UC Berkeley
IURD Working Paper Series

Title

COPC: Increasing Wage Inequity by Education Level in the San Francisco Bay Area Economy

Permalink

https://escholarship.org/uc/item/47r6798k

Author

Barbour, Elisa

Publication Date

1997-06-01

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

THE
UNIVERSITY-OAKLAND
METROPOLITAN FORUM
SERIES

Working Paper 97-06

COPC: Increasing Wage Inequity by Education Level in the San Francisco Bay Area Economy

Elisa Barbour

June 1997

University of California at Berkeley
$19.00

Working Paper 97-06

(formerly COPC 18)

COPC: Increasing Wage Inequity by Education Level in the San Francisco Bay Area Economy

Elisa Barbour

The University-Oakland Metropolitan Forum is a partnership of the University of California at Berkeley; California State University, Hayward; Mills College; Holy Names College; the Peralta Community College District; and the Oakland community.

University of California at Berkeley
Institute of Urban and Regional Development

Table of Contents

Executive Summary 1

1. Introduction 7

2. Methodology 9

3. Employment Trends by Education Level in the Bay Area from 1980 to 1990

Education Levels in the Bay Area Workforce and Working Age Pop. in 1990 12

Education Levels by County 14

Effects on Less Well-Educated Workers 18

Employment Growth from 1980 to 1990 22

Shift in Education Levels from 1980 to 1990 24

Education Trends from 1980 to 1990 by County 25

Shifts by Occupation from 1980 to 1990 28

Occupational Shifts by County 30

Jobs by Industry 32

Conclusion 35

4. Wage Trends by Education Level in the Bay Area from 1980 to 1990

Wages by Education Level in 1990 36

Wage Trends by Occupation and County from 1980 to 1990 38

Livable Wages in 1990 39

Accounting for Wage Shifts: Supply or Demand? 40

The Effect of Education on Wages 43

Wage Shifts Between and Within Occupations, Industries, and Counties 46

Breaking Down Trends by Occupation, Industry, and County 52

Conclusion 58

Appendix 61

Graphs and Tables

GRAPH 1. Percent Change in Real Wages from 1980 to 1990 by Education Level for the Bay Area 2

GRAPH 2. Bay Area Working Age Population and Workforce by Education Level in 1990 12

TABLE 1. Labor Force Participation Rates and Employment Rates by Education Level in the Bay Area in 1990 13

GRAPH 3. Working Age Residents by Education Level in Bay Area Counties in 1990 14

GRAPH 4. Workforce Compared with Working Age Residents by Education Level by County in 1990 15

GRAPH 5. Average Education of Workers and Employment Rates by Bay Area County in 1990 17

GRAPH 6. Education Gap Between the Workforce and the Labor Force Graphed by Employment Density in 1990 18

TABLE 2. Unemployed and Welfare Recipients by County in 1990 20

TABLE 3. Unemployed, Welfare Recipients, and the Working Age Population by Education Level in the Bay Area in 1990 20

TABLE 4. Unemployed Plus Non-Work-Disabled Welfare Recipients as Percent of Labor Force by County and Education Level in 1990 21

GRAPH 7. Change in the Size of the Labor Force if Welfare Recipients Entered, For Residents with High School Degrees or Less in 1990 22

TABLE 5. Workforce and Population Growth in Bay Area Counties from 1980 to 1990 23

GRAPH 8. Change in the Size of the Bay Area Working Age Population and Workforce by Education Level from 1980 to 1990 24

GRAPH 9. Change in Share by Education Level for the Bay Area Workforce and Working Age Population from 1980 to 1990 25

GRAPH 10. Change in Workforce as a Percent of Working Age Population by Education Level from 1980 to 1990 26

GRAPH 11. Change in Skew between Workforce and Working Age Population by Education Level from 1980 to 1990 27

TABLE 11. Average Wages and Earnings by Education Level in the Bay Area in 1990 36

GRAPH 12. Average Wages by Education Level Relative to Average Wages of Workers with Less than a High School Education in the bay Area in 1980 and 1990 37

GRAPH 13. Percent Change in Real Average Wages by Education by County from 1980 to 1990 in the Bay Area 38

GRAPH 14. Change in Share by Education Level for the Bay Area Workforce and Labor Force from 1980 to 1990 41

GRAPH 15. Shift in Share in Potential Experience Level of Bay Area Workers by Education Level from 1980 to 1990 42

TABLE 12. Between-Occupation and Within-Occupation Components of Real Wage Changes in the Bay Area from 1980 to 1990 in Dollars 49

TABLE 13. Between-Industry and Within-Industry Components of Shifts in Real Wages in the Bay Area from 1980 to 1990 in Dollars 51

GRAPH 16. Shift in Share in Clerical Employment from 1980 to 1990 Graphed Against Average Clerical Wage by County in 1990 59

GRAPH 17. Shift in Share in Precision Craft and Repair Employment Graphed Against 1990 Average Precision Wage by County 59

GRAPH 18. Shift in Share in Professional Services Employment Graphed Against Average Professional Service Wage in 1990 60

Appendix: Tables and Graphs

TABLE 1. Workforce and Adult Resident Population by Education Level 61
TABLE 2. Working Age Resident Population, Labor Force, and Workforce by Education Level 62
TABLE 3. Employment Density, Employment Rates, Workforce Participation 63
TABLE 4. Percent Commuters and Non-Commuters by Education Level, by County 64
TABLE 5. Unemployed, Welfare Recipients with No Work Disabilities 65
TABLE 6. Change in Size of Workforce and Adult Resident Population, 1980-1990 66
TABLE 7. Percent Change in Size of Workforce and Adult Resident Population, 1980-1990 67
TABLE 8. Shift in Share of Workforce and Adult Resident Population, 1980-1990 68
TABLE 9. Workers by Occupation, by Education Level 69
TABLE 10. Workers by Occupation, by Education Level, as Percentage 70
TABLE 11. Workers by Occupation, by County 71
TABLE 12. Workers by Occupation, by County, as Percentage 72
TABLE 13. Absolute Change in Jobs by Occupation, by Education Level 73
TABLE 14. Percent Change in Workforce, by Occupation and Education, 1980 - 1990 74
TABLE 15. Shift in Share in Workers by Education Level, 1980 - 1990 75
TABLE 16. Percent Increase in Workforce, by Occupation and County 76
TABLE 17. Shift in Share in Workers, by Occupation and County, 1980 -1990 77
TABLE 18. Jobs, Share of Jobs, Change in Jobs, by Industry and County 78
TABLE 19. Jobs in Professional Services, Share of Jobs, Change in Jobs, by County 80
TABLE 20. Jobs by Industry and Occupation 82
GRAPH 1. Contra Costa County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 84
GRAPH 2. Santa Clara County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 85
GRAPH 3. San Mateo County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 86
GRAPH 4. San Francisco County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 87
GRAPH 5. Alameda County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 88
GRAPH 6. Napa and Solano Counties: Shift in Share, and Education Level, for Occupations. 1980-90 89
GRAPH 7. Sonoma County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 90
GRAPH 8. Marin County: Shift in Share, and Education Level, for Occupations, 1980 - 1990 91
TABLE 21. Average Earnings by Education Level, by County 92
TABLE 22. Percent Full-Time Workers, Percent Change in Full-Time Workers, by County 93
TABLE 23. Full-Time Workers who Made Less than Basic Self-Sufficiency Wage, by County 94
TABLE 24. Full-Time Jobs that Pay Less than a Livable Wage, by Occupation 95
TABLE 25. Within-Occupation and Between-Occupation Components of Changes in Real Wages 96
TABLE 26. Between-Industry and Within-Industry Contributions to Overall Wage Shifts, by Occupation and Education Level 98
TABLE 27. Within-County and Between-County Components of Shifts in Real Wages 104
TABLE 28. Average Wages by Occupation and County 106
TABLE 29. Percent Change in Real Average Wages, by Occupation and County 107
TABLE 30. Average Wages, by Occupation and Education Level 108
TABLE 31. Percent Change in Real Average Wages, by Occupation and Education Level 109
GRAPH 9. Percent Change in Real Average Wages, by Occupation and Education Level 110
GRAPH 10. Percent Change in Employment, 1980 -1990, by Occupation and County 111

Executive Summary

Wage and income inequality by education level increased dramatically in the San Francisco Bay Area from 1980 to 1990. Using data from the U.S. Census 5% PUMS Sample, this report traces wage and employment trends by education level, experience, occupation, industry, and county in order to analyze this trend. The report concludes that wage shifts *within* occupations, industries, experience levels, and counties account for most of the shifts in real wages by education level in the Bay Area from 1980 to 1990, and that "employment magnet" counties are driving the increasing bifurcation in wages and employment by education level in the region.

In addition to leading the drive toward employing more highly-educated workers, especially in professional and managerial jobs, employment magnet counties (defined as counties with the highest number of jobs relative to the number of residents) are leading the regional decline in manufacturing and clerical employment, trends which account for the bifurcation in the educational structure of the workforce compared to the labor force by education level from 1980 to 1990, as well as the decline in real wages for less well-educated workers. Clerical and manufacturing employment are moving away from the growth pole of the region toward low-employment, low-wage counties.

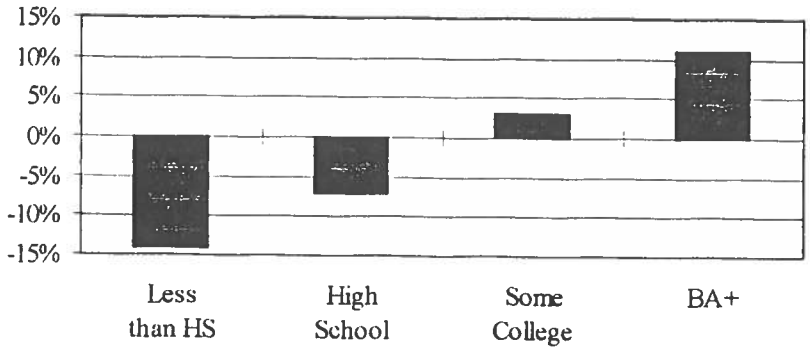
Bay Area residents and workers became more highly educated on average between 1980 and 1990. However, the least well-educated working age residents, those with less than a high school diploma, declined by less than residents with a high school degree, so overall the population became slightly more bifurcated by education level.

In addition, the workforce became more bifurcated relative to the resident population by education level. While residents of working age with less than a high school

diploma decreased in number, jobs for these residents actually *increased*. In contrast, the workforce shifted away from employing residents with a high school degree and shifted toward employing workers with some college education at a faster rate than residents could keep up.

A dramatic increase in wage inequality accompanied the bifurcating trend in employment by education level. Real wages (adjusted for inflation) declined for workers with a high school degree or less, and increased for workers with more education in the Bay Area from 1980 to 1990. Specifically, real average hourly wages for the least well-educated workers (those with less than a high school degree) declined by 14%, while real average hourly wages for the best educated-workers (those with a BA or higher) increased by 11%. The following graph shows the change in real average hourly wages by education level.

Graph 1. Percent Change in Real Wages from 1980 to 1990 by Education Level for the Bay Area



Source: 1980 and 1990 U.S. Census 5% PUMS Samples

An occupational/educational hierarchy exists by county within the regional Bay Area economy. Employment magnet counties tend to employ more highly-educated workers. These counties are driving the shift toward a more highly-educated workforce.

San Francisco, Santa Clara, Alameda, and San Mateo are the Bay Area's "employment magnets," meaning that they have many jobs in relation to the number of residents. Contra Costa is moving most rapidly to becoming a new employment magnet, with the fastest growth rate in the region. Employment "density," or the number of jobs relative to the size of the resident population of working age, is positively correlated with the average education level of workers by county, even after controlling for labor force participation. This trend was reinforced from 1980 to 1990 as high growth counties underwent the greatest overall shifts by occupation, moving the fastest toward employment in occupations with higher average education levels.

Contra Costa and Santa Clara shifted most dramatically toward higher-educated workers from 1980 to 1990. Workers with a college education declined as a share of all employment in every county except these two. Together they form the growth pole of the region in terms of absolute and relative employment growth, and these job engines are pulling the most educated workers from other parts of the region.

San Francisco's occupational structure changed the least, with one striking exception. Administrative support jobs declined dramatically, by a larger share than any other shift for any occupation in any county. Over 25,000 administrative support jobs were lost from San Francisco from 1980 to 1990.

Administrative support jobs declined as a share of all jobs in every county except Sonoma. Occupational shifts in Sonoma differed in other remarkable ways from trends in high-employment counties. Manufacturing and machine operating/laboring jobs increased more rapidly in Sonoma than other counties. Sonoma actually shifted *away* from high-education employment, in spite of its dramatic employment growth.

The increase in inequality in average wages by education level from 1980 to 1990 is primarily the result of shifts in real wages *within* occupations *within* industries *within* counties *within* experience categories of workers. Less well-educated workers are being paid lower wages at the same or similar jobs, while better-educated workers are getting higher real wages at the same or similar jobs.

Despite this overall trend, employment as well as wage shifts in particular occupations, industries, and counties played an important role in accounting for wage trends. The decline in employment and wages in manufacturing in Alameda, San Mateo, and Santa Clara was largely responsible for the decline in the real wages of the least well-educated workers. However, this was not just the result of an absolute decline in this sector. Instead, educational upgrading (defined here as a relatively rapid shift to more highly-educated workers in a given occupation) shifted manufacturing employment toward better-educated workers. Declining real wages for less well-educated service workers in Alameda, San Francisco, and Santa Clara also played a large part in wage trends for the least well-educated workers.

The general loss of clerical employment, particularly severe in San Francisco, as well as educational upgrading among clerical workers, made a huge dent in employment and wages for workers with a high school degree, while higher wages and more jobs in sales, management, and professional occupations primarily account for the sharp rise in the average wage of better-educated workers. This was largely the result of growth in the professional services sector, and largely due to wage and employment trends in Santa Clara and Contra Costa. It is very interesting to note that downsizing appears to have affected

clerical employment but not managerial employment. On the contrary, jobs and wages for managers increased dramatically over the period.

It is also interesting to note how these trends take shape geographically. Jobs in clerical and manufacturing work, which form the bulk of jobs in the middle of the wage and skill distribution, moved from employment magnet counties to low-wage, low-employment counties from 1980 to 1990. In contrast, growth in professional services was most rapid in high-wage employment magnet counties.

With the decline in real wages for less well-educated workers, it is important to consider whether they are able to earn sufficient income to cover the cost of basic needs. One in ten full-time jobs in the Bay Area did not pay adequate wages to support a single individual living alone in 1990. More than a quarter of all full-time workers with less than a high school education did not earn a livable wage.

Employment magnet counties have the highest shares of jobs that don't pay a livable wage. In San Francisco one-third of all full-time workers with less than a high school education did not earn a livable wage in 1990, and shares were high in San Mateo and Santa Clara as well.

In addition to these discouraging wage trends for less well-educated workers, some employment magnets also have reason to be particularly concerned about the consequences of welfare reform. San Francisco and Alameda already have disproportionate shares of unemployed workers. In addition they have high shares of welfare recipients with no work disabilities, and when they are added to the unemployed, among those with less than a high school level education, they form a group one quarter the size of the entire labor force with less than a high school education.

Since wage trends *within* occupations and industries rather than employment shifts *between* them played the largest part in the decline of real wages of less well-educated workers, popular concern about dead-end employment in "hamburger-flipping" jobs and the like should not focus only on the composition of employment. Rather than attributing the decline in wages of less well-educated workers to a seemingly intractable shift toward a service economy, it is important to seek explanations for declining real wages for service as well as manufacturing workers.

While lower wages and employment in manufacturing may be attributed to increasing foreign competition and deindustrialization, it is hard to make a similar argument about service jobs. Other explanations for declining real wages for less well-educated workers include lower productivity, lack of union representation, the political climate, and deregulation.

The bifurcation of the workforce by education level over the period relative to the resident population indicates that shifts in demand are creating a more "hollowed out" economy, in which low-paying jobs for the least well-educated workers increase in share, and high-paying jobs for the best-educated workers increase in share, with a decline in jobs for workers with a high school degree. This trend indicates that policies which encourage access to training and education may not adequately address the needs of the workforce. With increasing demand for the least well-educated workers, the problem in the Bay Area is not that they are being squeezed out of jobs. Rather they are being squeezed out of good wages. To address this issue, institutional changes will be required to ensure that less well-educated workers are able to earn an adequate income in today's economy.

1. Introduction

A number of studies indicate that 1979 marked a turning point nationally in terms of trends in earnings. [1] After 1979, earnings inequality grew sharply. Increasing popular concern has been prompted by earnings polarization around a stagnant mean and by fears that the US economy is producing fewer middle class jobs with a new skills mismatch in which jobs require skills beyond many workers' abilities.

Other studies have noted a sharp reversal in the 1980's of the trend in the wage premium for education, from a decrease during the 1970's to a dramatic increase in the 1980's. The increase in the education premium was most dramatic for young men and largely reflected a decline in the wages of young high school graduates and workers with less than a high school education.

According to Frank Levy and Richard Murnane, explanations for the growth in earnings inequality in the 1980's based on changes in the composition of the labor force by education or experience have been found to be inadequate. Explanations based on changes in the demand for labor, on the other hand, including demand shifts resulting from deindustrialization or foreign competition, have been better able to account for shifts in wages and earnings. However, the missing piece in demand-side explanations has been how to account for the rising inequality among workers *within* occupational, industrial, education and experience groups.

Trends in San Francisco resemble the rest of the nation. Real wages declined for workers with a high school education or less from 1980 to 1990, and increased for better-educated workers. This report explores the causes of this increase in earnings inequality by

---

[1] Frank Levy and Richard Murnane, "U.S. Earnings Levels and Earnings Inequality: A Review of Recent Trends and Proposed Explanations" Journal of Economic Literature, Volume 30, September 1992, p.1333

assessing wage and employment trends by occupation, industry, education, experience level, and county. Like Levy and Murnane, this report concludes that demand and supply-side shifts are unable to fully account for the significant rise in wage inequality within occupations, industries, and education and experience levels of workers.

This report adds a new dimension to the analysis by focusing on how wage and employment shifts have played out within the geography of a regional economy. The report concludes that high employment growth areas in the region are driving the shift toward a more highly-educated, highly paid workforce, while traditionally "good" jobs for less well-educated workers are being pushed toward low-wage counties.

2. Methodology

This report is based on data from the US Census 5% PUMS Sample (Public Use Microdata Sample) from 1980 and 1990. The tables and graphs in the report compare various characteristics of the workforce, labor force, and working age population in each of nine counties in the San Francisco Bay Area.

Due to the limitations of the Census data, a workforce cannot be constructed at a smaller geographical level than a county. County boundaries may be more representative in some cases than others of coherent sub-labor markets in the Bay Area. The report demonstrates that a regional labor market does operate in the sense that "employment magnet" counties attract significant numbers of workers from other counties, especially better-educated workers.

Another limitation of Census data is that it only provides a "snaphot" of conditions once every ten years, ignoring trends that occur in the interim. Workforce information in the Census refers to the year prior to taking the Census. In 1989, the Bay Area economy was just entering a recession, and this undoubtedly affects the results of the analysis.

However, much of the report considers factors which change relatively slowly, including education levels and experience. The report analyzes jobs by occupation as well as industry, and jobs by occupation tend to change more slowly than jobs by industry. For these reasons, the information is relevant in understanding long-term trends, though it cannot address the impact of short-term cyclical variation in employment and wages.

At any rate, there is simply no better data publicly available with the level of geographical detail, the number of indicators covering such a range of demographic and

workforce characteristics, and the large sample size required to draw statistically accurate findings regarding small sub-groups of workers, than the US Census.

The workforce of each county was constructed to comprise of all people who work within the county, including commuters from twenty surrounding counties, and excluding county residents who work outside the county. In other words, the county workforce is not the share of county residents who are employed. Instead, it is made up of all people who work in the county, no matter where they live.

The workforce of each county was limited to people sixteen to sixty-five years old who lived in any of the nine Bay Area counties or the eleven counties which surround the Bay Area, who worked within the county at the time of the Census, who earned wage or salary income of more than $1.00 and less than $128,097 (the inflation-adjusted equivalent of the 1980 income topcode), worked more than three weeks in the year prior to the Census, and excluding farmers and the self-employed.

Wages were constructed as annual wage or salary earnings divided by the number of weeks worked times the average number of hours worked per week. By dropping topcoded values, and creating an equivalent range for the two Census years, wage was constructed to be a truly continuous variable with an equivalent range in 1980 and 1990.

The working age population in each county was constructed to comprise all non-institutionalized individuals without work disabilities aged sixteen to sixty-five who resided in the county at the time of the census. The labor force is comprised of members of the working age population who indicated they were employed or looking for work (all those not coded as "Not in the Labor Force").

Comparisons of wages and annual earnings between the census years were adjusted for inflation. Therefore, changes in earnings reflect constant dollars.

Care was taken to ensure that sample sizes in cross-tabulations were adequate to ensure statistical reliability. Data cells always included at least 20 respondents, and in general many more.

Data comparisons based on absolute values between 1980 and 1990 should be treated with some caution.1980 data values are weighted by a factor based on the difference in the total number of workers in the nine county Bay Area as reported by the Association of Bay Area Governments with the total as reported by the US Census. This was done because the totals for the number of workers in the 1980 Census appeared too low. In 1990, the Census total was 96% of ABAG's total, while in 1980, the Census total was 84% of the ABAG total. Values from 1980 were weighted by the ratio of .96 to .84, or 1.14.

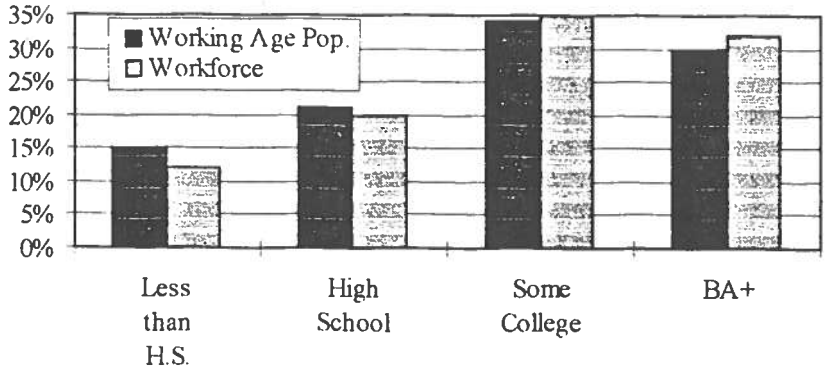
Most of the analysis in the report including all analysis in Part 2 depends on relative comparisons rather than absolute comparisons of data from 1980 and 1990. Such relative comparisons include comparing mean values or percent point changes (shifts in shares). These values are unaffected by the data weight mentioned above. In addition, information based only on 1990 Census data is unaffected.

3. Employment Trends by Education Level in the Bay Area from 1980 to 1990

I. Education Levels in the Bay Area Workforce and Working Age Population in 1990

The working age population in the San Francisco Bay Area breaks down fairly evenly into three education categories. In 1990, 36% had a high school degree or less, 34% had some college education, and 30% had a BA or higher. The Bay Area workforce is more educated on average than the working age resident population, as Graph 2 demonstrates.

Graph 2. Bay Area Working Age Population and Workforce by Education Level in 1990



Source: 1990 U.S. Census 5% PUMS Sample

The working age population is defined as non-institutionalized Bay Area residents between the ages of 16 and 65 with no work disabilities. This is distinct from another commonly used category, the "labor force," which includes all individuals who are employed or looking for work at a given time. The labor force category does not capture discouraged workers, those individuals no longer seeking employment due to low wages, extended unemployment, or the like. However, when considering the working age population it is difficult to distinguish discouraged workers from others who don't participate in the labor

force for different reasons. Mothers raising children often don't participate in the labor force, for example.

Even when compared with the labor force, the Bay Area workforce is more highly educated on average. Workforce participation rates in the region increase significantly with education. Once in the labor force the chance of being employed increases with education until the BA level, when it declines (second row of numbers in Table 1.) As a result, the chance of being employed is lowest for the least well-educated. Only half of the 620,300 working-age residents who had dropped out of high school were employed in 1990.

Table 1. Labor Force Participation Rates and Employment Rates by Education Level in the Bay Area in 1990

	Less than High School	High School	Some College	BA+	Total
Labor Force Participation Rate (Labor Force as Percent of Working Age Population)	72	79	82	92	83
Workforce as Percent of Labor Force	74	81	84	76	79
Workforce as Percent of Working Age Population	53	64	69	70	66

Source: 1990 U.S. Census 5% PUMS Sample

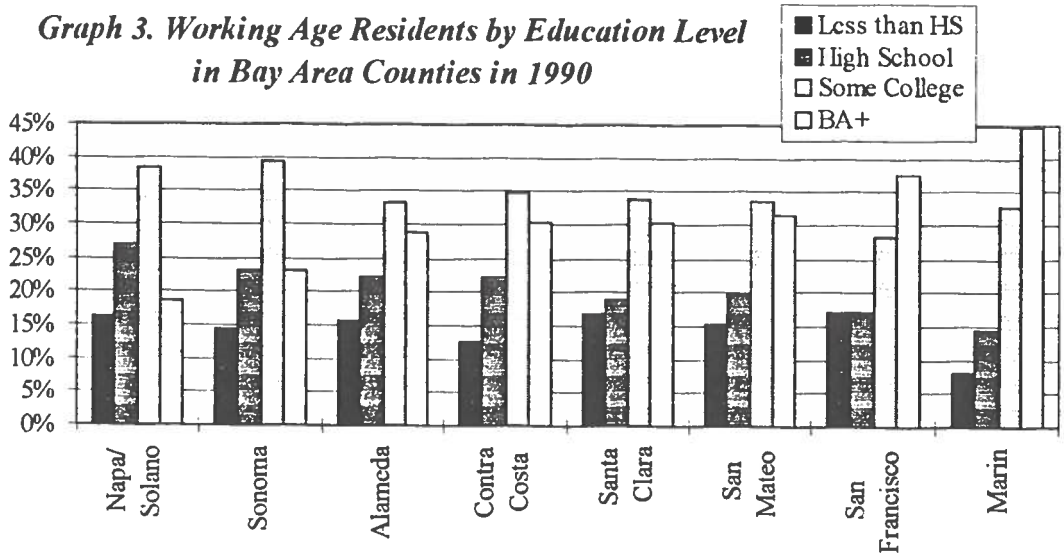
Since the labor force participation rate is so high for Bay Area residents with BAs or graduates degrees (92%), it is interesting to speculate on the reasons for their lower employment rates compared with residents with high school degrees or some college education. The lower employment rate for members of the labor force with BA's or above

may be the result of higher frictional unemployment or reservation wages among these job-seekers. In contrast, Bay Area residents with lower education levels are more likely to drop out of the labor force, or to spend less time looking for the right job.

II. Education Levels by County

Counties differ in terms of the education levels of both workers and residents. Working age residents in Napa/Solano Counties have the lowest education levels on average in the region. At the other extreme, Marin County residents are the most highly educated on average. San Francisco is the only county with a bimodal distribution, indicating that residents tend to be either highly educated or less well-educated, with fewer residents in the mid range. Alameda, Contra Costa, Santa Clara, and San Mateo Counties have distributions similar to the overall regional breakdown. Graphing this breakdown by county reveals that the geographical sequence of counties corresponds closely to ranking them by the share of residents with a BA or higher.

Graph 3. Working Age Residents by Education Level in Bay Area Counties in 1990

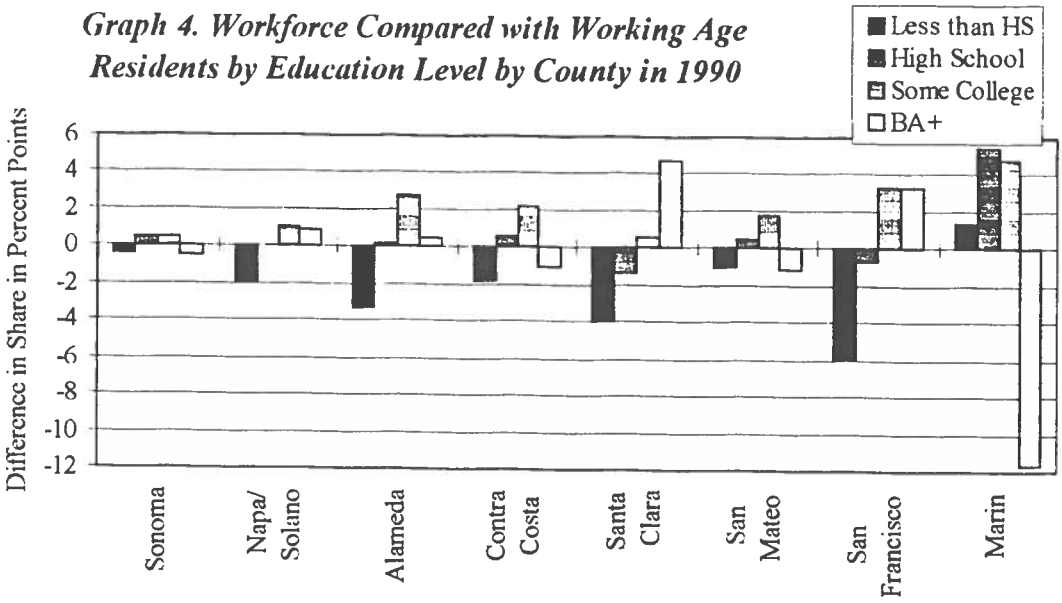


Source: 1990 U.S. Census 5% PUMS Sample

Counties differ not only in terms of the education level of residents but also workers. The education level of the county workforce does not always match the profile of the education level of residents.

The county workforce is defined as all people who work within the county, including commuters from twenty surrounding Bay Area Counties, and excluding all county residents who work outside the county. The county workforce is therefore *not* the share of county residents who are employed. Instead it is made up of all people who work within the county, no matter where they live.

Graph 4. Workforce Compared with Working Age Residents by Education Level by County in 1990



Source: 1990 U.S. Census 5% PUMS Sample

Graph 4 reveals that Marin is the most "skewed" in terms of the disparity between the education level of the workforce compared with residents. Marin is unique, however, because the workforce is much *less* well-educated than the resident population on average.

San Francisco, Santa Clara, and Alameda Counties have particularly high shares of well-educated workers compared with county residents. The gap is especially wide for the least well-educated in San Francisco, while Santa Clara is highly skewed toward employment of the best-educated workers. The disparity between the educational distribution of the workforce and of residents (measured as the sum of absolute differences in share for each education category) is highest in Marin, followed by San Francisco, Santa Clara, and Alameda Counties. (See Appendix Table 2.)

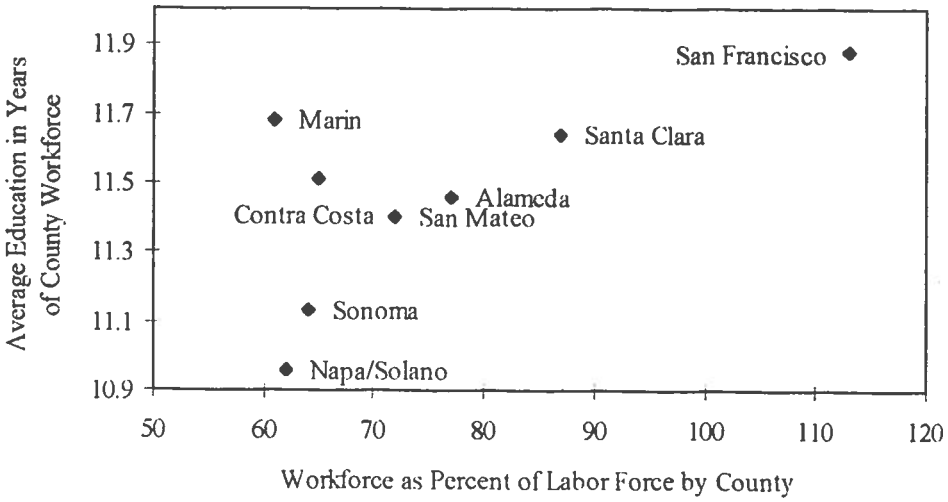
What factors help explain why this skew is higher in some counties than others? One explanation is "employment density," measured as the size of the workforce compared to the size of the resident population of working age.

Some Bay Area counties provide more employment relative to the size of the resident population than others. San Francisco, for example, is still the Bay Area's main "employment magnet." Santa Clara, Alameda, and San Mateo Counties also provide many jobs relative to their resident populations. At the other extreme, Napa and Solano Counties still function to a large degree as "bedroom communities." (See Appendix Table 3.)

In general, as employment density increases for Bay Area counties, the average education level of workers also increases, with two exceptions, Marin and Contra Costa, as the following graph demonstrates.

Graph 5. Average Education of Workers and Employment Rates by Bay Area County in 1990

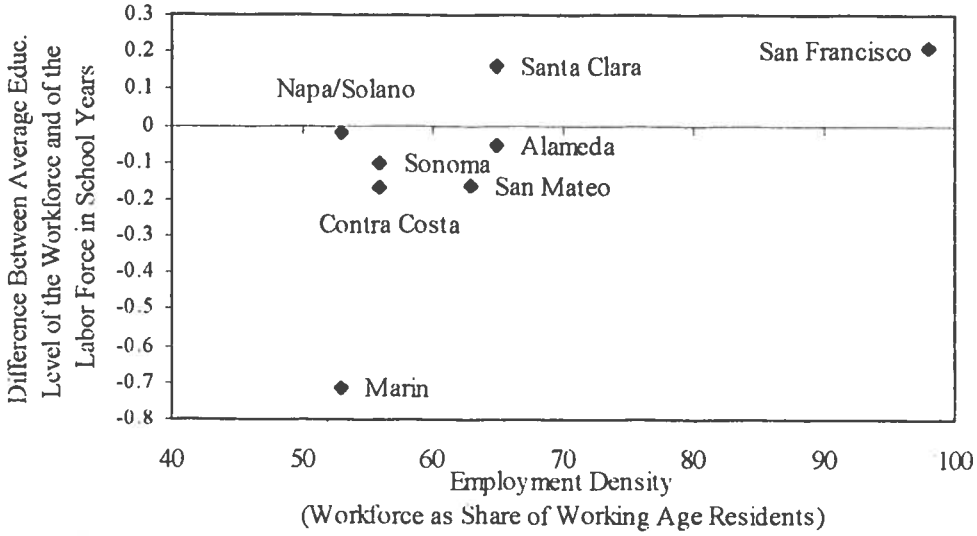
(Employment Rate = Workforce as Percent of Labor Force)



Source: 1990 U.S. Census 5% PUMS Sample

Even after controlling for labor force participation rates, the relationship between employment and education levels by county is still evident for San Francisco, Santa Clara, Alameda, San Mateo, and Contra Costa. Only in San Francisco and Santa Clara Counties, however, is the workforce more educated on average than the resident population.

Graph 6. Education Gap Between the Workforce and the Labor Force Graphed by Employment Density in 1990



Source: 1990 U.S. Census 5% PUMS Sample

III. Effects on Less Well-Educated Workers

The trends described in the previous section relied on average education levels. But this can be misleading since the distribution of the resident population by education varies by county. How does the skew toward more highly-educated workers in "employment magnet" counties affect the least well-educated members of the population?

The Bay Area functions as a single, large labor market for well-educated workers more than for less well-educated ones. This conclusion is based on an assessment of the shares of commuters and non-commuters (from one county to another) by education level. While 22% of all Bay Area workers with less than a high school education commute out of their county of residence to work, more than half (55%) of workers with some college education or higher do

so. Labor market opportunities available within their county of residence appear to be more important for the least well-educated workers. (See Appendix Table 4.)

Employment magnet counties still provide relatively high levels of employment for less well-educated workers in relation to the labor force as well as the working age population, in spite of their skew toward highly-educated workers. This trend can be attributed to the high level of employment in these counties overall. It is not the result of higher labor force participation rates among less well-educated working age residents in these counties. On the contrary, labor force participation rates among residents with a high school degree or less are relatively low in employment magnet counties, especially in Santa Clara, but also in San Francisco and Alameda (see Appendix Table 3c.)

Because of their large populations, Santa Clara, San Francisco, and Alameda Counties have high absolute numbers of unemployed workers. San Francisco and Alameda also have high relative shares of unemployed workers in relation to the size of the workforce.

In addition, San Francisco and Alameda have high numbers and high shares of welfare recipients. With welfare reform on the horizon, it is important to consider the employment effects when adult welfare recipients with no work disabilities are added to the labor force.

The sum of the number of unemployed and the number of adult welfare recipients with no work disabilities came to 69,946 in Alameda, 62,545 in Santa Clara, and 43,386 in San Francisco in 1990. As a share of the labor force, however, the number was highest in Alameda and San Francisco, and relatively low in Santa Clara.

Table 2. Unemployed and Welfare Recipients by County in 1990

	Unemployed	Unemployed as Percent of Working Age Population	Welfare Recipients 16-65 Yrs. Old with no Work Disabilities	Welfare Recipients as Percent of Working Age Population	Unemployed and Welfare Recipients as Share of Labor Force
San Francisco	26,263	5.4	17,123	3.5	10.4
Alameda	39,563	4.9	30,383	3.7	10.2
Napa/Solano	13,305	5.0	8,162	3.1	9.5
Contra Costa	21,613	4.3	14,111	2.8	8.3
Sonoma	9,634	4.1	5,409	2.3	7.4
Santa Clara	40,381	3.5	22,164	1.9	7.4
San Mateo	15,476	3.7	6,650	1.6	6.0
Marin	4,121	2.7	2,668	1.8	5.1
Total	170,356	4.2	106,670	2.7	8.3

Source: 1990 U.S. Census 5% PUMS Sample

The unemployed and welfare recipients tend to have lower education levels than the population in general, as the following table shows.

Table 3. Unemployed, Welfare Recipients, and the Working Age Population by Education Level in the Bay Area in 1990

	Less than High School	High School	Some College	BA+	Total
Unemployed	31%	26%	27%	16%	100%
Welfare Recipients (Aged 16 to 65, not work-disabled)	40%	27%	24%	9%	100%
Working Age Population (Not work-disabled)	15%	21%	34%	30%	100%

Source: 1990 U.S. Census 5% PUMS Sample

Alameda, San Francisco, and Contra Costa Counties in particular may have cause to be concerned about the consequences of welfare reform. Adding the unemployed to adult welfare recipients with no work disabilities, among those with less than a high school level education, forms a group one quarter the size of labor force with the same education level in those three counties.

Table 4. Unemployed Plus Non-work-disabled Welfare Recipients as Percent of Labor Force by County and Education Level in 1990

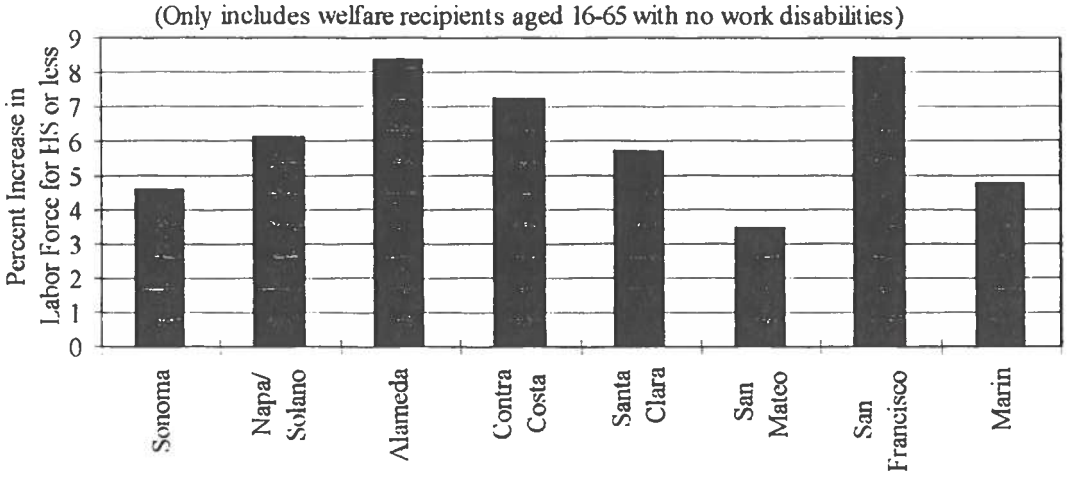
	Less than High School	High School	Combined (High School or Less)
San Francisco	24 %	15 %	19 %
Alameda	26	13	18
Contra Costa	25	12	16
Napa/Solano	22	12	15
Santa Clara	20	9	14
San Mateo	13	9	11
Marin	14	9	10
Total	22	11	15

Source: 1990 U.S. Census 5% PUMS Sample

Just adding adult welfare recipients with high school educations or less to the labor force, ignoring the unemployed, increases the part of the labor force made up of individuals with a high school degree or less by over 8% in Alameda and San Francisco, as revealed in the following graph.

Graph 7. Change in the Size of the Labor Force if Welfare Recipients Entered, For Residents with High School Degrees or Less in 1990

(Only includes welfare recipients aged 16-65 with no work disabilities)



Source: 1990 U.S. Census 5% PUMS Sample

Therefore, while employment magnets continue to provide relatively high numbers of jobs to less well-educated workers, they may also be disproportionately affected by the effects of unemployment and welfare reform (see Appendix Table 5.)

IV. Employment Growth from 1980 to 1990

Job growth can be measured in at least three ways: absolute growth in the number of jobs, relative growth in jobs (percent change), and job growth in relation to residential growth (increase in "density").

Santa Clara and Contra Costa Counties added the most jobs from 1980 to 1990. Because Santa Clara has more than a quarter of the jobs in the entire region, absolute job growth was high although the growth rate was only fair.

Contra Costa's growth rate, on the other hand, was the fastest in the Bay Area, and employment density increased rapidly. Contra Costa can be considered the Bay Area growth rate leader from 1980 to 1990.

Alameda was third after Santa Clara and Contra Costa in absolute job growth, but its growth rate was only fair. San Mateo's growth rate was similar, but employment density increased more rapidly. Jobs grew rapidly in Sonoma and so did employment density, but the absolute number of jobs was still relatively small.

San Francisco, on the other hand, was not a growth leader by any measure. Its position as the main employment magnet in the region therefore eroded somewhat from 1980 to 1990. San Francisco had the slowest job growth in the region at only 4%.

Table 5. Workforce and Population Growth in Bay Area Counties from 1980 to 1990

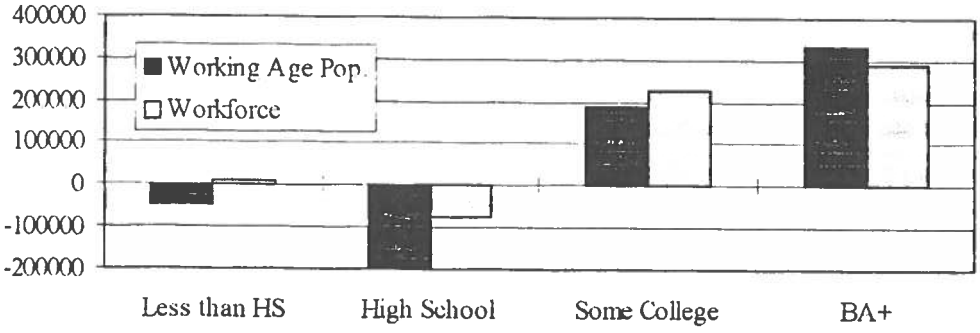
	Percent Growth in Workforce	Percent Growth in Working Age Pop.	Workforce Growth as Percent of Population Growth
Contra Costa	51 %	24 %	209 %
Sonoma	50	32	156
Napa/Solano	29	36	80
Marin	25	3	840
Alameda	20	17	115
San Mateo	19	10	187
Santa Clara	19	37	51
San Francisco	4	10	38
Total	21	23	91

Source: 1980 and 1990 U.S. Census 5% PUMS Samples

V. Shift in Education Levels from 1980 to 1990

Bay Area residents and workers became more highly educated on average between 1980 and 1990. However, the least well-educated portion of the region's population, those with less than a high school diploma, increased while the number of residents with a high school degree decreased, so overall the population became more bifurcated by education level. The increase in the number of residents with very low education levels is probably due to immigration.

Graph 8. Change in the Size of the Bay Area Working Age Population and Workforce by Education Level from 1980 to 1990



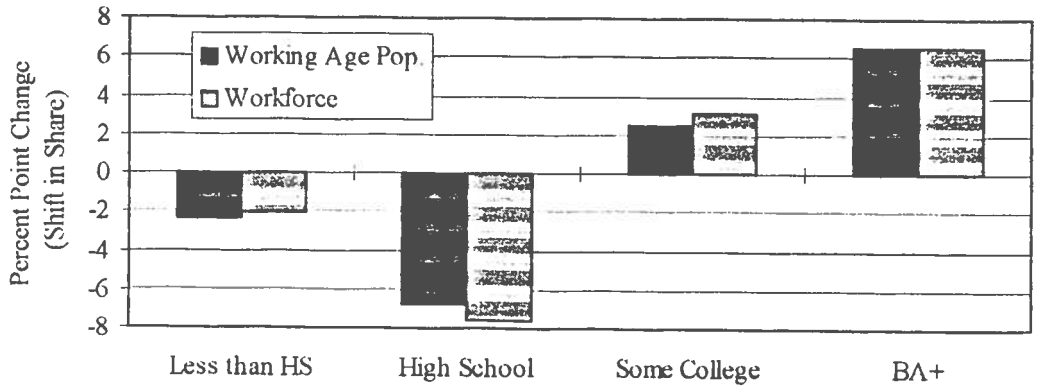
Source: 1980 and 1990 U.S. Census 5% Pums Sample

In addition, the workforce became more bifurcated relative to the resident population. As Graph 8 reveals, residents of working age with less than a high school education decreased in number, but jobs for these residents actually *increased*. (see Appendix Tables 6-8.)

The following graph shows the bifurcation more directly. The workforce shifted away from employing residents with a high school degree and shifted toward employing workers

with some college education at a faster rate than residents kept up in terms of educational attainment. In contrast, jobs for the least well-educated did not decline in proportion to residents with that education level (although they declined as a share of all jobs).

Graph 9.Change in Share by Education Level for the Bay Area Workforce and Working Age Population from 1980 to 1990

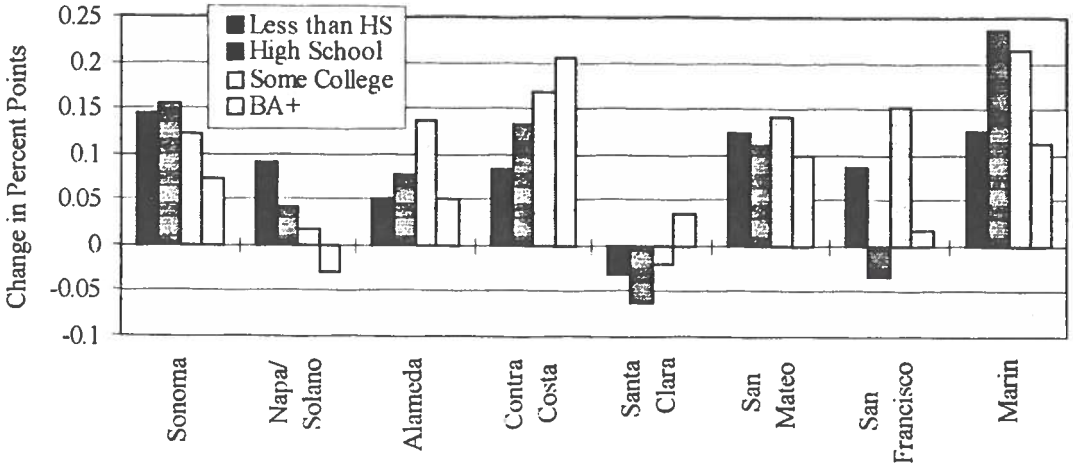


Source: 1980 and 1990 U.S. Census 5% PUMS Samples

VI. Education Trends by County

Contra Costa, the county with the most rapid employment growth, shifted dramatically toward employment at higher education levels from 1980 to 1990, as did Santa Clara, the leader in absolute job growth, as the following graph indicates. This only reinforced the skew in these counties between the workforce and resident population by education levels.

Graph 10. Change in Workforce as a Percent of Working Age Population by Education Level from 1980 to 1990



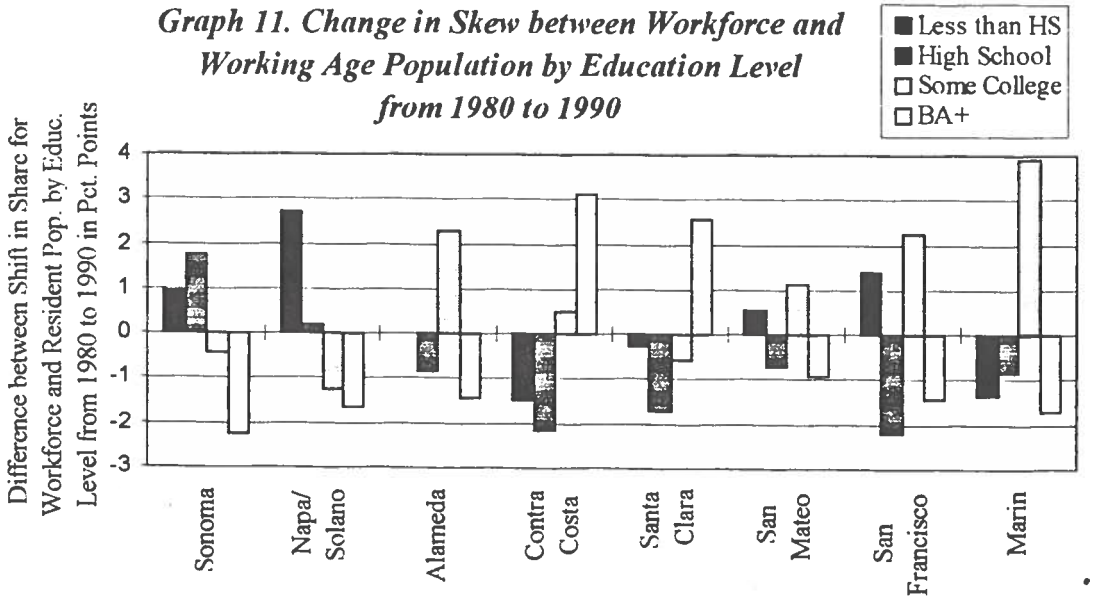
Source: 1980 and 1990 U.S. Census 5% PUMS Samples

On the other hand the education distribution in San Mateo, another high-growth county, did not shift much in spite of rapid growth, and Sonoma actually shifted *away* from high-education employment, in spite of its rapid employment growth. Napa/Solano likewise shifted toward lower-education employment, while Alameda and Marin shifted toward employment in the mid-education range.

San Francisco, unique among the counties, had a distinctly bimodal shift. While its workforce is highly skewed toward workers that are more educated than residents, this trend was not reinforced between 1980 and 1990. Rather, San Francisco was the only county that became distinctly more bifurcated over the period, with growth in employment for the least well-educated as well as workers with some college, but a drop in employment for workers with a high school degree. San Mateo is the only other county that showed evidence of this trend, but to a much lesser degree.

Graph 11 demonstrates that the regional increase in employment for workers with less than a high school diploma is the result of growth in San Francisco, San Mateo, Napa/Solano, and Sonoma Counties. The drop in employment for workers with a high school degree is the result of trends in all the employment magnet counties, while the increase in employment for workers with some college was especially pronounced in Alameda, San Francisco, San Mateo, and Marin.

Workers with a college education declined as a share of all employment in every county except Contra Costa and Santa Clara. Since these counties together form the growth pole of the region in terms of absolute and relative employment growth, it appears that these two job engines are pulling the most educated workers from other parts of the region.



Graph 11. Change in Skew between Workforce and Working Age Population by Education Level from 1980 to 1990

Source: 1980 and 1990 U.S. Census 5% PUMS Samples

VII. Shifts by Occupation from 1980 to 1990

Overall, jobs increased especially rapidly in the Bay Area from 1980 to 1990 in management and management-related occupations (accounting, personnel, analysts, advertising, inspection, and purchasing agents). Nearly a third of all jobs added from 1980 to 1990 were in these fields. The rate of increase in these jobs was nearly two-and-a-half times as fast as the overall rate of increase in Bay Area employment (see Appendix Tables 13-15.)

Sales supervision jobs increased astronomically, more than doubling from 1980 to 1990. Jobs also increased rapidly in professional and technical occupations, at twice the rate of jobs overall. Management, professional, technical, and sales supervisory jobs together account for more than two-thirds of the increase in *all* jobs. Jobs in sales to business and protective services also increased rapidly.

There was an absolute decrease in jobs in the military, precision trades, machine operators, and personal services (excluding protective, food preparation, health, and building services, which all increased). The rate of job increase was low in health services, administrative support, transportation, laboring, retail and service sales, and food preparation.

How did these trends affect workers by education level? Educational upgrading, defined here as occurring when an occupation increases its share of better-educated workers more quickly than the overall increase in share in the workforce for workers with the same level of education, is a principal cause of employment trends for workers with high school degrees and some college education, and principally due to shifts within two occupational categories, namely administrative support and precision craft and repair.

In absolute numbers, over half (56%) of the 75,095 jobs lost from 1980 to 1990 for workers with a high school degree were administrative support jobs, totalling over 42,000 jobs. In contrast, the rate of *increase* in administrative support jobs for workers with some college education was very high, indicating that replacement occurred toward higher-educated workers.

The same trend is apparent in precision craft and repair. Over 13,000 jobs were lost in precision craft and repair for workers with a high school degree from 1980 to 1990, and the rate of job loss was particularly high. In contrast, the rate of job gain for workers in these occupations with some college education was very high, especially for mechanics and repairers.

Combined with the loss of 12,000 military jobs for workers with a high school diploma, the trends in administrative support and precision craft and repair substantially account for the loss of jobs for workers with a high school degree. Furthermore, the shift of administrative support and precision craft and repair jobs to workers with some college education accounts for exactly a third of all jobs gained for workers with that education level from 1980 to 1990.

What shifts account for the relative increase in employment for the least well-educated workers? Jobs in services (especially building services and food preparation) and farming/gardening account for four out of five jobs gained from 1980 to 1990. Jobs in farming/gardening doubled over the period.

Management and professional jobs account for two-thirds of the increase in jobs for workers with a BA or higher. Educational upgrading was especially pronounced in the occupations that grew the most rapidly. It was highest for technical, sales supervisory, and business sales jobs, though also high among managers and professionals excluding teachers.

IX. Occupational Shifts by County

Shifts in the occupational structure of Bay Area counties from 1980 to 1990 reinforced the trends described above. High growth counties underwent the greatest overall shifts by occupation, and moved the fastest toward employment in occupations with higher average education levels.

The degree of change in the occupational composition of the county was measured as the sum of absolute shifts in share by occupation. This value was highest in Contra Costa, followed by Santa Clara, Marin, and Alameda.

To measure the rate of change in jobs by occupation toward higher-education level employment, the shift in share by occupation from 1980 to 1990 (the percent point change in a particular occupation's share of all jobs in the county) was regressed against the average education level of workers in each occupation in 1990.

In Contra Costa, the county with the fastest employment growth, 37% of the overall shift in the occupational structure is explained by the average education level within occupations, and the positive correlation indicates that Contra Costa shifted rapidly to higher-education employment (adjusted-R^2=.37, $p<.05$) A positive relationship is also statistically significant at the $p<.05$ level in Santa Clara, Alameda, Marin, and Sonoma Counties, and at the $p=.1$ level in San Mateo (adjusted-R^2's between .14 and .22) Of these counties, only Santa Clara did not have a high growth rate. However, Santa Clara accounts for the largest absolute job growth.

Contra Costa and Santa Clara Counties are unique in that professionals increased more rapidly than other occupations. In contrast, management jobs and sales supervisory jobs increased the most rapidly in San Mateo, San Francisco, Alameda, and Marin. (See Graphs 1-8 and Tables 16-17 in the appendix.)

Napa and Solano Counties are unique in that mechanics and construction jobs increased as a share of all jobs, while Sonoma is unique in that administrative support, laborers and precision craft workers increased in share. The decline in precision craft was especially pronounced in Santa Clara, followed by San Mateo, Marin, and Alameda.

San Francisco's occupational structure changed the least, with one striking exception. Administrative support jobs declined dramatically, by a larger share than any other shift for any occupation in any county. Over 25,000 administrative support jobs were lost from San Francisco from 1980 to 1990.

Earlier we noted that the loss of administrative support jobs accounts for more than half of all jobs lost in the Bay Area for workers with a high school degree from 1980 to 1990. A third of this loss, over14,000 administrative support positions, took place in San Francisco alone. Over half of all jobs lost for workers with a high school degree in San Francisco were in administrative support.

Were these administrative support jobs lost competely as a result of downsizing, or did they move to other counties due to "back-officing"? Administrative support declined as a share of all jobs everywhere in the Bay Area except Sonoma County. However, San Francisco was the only county in which administrative support jobs declined in absolute numbers.

The pattern of employment growth in management, professional, and administrative support jobs ran parallel in every county but Sonoma, indicating that the decrease in clerical employment from San Francisco was not an anomaly. Rather clerical employment was "downsized" in most counties. The low overall growth rate in San Francisco helps account for the severe decline in clerical employment in the city. Nevertheless, the spike in clerical employment in Sonoma relative to the general regional pattern indicates that some back-officing also appears to have taken place (see Appendix Graph 32a1.)

If the pattern of relative employment growth in clerical jobs compared with management and professional jobs was similar across counties, what accounts for the unique bifurcation in San Francisco's employment structure by education level? The severe loss of clerical employment, combined with relatively rapid employment gains in construction, retail sales, and personal services compared with other employment magnets, explain the bifurcation in the occupational structure of the city (see Appendix Graph 4.)

X. Jobs by Industry

In 1990, nearly a quarter of all jobs in the Bay Area were in professional services, a broad industrial sector which includes health care, legal services, schools, social and cultural services, and professional business services including engineering, architecture, accounting, research, and public relations. There were nearly as many jobs in trade and manufacturing. These sectors together account for 60% of Bay Area jobs. (See Appendix Table 18.)

In 1990, San Francisco was over-represented in relation to other counties by jobs in FIRE (finance, insurance and real estate), personal services, transportation and communication, professional services, and public administration. Santa Clara had more than its share of jobs in manufacturing, wholesale trade, and business and repair services (which includes advertising, building services, personnel services, and auto and electrical repair shops). Alameda was over-represented in public administration, trade, transportation and communication, and professional services. Contra Costa was over-represented in agriculture, construction, and FIRE, while San Mateo had high shares in transportation and communication, wholesale trade, and personal services. Marin, Sonoma, and Napa/Solano were over-represented in agriculture.

Breaking down professional services more carefully, San Francisco was highly over-represented in legal and cultural services, while Santa Clara and San Mateo had high shares in professional business services. Santa Clara and Alameda had high shares of jobs in education.

Nearly a third of all jobs added in the Bay Area from 1980 to 1990, or over 140,000 jobs, were in professional services. As a share of all jobs, professional services increased most rapidly in San Francisco, San Mateo, and Santa Clara. Trends by occupation underscore the prominence of this sector. As a share of all management and administrative support jobs, the biggest increase by far was in professional services.

Jobs in management increased as a share of all jobs within the industry most quickly in professional services, manufacturing, FIRE, and construction, while professional jobs increased in share most rapidly in manufacturing and wholesale trade. Administrative support declined as a share of jobs in almost every industry, with the biggest drop in FIRE and business andrepair services.

Breaking down growth in professional services more carefully, two-thirds of the increase in jobs was in professional business services and health care. However, in terms of the rate of growth, health care grew no more quickly than the economy as a whole, while professional business service jobs increased dramatically, more than doubling over the period. Professional business service jobs quadrupled in Napa/Solano, tripled in Contra Costa, and doubled in Santa Clara and San Mateo. Legal services also increased rapidly.

As for other industrial sectors, jobs in agriculture, construction, and personal services grew more rapidly than professional services, but added less jobs overall. Wholesale and retail trade added more than a quarter of all new jobs to the economy from 1980 to 1990, although the rate of growth was only fair.

Manufacturing jobs barely increased in the Bay Area from 1980 to 1990. Jobs declined in San Francisco, San Mateo, and Alameda, but increased by half in Sonoma. As a share of all jobs, manufacturing declined most rapidly in Santa Clara, San Mateo, Contra Costa, and Napa/Solano.

In addition to leading the decline in manufacturing, the employment magnets led the growth in professional business service employment. Professional business services grew fastest as a share of all jobs in San Mateo, Santa Clara and Contra Costa.

XI. Conclusion

In general, high growth employment magnets led the shift toward more highly-educated employment from 1980 to 1990, especially in professional and managerial jobs. By industry

sector, the dramatic growth in business professional services reinforced these trends by education, occupation and county.

An exception to this general pattern is San Francisco, still a major employment magnet but not a growth leader. In San Francisco employment by education level became more bifurcated, due to the regional pattern of decline in clerical employment, which hit San Francisco particularly severely due to its occupational composition, and because sales, construction, and service employment increased relatively rapidly in San Francisco compared with other counties.

Another very interesting exception to generalized trends in the region is Sonoma. Sonoma experienced a particularly high growth rate, almost as high as Contra Costa, although in absolute numbers job growth was smaller.

The composition of job growth in Sonoma differed, however, in remarkable ways compared with other high growth counties. In particular, manufacturing, laboring, and clerical employment increased dramatically in Sonoma compared with the rest of the region. Sonoma actually shifted *away* from high-education employment, in spite of its employment growth.

It appears that in the occupational/educational hierarchy of Bay Area Counties, clerical and manufacturing employment are being pushed in a different direction than professional and service employment, away from the growth pole of the region. It is precisely these sectors, clerical and manufacturing, whose job loss accounts in large part for the overall bifurcation in the educational structure of the workforce compared to the labor force by education level.

4. Wage Trends by Education Level in the Bay Area from 1980 to 1990

I. Wages by Education Level in 1990

Wages and annual earnings were closely correlated with education levels in the Bay Area in 1990, as Table 11 reveals. On average, wages were highest in San Francisco and Santa Clara Counties (see Appendix Table 21.)

Table 11. Average Wages and Earnings by Education Level in the Bay Area in 1990

	Less than High School	High School	Some College	BA+	Total
Hourly Wages	$ 10.30	$ 12.20	$ 13.90	$ 20.40	$ 15.20
Annual Wage and Salary Earnings in Dollars	$ 15,863	$ 22,340	$ 26,469	$ 41,657	$ 29,250

Note: Wages are hourly wages for all workers with non-zero income who worked more than three weeks in the year prior to the taking of the Census, excluding farmers and self-employed.

Source: 1990 U.S. Census 5% PUMS Sample

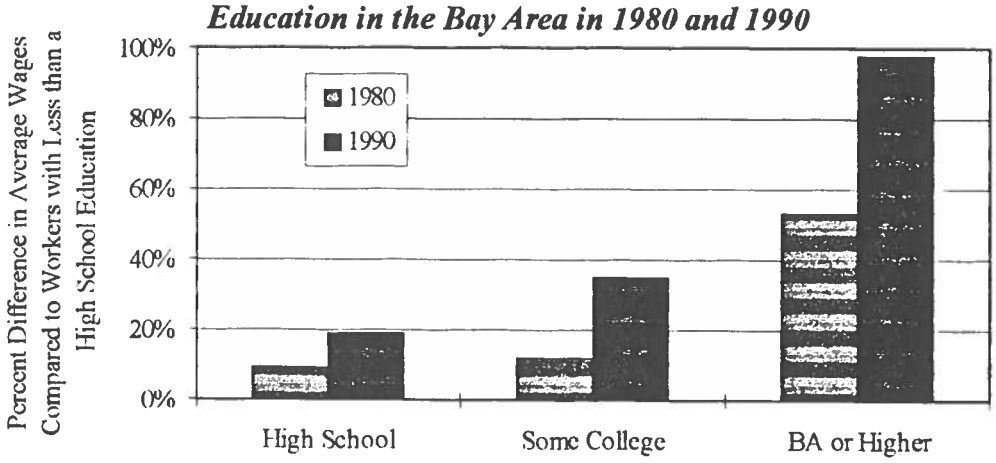
II. Wage Shifts from 1980 to 1990 by Education Level

From 1980 to 1990, wage inequality by education level increased significantly in the San Francisco Bay Area. Real wages (adjusted for inflation) declined for workers with a high school degree or less, and increased for workers with more education.

The trend was dramatic. The return to education (defined as the percent difference in average wages between educational categories) increased significantly. While in 1980, workers with some college education made 12% higher hourly wages than workers with

less than a high school education, by 1990 the difference had nearly tripled, to 35%. In 1980, workers with a BA or a graduate degree made 53% higher wages than workers with less than a high school education. By 1990, the difference had nearly doubled, to 98%.

Graph 12. Average Wages by Education Level Relative to Average Wages of Workers with Less than a High School Education in the Bay Area in 1980 and 1990



Source: 1980 and 1990 U.S. Census 5% PUMS Samples

Annual earnings increased much more rapidly than wages for workers with some college education. This reflects the fact that workers with some college education were more likely to be working full-time in 1990 than in 1980 (see Appendix Table 22.)

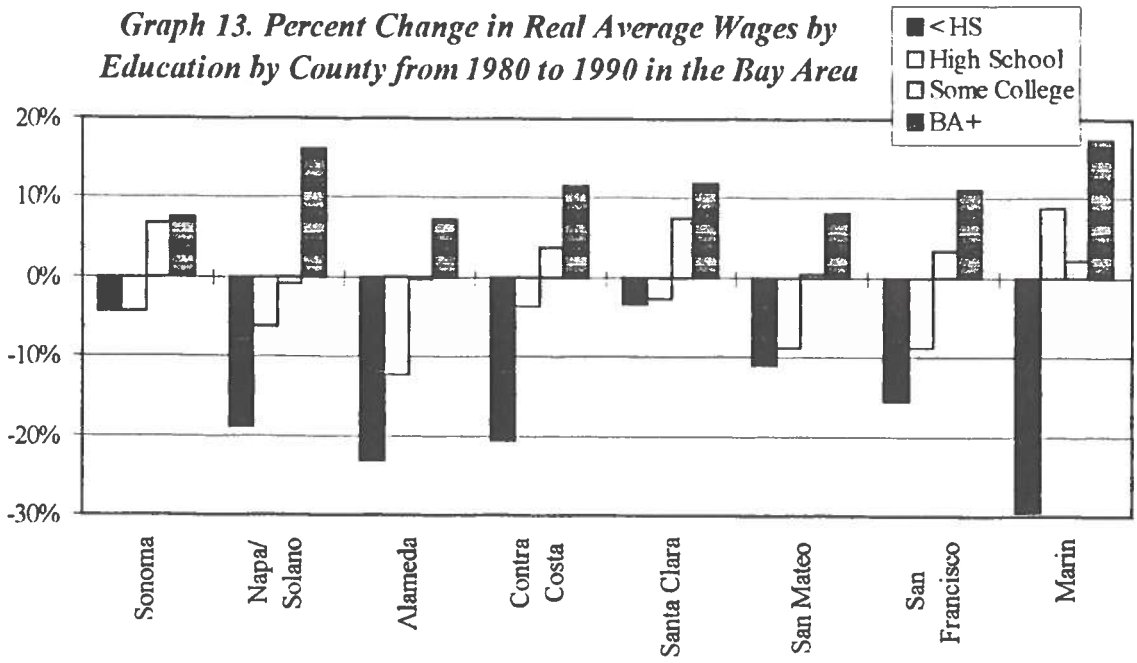
Workers with less than a high school diploma were also more likely to be working full-time, although this did not affect their earnings much. Full-time employment for these least well-educated workers increased most rapidly in Santa Clara, San Mateo, Sonoma, and Marin. In contrast, workers with a high school degree were less likely to be working

full-time in 1990 than in 1980, and this was also especially true in Santa Clara and Sonoma, indicating that some replacement may have occurred.

III. Wage Trends by Occupation and County

Wage inequality by education level increased more in some counties and some occupations than others. Growing wage inequality was especially pronounced for sales supervisors and business sales employees, although it was also significant for professionals, clerical workers (administrative support), protective occupations, food preparation, health services, mechanics and repairers, machine operators, and laborers (see Graph 9 in the appendix.) Wage inequality by education level increased in every county, but Sonoma and Santa Clara were exceptional because the trend was less severe than elsewhere.

Graph 13. Percent Change in Real Average Wages by Education by County from 1980 to 1990 in the Bay Area



Source: 1980 and 1990 U.S. Census 5% PUMS Sample

IV. Livable Wages in 1990

With the decline in real wages for less well-educated workers over the 1980's, it is important to consider whether these workers are able to earn an income sufficient to cover the cost of basic needs. To measure this, I used a calculation of the hourly "self-sufficiency" wage by county based on data from Wider Opportunities for Women.[1] They measured the costs of housing, child care, food, transportation, medical care, and miscellaneous expenses by California county from a variety of data sources, and then corrected for taxes and the earned income tax credit. I measured the number of full-time workers (35 hours a week or more) who earned less than the self-sufficiency wage for a single individual living alone by county, after correcting for inflation. The average self-sufficiency wage in the Bay Area was $5.65 an hour in 1990. (See Appendix Table 23a for the self-sufficiency wage by county.)

This measure does not calculate the effects of family composition on basic needs income. In some cases, the wage level I employed is too high to represent an accurate measure of self-sufficiency, since the individual may live with others who supplement his/her income. In other cases, it is too low, since the individual may be working to support a family on his/her wage alone. Nor does this measure account for the effects of part-time employment on economic self-sufficiency. However, this measure permits an assessment of the number of full-time jobs that do not pay enough to support an individual worker.

One in ten full-time jobs in the Bay Area did not pay a living wage in 1990, according to this measure. More than a quarter (27%) of all full-time workers with less than

[1] *The Self-Sufficiency Standard for California*, Wider Opportunities for Women, Washington D.C., 1996

a high school education did not make a livable wage, and 14% of full-time workers with a high school degree (see Appendix Table 23.)

Employment magnet counties have the highest shares (as well as the highest numbers) of full-time jobs that don't pay a livable wage. The lack of livable wage jobs was especially grave in San Francisco, where one-third of all full-time workers with less than a high school education did not earn enough to support themselves in 1990. San Mateo and Santa Clara Counties also had high relative shares of full-time jobs that paid less than a livable wage. This indicates that the high average wages in these counties don't translate into high numbers of livable wage jobs.

Which occupations account for jobs that pay less than a livable wage? Thirty-seven percent of full-time jobs in food preparation and personal services paid less than a livable wage in 1990, and 30% of jobs in retail sales. In absolute numbers, over 85,000 full-time jobs in services, 55,000 administrative support jobs, 51,000 jobs in sales, and nearly 50,000 fabricator and laborer jobs didn't pay a livable wage in 1990 (see Appendix Table 24.)

V. Accounting for Wage Shifts: Supply and Demand

In neoclassical market theory, shifts in prices reflect shifts in supply and demand for inputs and outputs. In the labor market, workers form the labor supply, while firms and employers form the demand for labor. Wages are the "price" of labor.

Supply shift explanations of wage changes refer to changes in the composition of the workforce. If the composition shifts, for example due to an influx of younger or more well-

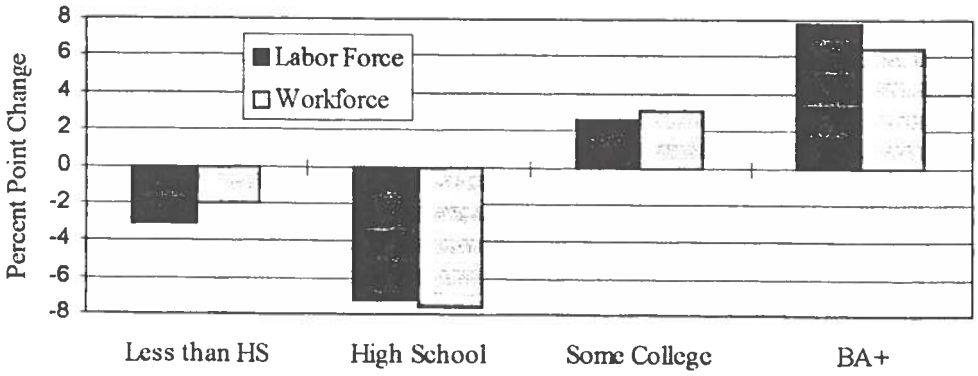
educated workers, while demand remains stable, then the wages of the "over-represented" groups will decline in the short run as a result of increased competition for available jobs.

Demand-side explanations for wage shifts depend on technology change and shifts in the composition of demand for workers with particular skills. The introduction of new technology may raise the relative productivity level of some workers, enabling them to gain a higher wage. Jobs in a sector may be eliminated due to technology change or foreign competition, and the downward shift in demand for these workers exerts downward pressure on wages for *all* jobs that are available for workers with the same set of skills.

Can supply and demand shifts account for the trend in wages from 1980 to 1990 in the Bay Area economy? The evidence indicates that a supply-side explanation is inadequate.

The shift in the educational composition of the labor force cannot fully account for wage trends by education. This can be surmised by considering the shift in the educational composition of the Bay Area labor force relative to the shift in the education distribution of the workforce, shown below.

Graph 14. Change in Share by Education Level for the Bay Area Workforce and Labor Force from 1980 to 1990

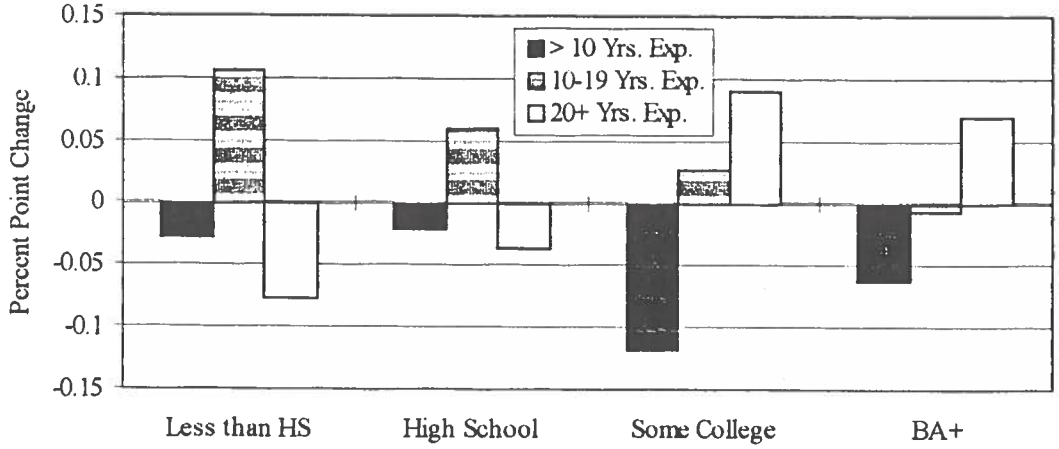


Source: 1980 and 1990 U.S. Census 5% PUMS Sample

With relatively more jobs than job seekers in 1990 than in 1980 for those with less than a high school degree as well as those with some college, a supply-side explanation would require an increase in wages, while the opposite is expected for those with a high school degree and those with a BA or higher. This supply-side hypothesis corresponds to the actual pattern of wage shifts for workers with a high school degree and those with some college. However, it predicts the opposite of actual trends for the least well-educated and the most highly-educated workers from 1980 to 1990.

Another possible supply-side explanation could explain wage shifts as the result of changes in the experience level of workers, which in turn are the result of changes in the age composition of the workforce. Wages have generally increased with experience, due at least in part to productivity increases resulting from on-the-job experience. Can such a trend help account for wage shifts in the Bay Area?

Graph 15. Shift in Share in Potential Experience Level of Bay Area Workers by Education Level from 1980 to 1990



Source: 1980 and 1990 U.S. Census 5% PUMS Sample

As Graph 15 shows, workers were more experienced overall in 1990 than in 1980 because the age composition of the workforce changed over the period. In 1980 the tail end of the baby boom was entering the workforce. By 1990, relatively fewer younger workers were entering.

Experience (actually potential experience) is defined here as age minus 12 for workers with a high school degree or less, age minus 14 for workers with some college, and age minus 16 for workers with a BA or higher. This somewhat sketchy measure is required because the Census codes education by degree acquired rather than years in school.

The increase in the experience level of Bay Area workers was especially pronounced among the most well-educated workers. In contrast, workers in the mid-range of experience increased as a share of workers with a high school degree or less.

The increase in the experience level of more well-educated workers helps to explain their increase in real wages from 1980 to 1990. However, the explanation is less convincing for less well-educated workers. The average experience level of workers with less than a high school degree declined by one-and-a-half years over the period, while for workers with a high school diploma it declined by half a year. This may help to account for a small part of their drop in real wages, but appears inadequate to explain such a significant wage decline, especially in absolute terms.

VI. The Effect of Education on Wages

If a demand-side explanation is required to explain wage shifts by education, we may begin by examining the effect of education itself on wages. Education could represent a

set of skills obtained by job seekers which have become more valuable to employers over the period from 1980 to 1990. Perhaps because of the introduction of new technology and/or new organizational patterns at work, better-educated workers have become more productive and less well-educated workers less productive. Such a trend, sometimes called a "skill-biased technology shift," could explain the wage patterns over the period.

To test this hypothesis I conducted a regression analysis using the methodology employed by John Bound and Richard Freeman in "What Went Wrong? The Erosion of Relative Earnings and Employment Among Young Black Men in the 1980's."[1]

I regressed the natural log of wages in 1990 on a continuous variable for experience and dummy variables representing four education categories, two sex, two race, eleven occupation, eight county, and eleven industry categories. I then repeated the regression using data from 1980. The adjusted-R^2 for the regression in 1990 was .36, indicating that the variables in the regression together account for about a third of the overall difference in individuals' log wages. The adjusted-R^2 in 1980 was lower, at .23.

The coefficient on each dummy variable can be interpreted as the percent difference in wages attributable to being a member of that particular group in relation to a base category, after controlling for the effects of all the other variables. I will refer to this difference as the wage premium for that group. The difference in the coefficients from 1980 to 1990 can be interpreted as the change in the wage premium. In the following discussion I compare this wage premium by education level based on the results of the regression (and therefore controlling for the effects of all the other variables) with the "return to education"

[1] in *Quarterly Journal of Economics*, February, 1992

defined as the actual percent difference in recorded wages between education groups (not controlling for the effect of other factors).

The results indicate that while education alone accounts for a substantial portion of the difference in real average wages by education level in the 1990 data, it cannot account for the *change* in the return to education from 1980 to 1990. This confirms the research described by Frank Levy and Richard Murnane mentioned in the introduction to this paper.

In 1990 the wage premium for workers with a high school degree relative to workers with less than a high school degree was 16% after controlling for all the other variables in the regression. Since the actual return to education for workers with a high school diploma was 18% relative to workers without a high school diploma, it appears that education *alone* can account for most of the difference in wages.

However, education cannot account for the change in average wages between these groups from 1980 to 1990, because the premium did not change at all over the period. The situation is similar for all the education groups.

The wage premium for workers with some college relative to workers with less than a high school education was 29% in 1990 while the return to education was 35%, so education alone accounts for a substantial portion. However, the wage premium increased by 4% from 1980 to 1990, while the return to education nearly tripled, from 12% in 1980 to 35% in 1990.

The wage premium for college-educated workers was 51% in 1990. The return to education was 98%, so education alone explains about half the wage differential. The wage premium increased by 10% from 1980. The return to education doubled from 53% in 1980 to 98% in 1990.

VII. Wage Shifts Between and Within Occupations, Industries, and Counties

A different demand-side explanation, other than demand increasing for better-educated workers *per se*, is required in order to explain wage shifts. Another possible explanation is that the composition of demand shifted towards occupations or industries with higher wages for better-educated workers on the one hand, and lower wages for less well-educated workers on the other. Popular concerns about a shift in the economy toward service jobs fit into this category.

To understand the dynamics of shifts in demand for workers with different education levels, it is helpful to decompose changes in employment and wages by occupation and industry as well as county, education, and experience levels. To do this, I employed the methodology used by Kevin Murphy and Finis Welch in "Industrial Change and the Rising Importance of Skill."[2]

Let w_{jt} be the average inflation-adjusted wage of workers in skill group j (defined by education and experience) in time t, and e_{ijt} be the average difference for workers in occupation i. The average wage by occupation for group j in year t is therefore w_{ijt}. This wage can be decomposed as

$$w_{ijt} = w_j + e_{ij} + u_{ijt} = w_{ij} + u_{ijt}$$

where w_j is the time average of w_{jt}, e_{ij} is the average difference between w_{ijt} and w_{jt} over time and occupation, and u_{ijt} is the difference between years by occupation for group j. Group wages, w_j, capture fixed differences in wages across groups over time. Occupation by group effects, e_{ij}, capture average differences over time across occupations in wages paid

[2] in *Uneven Tides: Rising Inequality in America*, edited by Sheldon Danziger and Peter Gottschalk, Russell Sage Foundation, New York, 1994

to particular groups, and the residual u_{ijt} captures differences in wages within occupations over time. Let $t_1 = {}_{90}$ for 1990, and $t_2 = {}_{80}$ for 1980.

Changes in average inflation-adjusted wages are then decomposed through time as

$$w_{j90} - w_{j80} = \sum_{i=1}^{I} n_{ij90} w_{ij90} - \sum_{i=1}^{I} n_{ij80} w_{ij80}$$

$$= \sum_{i=1}^{I} (n_{ij90} - n_{ij80}) w_{ij} + \left(\sum_{i=1}^{I} n_{ij90} u_{ij90} - \sum_{i=1}^{I} n_{ij80} u_{ij80}\right)$$

where n is the normalized number of workers in industry i in year t of type j. Normalizing the number of jobs simply means adjusting for the size of the workforce, so n refers to the share of overall employment by occupation, skill group, and year.

The first term in the decomposition captures the effect of changes in occupational composition by holding wages fixed over the period from 1980 to 1990. The second term captures the change over time in wages within occupations, weighted by the employment share in the occupation. If the occupational distribution were constant, the second or "within occupation" term would measure only the change in wages within the occupation over time. When the occupational distribution also changes, the second term includes an interaction effect, measuring how employment has shifted toward occupations with different wage levels. The occupational categories used in the analysis include the twenty-three occupations listed in the tables in the appendix with data by occupation.

As Table 12 demonstrates, real wages increased for the entire workforce overall from 1980 to 1990 by an average of $0.60. Two-thirds of the increase is due to shifts in the

occupational composition of the workforce ("between occupation" effects) while one-third is due to shifts in wages within occupations ("within occupation" effects).

The values in the table should be interpreted as the contribution in dollars and cents to the overall change in the average hourly wage for the group in question from 1980 to 1990.

While most of the overall shift in average wages can be explained by changes in the occupational composition of the workforce, the same is not true within education categories. In fact, trends in wages by education level are predominantly the result of wage shifts *within* occupations, not shifts in employment to occupations with different wages.

Why should trends within education categories differ from the overall trend? If the shift in the educational composition of the workforce is accompanied by a shift in the occupational composition of the workforce, the effect of wage shifts that occur within occupations for workers at the same level of education is masked.

The change in real wages for workers with a high school degree or less was due almost entirely to shifts in wages within occupations, rather than a shift in labor demand toward lower-paying occupations. This means that less well-educated workers are being paid lower wages at the same jobs by occupation.

Wages declined within 22 of the 23 occupational categories used in the analysis for workers with a high school degree or less. The only exception for workers with less than a high school diploma was health services, while the only exception for workers with a high school degree was management (see Appendix Table 25.)

Table 12. Between-Occupation and Within-Occupation Components of Real Wage Changes in the Bay Area from 1980 to 1990 in Dollars

	Between Occupations	Within Occupations	Total
All	0.4	0.2	0.6
By Education Group:			
Less than High School	0.0	-1.4	-1.4
High School	0.2	-0.9	-0.7
Some College	0.2	0.1	0.3
BA or Higher	0.3	1.3	1.6
By Experience Group:			
Less than 10 Years	0.2	-0.4	-0.1
10 to 20 Years	0.3	-0.1	0.2
More than 20 Years	0.5	0.2	0.7
Experience less than 10 Years:			
Less than High School	0.0	-0.8	-0.8
High School	0.1	-1.1	-1.0
Some College	0.0	-0.5	-0.5
BA or Higher	0.2	0.2	0.5
Experience 10-20 Years:			
Less than High School	0.1	-1.3	-1.2
High School	0.3	-1.0	-0.7
Some College	0.1	-0.3	-0.2
BA or Higher	0.4	0.9	1.3
Experience 20+ Years:			
Less than High School	-0.2	-1.5	-1.7
High School	0.0	-0.6	-0.6
Some College	0.1	-0.1	0.0
BA or Higher	0.2	0.9	1.1

Source: 1980 and 1990 U.S. Census 5% PUMS Sample

This trend persists regardless of the experience level of workers. Within-occupation wage declines account for the drop in real wages for workers with a high school degree or less, regardless of their level of experience. In fact, for workers with less than a high school degree, the wage decline was *most* severe for more experienced workers.

Experience plays a greater role in explaining the overall increase in average wages for workers with some college education. This confirms the earlier assessment of the possible effect of experience based on the shift in experience levels in the labor force. The wages of less experienced workers with some college education declined due to wage shifts within occupations. This trend resembles the situation for less well-educated workers. However, the wages of more experienced workers with some college education remained stable in spite of within-occupation wage declines, because there was an off-setting shift in employment toward higher-paying occupations.

This decomposition reveals an overall decline in wages for workers with some college except among the most experienced workers. However, we noted earlier that average wages increased for workers with some college education from 1980 to 1990. What can explain this apparent discrepancy? The answer is that the age/experience composition of the workforce changed from 1980 to 1990 especially among workers with some college education as Graph 14 demonstrated. The workforce was much older (hence more experienced) in 1990 than in 1980.

Among the most well-educated workers, experience and occupational shifts played a part in accounting for wage shifts, but overall, most of the increase in average wages for these workers was the result of wage *increases* within occupations. Therefore we can conclude that after controlling for the education level of workers, wage shifts occurred primarily *within* occupations, not as the result of shifting employment patterns by occupation.

To determine whether shifts in employment between industrial sectors as opposed to occupations could account for the wage trends, wage shifts were decomposed between and

within the eleven industrial sectors represented by the one-digit Standard Industrial Codes. To ensure adequate sample sizes within categories, the nine one-digit Standard Occupational Code categories were employed rather than the 23 occupations used in the previous decomposition. The following table lists only occupations that are adequately represented within each educational category (more than 20 sample respondents in each cell, although generally many more).

Table 13. Between-Industry and Within-Industry Components of Shifts in Real Wages in the Bay Area from 1980 to 1990 in Dollars

	Between Industries	Within Industries	Total
High School or Less:			
Management and Related	0.10	0.28	0.38
Sales	-0.08	-0.93	-1.01
Administrative Support	-0.05	-0.07	-0.13
Services	-0.08	-0.90	-0.98
Craft and Repair	0.12	-1.47	-1.35
Laborers and Operators	0.12	-1.86	-1.74
All Workers	**-0.10**	**-0.95**	**-1.04**
Some College:			
Management and Related	-0.16	0.75	0.59
Professionals	-0.15	1.12	0.96
Technical	0.02	0.20	0.22
Administrative Support	-0.04	0.33	0.29
Craft and Repair	0.07	0.02	0.09
Laborers and Operators	0.12	-0.59	-0.47
All Workers	**-0.06**	**0.44**	**0.38**
BA or Higher:			
Management and Related	0.07	1.94	2.01
Professionals	0.03	1.55	1.58
Technical	-0.12	-1.21	-1.33
Sales	0.06	3.26	3.32
Administrative Support	-0.14	0.59	0.45
All Workers	**0.01**	**1.58**	**1.59**

Source: 1980 and 1990 U.S. Census 5% PUMS Sample

The results demonstrate that shifts in wages within industries rather than between industries account for most of the overall shifts in wages by education and occupation. Therefore overall shifts in the sectoral composition of the workforce can't fully account for the wage trends.

To test whether employment shifts across Bay Area counties can explain wage shifts, within-county and between-county components of changes in the average wage by occupation and education level were calculated. The results are similar to those for occupation and industry; between-county shifts are far less important overall than within-county wage shifts (see Table 27 in the appendix.)

VIII. Breaking Down Trends by Occupation, Industry, and County

Wage trends *within* occupations *within* industries *within* experience levels *within* counties are primarily responsible for the overall shift in wages by education level from 1980 to 1990. Therefore it is necessary to look more closely at trends in individual occupations and industries to understand what happened.

Shifts in wages *and employment* in certain occupations and industries were particularly important. An employment decline in a high-paying sector like manufacturing can be offset by an employment increase in another high-paying sector like professional services. In that case, the between-industry analysis misses the contribution of employment shifts in those two industries, although it still accurately measures the relative influence of "within" and "between" effects overall.

Table 25 in the appendix lists the contribution of each of the 23 occupational categories to wage trends by education level. Table 26 breaks those trends down by industry and Table 27 breaks them down by county.

In these tables, the total change is the sum of the contributions of each occupation, industry, or county to the overall change in the average wage of the group in question. The effect of each occupation, industry, or county on the overall average wage shift can be assessed by considering the value in the "total" column for that occupation, industry, or county, and then considering whether that effect was primarily due to a "within" or "between" effect. Note that the "within" effect does not represent a strict wage change, since it is weighted by employment shares. Rather it represents the effect of wage changes in that particular occupation, industry, or county on the average wage for all workers in the group in question.

Wage and employment declines in all the precision craft and repair occupations and laboring, operating, and handling occupations together account for 70% of the overall decline in the wages of the least well-educated workers (calculated as a share of all declines). Wage declines had the most impact for workers in construction, transportation, machine operation, and laboring. Employment shifts were more influential for machine operators and precision craftsmen. For workers with less than a high school degree in the Bay Area, wages in construction and transportation jobs declined by a quarter, while laboring/machine operating wages declined by 21%.

Most of the remaining 30% of the overall decline in the average wage of workers with less than a high school degree can be chalked up to the effects of wage declines in food preparation, retail sales, and personal services.

Where in the Bay Area were these effects concentrated? Declining wages and employment (relative to other counties) in Alameda, San Mateo, and Santa Clara explain most of the trend in the wages of precision craft and repair workers for those with a high school degree or less. The wage decline in Alameda was the most pronounced effect of all, and explains 38% of the overall regional wage decline for these workers. Real wages declined by 16% in Alameda from 1980 to 1990 for these workers.

Wages declined for precision craft and repair workers almost as much in San Mateo as in Alameda but employment in the sector was much smaller. The wage decline in Santa Clara was minimal, but in contrast the employment decline was more severe.

Similar trends occurred in the laboring/machine operating sector. A severe wage decline of 21% in Alameda, not matched in any other county, alone accounted for nearly half the total effect on the average regional wage for these workers, among those with a high school degree or less. The wage drop in Alameda was most severe for transportation workers. Declining employment in Santa Clara and declining wages in San Francisco also contributed.

Alameda also plays an important role in explaining trends in the service sector. Declining wages in Alameda were the most important factor in explaining the regional decline in the average wage of service workers with a high school degree or less, although declining wages in San Francisco and Santa Clara also contributed significantly. The wages of service workers declined by 12% in Alameda from 1980 to 1990, at least twice as much as in any other county. The trend was most severe for workers in personal services, where wages declined by 27%. Wages for food preparation workers in Alameda declined by 11%, while employment increased quickly.

In retail sales, trends in San Francisco were more central, accounting for more than half of the overall trend in the regional wage of sales workers with a high school degree or less. Wages declined 14% for retail sales workers in the city.

Why were wage and employment trends in Alameda so influential? Of the employment magnet counties, Alameda has a high relative share of workers with a high school education or less. Alameda is over-represented in precision craft and repair, laboring, and food preparation jobs compared with the other employment magnets, and these are the occupations that account for most of the overall wage decline. Jobs in food preparation increased more rapidly than in San Francisco and Santa Clara, so Alameda's wage decline had a larger impact on the overall trend.

What trends account for the decline in wages for workers with high school diplomas? The loss of clerical jobs for workers with a high school degree alone was responsible for more than a third of the decline in the average wages of all workers with a high school degree from 1980 to 1990. Declining wages and employment in precision trades (already discussed above) and the military together made up half of the decline.

Clerical employment extends across different industries. Were employment and wage declines equally distributed across them? As has been noted, clerical jobs decreased especially rapidly as a share of all jobs in FIRE, business services, and wholesale trade. However, as a share of all clerical jobs, job losses were most severe in manufacturing.

Administrative support grew more unequal over the period, both in employment and wages. The decline in the average wage for the least well-educated administrative support workers can largely be attributed to declining employment in San Francisco. However, increasing wages and employment in Contra Costa and Sonoma explain the overall increase

in the average clerical wage for workers with some college education and higher. In the case of the best-educated clerical workers, those with a BA or more, increasing wages and employment in Alameda also played an important role.

Shifts in employment between occupations account for two-thirds of the overall shift in the average wage of workers with some college education. This is an exception to the trend for workers at other education levels, where changing real wages within occupations are more important. Increasing employment in sales supervision, management, construction, and mechanics and repair jobs, as well as wage increases for administrative support, professionals, and management, explain most of the trend in wages for these workers.

Managers with some college education benefitted from increased employment and wages in professional services and FIRE, which together explain most of the increase in management wages for these workers. The wage increase for professionals and administrative support workers with some college can be attributed in large part to increased employment and wages in the professional services industry.

Which occupations and industries can account for the large increase in the average wage of the best-educated workers, those with a BA or higher? Increasing employment and wages for managers and professionals account for nearly two-thirds of the rise in the average wage of these workers. Increasing employment of sales supervisors and increasing wages for business salespeople and medical professionals made up most of the rest. Wage and employment increases in Santa Clara, and more jobs in Contra Costa explain most of the trend, while declining employment in San Francisco was an off-setting factor.

The rise in managers' wages can be attributed to more employment in manufacturing and both more jobs and higher wages in professional services. The trend in sales is due to wage increases in FIRE and manufacturing and increased employment in wholesale trade, and can be attributed in large part to trends in Contra Costa.

Like administrative support and precision trades, sales became more unequal in terms of wage trends, depending on the education level of sales workers. The declining average real wage of less well-educated sales workers can be chalked up to a wage drop in San Francisco, while the increasing average wage for sales workers with some college can be attributed particularly to wage and employment trends in Alameda. Increased wages and employment of the best-educated sales workers in Contra Costa explain the overall increase in the average regional wage of these sales workers.

VIII. Conclusion

Particular trends by industry and occupation must be examined carefully in order to trace the primary factors which account for the increasing inequality in wages by education level in the Bay Area from 1980 to 1990. The most important trends that affected the least well-educated workers include the loss of manufacturing and clerical employment, and the decline in wages in manufacturing, services, and sales. Increasing employment and wages for managers and professionals account for most of the increase in average wages of the best-educated workers.

These trends take shape geographically as well as by occupation and industry. Employment magnets led the decline in manufacturing and clerical employment as well as

the increase in professional jobs. Jobs in manufacturing and clerical employment, which form the bulk of jobs in the "middle" of the wage and skill distribution, moved from employment magnets to low-employment, low-wage counties, especially Sonoma, but also Napa and Solano. In contrast, growth in professional services increased most rapidly in employment magnet counties.

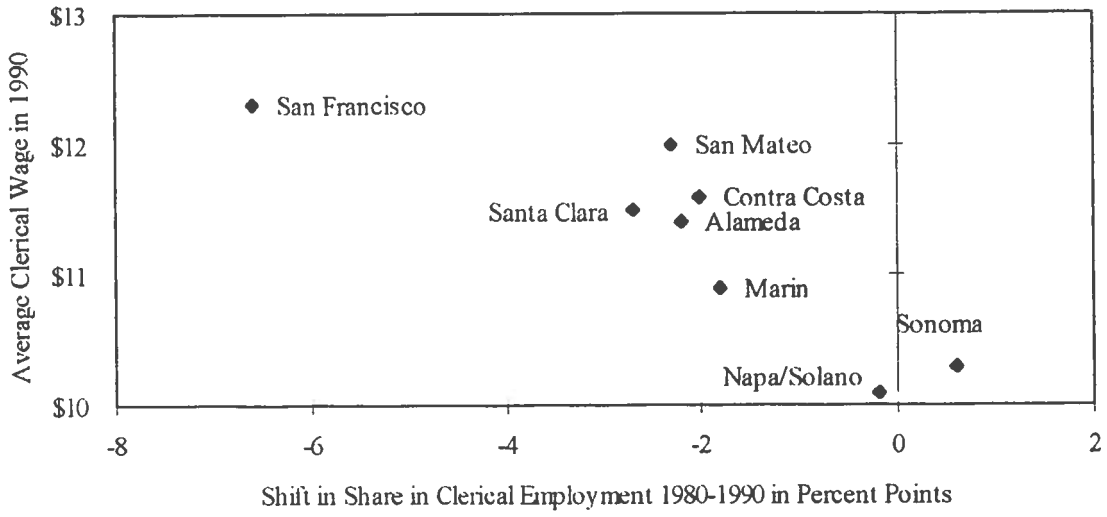
Because of the wage skew across the counties of the Bay Area, this trend only reinforced the bifurcation in wages by education level. Clerical and manufacturing employment increased most rapidly in low-wage counties, while professional employment increased most rapidly in high-wage counties.

These conclusions are confirmed by regressing the shift in share in employment in precision craft and repair, administrative support, and professional service jobs against the average wage in each occupation by county. There is a strong negative correlation between employment shifts and average wages for clerical jobs (adjusted $R^2 = .73$, $p<.05$) and precision craft and repair jobs (adjusted $R^2 = .44$, $p<.05$). In contrast, there is a strong positive correlation between employment shifts and average wages in the professional services sector (adjusted $R^2 = .66$, $p<.05$).

In spite of these trends, no shift in employment between occupations, industries, or counties was any match *overall* for the importance of within-group wage shifts in explaining the increasing bifurcation of wages by education level in the Bay Area from 1980 to 1990.

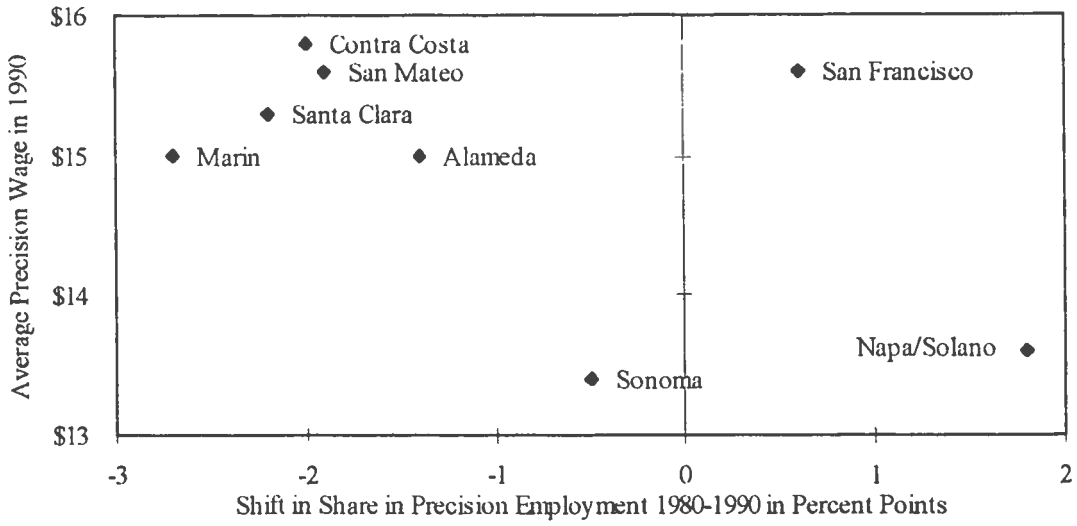
Graphs 16 through 18 show the pattern by county.

Graph 16. Shift in Share in Clerical Employment from 1980 to 1990 Graphed Against Average Clerical Wage by County in 1990



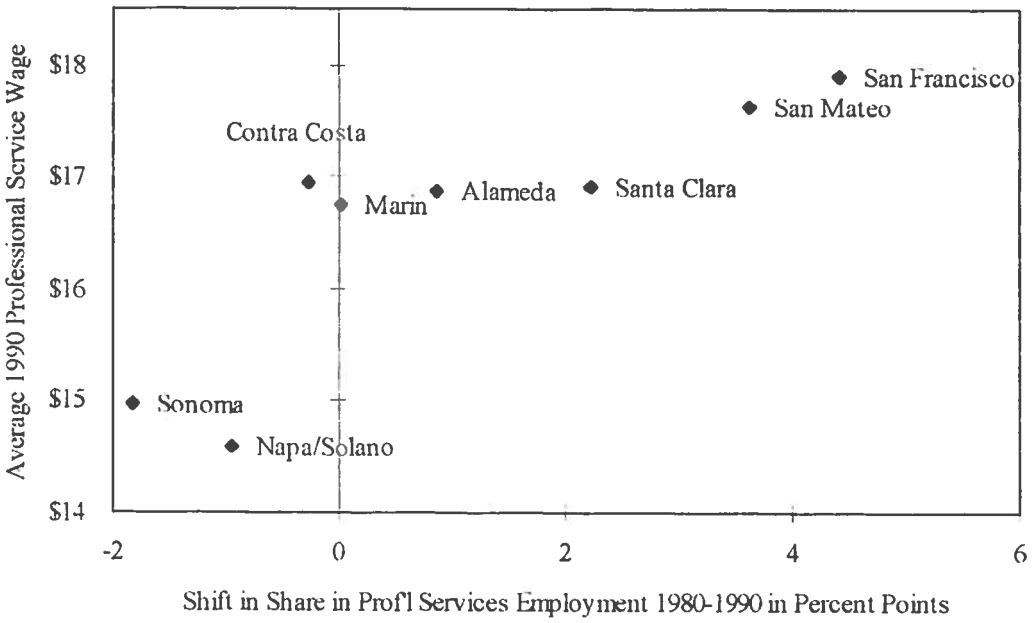
Source: 1980 and 1990 U.S. Census 5% PUMS Sample

Graph 17. Shift in Share in Precision Craft and Repair Employment Graphed Against 1990 Average Precision Wage by County



Source: 1980 and 1990 U.S. Census 5% PUMS Sample

Graph 18. Shift in Share in Professional Services Employment Graphed Against Average Professional Service Wage in 1990



Source: 1980 and 1990 U.S. Census 5% PUMS Sample

Appendix

Table 1. Workforce and Adult Resident Population by Education Level for Bay Area Counties in 1990

	Non-Institutionalized Resident Population 16 to 65 Years Old with No Work Disability					*Resident Population in the Labor Force*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	12,513	21,710	49,647	67,926	151,796	9,310	18,451	42,400	62,386	132,547
Napa/Solano	43,298	71,779	102,645	49,293	267,015	33,198	58,868	89,142	45,851	227,059
Contra Costa	64,008	111,803	176,435	153,254	505,500	46,394	91,149	152,004	140,944	430,491
San Francisco	83,124	82,087	136,638	180,564	482,413	61,656	67,847	119,108	167,318	415,929
Alameda	127,364	181,890	271,056	233,711	814,021	89,669	149,134	231,823	215,170	685,796
San Mateo	63,577	83,281	140,597	131,768	419,223	50,817	70,337	123,939	121,966	367,059
Santa Clara	192,762	217,608	387,646	345,946	1,143,962	128,478	152,966	285,826	281,352	848,622
Sonoma	33,656	54,188	92,368	54,045	234,257	27,703	46,315	80,323	49,611	203,952
Total	620,302	824,346	1,357,032	1,216,507	4,018,187	445,760	652,540	1,113,480	1,116,330	3,328,110

	County Workforce (includes commuters)					*County Full-time Workforce (includes commuters)*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	7,724	15,950	30,279	26,716	80,669	4,537	11,827	21,505	20,575	58,444
Napa/Solano	20,245	38,052	55,750	27,420	141,467	13,655	29,086	44,051	22,894	109,686
Contra Costa	30,532	63,881	104,375	82,091	280,879	18,699	49,920	80,322	68,989	217,930
San Francisco	53,050	77,020	149,326	192,200	471,596	40,523	62,755	119,930	164,852	388,060
Alameda	65,225	119,426	191,380	155,313	531,344	46,668	97,684	151,095	127,730	423,177
San Mateo	37,143	53,368	92,925	79,637	263,073	27,452	42,685	73,125	68,863	212,125
Santa Clara	95,547	130,938	255,216	258,956	740,657	72,163	106,494	207,347	229,153	615,157
Sonoma	18,203	30,880	52,137	29,572	130,792	11,682	22,573	38,033	23,019	95,307
Total	327,669	529,515	931,388	851,905	2,640,477	235,379	423,024	735,408	726,075	2,119,886

Table 2. Working Age Resident Population, Labor Force, and Workforce by Education Level for Bay Area Counties in 1990

	Resident Population 16 to 65 Years Old with No Work Disability					*Resident Population in the Labor Force*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	8 %	14 %	33 %	45 %	100 %	7 %	14 %	32 %	47 %	100 %
Napa/Solano	16	27	38	18	100	15	26	39	20	100
Contra Costa	13	22	35	30	100	11	21	35	33	100
San Francisco	17	17	28	37	100	15	16	29	40	100
Alameda	16	22	33	29	100	13	22	34	31	100
San Mateo	15	20	34	31	100	14	19	34	33	100
Santa Clara	17	19	34	30	100	15	18	34	33	100
Sonoma	14	23	39	23	100	14	23	39	24	100
Total	**15**	**21**	**34**	**30**	**100**	**13**	**20**	**33**	**34**	**100**

	County Workforce (includes commuters)					*County Full-time Workforce (includes commuters)*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	10 %	20 %	38 %	33 %	100 %	8 %	20 %	37 %	35 %	100 %
Napa/Solano	14	27	39	19	100	12	27	40	21	100
Contra Costa	11	23	37	29	100	9	23	37	32	100
San Francisco	11	16	32	41	100	10	16	31	42	100
Alameda	12	22	36	29	100	11	23	36	30	100
San Mateo	14	20	35	30	100	13	20	34	32	100
Santa Clara	13	18	34	35	100	12	17	34	37	100
Sonoma	14	24	40	23	100	12	24	40	24	100
Total	**12**	**20**	**35**	**32**	**100**	**11**	**20**	**35**	**34**	**100**

Table 3a. Employment Density: Workforce as Percent of Resident Population of Working Age by Education Level by Bay Area County in 1990

	Less than High School	High School	Some College	BA+	Total
San Francisco	64	94	109	106	98
Alameda	51	66	71	66	65
Santa Clara	50	60	66	75	65
San Mateo	58	64	66	60	63
Sonoma	54	57	56	55	56
Contra Costa	48	57	59	54	56
Marin	62	73	61	39	53
Napa/Solano	47	53	54	56	53
Total	53	64	69	70	66

Table 3b. Employment Rates: Workforce as Percent of Labor Force by Education Level by Bay Area County in 1990

	Less than High School	High School	Some College	BA+	Total
San Francisco	86	114	125	115	113
Santa Clara	74	86	89	92	87
Alameda	73	80	83	72	77
San Mateo	73	76	75	65	72
Contra Costa	66	70	69	58	65
Sonoma	66	67	65	60	64
Napa/Solano	61	65	63	60	62
Marin	83	86	71	43	61
Total	74	81	84	76	79

Table 3c. Workforce Participation: Labor Force as Percent of Working Age Population by Education Level by Bay Area County in 1990

	Less than High School	High School	Some College	BA+	Total
San Mateo	80	84	88	93	88
Marin	74	85	85	92	87
Sonoma	82	85	87	92	87
San Francisco	74	83	87	93	86
Contra Costa	72	82	86	92	85
Napa/Solano	77	82	87	93	85
Alameda	70	82	86	92	84

Table 4. Percent Commuters and Non-Commuters by Education Level by County in 1990

	Less than High School	High School	Some College	BA+	Total
Marin	13%	39%	42%	38%	33%
Napa/Solano	54	64	66	66	60
Contra Costa	11	39	44	40	31
San Francisco	19	43	56	62	44
Alameda	14	44	51	50	37
San Mateo	16	38	43	38	32
Santa Clara	20	56	66	72	49
Sonoma	17	48	57	60	42
Total	**22**	**48**	**55**	**55**	**41**

Table 5a. Unemployed by Education Level and County in 1990

	Less than High School	High School	Some College	BA+	Total
Santa Clara	15,021	8,019	9,763	7,578	40,381
Alameda	11,865	11,858	10,674	5,166	39,563
San Francisco	7,644	6,174	7,124	5,321	26,263
Contra Costa	6,404	6,296	6,491	2,422	21,613
San Mateo	4,402	4,118	4,111	2,845	15,476
Napa/Solano	4,414	4,204	3,775	912	13,305
Sonoma	3,015	2,679	2,927	1,013	9,634
Marin	677	886	1,309	1,249	4,121
Total	53,442	44,234	46,174	26,506	170,356

Table 5b. Welfare Recipients 16 to 65 Years Old with No Work Disabilities by Education Level and County in 1990

	Less than High School	High School	Some College	BA+	Total
Alameda	11,729	8,241	8,071	2,342	30,383
Santa Clara	11,034	4,988	4,548	1,594	22,164
San Francisco	7,017	3,839	3,926	2,341	17,123
Contra Costa	5,308	4,608	3,173	1,022	14,111
Napa/Solano	2,764	2,847	2,224	327	8,162
San Mateo	2,298	1,913	1,536	903	6,650
Sonoma	1,718	1,681	1,650	360	5,409
Marin	580	745	946	397	2,668
Total	42,448	28,862	26,074	9,286	106,670

Table 5c. Welfare Recipients with No Work Disabilities and the Unemployed as Percent of the Labor Force by Education Level and County in 1990

	Less than High School	High School	Some College	BA+	Total
San Francisco	23.8	14.8	9.3	4.6	10.4
Alameda	26.3	13.5	8.1	3.5	10.2
Napa/Solano	21.6	12.0	6.7	2.7	9.5
Contra Costa	25.2	12.0	6.4	2.4	8.3
Sonoma	17.1	9.4	5.7	2.8	7.4
Santa Clara	20.3	8.5	5.0	3.3	7.4
San Mateo	13.2	8.6	4.6	3.1	6.0
Marin	13.5	8.8	5.3	2.6	5.1
Total	21.5	11.2	6.5	3.2	8.3

Table 6. Change in the Size of the Workforce and Adult Resident Population by Education Level for Bay Area Counties from 1980 to 1990

	Resident Population 16 to 65 Years Old with No Work Disability					*Resident Population in the Labor Force*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	(3,515)	(13,835)	(5,506)	6,594	(16,263)	(3,800)	(11,166)	(1,353)	8,282	(8,038)
Napa/Solano	(1,094)	(8,340)	32,945	19,562	43,073	1,848	(4,311)	33,145	19,335	50,017
Contra Costa	(12,691)	(23,469)	34,596	43,837	42,272	(7,916)	(13,663)	38,597	44,728	61,747
San Francisco	(11,678)	(23,568)	(10,969)	26,504	(19,711)	(10,027)	(20,298)	(3,191)	26,596	(6,920)
Alameda	(22,592)	(49,051)	26,572	67,932	22,861	(21,116)	(37,233)	37,818	67,677	47,145
San Mateo	(6,237)	(41,116)	3,797	28,963	(14,593)	(7,665)	(33,107)	9,916	29,580	(1,275)
Santa Clara	13,166	(20,926)	79,960	119,816	192,016	(11,446)	(42,749)	34,068	79,686	59,560
Sonoma	(1,570)	(12,502)	28,323	17,451	31,702	1,027	(5,122)	29,798	17,600	43,303
Total	**(46,210)**	**(192,808)**	**189,718**	**330,659**	**281,358**	**(60,560)**	**(170,175)**	**167,713**	**325,216**	**262,194**

	County Workforce (includes commuters)					*County Full-time Workforce (includes commuters)*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	(165)	(1,788)	8,482	9,570	16,099	296	(1,853)	6,639	8,445	13,528
Napa/Solano	3,555	(1,027)	19,133	10,001	31,662	2,893	(3,016)	15,049	8,211	23,137
Contra Costa	345	4,419	44,183	45,930	94,877	1,052	2,998	36,956	39,805	80,811
San Francisco	610	(25,671)	10,565	30,913	16,417	2,675	(23,110)	10,216	27,459	17,241
Alameda	(3,905)	(14,364)	52,437	53,671	87,838	(1,850)	(13,717)	46,625	48,705	79,763
San Mateo	5,041	(12,524)	21,789	27,699	42,004	5,518	(11,625)	20,275	25,725	39,894
Santa Clara	1,018	(27,340)	46,642	97,486	117,807	5,085	(27,616)	45,193	88,979	111,642
Sonoma	4,204	3,201	23,728	12,244	43,377	3,748	1,415	17,741	9,111	32,014
Total	**10,703**	**(75,095)**	**226,959**	**287,514**	**450,081**	**19,417**	**(76,524)**	**198,696**	**256,441**	**398,030**

Table 7. Percent Change by Education Level in the Workforce and Adult Resident Population by Bay Area County from 1980 to 1990

	Resident Population 16 to 65 Years Old with No Work Disability					*Resident Population in the Labor Force*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	-11.0	-30.4	2.6	26.3	3.0	-19.0	-29.0	10.5	31.4	7.5
Napa/Solano	11.2	2.1	67.9	89.0	35.9	20.7	6.2	81.5	97.1	46.2
Contra Costa	-4.9	-5.8	41.8	59.7	24.4	-2.6	-0.9	52.8	67.0	33.1
San Francisco	0.0	-11.4	5.5	33.6	9.5	-1.9	-12.3	11.0	35.5	12.1
Alameda	-3.2	-10.2	26.4	60.7	17.3	-7.7	-8.8	36.2	66.3	22.4
San Mateo	3.8	-23.7	17.2	46.1	10.2	-0.9	-22.5	23.9	50.5	13.6
Santa Clara	22.4	4.0	43.6	74.4	37.0	4.7	-10.9	29.4	59.0	22.6
Sonoma	8.9	-7.4	64.4	68.4	31.8	18.4	2.6	81.2	76.7	44.7
Total	**6.1**	**-7.6**	**32.5**	**56.6**	**22.6**	**0.4**	**-9.6**	**34.2**	**60.9**	**23.7**

	County Workforce (includes commuters)					*County Full-time Workforce (includes commuters)*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	-2.1	-10.1	38.9	55.8	24.9	7.0	-13.5	44.7	69.6	30.1
Napa/Solano	21.3	-2.6	52.3	57.4	28.8	26.9	-9.4	51.9	55.9	26.7
Contra Costa	1.1	7.4	73.4	127.0	51.0	6.0	6.4	85.2	136.4	58.9
San Francisco	1.2	-25.0	7.6	19.2	3.6	7.1	-26.9	9.3	20.0	4.6
Alameda	-5.6	-10.7	37.7	52.8	19.8	-3.8	-12.3	44.6	61.6	23.2
San Mateo	15.7	-19.0	30.6	53.3	19.0	25.2	-21.4	38.4	59.6	23.2
Santa Clara	1.1	-17.3	22.4	60.4	18.9	7.6	-20.6	27.9	63.5	22.2
Sonoma	30.0	11.6	83.5	70.7	49.6	47.2	6.7	87.4	65.5	50.6
Total	**3.4**	**-12.4**	**32.2**	**50.9**	**20.5**	**9.0**	**-15.3**	**37.0**	**54.6**	**23.1**

Table 8. Shift in Share by Education Level for the Workforce and the Adult Resident Population by Bay Area County from 1980 to 1990

	Resident Population 16 to 65 Years Old with No Work Disability					*Resident Population in the Labor Force*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	-1.3	-6.8	-0.1	8.3	0.0	-2.3	-7.1	0.9	8.6	0.0
Napa/Solano	-3.6	-8.9	7.3	5.2	0.0	-3.1	-9.8	7.6	5.2	0.0
Contra Costa	-3.9	-7.1	4.3	6.7	0.0	-4.0	-7.3	4.6	6.6	0.0
San Francisco	-1.6	-4.0	-1.1	6.7	0.0	-2.1	-4.5	-0.3	6.9	0.0
Alameda	-3.3	-6.8	2.4	7.8	0.0	-4.3	-7.4	3.4	8.3	0.0
San Mateo	-0.9	-8.8	2.0	7.7	0.0	-2.0	-8.9	2.8	8.1	0.0
Santa Clara	-2.0	-6.0	1.6	6.5	0.0	-2.6	-6.8	1.8	7.6	0.0
Sonoma	-3.0	-9.8	7.8	5.0	0.0	-3.0	-9.3	7.9	4.4	0.0
Total	**-2.4**	**-6.7**	**2.5**	**6.6**	0.0	**-3.1**	**-7.2**	**2.6**	**7.7**	0.0

	County Workforce (includes commuters)					*County Full-time Workforce (includes commuters)*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Marin	-2.6	-7.7	3.8	6.6	0.0	-1.7	-10.2	3.7	8.2	0.0
Napa/Solano	-0.9	-8.7	6.1	3.5	0.0	0.0	-10.6	6.7	3.9	0.0
Contra Costa	-5.4	-9.2	4.8	9.8	0.0	-4.3	-11.3	5.2	10.4	0.0
San Francisco	-0.3	-6.2	1.2	5.3	0.0	0.2	-7.0	1.3	5.4	0.0
Alameda	-3.3	-7.7	4.7	6.3	0.0	-3.1	-9.4	5.3	7.2	0.0
San Mateo	-0.4	-9.5	3.1	6.8	0.0	0.2	-11.4	3.8	7.4	0.0
Santa Clara	-2.3	-7.7	1.0	9.0	0.0	-1.6	-9.3	1.5	9.4	0.0
Sonoma	-2.1	-8.1	7.4	2.8	0.0	-0.3	-9.7	7.8	2.2	0.0
Total	**-2.1**	**-7.5**	**3.1**	**6.5**	0.0	**-1.4**	**-9.1**	**3.5**	**7.0**	0.0

Table 9. Workers by Occupation by Education Level in the Bay Area in 1990

	Less than High School	High School	Some College	BA+	Total
Managers	10,826	33,189	98,124	151,947	294,086
Management Related Occs.	2,600	13,086	44,180	68,660	128,526
Total Management	**13,426**	**46,275**	**142,304**	**220,607**	**422,612**
Professionals exc. health	2,964	9,745	44,817	174,750	232,276
Medical Professionals	509	1,776	20,238	50,843	73,366
Teachers	1,114	5,452	17,661	91,166	115,393
Total Professionals	**4,587**	**16,973**	**82,716**	**316,759**	**421,035**
Total Technicians	**5,015**	**14,914**	**58,668**	**57,586**	**136,183**
Sales Supervisors	3,584	13,952	28,060	24,003	69,599
Business Sales	3,672	12,297	32,916	45,670	94,555
Retail and Service Sales	26,759	36,051	51,170	18,900	132,880
Total Sales	**34,015**	**62,300**	**112,146**	**88,573**	**297,034**
Total Admin. Support	**34,486**	**127,525**	**231,754**	**89,260**	**483,025**
Protective Services	3,152	8,403	24,571	9,657	45,783
Food Preparation	38,667	28,046	30,578	8,709	106,000
Health Service	6,130	8,326	15,014	4,892	34,362
Cleaning, Building Services	25,735	16,651	12,691	2,741	57,818
Personal Services	12,297	12,407	16,822	6,296	47,822
Total Services	**85,981**	**73,833**	**99,676**	**32,295**	**291,785**
Farm/Garden/Forestry/Fishing	**15,398**	**6,132**	**5,287**	**2,374**	**29,191**
Mechanics and Repairers	11,175	26,974	41,809	6,050	86,008
Construction Trades	20,555	32,292	33,209	6,668	92,724
Precision Trades	19,539	27,149	35,846	10,225	92,759
Total Precision, Craft, & Repair	**51,269**	**86,415**	**110,864**	**22,943**	**271,491**
Machine Operators	37,381	36,640	33,410	9,752	117,183
Transportation Occupations	18,012	29,376	27,904	5,843	81,135
Handlers, Laborers	27,900	26,436	24,189	4,343	82,868
Total Op's, Fabricators, Laborer	**83,293**	**92,452**	**85,503**	**19,938**	**281,186**
Military	**199**	**2,696**	**2,470**	**1,570**	**6,935**
TOTAL	**327,669**	**529,515**	**931,388**	**851,905**	**2,640,477**

Table 10. Percent by Education Level for Occupations in the Bay Area in 1990

	Less than High School	High School	Some College	BA+	Total
Managers	4 %	11 %	33 %	52 %	100 %
Management Related Occs.	2	10	34	53	100
Total Management	**3**	**11**	**34**	**52**	**100**
Professionals exc. health	1	4	19	75	100
Medical Professionals	1	2	28	69	100
Teachers	1	5	15	79	100
Total Professionals	**1**	**4**	**20**	**75**	**100**
Total Technicians	**4**	**11**	**43**	**42**	**100**
Sales Supervisors	5	20	40	34	100
Business Sales	4	13	35	48	100
Retail and Service Sales	20	27	39	14	100
Total Sales	**11**	**21**	**38**	**30**	**100**
Total Admin. Support	**7**	**26**	**48**	**18**	**100**
Protective Services	7	18	54	21	100
Food Preparation	36	26	29	8	100
Health Service	18	24	44	14	100
Cleaning. Building Services	45	29	22	5	100
Personal Services	26	26	35	13	100
Total Services	**29**	**25**	**34**	**11**	**100**
Farm/Garden/Forestry/Fishing	**53**	**21**	**18**	**8**	**100**
Mechanics and Repairers	13	31	49	7	100
Construction Trades	22	35	36	7	100
Precision Trades	21	29	39	11	100
Total Precision, Craft, & Repair	**19**	**32**	**41**	**8**	**100**
Machine Operators	32	31	29	8	100
Transportation Occupations	22	36	34	7	100
Handlers, Laborers	34	32	29	5	100
Total Op's, Fabricators, Laborer	**30**	**33**	**30**	**7**	**100**
Military	**3**	**39**	**36**	**23**	**100**
TOTAL	**12**	**20**	**35**	**32**	**100**

Table 11. Workers by Occupation in 1990 by Bay Area County

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	9,676	10,671	29,435	59,160	55,887	28,325	89,030	11,902	294,086
Management Related Occs.	4,188	3,763	14,158	32,886	22,790	12,037	34,734	3,970	128,526
Total Management	**13,864**	**14,434**	**43,593**	**92,046**	**78,677**	**40,362**	**123,764**	**15,872**	**422,612**
Professionals exc. health	5,481	6,407	21,705	44,354	35,435	18,005	94,917	5,972	232,276
Medical Professionals	2,470	4,609	8,272	14,659	14,433	6,721	18,076	4,126	73,366
Teachers	4,375	7,483	14,937	14,546	27,527	9,449	29,830	7,246	115,393
Total Professionals	**12,326**	**18,499**	**44,914**	**73,559**	**77,395**	**34,175**	**142,823**	**17,344**	**421,035**
Total Technicians	**3,013**	**5,842**	**13,099**	**20,331**	**27,477**	**11,433**	**49,738**	**5,250**	**136,183**
Sales Supervisors	2,584	3,831	8,450	11,495	15,309	8,246	16,251	3,433	69,599
Business Sales	3,542	3,403	10,106	19,770	17,996	10,376	24,922	4,440	94,555
Retail and Service Sales	4,989	8,369	16,825	20,727	27,170	13,836	32,047	8,917	132,880
Total Sales	**11,115**	**15,603**	**35,381**	**51,992**	**60,475**	**32,458**	**73,220**	**16,790**	**297,034**
Total Admin. Support	**14,390**	**21,532**	**52,816**	**98,632**	**99,905**	**52,276**	**120,371**	**23,103**	**483,025**
Protective Services	1,708	3,666	4,656	8,487	9,661	4,342	11,433	1,830	45,783
Food Preparation	3,919	7,875	10,243	22,099	19,846	11,959	22,720	7,339	106,000
Health Service	1,310	2,999	4,089	6,535	6,834	2,532	7,654	2,409	34,362
Cleaning, Building Services	1,322	3,782	5,590	12,843	9,852	6,861	14,423	3,145	57,818
Personal Services	2,109	2,530	5,000	9,819	8,220	7,513	9,930	2,701	47,822
Total Services	**10,368**	**20,852**	**29,578**	**59,783**	**54,413**	**33,207**	**66,160**	**17,424**	**291,785**
Farm/Garden/Forestry/Fishing	**1,331**	**4,134**	**3,371**	**1,494**	**3,897**	**3,896**	**6,984**	**4,084**	**29,191**
Mechanics and Repairers	1,956	7,697	8,628	9,157	21,354	11,769	21,380	4,067	86,008
Construction Trades	3,674	8,095	13,310	14,074	17,720	8,760	22,080	5,011	92,724
Precision Trades	1,199	5,146	8,492	11,012	18,692	8,700	34,942	4,576	92,759
Total Precision, Craft, & Repair	**6,829**	**20,938**	**30,430**	**34,243**	**57,766**	**29,229**	**78,402**	**13,654**	**271,491**
Machine Operators	1,916	6,656	8,816	16,316	27,563	9,259	40,133	6,524	117,183
Transportation Occupations	2,149	5,838	8,289	12,112	22,846	7,235	17,859	4,807	81,135
Handlers, Laborers	3,253	5,588	10,315	10,087	18,772	9,214	19,952	5,687	82,868
Total Op's, Fabricators, Laborers	**7,318**	**18,082**	**27,420**	**38,515**	**69,181**	**25,708**	**77,944**	**17,018**	**281,186**
Military	**115**	**1,551**	**277**	**1,001**	**2,158**	**329**	**1,251**	**253**	**6,935**
TOTAL	**80,669**	**141,467**	**280,879**	**471,596**	**531,344**	**263,073**	**740,657**	**130,792**	**2,640,477**

Table 12. Workers by Percent by Occupation in 1990 by Bay Area County

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	12	8	10	13	11	11	12	9	11
Management Related Occs.	5	3	5	7	4	5	5	3	5
Total Management	**17**	**10**	**16**	**20**	**15**	**15**	**17**	**12**	**16**
Professionals exc. health	7	5	8	9	7	7	13	5	9
Medical Professionals	3	3	3	3	3	3	2	3	3
Teachers	5	5	5	3	5	4	4	6	4
Total Professionals	**15**	**13**	**16**	**16**	**15**	**13**	**19**	**13**	**16**
Total Technicians	**4**	**4**	**5**	**4**	**5**	**4**	**7**	**4**	**5**
Sales Supervisors	3	3	3	2	3	3	2	3	3
Business Sales	4	2	4	4	3	4	3	3	4
Retail and Service Sales	6	6	6	4	5	5	4	7	5
Total Sales	**14**	**11**	**13**	**11**	**11**	**12**	**10**	**13**	**11**
Total Admin. Support	**18**	**15**	**19**	**21**	**19**	**20**	**16**	**18**	**18**
Protective Services	2	3	2	2	2	2	2	1	2
Food Preparation	5	6	4	5	4	5	3	6	4
Health Service	2	2	1	1	1	1	1	2	1
Cleaning. Building Services	2	3	2	3	2	3	2	2	2
Personal Services	3	2	2	2	2	3	1	2	2
Total Services	**13**	**15**	**11**	**13**	**10**	**13**	**9**	**13**	**11**
Farm/Garden/Forestry/Fishing	**2**	**3**	**1**	**0**	**1**	**1**	**1**	**3**	**1**
Mechanics and Repairers	2	5	3	2	4	4	3	3	3
Construction Trades	5	6	5	3	3	3	3	4	4
Precision Trades	1	4	3	2	4	3	5	3	4
Total Precision, Craft, & Repair	**8**	**15**	**11**	**7**	**11**	**11**	**11**	**10**	**10**
Machine Operators	2	5	3	3	5	4	5	5	4
Transportation Occupations	3	4	3	3	4	3	2	4	3
Handlers, Laborers	4	4	4	2	4	4	3	4	3
Total Op's, Fabricators, Laborers	**9**	**13**	**10**	**8**	**13**	**10**	**11**	**13**	**11**
Military	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
TOTAL	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Table 13. Absolute Change in Jobs by Occupation by Education Level in 1990

	Less than High School	High School	Some College	BA+	Total
Managers	1,752	(5,297)	33,418	61,112	90,984
Management Related Occs.	411	136	17,732	28,851	47,130
Total Management	**2,163**	**(5,162)**	**51,150**	**89,963**	**138,114**
Professionals exc. health	365	(2,293)	10,799	68,730	77,601
Medical Professionals	(84)	(823)	4,324	18,421	21,838
Teachers	(345)	2,351	5,896	13,464	21,366
Total Professionals	**(64)**	**(765)**	**21,019**	**100,615**	**120,805**
Total Technicians	**592**	**(1,958)**	**15,211**	**24,982**	**38,827**
Sales Supervisors	985	6,063	16,569	17,209	40,825
Business Sales	526	(927)	7,289	17,489	24,377
Retail and Service Sales	(145)	1,669	9,583	5,722	16,828
Total Sales	**1,365**	**6,805**	**33,440**	**40,419**	**82,030**
Total Admin. Support	**(261)**	**(42,381)**	**40,781**	**16,026**	**14,166**
Protective Services	370	1,654	6,377	2,543	10,945
Food Preparation	3,646	2,328	6,319	3,009	15,302
Health Service	521	(2,481)	924	1,290	253
Cleaning, Building Services	4,394	1,740	2,978	324	9,436
Personal Services	(425)	(2,687)	1,227	1,143	(742)
Total Services	**8,507**	**554**	**17,824**	**8,309**	**35,194**
Farm/Garden/Forestry/Fishing	**7,464**	**888**	**499**	**140**	**8,990**
Mechanics and Repairers	(955)	(3,988)	17,003	2,265	14,325
Construction Trades	2,725	2,971	11,549	2,245	19,490
Precision Trades	(3,170)	(12,523)	5,887	(491)	(10,297)
Total Precision, Craft, & Repair	**(1,399)**	**(13,540)**	**34,438**	**4,019**	**23,518**
Machine Operators	(7,125)	(9,462)	4,500	3,186	(8,901)
Transportation Occupations	(2,098)	1,788	8,798	2,195	10,683
Handlers, Laborers	3,595	353	5,903	1,425	11,276
Total Op's, Fabricators, Laborer	**(5,627)**	**(7,321)**	**19,201**	**6,805**	**13,058**
Military	**(2,035)**	**(12,215)**	**(6,604)**	**(3,765)**	**(24,620)**
TOTAL	**10,703**	**(75,095)**	**226,959**	**287,514**	**450,081**

Table 14. Percent Change in Workforce by Occupation and Education from 1980 to 1990

	Less than High School	High School	Some College	BA+	Total
Managers	19 %	(14) %	52 %	67 %	45 %
Management Related Occs.	19	1	67	72	58
Total Management	**19**	**(10)**	**56**	**69**	**49**
Professionals exc. health	14	(19)	32	65	50
Medical Professionals	(14)	(32)	27	57	42
Teachers	(24)	76	50	17	23
Total Professionals	**(1)**	**(4)**	**34**	**47**	**40**
Total Technicians	**13**	**(12)**	**35**	**77**	**40**
Sales Supervisors	38	77	144	253	142
Business Sales	17	(7)	28	62	35
Retail and Service Sales	(1)	5	23	43	15
Total Sales	**4**	**12**	**42**	**84**	**38**
Total Admin. Support	**(1)**	**(25)**	**21**	**22**	**3**
Protective Services	13	25	35	36	31
Food Preparation	10	9	26	53	17
Health Service	9	(23)	7	36	1
Cleaning, Building Services	21	12	31	13	20
Personal Services	(3)	(18)	8	22	(2)
Total Services	**11**	**1**	**22**	**35**	**14**
Farm/Garden/Forestry/Fishing	**94**	**17**	**10**	**6**	**45**
Mechanics and Repairers	(8)	(13)	69	60	20
Construction Trades	15	10	53	51	27
Precision Trades	(14)	(32)	20	(5)	(10)
Total Precision, Craft, & Repair	**(3)**	**(14)**	**45**	**21**	**9**
Machine Operators	(16)	(21)	16	49	(7)
Transportation Occupations	(10)	6	46	60	15
Handlers, Laborers	15	1	32	49	16
Total Op's, Fabricators, Laborer	**(6)**	**(7)**	**29**	**52**	**5**
Military	**(91)**	**(82)**	**(73)**	**(71)**	**(78)**
TOTAL	**3**	**(12)**	**32**	**51**	**21**

Table 15. Shift in Share in Workers by Education Level from 1980 to 1990

	Less than High School	High School	Some College	BA+	Total
Managers	(0.8)	(7.7)	1.5	6.9	(0.0)
Management Related Occs.	(0.7)	(5.7)	1.9	4.5	0.0
Total Management	**(0.8)**	**(7.1)**	**1.6**	**6.3**	**0.0**
Professionals exc. health	(0.4)	(3.6)	(2.7)	6.7	(0.0)
Medical Professionals	(0.5)	(2.6)	(3.3)	6.4	0.0
Teachers	(0.6)	1.4	2.8	(3.6)	0.0
Total Professionals	**(0.5)**	**(1.9)**	**(0.9)**	**3.2**	**0.0**
Total Technicians	**(0.9)**	**(6.4)**	**(1.6)**	**8.8**	**-**
Sales Supervisors	(3.9)	(7.4)	0.4	10.9	0.0
Business Sales	(0.6)	(5.8)	(1.7)	8.1	0.0
Retail and Service Sales	(3.0)	(2.5)	2.7	2.9	0.0
Total Sales	**(3.7)**	**(4.8)**	**1.1**	**7.4**	**0.0**
Total Admin. Support	**(0.3)**	**(9.8)**	**7.2**	**2.9**	**(0.0)**
Protective Services	(1.1)	(1.0)	1.4	0.7	0.0
Food Preparation	(2.1)	(1.9)	2.1	1.9	(0.0)
Health Service	1.4	(7.5)	2.4	3.7	0.0
Cleaning. Building Services	0.4	(2.0)	1.9	(0.3)	(0.0)
Personal Services	(0.5)	(5.1)	3.1	2.6	0.0
Total Services	**(0.7)**	**(3.3)**	**2.3**	**1.7**	**0.0**
Farm/Garden/Forestry/Fishing	**13.5**	**(5.0)**	**(5.6)**	**(2.9)**	**0.0**
Mechanics and Repairers	(3.9)	(11.8)	14.0	1.8	(0.0)
Construction Trades	(2.2)	(5.2)	6.2	1.2	0.0
Precision Trades	(1.0)	(9.2)	9.6	0.6	0.0
Total Precision, Craft, & Repair	**(2.4)**	**(8.5)**	**10.0**	**0.8**	**(0.0)**
Machine Operators	(3.4)	(5.3)	5.6	3.1	(0.0)
Transportation Occupations	(6.3)	(3.0)	7.3	2.0	(0.0)
Handlers, Laborers	(0.3)	(4.5)	3.6	1.2	0.0
Total Op's, Fabricators, Laborer	**(3.5)**	**(4.3)**	**5.7**	**2.2**	**0.0**
Military	**(4.2)**	**(8.4)**	**6.9**	**5.7**	**(0.0)**
TOTAL	**(2.1)**	**(7.5)**	**3.1**	**6.5**	**0.0**

Table 16. Percent Increase in Workforce by Occupation from 1980 to 1990 by Bay Area County

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	68	66	88	20	55	23	48	80	45
Management Related Occs.	114	83	185	16	64	73	63	118	58
Total Management	80	70	112	19	57	35	52	88	49
Professionals exc. health	54	73	162	9	52	47	60	82	50
Medical Professionals	20	35	87	21	36	71	46	59	42
Teachers	23	36	44	9	20	28	17	34	23
Total Professionals	34	46	94	11	36	45	47	53	40
Total Technicians	61	100	110	28	48	24	25	95	40
Sales Supervisors	89	155	135	115	200	126	151	98	142
Business Sales	23	119	72	2	54	28	44	32	35
Retail and Service Sales	7	33	32	17	18	(3)	3	43	15
Total Sales	25	67	59	22	52	24	34	48	38
Total Admin. Support	14	27	36	(21)	7	6	2	54	3
Protective Services	(1)	91	96	5	28	16	39	61	31
Food Preparation	15	35	23	7	20	27	6	48	17
Health Service	6	11	7	26	(2)	(24)	(12)	10	1
Cleaning. Building Services	(22)	11	32	4	(7)	95	39	44	20
Personal Services	(2)	(21)	(8)	15	(10)	20	(7)	(15)	(2
Total Services	2	22	22	9	7	27	11	27	14
Farm/Garden/Forestry/Fishing	108	65	64	(16)	15	55	50	52	45
Mechanics and Repairers	2	58	46	2	14	16	19	31	20
Construction Trades	10	76	29	32	24	16	19	29	27
Precision Trades	(39)	9	12	5	(12)	(21)	(19)	76	(10)
Total Precision, Craft, & Repair	(5)	47	28	13	6	2	(2)	43	9
Machine Operators	14	21	10	2	(9)	(11)	(19)	32	(7)
Transportation Occupations	31	33	23	1	20	23	4	32	15
Handlers. Laborers	32	44	19	11	4	0	19	62	16
Total Op's, Fabricators, Laborers	26	31	17	4	3	1	(6)	41	5
Military	(72)	(87)	(82)	(73)	(77)	140	(68)	(60)	(78)
TOTAL	25	29	51	4	20	19	19	50	21

Table 17. Shift in Share in Workers by Occupation from 1980 to 1990 by Bay Area County

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	3.1	1.7	2.1	1.7	2.4	0.4	2.3	1.5	1.9
Management Related Occs.	2.2	0.8	2.4	0.7	1.2	1.4	1.3	0.9	1.2
Total Management	5.3	2.5	4.4	2.5	3.5	1.8	3.6	2.5	3.0
Professionals exc. health	1.3	1.2	3.3	0.4	1.4	1.3	3.3	0.8	1.7
Medical Professionals	(0.1)	0.1	0.6	0.4	0.3	0.8	0.4	0.2	0.4
Teachers	(0.1)	0.3	(0.3)	0.1	0.0	0.3	(0.1)	(0.7)	0.1
Total Professionals	1.1	1.6	3.6	1.0	1.8	2.3	3.6	0.3	2.2
Total Technicians	0.8	1.5	1.3	0.8	1.0	0.2	0.3	0.9	0.7
Sales Supervisors	1.1	1.3	1.1	1.3	1.7	1.5	1.2	0.6	1.3
Business Sales	(0.1)	1.0	0.4	(0.1)	0.7	0.3	0.6	(0.5)	0.4
Retail and Service Sales	(1.0)	0.2	(0.9)	0.5	(0.1)	(1.2)	(0.7)	(0.3)	(0.3
Total Sales	0.0	2.5	0.6	1.7	2.4	0.5	1.1	(0.2)	1.4
Total Admin. Support	(1.8)	(0.2)	(2.0)	(6.6)	(2.2)	(2.3)	(2.7)	0.6	(3.1
Protective Services	(0.6)	0.8	0.4	0.0	0.1	(0.0)	0.2	0.1	0.1
Food Preparation	(0.4)	0.3	(0.8)	0.1	(0.0)	0.3	(0.4)	(0.1)	(0.1
Health Service	(0.3)	(0.3)	(0.6)	0.2	(0.3)	(0.5)	(0.4)	(0.7)	(0.3
Cleaning. Building Services	(1.0)	(0.4)	(0.3)	(0.0)	(0.5)	1.0	0.3	(0.1)	(0.0
Personal Services	(0.7)	(1.1)	(1.1)	0.2	(0.5)	0.0	(0.4)	(1.6)	(0.4
Total Services	(3.0)	(0.8)	(2.5)	0.6	(1.2)	0.8	(0.6)	(2.3)	(0.7
Farm/Garden/Forestry/Fishing	0.7	0.6	0.1	(0.1)	(0.0)	0.3	0.2	0.0	0.2
Mechanics and Repairers	(0.5)	1.0	(0.1)	(0.0)	(0.2)	(0.1)	(0.0)	(0.4)	(0.0
Construction Trades	(0.6)	1.5	(0.8)	0.6	0.1	(0.1)	0.0	(0.6)	0.2
Precision Trades	(1.6)	(0.7)	(1.0)	0.0	(1.3)	(1.7)	(2.2)	0.5	(1.2
Total Precision, Craft, & Repair	(2.7)	1.8	(2.0)	0.6	(1.4)	(1.9)	(2.2)	(0.5)	(1.0
Machine Operators	(0.2)	(0.3)	(1.2)	(0.1)	(1.6)	(1.2)	(2.5)	(0.6)	(1.3
Transportation Occupations	0.1	0.1	(0.7)	(0.1)	0.0	0.1	(0.3)	(0.5)	(0.1
Handlers, Laborers	0.2	0.4	(1.0)	0.1	(0.5)	(0.7)	(0.0)	0.3	(0.1
Total Op's, Fabricators, Laborers	0.1	0.2	(2.8)	0.0	(2.1)	(1.8)	(2.8)	(0.8)	(1.6
Military	(0.5)	(9.7)	(0.7)	(0.6)	(1.7)	0.1	(0.5)	(0.5)	(1.2

Table 18a. Jobs by Industry by Bay Area County in 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Agriculture	1,708	4,817	6,498	3,263	4,609	4,124	7,620	4,977	37,616
Construction	5,758	9,923	21,284	23,867	27,638	13,783	34,792	8,729	145,774
Manufacturing	6,025	19,922	34,321	41,064	84,316	35,959	254,904	19,433	495,944
Transport/Comm.	4,479	7,761	24,310	48,898	49,530	37,764	37,122	9,019	218,883
Wholesale Trade	3,185	3,908	12,084	16,807	28,891	15,436	37,533	4,970	122,814
Retail Trade	16,985	26,402	51,159	65,532	84,869	44,363	94,519	25,402	409,231
FIRE	9,940	5,780	31,834	65,771	33,325	21,847	35,067	10,643	214,207
Business/Repair Svs.	4,762	5,042	14,007	30,105	27,388	16,607	43,699	5,559	147,169
Personal Services	4,029	6,062	10,156	28,572	18,951	12,884	22,335	6,246	109,235
Professional Services	19,446	30,026	63,022	115,752	130,198	50,181	146,637	30,228	585,490
Public Administration	3,895	11,932	10,261	27,074	29,429	9,601	21,642	4,550	118,384
Total	80,212	131,575	278,936	466,705	519,144	262,549	735,870	129,756	2,604,747

Table 18b. Share of Jobs by Industry by Bay Area County in 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Agriculture	2	4	2	1	1	2	1	4	1
Construction	7	8	8	5	5	5	5	7	6
Manufacturing	8	15	12	9	16	14	35	15	19
Transport/Comm.	6	6	9	10	10	14	5	7	8
Wholesale Trade	4	3	4	4	6	6	5	4	5
Retail Trade	21	20	18	14	16	17	13	20	16
FIRE	12	4	11	14	6	8	5	8	8
Business/Repair Svs.	6	4	5	6	5	6	6	4	6
Personal Services	5	5	4	6	4	5	3	5	4
Professional Services	24	23	23	25	25	19	20	23	22
Public Administration	5	9	4	6	6	4	3	4	5
Total	100	100	100	100	100	100	100	100	100

Table 18c. Share of Jobs by County by Industry in 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Agriculture	5	13	17	9	12	11	20	13	100
Construction	4	7	15	16	19	9	24	6	100
Manufacturing	1	4	7	8	17	7	51	4	100
Transport/Comm.	2	4	11	22	23	17	17	4	100
Wholesale Trade	3	3	10	14	24	13	31	4	100
Retail Trade	4	6	13	16	21	11	23	6	100
FIRE	5	3	15	31	16	10	16	5	100
Business/Repair Svs.	3	3	10	20	19	11	30	4	100
Personal Services	4	6	9	26	17	12	20	6	100
Professional Services	3	5	11	20	22	9	25	5	100
Public Administration	3	10	9	23	25	8	18	4	100
Total	3	5	11	18	20	10	28	5	100

Table 18d. Absolute Change in Jobs by Industry for Bay Area Counties from 1980 to1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Agriculture	705	2,127	4,036	(1,069)	1,280	2,026	2,194	1,283	12,582
Construction	1,107	4,953	7,194	4,213	8,258	3,751	9,894	3,485	42,855
Manufacturing	371	1,180	4,681	(5,722)	(546)	(3,303)	6,886	6,665	10,213
Transport/Comm.	147	2,198	10,767	(9,014)	9,721	4,886	6,205	3,182	28,093
Wholesale Trade	1,361	807	5,472	(3,850)	5,179	(68)	15,827	1,459	26,188
Retail Trade	4,217	7,432	11,852	11,040	16,013	5,922	13,716	8,120	78,312
FIRE	2,279	1,220	16,740	(5,593)	7,835	4,610	4,743	3,757	35,592
Business/Repair Svs.	1,479	2,352	7,167	(173)	6,503	2,608	11,004	2,823	33,762
Personal Services	837	1,958	4,319	5,362	5,043	5,497	7,287	2,552	32,855
Professional Services	3,896	5,676	20,796	24,096	25,409	16,027	37,243	8,431	141,574
Public Administration	(346)	3,770	1,460	(4,071)	291	(340)	1,897	1,221	3,882
Total	16,053	33,672	94,484	15,219	84,986	41,617	116,896	42,979	445,906

Table 18e. Percent Change in Jobs by Industry for Bay Area Counties in 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Agriculture	70	79	164	-25	38	97	40	35	50
Construction	24	100	51	21	43	37	40	66	42
Manufacturing	7	6	16	-12	-1	-8	3	52	2
Transport/Comm.	3	40	79	-16	24	15	20	55	15
Wholesale Trade	75	26	83	-19	22	0	73	42	27
Retail Trade	33	39	30	20	23	15	17	47	24
FIRE	30	27	111	-8	31	27	16	55	20
Business/Repair Svs.	45	87	105	-1	31	19	34	103	30
Personal Services	26	48	74	23	36	74	48	69	43
Professional Services	25	23	49	26	24	47	34	39	32
Public Administration	-8	46	17	-13	1	-3	10	37	3
Total	25	34	51	3	20	19	19	50	21

Table 18f. Shift in Share of Jobs by Industry for Bay Area Counties in 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Agriculture	0.6	0.9	1.0	-0.3	0.1	0.6	0.2	-0.4	0.3
Construction	-0.1	2.5	0.0	0.8	0.9	0.7	0.7	0.7	0.8
Manufacturing	-1.3	-4.0	-3.8	-1.6	-3.3	-4.1	-5.4	0.3	-3.5
Transport/Comm.	-1.2	0.2	1.4	-2.3	0.4	-0.5	0.0	0.2	-0.4
Wholesale Trade	1.1	-0.2	0.7	-1.0	0.1	-1.1	1.6	-0.2	0.2
Retail Trade	1.3	0.7	-3.0	2.0	0.5	-0.5	-0.2	-0.3	0.4
FIRE	0.5	-0.3	3.2	-1.7	0.5	0.5	-0.1	0.3	0.0
Business/Repair Svs.	0.8	1.1	1.3	-0.3	0.5	0.0	0.7	1.1	0.4
Personal Services	0.0	0.4	0.5	1.0	0.4	1.6	0.6	0.6	0.7
Professional Services	0.0	-2.1	-0.3	4.5	0.9	3.7	2.3	-1.8	1.9
Public Administration	-1.8	0.7	-1.1	-1.1	-1.0	-0.8	-0.2	-0.3	-0.8
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table 19a. Jobs in Professionals Services by County in the Bay Area in 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Health Care	6,677	13,083	21,549	38,609	40,297	17,172	46,817	11,759	195,963
Legal Services	1,022	520	3,056	18,066	4,731	1,903	7,192	1,176	37,666
Schools	6,380	11,071	20,707	25,797	48,204	14,424	52,205	10,522	189,310
Social Services	2,539	3,448	8,016	13,217	13,914	6,207	15,231	3,963	66,535
Cultural Services	62	23	34	1,218	426	39	192	21	2,015
Business Svcs.	2,766	1,881	9,660	18,845	22,626	10,436	25,000	2,787	94,001
Total	19,446	30,026	63,022	115,752	130,198	50,181	146,637	30,228	585,490

Table 19b. Absolute Change in Jobs in Professional Services from 1980 to 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Health Care	1,251	1,820	5,543	4,455	5,778	4,267	10,793	2,411	36,317
Legal Services	566	155	2,144	8,855	1,949	809	3,818	766	19,061
Schools	361	948	4,154	2,587	2,467	2,249	2,638	2,040	17,444
Social Services	168	1,350	1,723	1,771	2,788	1,419	3,284	1,501	14,004
Cultural Services	62	23	34	215	152	(52)	55	21	510
Business Svcs.	1,489	1,379	7,198	6,214	12,275	7,335	16,655	1,693	54,238
Total	3,896	5,676	20,796	24,096	25,409	16,027	37,243	8,431	141,574

Table 19c. Share of Professional Service Jobs by Industry Sector by County in 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Health Care	34	44	34	33	31	34	32	39	33
Legal Services	5	2	5	16	4	4	5	4	6
Schools	33	37	33	22	37	29	36	35	32
Social Services	13	11	13	11	11	12	10	13	11
Cultural Services	0	0	0	1	0	0	0	0	0
Business Svcs.	14	6	15	16	17	21	17	9	16
Total	100	100	100	100	100	100	100	100	100

Table 19d. Share of Professional Service Jobs by Industry Sector by County in 1990

	Marin	Napa/ Solano	Contra Costa	San Francisco	Alameda	San Mateo	Santa Clara	Sonoma	Total
Health Care	3	7	11	20	21	9	24	6	100
Legal Services	3	1	8	48	13	5	19	3	100
Schools	3	6	11	14	25	8	28	6	100
Social Services	4	5	12	20	21	9	23	6	100
Cultural Services	3	1	2	60	21	2	10	1	100
Business Svcs.	3	2	10	20	24	11	27	3	100
Total	3	5	11	20	22	9	25	5	100

Table 19e. Shift in Share of Professional Service Jobs by Industry Sector from 1980 to 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Health Care	-1	-3	-4	-4	-2	-4	-1	-4	-2
Legal Services	2	0	3	6	1	1	2	2	2
Schools	-6	-5	-6	-3	-7	-7	-10	-4	-6
Social Services	-2	3	-2	-1	0	-2	-1	2	0
Cultural Services	0	0	0	0	0	0	0	0	0
Business Svcs.	6	4	9	2	7	12	9	4	7
Total	0	0	0	0	0	0	0	0	0

Table 19f. Percent Change in Professional Service Jobs by Industry Sector from 1980 to 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Health Care	23	16	35	13	17	33	30	26	23
Legal Services	124	43	235	96	70	74	113	187	102
Schools	6	9	25	11	5	18	5	24	10
Social Services	7	64	27	15	25	30	27	61	27
Cultural Services	0	0	0	21	56	-57	40	0	34
Business Svcs.	117	275	292	49	119	237	200	155	136
Total	25	23	49	26	24	47	34	39	32

Table 20a. Jobs by Industry and Occupation in the Bay Area in 1990

	Mgt.	Pro's	Tech.	Sales	Ad Sppt	Services	Agric.	Craft	Laborers	Total
Agriculture	3,212	2,628	1,136	569	2,437	649	22,088	1,704	3,193	37,616
Construction	18,570	8,240	2,674	1,842	9,506	1,206	446	75,126	28,164	145,774
Manufacturing	93,315	80,779	37,958	22,493	65,047	7,897	131	82,263	106,061	495,944
Transport/Comm.	31,507	13,841	10,080	6,791	72,577	8,689	122	31,041	44,235	218,883
Wholesale Trade	19,791	6,706	3,822	39,022	23,495	2,520	280	8,039	19,139	122,814
Retail Trade	37,676	9,781	3,672	159,232	41,669	91,574	443	24,530	40,654	409,231
FIRE	63,627	8,530	7,152	43,564	81,803	4,512	674	2,636	1,709	214,207
Business/Repair	27,254	15,813	9,173	9,492	28,181	24,597	130	18,315	14,214	147,169
Personal Services	14,943	9,257	797	7,475	11,851	51,717	2,565	3,342	7,288	109,235
Prof'l Services	84,769	245,708	49,546	5,913	112,235	67,966	1,759	8,424	9,170	585,490
Public Admin.	25,471	16,436	6,360	499	30,839	27,958	537	6,667	3,617	118,384
Total	420,135	417,719	132,370	296,892	479,640	289,285	29,175	262,087	277,444	2,604,747

Table 20b. Jobs by Occupation as Share of Jobs by Industry in the Bay Area in 1990

	Mgt.	Pro's	Tech.	Sales	Ad Sppt	Services	Agric.	Craft	Laborers	Total
Agriculture	9	7	3	2	6	2	59	5	8	100
Construction	13	6	2	1	7	1	0	52	19	100
Manufacturing	19	16	8	5	13	2	0	17	21	100
Transport/Comm.	14	6	5	3	33	4	0	14	20	100
Wholesale Trade	16	5	3	32	19	2	0	7	16	100
Retail Trade	9	2	1	39	10	22	0	6	10	100
FIRE	30	4	3	20	38	2	0	1	1	100
Business/Repair	19	11	6	6	19	17	0	12	10	100
Personal Services	14	8	1	7	11	47	2	3	7	100
Prof'l Services	14	42	8	1	19	12	0	1	2	100
Public Admin.	22	14	5	0	26	24	0	6	3	100
Total	16	16	5	11	18	11	1	10	11	100

Table 20c. Percent Change in Jobs by Occupation and Industry in the Bay Area from 1980 to 1990

	Mgt.	Pro's	Tech.	Sales	Ad Sppt	Services	Agric.	Craft	Laborers	Total
Agriculture	81	20	25	39	-19	42	72	7	71	50
Construction	113	67	7	84	0	120	40	33	50	42
Manufacturing	46	37	6	52	-20	-9	-4	-9	-19	2
Transport/Comm.	42	36	25	-16	10	-1	34	1	21	15
Wholesale Trade	6	227	127	91	-1	140	514	-12	-3	27
Retail Trade	29	58	210	29	16	20	-3	-1	23	24
FIRE	42	76	170	30	-3	5	-47	45	56	20
Business/Repair	26	39	36	67	-1	74	-5	17	49	30
Personal Services	96	37	-8	82	79	25	76	44	35	43
Prof'l Services	95	37	62	140	17	-11	33	2	31	32
Public Admin.	14	20	-2	-36	-10	12	-75	2	4	3
Total	48	39	36	38	2	13	44	6	3	21

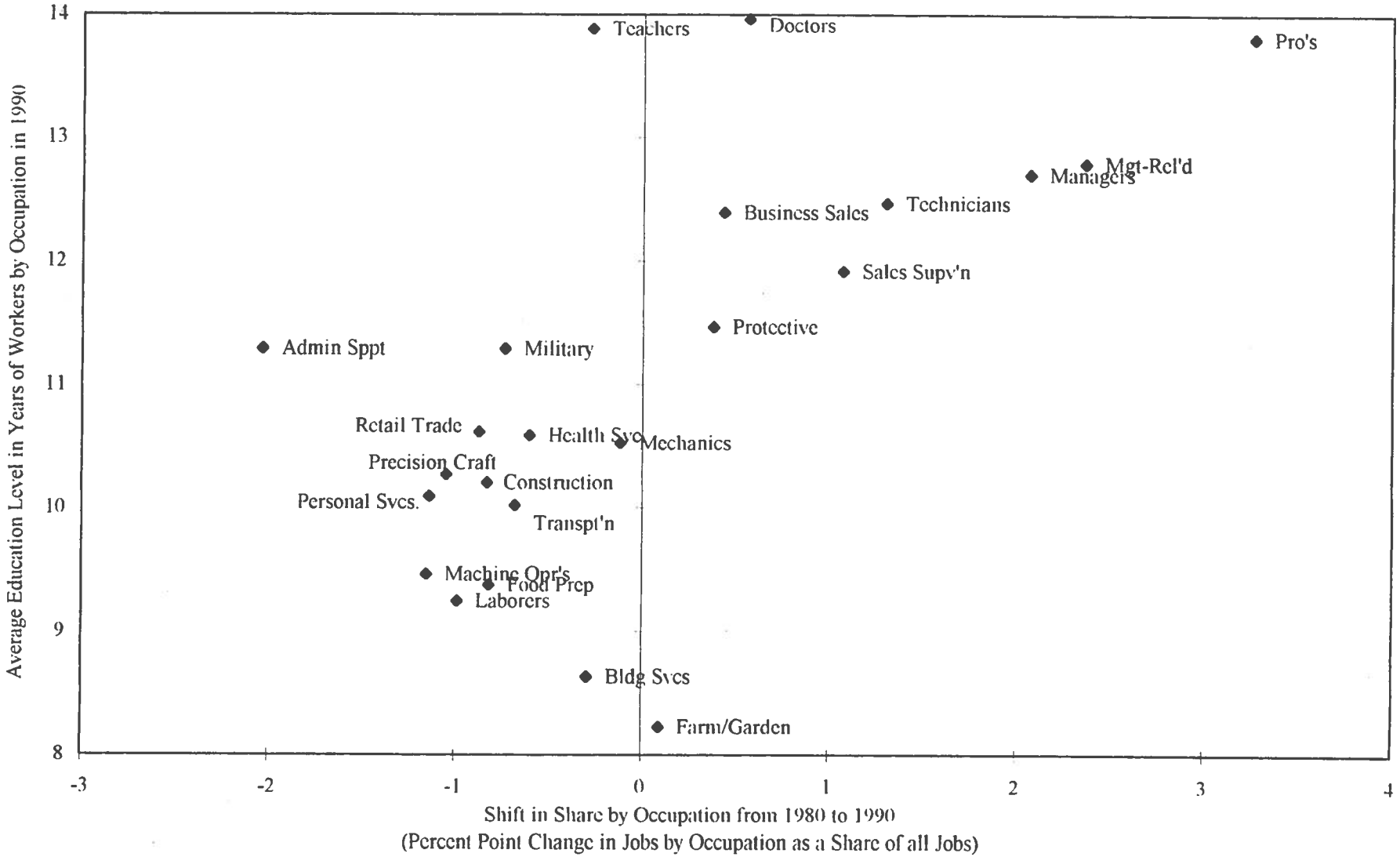
Table 20d. Shift in Share in Jobs by Occupation as Share of Jobs by Industry from 1980 to 1990

	Mgt.	Pro's	Tech.	Sales	Ad Sppt	Services	Agric.	Craft	Laborers	Total
Agriculture	1.4	-1.8	-0.6	-0.1	-5.5	-0.1	7.5	-1.8	1.0	0.0
Construction	4.3	0.9	-0.6	0.3	-2.7	0.3	0.0	-3.4	1.0	0.0
Manufacturing	5.7	4.1	0.3	1.5	-3.7	-0.2	0.0	-2.0	-5.7	0.0
Transport/Comm.	2.8	1.0	0.4	-1.2	-1.4	-0.6	0.0	-1.9	1.0	0.0
Wholesale Trade	-3.2	3.3	1.4	10.6	-5.5	1.0	0.2	-2.9	-4.8	0.0
Retail Trade	0.4	0.5	0.5	1.6	-0.7	-0.7	0.0	-1.5	-0.1	0.0
FIRE	4.5	1.3	1.9	1.5	-8.9	-0.3	-0.4	0.2	0.2	0.0
Business/Repair Svs.	-0.6	0.7	0.3	1.4	-5.9	4.2	0.0	-1.4	1.3	0.0
Personal Services	3.7	-0.4	-0.4	1.5	2.2	-6.7	0.4	0.0	-0.4	0.0
Prof'l Services	4.7	1.6	1.6	0.5	-2.4	-5.5	0.0	-0.4	0.0	0.0
Public Admin.	2.0	1.9	-0.3	-0.3	-3.8	1.9	-1.4	-0.1	0.0	0.0
Total	3.0	2.1	0.6	1.4	-3.3	-0.8	0.2	-1.4	-1.8	0.0

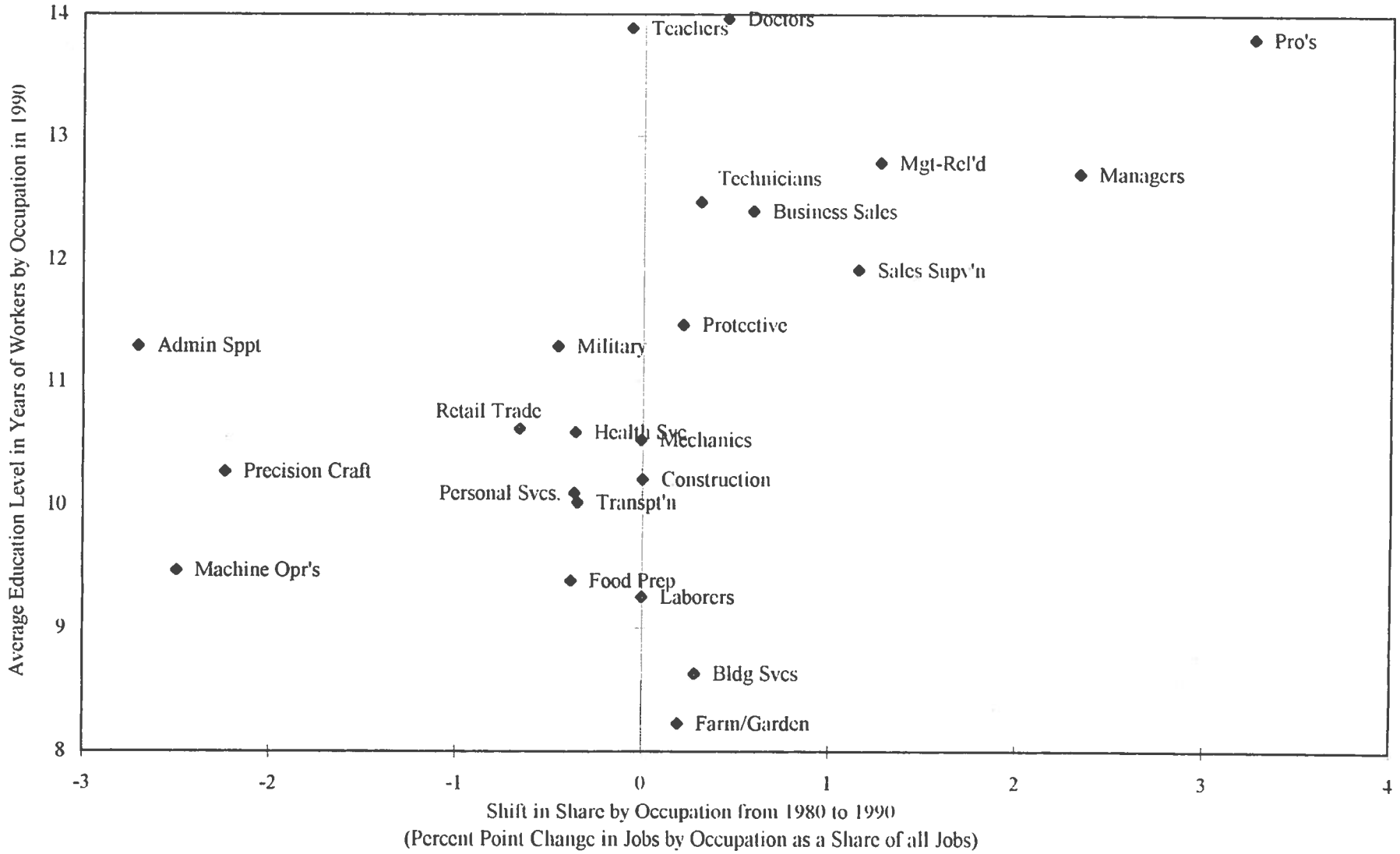
Table 20e. Shift in Share in Jobs by Industry as Share of Jobs by Occupation from 1980 to 1990

	Mgt.	Pro's	Tech.	Sales	Ad Sppt	Services	Agric.	Craft	Laborers	Total
Agriculture	0.1	-0.1	-0.1	0.0	-0.1	0.0	12.3	0.0	0.5	0.3
Construction	1.4	0.3	-0.6	0.2	0.0	0.2	-0.1	5.8	3.1	0.8
Manufacturing	-0.2	-0.3	-8.0	0.7	-3.8	-0.7	-0.2	-5.1	-10.8	-3.5
Transport/Comm.	-0.3	-0.1	-0.7	-1.5	1.1	-0.4	0.0	-0.5	2.3	-0.4
Wholesale Trade	-1.9	0.9	1.2	3.6	-0.2	0.5	0.7	-0.6	-0.4	0.2
Retail Trade	-1.3	0.3	1.6	-3.9	1.0	1.9	-0.7	-0.7	2.3	0.4
FIRE	-0.7	0.4	2.7	-0.9	-0.9	-0.1	-4.0	0.3	0.2	0.0
Business/Repair Svs.	-1.1	0.0	0.0	0.5	-0.2	3.0	-0.2	0.7	1.6	0.4
Personal Services	0.9	0.0	-0.3	0.6	1.1	1.8	1.6	0.3	0.6	0.7
Prof'l Services	4.9	-0.8	6.1	0.8	3.0	-6.2	-0.5	-0.1	0.7	1.9
Public Admin.	-1.8	-0.6	-1.9	-0.2	-0.9	0.0	-8.8	-0.1	0.0	-0.8
Total	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

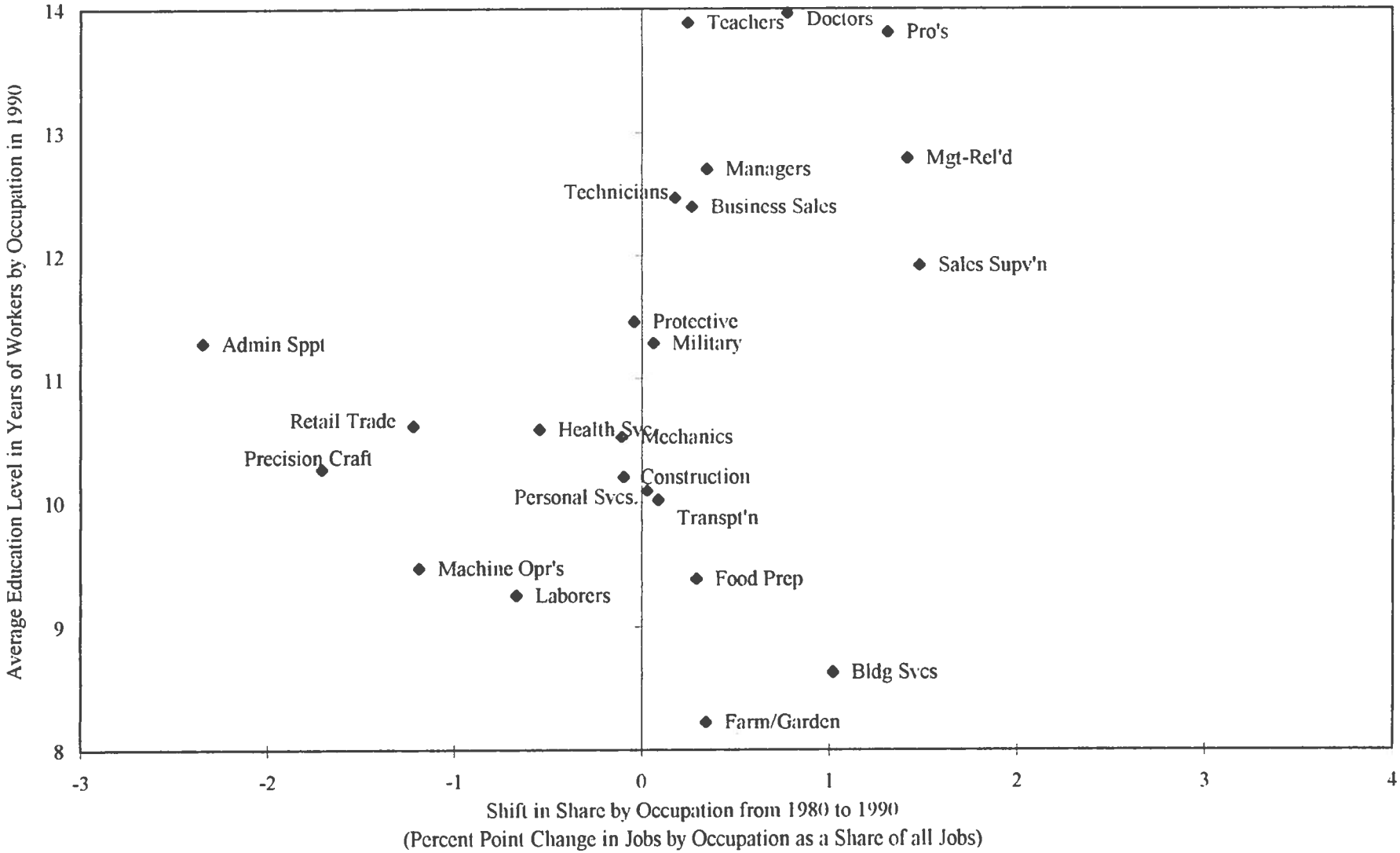
Graph 1. Contra Costa County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



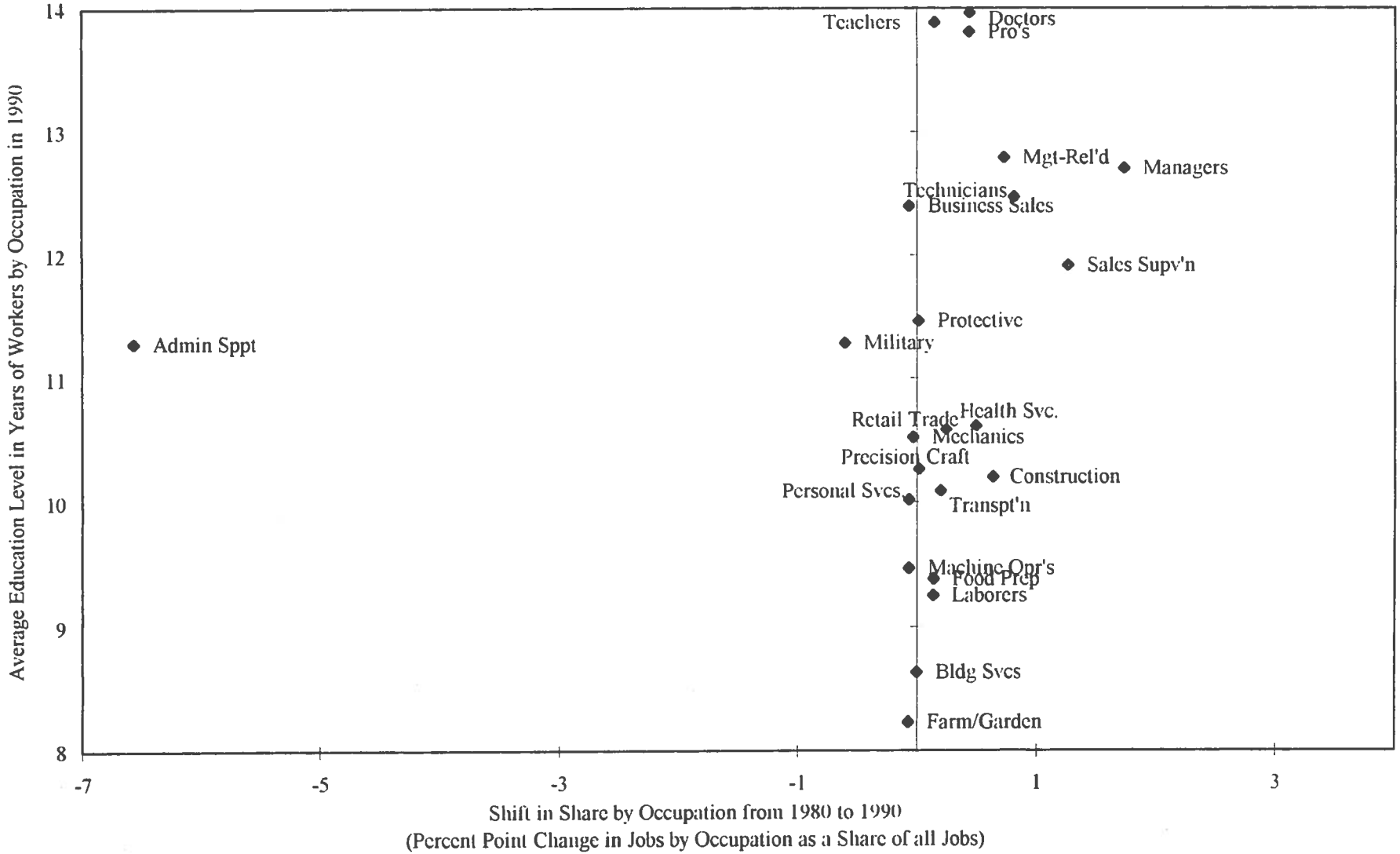
Graph 2. Santa Clara County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



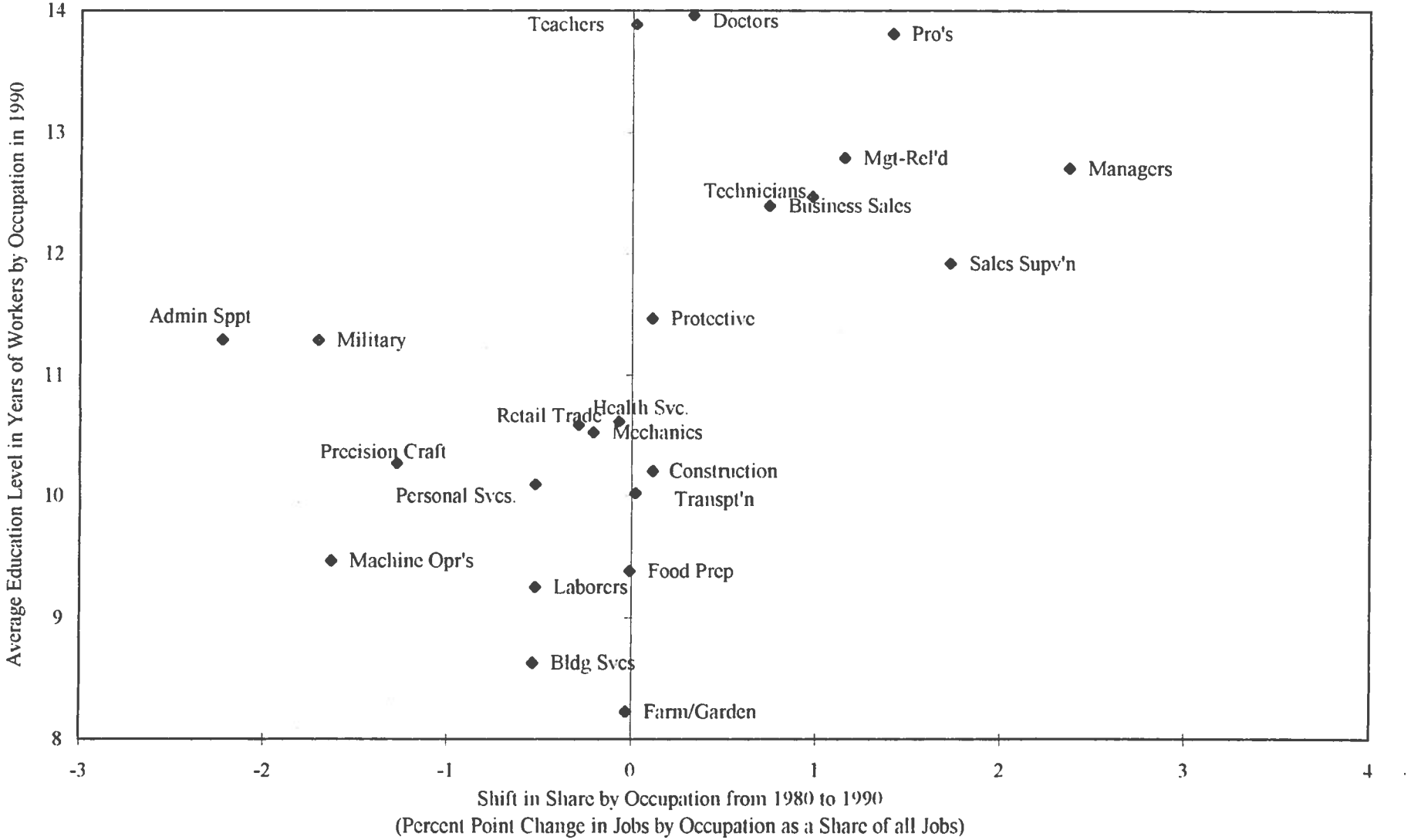
Graph 3. San Mateo County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



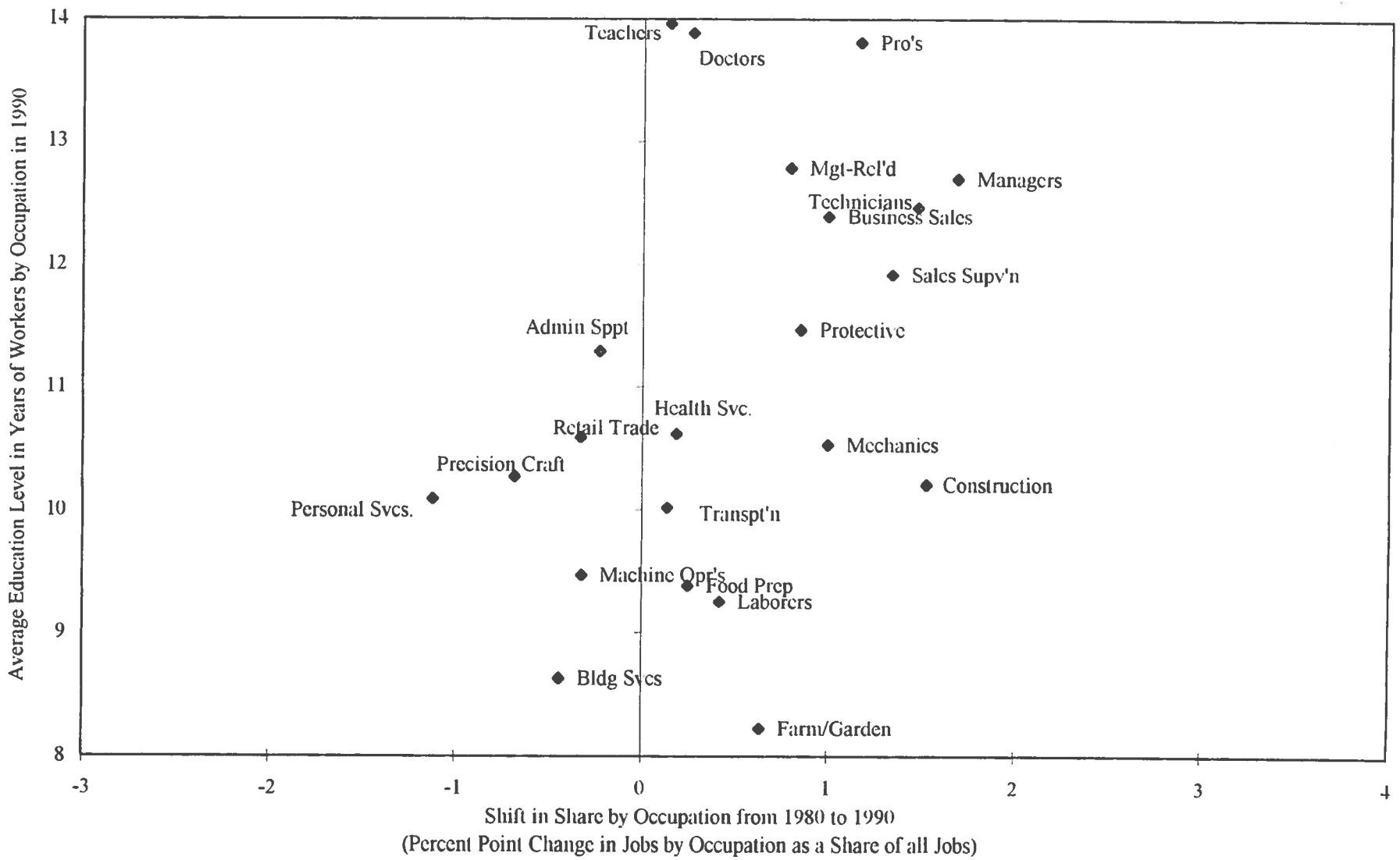
Graph 4. San Francisco County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



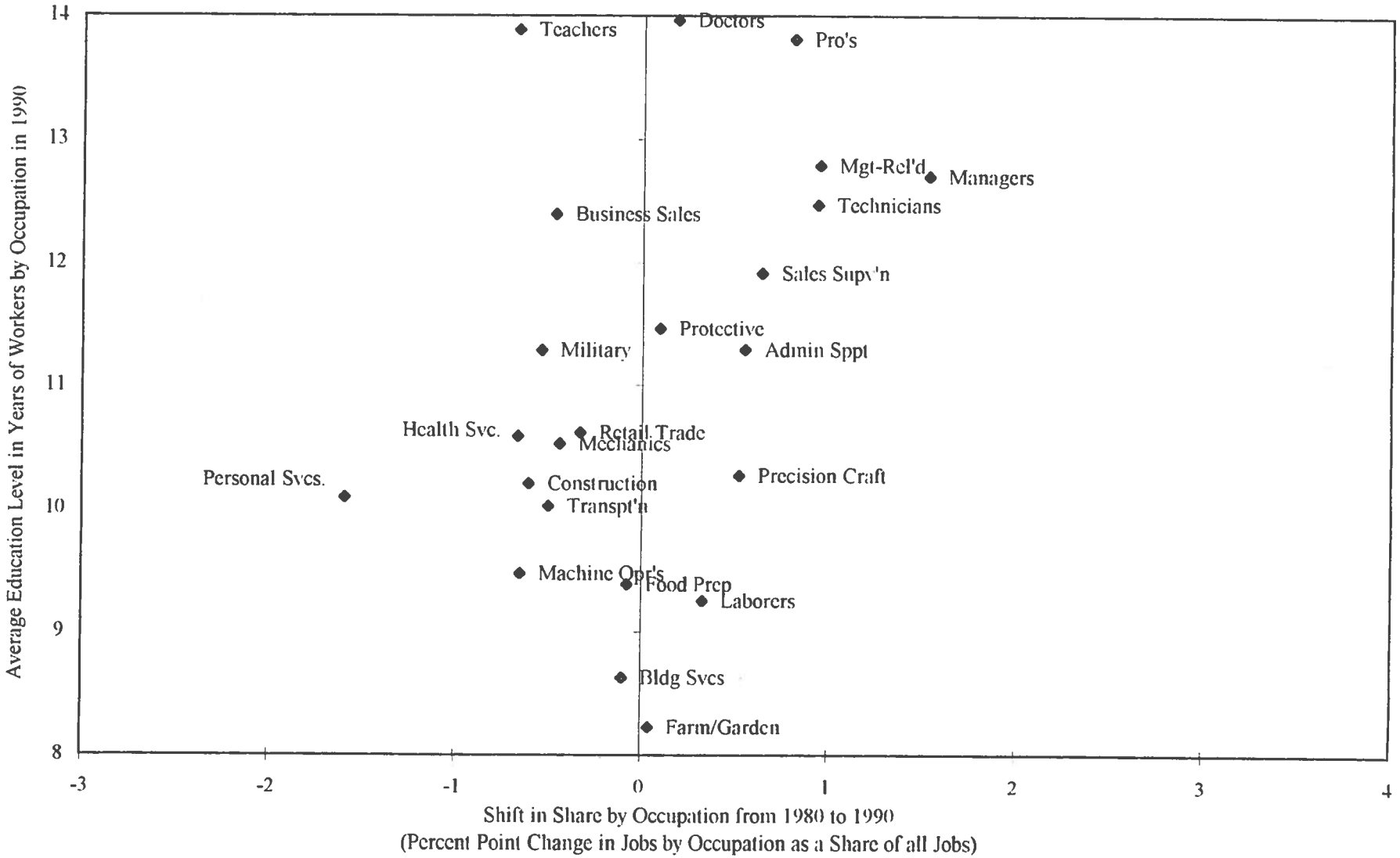
Graph 5. Alameda County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



Graph 6. Napa and Solano Counties:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



Graph 7. Sonoma County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation



Graph 8. Marin County:
Shift in Share by Occupation for from 1980 to 1990, by the Average Education Level of the Occupation

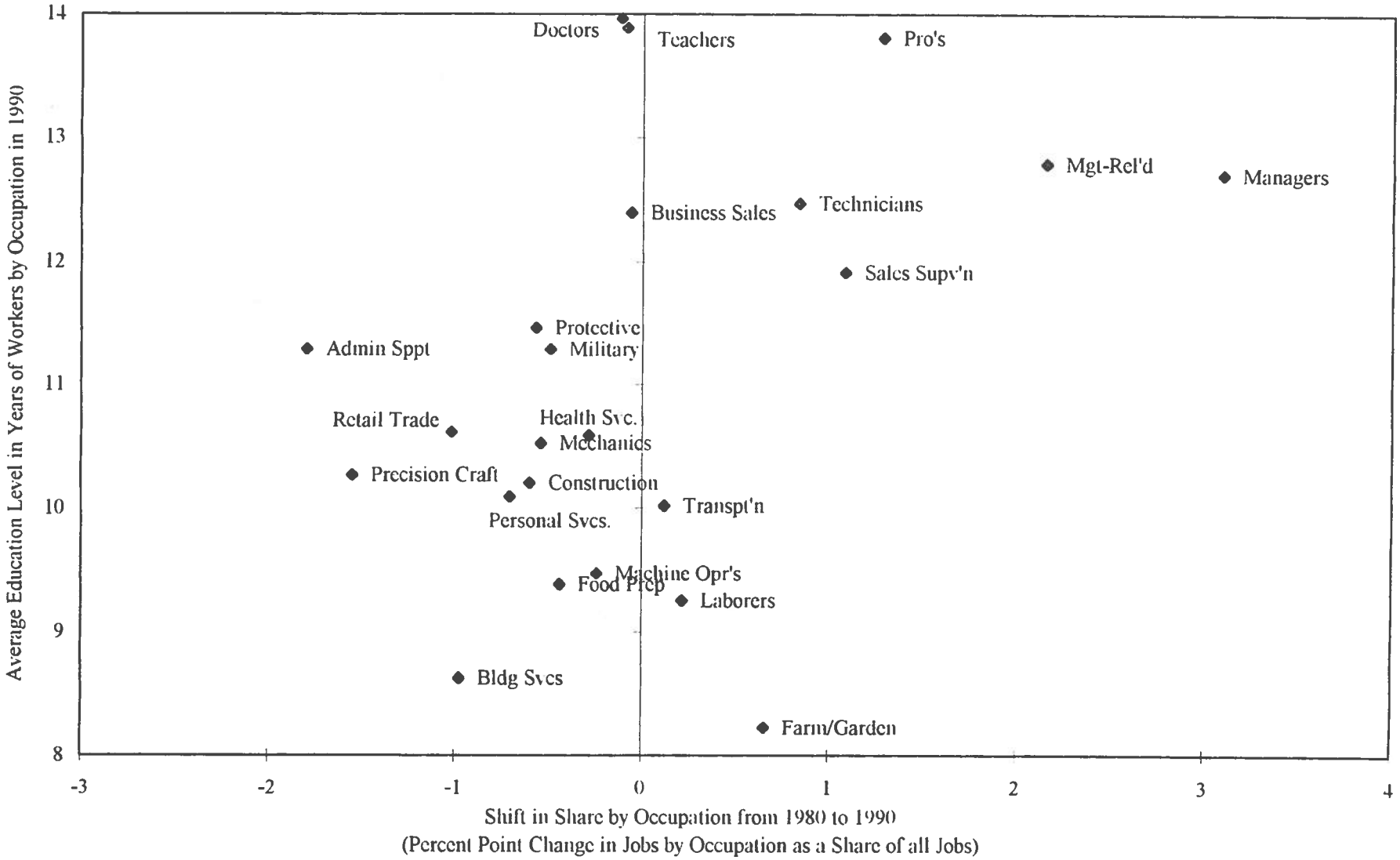


Table 21. Average Earnings and Wages by Education Level for Bay Area Counties

	Value in 1990					*Percent Change from 1980 to 1990 in Inflation-Adjusted Values*				
	Less than High School	High School	Some College	BA+	Total	Less than High School	High School	Some College	BA+	Total
Average Earnings (Annual Wage or Salary Income)										
Marin	$ 12,976	$ 21,546	$ 24,248	$ 36,788	$26,758	-14 %	9 %	12 %	26 %	19 %
Napa/Solano	14,345	19,768	23,432	35,345	23,424	-12	-5	9	12	6
Contra Costa	14,834	22,267	25,984	40,397	28,201	-18	3	16	16	17
San Francisco	16,947	22,557	26,946	42,132	31,373	-7	-8	11	15	11
Alameda	17,045	22,189	25,627	38,315	27,544	-13	-8	11	14	8
San Mateo	16,231	23,348	27,523	42,247	29,681	-10	-5	8	11	8
Santa Clara	16,362	22,784	27,631	45,684	31,681	-3	0	14	15	17
Sonoma	13,477	19,605	22,557	45,617	23,051	2	-3	14	13	11
Total	**15,863**	**22,340**	**26,469**	**41,657**	**29,250**	**-10**	**-2**	**13**	**13**	**12**
Average Hourly Wages										
Marin	$ 9.1	$ 13.2	$ 13.3	$ 18.5	$ 14.6	-30 %	9 %	2 %	17 %	8
Napa/Solano	9.2	11.4	12.8	18.3	13.0	-19	-6	-1	16	1
Contra Costa	10.0	12.4	13.9	20.5	15.1	-21	-4	4	12	7
San Francisco	10.3	12.8	14.3	20.3	16.1	-16	-9	3	11	5
Alameda	10.3	12.0	13.5	19.3	14.4	-23	-12	0	7	-1
San Mateo	10.6	12.5	14.4	20.8	15.4	-11	-9	1	8	3
Santa Clara	10.9	12.2	14.4	21.7	16.1	-3	-3	8	12	12
Sonoma	8.6	11.1	12.4	17.9	12.8	-4	-4	7	7	5
Total	**10.3**	**12.2**	**13.9**	**20.4**	**15.2**	**-14**	**-7**	**3**	**11**	**5**

Table 22. Percent Full-Time Workers (35 Hours or More per Week) in 1990 by Education Level, and Percent Point Change in Full-Time Workers from 1980 to 1990 by Education Level for Bay Area Counties

	Percent Full-time in 1990					*Percent Pt. Change from 1980 to 1990*				
County	Less than H.S.	High School	Some College	BA+	Total	Less than H.S.	High School	Some College	BA+	Total
Marin	61 %	77 %	74 %	80 %	75 %	6.5	-1.5	3.3	5.9	3.6
Napa/Solano	69	78	81	85	79	3.6	-6.2	0.0	-0.9	-1.3
Contra Costa	62	80	78	85	79	2.8	-1.0	5.2	1.4	3.5
San Francisco	78	84	83	88	85	3.6	-3.0	1.6	0.0	0.5
Alameda	73	83	81	84	81	1.2	-1.7	4.0	4.0	2.1
San Mateo	76	82	80	88	82	6.5	-2.7	4.0	3.2	2.6
Santa Clara	77	83	83	90	84	5.3	-3.9	3.7	1.3	2.2
Sonoma	66	75	75	80	75	7.4	-4.1	1.7	-3.8	0.0
Total	71	81	80	86	81	1.4	-3.9	2.5	0.7	0.7

Source: 1980 and 1990 US Census

Table 23a. Number of Full-time Workers (35 Hours a Week or More) who Made Less than the Basic Needs Self-Sufficiency Wage in 1990 by County

	Livable Wage	Less than High School	High School	Some College	BA+	Total
Marin	$ 5.90	1,200	1,606	1,852	1,188	5,846
Napa/Solano	$ 5.14	2,974	4,440	3,889	936	12,239
Contra Costa	$ 5.50	3,933	5,348	5,777	1,862	16,920
San Francisco	$ 6.05	13,334	10,401	10,440	7,417	41,592
Alameda	$ 5.16	8,243	11,540	9,458	4,501	33,742
San Mateo	$ 6.05	8,386	5,912	5,853	2,590	22,741
Santa Clara	$ 6.26	21,818	17,396	18,912	8,046	66,172
Sonoma	$ 5.16	3,104	2,834	3,173	708	9,819
Total	$ 5.65	62,992	59,477	59,354	27,248	209,071

Table 23b. Percent of Full-time Workers (35 Hours a Week or More) who Made Less than the Basic Needs Self-Sufficiency Wage in 1990 by County

	Less than High School	High School	Some College	BA+	Total
Marin	26 %	14 %	9 %	6 %	10 %
Napa/Solano	22	15	9	4	11
Contra Costa	21	11	7	3	8
San Francisco	33	17	9	4	11
Alameda	18	12	6	4	8
San Mateo	31	14	8	4	11
Santa Clara	30	16	9	4	11
Sonoma	27	13	8	3	10
Total	27	14	8	4	10

Table 24. Full-time Jobs that Pay Less than a Livable Wage by Occupation for the San Francisco Bay Area in 1990

(Livable wage = $5.65 an hour, based on average of Bay Area Counties' self-sufficiency wages as calculated by Wider Opportunities for Women, adjusted for inflation)

	Jobs with Less than Livable Wage	Percent by Occupation	Share of Non-livable Wage Jobs
Managers	11,986	4	4
Management Related Occs.	4,854	4	1
Total Management	**16,840**	**4**	**5**
Professionals exc. health	9,897	4	3
Medical Professionals	2,207	3	1
Teachers	10,201	9	3
Total Professionals	**22,305**	**5**	**7**
Total Technicians	**7,985**	**6**	**2**
Sales Supervisors	5,484	8	2
Business Sales	5,787	6	2
Retail and Service Sales	39,966	30	12
Total Sales	**51,237**	**17**	**16**
Total Admin. Support	**55,917**	**12**	**17**
Protective Services	5,129	11	2
Food Preparation	39,671	37	12
Health Service	8,187	24	3
Cleaning, Building Services	14,796	26	5
Personal Services	17,886	37	5
Total Services	**85,669**	**29**	**26**
Farm/Garden/Forestry/Fishing	**9,206**	**32**	**3**
Mechanics and Repairers	8,143	9	2
Construction Trades	7,957	9	2
Precision Trades	8,856	10	3
Total Precision, Craft, & Repair	**24,956**	**9**	**8**
Machine Operators	20,014	17	6
Transportation Occupations	11,237	14	3
Handlers, Laborers	18,163	22	6
Total Op's, Fabricators, Laborer	**49,414**	**18**	**15**
Military	**2,233**	**32**	**1**
TOTAL	**325,762**	**12**	**100**

Table 25. Within-Occupation and Between Occupation Components of Changes in Real Wages By Education Level and Occupation from 1980 to 1990

For Less than High School	Between Occupations	Within Occupation	Total
Managers	0.06	0.00	0.06
Management Related Occs.	0.01	0.00	0.01
Professionals exc. health	0.01	0.00	0.01
Medical Professionals	0.00	0.00	-0.01
Teachers	-0.01	0.00	-0.01
Technicians	0.01	-0.02	-0.01
Sales Supervisors	0.03	-0.04	-0.01
Business Sales	0.01	-0.01	0.01
Retail and Service Sales	-0.02	-0.06	-0.08
Admin. Support	-0.04	-0.03	-0.06
Protective Services	0.01	0.00	0.01
Food Preparation	0.05	-0.20	-0.15
Health Service	0.01	0.01	0.01
Cleaning, Building Services	0.10	-0.06	0.04
Personal Services	-0.02	-0.09	-0.11
Farm/Garden/Forestry/Fishing	0.16	-0.01	0.15
Mechanics and Repairers	-0.05	-0.02	-0.07
Construction Trades	0.09	-0.21	-0.13
Precision Trades	-0.12	-0.10	-0.23
Machine Operators	-0.23	-0.18	-0.41
Transportation Occupations	-0.10	-0.20	-0.30
Handlers, Laborers	0.08	-0.17	-0.09
Military	-0.03	0.00	-0.04
Total	**-0.01**	**-1.39**	**-1.40**
For High School Graduates			
Managers	-0.01	0.06	0.05
Management Related Occs.	0.04	-0.02	0.02
Professionals exc. health	-0.02	-0.06	-0.08
Medical Professionals	-0.01	0.00	-0.01
Teachers	0.04	-0.01	0.04
Technicians	0.00	-0.05	-0.05
Sales Supervisors	0.16	-0.02	0.14
Business Sales	0.02	0.00	0.02
Retail and Service Sales	0.10	-0.11	-0.02
Admin. Support	-0.36	-0.02	-0.38
Protective Services	0.05	-0.01	0.04
Food Preparation	0.07	-0.05	0.02
Health Service	-0.02	0.01	-0.01
Cleaning, Building Services	0.06	-0.03	0.03
Personal Services	-0.01	-0.01	-0.02
Farm/Garden/Forestry/Fishing	0.02	-0.03	0.00
Mechanics and Repairers	0.00	-0.05	-0.05
Construction Trades	0.18	-0.15	0.03
Precision Trades	-0.16	-0.07	-0.23
Machine Operators	-0.07	-0.05	-0.13
Transportation Occupations	0.12	-0.13	-0.01
Handlers, Laborers	0.07	-0.09	-0.02
Military	-0.11	-0.01	-0.11
Total	**0.15**	**-0.89**	**-0.74**

Table 25. continued

	Between Occupations	Within Occupation	Total
For Some College			
Managers	0.19	0.05	0.24
Management Related Occs.	0.11	0.03	0.15
Professionals exc. health	0.00	0.06	0.06
Medical Professionals	-0.01	0.07	0.06
Teachers	0.02	-0.04	-0.02
Technicians	0.02	0.01	0.03
Sales Supervisors	0.17	0.00	0.17
Business Sales	-0.01	0.02	0.00
Retail and Service Sales	-0.03	-0.03	-0.06
Admin. Support	-0.20	0.07	-0.13
Protective Services	0.01	0.01	0.01
Food Preparation	-0.01	0.02	0.01
Health Service	-0.03	-0.01	-0.05
Cleaning, Building Services	0.00	-0.02	-0.02
Personal Services	-0.03	-0.02	-0.05
Farm/Garden/Forestry/Fishing	-0.01	0.00	-0.01
Mechanics and Repairers	0.12	-0.02	0.10
Construction Trades	0.07	0.00	0.07
Precision Trades	-0.05	0.00	-0.06
Machine Operators	-0.05	0.01	-0.04
Transportation Occupations	0.03	-0.06	-0.03
Handlers, Laborers	0.00	-0.01	-0.01
Military	-0.08	-0.01	-0.09
Total	**0.21**	**0.12**	**0.33**
For BA or Higher			
Managers	0.34	0.39	0.73
Management Related Occs.	0.15	0.10	0.25
Professionals exc. health	0.29	0.42	0.71
Medical Professionals	0.05	0.20	0.25
Teachers	-0.45	-0.12	-0.57
Technicians	0.15	-0.08	0.07
Sales Supervisors	0.25	0.08	0.33
Business Sales	0.07	0.22	0.28
Retail and Service Sales	-0.01	0.01	-0.01
Admin. Support	-0.26	0.05	-0.21
Protective Services	-0.02	0.02	0.01
Food Preparation	0.00	0.01	0.01
Health Service	-0.01	0.00	-0.01
Cleaning, Building Services	-0.01	-0.02	-0.03
Personal Services	-0.02	-0.01	-0.03
Farm/Garden/Forestry/Fishing	-0.01	0.01	0.00
Mechanics and Repairers	0.01	0.01	0.01
Construction Trades	0.00	-0.02	-0.02
Precision Trades	-0.11	-0.04	-0.14
Machine Operators	0.00	0.01	0.01
Transportation Occupations	0.00	0.00	0.00
Handlers, Laborers	0.00	0.00	0.00
Military	-0.09	0.00	-0.09
Total	**0.31**	**1.25**	**1.56**

Table 26a: For Sales Workers with Education at High School Level or Below:
Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.00	0.00	0.00
Construction	-0.03	-0.04	-0.07
Manufacturing	0.01	0.01	0.02
Transportation/Communication	-0.07	0.04	-0.03
Wholesale Trade	0.25	-0.17	0.08
Retail Trade	0.01	-0.84	-0.82
FIRE	-0.25	0.08	-0.17
Business and Repair Services	-0.06	0.01	-0.04
Personal Services	0.09	-0.02	0.07
Professional Services	-0.01	-0.01	-0.02
Public Administration	-0.02	0.00	-0.02
Total	-0.08	-0.93	-1.01

Table 26b: For Clerical Workers with Education at High School Level or Below:
Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	-0.02	0.00	-0.03
Construction	0.00	0.00	0.00
Manufacturing	-0.32	0.02	-0.30
Transportation/Communication	0.01	-0.18	-0.17
Wholesale Trade	0.00	-0.05	-0.05
Retail Trade	0.13	-0.05	0.08
FIRE	-0.08	0.09	0.01
Business and Repair Services	0.02	0.02	0.04
Personal Services	0.08	0.02	0.10
Professional Services	0.20	-0.03	0.17
Public Administration	-0.07	0.09	0.02
Total	-0.05	-0.07	-0.13

Table 26c: For Service Workers with Education at High School Level or Below:
Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.00	-0.01	-0.02
Construction	0.02	0.01	0.03
Manufacturing	-0.12	-0.09	-0.21
Transportation/Communication	-0.03	-0.05	-0.08
Wholesale Trade	0.07	-0.05	0.01
Retail Trade	0.16	-0.51	-0.35
FIRE	0.02	-0.11	-0.09
Business and Repair Services	0.36	0.07	0.43
Personal Services	0.06	-0.04	0.03
Professional Services	-0.50	-0.09	-0.59
Public Administration	-0.11	-0.02	-0.14
Total	-0.08	-0.90	-0.98

Table 26d: For Craft and Repair Workers with Education at High School Level or Below:
Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.03	-0.02	0.01
Construction	1.22	-1.00	0.22
Manufacturing	-0.66	-0.27	-0.93
Transportation/Communication	-0.39	-0.18	-0.57
Wholesale Trade	-0.11	-0.05	-0.15
Retail Trade	0.00	-0.10	-0.10
FIRE	0.03	0.00	0.03
Business and Repair Services	0.09	0.03	0.12
Personal Services	0.03	-0.01	0.02
Professional Services	-0.06	0.09	0.03
Public Administration	-0.06	0.03	-0.03
Total	0.12	-1.47	-1.35

Table 26e: For Laborers with Education at High School Level or Below:
Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.07	-0.03	0.04
Construction	0.47	-0.29	0.18
Manufacturing	-1.05	-0.55	-1.60
Transportation/Communication	0.17	-0.43	-0.26
Wholesale Trade	-0.07	-0.16	-0.23
Retail Trade	0.28	-0.28	0.00
FIRE	0.02	-0.02	0.00
Business and Repair Services	0.15	-0.11	0.03
Personal Services	0.05	0.00	0.05
Professional Services	0.05	0.02	0.07
Public Administration	-0.02	-0.01	-0.03
Total	0.12	-1.86	-1.74

Table 26f: For Management Employees with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.01	0.00	0.01
Construction	0.28	0.01	0.30
Manufacturing	-0.30	-0.03	-0.32
Transportation/Communication	-0.11	-0.05	-0.15
Wholesale Trade	-0.24	0.01	-0.24
Retail Trade	-0.15	-0.01	-0.16
FIRE	0.00	0.26	0.26
Business and Repair Services	-0.08	0.27	0.20
Personal Services	0.14	0.05	0.19
Professional Services	0.56	0.30	0.86
Public Administration	-0.28	-0.07	-0.35
Total	-0.16	0.75	0.59

Table 26g: For Professional Workers with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.01	0.02	0.03
Construction	-0.02	0.01	0.00
Manufacturing	-0.73	0.41	-0.31
Transportation/Communication	0.09	0.09	0.18
Wholesale Trade	0.16	0.02	0.18
Retail Trade	0.04	0.03	0.07
FIRE	0.12	-0.01	0.11
Business and Repair Services	0.04	0.14	0.18
Personal Services	0.09	0.07	0.16
Professional Services	0.16	0.24	0.40
Public Administration	-0.12	0.10	-0.03
Total	-0.15	1.12	0.96

Table 26h: For Technical Workers with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	-0.01	0.01	0.00
Construction	-0.14	0.06	-0.08
Manufacturing	-0.92	0.44	-0.49
Transportation/Communication	0.06	-0.32	-0.27
Wholesale Trade	0.13	0.05	0.18
Retail Trade	0.18	-0.09	0.09
FIRE	0.30	0.05	0.35
Business and Repair Services	0.02	0.02	0.04
Personal Services	-0.03	0.01	-0.02
Professional Services	0.86	-0.03	0.82
Public Administration	-0.43	0.02	-0.41
Total	0.02	0.20	0.22

Table 26i: For Clerical Workers with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.00	-0.01	-0.01
Construction	0.00	-0.04	-0.03
Manufacturing	-0.37	0.14	-0.23
Transportation/Communication	0.13	-0.05	0.07
Wholesale Trade	0.01	0.00	0.01
Retail Trade	0.12	-0.06	0.07
FIRE	-0.10	0.09	-0.01
Business and Repair Services	-0.05	0.03	-0.02
Personal Services	0.06	0.01	0.07
Professional Services	0.19	0.20	0.40
Public Administration	-0.03	0.00	-0.03
Total	-0.04	0.33	0.29

Table 26j: For Craft and Repair Workers with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	-0.05	-0.01	-0.06
Construction	0.56	-0.16	0.40
Manufacturing	-0.53	0.07	-0.46
Transportation/Communication	0.13	-0.02	0.11
Wholesale Trade	-0.03	0.02	-0.01
Retail Trade	-0.10	0.09	-0.02
FIRE	0.00	0.04	0.04
Business and Repair Services	0.10	0.01	0.11
Personal Services	0.03	0.07	0.10
Professional Services	0.00	0.05	0.05
Public Administration	-0.04	-0.12	-0.16
Total	0.07	0.02	0.09

Table 26k: For Laborers with Some College Education

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.02	-0.01	0.01
Construction	0.36	-0.03	0.33
Manufacturing	-1.02	-0.03	-1.05
Transportation/Communication	0.42	-0.27	0.15
Wholesale Trade	0.06	-0.10	-0.04
Retail Trade	0.05	-0.16	-0.12
FIRE	0.03	0.05	0.08
Business and Repair Services	0.16	0.02	0.17
Personal Services	0.03	0.00	0.03
Professional Services	0.00	-0.05	-0.05
Public Administration	0.02	-0.01	0.01
Total	0.12	-0.59	-0.47

Table 26l: For Management with BA or Higher

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.03	0.00	0.03
Construction	0.20	0.02	0.22
Manufacturing	0.02	0.86	0.88
Transportation/Communication	-0.01	0.07	0.07
Wholesale Trade	-0.23	0.17	-0.07
Retail Trade	-0.06	0.21	0.15
FIRE	-0.01	0.38	0.38
Business and Repair Services	-0.29	0.10	-0.19
Personal Services	0.14	-0.60	-0.46
Professional Services	0.63	0.69	1.33
Public Administration	-0.36	0.04	-0.32
Total	0.07	1.94	2.01

Table 26m: For Professionals with BA or Higher

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	-0.02	0.02	-0.01
Construction	0.09	0.05	0.14
Manufacturing	0.28	0.23	0.51
Transportation/Communication	0.02	0.08	0.10
Wholesale Trade	0.17	0.04	0.21
Retail Trade	0.05	0.03	0.09
FIRE	0.08	0.06	0.14
Business and Repair Services	-0.02	0.12	0.09
Personal Services	-0.01	0.01	0.00
Professional Services	-0.50	0.87	0.37
Public Administration	-0.10	0.04	-0.06
Total	0.03	1.55	1.58

Table 26n: For Technicians with BA or Higher

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	-0.05	0.07	0.01
Construction	0.11	-0.02	0.08
Manufacturing	-0.49	0.36	-0.13
Transportation/Communication	-0.29	-0.90	-1.19
Wholesale Trade	0.14	0.01	0.15
Retail Trade	0.24	0.03	0.27
FIRE	0.43	-0.13	0.30
Business and Repair Services	-0.15	0.25	0.11
Personal Services	0.03	-0.02	0.01
Professional Services	-0.14	-0.81	-0.95
Public Administration	0.05	-0.05	0.01
Total	-0.12	-1.21	-1.33

Table 26n: For Sales Workers withBA or Higher

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.00	0.01	0.01
Construction	0.05	-0.02	0.03
Manufacturing	-0.20	0.58	0.38
Transportation/Communication	-0.37	0.16	-0.21
Wholesale Trade	0.97	0.10	1.06
Retail Trade	-0.12	0.53	0.41
FIRE	-0.62	1.50	0.88
Business and Repair Services	0.13	0.24	0.37
Personal Services	0.01	0.05	0.06
Professional Services	0.23	0.11	0.34
Public Administration	-0.02	0.00	-0.02
Total	0.06	3.26	3.32

Table 26o: For Clerical Workers with BA or Higher

Between-Industry and Within-Industry Contributions to Overall Wage Shift from 1980 to 1990

	Between	Within	Total
Agriculture	0.00	0.03	0.03
Construction	-0.01	0.01	0.00
Manufacturing	-0.38	0.11	-0.27
Transportation/Communication	0.28	0.02	0.31
Wholesale Trade	-0.06	0.01	-0.05
Retail Trade	0.03	0.06	0.10
FIRE	0.04	0.28	0.33
Business and Repair Services	-0.04	-0.04	-0.09
Personal Services	0.09	0.01	0.10
Professional Services	0.28	0.14	0.42
Public Administration	-0.39	-0.04	-0.43
Total	-0.14	0.59	0.45

Table 27. Within-County and Between-County Components of Shifts in Real Wages from 1980 to 1990 for Designated Workers by Occupation and Education Level

Service Workers

	High School or Less		
	Between	Within	Total
Marin	-0.1	0.0	-0.1
Napa/Solano	0.0	-0.1	-0.1
Contra Costa	0.0	-0.1	-0.1
San Francisco	-0.1	-0.3	-0.3
Alameda	-0.1	-0.3	-0.5
San Mateo	0.2	0.1	0.2
Santa Clara	0.1	-0.2	-0.2
Sonoma	0.0	0.0	0.0
Total	0.0	-1.0	-1.0

Sales Workers

	High School or Less			Some College			BA+		
	Between	Within	Total	Between	Within	Total	Between	Within	Total
Marin	-0.1	-0.1	-0.1	-0.1	-0.2	-0.2	-0.1	0.1	0.1
Napa/Solano	0.1	-0.2	-0.1	0.2	-0.1	0.1	0.1	0.0	0.1
Contra Costa	0.1	-0.2	-0.1	0.2	-0.1	0.1	0.5	0.8	1.3
San Francisco	-0.2	-0.4	-0.6	-0.3	-0.1	-0.4	-1.0	1.3	0.3
Alameda	0.2	-0.1	0.1	0.2	0.2	0.4	0.3	0.2	0.5
San Mateo	-0.1	0.0	-0.1	-0.2	0.0	-0.2	-0.1	0.5	0.5
Santa Clara	0.0	0.0	0.0	-0.2	0.4	0.2	0.0	0.3	0.3
Sonoma	0.1	-0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.3
Total	0.0	-1.0	-1.0	-0.1	0.2	0.2	0.0	3.4	3.3

Administrative Support

	High School or Less			Some College			BA+		
	Between	Within	Total	Between	Within	Total	Between	Within	Total
Marin	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0	0.2
Napa/Solano	0.1	0.0	0.1	0.1	0.0	0.1	0.0	0.1	0.1
Contra Costa	0.2	0.1	0.2	0.3	0.1	0.3	0.4	0.1	0.5
San Francisco	-0.4	-0.1	-0.5	-0.8	0.1	-0.7	-0.9	0.1	-0.8
Alameda	0.1	-0.2	-0.1	0.1	0.0	0.1	0.1	0.2	0.3
San Mateo	0.0	0.0	0.0	0.1	0.0	0.1	0.2	-0.2	0.0
Santa Clara	0.0	0.1	0.1	0.0	0.1	0.1	-0.1	0.0	0.0
Sonoma	0.1	0.0	0.1	0.2	0.0	0.2	0.2	0.0	0.2
Total	0.0	-0.1	-0.2	-0.1	0.3	0.3	-0.1	0.5	0.4

Precision Craft and Repair

	High School or Less			Some College		
	Between	Within	Total	Between	Within	Total
Marin	0.0	0.0	0.0	-0.1	0.0	0.0
Napa/Solano	0.2	-0.2	0.1	0.2	-0.1	0.1
Contra Costa	0.2	-0.1	0.1	0.3	0.0	0.3
San Francisco	0.1	-0.3	-0.2	0.0	0.1	0.1
Alameda	-0.2	-0.5	-0.7	0.1	-0.3	-0.1
San Mateo	-0.2	-0.2	-0.5	0.0	-0.1	-0.1
Santa Clara	-0.2	-0.2	-0.4	-0.8	0.2	-0.6
Sonoma	0.1	-0.1	0.0	0.2	0.0	0.2
Total	0.0	-1.5	-1.6	0.0	-0.2	-0.2

Operators, Laborers, Fabricators

	High School or Less		
	Between	Within	Total
Marin	0.0	0.0	0.0
Napa/Solano	0.1	-0.1	0.0
Contra Costa	0.1	-0.2	-0.1
San Francisco	0.0	-0.3	-0.3
Alameda	-0.1	-0.8	-0.9
San Mateo	0.1	-0.2	-0.1
Santa Clara	-0.3	-0.1	-0.5
Sonoma	0.1	0.0	0.1
Total	0.0	-1.8	-1.8

Management	Some College			BA+		
	Between	Within	Total	Between	Within	Total
	0.1	0.1	0.1	0.1	0.1	0.2
Marin	0.0	0.1	0.2	0.1	0.1	0.1
Napa/Solano	0.5	0.0	0.5	0.6	0.2	0.7
Contra Costa	-0.6	-0.1	-0.7	-1.5	0.2	-1.2
San Francisco	0.2	0.1	0.3	0.3	0.1	0.4
Alameda	-0.2	0.0	-0.2	0.0	0.4	0.4
San Mateo	-0.2	0.3	0.1	0.4	1.0	1.4
Santa Clara	0.2	0.0	0.2	0.1	-0.1	0.0
Sonoma	-0.1	0.6	0.5	0.0	2.0	2.0
Total						

Professionals	Some College			BA+		
	Between	Within	Total	Between	Within	Total
Marin	0.0	0.1	0.1	0.0	0.0	0.0
Napa/Solano	0.1	0.0	0.1	0.0	0.1	0.1
Contra Costa	0.4	0.2	0.6	0.5	0.0	0.5
San Francisco	-0.5	0.2	-0.3	-0.9	0.4	-0.5
Alameda	0.1	0.1	0.2	-0.2	0.2	0.1
San Mateo	0.1	0.1	0.2	0.1	0.2	0.2
Santa Clara	-0.7	0.2	-0.4	0.6	0.6	1.1
Sonoma	0.3	0.1	0.4	0.0	0.1	0.0
Total	-0.1	1.0	0.9	0.0	1.6	1.6

Table 28. Average Wages by Occupation in 1990 for Bay Area Counties

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	20.0	19.0	21.0	21.6	20.1	22.1	23.9	16.8	21.6
Management Related Occs.	17.9	14.7	16.4	18.3	15.6	16.8	16.9	15.3	16.9
Total Management	**19.4**	**17.9**	**19.5**	**20.4**	**18.8**	**20.5**	**21.9**	**16.4**	**20.2**
Professionals exc. health	17.6	17.8	19.1	22.5	19.7	20.3	21.6	17.7	20.8
Medical Professionals	22.8	22.2	26.5	22.8	24.7	29.2	25.9	22.8	24.9
Teachers	15.2	14.9	15.6	17.6	16.2	14.9	16.4	15.1	16.0
Total Professionals	**17.8**	**17.7**	**19.3**	**21.6**	**19.4**	**20.6**	**21.1**	**17.8**	**20.2**
Total Technicians	**16.3**	**15.9**	**16.1**	**16.1**	**15.0**	**17.9**	**17.0**	**14.9**	**16.3**
Sales Supervisors	18.4	14.1	16.8	18.9	16.8	17.7	16.4	15.6	17.0
Business Sales	19.7	16.2	23.9	22.7	18.6	21.8	20.1	18.2	20.7
Retail and Service Sales	10.2	9.3	9.9	10.9	10.1	10.2	10.0	9.2	10.1
Total Sales	**15.1**	**12.0**	**15.6**	**17.2**	**14.3**	**15.8**	**14.8**	**12.8**	**15.1**
Total Admin. Support	**10.9**	**10.1**	**11.6**	**12.3**	**11.4**	**12.0**	**11.5**	**10.3**	**11.6**
Protective Services	19.0	14.8	13.1	14.5	14.4	15.5	14.5	16.3	14.7
Food Preparation	8.5	7.2	7.6	9.4	8.0	8.2	8.3	7.2	8.3
Health Service	13.4	8.8	9.6	11.0	10.3	10.6	9.8	9.1	10.2
Cleaning, Building Services	10.8	10.0	9.3	10.6	10.1	14.9	9.4	8.2	10.5
Personal Services	8.4	7.5	8.5	9.7	8.0	11.3	8.8	8.7	9.1
Total Services	**11.1**	**9.3**	**9.2**	**10.6**	**9.8**	**11.4**	**9.9**	**8.8**	**10.1**
Farm/Garden/Forestry/Fishing	**9.8**	**9.0**	**9.1**	**10.1**	**8.6**	**9.0**	**10.7**	**10.3**	**9.6**
Mechanics and Repairers	15.7	11.4	15.3	15.8	14.5	16.7	16.5	12.8	15.2
Construction Trades	15.7	15.0	16.5	17.4	16.4	15.9	16.5	15.2	16.3
Precision Trades	12.7	15.7	15.7	13.7	14.8	14.4	14.4	12.6	14.5
Total Precision, Craft, & Repair	**15.2**	**13.8**	**16.0**	**15.8**	**15.2**	**15.8**	**15.5**	**13.6**	**15.3**
Machine Operators	10.6	12.3	13.2	10.4	11.3	11.8	11.9	11.8	11.6
Transportation Occupations	12.8	13.2	13.3	14.0	13.1	12.5	13.2	11.6	13.2
Handlers, Laborers	11.0	10.0	12.3	12.6	11.2	10.6	10.8	10.2	11.2
Total Op's, Fabricators, Laborers	**11.4**	**11.9**	**12.9**	**12.1**	**11.9**	**11.6**	**11.9**	**11.2**	**11.9**
Military	**12.4**	**8.5**	**5.9**	**9.9**	**8.3**	**9.1**	**9.5**	**6.5**	**8.7**
TOTAL	**14.6**	**13.0**	**15.1**	**16.1**	**14.4**	**15.4**	**16.1**	**12.8**	**15.2**

Table 29. Percent Change in Real Average Wages by Occupation from 1980 to 1990

	Marin	*Napa/ Solano*	*Contra Costa*	*San Francisco*	*Alameda*	*San Mateo*	*Santa Clara*	*Sonoma*	*Total*
Managers	34	25	16	1	9	17	20	6	12
Management Related Occs.	52	7	9	11	(4)	16	14	(21)	8
Total Management	**37**	**20**	**13**	**4**	**6**	**15**	**18**	**(1)**	**11**
Professionals exc. health	4	15	13	22	11	12	10	10	13
Medical Professionals	25	22	60	(11)	17	61	43	54	23
Teachers	(7)	(1)	(21)	(1)	(6)	(14)	(11)	(11)	(10)
Total Professionals	**5**	**10**	**6**	**10**	**7**	**15**	**10**	**10**	**9**
Total Technicians	**6**	**(26)**	**(4)**	**15**	**(5)**	**(28)**	**2**	**24**	**(3)**
Sales Supervisors	(35)	(9)	32	16	17	8	13	(10)	8
Business Sales	5	(17)	31	27	6	25	13	29	17
Retail and Service Sales	(9)	(22)	(14)	(14)	(8)	(3)	1	3	(8)
Total Sales	**(7)**	**(13)**	**15**	**11**	**7**	**17**	**15**	**10**	**10**
Total Admin. Support	**12**	**(1)**	**11**	**2**	**(2)**	**1**	**6**	**5**	**2**
Protective Services	22	(5)	(9)	3	4	15	4	42	5
Food Preparation	(4)	(24)	(9)	(14)	(11)	(4)	0	(6)	(9)
Health Service	58	2	19	(18)	(2)	13	(5)	5	(0)
Cleaning, Building Services	(45)	17	(15)	(6)	(24)	21	(22)	4	(12)
Personal Services	8	(9)	(16)	0	(27)	(31)	(4)	12	(12)
Total Services	**(3)**	**(3)**	**(6)**	**(8)**	**(12)**	**(3)**	**(3)**	**8**	**(6)**
Farm/Garden/Forestry/Fishing	**(46)**	**(11)**	**(4)**	**(17)**	**(16)**	**(2)**	**(4)**	**14**	**(8)**
Mechanics and Repairers	13	(35)	3	0	(9)	(5)	9	(4)	(4)
Construction Trades	(4)	(2)	(10)	(7)	(16)	(21)	(14)	(20)	(13)
Precision Trades	2	1	(1)	(25)	(13)	(11)	2	(7)	(7)
Total Precision, Craft, & Repair	**4**	**(14)**	**(4)**	**(11)**	**(12)**	**(11)**	**0**	**(13)**	**(7)**
Machine Operators	3	4	(17)	(9)	(20)	1	5	18	(5)
Transportation Occupations	(2)	(20)	(25)	(14)	(27)	(20)	(10)	(25)	(19)
Handlers, Laborers	(21)	(16)	(11)	(14)	(16)	(23)	(3)	3	(13)
Total Op's, Fabricators, Laborers	**(10)**	**(11)**	**(18)**	**(12)**	**(21)**	**(13)**	**(0)**	**(3)**	**(12)**
Military	**52**	**(10)**	**4**	**(7)**	**(5)**	**12**	**(8)**	**2**	**(5)**
TOTAL	**8**	**1**	**7**	**5**	**(1)**	**3**	**12**	**5**	**5**

Table 30. Average Wages by Occupation by Education Level in 1990

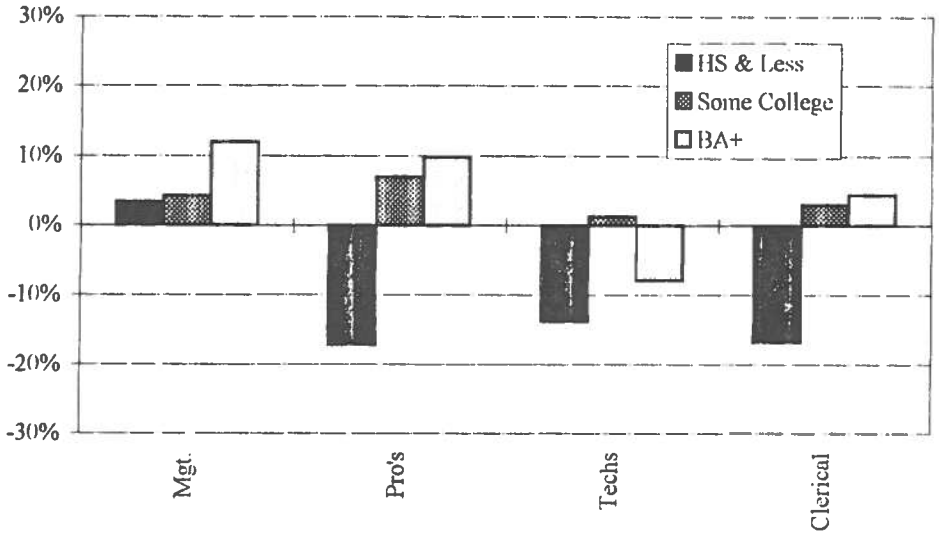
	Less than High School	High School	Some College	BA+	Total
Managers	15.7	17.4	18.0	25.3	21.6
Management Related Occs.	14.6	13.2	14.9	19.0	16.9
Total Management	**15.5**	**16.2**	**17.1**	**23.3**	**20.2**
Professionals exc. health	11.9	14.4	17.7	22.2	20.8
Medical Professionals	11.7	14.5	19.0	27.7	24.9
Teachers	11.6	10.1	10.4	17.6	16.0
Total Professionals	**11.8**	**13.0**	**16.4**	**21.7**	**20.2**
Total Technicians	**12.1**	**13.4**	**15.2**	**18.5**	**16.3**
Sales Supervisors	11.4	13.9	15.2	21.7	17.0
Business Sales	12.9	16.5	17.7	24.6	20.7
Retail and Service Sales	7.5	9.5	10.3	14.3	10.1
Total Sales	**8.5**	**11.8**	**13.7**	**21.6**	**15.1**
Total Admin. Support	**10.0**	**11.0**	**11.4**	**13.4**	**11.6**
Protective Services	9.2	11.8	15.0	18.2	14.7
Food Preparation	7.3	8.1	9.1	10.1	8.3
Health Service	8.7	9.7	10.1	13.0	10.2
Cleaning, Building Services	10.5	10.0	11.0	10.5	10.5
Personal Services	7.1	8.3	9.7	12.9	9.1
Total Services	**8.4**	**9.2**	**11.1**	**13.6**	**10.1**
Farm/Garden/Forestry/Fishing	**8.9**	**8.9**	**11.2**	**13.1**	**9.6**
Mechanics and Repairers	14.9	14.7	15.4	16.6	15.2
Construction Trades	14.1	16.1	17.4	18.7	16.3
Precision Trades	11.9	13.4	15.9	17.4	14.5
Total Precision, Craft, & Repair	**13.4**	**14.8**	**16.2**	**17.5**	**15.3**
Machine Operators	9.8	11.9	12.8	13.8	11.6
Transportation Occupations	12.7	13.5	13.0	13.5	13.2
Handlers, Laborers	9.7	10.9	12.3	15.9	11.2
Total Op's, Fabricators, Laborers	**10.4**	**12.2**	**12.7**	**14.2**	**11.9**
Military	**6.3**	**6.4**	**8.3**	**13.8**	**8.7**
TOTAL	**10.3**	**12.2**	**13.9**	**20.4**	**15.2**

Table 31. Percent Change in Real Average Wages by Occupation by Education Level from 1980 to 1990

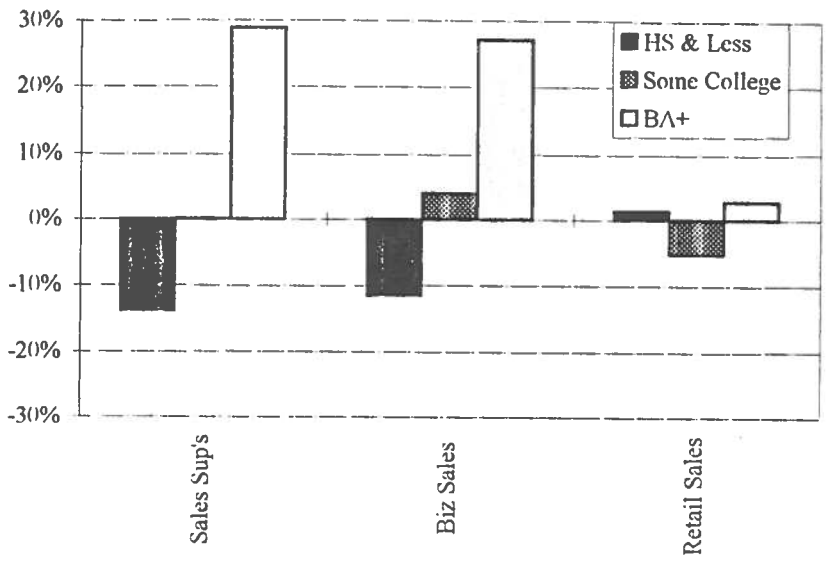
	Less than High School	High School	Some College	BA+	Total
Managers	1	7	4	13	12
Management Related Occs.	(1)	(6)	7	10	8
Total Management	**0**	**3**	**4**	**12**	**11**
Professionals exc. health	3	(21)	9	14	13
Medical Professionals	(15)	(3)	26	19	23
Teachers	15	(12)	(23)	(7)	(10)
Total Professionals	**4**	**(21)**	**7**	**10**	**9**
Total Technicians	**(13)**	**(14)**	**1**	**(8)**	**(3)**
Sales Supervisors	(32)	(8)	0	29	8
Business Sales	(4)	1	4	27	17
Retail and Service Sales	(11)	(19)	(5)	3	(8)
Total Sales	**(11)**	**(11)**	**2**	**24**	**10**
Total Admin. Support	**(3)**	**(1)**	**3**	**4**	**2**
Protective Services	(1)	(6)	2	17	5
Food Preparation	(23)	(14)	8	17	(9)
Health Service	4	6	(9)	2	(0)
Cleaning, Building Services	(9)	(12)	(12)	(32)	(12)
Personal Services	(29)	(6)	(10)	(14)	(12)
Total Services	**(16)**	**(8)**	**(1)**	**1**	**(6)**
Farm/Garden/Forestry/Fishing	**(5)**	**(26)**	**3**	**27**	**(8)**
Mechanics and Repairers	(4)	(7)	(4)	10	(4)
Construction Trades	(24)	(17)	0	(14)	(13)
Precision Trades	(14)	(10)	(1)	(15)	(7)
Total Precision, Craft, & Repair	**(15)**	**(10)**	**(2)**	**(11)**	**(7)**
Machine Operators	(16)	(7)	3	7	(5)
Transportation Occupations	(25)	(19)	(17)	(2)	(19)
Handlers, Laborers	(21)	(18)	(3)	8	(13)
Total Op's, Fabricators, Laborers	**(20)**	**(14)**	**(5)**	**5**	**(12)**
Military	**(10)**	**(6)**	**(21)**	**(6)**	**(5)**
TOTAL	**(14)**	**(7)**	**3**	**11**	**5**

Graph 9. Percent Change in Real Average Wages by Occupation by Education Level in the Bay Area from 1980 to 1990

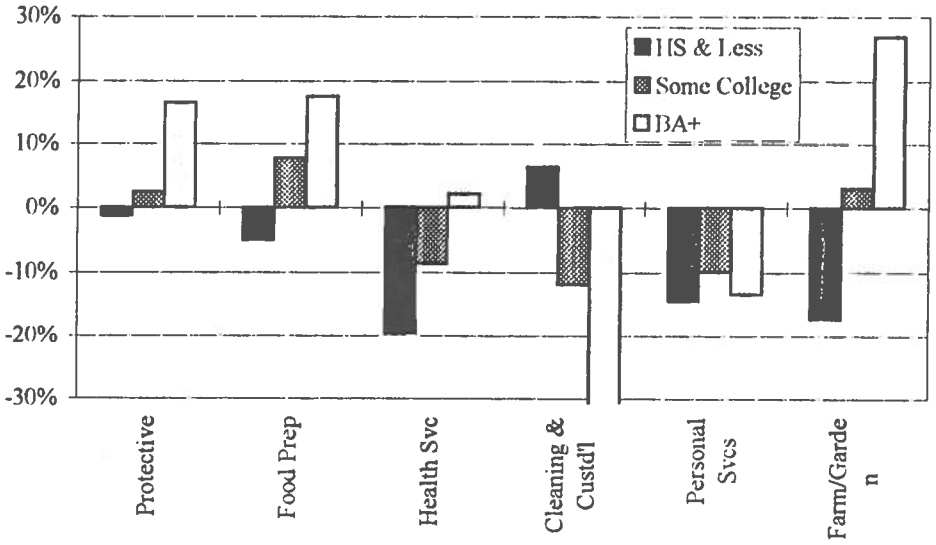
Administrative and Professional Occupations



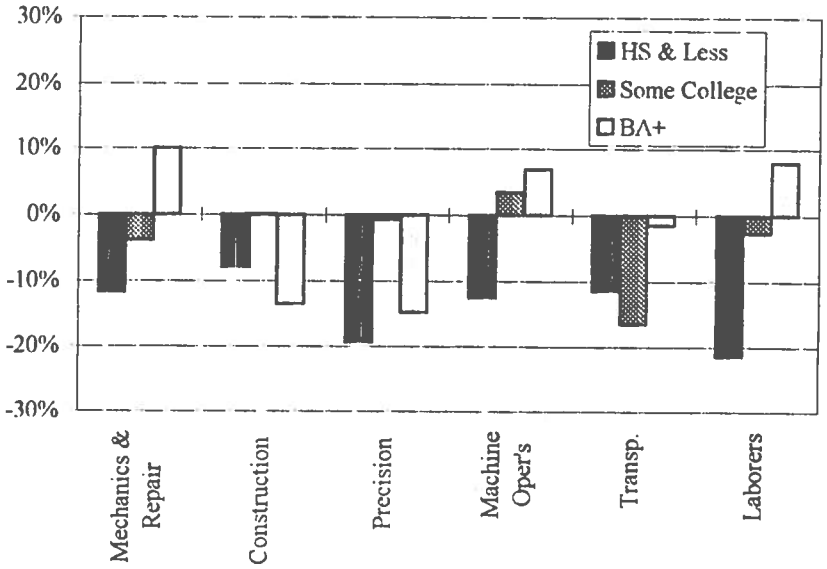
Sales Occupations



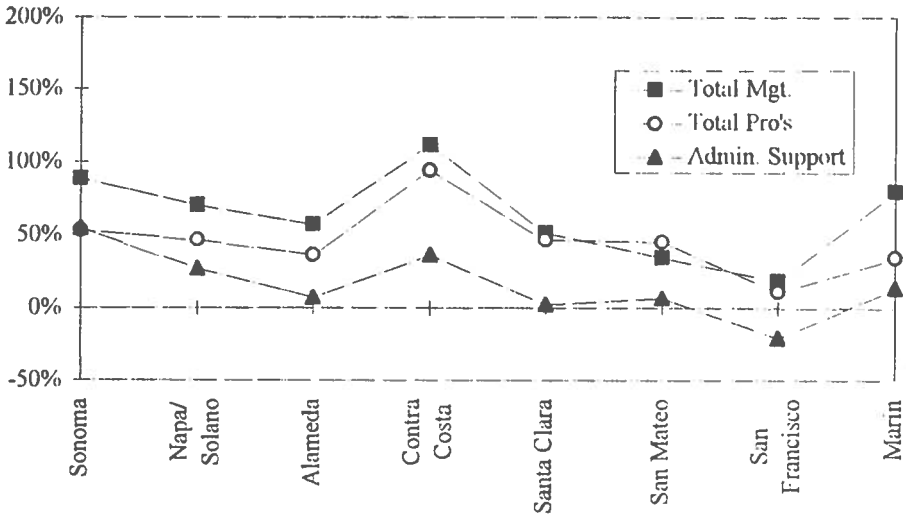
Service Employment



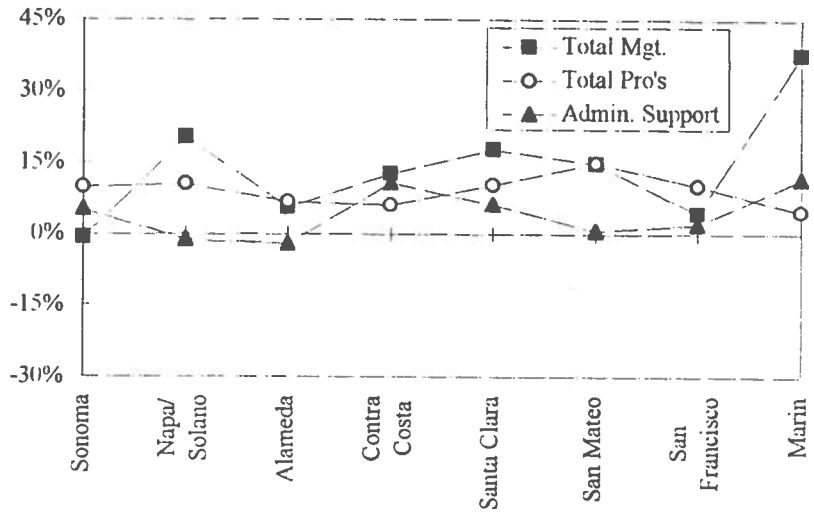
Precision and Laboring



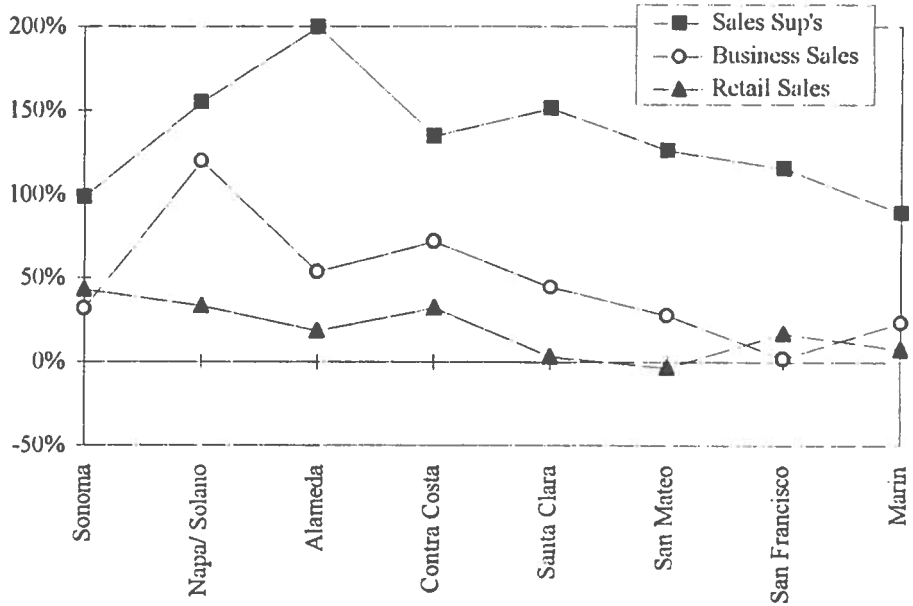
Graph 10-1a. Percent Change in Administrative and Prof'l Employment from 1980 to 1990



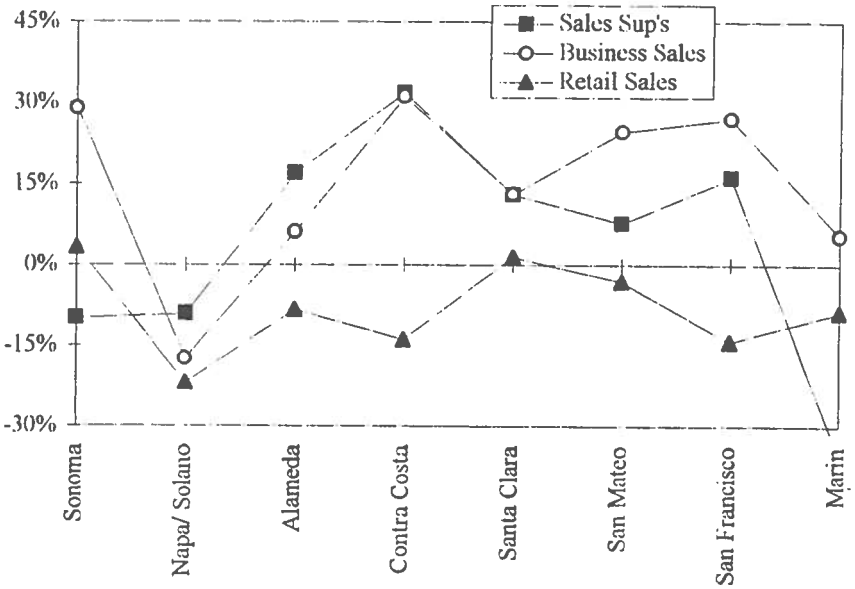
Graph 10-1b. Percent Change in Real Wages for Administrative and Prof'l Workers from 1980 to 1990



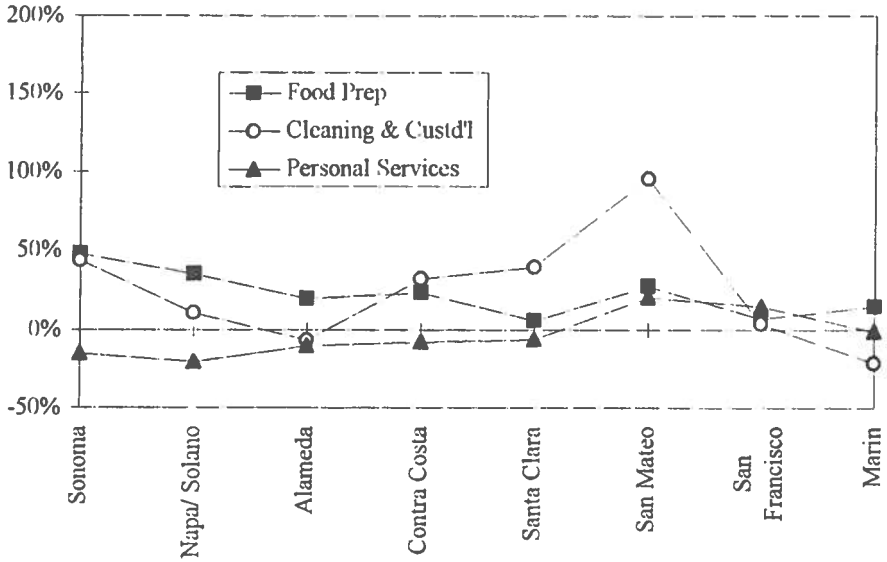
Graph 10-2a. Percent Change in Sales Employment from 1980 to 1990



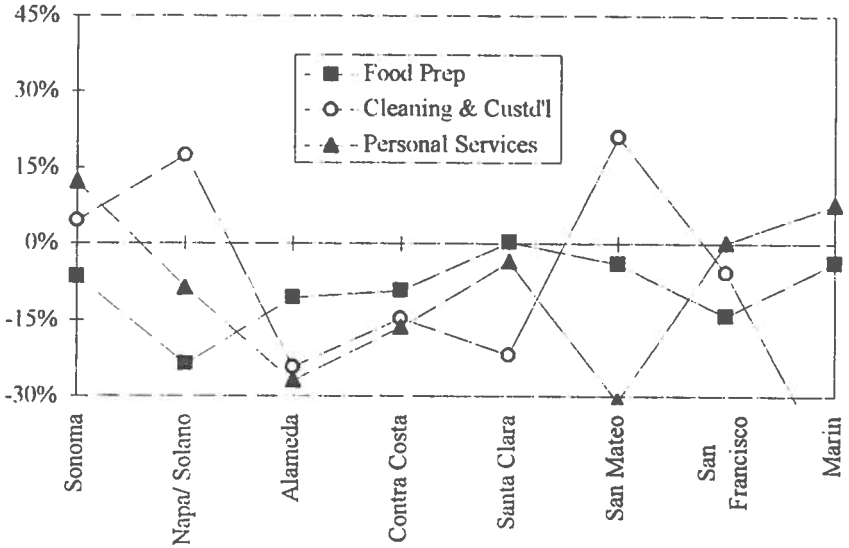
Graph 10-2b. Percent Change in Real Wages for Sales Workers from 1980 to 1990



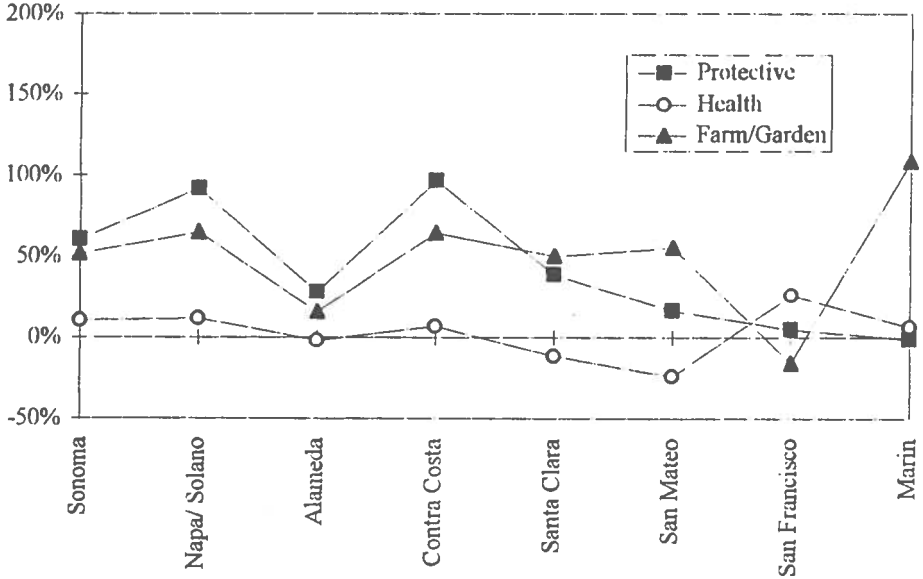
Graph 10-3a. Percent Change in Service Employment from 1980 to 1990



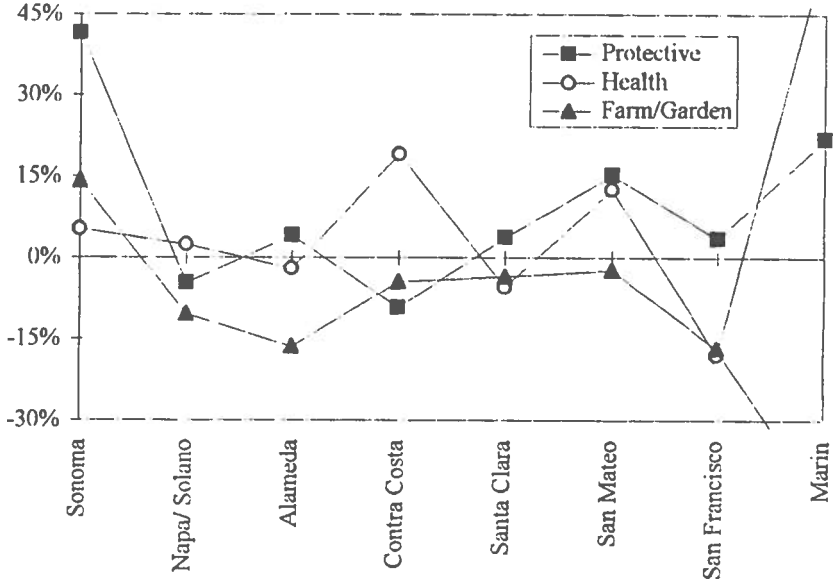
Graph 10-3b. Percent Change in Real Wages for Service Workers from 1980 to 1990



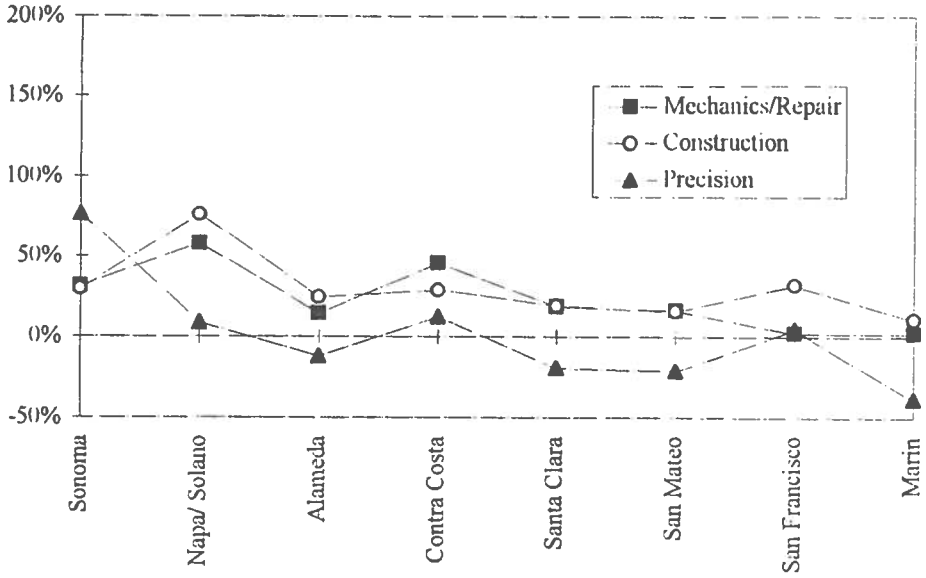
Graph 10-4a. Percent Change in Other Service Employment from 1980 to 1990



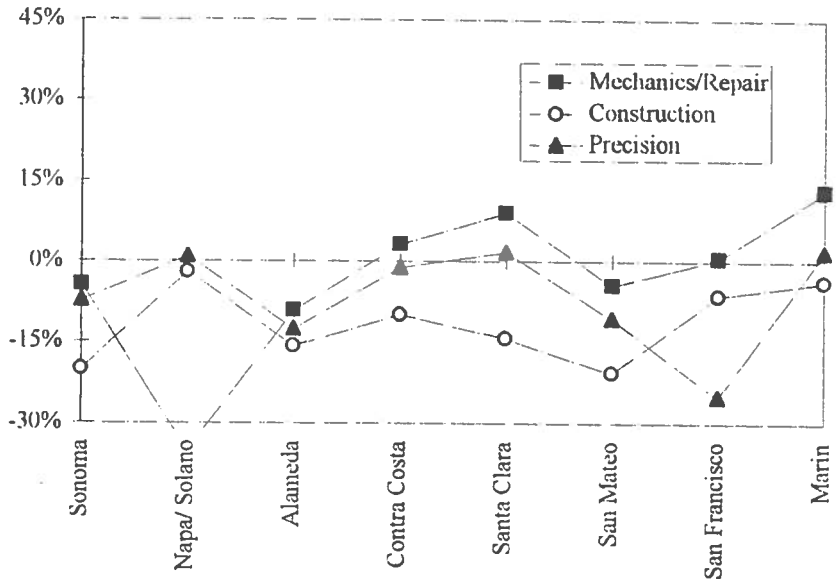
Graph 10-4b. Percent Change in Real Wages for Other Service Workers from 1980 to 1990



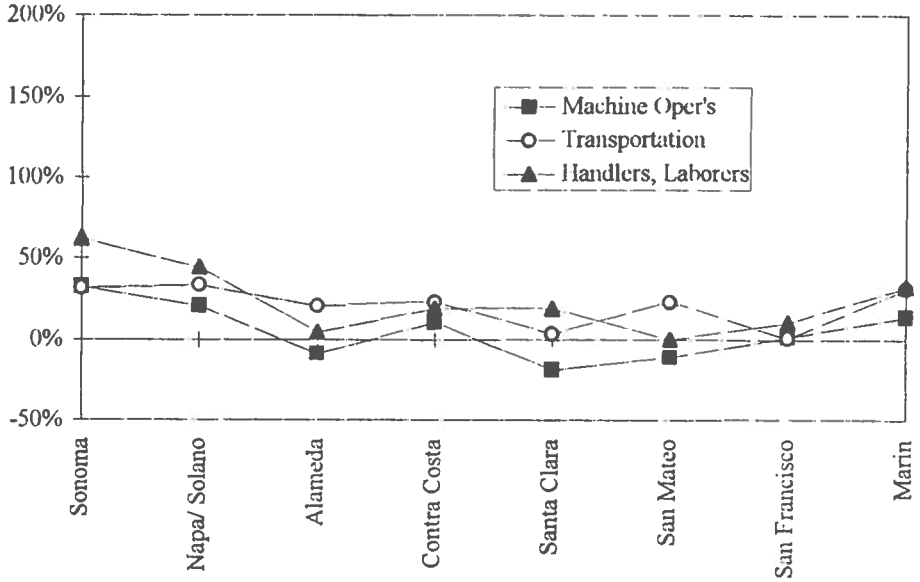
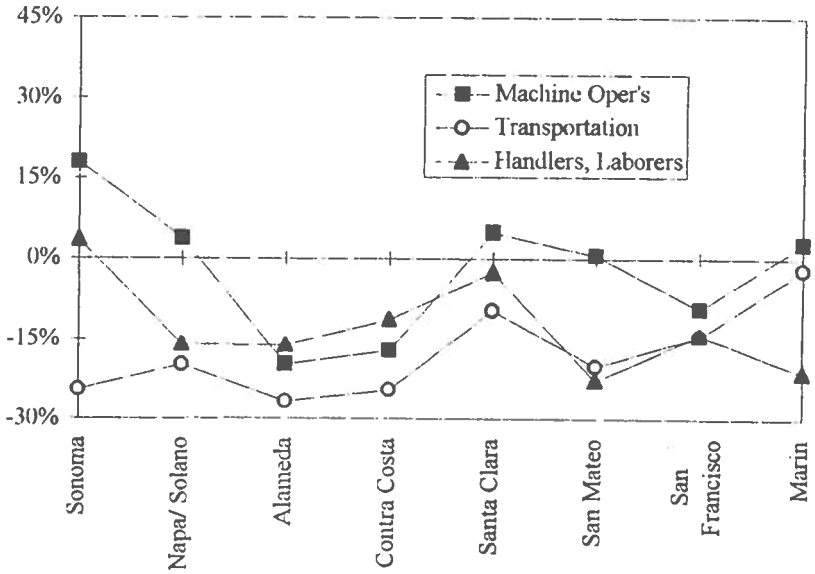
Graph 10-5a. Percent Change in Precision Craft and Repair Employment from 1980 to 1990



Graph 10-5b. Percent Change in Real Wages for Precision Workers from 1980 to 1990



Graph 10-6a. Percent Change in Laboring Employment from 1980 to 1990



Graph 10-6b. Percent Change in Real Wages for Laboring Workers from 1980 to 1990