-527	-2
• 13-15, no degree	28,215	300,000	+797	+3
• Associate's degree	30,889	32,000	+1,785	+6
• Bachelor's only	36,276	39,000	+2,724	+8
• Master's or higher	45,682	48,500	+2,819	+6

Source: 1990 and 2000 Census PUMS data files, tabulations by authors.

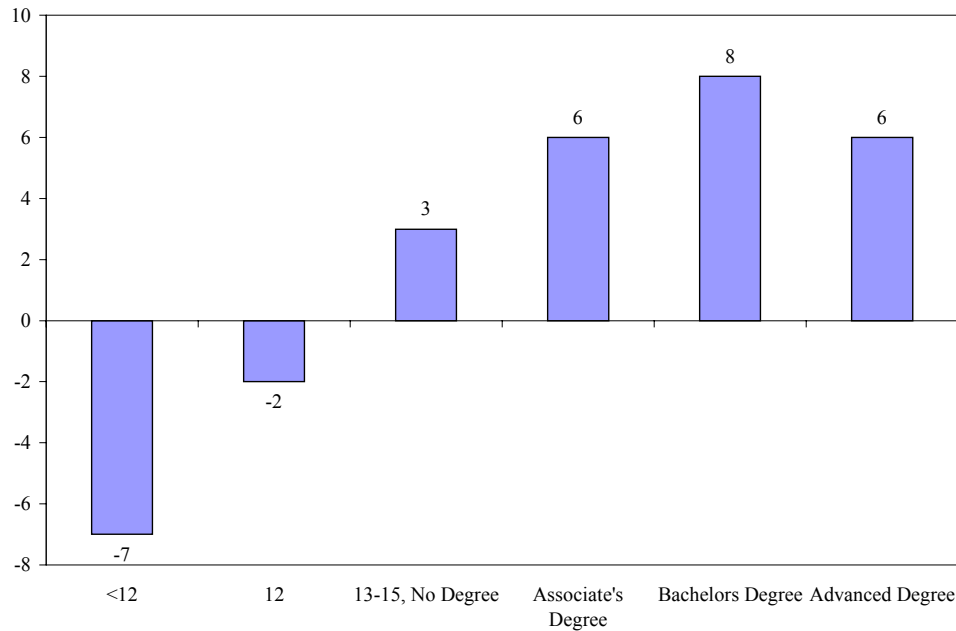
Chart 1:
Percent Changes in the Median Real Annual Earnings Between 1989 and 1999 of 20-64 Year
Old Massachusetts Males Employed, Year-Round, Full-Time by Educational Attainment



Somewhat similar earnings patterns prevailed among women although more of the educational subgroups of women improved their real annual earnings over the 1990's (Table 4 and Chart 2). Employed women lacking a high school diploma/GED experienced a near \$1,500 or 7 percent decline in their median annual earnings while women with a bachelor's degree improved their real earnings by \$2,724 or 8 percent. The relative size of these earnings' changes ranged from -7 percent among high school dropouts and -4 percent for high school graduates to a high of +8 percent for bachelor degree holders. Each of the four groups of women with some post-secondary schooling obtained gains in their median real annual earnings. Among both men and women, the earnings differences between four year college graduates and high school graduates/dropouts widened over the decade.⁹

⁹ For example, in 1989, the median annual earnings of employed women with a bachelor's degree was 42% higher than that of high school graduates, but by 1999 the difference had widened to 56%. The median earnings of employed Bachelor degree recipients in the latter year were nearly twice as high as those of female high school dropouts.

Chart 2:
Percent Change in the Median Annual Earnings Between 1989 and 1999 of 20-64 Year Old
Massachusetts Women Employed Year-Round, Full-Time by Educational Attainment



In most cases, the changes in the real annual earnings of Massachusetts workers by educational attainment in the 1990s represented in a dramatic reversal of developments during the 1980s. Estimates of the growth rates of the median annual earnings of 20-64 year old Massachusetts men and women in five educational attainment groups during the 1980s and the 1990s are compared in Table 5.¹⁰ During the 1980s, the median annual earnings of 20-64 year old men increased in each of these five educational groups although the rates of increase were higher for men with at least some college. This pattern of earnings change for men stands in sharp contrast to that of the 1990s, when the only groups of men who increased their annual earnings were those who held a Bachelor's or higher degree. However, it should be noted that men in nearly every educational attainment group fared considerably better in the 1980s than in the 1990s, particularly those men with no post-secondary schooling.

¹⁰ During the 1990s, women in Massachusetts accounted for 97% of labor force growth and more than 90% of employment growth. For a review of labor force growth by gender in Massachusetts and New England during the 1990s,

See: Andrew Sum, Ishwar Khatiwada, Nathan Pond with Jacqui Motroni and Sheila Palma, *The Absent Male Worker and the Limited Growth in New England's Labor Force in the 1990s: Implications for Future Educational and Workforce Development Policy*, Report Prepared for the New England Regional Office, U.S. Department of Labor, Employment and Training Administration, Boston, July 2002.

Table 5:
Comparisons of Growth Rates in the Median Real Annual Earnings of
20-64 Year Old Workers Employed 40 or More Weeks Full-Time
Between 1979-89 and 1989-99 by Educational Attainment
(in Constant 1999, Dollars)

Educational Attainment	(A) 1979-89	(B) 1989-99	(C) Percentage Point Different (A – B)
Men			
<12	+1.6	-7.1	+8.7
High School Graduates, No College	+7.4	-4.3	+11.7
13-15 Years, Including Associates	+11.0	-.8	+11.8
Bachelor's Degree	+10.4	+6.6	+3.8
Master's or Higher Degree	+21.8	+4.2	+17.8
Women			
<12	+19.1	-6.8	+25.9
High School Graduates, No College	+19.3	-2.1	+21.4
13-15 Years, Including Associates	+24.5	+6.3	+18.2
Bachelor's Degree	+34.2	+7.6	+26.6
Master's or Higher Degree	+26.8	+6.2	+20.6

Among employed women, annual earnings increased in every educational attainment group during the 1980s, with the size of these gains ranging from 19% among those women lacking a high school diploma and high school graduates to a high of 34 percent among those women holding a Bachelor's degree. All of these five educational groups of women workers obtained double-digit increases in their median annual earnings. In contrast, in the 1990s, women without any post-secondary schooling saw their real annual earnings decline over the decade and each of the three subgroups of women with some post-secondary schooling experienced only modest 6 to 7 percent gains in their annual earnings over the decade. As was the case for men, adult women in every educational attainment group fared considerably better in improving their annual earnings in the 1980s than during the 1990s. As will be revealed in a following section, however, there were large gainers and losers in nearly every educational group during the 1990s as the distribution of earnings became substantially more unequal.

Trends in the Annual Earnings of Massachusetts Workers by Race-Ethnic Group

The 1990 and 2000 Censuses collected information on the race-ethnic characteristics of workers. We have classified year-round, full-time workers in Massachusetts into one of the following four mutually exclusive race-ethnic groups:¹¹

- Asian, not Hispanic
- Black, not Hispanic
- Hispanic¹²
- White, not Hispanic

Estimates of the 1989 and 1999 median real annual earnings of Massachusetts workers by gender and race-ethnic group are displayed in Table 6. Earnings developments among men during the 1990s were quite mixed. Both Black and Hispanic men experienced declines of 4 to 6 percent in their median real annual earnings over the decade while White and Asian men posted gains in their real annual earnings during the 1990s. White males posted a near 5 percent gain in their median real annual earnings while Asian males fared the best, increasing their annual earnings by just under 17 percent (Table 6). At the end of the decade, there were large variations in the median annual earnings of male workers across race-ethnic groups, ranging from a low of \$25,000 for Hispanic males to a high of \$45,000 for White males. A relatively high fraction of the Hispanic workers were immigrants whose earnings potential was constrained by limited formal schooling, U.S. work experience, and English-speaking proficiencies. Recent evidence suggests that the annual earnings of immigrant workers in our state and the nation are strongly influenced by their human capital skills.¹³

¹¹ The 2000 Census was the first to allow respondents to select more than one race to describe themselves. Such “mixed race” categories were not available from the 1990 Census. Due to smaller sample cases, we have excluded persons of mixed race and American Indian/Alaskan Natives from the analysis of earnings data in this paper.

¹² Hispanics can be members of any race. We have excluded them from the count of all other race groups.

¹³ See: Andrew Sum, Ishwar Khatriwada, Johan Uvin, et. al, *The Labor Market Experiences of Immigrants and Their Human Capital Traits*, Massachusetts Institute for A New Commonwealth, Boston, 2004, forthcoming.

Table 6:
Trends in the Median Real Annual Earnings of 20-64 Year Old
Full-Time, Year-Round Workers in Massachusetts by Gender and Race-Ethnic Group, 1989 – 99
(in Constant 1999 Dollars)

	(A)	(B)	(C)	(D)
Gender/Race-Ethnic	1989	1999	Change, 1989 – 99	Percent Change, 1989 – 99
<u>Men</u>				
Asian	\$35,067	\$41,000	+5,933	+16.9
Black	32,245	31,000	-1,245	-3.9
Hispanic	26,554	25,000	-1,554	-5.9
White	42,994	45,000	2,006	+4.7
<u>Women</u>				
Asian	\$28,215	\$30,000	+1,785	+6.3
Black	27,140	28,500	+1,380	+5.0
Hispanic	22,357	22,800	+443	+2.0
White	29,558	33,000	+3,442	+11.6

Source: 1990 and 2000 Censuses of Population and Housing, 5-100 PUMS files, tabulations by authors.

Female workers in each of our four race-ethnic groups received boosts in their real annual earnings over the past decade, with the size of these gains ranging from 2 percent among Hispanics and 5 to 6 percent among Blacks and Asians to a high of nearly 12% among Whites. Similar to the pattern for males, median annual earnings among women were lowest among Hispanics and highest among Whites; however, the Black-White and Hispanic-White earnings differences among women were substantially smaller than they were among men.

Estimates of the 1989 and 1999 annual earnings of full-time, year-round workers by race-ethnic group, gender, and educational attainment also were generated and used to derive growth rates in annual earnings over the decade. Findings are displayed in Table 7. Among men, with one exception, the median annual earnings of those with less schooling than a bachelor's degree either declined or remained unchanged over the decade.¹⁴ While men with a bachelor's or higher degree fared better than their less educated counterparts, gains in real annual earning were not uniform across race-ethnic groups. For example, among bachelor's degree recipients, the

changes in median annual earnings among men ranged from -2% among Hispanics to +3% for Blacks to a high of +24% for Asian bachelor degree holders. Among males with a Master's or higher degree, median annual earnings declined among Blacks and Hispanics and rose modestly among Whites and Asians. In each of the four race-ethnic groups, the absolute and relative size of the earnings gaps between bachelor degree recipients and high school graduates widened fairly considerably over the decade.

Table 7:
Percent Change in the Median Real Annual Earnings of 20-64 Year Old,
Full-Time, Year-Round Workers in Massachusetts by Gender, Race-Ethnic Group and
Educational Attainment, 1989-99

	(A)	(B)	(C)	(D)	(E)
Gender/Race-Ethnic Group	<12 Years	12 Years	13-15 Years, Including Associate's	Bachelor's Degree	Master's or Higher Degree
<u>Men</u>					
Asian	9.2	-3.4	-7.3	24.0	6.3
Black	-3.2	-7.8	-7.0	3.0	-4.8
Hispanic	-2.3	-4.8	-.8	-1.6	-2.1
White	-7.4	-5.2	.8	5.8	4.2
<u>Women</u>					
Asian	-1.9	-11.3	-2.1	16.1	8.8
Black	-7.0	-.8	2.8	4.1	-.1
Hispanic	-4.3	-6.4	-.8	18.9	-2.4
White	-2.1	.3	1.5	8.6	7.3

Source: 1990 and 2000 Censuses of Population and Housing, 5-100 PUMS files, tabulations by authors.

Among women, in nearly every race-ethnic group, median annual earnings tended to decline for those who failed to complete any years of post-secondary schooling. For example, among high school dropouts, median annual earnings declined over the decade for women in each of the four race-ethnic groups, with the relative size of these declines ranging from 2 to 7 percent (See Table 7, Column A, lower half of table). Women who had completed some post-secondary schooling but did not obtain a bachelor's degree had a mixed record of earnings changes, with Asians and Hispanics experiencing modest one to two percent declines in their

¹⁴ Asian, male high school dropouts saw their median earnings rise by 9 percent over the decade. Every other group of high school dropouts and all groups of high school graduates experienced a decline in their median earnings.

earnings while Black and White women obtained modest 1.5 to 3.0 percent increases. Women with a bachelor's degree in each race-ethnic group secured gains in their annual earnings over the decade, with the size of these gains ranging from 4 to 19 percent. Among those women with a Master's or higher degree, only Asians and Whites achieved gains in their real annual earnings over the decade. As was the case for men, the absolute and relative size of the annual earnings differences between female four-year college graduates and high school graduates widened sharply within each of the four race-ethnic groups (Table 7, Columns C and D).

In comparing the 1980s and 1990s earnings experiences of full-time, year-round workers by race-ethnic group and educational attainment, we combined the earnings data for men and women. Findings in Table 8 reveal that employed high school dropouts and high school graduates in each of the four race-ethnic groups fared considerably better in boosting their real earnings during the decade of the 1980s than in the 1990s, with the differences in growth rates being in the double digits for seven of these eight groups and twenty percentage points or more for five of these eight groups, including all four groups of high school graduates. Among bachelor degree holders, only Asians fared better in the 1990s than they did in the 1980s. For 11 of the 12 groups of workers displayed in Table 8, the labor markets of the 1980s produced far greater gains in their real earnings. In fact, only 2 of the 12 worker groups in Table 8 experienced any gain in their median real annual earnings over the decade.¹⁵ Rising earnings inequality among workers in most of these groups also held down the growth of the median relative to mean earnings for workers in the 1990s. Prosperity was not as widely shared in the 1990s decade as it was in the 1980s. This was true for both workers and their families.

¹⁵ The rising share of women in each of these educational groups during the 1990s also modestly lowered the median earnings for the combined group of men and women in 1999, given the lower averages earnings of women.

Table 8:
Growth Rates in the Median Real Annual Earnings of High School Dropouts,
High School Graduates, and Bachelor Degree Recipients Employed 40 or More
Weeks Full-Time Between 1979-89 and 1989-99 in Massachusetts by Race-Ethnic Group
(in Constant 1999 Dollars)

Educational/Race-Ethnic Group	(A) 1979-89	(B) 1989-99	(C) Percentage Point Difference (A – B)
High School Dropouts			
• Asian	24.2	-2.7	+26.9
• Black	8.7	-9.0	+17.7
• Hispanic	-6	-5.7	+5.1
• White	4.9	-8.1	+13.0
High School Graduates			
• Asian	37.9	-15.5	+53.4
• Black	12.1	-10.7	+22.8
• Hispanic	11.6	-13.2	+34.8
• White	14.3	-6.2	+20.5
Bachelor Degree Holders			
• Asian	3.6	15.2	-11.6
• Black	20.0	-.9	+20.9
• Hispanic	12.4	4.2	+8.2
• White	13.7	.0	13.7

The Growth of Annual Earnings Among Native Born and Foreign Born Workers in the 1990s

During the 1990s, new flows of foreign immigrants accounted for all of the growth in the civilian labor force of the state. In fact, the number of native born male labor force participants declined sharply over the decade. Given these changes in the nativity composition of the labor force and the lower human capital of many immigrant workers (less formal schooling, lower literacy levels, more limited English-speaking proficiencies, and less U.S.-based work experience), one might argue that the absence of real earnings growth among many groups of workers in the state may be due to the altered composition of the labor force.¹⁶ Perhaps, native-

¹⁶ For an overview of the changing demography of the Massachusetts labor force in the 1990s,

born workers, especially males, fared better over the decade than suggested by the overall earnings data, which includes the experiences of immigrants.

To test the hypothesis that the changing nativity composition of the employed underlies the weak earnings performance during the 1990s, we estimated changes in the median real annual earnings of both native and foreign born men and women by educational attainment over the decade of the 1990s. Findings of our analysis are displayed in Tables 9 and 10. Native born males in the aggregate fared only slightly better than all male workers in improving their real annual earnings over the decade. Their median annual earnings rose by 3.2%; however, native born male workers without a four year college degree experienced earnings declines over the decade, with the relative size of these earnings losses being greatest for those native born men lacking a high school diploma (-7%). Native born males with a bachelor’s or higher degree modestly boosted their real annual earnings by 4 to 6 percent (Table 9)

Table 9:
Trends in the Median Real Annual Earnings of Full-Time, Year-Round Employed Male Workers in Massachusetts by Nativity Status and Educational Attainment, 1989 – 1999
(in Constant 1999 Dollars)

Nativity Status/ Educational Attainment	(A) 1989	(B) 1999	(C) Absolute Change	(D) Percent Change
<u>Native Born, All</u>	\$42,627	\$44,000	1,373	3.2
• < 12 years	32,245	30,000	-2,245	-7.0
• 12 years	36,276	35,000	-1,276	-3.5
• 13-15 years, including Associate’s	40,306	40,000	-306	-0.8
• Bachelor’s degree	50,707	54,000	3,293	6.5
• Master’s or higher degree	67,177	70,000	2,823	4.2
<u>Foreign Born, All</u>	33,589	34,000	411	+1.2
• < 12 years	26,761	25,000	-1,871	-7.0
• 12 years	30,902	28,000	-2,902	-9.4
• 13-15 years, including Associate’s	32,245	31,000	-1,245	-3.9
• Bachelor’s degree	42,996	48,200	5,206	12.1
• Master’s or higher degree	60,460	63,000	2,540	4.2

See: (i) Andrew Sum, Paul Harrington, Neeta Fogg, et. al., *The State of the American Dream in Massachusetts, 2002*, “Chapter Two”; (ii) Andrew Sum, Ishwar Khatiwada, and Mykhaylo Trubs’kyy, *The Contributions of Immigration to Population and Labor Force Growth in the Commonwealth from 1990 – 2003*, Paper prepared for the Commonwealth Corporation, Boston, 2004.

Among foreign born men, median annual earnings were basically unchanged over the decade, rising by only one percent. Similar to the findings for native born men, only immigrant males with a bachelor's or higher degree were able to achieve a gain in their median real annual earnings over the decade. Immigrant male workers with 12 or fewer years of schooling experienced steep annual earnings losses (-7 to -9 percent) over the past decade.

Native born women fared better than all women in boosting their real annual earnings over the decade of the 1990's, obtaining a gain of nearly 12% in their median annual earnings (Table 10). The pattern of earnings gains among native born women was strongly associated with their years of schooling. Women lacking a high school diploma lost ground during the decade while their counterparts with only a high school diploma basically only maintained their earnings over the decade. Native born women with some post-secondary schooling boosted their annual earnings by six to nine percent.¹⁷

Table 10:
Trends in the Median Real Annual Earnings of Full-time, Year-Round Employed Female
Workers in Massachusetts by Nativity Status and Educational Attainment, 1989-99
(in constant 1999 dollars)

Nativity Status/Educational Attainment	(A) 1989	(B) 1999	(C) Absolute Change	(D) Percent Change
<u>Native Born, All</u>	29,558	33,000	3,442	11.6
• < 12 years	22,303	21,300	-1,003	-4.5
• 12 years	25,527	25,800	273	1.1
• 13-15 years, including Associate's	28,215	30,000	1,785	6.3
• Bachelor's degree	36,276	39,600	3,324	9.2
• Master's or higher degree	45,681	49,000	3,319	7.3
<u>Foreign Born, All</u>	24,184	26,000	1,816	7.5
• < 12 years	20,153	19,900	-253	-1.3
• 12 years	23,512	22,000	-1,512	-6.4
• 13-15 years, including Associate's	25,796	26,200	404	1.6
• Bachelor's degree	33,589	36,000	2,411	7.2
• Master's or higher degree	42,994	45,000	2,006	4.7

¹⁷ Each of the employed groups of native born women had earnings gains below those of all native born women. This is due to the educational upgrading of the female native born employed. More female workers at the end of the 1990s were in the higher educational groups, which have higher median annual earnings. This development boost the overall average rate of growth by more than the median annual earnings growth rate for female workers in each educational attainment subgroup.

In the aggregate, foreign born women also improved their median annual earnings over the decade by 7.5%. All of the gains in earnings, however, were obtained by immigrant women with some post-secondary schooling. Earnings gains were largest for those foreign born women with a bachelor's or higher degree. As was true for native born women workers, the overall gain in the annual earnings of immigrant women was favorably influenced by a rising level of educational attainment for immigrant women workers.

The Changing Distribution of Annual Earnings Among Massachusetts Men and Women Over the 1990s

The preceding discussions of changes in the annual earnings of Massachusetts workers over the decade of the 1990's were focused on changes in the earnings of the average (median) worker in gender, educational attainment, race-ethnic and nativity subgroups. Changes in median earnings, however, may disguise changes occurring at various points along the distribution, including the bottom and top of the distribution. How did the annual earnings of workers at various points along the distribution change? To answer this key question, we estimated the annual earnings of workers in various gender and educational subgroups at each 10th percentile and 95th percentile of the earnings distribution in 1989 and 1999 and calculated changes in earnings at various points along the distribution to determine which groups of workers benefited more and which groups benefited less from the economic prosperity of the 1990's.

Concerns with rising inequality in earnings and incomes across the nation and in geographic regions and states have grown during the past two decades.

Table 11:
Trends in the Real Annual Earnings of 20-64 Year Old Full-Time, Year-Round
Male Workers in Massachusetts at Various Points Along the Earnings Distribution, 1989 to 1999
(in 1999 dollars)

	(A)	(B)	(C)
Percentile	1989	1999	Percent Change
10	20,153	19,600	-3
20	26,871	25,000	-7
30	32,245	30,600	-5
40	36,926	36,200	-2
50	41,322	42,000	+2
60	47,024	50,000	+6
70	53,742	58,000	+8
80	64,490	70,000	+9
90	87,331	100,000	+15
95	117,560	140,000	+19
99	257,303	322,000	+25
<u>Earnings Ratios</u>			
Y ₉₉ /Y ₁₀	12.77	16.42	+29
Y ₉₀ /Y ₁₀	4.33	5.10	+18
Y ₉₀ /Y ₂₀	3.25	4.00	+23
Y ₉₀ /Y ₅₀	2.11	2.38	+13
Y ₈₀ /Y ₁₀	3.20	3.57	+12
Y ₈₀ /Y ₂₀	2.40	2.80	+17
Y ₅₀ /Y ₁₀	2.05	2.14	+5

During this time period, labor market analysts have paid increased attention to the rising degree of wage and annual earnings inequality among workers in the U.S. and other industrial countries.¹⁸ One method for analyzing changes in earnings inequality involves tracking changes in the weekly or annual earnings of workers at various points along the earnings distribution over time. In Table 11, we provide estimates of the annual earnings of year-round, full-time male workers in Massachusetts at selected percentiles of the annual earnings distribution in 1989 and

¹⁸ See: (i) Lawrence F. Katz and Richard Freeman, "Wage Inequality in the U.S. and Other Advanced Industrial Countries," in *Working under Different Rules* (Editor: Richard Freeman), Russell Sage Foundation, New York, 1996; (ii) Garth Mangum, Stephen Mangum and Andrew Sum, *A Fourth Chance for the Second Chance Employment and Training System*, Sar Levitan Center for Social Policy Studies, Johns Hopkins University, Baltimore, 1998; (iii) Paul Ryscavage, *Income Inequality in America: An Analysis of Trends*, ME Sharpe, Armonk, New York, 1999; (iv) Andrew Sum, Mykhaylo Trubs'kyy and Sheila Palma, *The Rising Tide of Wage Inequality in*

1999. These selected percentiles range from the tenth percentile from the bottom of the annual earnings distribution to the highest percentile, i.e., the 99th percentile. The growth rates of the real annual earnings of workers at each of these percentiles are displayed in column C of Table 11.

A careful review of the findings in Table 11 reveals that the growth rates of the annual earnings of male workers between 1989 and 1999 varied quite considerably along the earnings distribution. Males in the bottom 40 percent of the earnings distribution either experienced stagnant earnings or declines over the decade. From the 50th percentile on up, real earnings of male workers improved over the decade, but the relative size of these gains rose steadily with one's ranking in the distribution. Workers at the 50th percentile obtained a 2 percent gain while the annual earnings of those at the 90th percentile rose by 15 percent and those at the 95th and 99th percentiles improved by 19 and 25 percent, respectively.

The much greater absolute and relative gains in real earnings among male workers at the top of the distribution widened earnings differentials sharply among Massachusetts men over the decade. In the bottom half of Table 11, a series of seven relative earnings measures are displayed. These relative earnings measures primarily reflect the size of the earnings of workers at the top of the distribution (the 99th, 90th, and 80th percentiles) relative to those of male workers at the bottom or middle of the distribution; e.g., the 10th, 20th, and 50th percentiles. These relative earnings measures have been used in a wide variety of international, national, and regional studies of wage and earnings differentials over the past decade. Each of the seven relative earnings measures increased in size over the decade, with the largest increases in earnings differentials taking place between those at the top and bottom of the distribution. For example, the annual earnings of male workers at the 99th percentile increased from 12.8 times those of workers at the 90th percentile rose from 4.3 times those of workers at the tenth percentile in 1989 to 16.4 times as high in 1999, and the annual earnings of workers at the tenth percentile in 1989 to 5.1 times as high in 1999. The size of the relative earnings differential between workers in the middle of the distribution (50th percentile) and those at the 10th percentile rose more modestly over the decade from 2.05 to 2.14. The net effect of these rising earnings differentials across the

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entire earnings distribution was to considerably widen earnings inequality among male workers in Massachusetts over the decade.

Earlier, we revealed that the 1990's were characterized by rising earnings gaps between male bachelor degree recipients and high school graduates and those workers with even fewer years of schooling. One might infer from these findings that the rise in inequality in the overall male earnings distribution was primarily reflective of rising earnings differentials by years of schooling. Other factors also appear to be driving earnings inequality upward among male workers. To illustrate this, we examined 1989-99 changes in the real annual earnings of male workers at various points along the distribution for high school dropouts, high school graduates, and bachelor degree recipients. Did earnings inequality among men also widen within educational groups? Key findings of our analysis are displayed in Tables 13 through 15.

Table 13:
Trends in the Median Real Annual Earnings of Male High School Dropouts
Employed Full-Time, Year-Round in Massachusetts, 1989-1999

Percentile	1989 Earnings	1999 Earnings	Absolute Change	Percent Change
10	\$16,123	\$13,700	-\$2,433	-15.0
20	\$20,153	\$18,000	-\$2,153	-10.7
30	\$24,184	\$20,900	-\$3,284	-13.6
40	\$26,871	\$25,000	-\$1,871	-7.0
50	\$30,129	\$28,000	-\$2,129	-7.0
60	\$34,395	\$31,000	-\$3,395	-9.9
70	\$40,038	\$36,000	-\$4,038	-10.1
80	\$44,337	\$42,000	-\$2,337	-5.3
90	\$53,742	\$50,500	-\$3,242	-6.0
95	\$64,490	\$62,000	-\$2,490	-3.9

Table 14:
Trends in the Median Real Annual Earnings of Male High School Graduates
Employed Full-Time, Year-Round in Massachusetts, 1989-1999

Percentile	1989 Earnings	1999 Earnings	Absolute Change	Percent Change
10	\$19,481	\$17,000	-\$2,481	-12.7
20	\$24,184	\$22,000	-\$2,184	-9.0
30	\$28,215	\$26,000	-\$2,215	-7.8
40	\$32,245	\$30,000	-\$2,245	-7.0
50	\$36,276	\$34,700	-\$1,576	-4.3
60	\$40,307	\$38,900	-\$1,407	-3.5
70	\$44,639	\$43,000	-\$1,639	-3.7
80	\$51,055	\$50,000	-\$1,055	-2.1
90	\$60,460	\$60,000	-\$460	-0.8
95	\$71,208	\$73,000	1,792	2.5

Among male high school dropouts, real annual earnings declined across the entire distribution between 1989 and 1999 (Table 13). The relative sizes of these declines were, however, greater for workers in the bottom third of the distribution than they were for those occupying the middle or top of the distribution. Male dropouts at the 10th, 20th, and 30th percentiles incurred double digit declines in their annual earnings while those in the middle (40th, 50th percentiles) experienced 7 percent declines, and those at the 80th, 90th and 95th percentiles saw their real annual earnings decline by only 4 to 6 percent. Among male high school graduates, real annual earnings also declined nearly all along the distribution except at the very top (95th percentile) where annual earnings modestly increased (Table 14). Yet again, we find that the relative size of these declines were most severe among workers at the bottom of the distribution (10th and 20th percentiles) than at the middle and upper end of the distribution.

Among male bachelor degree recipients, real annual earnings declined for those in the bottom third of the distribution, rose by 6 to 8 percent for those at the 50th to 70th percentiles, and grew by 17 and 49 percent, respectively, for workers at the 90th and 95th percentiles (Table 15). In each of the three male educational subgroups, earnings inequality widened over the decade,

with particularly large increases in earnings inequality among the state's best educated male workers.¹⁹

Table 15:
Trends in the Median Real Annual Earnings of Male Four-Year College Graduates
Employed Full-Time, Year-Round in Massachusetts, 1989-1999

Percentile	1989 Earnings	1999 Earnings	Absolute Change	Percent Change
10	\$26,165	\$25,000	-\$1,165	-4.5
20	\$33,589	\$33,000	-\$589	-1.8
30	\$40,307	\$40,000	-\$307	-0.8
40	\$44,337	\$46,000	\$1,663	3.8
50	\$49,711	\$53,000	\$3,289	6.6
60	\$56,429	\$60,000	\$3,571	6.3
70	\$66,523	\$72,000	\$5,477	8.2
80	\$78,676	\$88,000	\$9,324	11.9
90	\$102,110	\$120,000	\$17,890	17.5
95	\$134,355	\$200,000	\$65,645	48.9

Comparisons of Male Earnings Inequality in Massachusetts with that in the U.S. and the Other 49 States

The 2000 PUMS earnings data for male workers in the U.S. during 1999 also were analyzed, and estimates of relative earnings differentials were calculated for U.S. male workers. Comparisons of the degree of inequality in the male earnings distribution in the U.S. and Massachusetts are displayed in Table 16. Earnings inequality among men in Massachusetts in 1999 was typically below that of the U.S., with the single exception of the Y_{90}/Y_{50} measure where the Massachusetts ratio was 2% higher than the U.S. (Table 16). In five of the six cases where male earnings inequality in Massachusetts fell below that of the U.S., the Massachusetts measure was within 10 percentage points of the U.S. measure. A separate analysis of the 1989 male earnings inequality measures for our state and the nation revealed a narrowing of the gaps between these two areas as male earnings inequality rose more strongly in Massachusetts during the decade.

¹⁹ There also was a substantial rise in earnings inequality over the 1990's among employed men with a Master's or higher degree.

Table 16:
Comparisons of Relative Earnings Inequality for Men
in Massachusetts and the U.S., 1999

	(A)	(B)	(C)
Relative Earnings Measure	MA	U.S.	MA as % of U.S.
Y ₉₉ /Y ₁₀	16.42	21.40	77
Y ₉₀ /Y ₁₀	5.10	5.53	92
Y ₉₀ /Y ₂₀	4.00	4.09	98
Y ₉₀ /Y ₅₀	2.38	2.34	102
Y ₈₀ /Y ₁₀	3.57	4.00	89
Y ₈₀ /Y ₂₀	2.80	2.96	95
Y ₅₀ /Y ₁₀	2.14	2.36	91

How did the size of the relative earnings differences among male workers in Massachusetts in 1999 compare to those of their counterparts in the other 49 states? To answer this question, we computed values for eight relative earnings measures for male workers in each of the 50 states and identified Massachusetts' ranking among the states on each of these inequality measures. For four of these measures, primarily those reflecting earnings gaps between those at the top (95th and 90th percentiles) and bottom of the distribution (10th and 20th percentiles), Massachusetts ranked among the top ten most unequal states. On two other measures (Y₉₀/Y₁₀, Y₅₀/Y₂₀), Massachusetts ranked in the top third. On the Y₅₀/Y₁₀ measure, representing the relative earnings gap between workers in the middle and bottom of the distribution, Massachusetts ranked below average (33rd). On six of these key male earnings inequality measures, Massachusetts ranked among the most inegalitarian states in the nation at the end of the 1990s.

Table 17:
Massachusetts' Rankings Among the 50 States on the Degree of
Earnings Inequality Among Male Year-Round, Full-Time Workers in 1999

	(A)	(B)
Relative Earnings Ratio	Value of Ratio	MA Ranking Among 50 States
Y ₉₉ /Y ₁₀	7.29	10 th
Y ₉₅ /Y ₂₀	5.60	8 th (tied)
Y ₉₀ /Y ₁₀	5.21	15 th
Y ₉₀ /Y ₂₀	4.0	9 th (tied)
Y ₉₀ /Y ₅₀	2.38	6 th (tied)
Y ₈₀ /Y ₁₀	3.65	32 nd
Y ₈₀ /Y ₂₀	2.80	17 th (tied)
Y ₅₀ /Y ₁₀	2.19	33 rd

Trends in Relative Earnings Inequality Among Women in Massachusetts

An identical analysis of earnings inequality was undertaken for employed women in Massachusetts. Estimates of changes in the real annual earnings of Massachusetts women at various points along the earnings distribution in 1989 and 1999 were generated. Women in the bottom 20 percent of annual earnings distribution lost ground over the decade, experiencing earnings' declines ranging from 1 to 3 percent (Table 18). Female workers from the 30th percentile on up increased their annual earnings over the decade; however, the absolute and relative size of these gains among women varied considerably across the earnings distribution, being far higher for the most well paid workers, especially those from the 80th percentile on up. The real annual earnings of women at the 30th and 40th percentiles rose by only 4 percent versus gains of 16 percent for those at the 80th percentile, 19 to 26 percent for those at the 90th and 95th percentiles, and 56 percent for those women at the 99th percentile. Clearly, among Massachusetts' women workers, the "rich got richer" (top 20 percent) and "the poor (bottom 20 percent) got poorer" over the 1990s. Earnings inequality between the most well paid and the least well paid women in Massachusetts rose considerably during the decade of the 1990s.

Table 18:
Trends in the Real Annual Earnings of 20-64 Year Old Full-Time, Year-Round Female Workers
in Massachusetts at Various Points Along the Earnings Distribution, 1989 to 1999
(in 1999 dollars)

	(A)	(B)	(C)
Percentile	1989	1999	Percent Change
10	16,123	15,600	-3
20	20,153	20,000	-1
30	24,016	25,000	+4
40	26,871	28,000	+4
50	29,558	32,000	+8
60	33,589	36,000	+7
70	37,619	42,000	+12
80	42,994	50,000	+16
90	53,742	64,000	+19
95	64,490	81,000	+26
99	100,766	157,000	+56
<u>Earnings Ratios</u>			
Y_{99}/Y_{10}	6.25	10.06	+61
Y_{90}/Y_{10}	3.33	4.10	+23
Y_{90}/Y_{20}	2.67	3.20	+20
Y_{90}/Y_{50}	1.82	2.00	+10
Y_{80}/Y_{10}	2.67	3.20	+20
Y_{80}/Y_{20}	2.13	2.50	+17
Y_{50}/Y_{10}	1.83	2.05	+12

As a consequence of these highly divergent gains in the real annual earnings of women, annual earnings differences among Massachusetts women increased sharply over the decade. The relative size of the earning gaps between women at the very top of the distribution (99th percentile) and those at the lower end of the distribution (10th percentile) increased by more than 60 percent over the decade. For example, in 1989, a woman at the 99th percentile obtained annual earnings that were 6.2 times as high as those of women at the 10th percentile while by 1999 this relative earnings multiple had increased to more than 10 times. The earnings gaps between women at the 90th percentile and those at the 10th and 20th percentiles rose by 23 and 20 percent, respectively, over the decade. Similar to the findings for men, the earnings gaps

between women in the middle of the distribution (50th) and those at the bottom (10th percentile) increased more modestly; i.e., by 12 percent.

Our earlier analysis of changes in the real annual earnings of women by educational attainment during the 1990's had revealed the existence of growing disparities in the earnings of college educated women relative to their peers with only a high school education or less. These rising educational differentials clearly were a key factor contributing to the rising degree of earnings inequality among Massachusetts women over the past decade. Yet, other economic factors also played a role in generating rising earnings inequality among women, including rising inequality within educational groups. To illustrate this, we examined changes in annual earnings between 1989 and 1999 among white women with high school diplomas and bachelor degrees. How did the distribution of annual earnings change for these two groups of women in our state?

Findings in Table 19 reveal growing disparities in the annual earnings of White women with high school diplomas. During the 1990's, women in the bottom three deciles experienced declines of 4 to 5 percent in their annual earnings while women at the 40th percentile maintained their 1989 earnings and those in the exact middle of the distribution achieved a modest 2 percent gain. All other groups of women experienced larger gains, with the absolute and relative size of these earnings improvements rising as we move up the earnings distribution from 5% to those at the 70th percentile to 9% at the 90th percentile and a high of 19% for those at the 99th percentile. Comparing the absolute changes in real earnings for women at the 10th and 99th percentiles yields a loss of \$779 for those at the bottom, versus a gain of nearly \$13,000 in annual earnings for those women at the top of the earnings distribution.

Table 19:
Trends in the Real Annual Earnings of 20-64 Year Old White Female
High School Graduates Employed 40 or More Weeks Full-Time in 1989 and 1999
(in Constant 1999 Dollars)

	(A)	(B)	(C)	(D)
Percentile	1989	1999	Absolute Change	Percent Change
10	\$14,779	\$14,000	-\$779	-5
20	18,810	18,000	-810	-4
30	21,497	20,500	-997	-5
40	23,496	23,500	+4	0
50	25,527	26,000	+473	+2
60	26,927	29,000	+2,073	+8
70	30,453	32,000	+1,547	+5
80	33,589	36,000	+2,411	+7
90	40,307	44,000	+3,693	+9
95	47,024	52,690	+5,666	+12
99	67,178	80,000	+12,822	+19

Earnings gains for employed women with bachelor degrees also were quite varied (Table 20). While women all along the distribution obtained some improvement in their annual earnings over the decade, the absolute and relative size of these changes varied widely bottom to top. Women at the top percentile (99th) nearly tripled their annual earnings to \$322,000 by the end of the decade. A heightened degree of earnings inequality took place among college-educated women over the decade.

Table 20:
Trends in the Real Annual Earnings of 20-64 Year Old White Female
Bachelor Degree Holders Employed 40 or More Weeks Full-Time in 1989 and 1999
(in Constant 1999 Dollars)

	(A)	(B)	(C)	(D)
Percentile	1989	1999	Absolute Change	Percent Change
10	\$20,153	\$21,000	+847	+4
20	25,527	27,000	+1,473	+6
30	29,558	31,000	+1,442	+5
40	33,589	35,000	+1,411	+4
50	36,276	40,000	+3,724	+10
60	40,306	45,000	+4,694	+11
70	44,337	50,050	+5,713	+13
80	49,711	60,000	+10,289	+21
90	60,460	78,000	+17,540	+29
95	71,208	100,000	+28,792	+40
99	111,515	322,000	+210,485	+179

How did the degree of earnings inequality among Massachusetts women at the end of the 1990s compare to that of their U.S. counterparts? To answer this question, we compared seven relative earnings inequality measures for women in the state and the nation in 1999 (Table 21). On all seven measures, inequality among Massachusetts women was modestly below that of their counterparts across the country, with each of the Massachusetts measures being equal to 90 to 97 percent of the corresponding U.S. values. Over the decade, however, as was the case for men, earnings inequality among Massachusetts women increased at a faster pace than it did for women across the nation. As a result, the inequality gaps between the state and nation narrowed over the decade.

Table 21:
Comparisons of Relative Earnings Inequality for Women in
Massachusetts and the U.S., 1999

	(A)	(B)	(C)
Relative Earnings Measure	MA	U.S.	MA as % of U.S.
Y ₉₉ /Y ₁₀	10.06	10.42	97
Y ₉₀ /Y ₁₀	4.10	4.58	90
Y ₉₀ /Y ₂₀	3.20	3.44	93
Y ₉₀ /Y ₅₀	2.00	2.09	96
Y ₈₀ /Y ₁₀	3.20	3.50	91
Y ₈₀ /Y ₂₀	2.50	2.63	95
Y ₅₀ /Y ₁₀	2.05	2.19	94

How did earnings inequality among Massachusetts women compare to that of their peers in the other 49 states during 1999? While earnings inequality among Massachusetts women clearly increased strongly over the decade, the state typically ranked only slightly above average or in the middle of the state distribution on the eight earnings inequality measures in 1999. On only two of the eight earnings inequality measures (Y₉₀/Y₂₀ and Y₉₀/Y₅₀) did the state rank in the top third of the distribution. On two others, the state ranked 19th and 22nd, slightly above the average, and on the four other measures it ranked right in the middle or slightly below the average. On not one of these eight earnings inequality measures, however, was the state among the most egalitarian in the nation. Similar to findings for men, a substantially heightened degree of earnings inequality has taken place among Massachusetts women over the past few decades, and this rise in earnings inequality has contributed in important ways to increasing income inequality among the state's families, especially given high assortative mating that results in high earnings women marrying men with high annual earnings.

Table 22:
Massachusetts' Rankings Among the 50 States on the Degree of Annual Earnings Inequality Among Female Year-Round, Full-Time Workers in 1999

	(A)	(B)
Relative Earnings Ratio	Value of Ratio	Ranking
Y ₉₅ /Y ₁₀	5.19	26 th
Y ₉₅ /Y ₂₀	4.05	19 th
Y ₉₀ /Y ₁₀	4.10	28 th
Y ₉₀ /Y ₂₀	3.20	16 th
Y ₉₀ /Y ₅₀	2.00	17 th
Y ₈₀ /Y ₁₀	3.20	28 th
Y ₈₀ /Y ₂₀	2.50	22 nd
Y ₅₀ /Y ₁₀	2.05	25 th

The Annual Earnings of Full-Time, Year-Round Workers Across Counties of the State: 1999

All of our preceding analyses of the annual earnings experiences of Massachusetts workers in the 1990s and the 1980s were based on statewide findings. During the past two decades, there has been a growing geographic divide in the economic fortunes of workers and families across geographic regions, counties, and cities and towns of the state.²⁰ On a comparative basis, the western region of the state (Berkshire, Franklin, Hampden and Hampshire counties) performed quite poorly during recent decades, lagging far behind the Greater Boston and Southeast regions in job creation and in real wage growth in private sector wage and salary jobs. For example, between 1991 and 2000, wage and salary job growth varied across the four major geographic regions of the state from a low of 10.5% in the western region to highs of 20.5% in the Greater Boston region and 26.5% in the Southeast region, boosted by a 32% jobs growth rate in Barnstable County.²¹ In fact, job growth (+27,800) in the western region of the

²⁰ For earlier reviews of geographic variations in labor market, incomes, and earnings outcomes across the state in the 1980s and the 1990s,

See: (i) Andrew Sum, Anwiti Bahuguna, Neeta Fogg, et. al., *The Road Ahead: Emerging Threats to Workers, Families, and the Massachusetts Economy*, Massachusetts Institute for A New Commonwealth and the Teresa and H. John Heinz Foundation, Boston, 1998; (ii) Andrew Sum, Paul Harrington, Neeta Fogg, et. al., *The State of the American Dream in Massachusetts, 2002*, The Massachusetts Institute for A New Commonwealth, Boston, 2002.

²¹ These job growth estimates are based on the state ES-202 data base on private sector wage and salary jobs covered by the provisions of the state and federal unemployment insurance laws. These jobs counts are universe counts

state between 1991 and 2000 fell slightly short of the steep job losses (28,100) that were generated between 1989 and 1991.

The growth of mean real annual wages and salaries of private sector jobs also varied considerably across regions and counties of the state over the past decade. These growth rates ranged from a low of 6% in the western region to a high of 27% in the Greater Boston region.²² Across counties, growth rate of mean annual wages and salaries on private sector jobs varied from a low of under 1% in Hampshire County to highs of 36 to 39 percent in Middlesex and Suffolk Counties, respectively. The findings for Suffolk County need to be interpreted with some caution for several reasons. First, a high share of the jobs in Suffolk County, especially in the city of Boston, are held by in-commuters rather than by county residents. City residents' earnings did not improve nearly that well in the 1990s. Second, there was a very large gap between the mean and median annual earnings of Suffolk County workers in 1999, implying a very high degree of inequality in the earnings distribution of the county, especially among males.²³ This earnings inequality has exacerbated income inequality in Suffolk and many other counties of the state during the past decade.

Differences in job growth rates and in real annual earnings per worker across counties of the state led to differences in the growth rates of median real family incomes across counties.²⁴ During the decade of the 1990s, median family incomes declined in Hampden (-1.6%) and Suffolk Counties (-5.3%) while they increased by 6 to 7 percent in Norfolk, Middlesex, and Barnstable Counties.

How much did the average annual earnings of full-time, year-round workers vary across counties of the state at the end of the 1990s? To answer this key question, we estimated the 1999 median annual earnings of those workers who were employed full-time for 40 or more weeks in

based on earnings and employment reports submitted by private sector employers to the Massachusetts Department of Employment and Training on a quarterly basis.

²² See: Andrew Sum, Paul Harrington, Neeta Fogg, et. al., *The State of the American Dream in Massachusetts, 2002*, The Massachusetts Institute for A New Commonwealth, Boston, 2002.

²³ See: Andrew Sum, Ishwar Khatiwada, Sheila Palma, and Paulo Tobar, *Changes in the Economic Well Being of Families in Substate Areas of Massachusetts: Implications for the Targetting of Economic Development and Workforce Development Programs*, Report Prepared for The Workforce Solutions Group, Boston, June 2004.

²⁴ The mean annual earnings of year-round, full-time male workers in Suffolk County during 1999 was \$47,645 versus a median earnings level of only \$35,000, a relative gap of 36%. Gaps of closer to 40% between mean and median earnings prevailed in Essex and Middlesex Counties while Hampshire county had only a 7% gap.

each county of the state. Estimates were generated for all such workers and for men and women separately. During 1999, the median annual earnings of workers employed full-time for 40 or more weeks ranged from lows of \$30,000 in Berkshire and Hampshire counties to highs of \$40,000 and \$42,000 in Middlesex and Norfolk Counties, respectively. The relative size of the difference in annual earnings between the top and bottom of the county earnings distribution for all workers was a rather large 40 percent.

Table 23:
Rankings of Massachusetts Counties by the Median Annual Earnings of
Workers Employed 40 or More Weeks Full-Time in 1999, Total and by Gender

(A)		(B)		(C)	
All Workers		Male Workers		Female Workers	
County	Annual Earnings	County	Annual Earnings	County	Annual Earnings
Norfolk	\$42,000	Norfolk	\$50,000	Norfolk	\$35,500
Middlesex	\$40,000	Middlesex	\$46,000	Middlesex	\$35,000
Essex	\$38,000	Essex	\$43,000	Essex	\$32,000
Worcester	\$36,000	Worcester	\$42,000	Suffolk	\$31,700
Barnstable	\$35,000	Barnstable	\$40,000	Franklin	\$31,200
Bristol	\$35,000	Bristol	\$40,000	Barnstable	\$30,000
Franklin	\$35,000	Plymouth	\$40,000	Worcester	\$30,000
Plymouth	\$34,400	Franklin	\$39,000	Bristol	\$29,000
Hampden	\$33,300	Hampden	\$38,900	Plymouth	\$28,500
Suffolk	\$33,100	Berkshire	\$35,000	Hampden	\$28,000
Hampshire	\$30,000	Hampshire	\$35,000	Berkshire	\$26,000
Berkshire	\$30,000	Suffolk	\$35,000	Hampshire	\$26,000
Top/Bottom	1.40		1.43		1.36

The geographic pattern of annual earnings levels for employed men by county was quite similar to that for all workers. These median annual earnings levels of men ranged from lows of \$35,000 in Berkshire, Hampshire and Suffolk Counties to highs of \$46,000 in Middlesex and \$50,000 in Norfolk County. The highest median annual earnings exceeded the lowest by \$15,000 or 43%.

Among women, median annual earnings also were lowest in Berkshire and Hampshire counties at \$26,000, and they again were highest in Middlesex and Norfolk Counties with

earnings levels of \$35,000 and \$35,500, respectively. The highest median earnings level for women exceeded the lowest by \$9,500 or 36%. The absolute and relative sizes of these annual earnings differences by county have widened over the past two decades, contributing to the widening gaps in per capita incomes and median incomes across counties. These widening income differences in turn have been responsible for growing geographic differences in the incidence of poverty and low income problems across the state and the high degree of geographic variability in the share of families that were unable to achieve Economic Self-Sufficiency at the end of the 1990s.²⁵

Annual Earnings of Workers by Major Industrial Sector, 1999

The wages and annual earnings of workers are influenced not only by their own human capital characteristics, such as cumulative years of work experience, formal education, literacy and numeracy proficiencies, and occupational training, but also by the characteristics of the firms in which they are employed. Among the firm characteristics that have been found to independently influence the earnings of workers are the industries of the firms, their number of employees, their profitability, and their unionization status.²⁶ The 2000 Census captured some information on the firms in which employees worked at the time of the Census. The information on the type of products or services produced by the firm on the job held at the time of the Census was used by the U.S. Census Bureau to assign an industry code. We combined all of these industries into 20 industrial sectors and calculated the median and mean 1999 annual earnings of all 20-64 year old Massachusetts workers who were employed full-time for 40 or more weeks during that year. These estimates of median earnings were generated for all workers meeting the above age and employment criteria and for workers in five educational categories. Findings for all workers combined are displayed in Table 24 and for a selected number of industries for workers with a high school diploma and a Bachelor's degree in Table 25.

During 1999, the median annual earnings of all 20-64 year old workers who were employed 40 or more weeks full-time were \$37,500. The median annual earnings of these

²⁵ For a review of geographic variations in poverty, low income, and FESS budget deficit problems across the state, See: Andrew Sum, Neeta Fogg, Ishwar Khatiwada, Susan Perron, et. al., *A New Look at Income Inadequacy Challenges in Massachusetts*.....

workers varied quite widely across major industrial sectors of the state, ranging from lows of \$22,000 in the accommodation and food services industries and \$29 to \$30 thousand in other services, administrative support and waste management, and agriculture/forestry/fishing industries to highs of \$51,000 in the utilities industries (gas, electric) and \$52,000 in professional, scientific, and technical services. The relative differences in median annual earnings between the top two paying industries and the bottom four industries were quite substantial, ranging from 70 to nearly 140 percent. Annual earnings of resident workers clearly varied widely by the industrial sector of their job attachment.

Table 24:
Median Annual Earnings of 20-64 Year Old Full-Time, Year-Round
Workers in Massachusetts by Major Industrial Sector of Employment, 1999

Sector	Median Earnings
Professional, scientific, technical services	\$52,000
Utilities	\$51,000
Information services	\$45,000
Public administration	\$43,000
Financial and insurance	\$42,000
Durable manufacturing	\$40,000
Transportation and warehousing	\$39,500
Construction	\$39,000
Educational services	\$38,300
Wholesale trade	\$38,000
Real estate, rental and leasing	\$35,500
Nondurable manufacturing	\$34,000
Health care and social assistance	\$33,000
Retail trade	\$31,600
Arts, entertainment, recreation	\$31,000
Other services	\$30,000
Administrative support and waste management	\$30,000
Agriculture, forestry, fishing	\$29,100
Accommodation and food services	\$22,300
All	\$37,500

²⁶ In this table, we do not separately report the annual earnings of workers in the state's mining industries. There were only 1,344 full-time, year round workers in these industries in 1999, accounting for less than .1% of all such workers across the state.

The median earnings of workers in a given industry reflect both a combination of the human capital traits of these workers and other factors related to firm characteristics (capital intensity, level of technology, management quality, profitability) that influence their productivity and earnings power. For example, the high median earnings of workers in professional, scientific, and technical services industries and information services are partly the result of the relatively high share of college graduates employed in those industries. Yet, the median annual earnings of Massachusetts workers with the same level of educational attainment vary quite sharply across major industrial sectors.²⁷ To illustrate this, we estimated the 1999 median annual earnings of high school graduates and Bachelor degree recipients in each major industrial sector and ranked them from highest paying to lowest paying. The top six paying industries and the bottom five paying industries for both groups of workers are displayed in Table 25.

The median annual earnings of 20-64 year old high school graduates in Massachusetts was \$30,000. The median earnings of these high school graduates, however, ranged considerably across major industrial sectors from lows of \$20 to \$25 thousand in accommodation and food services and health and social assistance industries to highs of \$36 to \$37 thousand in construction, public administration, transportation, and utilities industries. Among workers with bachelor degrees, median annual earnings in 1999 were \$45,000, but they also varied widely across major industrial sectors. Four year college graduates employed in arts/entertainment/recreation/accommodation/food services, and educational services only obtained median annual earnings in the \$30 to \$34,000 range versus highs of \$60,000 for workers in durable manufacturing and utilities industries. Relative earnings differences of 100% prevailed from top to bottom of the interindustry earnings distribution for bachelor degree holders. These are extraordinarily large differences. The industry of one's employer clearly has a marked impact on one's expected earnings both among high school graduates and college graduates.

²⁷ Findings of multivariate statistical analyses of the 1999 earnings of workers reveal that large industry pay premiums remain even after controlling for key demographic and human capital characteristics of workers and their geographic locations across the state.

Table 25:
Median Annual Earnings of 20-64 Year Old Full-Time,
 Year Round Employed High School Graduates and College Graduates in
 Massachusetts in Selected Major Industrial Sectors, 1999

High School Graduates		Bachelor Degree Holders	
(A)	(B)	(A)	(B)
Industrial Sector	Earnings	Industrial Sector	Earnings
Utilities	\$45,000	Utilities	\$60,000
Transportation/Warehousing	\$37,000	Durable manufacturing	\$60,000
Public Administration	\$37,000	Wholesale Trade	\$55,000
Construction	\$36,000	Professional, scientific services	\$52,000
Information services	\$35,000	Information services	\$50,000
Durable manufacturing	\$32,000	Finance & insurance	\$50,000
Retail trade	\$27,000	Agriculture, forestry, fishing	\$35,000
Other services	\$27,000	Other services	\$35,000
Administrative and support and waste management	\$27,000	Educational services	\$34,000
Health care and social assistance	\$25,000	Accommodation and food services	\$33,000
Accommodation and food services	\$20,000	Arts, entertainment, recreation	\$30,000
Total	\$30,000	Total	\$45,000

A review of recent projected employment developments by major industry in Massachusetts should raise concerns about their potential earnings impacts. Since 2000, major job losses have taken place in the state's manufacturing, information services, and key utilities industries. Little employment growth or actual job declines over the remainder of the decade is projected for manufacturing, utilities, and public administration, all of which pay above average wages.²⁸ Job growth will be concentrated in retail trade and private service industries, many of which pay below average annual salaries. Efforts to sharply raise productivity in these latter industries will be required to boost real annual earnings of many workers over the remainder of the current decade.

²⁸ Construction employment held up well in the state until 2000, but has since began to decline in part as a result of the end of public works projects including the Big Dig.

Estimating the Shares of Massachusetts Workers with Annual Earnings Above the Low Income Threshold During 1999

In addition to estimating the median annual earnings levels of a wide array of demographic and socioeconomic subgroups of Massachusetts workers in recent years, we also are interested in identifying how many workers were able to achieve an “adequate level of earnings”. There are a variety of earnings standards that can be used to measure “adequacy”, each of which will yield quite different estimates of the share of Massachusetts workers that are able to obtain adequate earnings during a given calendar year. The earnings standard that we have adopted to represent “adequacy” in this paper is the following:

“...a worker obtaining annual earnings that would allow him/her to support a family of four with an income at least twice the poverty line for such a family is considered to have adequate earnings.”

During calendar year 1999, a Massachusetts worker with annual earnings of \$34,060 would have been able to support the average four person family with an income above twice the federal poverty line for such a family.²⁹ The family income level representing twice the poverty line is referred to as the low income threshold. We will apply this earnings standard only to those 20-64 year old workers who were employed full-time for 40 or more weeks during calendar year 1999.

An annual earnings level of \$34,060 in calendar year 1999 would have been sufficient to raise every family of two, three, and four persons in Massachusetts above the low income threshold for that year. Unlike the Family Economic Self-Sufficiency Standards, the poverty and low income thresholds are not adjusted for cost-of-living differences across substate areas.³⁰ An earnings level of \$34,060 also would have been sufficiently high to raise a fairly large number of families above the economic self-sufficiency standards of the Women’s Educational and Industrial Union. A listing of such families is displayed in Table 26. For example, all families in

²⁹ The poverty line for a four person family varies with the age composition of family members, especially the number of children under 18. The average weighted poverty threshold for a four person family in 1999 was \$34,058. See: U.S. Census Bureau, *Poverty in the United States: 1999*, Washington, D.C., 2000.

³⁰ For a more detailed review of the Family Economic Self Sufficiency Standards in Massachusetts during 1999 and their variations across substate areas,

the state with two adults and no children under 18 would have achieved economic self-sufficiency in 1999 with an annual earnings above \$34,060. If there were three adults present in the household, only families in 5 of the state's 12 counties (Bristol, Hampden, Hampshire, Franklin, Berkshire) would have been able to achieve self-sufficiency with an income of at least \$34,060.³¹

Table 26:
Massachusetts Families Who Would Have Been Raised Above the
Low Income Threshold or the FESS Budget Standard in 1999 with
Annual Earnings Above \$34,060

Type of Family	Income Standard Above Which Raised
Families with 2 Persons	Low Income in All Counties
Families with 3 Persons	Low Income in All Counties
Families with 4 Persons	Low Income in All Counties
Families with 2 Adults and No Children Under 18	FESS Budget Standard in All Counties
Families with 3 Adults No Children	FESS Budget Standard in 5 Counties
Single Parent Families with One Child Under 6	FESS Budget Standard in 8 Counties
Single Parent Families with One Child Over 6	FESS Budget Standard in All Counties
Single Parent Families, 2 Children Over 6	FESS Budget Standard in All Counties
Married Couple, One Child Under 6	FESS Budget Standard in 5 Counties
Married Couple, One Child Over 6, One Child Under 6	None of the Counties

Among the state's single parent families, those with only 1 child under 6 would have been able to achieve the FESS budget standard with annual earnings of \$34,060 in 5 counties in 1999; however, if the child was older than 6, an income of \$34,060 would have been sufficient to raise all such families above the FESS standard in 1999. Lower child care costs for children over the age of six make this possible. Among married couple families with one child under 6, an annual income of \$34,060 would have been sufficient to raise them above the FESS budget standard in 1999 in five counties. If there were two children present in such families (one child under 6, one child over 6), however, an income of \$34,060 would not have been sufficient to raise such families above the FESS budget standard in any county of the state. Additional

See: Jean Bacon, Laura Henze Russell and Diana Pearce, *The Self-Sufficiency Standard: Where Massachusetts Families Stand*, Women's Educational and Industrial Union, United Way of Massachusetts Bay, Boston, 2000.

³¹ The counties of Dukes and Nantucket were combined with Barnstable County in developing estimates of FESS family budgets at the county level.

income from the earnings of other family members or property income equal to \$2,700 in Berkshire County and up to \$17,600 in Middlesex County would have been needed to raise these married couple families above the FESS budget standard during 1999.

Estimates of the Share of Massachusetts Workers with Annual Earnings Above the Low Income Threshold for a Four Person Family

Estimates of the percent of full-time, year-round Massachusetts workers with annual earnings above the low income threshold in 1999 and 1989 are displayed in Table 27.³² These estimates were generated for 20-64 year old workers by educational attainment and by gender. During 1999, nearly 57 percent of such Massachusetts workers were able to achieve adequate earnings; i.e., earnings of at least \$34,060. The fraction of workers doing so, however, varied widely by educational attainment and gender during that year. For all workers (both genders combined), the fraction that were able to achieve adequate earnings ranged from a low of 27 percent for those lacking a high school diploma to 40 percent for those with a diploma to highs of 72 percent for those with a Bachelor's degree and 83 percent for those with a Master's or higher degree. Males were nearly twenty percentage points more likely than women (65 vs. 45 percent) to obtain adequate annual earnings in 1999, with the gender gaps typically being largest for those workers lacking a four year college degree. Among both groups, but especially among women, the share of workers obtaining adequate annual earnings rose uniformly and strongly with their years of formal schooling. Among women, only 14 percent of those workers lacking a high school diploma and 23 percent of high school graduates were able to secure adequate annual earnings versus 62 of every 100 women with a Bachelor's degree and nearly 78 percent of those with a Master's or higher degree (Table 27).

Between 1989 and 1999, the share of year-round, full-time workers in Massachusetts who were able to obtain earnings in excess of the low income threshold improved by nearly four percentage points from 53% to just under 57% (Table 27). Almost all of the improvement in this ratio, however, took place among women, whose share rose by 9.3 percentage points. The fraction of male workers with adequate annual earnings rose by only one percentage point over

See: Andrew Sum, Neeta Fogg, Ishwar Khatiwada, et. al., *A New Look at Income Inequality Challenges in Massachusetts...*, especially "Appendix B".

³² The low income threshold for 1989 is based on two times the average weighted poverty threshold for families containing four persons.

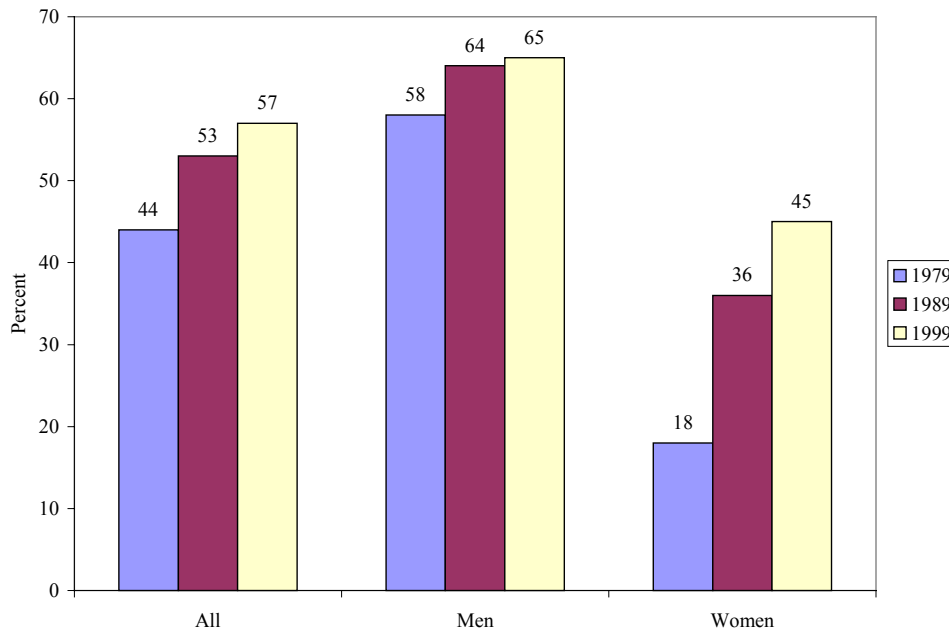
the decade, reflecting the far weaker gains in the real annual earnings of men during the 1990s. Among employed males, only those with a bachelor's degree increased their likelihood of securing adequate annual earnings over the decade. Less educated males experienced declines in their ability to obtain annual earnings above the low income threshold.

Table 27:
Percent of 20-64 Year Old Full-Time, Year-Round Employed in Massachusetts
With Annual Earnings Above Two Times the Poverty Line for a Four Person
Family, by Gender and Educational Attainment, 1989 and 1999

	(A)	(B)	(C)
Gender and Educational Attainment	1989	1999	Absolute Change, 1989-99
Male			
Less than 12 or 12, no diploma	38.7	33.9	-4.8
HS Diploma or GED	52.7	51.0	-1.7
Some College, No Degree	61.3	61.0	-0.3
Associate Degree	69.6	68.7	-0.8
Bachelor's Degree	77.0	79.1	2.1
Master's or Higher Degree	88.6	86.6	-1.9
Total	63.8	64.7	1.0
Female			
Less than 12 or 12, no diploma	9.5	13.9	4.3
HS Diploma or GED	18.2	23.1	5.0
Some College, No Degree	30.2	36.1	5.9
Associate Degree	39.4	45.4	6.0
Bachelor's Degree	55.4	61.7	6.2
Master's or Higher Degree	74.1	77.7	3.6
Total	36.1	45.3	9.3
Total			
Less than 12 or 12, no diploma	28.5	26.7	-1.8
HS Diploma or GED	38.8	40.3	1.5
Some College, No Degree	48.6	50.1	1.5
Associate Degree	55.0	57.0	1.9
Bachelor's Degree	68.2	71.7	3.5
Master's or Higher Degree	83.5	83.0	-0.6
Total	52.8	56.7	3.9

Earlier, we revealed that growth in the median real annual earnings of Massachusetts workers was considerably higher in the 1980s than it was during the 1990s. One would expect that such higher earnings growth over the 1980s would have been more effective in boosting workers earnings above the low income threshold for a four person family. Such indeed was the case (Chart 3). Between 1979 and 1989, the share of year-round, full-time workers with annual earnings above the low income threshold increased from 44 to 53 percent, a gain of 9 full percentage points versus a gain of only 4 percentage points during the 1990s. During the 1980s, both men and women experienced a substantive increase in the share of workers with annual earnings above the low income threshold; however, the gain for women was three times higher than that of men (18 versus 6 percentage points).³³

Chart 3:
Percent of 20-64 Year Old Persons Employed 40 or More Weeks
Full-Time with Annual Earnings Two or More Times the Poverty Line:
All and by Gender: 1979, 1989, and 1999



How successful were Massachusetts workers in obtaining adequate annual earnings in 1999 relative to their U.S. counterparts? Comparisons of the shares of U.S. and Massachusetts

³³ The improvements in the share of men with annual earnings above the low income threshold during the 1980s varied considerably across educational attainment subgroups, with the bulk of the gains taking place among men with at least a few years of post-secondary schooling.

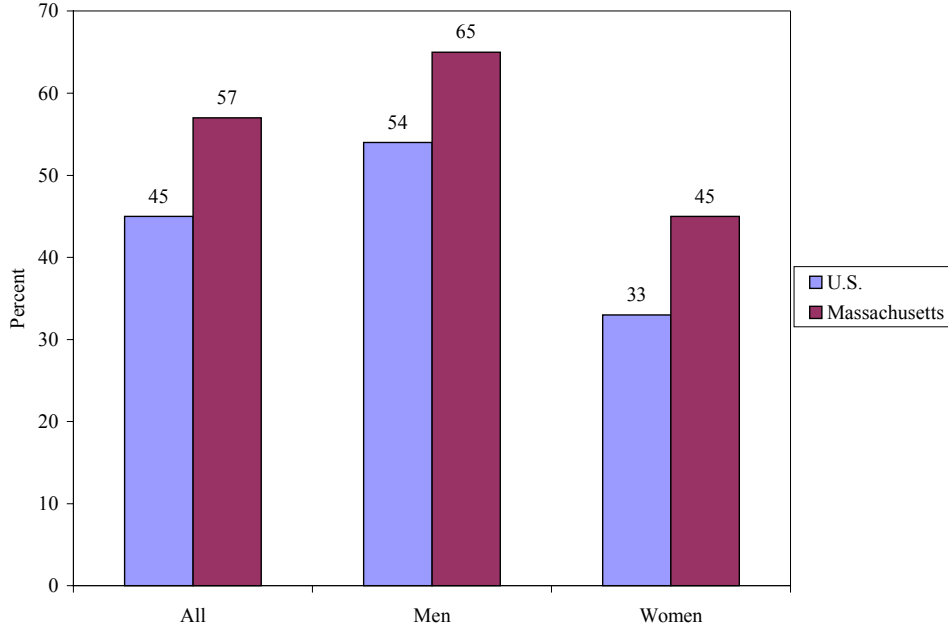
year-round, full-time workers with adequate annual earnings during 1999 are displayed in Table 28 and Chart 4. Results are displayed for all workers and for those in gender and educational attainment groups. Overall, Massachusetts workers were more successful than their U.S. counterparts in securing adequate annual earnings (57% vs. 45%). Substantive earnings advantages existed for both men (11.2 percentage points) and women (11.9 percentage points) and for workers in each of the educational attainment subgroups. The absolute size of these advantages, however, were higher for less educated workers than for those Massachusetts workers with Bachelor or higher degrees. A careful analysis of the findings in Table 28 also reveals that a substantive part of the overall Massachusetts advantage is attributable to the higher educational attainment of full-time, year-round workers in our state.³⁴

³⁴ The size of the improvements in the earnings adequacy rates of workers with bachelor and master degrees were well below that for the combined group of workers.

Table 28:
Percent of 20-64 Year Old Adults Employed Full-Time for 40 or More
Weeks with Annual Earnings Above Two Times the Poverty Line in
1999 by Gender and Educational Attainment, U.S. and Massachusetts

	(A)	(B)	(C)
Gender/Educational Attainment	U.S.	Massachusetts	Massachusetts – U.S.
Both Sexes, All	45.3	56.7	+11.4
• Less than 12 or 12 no diploma	19.5	26.7	+7.2
• H.S. graduate/GED	31.6	40.3	+8.7
• 1-3 years college, no degree	41.6	50.1	+8.5
• Associate’s degree	49.2	57.0	+7.8
• Bachelor’s degree	66.2	71.7	+5.5
• Master’s or higher degree	80.4	83.0	+2.6
Men, All	53.5	64.7	+11.2
• Less than 12 or 12 no diploma	24.3	33.9	+9.6
• H.S. graduate/GED	41.5	51.0	+9.5
• 1-3 years college, no degree	52.9	61.0	+8.1
• Associate’s degree	60.0	68.7	+8.7
• Bachelor’s degree	74.6	79.1	+4.5
• Master’s or higher degree	84.6	86.6	+2.0
Women, All	33.4	45.3	+11.9
• Less than 12 or 12 no diploma	9.2	13.9	+4.7
• H.S. graduate/GED	17.0	23.1	+6.1
• 1-3 years college, no degree	27.3	36.1	+8.8
• Associate’s degree	37.2	45.4	+8.2
• Bachelor’s degree	54.5	61.7	+7.2
• Master’s or higher degree	73.9	77.7	+3.8

Chart 4 :
Percent of 20-64 Year Old Persons Employed 40 or More Weeks Full-Time
In 1999 with Annual Earnings Above Two Times the Poverty Line,
All and Gender: U.S. and Massachusetts



The shares of Massachusetts workers with adequate annual earnings in 1989 and 1999 by race-ethnic group are presented in Table 29. There was considerable variation in the success rates of workers in achieving adequate annual earnings across these four race-ethnic groups. The percent of workers with adequate annual earnings during 1989 ranged from a low of 26 percent among Hispanic workers, to 39 percent among Black workers, to nearly 53 percent among Asian workers, and to a high of 60 percent among White, non-Hispanics.

Table 29:
Percent of 20-64 Year Old Persons Employed Full-Time for 40 or More
Weeks in Massachusetts With Annual Earnings Above Two Times the Poverty Line
For a Four Person Family, by Gender by Race/Ethnic Group, 1989 and 1999

	(A)	(B)	(C)
Gender and Race/Ethnic Group	1989	1999	Absolute Change, 1989 – 99
Male			
White	66.0	68.4	2.4
Black	44.4	44.2	-0.1
Asian	51.3	59.2	8.0
Hispanic	29.6	30.2	0.6
Total	63.8	64.8	1.0
Female			
White	37.2	48.1	10.9
Black	29.8	34.3	4.5
Asian	33.7	43.7	10.0
Hispanic	16.6	21.1	4.4
Total	36.1	45.3	9.3
Total			
White	54.7	60.1	5.4
Black	37.5	39.3	1.8
Asian	44.0	52.7	8.7
Hispanic	24.4	26.2	1.8
Total	52.8	56.7	4.0

The race-ethnic patterns of earnings adequacy rates were quite similar for both men and women. Within both gender groups, Hispanic workers were the least likely to achieve earnings adequacy while White workers were the most likely to do so. Over the decade, workers in each race-ethnic group made some progress in obtaining adequate annual earnings; however, the size of these percentage increases varied markedly by race-ethnic group, being lowest for Hispanics at 1.8 percentage points and highest for Asian workers (8.7 percentage points). The higher gains for Asian workers were strongly associated with the more substantial improvements in their educational attainment over the decade.

The success rates of Massachusetts workers in achieving adequate earnings in each race-ethnic group were positively linked to their levels of formal schooling in both 1989 and 1999 (Table 30). In the latter year, the share of Asian workers with adequate annual earnings varied from a low of slightly under 14 percent for those workers lacking a high school diploma/GED to 33 percent for those completing 1-3 years of college to a high of 81% for those with a Master's or higher degree. Among Hispanics, the share of workers with adequate annual earnings ranged from a low of 15 percent for those lacking a high school diploma to a high of 70 percent for those with a Master's or higher degree. Gains in the rates of achieving adequate earnings over the decade were very modest among high school dropouts in each of the four race-ethnic groups, and both Black and Hispanic high school graduates failed to achieve any improvements in their ability to secure adequate earnings over the decade. During 1999, only 18 percent of employed Hispanic high school graduates and 26 percent of Black high school graduates were able to obtain annual earnings above twice the poverty line. Given projected changes in the state's occupational skills mix over the current decade, these groups of workers are likely to find it increasingly difficult to obtain adequate annual earnings in the years ahead.

Table 30:
Percent of 20-64 Year Old Persons Employed Full-Time for 40 or
More Weeks with Annual Earnings Above Two Times the Poverty Line by
Race-Ethnic Origin and Educational Attainment, 1999

	(A)	(B)	(C)
	1989	1999	Change
White			
Less than 12 or 12, No Diploma	32.0	32.5	0.6
High School Diploma or GED	40.3	43.5	3.2
Some College, No Degree	50.3	53.4	3.1
Associate's Degree	56.3	60.0	3.6
Bachelor's Degree	69.1	72.9	3.8
Master's or Higher Degree	84.0	83.8	-0.2
Total	54.7	60.1	5.4
Black			
Less than 12 or 12, No Diploma	20.2	20.4	0.2
High School Diploma or GED	26.4	26.1	-0.3
Some College, No Degree	34.8	35.0	0.2
Associate's Degree	42.7	39.1	-3.6
Bachelor's Degree	60.3	62.2	1.8
Master's or Higher Degree	79.5	77.6	-1.9
Total	37.5	39.3	1.8
Asian			
Less than 12 or 12, no diploma	12.4	13.8	1.5
High School Diploma or GED	20.1	23.7	3.6
Some College, No Degree	30.0	32.9	2.9
Associate's Degree	41.5	32.2	-9.4
Bachelor's Degree	53.9	66.7	12.8
Master's or Higher Degree	80.5	80.6	0.1
Total	44.0	52.7	8.7
Hispanic			
Less than 12 or 12, no diploma	13.4	15.1	1.7
High School Diploma or GED	17.8	18.2	0.5
Some College, No Degree	25.4	24.3	-1.1
Associate's Degree	32.9	28.2	-4.7
Bachelor's Degree	47.9	56.3	8.4
Master's or Higher Degree	70.6	69.8	-0.8
Total	24.4	26.2	1.8

The Adequacy of the Annual Earnings of Massachusetts Workers by Major Industrial Sector and Occupational Group

Earlier in this report, we identified fairly substantial variations in the median annual earnings of Massachusetts workers by the industrial sector of their jobs and their occupational areas of employment. One would, thus, anticipate that the ability of workers to achieve adequate annual earnings also would be influenced by the industrial and occupational characteristics of their jobs. We classified the jobs held by Massachusetts workers into 17 major industrial sectors and 22 occupational clusters. Findings of our analysis of the relationships between earnings adequacy and sector of employment are displayed in Tables 31 and 32.

Overall, nearly 57 percent of 20-64 year old Massachusetts workers were able to obtain adequate annual earnings during 1999. The fraction doing so, however, varied quite considerably across major industrial sectors (Table 31). Only 27 percent of those workers employed in arts/entertainment/recreation industries and 38 percent of those working in personal/other service industries were able to achieve adequate annual earnings versus highs of 68 percent in professional and related services, 69 percent of those in the federal government, and 71 percent of those in information services.

The higher shares of workers obtaining earnings in excess of the low income threshold during 1999 in the professional services and information services industries were attributable in large part to the higher fraction of workers with college degrees in those sectors. To identify whether these links between the industrial sector of one's job and the ability to obtain adequate annual earnings also existed for workers with a given level of schooling, we computed the shares of workers with adequate earnings by industrial sector for six educational subgroups.

Table 31:
Percent of 20-64 Year Old Persons Employed Full-Time for 40 or More
Weeks With Annual Earnings Above Two Times the Poverty Line by Major Industry and
Educational Attainment, 1999

Industry	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Less than 12 or 12, no diploma	High School Graduate	Some College, No Degree	Associate's Degree	Bachelor's Degree	Master's or Higher Degree	Total
Agriculture, Forestry, and Fisheries	30.9	38.1	32.8	52.9	43.7	51.4	38.2
Mining	66.0	75.1	58.1	89.5	100.0	0.0	72.8
Construction	48.3	56.3	58.8	65.9	75.2	83.8	59.1
Manufacturing, Nondurable	22.1	41.9	55.0	59.2	79.6	87.9	49.8
Manufacturing, Durable	28.0	45.3	63.7	70.6	86.0	91.8	62.0
Wholesale Trade	29.8	45.2	54.8	63.4	82.4	84.9	58.6
Retail Trade	23.3	32.4	42.9	46.4	66.9	74.2	44.8
Transportation, Communications, and Utilities	41.1	56.2	59.8	66.6	77.2	79.4	60.2
Information Services	44.5	53.7	68.4	66.5	76.4	83.6	70.7
Finance, Insurance, and Real Estate	32.5	36.2	49.2	53.7	78.0	88.3	63.1
Professional and Related Services	22.4	37.8	52.9	60.7	77.7	87.4	68.2
Educational, Health, and Social Services	17.5	21.5	34.0	48.4	55.7	77.9	50.1
Arts, entertainment and recreation	11.3	18.0	29.2	37.9	47.0	58.0	27.2
Other Services, including Personal	24.8	31.9	35.8	40.9	51.8	60.0	38.3
Local Government	31.6	47.4	59.0	63.8	65.8	85.4	65.9
State Government	31.4	49.7	50.2	65.7	67.1	84.0	63.5
Federal Government	36.5	60.7	63.6	70.4	79.9	87.8	69.3
Total	26.7	40.3	50.1	57.0	71.7	83.0	56.7

Source: PUMS, 5%, Census of Population and Housing 2000, U.S. Census Bureau.

For workers in most of these educational subgroups, there were substantial variations in the share of workers with adequate annual earnings across industrial sectors. For example, among high school graduates with no post-secondary schooling, the share of workers with adequate annual earnings in 1999 ranged from lows of 18 percent in the arts/entertainment/recreation industries and 21 percent in educational/health/social services to highs of 54 percent in information services, 56 percent in the construction and transportation/communications sectors, and 61 percent in the federal government (Table 31 and Chart 5). Among workers with an Associate’s degree, the percent with adequate annual earnings varied from lows of 38 to 46 percent in arts/entertainment/recreation, other services, and retail trade industries to highs of 66 to 71 percent in construction, information services, transportation/communications/utilities, durable manufacturing, and the federal government (Chart 6).

Table 5:
The Percent of 20-64 Year Old Employed Full-Time, Year-Round High School Graduates with Adequate Annual Earnings During 1999 in Selected Industrial Sectors

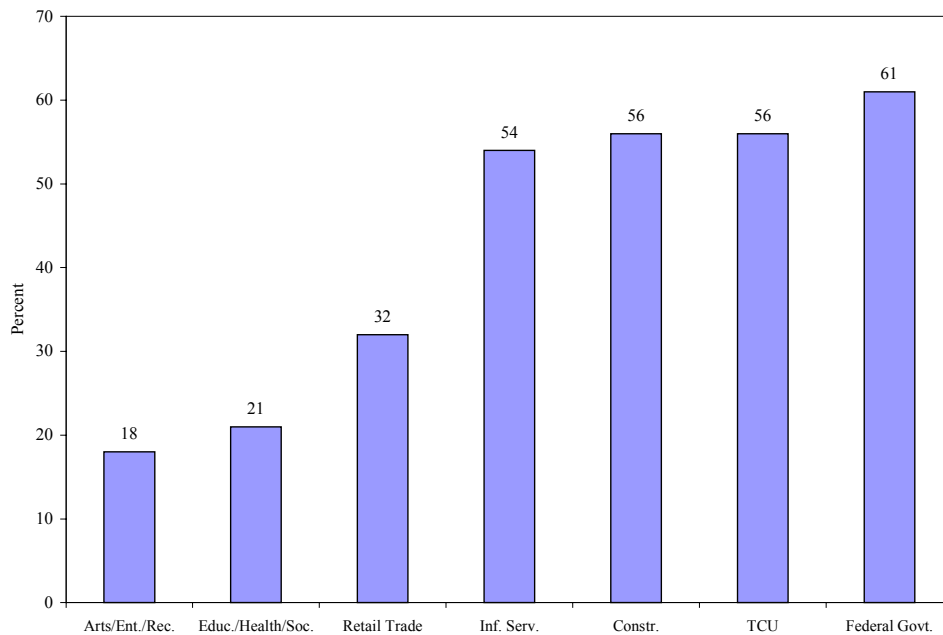
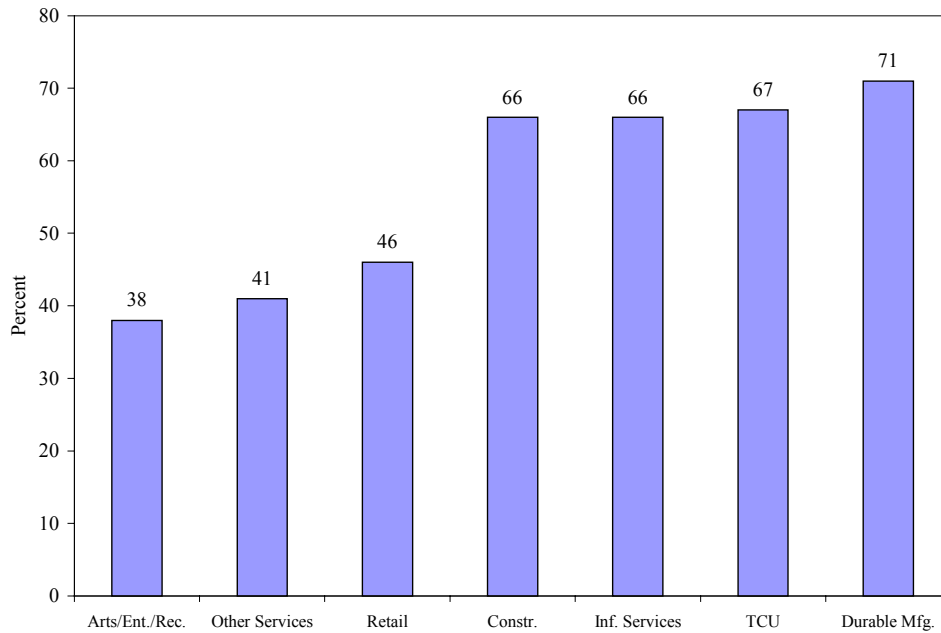


Table 6:
The Percent of 20-64 Year Old Employed Full-Time, Year-Round Associate Degree
Holders with Adequate Annual Earnings During 1999 in Selected Industrial Sectors



Within every major industrial sector of the Massachusetts economy, the ability of full-time, year-round workers to obtain adequate annual earnings increased markedly with their years of formal schooling. In durable manufacturing industries, the share of workers with adequate annual earnings varied from a low of 28 percent among those lacking a high school diploma, to 45 percent among high school graduates, 71 percent among Associate degree holders, and to a high of 92 percent among Master's degree holders (Table 31). Within the professional and related services industries, a major job growth sector in the 1980s and 1990s, 68 percent of all year-round, full-time workers in 1999 obtained annual earnings in excess of the low income threshold. The ability of workers in this sector to achieve adequate annual earnings again varied considerably across educational subgroups, ranging from a low of 22% among those lacking a high school diploma to 38% among high school graduates, 61% among Associate degree holders, and 87% among those with a Master's or higher degree. In nearly every major industrial sector of the state, upgrading opportunities (both on and off the job) for front line workers lacking post-secondary credentials will be needed in coming years to boost their productivity and their ability to obtain adequate annual earnings.

Data on the ability of Massachusetts workers in major occupational groups to obtain adequate annual earnings in 1999 are displayed in Table 32. The occupations of the jobs held by workers at the time of the 2000 Census were assigned to 22 mutually exclusive, occupational categories. As anticipated, the percent of workers obtaining adequate annual earnings varied substantially across these 22 occupational groups. At the bottom of the distribution were workers in food preparation and serving (15%), healthcare support (17 percent), and personal care and services (19%). Workers in many of these service occupations were the focus of Barbara Ehrenreich's recent examination of the economic plight of America's working poor in Nickel and Dimed: On (Not) Getting By in America.³⁵ At the upper end of the occupational distribution, 80 to 90 percent of the employed in legal, management-related, architecture and engineering, and computer/mathematical science occupations were able to achieve annual earnings above the low income threshold. The vast majority of the workers in the latter set of occupations held bachelor's and advanced academic degrees.

³⁵ See: Barbara Ehrenreich, *Nickel and Dimed: On (Not) Getting By in America*, Henry Holt and Company, New York, 2001.

Table 32:
Percent of 20-64 Year Old Persons Employed Full-Time for 40 or More
Weeks With Annual Earnings Above Two Times the Poverty Line by Major Occupation and
Educational Attainment, 1999

Occupation	(A) Less than 12 or 12, no diploma	(B) High School Graduate	(C) Some College, No Degree	(D) Associate's Degree	(E) Bachelor's Degree	(F) Master's or Higher Degree	(G) Total
Management-Related	56.4	63.0	72.0	75.4	84.7	91.0	80.2
Business and Financial Operations	42.2	49.3	57.4	60.2	78.6	87.6	72.6
Computer & Mathematical Sciences	69.4	71.7	82.7	84.2	89.5	93.7	88.0
Architecture & Engineering	59.7	66.8	75.6	83.2	89.0	92.5	84.8
Life, Physical, and Social Services	28.4	54.3	62.9	59.5	61.6	73.4	68.2
Community & Social Services	24.6	21.9	27.9	23.6	44.7	65.0	47.9
Legal Occupation	36.2	47.5	51.7	59.9	62.8	87.4	79.5
Education, Training, & Library	29.7	18.7	24.4	20.7	47.5	79.2	61.8
Arts, Design, Entertainment and Media	38.1	39.7	56.9	58.7	66.3	70.9	62.5
Healthcare Practitioner & Technician	43.7	35.0	60.6	71.3	77.6	88.8	75.9
Healthcare Support	12.1	13.6	13.6	21.5	31.1	43.7	16.9
Protective Services	33.1	64.4	71.7	84.1	81.9	92.9	73.7
Food Preparation & Serving Related	8.5	10.8	19.2	30.2	27.2	42.2	15.4
Building, Ground cleaning & Maintenance	13.6	23.7	31.9	38.5	35.6	25.6	23.2
Personal Care & Services	14.4	14.4	18.7	22.1	27.3	38.5	18.8
Sales and Related	27.7	38.0	51.1	58.4	74.9	78.3	57.2
Office & Administrative Support	21.9	29.2	35.5	39.2	50.8	60.9	36.4
Farming, Forestry, & Fishing	19.7	34.4	39.2	33.9	34.5	43.5	30.8
Construction & Extraction	47.2	57.9	60.7	65.7	64.9	69.2	57.8
Installation, Repair & Maintenance	43.1	56.5	66.6	65.5	67.1	73.5	58.8
Production	21.6	40.4	47.2	49.2	54.8	63.4	37.9
Material Moving	31.8	44.7	44.9	49.4	62.6	62.8	43.4
Total	26.8	40.4	50.1	57.0	71.7	83.0	56.7

Source: PUMS, 5%, Census of Population and Housing 2000, U.S. Census Bureau.

Chart 7:
The Percent of 20-64 Year Old High School Graduates Employed Full-Time
For 40 or More Weeks in Selected Occupations with Annual Earnings Above
The Low Income Threshold, 1999

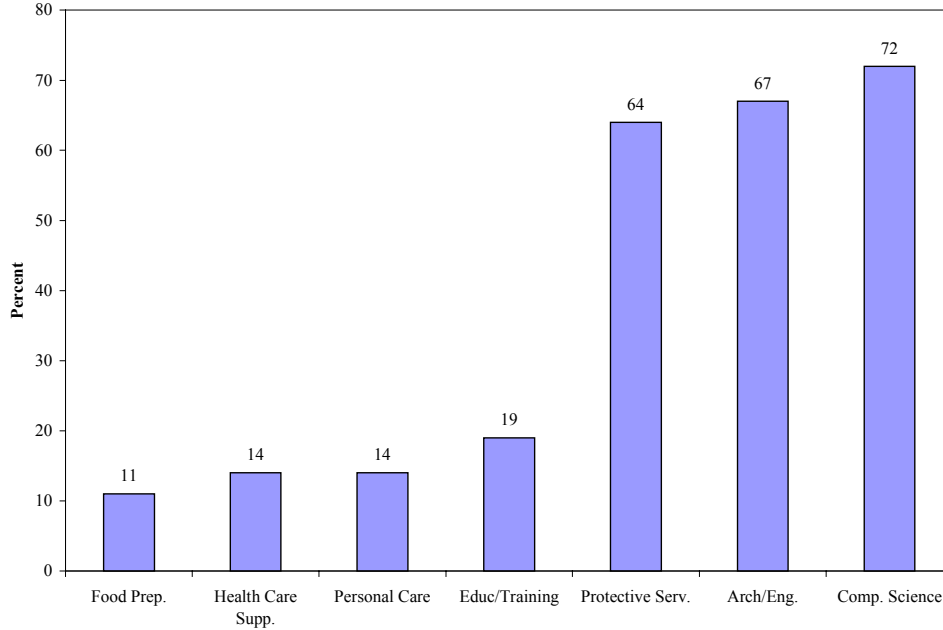
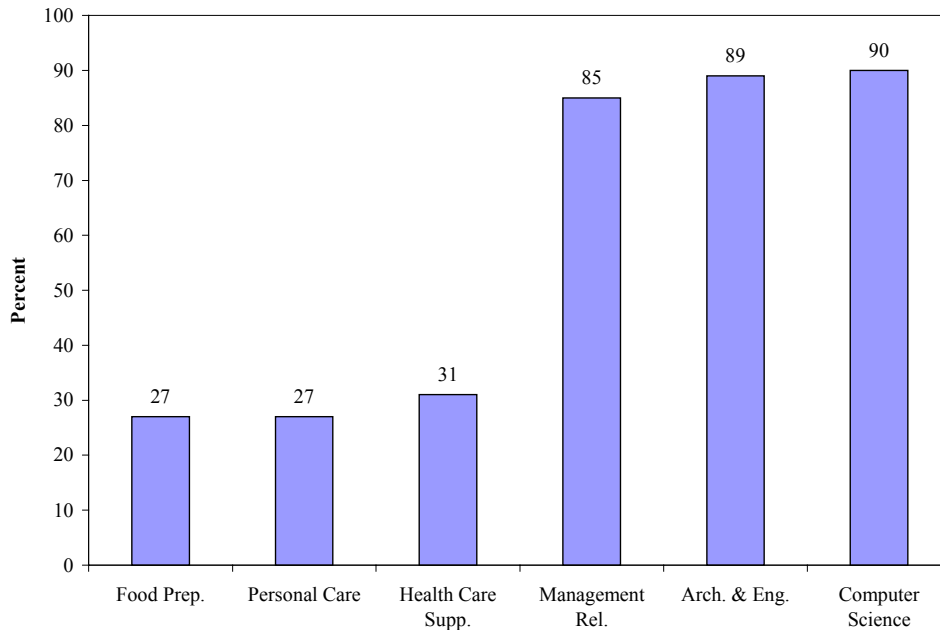


Chart 8:
The Percent of 20-64 Year Old Bachelor Degree Holders Employed
Full-Time for 40 or More Weeks in Selected Occupations with
Annual Earnings Above the Low Income Threshold, 1999



A more disaggregated analysis of the ability of workers in educational/occupational clusters to obtain adequate annual earnings in 1999 also was undertaken. Within each of the six educational subgroups, including those workers holding a Master's or higher degree, the share of workers achieving adequate annual earnings varied quite markedly across the occupational subgroups (Table 31). Among high school graduates with no post-secondary schooling, the fraction of workers with adequate annual earnings in 1999 varied from lows of 11 to 14 percent in food preparation/serving, health care support, and personal care occupations to highs of 63 to 72 percent in management-related, protective service, architecture/engineering, and computer science occupations (Chart 7). Among bachelor degree holders, the share of the employed with adequate annual earnings ranged from lows of 27 to 31 percent in food preparation/service, personal care, and health care support occupations to highs of 85 to 89 percent in management-related, architecture and engineering, and computer/mathematical science occupations (Chart 8). Clearly, in Massachusetts labor markets in 1999, the likelihood of a worker securing adequate annual earnings depended not only on his/her level of educational attainment but also on the industrial sector and occupational characteristics of their jobs. We will provide a more rigorous statistical test of the independent influence of industrial sector of job attachment on the probability of securing adequate annual earnings in a following section of this paper.

The Ability of Employed Family Heads in Massachusetts to Achieve Adequate Annual Earnings

All of the preceding analyses of the annual earnings experiences of Massachusetts workers were focused on 20-64 year olds who were employed full-time for 40 or more weeks irregardless of their family membership status. Many of these earners were heads of families, but others were spouses, young adults living with their parents, and persons living on their own or with others to whom they were not related. A separate analysis of the annual earnings experiences of family heads seemed desirable. How many employed family heads in our state were able to achieve annual earnings above the low income threshold in 1999? How did these success rates of family heads vary by gender, educational attainment, type of family, and the presence of children (under 18) in the family? As was the case for all workers, our findings are confined to those family heads who were 20-64 years old at the time of the 2000 Census and who worked full-time for 40 or more weeks during calendar year 1999.

Overall, one would expect family heads to be somewhat more successful than all employed 20-64 year olds in obtaining annual earnings above the low income threshold. Family heads to be somewhat older and thus more experienced than their other counterparts, especially among men, and they also are somewhat better educated.³⁶ Thus, they are more likely to be able to achieve annual earnings above the low income threshold. Findings in Table 33 clearly reveal that family heads in the aggregate (69%) were more likely than all workers (57%) to obtain adequate annual earnings. All of the difference, however, was attributable to the higher annual earnings of married men.³⁷ Three-fourths of the male family heads had achieved adequate annual earnings versus only 65 percent of all 20-64 year old male, full-time, year-round workers.³⁸ In contrast, female family heads were no more likely than all female workers to have obtained adequate annual earnings during calendar year 1999.

The associations between the educational attainment of family heads and their ability to achieve adequate annual earnings were quite strong. The percent of family heads with annual earnings above the low income threshold ranged from a low of 36 percent among high school dropouts, to nearly 66 percent among those completing one to three years of college, and to a high of 89 percent among Masters' degree holders (Table 33). The links between the educational attainment of family heads and their success in achieving adequate annual earnings were quite strong for both men and women. Among female family heads, these links were particularly strong. Only 15 percent of female family heads lacking a high school diploma/GED were able to achieve adequate annual earnings as were only 23 percent of high school graduates. In contrast, two-thirds of female family heads with a bachelor's degree were able to achieve adequate earnings.

³⁶ Again, these findings hold true for men more so than for women. Many single mothers have limited education that limits their earnings potential.

³⁷ In married couple families, the family householder can be either the husband or the wife. In a substantial majority (80%+) of the cases, the husband is classified as the householder; however, the likelihood that the wife is classified as the householder rises with her educational attainment.

³⁸ Married men also tend to work more hours during the year than their unmarried counterparts. These higher hours of labor supply also boost their annual earnings.

Table 33:
Percent of 20-64 Year Old Family Heads Employed, Full-Time for 40 or More
Weeks in 1999 with Annual Earnings Above Two Times the Poverty Line by
Educational Attainment and Gender

	(A)	(B)	(C)
Educational Attainment	All	Men	Women
Less than 12 or 12, no diploma	36.4	43.0	14.9
High school graduate/GED holder	54.6	63.4	22.6
1-3 years of college, including Associate's degree	65.6	74.8	39.3
Bachelor's degree	83.1	86.9	66.8
Master's or higher degree	89.2	90.7	82.0
All	68.7	75.3	44.8

With the available Census data, families can be categorized into the following three groups: married couple families, male headed families with no female spouse present, and female headed families with no male spouse present. Not all such families have children present in the home. Estimates of the share of family heads with 1999 annual earnings above the low income threshold in each family type/educational attainment category are displayed in Table 34. Nearly three of every four employed heads of married couple families in the state were able to achieve earnings adequacy during 1999 versus 55 percent of male family heads (no wife present) and only 37 percent of female family heads (no husband present). In each of these family groups, the likelihood that the head obtained adequate annual earnings varied strongly with his/her educational attainment. These links again were particularly strong for female headed families. The share of female family heads with annual earnings above the low income threshold ranged from a low of 13 percent among high school dropouts to 37 percent for those with 1-3 years of college to a high of nearly 81 percent for those with a Master's or higher degree. Those unmarried women with no post-secondary schooling who headed families were at a substantial risk of earnings inadequacy even when they worked full-time for 80 percent or more of available weeks during the year. Low hourly earnings are the major underlying cause of their limited annual earnings.

Table 34:
Percent of 20-64 Year Old Family Heads Employed Full-Time for
40 or More Weeks in 1999 with Annual Earnings Two or More Times
the Poverty Line by Educational Attainment and Type of Family

	(A)	(B)	(C)
Educational Attainment	Married Couple	Female Householder, No Male Spouse Present	Male Householder, No Female Spouse Present
Less than 12 or 12, no diploma	42.2	12.8	34.4
High school graduate/GED holder	62.5	20.3	44.8
1-3 years of college, including Associate's Degree	72.4	36.8	61.2
Bachelor's degree	85.7	60.4	73.0
Master's or higher degree	90.1	80.7	83.1
Total	74.7	37.2	55.4

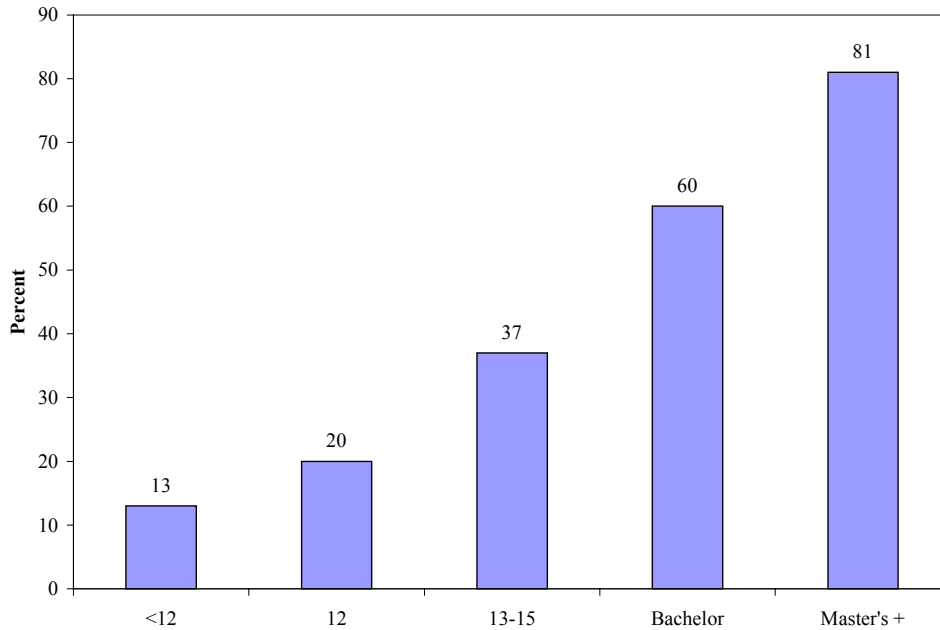
How successful were the employed heads of families with two or more children present in the home in obtaining adequate annual earnings during 1999? Estimates of earnings adequacy rates for the heads of such families by family type and educational attainment are presented in Table 35. The employed heads of married couple families were the most successful in achieving earnings adequacy. Seventy-seven percent of these married family heads obtained earnings adequacy during 1999 versus only one-half of unmarried male family heads³⁹ and only 31 percent of single mothers. Within each of these three family groups, the ability of the family head to achieve adequate annual earnings improved consistently and strongly with his/her educational attainment. Among the heads of married couple families, the share with adequate annual earnings varied from a low of 41 percent for those lacking a high school diploma to 63 percent for high school graduates and to highs of 89 to 29 percent for those with a Bachelor's or more advanced academic degree (Table 35). Across all family types and educational attainment categories, the success rates of achieving adequate annual earnings ranged from a low of 8 percent for unmarried female family heads to a high of 92 percent for married couple family heads with a Master's or higher degree.

³⁹ Again, the heads of these married couple families include both husbands and wives. "Unmarried" refers to those family heads who are single (never married), separated, divorced, or widowed.

Table 35:
Percent of 20-64 Year Old Family Heads Employed Full-Time for 40 or
More Weeks in 1999 with Annual Earnings Two or More Times the Poverty
Line by Educational Attainment and Type of Family (2 or More Children Under 18 in Home)

	(A)	(B)	(C)
Educational Attainment	Married Couple	Male householder, No male spouse present	Female householder, No male spouse present
Less than 12 years or 12 years, no diploma	40.8	34.5	8.3
High school graduate, GED holder	63.4	43.3	16.1
1-3 years of college, including Associate's degree	74.7	53.7	33.4
Bachelor's degree	89.1	60.0	59.1
Master's or higher degree	92.2	91.4	76.2
All	77.0	50.6	31.4

Chart 9:
Percent of Female Family Heads (No Male Spouse Present) With
Annual Earnings Above the Low Income Threshold by Educational Attainment, 1999



In this section, we present the findings of a multivariate statistical analysis of the ability of 20-64 year old full-time, year-round Massachusetts’ workers during 1999 to earn more than two times the poverty income line for a four- person family. The predictor variables in the logit model include their age, gender, race-ethnicity, their educational attainment, their industry of work, and their place of residence. These multivariate statistical models were constructed for all workers, male workers, female workers, and for those workers with an Associate’s degree or lower level of educational attainment. The dependent variable in the model is a dichotomous variable (1 or 0) representing whether a worker was able to obtain annual earnings in 1999 more than two times the poverty line for a four person family. A complete listing of the predictor variables and their definitions is presented in Table 36.

Table 36:
Definitions of Variables Appearing in the Logit Probability Models on the Ability of 20-64 Years Old Full-Time Year-Round Workers to Earn Two Times Poverty in Massachusetts

Variable Name	Definition
POV2T	A dummy variable representing whether a person in 1999 had an annual earning above two times the poverty line for 4 person family. = 1 if full-time worker had earnings above 2 times poverty = 0 if full-time worker had earnings below 2 times poverty
MALE	A dummy variable representing the gender of the full-time worker = 1 if male = 0 if female
ASIAN	A dummy variable representing an Asian worker =1 if Asian = 0 if other
BLACK	A dummy variable representing a Black worker =1 if Black = 0 if other
HISPANIC	A dummy variable representing an Hispanic worker =1 if Hispanic = 0 if other
MIXEDR	A dummy variable representing a Mixed race worker =1 if mixed race = 0 if other
OTHERR	A dummy variable representing some other race =1 if other race = 0 if other

NATIVE	A dummy variable representing the nativity status of a worker =1 if native born = 0 if foreign born
AGE20_34	A dummy variable representing age of a worker =1 if 20-34 years old = 0 if other
AGE45_54	A dummy variable representing age of a worker =1 if 45-54 years old = 0 if other
AGE55_64	A dummy variable representing age of a worker =1 if 55-64 years old = 0 if other
ED1_8 YRS	A dummy variable representing the education of a worker =1 if 1-8 years of school = 0 if other
ED_HSDO	A dummy variable representing the education of a worker =1 if a high school dropout, no GED = 0 if other
EDCOL1_3	A dummy variable representing the education of a worker =1 if 1-3 years of college, no degree = 0 if other
ED_ASSOC	A dummy variable representing the education of a worker =1 if Associate Degree = 0 if other
ED_BACH	A dummy variable representing the education of a worker =1 if Bachelor's degree = 0 if other
ED_MAST	A dummy variable representing the education of a worker =1 if Master's degree or higher = 0 if other
AGFF	A dummy variable representing the industry of a worker =1 if agriculture, forestry, and fishing = 0 if other
MINING	A dummy variable representing the industry of a worker =1 if mining industry = 0 if other
CONSTRUC	A dummy variable representing the industry of a worker =1 if construction industry = 0 if other
NONDURMF	A dummy variable representing the industry of a worker =1 if non-durable goods manufacturing = 0 if other
DURBLEMF	A dummy variable representing the industry of a worker =1 if durable goods manufacturing = 0 if other

WHOLESALE	A dummy variable representing the industry of a worker =1 if wholesale industry = 0 if other
TCU	A dummy variable representing the industry of a worker =1 if transportation, communications, and utilities = 0 if other
INFORMAT	A dummy variable representing the industry of a worker =1 if information industry = 0 if other
FIRE	A dummy variable representing the industry of a worker =1 if finance, insurance, and real estate = 0 if other
PROFSERV	A dummy variable representing the industry of a worker =1 if professional service industry = 0 if other
EDHSOCS	A dummy variable representing the industry of a worker =1 if education, health and social services = 0 if other
ARTSEREC	A dummy variable representing the industry of a worker =1 if arts, entertainment, and recreation industry = 0 if other
OTHERSER	A dummy variable representing the industry of a worker =1 if other service industry = 0 if other
GVTSERV	A dummy variable representing the industry of a worker =1 if government service sector = 0 if other
BERKSHIR	A dummy variable representing the WIB area of a worker =1 if Berkshire = 0 if other
BRISTOL	A dummy variable representing the WIB area of a worker =1 if Bristol = 0 if other
BROCTON	A dummy variable representing the WIB area of a worker =1 if Brockton = 0 if other
CAPECOD	A dummy variable representing the WIB area of a worker =1 if Cape Cod = 0 if other
CENTRMA	A dummy variable representing the WIB area of a worker =1 if Central Massachusetts = 0 if other
FRNKHAMP	A dummy variable representing the WIB area of a worker =1 if Franklin and Hampshire = 0 if other

GLOWELL	A dummy variable representing the WIB area of a worker =1 if Greater Lowell = 0 if other
GNEWBEDF	A dummy variable representing the WIB area of a worker =1 if Greater New Bedford = 0 if other
HAMPDEN	A dummy variable representing the WIB area of a worker =1 if Hampden = 0 if other
LMERRIMC	A dummy variable representing the WIB area of a worker =1 if Lower Merrimack Valley = 0 if other
METRONOR	A dummy variable representing the WIB area of a worker =1 if Metro North = 0 if other
METROSW	A dummy variable representing the WIB area of a worker =1 if Metro South/West = 0 if other
NCENTRAL	A dummy variable representing the WIB area of a worker =1 if North Central = 0 if other
SCOASTAL	A dummy variable representing the WIB area of a worker =1 if South Coastal = 0 if other
SESSEX	A dummy variable representing the WIB area of a worker =1 if South Essex = 0 if other

Findings from the multivariate statistical model for all workers revealed that their ability to earn more than two times the poverty threshold income was significantly influenced by their gender and age, their educational attainments, their industry of employment, and their place of residence in Massachusetts. Holding all other variables constant, male full-time workers were nearly 23 percentage points more likely than their comparable female counterparts to earn more than two times the poverty income level. (See Tables 37 and 38 for estimates of the marginal probabilities of these variables on the probability of achieving adequate earnings). Among race-ethnic groups, the likelihood of earning more than two times the poverty income for each of the non-White groups was significantly lower than that of comparable White workers, with the size of these probabilities ranging from 6 percentage points for Asians to 11 percentage points for Hispanics and to 14 percentage points for “other” race ethnic-groups. All of these demographic coefficients were statistically significant at the .01 percent level. (Table 36 and Chart 10). Young

workers, ages 20-34, were 22 percentage points less likely than their older cohorts (35-44 years old) to earn more than two times the poverty income in Massachusetts. Older workers, 55-64 year old, were moderately less likely to earn more than two times the poverty income in comparison to their younger 35-44 year old counterparts.

Table 37:
Estimated Marginal Probabilities of Traits of 20-64 Year Old Full-Time, Year-Round Workers in Massachusetts with an Ability to Earn Above Two Times the Poverty Line, 1999

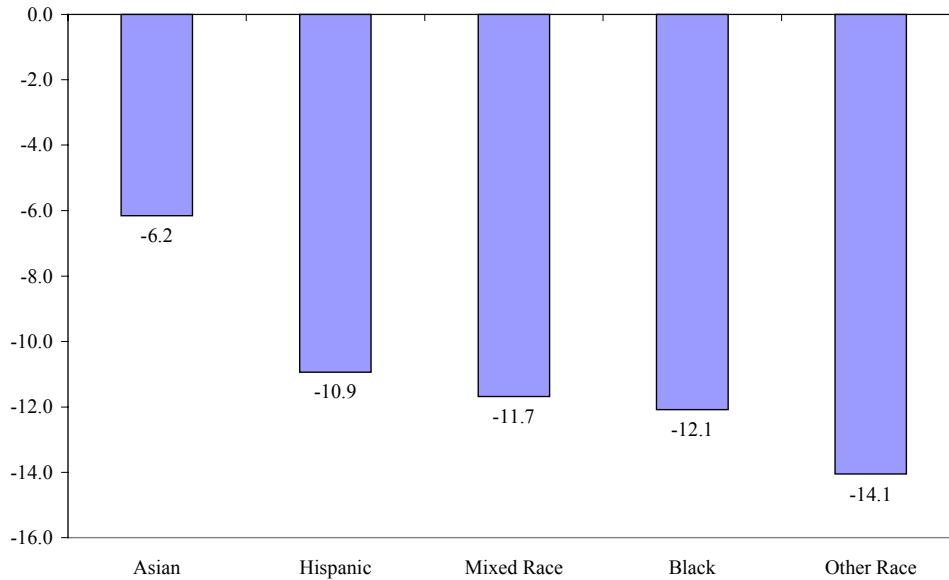
Variables	All	Men	Women
MALE	0.227***		
ASIAN	-0.062***	-0.079***	-0.021
BLACK	-0.121***	-0.171***	-0.050***
HISPANIC	-0.109***	-0.120***	-0.080***
MIXEDR	-0.117***	-0.126***	-0.090***
OTHERR	-0.141***	-0.129***	-0.148***
NATIVE	0.056***	0.045***	0.057***
AGE20_34	-0.219***	-0.221***	-0.200***
AGE45_54	0.007*	0.011*	0.008
AGE55_64	-0.016**	-0.010	-0.012
ED1_8YRS	-0.152***	-0.157***	-0.135***
ED_HSDO	-0.102*	-0.105***	-0.090***
EDCOL1_3	0.121***	0.098***	0.160***
ED_ASSOC	0.202***	0.158***	0.256***
ED_BACH	0.379***	0.304***	0.454***
ED_MAST	0.542***	0.434***	0.637***
AGFF	-0.141***	-0.148***	-0.175**
MINING	0.306***	0.285***	0.117
CONSTRUC	0.142***	0.105***	0.150***
NONDURMF	0.070***	0.063**	0.053***
DURBLEMF	0.142***	0.121***	0.157***
WHOLESAL	0.108***	0.096***	0.096***
TCU	0.203***	0.163***	0.240***
INFORMAT	0.184***	0.148***	0.220***
FIRE	0.134***	0.094***	0.179***
PROFSERV	0.122***	0.085***	0.173***
EDHSOCS	-0.017**	-0.057***	0.016*
ARTSEREC	-0.150***	-0.163***	-0.106***
OTHERSER	-0.073***	-0.073***	-0.082***
GVTSERV	0.201***	0.232***	0.151***
Constant	-1.156***	0.002	-1.499***

*** significant at .01 percent level

** significant at .05 percent level

* significant at .1 percent level

Chart 10:
Marginal Probabilities of the Effects of Race-Ethnic Traits of 20-64 Year Old Full-Time Workers
in Massachusetts Earning an Income More than Two Times the Poverty Line, 1999 (Base Group
is White non-Hispanic, Numbers in Percentage Points)



The ability of full-time, year-round workers in Massachusetts to obtain an annual earnings level more than two times the poverty line was also powerfully influenced by their formal educational attainment. Earlier sections of this report revealed the strong links between educational attainment and the annual earnings of Massachusetts workers. Findings from our multivariate statistical models revealed that workers with only 1-8 years of education and those without a high school diploma were 15 and 10 percentage points, respectively, less likely than their peers with high school diplomas to earn more than two times the poverty income, holding all other variables constant. All workers with some college education were substantially more likely than their counterparts with only a high school diploma to earn more than two times the poverty income. The increased probabilities of achieving the desired earnings threshold ranged from 12 percentage points for those workers with 1-3 years of college, to 20 percentage points for those with an Associate’s degree, 38 percentage points for those with a bachelor’s degree, and 54 percentage points for those with a Master’s or higher degree. (Table 38 and Chart 11). Native born workers, *ceteris paribus*, were nearly 6 percentage points more likely than their foreign born counterparts to have been earning more than two times the poverty level in 1999.

Table 38:
Estimated Marginal Probabilities of the Effects of Traits of 20-64 Year Old Full-Time
Year-Round Workers in Massachusetts to Earn Above Two Times the Poverty Line, 1999

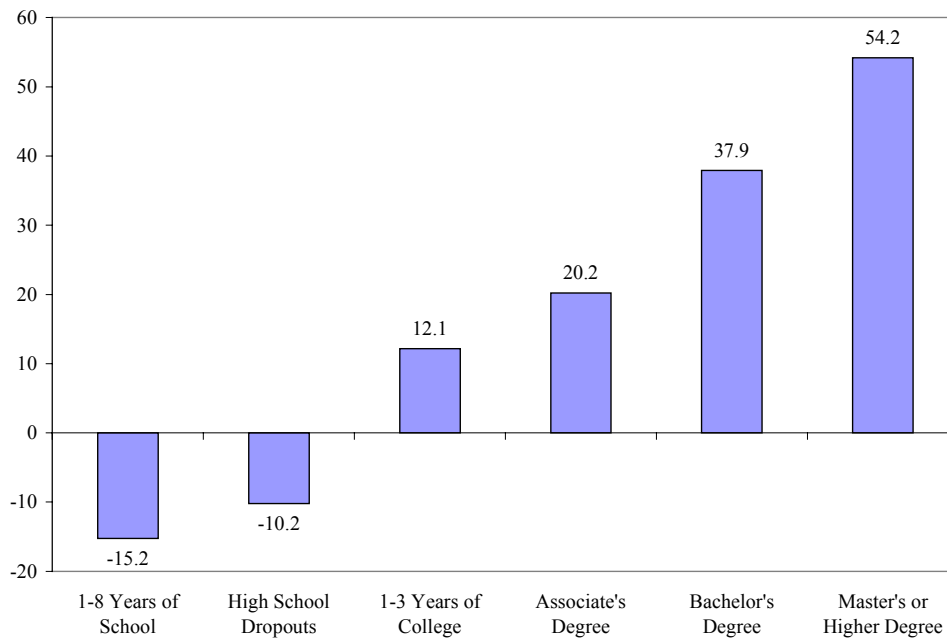
Variables	All	Men	Women
MALE	0.230***		
ASIAN	-0.074***	-0.086***	-0.042**
BLACK	-0.123***	-0.157***	-0.075***
HISPANIC	-0.111***	-0.118***	-0.083***
MIXEDR	-0.119***	-0.122***	-0.100***
OTHERR	-0.136***	-0.122***	-0.148***
NATIVE	0.069***	0.053***	0.073***
AGE20_34	-0.223***	-0.221***	-0.213***
AGE45_54	0.009**	0.013**	0.009*
AGE55_64	-0.018**	-0.009	-0.017*
ED1_8YRS	-0.148***	-0.153***	-0.131***
ED_HSDO	-0.100***	-0.104***	-0.088***
EDCOL1_3	0.118***	0.095***	0.161***
ED_ASSOC	0.201***	0.155***	0.259***
ED_BACH	0.367***	0.295***	0.442***
ED_MAST	0.526***	0.421***	0.621***
BERKSHIR	-0.146***	-0.078***	-0.229***
BRISTOL	-0.031***	0.038***	-0.121***
BROKTON	0.029**	0.080***	-0.038**
CAPECOD	-0.074***	-0.021**	-0.135***
CENTRMA	-0.014*	0.046***	-0.090***
FRNKHAMP	-0.133***	-0.067***	-0.214***
GLOWELL	0.024**	0.059***	-0.013
GNEWBEDF	-0.072***	-0.019	-0.136***
HAMPDEN	-0.080***	-0.019*	-0.159***
LMERRIMC	0.014	0.061***	-0.040**
METRONOR	0.036***	0.059***	0.005
METROSW	0.081***	0.125***	0.023**
NCENTRAL	-0.043***	0.023	-0.134***
SCOASTAL	0.055***	0.092***	0.008
SESSEX	0.015*	0.048***	-0.025*
AGFF	-0.097***	-0.111***	-0.114*
MINING	0.332***	0.310***	0.069
CONSTRUC	0.145***	0.107***	0.148***
NONDURMF	0.087***	0.075***	0.075***
DURBLEMF	0.146***	0.122***	0.161***
WHOLESA	0.106***	0.095***	0.089***
TCU	0.203***	0.165***	0.238***
INFORMAT	0.177***	0.143***	0.211***
FIRE	0.126***	0.088***	0.172***

Table 38: (Continued)

Variables	All	Men	Women
PROFSERV	0.114***	0.081***	0.158***
EDHSOCS	-0.009	-0.048***	0.024**
ARTSEREC	-0.146***	-0.157***	-0.102***
OTHERSER	-0.073***	-0.073***	-0.083***
GVTSERV	0.206***	0.238***	0.155***
Constant	-1.180***	-0.199***	-1.306***

Chart 11:

Marginal Probabilities of the Effects of Educational Traits of 20-64 Year Old Full-Time Workers in Massachusetts of Obtaining Annual Earnings More than Two Times the Poverty Line , 1999
(Base Group is High School Graduates, Numbers in Percentage Points)

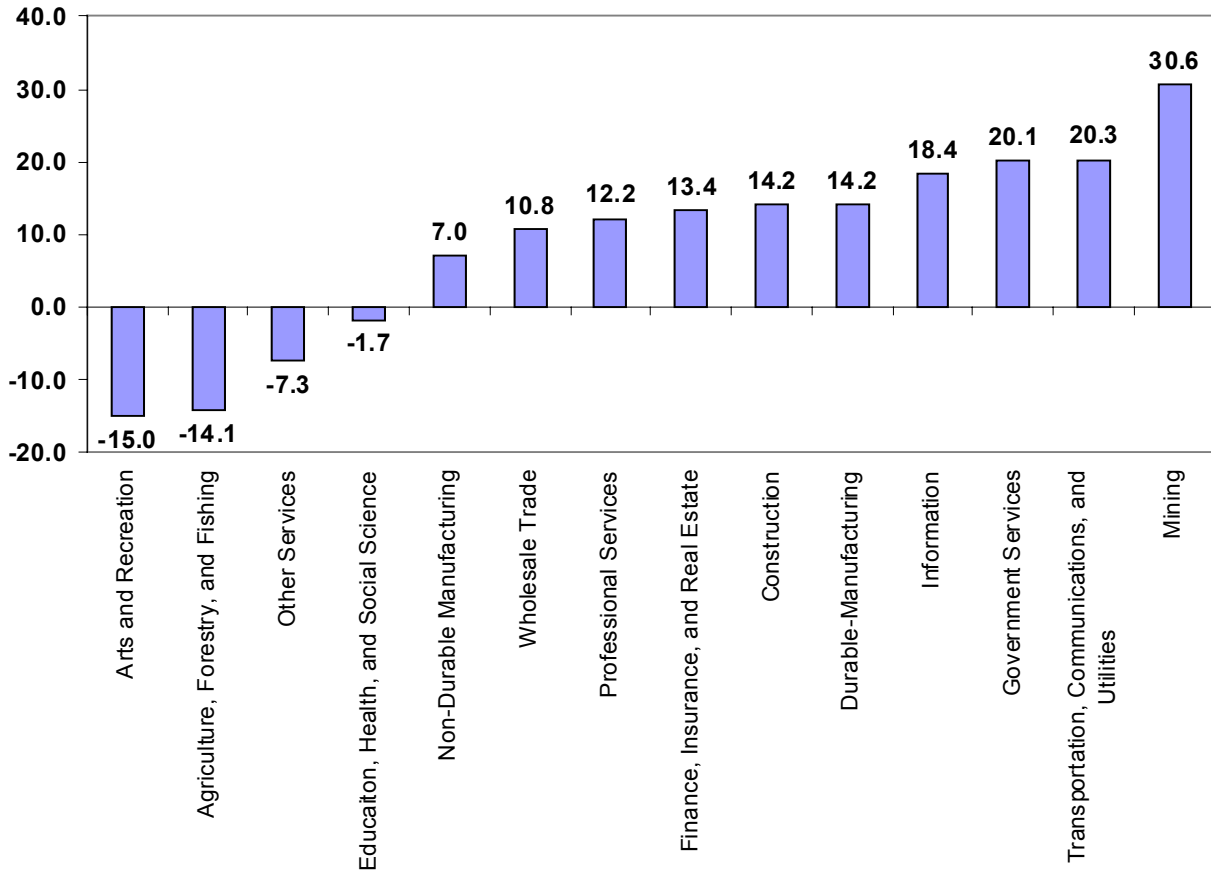


The decade of the 1990s witnessed a fundamental change in the industrial structure of the jobs held by workers in the state, with a steep decline in overall manufacturing employment offset by strong growth in many private service industries, retail trade, and construction. Workers without a college education in earlier decades who were employed in manufacturing, construction, transportation, communications and public utilities industries were able to earn good wages. However, jobs in many of these sectors have been declining, thus, workers without a college education are at a greater risk of failing to achieve adequate annual earnings. Future job

projections for these industrial sectors in Massachusetts and the nation as a whole are rather bleak.

Other findings of our statistical analysis revealed that the likelihood of full-time, year-round workers earning above two times the poverty income level varied considerably by their industry of employment. Those workers in arts and recreation, agricultural, forestry and fishing, other personal services, and education, health and social services industries were 15, 14, 7, and 2 percentage points, respectively, less likely than their peers in the retail trade industry (the base group) to earn an income more than two times the poverty income level. (Table 39). At the other end of the spectrum were workers in industries with earnings above those of retail trade. Workers in industries with significantly higher marginal probabilities of earning an income more than the two times the poverty level included transportation (20 percentage points), communications and utilities and government services (20 percentage points), information services (18 percentage points), construction and durable-manufacturing (14 percentage points), finance, insurance, and real estate (13 percentage points), professional services (12 percentage points), wholesale trade (11 percentage points), and non-durable manufacturing (7 percentage points). All of these industry impacts were statistically significant at the .01 percent level.

Chart 12:
Marginal Probabilities of the Effects of Employment of 20-64 Year Old Full-Time
Workers on Their Ability to Earn an Income More than Two Times the Poverty Line, 1999
 (Base Group is Retail Trade Industry, Numbers in Percentage Points)

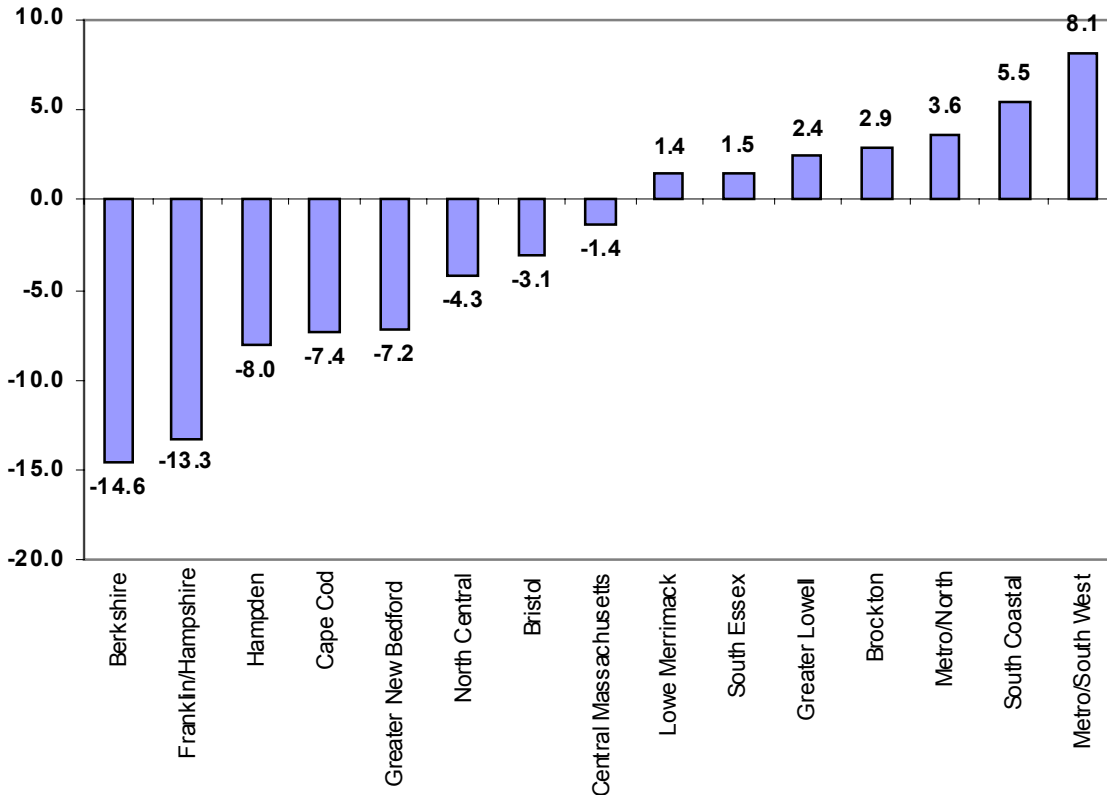


As noted above, the multivariate statistical models designed to predict the likelihood of 20-64 year old full-time workers earning more than two times a poverty income also were estimated for men and women separately. The results for both male and female full-time workers are quite similar to those for all full-time workers in Massachusetts. Findings for men and women in both models revealed that age, education, and industry of employment were key determining factors in influencing the likelihood of a worker earning an income more than two times the poverty income level. The higher the formal educational attainment of a full-time worker, the higher was his/her ability to earn an income more than two times the poverty threshold. For example, a male worker with an Associate’s degree was 15 percentage points more likely than his peers with only a high school diploma to earn an income more than two times the poverty line. Similarly, women with a Master’s or higher degree were 62 percentage points more

likely than their peers with only a high school diploma to earn an income more than two times poverty.

We further tested whether the region of residence within Massachusetts significantly determined the ability of a full-time worker to earn an annual income above two times the poverty line. Workers were classified by the local Workforce Investment Board area (WIB) in which they resided at the time of the 2000 Census. Findings from the statistical models revealed that place of residence of a worker had a substantive influence on his/her ability to earn an income more than two times the poverty line. Out of 16 WIB areas in Massachusetts, workers in eight WIB areas were significantly less likely than Suffolk County workers to earn an income above two times the poverty line. WIB areas with a lower marginal probability of earning an income more than two times poverty were Central Massachusetts (1.4 percentage points), Bristol (3.1 percentage points), North Central (4.3 percentage points), Greater New Bedford (7.2 percentage points), Cape Cod (7.4 percentage points), Hampden (8.0 percentage points), Franklin/Hampshire (13 percentage points), and Berkshire (15 percentage points). At the other end of the spectrum, workers in seven WIB areas were significantly more likely than comparable workers from Suffolk County to earn more than two times the poverty income level. These higher marginal probabilities ranged from 1.4 percentage points in Lower Merrimack to a high of 8.1 percentage points in the Metro/South West area. These results were similar for both men and women. All of the coefficients on the WIB area variables were statistically significant either at the .01 level or at the .05 level.

Chart 13:
Marginal Probabilities of the Effects of Place of Residence of 20-64 Year Old
Full-Time Workers in Massachusetts on Their Ability to Earn an Income
More than Two Times the Poverty Line, 1999
 (Base Group Suffolk County, Numbers in Percentage Points)



The bulk of the training activities under the Boston Workforce Development Initiative will be targeted upon workers who have no formal college degree. Sixty-two percent of all 20-64 year old workers who were not enrolled in school at the time of the 2000 Census in Massachusetts had an Associate's degree or less education. Since the training initiative will primarily focus on workers without a college diploma, we re-estimated our multivariate statistical models for those workers whose education was no higher than an Associate's degree. The findings for such workers are consistent with earlier findings for all workers. Male workers were 27 percentage points more likely than their female peers to earn an income more than two times the poverty level. Younger workers, ages 20 to 34 years, were 23 percentage points less likely than their 35 to 44 years old peers to earn an income above two times the poverty level. Holding all other variables constant, native born workers were 5.4 percentage points more likely than their foreign born counterparts to earn an income more than two times the poverty threshold. Again,

the educational attainment of a worker was a strong predictor of their ability to earn an income above two times the poverty line. For example, workers with only 1-8 years of schooling were 15 percentage points less likely than their peers with a high school diploma to earn an income more than twice the poverty level whereas workers with an Associate's degree were 21 percentage points more likely than their peers with a high school diploma to earn an income more than two times the poverty level. All these educational variables were statistically significant at the .01 percent level.

Table 39:
Estimated Marginal Probabilities of the Effects of Selected Worker Traits on
Their Ability to Earn an Income Above Two Times the Poverty Line in Massachusetts, 1999

Variable	All	Men	Women
MALE	0.271***	--	--
ASIAN	-0.158***	-0.187***	-0.091***
BLACK	-0.145***	-0.203***	-0.060***
HISPANIC	-0.125***	-0.134***	-0.092***
MIXEDR	-0.112***	-0.130***	-0.067**
OTHERR	-0.136***	-0.139***	-0.116***
NATIVE	0.054***	0.055***	0.039***
AGE20_34	-0.227***	-0.249***	-0.160***
AGE45_54	0.018***	0.019**	0.019**
AGE55_64	-0.002	0.001	0.003
ED1_8YRS	-0.149***	-0.165***	-0.102***
ED_HSDO	-0.102***	-0.112***	-0.071***
EDCOL1_3	0.128***	0.110***	0.134***
ED_ASSOC	0.214***	0.178***	0.216***
AGFF	-0.098***	-0.122***	-0.072
MINING	0.284***	0.301***	0.026
CONSTRUC	0.146***	0.124***	0.159***
NONDURMF	0.060***	0.060***	0.031***
DURBLEMF	0.124***	0.112***	0.121***
WHOLESAL	0.095***	0.094***	0.064***
TCU	0.215***	0.189***	0.229***
INFORMAT	0.235***	0.190***	0.254***
FIRE	0.121***	0.073***	0.143***
PROFSERV	0.098**	0.050***	0.142***
EDHSOCS	-0.015*	-0.078***	0.027**

Table 39: (Continued)

Variable	All	Men	Women
ARTSEREC	-0.126***	-0.153***	-0.060***
OTHERSER	-0.032**	-0.035**	-0.040**
GVTSERV	0.236***	0.278***	0.171***
Constant	-1.270***	-0.011	-1.519***

*** significant at .01 percent level

** significant at .05 percent level

* significant at .1 percent level

Workers in the above group who were employed in non-service related industries had a significantly higher probability than comparable workers in retail trade industries to earn an income more than two times the poverty line. The predicted ability of full-time workers to earn an income more than two times the poverty level compared to their peers in retail trade industries varied by industry, ranging from lows of 6 percentage points in non-durable manufacturing and 9 percentage points in wholesale trade industries to highs of 24 percentage points in government services and 28 percentage points in mining, holding all other variables constant. (Chart 14). All of the coefficients of these industry variables were statistically significant at the .01 percent level. (Table 39). The pattern of findings was quite similar for both male and female full-time workers in Massachusetts.

Table 40:

Estimated Marginal Probabilities of the Effects of Selected Traits of Workers with Associate's Degree or Less on Their Ability to Earn an Income Above Two Times the Poverty Line in Massachusetts, 1999

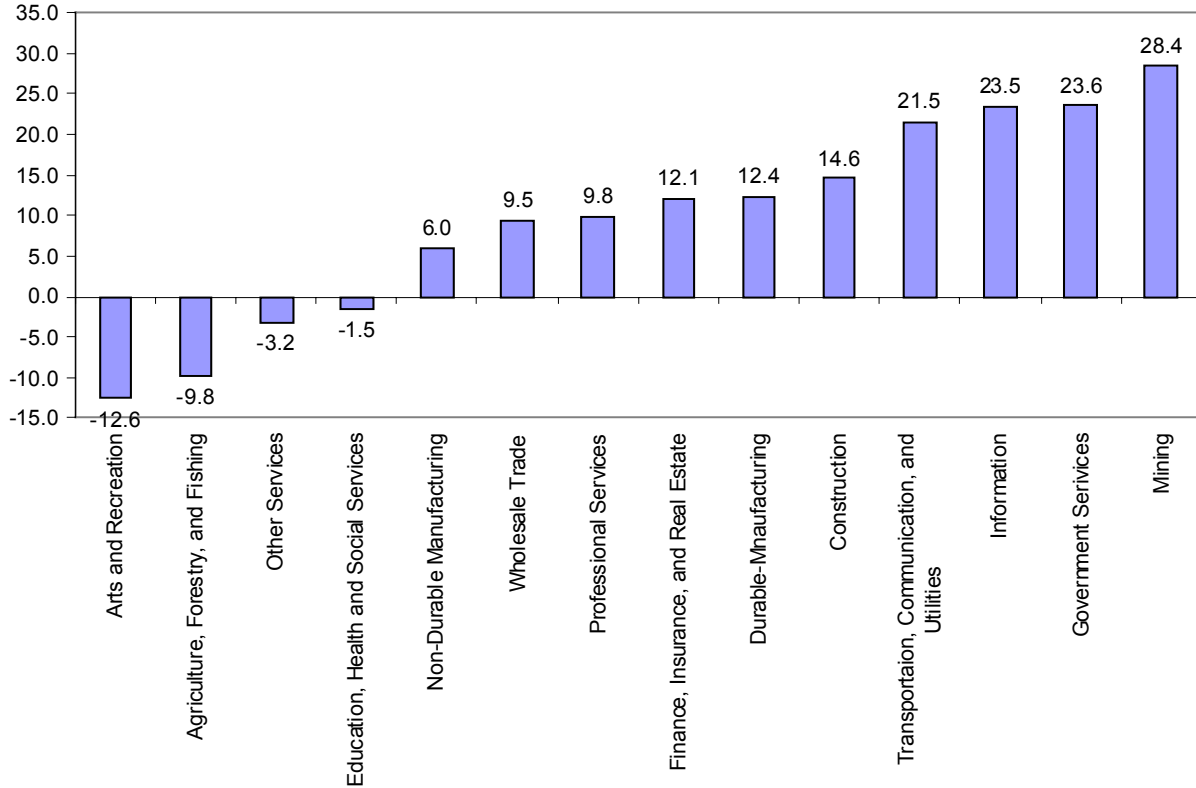
	All	Men	Women
MALE	0.275***		
ASIAN	-0.172***	-0.191***	-0.121***
BLACK	-0.145***	-0.185***	-0.087***
HISPANIC	-0.128***	-0.132***	-0.100***
MIXEDR	-0.115***	-0.127***	-0.080***
OTHERR	-0.129***	-0.131***	-0.114***
NATIVE	0.067***	0.064***	0.055***
AGE20_34	-0.229***	-0.250***	-0.166***
AGE45_54	0.017**	0.020**	0.016**
AGE55_64	-0.006	-0.001	-0.006
ED1_8YRS	-0.141***	-0.160***	-0.093***
ED_HSDO	-0.099***	-0.110***	-0.067***

(Table 40: Continued)

	All	Men	Women
EDCOL1_3	0.125***	0.107***	0.134***
ED_ASSOC	0.213***	0.175***	0.218***
BERKSHIR	-0.135***	-0.073***	-0.200***
BRISTOL	-0.025**	0.051***	-0.120***
BROKTON	0.040***	0.101***	-0.039**
CAPECOD	-0.053***	-0.015	-0.091***
CENTRMA	-0.014	0.051***	-0.094***
FRNKHAMP	-0.098***	-0.033**	-0.176***
GLOWELL	0.019	0.057**	-0.026
GNEWBEDF	-0.068***	-0.006	-0.141***
HAMPDEN	-0.071***	-0.009**	-0.146***
LMERRIMC	0.008	0.059*	-0.052**
METRONOR	0.066***	0.091*	0.027**
METROSW	0.081***	0.126	0.016
NCENTRAL	-0.034**	0.036**	-0.124***
SCOASTAL	0.055***	0.105*	-0.012
SESSEX	0.024**	0.059*	-0.022
AGFF	-0.065**	-0.092*	-0.045
MINING	0.307***	0.323	-0.012
CONSTRUC	0.147***	0.125	0.154***
NONDURMF	0.077***	0.072*	0.055***
DURBLEMF	0.130***	0.115	0.129***
WHOLESAL	0.093***	0.093*	0.060***
TCU	0.214***	0.189	0.225***
INFORMAT	0.230***	0.184	0.248***
FIRE	0.114***	0.066*	0.137***
PROFSERV	0.089***	0.045**	0.127***
EDHSOCS	-0.010	-0.073*	0.032**
ARTSEREC	-0.127***	-0.150	-0.061***
OTHERSER	-0.036**	-0.037**	-0.046**
GVTSERV	0.239***	0.281	0.170***
Constant	-1.328***	-0.241***	-1.303***

Chart 14:
Marginal Probabilities of the Effects of Industry of Employment on the Ability of 20-64 Year Old Full-Time Workers with an Associate's Degree or Less in Massachusetts to Earn an Income More than Two Times the Poverty Line, 1999

(Base Group is Retail Trade Industry, Numbers in Percentage Points)



Predicted Probabilities of Earning An Income More Than Two Times the Poverty Line for Selected Groups of Full-Time, Year-Round Workers in Massachusetts, 1999

The findings of the logit regression model also can be used to predict the probability of earning an income more than two times the poverty line for Massachusetts workers with given demographic, schooling, place of residence and industry of employment characteristics. We have selected four hypothetical, full-time year-round workers in Massachusetts to illustrate the range in the expected probabilities of earning an income more than two times the poverty line in 1999. These four hypothetical graduates have varying combinations of educational attainment, age, place of residence, and industry of employment. The traits of these four hypothetical male and female workers and their predicted probabilities of earning an income more than two times the poverty line are displayed in Table 41.

The predicted probabilities of earning an income more than two times the poverty line for these four full-time year-round workers varied considerably, ranging from a low of 11.3% to a high of 81% for men and from 3% to 75% for women, respectively. Our first worker was a relatively young 20-34 years old native born, high school dropout who was living in Berkshire County and was working in “other services” industries. Such a person had predicted probability of only 11% for men and 3% for women, respectively, in earning an income more than two times the poverty line. The second hypothetical worker is a native born 35-44 year old high school graduate who lived in Suffolk County and worked in the retail trade industry. Such a person had predicted probability of 45% for men and 21% for women, respectively, in earning an income more than two times the poverty level. The third hypothetical worker was a native born 35-44 years old with an Associate’s degree who lived in Norfolk County and worked in the professional services industries. This person had a predicted probability of 70% for men and 59% for women, respectively, in earning an income more than two times the poverty line. Similarly, the last hypothetical worker, a 35-44 year old native born worker with a Bachelor’s degree who lived in Suffolk County and worked in information services had a marginal probability of 81% for men and 75% for women, respectively, in earning an income more than two times the poverty line.

Table 41:
Predicted Probability of Earning an Income More Than Two Times the
Poverty Line for a Selected Hypothetical Set of 20-64 Year Old Full-Time Year-Round
Workers in Massachusetts, 1999

Worker Characteristics	Predicted Probability	
	Men	Women
Native Born, 20-34 Years Old, HS Dropout Lived in Berkshire County and Worked in Other services Industry	11.3%	3.0%
Native Born, 35-44 Years Old, HS Graduate Lived in Suffolk County and Worked in Retail Trade	45.0%	21.3%
Native Born, 35-44 Years Old, HS Graduate Lived in Suffolk County and Worked in Construction	56.8%	33.0%
Native Born, 35-44 Years Old, with an Associates Degree Lived in Norfolk County and Works in Professional Services Industries	69.9%	59.3%
Native Born, 35-44 Years Old, with a Bachelor's Degree Lived in Suffolk County and Works in Information Services Industry	81.1%	75.3%

Trends in Annual Earnings Adequacy for Employed 20-64 Year Old Adults in Massachusetts, 1999-2002/03

The above findings on the success rates of Massachusetts adult workers in obtaining adequate annual earnings were based on the results of the 2000 Census and those for earlier decades (1990 and 1980). At the time of the 2000 Census, the Massachusetts economy and its labor market were performing quite strongly. High levels of net new job creation were taking place, and the state unemployment rate during that year would reach a historical low (2.6%). From early 2001 through 2003, however, the state experienced substantial losses in wage and salary jobs, and the unemployment rate doubled from 2000 to 2003. From a level of 3.372 million jobs in January-February 2001, the number of nonfarm wage and salary jobs declined to 3.171 million in November-December 2003, a loss of 201,000 jobs over this three year period.⁴⁰ The state unemployment rate rose sharply over this period, climbing from 2.6% in 2000 to 5.8% in the late fall of 2003 (November-December). During 2004, the unemployment rate has declined due to a combination of job growth and a declining labor force.

Given the deterioration in state labor market conditions over the 2001-2003 period, how well did Massachusetts workers' fare in terms of their ability to achieve annual earnings in excess of the low income threshold? To answer this question, we examined the findings of the March 2003 and March 2004 CPS surveys which contain a supplement that captures information on the employment and earnings experiences of working-age respondents in the prior calendar year. Two year averages for 2002-2003 were used to reduce sampling error associated with the estimates. The findings pertain to 20-64 year olds who were employed full-time for 40 or more weeks during calendar years 2002 or 2003. Findings for these two years are compared to those for 1999, which were based on the data from the much larger 2000 Census PUMS files.

During 2002-03, only 55% of Massachusetts workers in our designated group were able to obtain adequate annual earnings (Table 42). This ratio was 1.5 percentage points below the share of such workers with adequate annual earnings in 1999. The results are even more

⁴⁰ These estimates are seasonally adjusted and are based on the monthly Current Employment Statistics program of the Massachusetts Department of Employment and Training. See: www.DETMA.org for the monthly estimates of nonfarm wage and salary employment.

disturbing given the fact that the share of 20-64 year old adults who were able to obtain full-time, year-round employment over the past two years was below that in 1999.

Table 42:
Comparisons of the Percent of 20-64 Year Old Persons Employed Full-Time
For 40 or More Weeks With Annual Earnings Above the Low Income
Threshold by Gender and Race-Ethnic Origin, 1999 and 2002-2003: Massachusetts

	(A)	(B)	(C)
Demographic Group	1999	2002-03	Percentage Point Change, 1999-2002/03
All	56.7	55.2	-1.5
Men	64.7	64.0	-.7
Women	45.3	45.3	0
Asian	52.7	59.3	+6.6
Black	39.3	36.8	-2.5
Hispanic	26.2	18.7	-7.5
White	60.1	58.7	-1.4

Source: 2000 Census, 5-100 PUMS files; March 2003 and March 2004 CPS Annual Social and Economic Supplement, tabulations by authors.

The share of 20-64 year old employed men with adequate annual earnings during calendar years 2002-2003 was only modestly below that of 1999 while women were just as likely to have obtained adequate annual earnings in 2002-03 as they were in 1999. The higher rate of decline in earnings adequacy for all 20-64 year old workers than for men and women separately is explained by the shift in the gender composition of full-time, year-round workers toward women. Since adult women are less likely than men to obtain adequate annual earnings, a shift in the gender composition of employment in favor of women will, *ceteris paribus*, reduce the share of Massachusetts workers with adequate annual earnings.

Findings by race-ethnic group reveal that Massachusetts workers in each race-ethnic group, with the exception of Asians, were less likely to obtain adequate annual earnings in 2002-2003 than they were in 1999. This race-ethnic pattern for our state was quite similar to that for the entire nation over the same time period. In our state, Hispanic workers were considerably less likely to have obtained adequate annual earnings in 2002-2003 than they were in 1999. Fewer than 19 percent of full-time, year-round Hispanic workers obtained annual earnings above

the low income threshold in 2002-2003. Continued high levels of immigration among Hispanic workers are likely to have played a key role in generating this particular result. Asian workers were the only race-ethnic group that was more likely to have obtained annual earnings above the low income threshold in 2002-03 than they did in 1999. By 2002-2003, Asian workers were just as likely as White workers to have obtained adequate annual earnings. In sharp contrast, Black workers were less than one-half as likely as Asian and White workers to have secured adequate annual earnings, and Hispanic workers were only one-third as likely to have done so in comparison to both Asian and White workers.

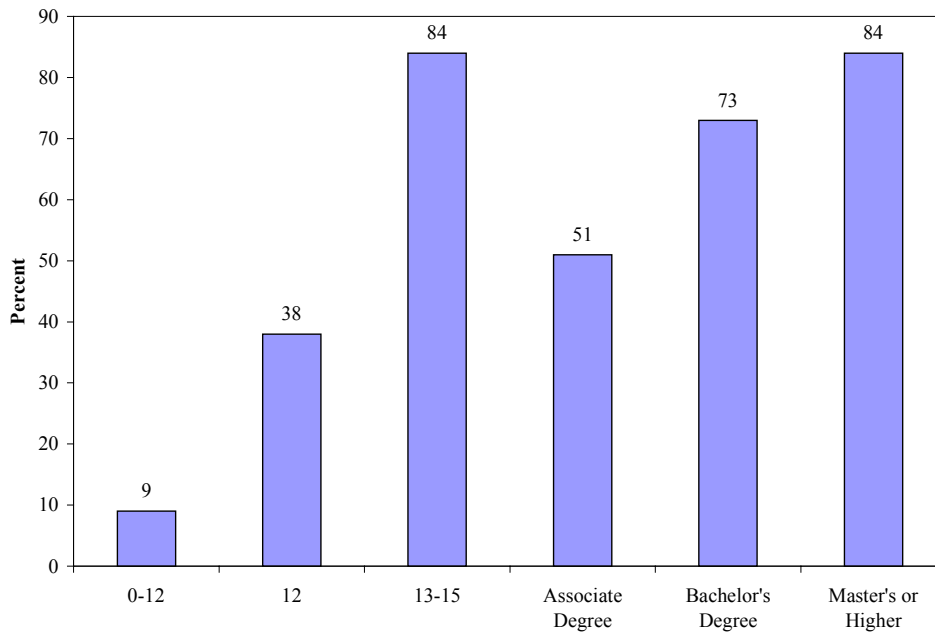
The ability of adult workers in Massachusetts to obtain adequate annual earnings in 2002-2003 varied dramatically by educational attainment group (See Table 43 and Chart 15). The gaps in earnings adequacy among educational groups widened further over the past few years as workers with formal schooling below the bachelor's degree experienced declines in their ability to obtain adequate annual earnings while their peers with a Bachelor's or higher degree posted modest gains over the past few years. The decline in earnings adequacy was particularly pronounced among workers lacking a high school diploma/GED certificate. By 2002-2003, fewer than 10 percent of employed high school dropouts reported annual earnings in excess of the low income threshold, a share only one-fourth as high as that of high school graduates and one ninth as high as that of workers with a Master's or higher degree. The role of rising immigration among workers without a high school diploma in contributing to this problem of sharply reduced earnings adequacy needs to be more carefully examined.

Table 43:
Comparisons of the Percent of 20-64 Year Old Persons Employed Full-Time for
40 or More Weeks with Annual Earnings Above the Low Income Threshold by
Educational Attainment, 1999 and 2002-2003: Massachusetts

	(A)	(B)	(C)
Educational Attainment	1999	2002-03	Percentage Point Change, 1999-2002/03
0-12 years, no diploma	26.7	9.4	-17.3
High school graduate/GED	40.3	38.3	-2.0
Some college, no degree	50.1	44.3	-5.8
Associate degree	57.0	51.1	-5.9
Bachelor's degree	71.7	72.9	+1.2
Master's or higher degree	83.0	83.7	+.7

Source: 2000 Census, 5-100 PUMS files; March 2003 and March 2004 CPS Annual Social and Economic Supplement, tabulations by authors.

Chart 15:
Percent of 20-64 Year Old Full-Time Employed Persons in Massachusetts
Who Worked 40 or More Weeks with Annual Earnings Above the
Low Income Threshold by Educational Attainment, 2002-2003 Averages



Reduced employment opportunities, lower real earnings for wage and salary workers, and a reduction in the share of full-time, year-round workers with annual earnings above our low income threshold have contributed to the rising incidence of low income problems among all

Massachusetts families over the past three years.⁴¹ Between 1999 and 2002, the share of state families with annual money incomes below two times the federal government's poverty lines rose from 17 to 19 percent. Family income inadequacy problems clearly have been exacerbated by the deterioration in the economic fortunes of the state over the 2001-2003 period.

Summary of Key Research Findings and Their Workforce Development Implications

This research report was designed to estimate and assess the real annual earnings experiences of Massachusetts full-time, year-round workers in recent years, to track changes in the real annual earnings of these full-time, year-round workers in Massachusetts during the decade of 1990s and the 1980s, to identify changes in the distribution of those earnings over time, and to estimate the share of workers in a wide array of demographic and socioeconomic subgroups who were able to obtain adequate annual earnings. Among the key research findings are the following:

(i) Despite strong job growth from 1993 through 2000 and record low unemployment at the end of the decade, the median real annual earnings of the typical 20-64 year old, full-time, year-round worker in Massachusetts rose only modestly over the decade, increasing by only 4%. The median annual earnings of women in Massachusetts over the 1990s increased more strongly than among men (8% vs. 2%), a pattern similar to that for the nation and the region. The gains in the median annual earnings of Massachusetts' workers in the 1980s were far more substantial than those in the 1990s in every gender and educational attainment subgroup.

(ii) Among both men and women, the gains in median real annual earnings during the 1990s were heavily concentrated among those holding a bachelor's or higher degree. Median real annual earnings of males declined in all educational subgroups lacking a bachelor's degree, with the steepest declines experienced by male high school dropouts. Among women, there were declines in the median annual earnings of those workers with no post-secondary schooling while women with bachelor degrees fared the best. The gaps in annual earnings between college graduates and high school graduates widened sharply over the 1990s for both men and women.

⁴¹ An analysis of the mean inflation-adjusted weekly earnings of Massachusetts wage and salary workers from 2000 to 2003 revealed a decline of nearly 6 percent in real weekly earnings over the past three years.

(iii) Earnings gains of adult male and female workers in Massachusetts during the 1990s varied quite widely across race-ethnic groups. Among males, the median real annual earnings of Black and Hispanic workers declined during the past decade while those of Whites (+5) and Asians (+17%) increased. Among women, median annual earnings of workers increased in each race-ethnic group; however, the relative size of these gains varied from a low of 2 percent among Hispanic women to a high of nearly 12 percent among White women. In nearly every race-ethnic group, workers with no post-secondary schooling either experienced real earnings declines or only maintained their real annual earnings over the decade while bachelor degree recipients typically experienced the highest relative gains. Gaps between the annual earnings of college and high school graduates widened across the demographic spectrum.

(iv) Native born male and female workers in the aggregate obtained earnings gains modestly above those of their foreign born counterparts over the past decade; however, among both native born and foreign born male workers, those workers lacking a bachelor's degree lost economic ground over the decade, with sizable declines taking place among high school dropouts and graduates. Among native and foreign-born women, increases in median annual earnings were highest among those holding a bachelor's or more advanced academic degree. Women without any post-secondary schooling generally failed to improve their real earnings position.

(v) At the end of the 1990s, there were substantial variations in the median annual earnings of full-time, year-round workers in Massachusetts across both counties and major industrial sectors. Workers in Norfolk and Middlesex Counties obtained the highest median annual earnings (\$42,000 and \$40,000, respectively) while workers in Hampden, Suffolk, Hampshire, and Berkshire Counties fared the worst (with median earnings of \$30,000 to \$33,000). The relative size of the gap in median annual earnings between the top and bottom counties was equivalent to 40%. Similar geographic patterns prevailed among men and women, with somewhat greater geographic variability in earnings among men. There were extraordinarily large differences in the median annual earnings of workers across major industrial sectors of the state. Median annual earnings in 1999 ranged from highs of \$51,000-\$52,000 in utilities and professional/scientific/technical services industries to a low of \$22,300 for workers in accommodation and food services. Even among workers with identical levels of formal

schooling, median annual earnings differences between the top paying and lowest paying industries were typically two to one.

(vi) The absolute and relative sizes of the annual earnings changes among both men and women between 1989 and 1999 varied considerably by their position in the annual earnings distribution. Among men, those in the bottom forty percent of the distribution experienced declines in their real annual earnings while very large absolute and relative gains took place among men in the top decile of the earnings distribution. Among women, only those in the bottom twenty percent failed to boost their real annual earnings; however, only very modest gains were experienced by most women up to the 70th percentile of the distribution. Annual earnings gains were quite strong among women in the upper two deciles of the earnings distribution (16 to 56 percent gains).

(vii) Relative earnings differences among both men and women in Massachusetts widened across the board over the decade of the 1990s. The increases in these relative earnings differentials were far greater between those workers at the top and bottom of the earnings distribution and between those at the top and middle of the distribution than between those in the middle and bottom of the earnings distribution. Similar inequality patterns prevailed for both men and women.

(viii) The distribution of annual earnings among both adult men and women in Massachusetts became much more unequal during the decade of the 1990s, with the top quintile of earners in both distributions substantially increasing their share of annual earnings over the decade. Among men, the top quintile of earners conservatively obtained between 47 and 48 percent of total pre-tax earnings during 1999, the largest share of earnings ever obtained by the top quintile of male earners in Massachusetts since the end of World War II. The male earnings distribution in Massachusetts by 1999 had become one of the most inegalitarian in the country. A substantial rise in the share of earnings obtained by the top quintile of female earners also took place in Massachusetts during the 1990s, with their share exceeding that of the nation's and also being the highest in the state since the end of World War II.

(ix) The ability of 20-64 year old, full-time, year-round workers in Massachusetts to achieve an annual earnings level equal to or greater than the low income threshold for a family of

four persons (\$34,060 in 1999) also was examined. In 1999, just under 57 percent of Massachusetts workers in the above target group achieved annual earnings above the adequacy threshold, a rise of 4 percentage points over the 1989 performance. Men (65%) were substantially more likely than women (45%) to have obtained earnings adequacy in 1999; however, nearly all of the gains in earnings adequacy over the decade took place among female workers. Among men, the only group of workers to experience a rise in the share of the employed with adequate annual earnings were bachelor degree holders.

(x) The success rates of workers in achieving adequate annual earnings varied quite considerably across educational attainment and race-ethnic groups. Overall, only 27 percent of the adult workers lacking a high school diploma/GED certificate were able to achieve earnings adequacy versus 40 percent of high school graduates, 57 percent of Associate degree holders, and 83 percent of Master's or advanced degree holders. Links between educational attainment and earnings adequacy were quite strong among both men and women and workers in each of four major race-ethnic groups. Rates of annual earnings adequacy in 1999 varied from a low of 26 percent among Hispanic workers to a high of 60 percent among White workers.

(xi) There were very substantial differences in the earnings adequacy rates of Massachusetts' workers across major industrial sectors and occupations in 1999. Across industries, these earnings adequacy rates ranged from lows of 27 to 44 percent in arts/entertainment/recreation, personal and other services, and retail trade industries to highs of 68 to 71 percent in the federal government, professional and related services, and information services. Large interindustry differences in earnings adequacy rates also prevailed among workers in each educational attainment subgroup. Across major occupational groups, earnings adequacy rates ranged from lows of 15 to 19 percent in food services, health care support, and personal services occupations to highs of 80 to 88 percent in management-related, architecture and engineering, and computer/mathematical science occupations. Unfortunately, many jobs in the mid-level to above average range of earnings adequacy, especially for workers with no post-secondary schooling, are projected to decline or experience no net job growth during the current decade.

(xii) We also designed a set of multivariate statistical models to predict the ability of 20-64 year old full-time, year-round Massachusetts' workers during 1999 to earn more than two times the poverty income line for a four- person family. Our findings revealed that the ability of workers to obtain annual earnings more than two times the poverty line was significantly influenced by their gender, age, education, and industry of employment. For example, male full-time workers were nearly 23 percentage points more likely than their comparable female counterparts to earn more than two times the poverty income level. Among race-ethnic groups, the likelihood of earning more than two times the poverty income for each of the non-White groups was significantly lower than that of comparable White workers, with the size of these probabilities ranging from 6 percentage points for Asians to 11 percentage points for Hispanics and to 14 percentage points for "members of the other" race ethnic-group. Young workers, ages 20-34, were 22 percentage points less likely than their older cohorts (35-44 years old) to earn more than two times the poverty income in Massachusetts.

(xiii) Our analysis of more recent annual earnings data from the March 2003 and March 2004 CPS surveys for Massachusetts revealed modest declines in the overall earnings adequacy rate between 1999 and 2002/2003. Declines were quite severe, however, for Hispanics, Blacks, and workers with no post-secondary schooling, especially high school dropouts. Asian workers were estimated to have improved their earning adequacy rate while workers with a Bachelor's or higher degree experienced a slight one percentage point gain.

Workers with only 1-8 years of education and those without a high school diploma were 15 and 10 percentage points, respectively, less likely than their peers with high school diplomas to earn more than two times the poverty income level. The increased probabilities of achieving the desired earnings threshold ranged from 12 percentage points for those workers with 1-3 years of college, to 20 percentage points for those with an Associate's degree, 38 percentage points for those with a bachelor's degree, and 54 percentage points for those with a Master's or higher degree.

Those workers in arts and recreation/other personal services, and education, health and social services industries were less likely than their peers in the retail trade industry (the base group) to earn an income more than two times the poverty income level. Workers in industries

with significantly higher probabilities of earning an income more than the two times the poverty level included transportation, communications and utilities, government services, information services, construction and durable-manufacturing, finance, insurance, and real estate, professional services, wholesale trade, and non-durable manufacturing.

What are the implications of the above findings on recent trends in the levels and distribution of annual earnings among Massachusetts' workers for the Boston Workforce Development Initiative? First, a careful assessment of the above findings strongly indicates that strong job growth and economic growth are clearly necessary but not sufficient for improving the real annual earnings position of many of the state's frontline workers, especially those lacking any post-secondary schooling. Despite strong job growth from 1993 to 2000, both male and female workers in Massachusetts with no formal schooling beyond high school failed to experience any gains in their median real annual earnings over the past decade. In fact, their median real earnings declined by anywhere from 2 to 7 percent depending on gender and years of schooling attainment, with high school dropouts faring the worst. As state labor market conditions deteriorated from 2000 to 2003, these workers found it increasingly more difficult to obtain jobs that would provide them with annual earnings above the low income threshold. Future workforce development initiatives should be supportive of state economic development goals and vice versa. The success of workforce training initiatives is clearly dependent on the ability of state employers to generate additional high quality job opportunities for resident workers.

Second, participants in workforce training programs should be strongly encouraged to complete additional years of post-secondary schooling, especially in courses closely tied to their occupations. There are substantive gains in median annual earnings and in annual earnings adequacy for workers who complete some post-secondary schooling and obtain Associate degrees. Employers who finance the post-secondary educational costs of their front line workers should be provided tax credits by state government.

Third, the annual earnings of workers in each educational category (including high school dropouts, graduates, and those with one or more years of college) were found to vary widely across major industries and occupations in the state during 1999. The selection of occupational

areas for future training should be based on their ability to provide an adequate stream of earnings over the work life of individuals not simply on the availability of current job openings in the occupation. Starting wages and earnings growth for employment in occupations should be among the criteria for targetting occupations for training.

Fourth, there is a need to more systematically analyze available job vacancy data by industry, occupation, and geographic area across the state. The Massachusetts Department of Employment and Training has been undertaking job vacancy surveys on a bi-annual basis for the past two years, with the most recent survey results for the second quarter of 2004 due for release in early December. The job vacancy data should be analyzed over time to identify occupational areas of shortage and surplus across the state and to assess starting wages, hours of work, employee benefits and educational requirements. The analysis of the job vacancy data should be supplemented with an analysis of the existing industry and occupational employment projections data for the state through 2010. Are current job vacancy patterns consistent with projections of employment growth by industry and occupation over the remainder of the current decade?

Fifth, many existing frontline workers lacking post-secondary degrees are finding it increasingly difficult to improve their real annual earnings and to secure adequate annual earnings; i.e., earnings above the low income threshold for a family of four. Further investments in their education and training will be needed to boost their productivity and their ability to obtain future higher earnings. Workforce training initiatives also should target such incumbent frontline workers, working with employers who are willing to invest the time and resources needed for in upgrading the skills of their frontline workers. Programs funded under the state's current Workforce Training Investment Fund should be carefully evaluated to gain knowledge of their past success in boosting worker productivity, earnings, and occupational mobility. Our existing knowledge base on the effectiveness of many publicly-funded employment and training programs is quite thin.⁴² Longer-term tracking of the employment and earnings experiences of education and training program participants is clearly needed at this point in time to help formulate future workforce development policy.

⁴² Recent efforts by the Commonwealth Corporation have begun to fill the void. See: The Center for the Study of Urban Poverty at UCLA, *The Effectiveness of Employment and Training Programs in Raising the Earnings Trajectories of Low Income Adults: Findings for Massachusetts JTPA Title II Programs*, Prepared for the Commonwealth Corporation, Boston, 2003.

The absence of any sustained growth in the real annual earnings of Massachusetts workers with no post-secondary schooling and the rising tide of earnings inequality in the state will not be turned around any time soon by any one single economic development, workforce development, or educational strategy. A comprehensive and closely coordinated set of short and long-term strategies will be needed to upgrade the educational qualifications and occupational skills of the state's work force, to create more high skilled and high wage jobs, and redesign work and on-the-job training opportunities so that future workers can be more productive and better compensated. Job creation, job training, and job matching will have to go hand in hand to boost future real annual earnings and successfully combat rising earnings inequality across the Commonwealth.

Appendix A:

Table 1:
Marginal Probabilities of All 20-64 Years Old Full-Time, Year-Round Workers in Massachusetts
With an Ability to Earn an Income More than Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
MALE	0.925	0.227	0.015	3,854.4	0.000
ASIAN	-0.251	-0.062	0.043	33.6	0.000
BLACK	-0.493	-0.121	0.034	203.9	0.000
HISPANIC	-0.446	-0.109	0.044	104.7	0.000
MIXEDR	-0.476	-0.117	0.053	81.2	0.000
OTHERR	-0.573	-0.141	0.055	110.4	0.000
NATIVE	0.229	0.056	0.024	88.1	0.000
AGE20_34	-0.891	-0.219	0.017	2,607.3	0.000
AGE45_54	0.030	0.007	0.019	2.6	0.110
AGE55_64	-0.065	-0.016	0.024	7.6	0.006
ED1_8YRS	-0.621	-0.152	0.051	150.9	0.000
ED_HSDO	-0.415	-0.102	0.032	169.4	0.000
EDCOL1_3	0.495	0.121	0.020	626.8	0.000
ED_ASSOC	0.822	0.202	0.026	970.0	0.000
ED_BACH	1.544	0.379	0.021	5,673.7	0.000
ED_MAST	2.208	0.542	0.026	7,153.4	0.000
AGFF	-0.576	-0.141	0.112	26.5	0.000
MINING	1.248	0.306	0.258	23.3	0.000
CONSTRUC	0.578	0.142	0.033	301.8	0.000
NONDURMF	0.287	0.070	0.034	69.6	0.000
DURBLEMF	0.580	0.142	0.029	398.7	0.000
WHOLESALE	0.441	0.108	0.040	119.2	0.000
TCU	0.829	0.203	0.038	486.0	0.000
INFORMAT	0.751	0.184	0.042	323.7	0.000
FIRE	0.544	0.134	0.031	304.5	0.000
PROFSERV	0.499	0.122	0.030	280.1	0.000
EDHSOCS	-0.068	-0.017	0.027	6.4	0.011
ARTSEREC	-0.610	-0.150	0.039	246.5	0.000
OTHERSER	-0.297	-0.073	0.040	54.6	0.000
GVTSERV	0.819	0.201	0.039	451.5	0.000
Constant	-1.156		0.036	1,039.4	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.568				
-2 Log likelihood	127,257				
Cox & Snell R Square	0.230				
Nagelkerke R Square	0.308				
Chi-square	30,031				
DF	30				
N	115,014				

Table 2:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Male Workers in
 Massachusetts With an Ability to Earn an Income More than Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.350	-0.079	0.056	39.1	0.000
BLACK	-0.753	-0.171	0.047	254.3	0.000
HISPANIC	-0.527	-0.120	0.056	89.8	0.000
MIXEDR	-0.552	-0.126	0.067	67.1	0.000
OTHERR	-0.570	-0.129	0.069	68.8	0.000
NATIVE	0.198	0.045	0.031	39.6	0.000
AGE20_34	-0.973	-0.221	0.023	1,815.7	0.000
AGE45_54	0.046	0.011	0.025	3.4	0.067
AGE55_64	-0.042	-0.010	0.032	1.8	0.185
ED1_8YRS	-0.693	-0.157	0.060	135.7	0.000
ED_HSDO	-0.463	-0.105	0.037	152.2	0.000
EDCOL1_3	0.432	0.098	0.026	283.2	0.000
ED_ASSOC	0.697	0.158	0.038	344.3	0.000
ED_BACH	1.338	0.304	0.028	2,353.6	0.000
ED_MAST	1.912	0.434	0.037	2,724.7	0.000
AGFF	-0.650	-0.148	0.123	28.2	0.000
MINING	1.253	0.285	0.285	19.4	0.000
CONSTRUC	0.461	0.105	0.038	149.5	0.000
NONDURMF	0.278	0.063	0.042	44.0	0.000
DURBLEMF	0.532	0.121	0.036	220.2	0.000
WHOLESAL	0.422	0.096	0.049	74.4	0.000
TCU	0.719	0.163	0.045	253.3	0.000
INFORMAT	0.654	0.148	0.056	133.9	0.000
FIRE	0.414	0.094	0.045	84.4	0.000
PROFSERV	0.375	0.085	0.039	91.9	0.000
EDHSOCS	-0.251	-0.057	0.039	40.8	0.000
ARTSEREC	-0.716	-0.163	0.048	221.4	0.000
OTHERSER	-0.321	-0.073	0.051	40.1	0.000
GVTSERV	1.023	0.232	0.053	369.8	0.000
Constant	0.002		0.044	0.0	0.957
<u>Model Summary</u>					
Mean of Dep Var	0.651				
-2 Log likelihood	72,211				
Cox & Snell R Square	0.193				
Nagelkerke R Square	0.266				
Chi-square	14,358				
DF	29				
N	66,925				

Table 3:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Female Workers in
Massachusetts With an Ability to Earn an Income More than Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.086	-0.021	0.067	1.6	0.202
BLACK	-0.201	-0.050	0.050	16.2	0.000
HISPANIC	-0.324	-0.080	0.070	21.4	0.000
MIXEDR	-0.362	-0.090	0.085	18.3	0.000
OTHEERR	-0.599	-0.148	0.090	43.9	0.000
NATIVE	0.230	0.057	0.039	34.7	0.000
AGE20_34	-0.808	-0.200	0.027	876.6	0.000
AGE45_54	0.034	0.008	0.028	1.4	0.230
AGE55_64	-0.047	-0.012	0.036	1.7	0.192
ED1_8YRS	-0.544	-0.135	0.101	28.9	0.000
ED_HSDO	-0.365	-0.090	0.065	31.9	0.000
EDCOL1_3	0.647	0.160	0.033	395.9	0.000
ED_ASSOC	1.034	0.256	0.039	710.9	0.000
ED_BACH	1.831	0.454	0.032	3,248.7	0.000
ED_MAST	2.569	0.637	0.038	4,479.4	0.000
AGFF	-0.708	-0.175	0.281	6.3	0.012
MINING	0.472	0.117	0.748	0.4	0.528
CONSTRUC	0.605	0.150	0.098	38.0	0.000
NONDURMF	0.214	0.053	0.063	11.3	0.001
DURBLEMF	0.635	0.157	0.051	153.7	0.000
WHOLESALE	0.388	0.096	0.075	26.8	0.000
TCU	0.967	0.240	0.070	188.8	0.000
INFORMAT	0.888	0.220	0.063	199.3	0.000
FIRE	0.722	0.179	0.046	249.8	0.000
PROFSERV	0.698	0.173	0.047	221.3	0.000
EDHSOCS	0.065	0.016	0.040	2.6	0.105
ARTSEREC	-0.427	-0.106	0.066	41.8	0.000
OTHERSER	-0.329	-0.082	0.068	23.4	0.000
GVTSERV	0.609	0.151	0.060	103.4	0.000
Constant	-1.499		0.0568	697.28	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.453				
-2 Log likelihood	54,398				
Cox & Snell R Square	0.218				
Nagelkerke R Square	0.292				
Chi-square	11,845				
DF	29				
N	48,089				

Table 4:
Marginal Probabilities of All 20-64 Years Old Full-Time, Year-Round Workers in Massachusetts
With an Ability to Earn an Income More than Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
MALE	0.939	0.230	0.015	3917.5	0.000
ASIAN	-0.301	-0.074	0.044	47.9	0.000
BLACK	-0.500	-0.123	0.036	195.0	0.000
HISPANIC	-0.451	-0.111	0.044	106.2	0.000
MIXEDR	-0.484	-0.119	0.053	83.2	0.000
OTHERR	-0.553	-0.136	0.055	102.4	0.000
NATIVE	0.279	0.069	0.025	127.9	0.000
AGE20_34	-0.910	-0.223	0.018	2652.3	0.000
AGE45_54	0.037	0.009	0.019	3.9	0.050
AGE55_64	-0.071	-0.018	0.024	9.1	0.003
ED1_8YRS	-0.602	-0.148	0.051	140.2	0.000
ED_HSDO	-0.407	-0.100	0.032	160.7	0.000
EDCOL1_3	0.483	0.118	0.020	587.6	0.000
ED_ASSOC	0.818	0.201	0.027	946.3	0.000
ED_BACH	1.495	0.367	0.021	5194.4	0.000
ED_MAST	2.145	0.526	0.026	6561.4	0.000
BERKSHIR	-0.597	-0.146	0.053	125.4	0.000
BRISTOL	-0.126	-0.031	0.039	10.6	0.001
BROKTON	0.118	0.029	0.041	8.2	0.004
CAPECOD	-0.300	-0.074	0.043	48.8	0.000
CENTRMA	-0.056	-0.014	0.034	2.7	0.097
FRNKHAMP	-0.542	-0.133	0.038	199.5	0.000
GLOWELL	0.099	0.024	0.040	6.1	0.013
GNEWBEDF	-0.296	-0.072	0.049	36.4	0.000
HAMPDEN	-0.327	-0.080	0.036	84.4	0.000
LMERRIMC	0.059	0.014	0.043	1.9	0.173
METRONOR	0.145	0.036	0.031	22.4	0.000
METROSW	0.330	0.081	0.032	109.6	0.000
NCENTRAL	-0.177	-0.043	0.051	11.9	0.001
SCOASTAL	0.225	0.055	0.034	43.6	0.000
SESSEX	0.061	0.015	0.036	2.9	0.088
AGFF	-0.394	-0.097	0.112	12.3	0.000
MINING	1.353	0.332	0.260	27.1	0.000
CONSTRUC	0.591	0.145	0.034	310.6	0.000
NONDURMF	0.356	0.087	0.035	105.2	0.000
DURBLEMF	0.594	0.146	0.029	407.9	0.000
WHOLESAL	0.434	0.106	0.041	113.8	0.000
TCU	0.829	0.203	0.038	480.0	0.000

Table 4: (Continued)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
INFORMAT	0.723	0.177	0.042	294.8	0.000
FIRE	0.515	0.126	0.031	268.0	0.000
PROFSERV	0.463	0.114	0.030	236.8	0.000
EDHSOCS	-0.038	-0.009	0.027	1.9	0.165
ARTSEREC	-0.595	-0.146	0.039	232.0	0.000
OTHERSER	-0.298	-0.073	0.040	54.2	0.000
GVTSERV	0.841	0.206	0.039	470.3	0.000
Constant	-1.180		0.043	745.0	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.568				
-2 Log likelihood	126,002				
Cox & Snell R Square	0.238				
Nagelkerke R Square	0.3196				
Chi-square	31,286				
DF	45				
N	115,014				

Table 5:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Male Workers in
 Massachusetts With an Ability to Earn an Income More than Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.379	-0.086	0.056	45.1	0.000
BLACK	-0.693	-0.157	0.049	203.5	0.000
HISPANIC	-0.519	-0.118	0.056	86.0	0.000
MIXEDR	-0.538	-0.122	0.068	63.0	0.000
OTHERR	-0.539	-0.122	0.069	61.2	0.000
NATIVE	0.231	0.053	0.032	52.9	0.000
AGE20_34	-0.973	-0.221	0.023	1781.0	0.000
AGE45_54	0.057	0.013	0.025	5.0	0.026
AGE55_64	-0.040	-0.009	0.032	1.5	0.214
ED1_8YRS	-0.675	-0.153	0.060	126.6	0.000
ED_HSDO	-0.457	-0.104	0.038	146.7	0.000
EDCOL1_3	0.416	0.095	0.026	259.9	0.000
ED_ASSOC	0.684	0.155	0.038	328.3	0.000
ED_BACH	1.297	0.295	0.028	2157.4	0.000
ED_MAST	1.851	0.421	0.037	2485.1	0.000
BERKSHIR	-0.342	-0.078	0.069	24.9	0.000
BRISTOL	0.168	0.038	0.051	10.8	0.001
BROKTON	0.352	0.080	0.055	40.7	0.000
CAPECOD	-0.094	-0.021	0.057	2.8	0.097
CENTRMA	0.204	0.046	0.045	20.3	0.000
FRNKHAMP	-0.293	-0.067	0.050	34.0	0.000
GLOWELL	0.259	0.059	0.053	23.7	0.000
GNEWBEDF	-0.082	-0.019	0.064	1.7	0.199
HAMPDEN	-0.085	-0.019	0.047	3.3	0.069
LMERRIMC	0.269	0.061	0.058	21.5	0.000
METRONOR	0.259	0.059	0.041	39.4	0.000
METROSW	0.551	0.125	0.043	164.4	0.000
NCENTRAL	0.103	0.023	0.067	2.4	0.122
SCOASTAL	0.405	0.092	0.046	76.7	0.000
SESSEX	0.211	0.048	0.048	19.2	0.000
AGFF	-0.490	-0.111	0.123	15.8	0.000
MINING	1.365	0.310	0.286	22.8	0.000
CONSTRUC	0.472	0.107	0.038	154.5	0.000
NONDURMF	0.330	0.075	0.042	61.0	0.000
DURBLEMF	0.537	0.122	0.036	219.7	0.000
WHOLESA	0.418	0.095	0.049	71.8	0.000
TCU	0.727	0.165	0.045	255.8	0.000
INFORMAT	0.630	0.143	0.057	122.6	0.000

Table 5: (Continued)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
FIRE	0.389	0.088	0.045	73.0	0.000
PROFSERV	0.355	0.081	0.039	81.3	0.000
EDHSOCS	-0.213	-0.048	0.040	29.0	0.000
ARTSEREC	-0.690	-0.157	0.048	203.2	0.000
OTHERSER	-0.321	-0.073	0.051	39.6	0.000
GVTSERV	1.047	0.238	0.053	383.6	0.000
Constant	-0.199		0.055	13.2	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.6511				
-2 Log likelihood	71,560				
Cox & Snell R Square	0.201				
Nagelkerke R Square	0.277				
Chi-square	15,008				
DF	44				
N	66,925				

Table 6:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Female Workers in
Massachusetts With an Ability to Earn an Income More than Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.168	-0.042	0.067	6.238	0.013
BLACK	-0.303	-0.075	0.052	33.307	0.000
HISPANIC	-0.334	-0.083	0.070	22.505	0.000
MIXEDR	-0.404	-0.100	0.085	22.537	0.000
OTHERR	-0.596	-0.148	0.091	43.099	0.000
NATIVE	0.297	0.073	0.040	56.281	0.000
AGE20_34	-0.860	-0.213	0.028	957.697	0.000
AGE45_54	0.037	0.009	0.028	1.684	0.194
AGE55_64	-0.067	-0.017	0.036	3.384	0.066
ED1_8YRS	-0.529	-0.131	0.102	27.049	0.000
ED_HSDO	-0.354	-0.088	0.065	29.608	0.000
EDCOL1_3	0.648	0.161	0.033	389.450	0.000
ED_ASSOC	1.046	0.259	0.039	712.174	0.000
ED_BACH	1.783	0.442	0.033	3001.826	0.000
ED_MAST	2.507	0.621	0.039	4130.800	0.000
BERKSHIR	-0.923	-0.229	0.087	112.857	0.000
BRISTOL	-0.490	-0.121	0.060	67.569	0.000
BROKTON	-0.154	-0.038	0.063	6.060	0.014
CAPECOD	-0.545	-0.135	0.066	67.984	0.000
CENTRMA	-0.365	-0.090	0.051	50.229	0.000
FRNKHAMP	-0.865	-0.214	0.060	208.292	0.000
GLOWELL	-0.053	-0.013	0.061	0.742	0.389
GNEWBEDF	-0.550	-0.136	0.079	49.026	0.000
HAMPDEN	-0.640	-0.159	0.055	134.186	0.000
LMERRIMC	-0.159	-0.040	0.065	5.991	0.014
METRONOR	0.021	0.005	0.045	0.217	0.641
METROSW	0.091	0.023	0.046	3.891	0.049
NCENTRAL	-0.542	-0.134	0.082	43.996	0.000
SCOASTAL	0.031	0.008	0.050	0.382	0.537
SESSEX	-0.102	-0.025	0.053	3.607	0.058
AGFF	-0.461	-0.114	0.280	2.716	0.099
MINING	0.278	0.069	0.756	0.135	0.713
CONSTRUC	0.596	0.148	0.099	36.272	0.000
NONDURMF	0.303	0.075	0.064	22.170	0.000
DURBLEMF	0.651	0.161	0.052	156.210	0.000
WHOLESA	0.358	0.089	0.076	22.393	0.000
TCU	0.959	0.238	0.071	182.792	0.000
INFORMAT	0.851	0.211	0.064	178.808	0.000

Table 6: (Continued)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
FIRE	0.694	0.172	0.046	225.321	0.000
PROFSERV	0.636	0.158	0.047	179.754	0.000
EDHSOCS	0.095	0.024	0.041	5.491	0.019
ARTSEREC	-0.411	-0.102	0.067	37.983	0.000
OTHERSER	-0.333	-0.083	0.068	23.691	0.000
GVTSERV	0.626	0.155	0.060	107.502	0.000
Constant	-1.306		0.067	379.753	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.453				
-2 Log likelihood	53,624				
Cox & Snell R Square	0.231				
Nagelkerke R Square	0.309				
Chi-square	12,619				
DF	43				
N	48,049				

Table 7:
Marginal Probabilities of All 20-64 Years Old Full-Time, Year-Round Workers in
Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
MALE	1.101	0.271	0.019	3295.6	0.000
ASIAN	-0.640	-0.158	0.068	89.2	0.000
BLACK	-0.589	-0.145	0.041	203.3	0.000
HISPANIC	-0.508	-0.125	0.052	97.2	0.000
MIXEDR	-0.454	-0.112	0.063	52.4	0.000
OTHERR	-0.550	-0.136	0.062	78.2	0.000
NATIVE	0.219	0.054	0.030	52.3	0.000
AGE20_34	-0.920	-0.227	0.022	1748.9	0.000
AGE45_54	0.073	0.018	0.023	10.5	0.001
AGE55_64	-0.007	-0.002	0.028	0.1	0.790
ED1_8YRS	-0.605	-0.149	0.052	136.0	0.000
ED_HSDO	-0.415	-0.102	0.032	164.6	0.000
EDCOL1_3	0.518	0.128	0.020	663.6	0.000
ED_ASSOC	0.868	0.214	0.027	1035.2	0.000
AGFF	-0.396	-0.098	0.124	10.2	0.001
MINING	1.154	0.284	0.263	19.3	0.000
CONSTRUC	0.593	0.146	0.037	262.6	0.000
NONDURMF	0.242	0.060	0.039	39.5	0.000
DURBLEMF	0.502	0.124	0.033	227.7	0.000
WHOLESALE	0.384	0.095	0.046	68.6	0.000
TCU	0.874	0.215	0.041	445.3	0.000
INFORMAT	0.955	0.235	0.055	304.0	0.000
FIRE	0.491	0.121	0.039	156.4	0.000
PROFSERV	0.399	0.098	0.039	105.8	0.000
EDHSOCS	-0.063	-0.015	0.034	3.4	0.066
ARTSEREC	-0.510	-0.126	0.045	125.9	0.000
OTHERSER	-0.131	-0.032	0.047	7.9	0.005
GVTSERV	0.958	0.236	0.046	429.0	0.000
Constant	-1.270		0.043	877.8	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.440				
-2 Log likelihood	81,214				
Cox & Snell R Square	0.179				
Nagelkerke R Square	0.240				
Chi-square	13,656				
DF	28				
N	69,151				

Table 8:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Male Workers in
Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.754	-0.187	0.084	79.8	0.000
BLACK	-0.818	-0.203	0.055	225.5	0.000
HISPANIC	-0.541	-0.134	0.063	72.7	0.000
MIXEDR	-0.525	-0.130	0.077	46.2	0.000
OTHERR	-0.560	-0.139	0.076	54.3	0.000
NATIVE	0.222	0.055	0.038	34.7	0.000
AGE20_34	-1.004	-0.249	0.027	1,363.1	0.000
AGE45_54	0.078	0.019	0.030	6.9	0.008
AGE55_64	0.004	0.001	0.037	0.0	0.917
ED1_8YRS	-0.664	-0.165	0.061	120.4	0.000
ED_HSDO	-0.452	-0.112	0.038	143.2	0.000
EDCOL1_3	0.445	0.110	0.026	296.3	0.000
ED_ASSOC	0.716	0.178	0.038	358.1	0.000
AGFF	-0.491	-0.122	0.134	13.5	0.000
MINING	1.211	0.301	0.288	17.7	0.000
CONSTRUC	0.499	0.124	0.041	147.1	0.000
NONDURMF	0.242	0.060	0.046	27.8	0.000
DURBLEMF	0.449	0.112	0.040	123.6	0.000
WHOLESALE	0.378	0.094	0.055	46.9	0.000
TCU	0.761	0.189	0.049	239.4	0.000
INFORMAT	0.765	0.190	0.073	110.9	0.000
FIRE	0.295	0.073	0.060	24.3	0.000
PROFSERV	0.203	0.050	0.051	16.0	0.000
EDHSOCS	-0.314	-0.078	0.052	37.3	0.000
ARTSEREC	-0.614	-0.153	0.055	124.4	0.000
OTHERSER	-0.139	-0.035	0.056	6.1	0.013
GVTSERV	1.117	0.278	0.063	319.4	0.000
Constant	-0.011		0.051	0.0	0.827
Model Summary					
Mean of Dep Var					
-2 Log likelihood	49,327				
Cox & Snell R Square	0.152				
Nagelkerke R Square	0.203				
Chi-square	6,700				
DF	27				
N	40,597				

Table 9:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Female Workers in
Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
Two Times the Poverty Line, 1999

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.434	-0.091	0.111	15.1	0.000
BLACK	-0.284	-0.060	0.061	21.5	0.000
HISPANIC	-0.440	-0.092	0.088	24.8	0.000
MIXEDR	-0.319	-0.067	0.106	9.1	0.003
OTHERR	-0.553	-0.116	0.109	26.0	0.000
NATIVE	0.185	0.039	0.051	13.3	0.000
AGE20_34	-0.763	-0.160	0.037	415.3	0.000
AGE45_54	0.089	0.019	0.035	6.4	0.011
AGE55_64	0.013	0.003	0.043	0.1	0.760
ED1_8YRS	-0.486	-0.102	0.103	22.2	0.000
ED_HSDO	-0.341	-0.071	0.065	27.6	0.000
EDCOL1_3	0.640	0.134	0.033	383.9	0.000
ED_ASSOC	1.029	0.216	0.039	694.2	0.000
AGFF	-0.346	-0.072	0.350	1.0	0.323
MINING	0.122	0.026	0.854	0.0	0.886
CONSTRUC	0.758	0.159	0.111	47.0	0.000
NONDURMF	0.147	0.031	0.075	3.8	0.050
DURBLEMF	0.576	0.121	0.061	90.7	0.000
WHOLESALE	0.305	0.064	0.091	11.1	0.001
TCU	1.092	0.229	0.078	194.2	0.000
INFORMAT	1.212	0.254	0.083	213.0	0.000
FIRE	0.683	0.143	0.056	146.1	0.000
PROFSERV	0.679	0.142	0.061	122.5	0.000
EDHSOCS	0.130	0.027	0.051	6.5	0.011
ARTSEREC	-0.284	-0.060	0.081	12.3	0.000
OTHERSER	-0.189	-0.040	0.088	4.7	0.031
GVTSERV	0.814	0.171	0.074	121.6	0.000
Constant	-1.519		0.070	470.8	0.000
<u>Model Summary</u>					
Mean of Dep Var					
-2 Log likelihood	31,567				
Cox & Snell R Square	0.108				
Nagelkerke R Square	0.153				
Chi-square	3,265				
DF	26				
N	28,554				

Table 10:
Marginal Probabilities of All 20-64 Years Old Full-Time, Year-Round Workers in
 Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
 Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
MALE	1.116	0.275	0.019	3337.7	0.000
ASIAN	-0.698	-0.172	0.068	104.6	0.000
BLACK	-0.588	-0.145	0.044	181.1	0.000
HISPANIC	-0.519	-0.128	0.052	99.8	0.000
MIXEDR	-0.466	-0.115	0.063	54.6	0.000
OTHERR	-0.524	-0.129	0.062	70.6	0.000
NATIVE	0.272	0.067	0.031	78.9	0.000
AGE20_34	-0.931	-0.229	0.022	1767.0	0.000
AGE45_54	0.070	0.017	0.023	9.6	0.002
AGE55_64	-0.025	-0.006	0.028	0.8	0.366
ED1_8YRS	-0.573	-0.141	0.052	120.9	0.000
ED_HSDO	-0.402	-0.099	0.033	152.4	0.000
EDCOL1_3	0.507	0.125	0.020	627.0	0.000
ED_ASSOC	0.865	0.213	0.027	1014.3	0.000
BERKSHIR	-0.546	-0.135	0.066	67.9	0.000
BRISTOL	-0.100	-0.025	0.049	4.2	0.040
BROKTON	0.163	0.040	0.051	10.3	0.001
CAPECOD	-0.217	-0.053	0.055	15.3	0.000
CENTRMA	-0.058	-0.014	0.045	1.7	0.195
FRNKHAMP	-0.397	-0.098	0.050	61.9	0.000
GLOWELL	0.078	0.019	0.051	2.4	0.124
GNEWBEDF	-0.277	-0.068	0.059	22.3	0.000
HAMPDEN	-0.288	-0.071	0.045	40.2	0.000
LMERRIMC	0.033	0.008	0.055	0.3	0.557
METRONOR	0.267	0.066	0.043	39.4	0.000
METROSW	0.328	0.081	0.044	54.9	0.000
NCENTRAL	-0.137	-0.034	0.061	5.0	0.026
SCOASTAL	0.223	0.055	0.045	24.4	0.000
SESSEX	0.098	0.024	0.047	4.4	0.037
AGFF	-0.264	-0.065	0.125	4.5	0.034
MINING	1.246	0.307	0.264	22.3	0.000
CONSTRUC	0.598	0.147	0.037	263.6	0.000
NONDURMF	0.314	0.077	0.039	65.0	0.000
DURBLEMF	0.527	0.130	0.034	245.3	0.000
WHOLESALE	0.379	0.093	0.047	65.9	0.000
TCU	0.867	0.214	0.042	432.2	0.000
INFORMAT	0.932	0.230	0.055	285.4	0.000

Table 10: (Continued)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
FIRE	0.461	0.114	0.040	135.9	0.000
PROFSERV	0.361	0.089	0.039	85.3	0.000
EDHSOCS	-0.041	-0.010	0.034	1.4	0.229
ARTSEREC	-0.514	-0.127	0.046	125.9	0.000
OTHERSER	-0.144	-0.036	0.047	9.5	0.002
GVTSERV	0.968	0.239	0.047	432.2	0.000
Constant	-1.328		0.054	598.8	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.440				
-2 Log likelihood	80,491				
Cox & Snell R Square	0.188				
Nagelkerke R Square	0.252				
Chi-square	14,378				
DF	43				
N	69,151				

Table 11:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Male Workers in
 Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
 Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.770	-0.191	0.085	81.9	0.000
BLACK	-0.747	-0.185	0.057	172.3	0.000
HISPANIC	-0.529	-0.132	0.064	68.4	0.000
MIXEDR	-0.509	-0.127	0.078	43.0	0.000
OTHERR	-0.526	-0.131	0.076	47.5	0.000
NATIVE	0.257	0.064	0.038	45.3	0.000
AGE20_34	-1.008	-0.250	0.027	1358.3	0.000
AGE45_54	0.082	0.020	0.030	7.5	0.006
AGE55_64	-0.003	-0.001	0.037	0.0	0.934
ED1_8YRS	-0.642	-0.160	0.061	110.8	0.000
ED_HSDO	-0.443	-0.110	0.038	136.3	0.000
EDCOL1_3	0.433	0.107	0.026	277.0	0.000
ED_ASSOC	0.705	0.175	0.038	344.6	0.000
BERKSHIR	-0.295	-0.073	0.082	12.8	0.000
BRISTOL	0.205	0.051	0.062	10.9	0.001
BROKTON	0.405	0.101	0.066	38.0	0.000
CAPECOD	-0.060	-0.015	0.070	0.7	0.392
CENTRMA	0.205	0.051	0.057	13.0	0.000
FRNKHAMP	-0.134	-0.033	0.063	4.5	0.034
GLOWELL	0.230	0.057	0.065	12.6	0.000
GNEWBEDF	-0.026	-0.006	0.074	0.1	0.727
HAMPDEN	-0.035	-0.009	0.058	0.4	0.544
LMERRIMC	0.236	0.059	0.071	10.9	0.001
METRONOR	0.365	0.091	0.055	44.1	0.000
METROSW	0.508	0.126	0.057	78.2	0.000
NCENTRAL	0.146	0.036	0.078	3.5	0.060
SCOASTAL	0.424	0.105	0.059	52.3	0.000
SESSEX	0.236	0.059	0.061	15.2	0.000
AGFF	-0.372	-0.092	0.135	7.6	0.006
MINING	1.300	0.323	0.289	20.2	0.000
CONSTRUC	0.505	0.125	0.041	148.6	0.000
NONDURMF	0.289	0.072	0.046	38.7	0.000
DURBLEMF	0.461	0.115	0.041	127.7	0.000
WHOLESALE	0.374	0.093	0.056	45.3	0.000
TCU	0.762	0.189	0.050	236.6	0.000
INFORMAT	0.742	0.184	0.073	102.9	0.000
FIRE	0.266	0.066	0.060	19.5	0.000

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
PROFSERV	0.183	0.045	0.051	12.9	0.000
EDHSOCS	-0.294	-0.073	0.052	32.2	0.000
ARTSEREC	-0.605	-0.150	0.055	119.1	0.000
OTHERSER	-0.148	-0.037	0.056	6.9	0.009
GVTSERV	1.131	0.281	0.063	323.6	0.000
Constant	-0.241		0.066	13.2	0.000
<u>Model Summary</u>					
Mean of Dep Var	0.5394				
-2 Log likelihood	48,967				
Cox & Snell R Square	0.160				
Nagelkerke R Square	0.213				
Chi-square	7,060				
DF	42				
N	40,597				

Table 12:
Marginal Probabilities of 20-64 Years Old Full-Time, Year-Round Female Workers in
 Massachusetts With Associate's Degree or Less with an Ability to Earn an Income More than
 Two Times the Poverty Line, 1999
 (Geography Variable Included)

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
ASIAN	-0.576	-0.121	0.113	26.1	0.000
BLACK	-0.417	-0.087	0.067	38.7	0.000
HISPANIC	-0.477	-0.100	0.089	28.8	0.000
MIXEDR	-0.380	-0.080	0.107	12.7	0.000
OTHERR	-0.545	-0.114	0.109	24.9	0.000
NATIVE	0.262	0.055	0.052	25.8	0.000
AGE20_34	-0.794	-0.166	0.038	439.7	0.000
AGE45_54	0.074	0.016	0.036	4.3	0.037
AGE55_64	-0.029	-0.006	0.044	0.4	0.513
ED1_8YRS	-0.446	-0.093	0.104	18.5	0.000
ED_HSDO	-0.321	-0.067	0.065	24.1	0.000
EDCOL1_3	0.640	0.134	0.033	375.7	0.000
ED_ASSOC	1.042	0.218	0.040	693.6	0.000
BERKSHIR	-0.953	-0.200	0.115	68.3	0.000
BRISTOL	-0.573	-0.120	0.079	52.4	0.000
BROKTON	-0.188	-0.039	0.080	5.5	0.020
CAPECOD	-0.436	-0.091	0.090	23.7	0.000
CENTRMA	-0.450	-0.094	0.072	39.6	0.000
FRNKHAMP	-0.840	-0.176	0.086	94.8	0.000
GLOWELL	-0.122	-0.026	0.080	2.3	0.130
GNEWBEDF	-0.674	-0.141	0.099	46.3	0.000
HAMPDEN	-0.697	-0.146	0.074	88.1	0.000
LMERRIMC	-0.247	-0.052	0.087	8.0	0.005
METRONOR	0.130	0.027	0.066	3.9	0.047
METROSW	0.078	0.016	0.068	1.3	0.256
NCENTRAL	-0.590	-0.124	0.104	32.4	0.000
SCOASTAL	-0.055	-0.012	0.070	0.6	0.428
SESSEX	-0.103	-0.022	0.073	2.0	0.157
AGFF	-0.216	-0.045	0.352	0.4	0.540
MINING	-0.057	-0.012	0.860	0.0	0.947
CONSTRUC	0.734	0.154	0.112	43.3	0.000
NONDURMF	0.261	0.055	0.076	11.7	0.001
DURBLEMF	0.618	0.129	0.062	100.6	0.000
WHOLESAL	0.284	0.060	0.092	9.5	0.002
TCU	1.073	0.225	0.079	183.9	0.000
INFORMAT	1.186	0.248	0.084	198.8	0.000
FIRE	0.652	0.137	0.057	130.5	0.000

Variable	Odds Ratio	Marginal Probability	Standard Error	Wald Statistics	Significance
PROFSERV	0.604	0.127	0.062	94.7	0.000
EDHSOCS	0.155	0.032	0.052	9.0	0.003
ARTSEREC	-0.291	-0.061	0.082	12.7	0.000
OTHERSER	-0.219	-0.046	0.088	6.1	0.013
GVTSERV	0.811	0.170	0.075	117.6	0.000
Constant	-1.303		0.087	224.6	0.000
<u>Model Summary</u>					
Mean of Dependent Variable	0.2989				
-2 Log likelihood	31,062				
Cox & Snell R Square	0.124				
Nagelkerke R Square	0.176				
Chi-square	3,770				
DF	42				
N	28,554				