INTRODUCTION TO JOB QUALITY

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Tom Rex, M.B.A.
Associate Director, Center for Competitiveness and Prosperity Research;
and Manager of Research Initiatives, Office of the University Economist

P3 | PRODUCTIVITY AND PROSPERITY PROJECT

ASU W. P. CAREY SCHOOL of BUSINESS
ARIZONA STATE UNIVERSITY

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A Report from the Productivity and Prosperity Project (P3), Supported by the Office of the University Economist

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and Manager of Research Initiatives, Office of the University Economist

Center for Competitiveness and Prosperity Research
L. William Seidman Research Institute
W. P. Carey School of Business
Arizona State University
Box 874011
Tempe, Arizona 85287-4011

(480) 965-5362
FAX: (480) 965-5458
EMAIL: Tom.Rex@asu.edu
wpcarey.asu.edu/research/competitiveness-prosperity-research
economist.asu.edu

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ARIZONA STATE UNIVERSITY

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SUMMARY

- Arizona's average wage in 2003 was 7 percent (approximately $2,500) less than the national average. Despite some narrowing of the gap since the early 1990s, this differential remains larger than the historical norm.
- Job quality explained only about 20 percent of the state's subpar average wage in 2003. The state's industrial mix, which is somewhat shifted towards low-paying industries, lowered the state's average wage relative to the national average by a little more than 1 percent in 2003. Arizona's occupational mix had no effect on its average wage.
- Thus, factors other than job quality — which are largely not measurable — account for most of the state's low average wage. A likely cause of the low wages is the substantial number of people who seem willing to move to Arizona and accept a substandard wage in exchange for perceived qualitative advantages to living in Arizona, particularly climate. Another possible cause of the low average wage is that the productivity of Arizona workers could be below average. The state's cost of living, which is close to the national average, has little if any impact on the average wage.
- Job quality in the United States has been declining gradually for at least 35 years. If job quality currently were the same as in 1970, the nation's average wage would be 5 percent higher.
- Job quality in Arizona also has declined over time, generally at the same pace as the national average. The exception was in the 1982-to-1991 economic cycle, when Arizona's job quality dropped 1.5 percent more than the national norm.
- Arizona's subpar industrial mix is a result of its above-average shares of the low-paying administrative support and accommodation and food services sectors and its below-average shares of the high-paying management of companies and professional, scientific, and technical services sectors. These negative factors are partially offset by an above-average share of high-technology manufacturing and a below-average share of low-paying health care industries.
- The larger-than-average size of the high-paying architecture and engineering occupational group and the smaller-than-average size of below-average-paying production occupations contribute positively to the state's occupational mix. The relatively large size of the low-paying food preparation and serving group and the relatively small size of the high-paying health practitioners group offset the positive factors.
- The below-average growth of the high-paying manufacturing sector has been the single largest factor contributing to the decline in job quality over time, nationally and in Arizona. The fast growth of low-paying service industries also has been a factor.
- Job quality in Arizona — both the industrial mix and the occupational mix —compares favorably to Nevada, but unfavorably to California and Colorado. In recent years, Arizona's change in job quality has been average among these four states.
- Large variations in job quality exist across Arizona's metropolitan areas. The Phoenix area's average wage receives a small positive contribution from the occupational mix and no net effect from the industrial mix. In the Tucson area, the occupational mix also has a small positive effect on the average wage but the industrial mix has a negative impact. The industrial and occupational mixes in the Flagstaff and Yuma metro areas cause their average wages to be far below the national average. In recent years, job quality has been steady in the Phoenix area and has improved in the other areas, particularly Tucson.

Introduction

The quality of jobs in the United States became a national concern in the 1980s after a long period of losses of relatively high-paying manufacturing jobs and gains of frequently low-paying service jobs. National job quality remains a concern today, as witnessed by the debate in the 2004 presidential campaign. Job quality in Arizona continues to be discussed as well, with the quality of the state's rapid employment growth being questioned.

The number of jobs by industry (industrial mix) and the number of jobs by occupation (occupational mix) are components of job quality that are measured in this report. A new measure of the change in job quality is introduced in this report, calculated using average wages by industry or occupation and relative changes in sectoral or occupational shares. A similar measurement focuses on the industrial mix or occupational mix as of a particular point in time.

The overall average wage is a measure of prosperity or well-being, but is not in itself a measure of job quality since job quality is just one of several factors that affect the overall average wage. Historically, Arizona's average wage was 1 to 5 percent less than the national average. However, between the early 1980s and early 1990s, Arizona's average wage rose much less than the national average, falling to 10 percent below average. Since the early 1990s, gains in the average wage in Arizona have been somewhat higher than the national average. Arizona's average wage in 2003 was about 7 percent, or $2,500, less than the national average.

Relative to the nation, the state's industrial mix is slightly tilted toward low-wage jobs, accounting for a little more than 1 of the 7 percentage-point differential between the state and nation in the 2003 average wage. The occupational mix in Arizona has almost no effect on the relative average wage. Thus, job quality accounts for only about 20 percent of the differential between the Arizona and national average wage.

Other factors that have an effect on the average wage comparison to the nation include cost of living, productivity, and labor force supply and demand, but little information on these factors are available by state. Available data on the cost of living indicate that living costs in Arizona are close to the national average — thus, the state's lower-than-average wages are not offset by low living costs. No productivity data exist for Arizona. Worker productivity in Arizona could be below the national average due to lesser investments in physical or human capital, which would result in lower wages. Labor market supply and demand factors are a likely cause of the low wages in Arizona. A substantial number of people seem willing to move to Arizona and accept a substandard wage in exchange for perceived qualitative advantages to living in Arizona, primarily climate.

Job Mix

The relatively large sizes in Arizona of the below-average-wage administrative support and accommodation and food services sectors and the relatively small sizes of the high-wage management of companies and professional, scientific and technical services sectors are the main reasons for the state's subpar industrial mix. Within these sectors, the larger-than-average but low-wage temporary help, employee leasing, telephone call centers, lodging places, and restaurants industries are specific causes of the state's below-average industrial mix. In addition, the scarcity in Arizona of high-wage corporate and regional managing offices and research and

development facilities contributes to the state's subpar industrial mix. Partially offsetting these negative factors are the large size of high-technology manufacturing, especially semiconductors, and the small size of low-paying health care industries, such as nursing care facilities.

Arizona's occupational mix has almost no net effect on the differential in the overall average wage between Arizona and the nation. The largest positive effect on the average wage comes from the below-average size of the below-average-paying production occupations group, which mostly consist of lower-wage manufacturing jobs. The larger-than-average size of the high-paying architecture and engineering group also contributes positively, due to Arizona's large number of aerospace, electronics, and electrical engineers, who mostly are employed in high-tech manufacturing industries. The largest negative effect comes from the large size of the low-paying food preparation and serving group. Arizona's relatively small number of workers in the high-paying health practitioners and technical group also is a negative factor.

Changes in Job Quality

The long-term trend has been toward lower-quality jobs, both nationally and in Arizona. Nationally, the rate of decline in job quality has been fairly steady over the last 35 years after adjusting for the cyclical pattern — job quality typically changes little during the recovery phase, improves slightly in the middle of an economic cycle, but falls leading into and during recessions. In Arizona, declines in job quality were greatest during the 1982-to-1991 economic cycle, when the state's job quality fell much more than the national average. The effect on the overall average wage of this downward shift in job quality has been relatively modest. Had no erosion in job quality occurred between 1969 and 2003, average wages would be 6.5 percent higher in Arizona and 4.6 percent higher nationally.

Manufacturing has been the sector most responsible for the decline in job quality since 1969, nationally and in Arizona. Manufacturing pays above-average wages, but has experienced below-average growth for decades. Through much of this period, the electronics and machinery manufacturing industries were the largest causes of declines in job quality in Arizona. In recent years, declining employment in the semiconductor industry has been responsible for most of the drop in job quality. Difficulties in the high-paying mining sector and above-average growth in low-paying sectors also have caused drops in job quality in Arizona. Retail trade (particularly restaurants and bars) was a negative influence during the 1970s and 1980s and services (especially below-average-paying business services) had a negative effect especially during the 1990s.

Except during the 1982-to-1991 economic cycle — when most sectors in Arizona contributed to a much worse performance on job quality than the national average — Arizona's decline in job quality has been similar to the national average. In the 1975-to-82 cycle, manufacturing was a major boost to Arizona's job quality relative to the nation, buts its positive effect was offset by a large negative impact from mining. In the 1991-to-2001 cycle and continuing in the current cycle, manufacturing has been a large negative factor on Arizona's change in job quality relative to the nation, offset by somewhat better results in several sectors, such as finance and insurance. In the current cycle (since 2001), declines in semiconductor manufacturing employment have had a large negative impact on job quality in Arizona.

Based on occupational data (which are available only for the 2000-to-2003 period), job quality has declined nationally and in Arizona. The high-paying management occupations group has been responsible for the drop in Arizona, with particularly sizable negative effects from the declining occupational shares of the general and operations managers and chief executives occupations. The high-paying computer and mathematical and architecture and engineering groups also have had negative effects on job quality, but the high-paying business and financial operations and health practitioners and technical groups have had positive impacts.

The decrease in job quality measured by the occupational data has not been quite as great in Arizona as the national average. The better performance in Arizona can be traced to the high-paying business and financial operations occupational group and the low-paying food preparation and serving, office and administrative support, and building and grounds cleaning and maintenance groups. In contrast, the high-paying computer and mathematical, management (particularly the general and operations managers occupation), and architecture and engineering groups as well as the somewhat below-average-paying sales group have had larger negative effects in Arizona than the nation.

Comparisons to Other States

Arizona's average wage in 2003 was similar to that in Nevada, but much less than in California and Colorado. The slightly negative industrial mix in Arizona compares to small positive mixes in California and Colorado and a large negative value in Nevada. Similarly, the occupational mix in Arizona compares favorably to the large negative value in Nevada, but unfavorably to California's small positive value and Colorado's larger value. Controlling for job quality, Arizona's average wage was 5 percent below average in 2003. In contrast, the adjusted figure was average in Colorado and considerably above average in California and Nevada. The high cost of living in California explains much of its high figure.

Between 2000 and 2003, the average wage relative to the national average was unchanged in Arizona, down slightly in California and Colorado, and up in Nevada. Industrial job quality slipped in California and Colorado, increased slightly in Arizona and climbed more substantially in Nevada. Occupational job quality improved in Nevada and changed little in the other states.

Metropolitan Areas within Arizona

The average wage and job quality varies widely across Arizona's metropolitan areas. The average wage in the Phoenix-Mesa metro area in 2003 was only 3 percent less than the national average, though it was more substantially below the average of large metro areas. The average wage in the Tucson area was 10 percent below average, with wide differentials of 24 percent in the Flagstaff area and 31 percent in the Yuma area.

The industrial mix in the Phoenix area had no effect on the 2003 average wage relative to the national average, but the effect was -5 percent in the Tucson area and -13 percent in the Flagstaff and Yuma areas. The occupational mix had a small positive effect on the average wage comparison of 1 percent in the Phoenix and Tucson areas, but had negative impacts of -8 percent in the Flagstaff area and -12 percent in the Yuma area. After controlling for the industrial and occupational mixes, the average wage ranged narrowly across Arizona's metro areas: from 3 to 7 percent below the national average.

The average wage fell 1 percent in the Phoenix area relative to the national average between 2000 and 2003, partially due to small drops in the industrial and occupational job quality. The average wage advanced more than the national average in the other three metros. A big increase of 4 percent in the Tucson area was tied to a large gain in occupational job quality and a small increase in industrial job quality; the effect on the average wage of other factors was negative. In the Flagstaff area, the relative average wage went up 2 percent due to improvements in the industrial and occupational mixes. Yuma had a similar gain in relative average wage, in part due to an improvement in industrial job quality.

INTRODUCTION

The quality of jobs in the United States became a national concern in the 1980s after a long period of losses of relatively high-paying manufacturing jobs and gains of frequently low-paying service jobs. National job quality remains a concern today, as witnessed by the debate in the 2004 presidential campaign. Job quality in Arizona continues to be discussed as well, with the quality of the state's rapid employment growth being questioned.

The number of jobs by industry (industrial mix) and the number of jobs by occupation (occupational mix) are components of job quality that are measured in this report. A new measure of the change in job quality is introduced in this report, calculated using average wages by industry or occupation and relative changes in sectoral or occupational shares. A similar measurement focuses on the industrial mix or occupational mix as of a particular point in time.

Ideally, job quality would be evaluated by industry and occupation jointly, but little such cross-tabulated data exist. Limited cross-sectional results from one national dataset and one dataset for Arizona are included in this report.

Conceptually, workforce demographics could have an additional effect on wages beyond the effects from the industrial and occupational mixes. For example, a higher-than-average proportion of workers in a particular occupation might be in entry-level positions. However, prior research ("Arizona Per Capita Personal Income and Components," Center for Business Research, March 1996) indicated that workforce demographics had little effect in Arizona after accounting for industrial mix and occupational mix. That analysis has not been updated.

Data limitations, particularly at subnational levels of geography, significantly impact the analysis of job quality. Because of these limitations, multiple datasets were analyzed for this report. Some inconsistencies in the measurement of job quality exist across datasets.

Data that specifically identify new jobs do not exist, so changes in job quality are based on net changes in total employment. In most datasets, part-time workers are not distinguished from full-time workers, causing the reported average wage to be less than the average of full-time workers.

In most of the analyses included in this report, job quality is based on wages and salaries of wage and salary workers. One dataset provides two alternative measures: overall compensation (including benefits) of wage and salary workers, and overall compensation of all workers (including self employed). One other dataset also includes proprietors, and allows earnings to be adjusted for the number of hours worked. Measures of job quality hardly vary across these measures.

Literature Review

The first study of changes in national job quality was made by Bluestone and Harrison in 1986. They placed the categorical changes in employment into three groups — low, medium and high earnings. They found that the proportion of low-wage workers rose between 1979 and 1985. However, using similar data and similar methods, Koster and Ross (1987, 1988) came to a contradictory conclusion.

Subsequent studies used similar methods, ranking categories (of occupations, industries, or a cross-tabulation of the two) by average wage (mean or median), breaking the distribution into two parts (above/below the median), three parts (above, near average, and below), quartiles, or deciles. The groupings (e.g. quartiles) were made by employment sectoral share, with the goal being to keep the sectoral share nearly equal across the groups. Among the studies using this method were three done by U.S. Bureau of Labor Statistics employees published in the *Monthly Labor Review* (Rosenthal, 1995; Ilg, 1996; Ilg and Haugen, 2000). The 1999 U.S. Department of Labor "Report on the American Workforce" also used this method, as did Wright and Dwyer (2000).

An important finding of the work done by the BLS is that the results vary depending on whether industrial or occupational data are used — national job quality generally has been found to be worsening by more based on industrial data than using occupational data. The BLS believes that a cross-section of occupational and industrial data provides the most reliable results. However, few such datasets exist, especially for geographic areas smaller than the nation.

The prevailing method of dividing the distribution of categories into groups is simplistic, with results difficult to interpret since relative employment changes can vary widely by group in an erratic manner. As indicated by the contradictory results from Bluestone and Harrison and Koster and Ross, this method is sensitive to small changes in assumptions, methods, and data (Costrell, 1990).

More importantly, this method does not fully utilize all of the available data in the analysis. It does not recognize that the average wage can vary widely within a group. For example, even when splitting a distribution into deciles, a significant difference in the average wage exists across categories in the top (and bottom) decile.

A recent study again illustrates the method's problems. A national analysis of the change in job quality between 2001 and 2004 recently was conducted by the Annenberg Political Fact Check Project (FactCheck.org). A cross-tabulation of national industrial and occupational data from the Current Population Survey was used for 151 categories for which both wage and employment data were available. The average weekly wage in 2003 was used to rank the 151 categories. The categories were split into two groups based on the median wage figure. The results were striking: All of the net job growth both from 2001 to 2004 and from 2003 to 2004 (measured as of June of each year) was in categories with wages above the median.

Despite the seemingly overwhelming evidence of an improvement in job quality, a more sophisticated analysis (see the next two subsections) of the same dataset results in the opposite conclusion for the three-year period: job quality worsened. The differing conclusions result from the Annenberg analysis not considering sectoral shares of employment and employment change and not incorporating the very large intragroup differences in wages in their simplistic above- and below-median-wage groups.

Thus, Annenberg's analysis did not consider that 11 of the 12 highest-paying categories lost jobs (employment in the 12th was flat), with a net loss of 716,000 jobs over the three years in these 12 categories. In contrast, five of the seven lowest-paying categories gained jobs, with a net gain

of 734,000. One category with an average wage moderately above the median — professional occupations in the educational and health services sectors — had a three-year increase in employment of 1.38 million, which was greater than the overall increase of 1.07 million. In contrast, the category of production occupations in manufacturing (with earnings slightly below the median) lost 1.27 million jobs.

The Measurement of Job Mix and Job Quality

Instead of ranking and dividing categories into groups, an overall measure of the change in job quality can be calculated, using all of the available data. The change in job quality (sometimes referred to as the "score" in this report) for the nation and for subnational areas (such as states or metropolitan areas) is calculated from the following formula, summing over all categories (industries or occupations):

(change over time in categorical share of employment) * (ratio of average wage to overall average wage – 1) * 100.

A similar measure is used to compare the job mix (either industrial mix or occupational mix) in subnational areas to the national average as of a particular point in time, summing over all categories:

(difference in share of employment between the subnational area and the nation) * (ratio of average wage to overall average wage – 1) * 100.

The mid-point of the job quality score is zero; that is, categorical employment change that is exactly proportionate to employment shares results in a score of zero. A negative score indicates a deterioration in job quality while a positive score signals an improvement in job quality. Similarly, a job mix value of zero indicates that differences in the job mix between the subnational area and the nation have no effect on the average wage comparison.

The multiplication by 100 in the formulae converts the results to percentages. For example, a job quality score of -0.5 indicates that deterioration in job quality had a downward effect of 0.5 percent on the overall average wage. A job mix value of -1.0 indicates that a difference in the job mix between the subnational area and the nation accounts for a 1.0 percentage point shortfall in the average wage in the subnational area relative to the nation.

The formula for the change in job quality can be used for one-year or multi-year analyses. A score for a multi-year period can be calculated by either of two techniques: (1) by applying the formula to data for the beginning and ending years of the period, or (2) by cumulating the annual scores according to the formula (((1 + annual score for first year/100) * (1 + annual score for second year/100) …) -1) * 100. The multi-year score from the two techniques will differ because of the variation in the base period used for the average wage ratio. When annual data exist, the cumulation of annual scores is the preferred method since it allows the average wage data to be updated each year, rather than held constant.

The average wage ratio for either the first or last year of the time period being analyzed can be used in the change in job quality calculation. If a long time frame is analyzed using the beginning and ending year technique, the results will vary with the choice of the year used for the wage data. The first year of the time period has been used for this report.

Since the job mix focuses on the difference in the industrial or occupational structure between a subnational area and the nation, the formula uses national wage data. Similarly, the change in job quality calculation for the nation uses national wage data. For the change in job quality calculation for a subnational area, an argument can be made to use either national or subnational area wage data. A noticeable difference in the score can result (see Appendix I). Subnational area wage data are used in the calculation of the change in job quality in subnational areas for this report.

The job quality scores of individual categories can be used to identify the major contributors to the overall change in job quality. Faster-than-average growth in a higher-than-average-paying category results in a positive score, as does slower-than-average growth in a lower-than-average-paying category. Categorical job mix values can be interpreted similarly.

National Change in Job Quality

Applying the change in job quality formula to the Annenberg dataset, the job quality scores were calculated to be -0.09 in 2002, -0.20 in 2003, and 0.07 in 2004. Thus, job quality declined marginally in 2002 and 2003 and rose slightly in 2004. The three-year score was -0.21. (The 2003 average wage — the only figure supplied by Annenberg — was used in the formula for each time period. Thus, the scores for these three one-year periods sum to the three-year figure.)

For the three-year period, the category of professional occupations in the educational and health services sectors had the greatest positive contribution, followed by management occupations in financial services. Both categories pay above the median wage and had faster-than-average employment growth. Service occupations in leisure and hospitality — very low paying with above-average job growth — had the largest negative contribution. Management occupations in manufacturing and professional occupations in manufacturing —high paying categories that lost jobs — also had negative scores.

Gould et. al. of the Economic Policy Institute (EPI, 2004) issued a report critical of Annenberg's methodology and conclusion. The EPI redid the study. Their methodology is similar to that used for this report, utilizing all of the available data. However, the EPI devised a different calculation. They split the 151 categories into two groups: those with gains in employment share and those with losses in employment share. In each group, a weighted share for each category was created using the total change in share for the group. By category, the weighted share was multiplied by the average wage, with this weighted wage summed over all categories in each group. For the three-year period, the weighted average wage of categories with gains in employment was 7 percent less than the weighted average wage of categories with job losses. See Appendix II for a comparison of the EPI calculation to that used in this report.

Datasets

Since all available datasets of employment and wages for subnational areas have significant but varying limitations, five datasets were examined in this project. Three datasets present industrial data, one provides occupational data, and the fifth contains both occupational and industrial data — but its latest data are for 1999.

Industrially, workforce data currently are categorized by the North American Industry Classification System (NAICS). The Standard Industrial Classification (SIC) was used prior to NAICS. Changes over time to the SIC, then the switch from the SIC to the NAICS, result in data that are not comparable over time.

The NAICS presents data hierarchically. The most detailed data are for industries (5- or 6-digit NAICS code). These are totaled into industry groups (4-digit), then into subsectors (3-digit), and finally into 20 (2-digit) sectors. The SIC used a similar system, grouping 4-digit industries progressively into 3-digit industry groups, 2-digit major groups, and 1-digit divisions.

The classification system for occupational data also has been revised, causing discontinuities in the time series. Currently, the Standard Occupation Classification (SOC) system is used. The SOC defines more than 700 occupations, which are combined into 22 major occupational groups.

A limitation to all government data is the withholding of data that violates the federal government's disclosure restrictions. To prevent the identification of data for a specific company, data are withheld if too few companies are represented in a given industry or occupation or if one company dominates the category. Data for a second category must be withheld, even if its disclosure restriction is not violated, so that the data for the first category cannot be calculated from available data.

This disclosure restriction has little effect on national data but a considerable impact on published data for most subnational areas. A substantial portion of the industrial or occupational data may be withheld from geographic areas with few employers. For this project, categories with withheld data were combined — the data for these aggregations could be calculated from the figures at the next higher level of industrial or occupational detail and figures for other categories at the same level. (For one dataset that was not very sectorally detailed, the missing data were imputed for Arizona.)

While the primary focus of this project was job quality in Arizona with comparisons to the nation, the results for Arizona also were compared to those of selected states for some of the datasets. Because of the lengthy data processing time, only three neighboring states have been analyzed as comparisons to Arizona. California is the dominant western state with strong business ties to Arizona, Colorado is fairly similar in size to Arizona, and Nevada is the nation's other very fast-growing state.

The analysis also was extended to substate areas within Arizona for some of the datasets. Other than the Phoenix and Tucson areas, limited detail is available because of the disclosure restrictions.

Bureau of Labor Statistics Occupational Data (OES)

The Bureau of Labor Statistics (BLS), part of the U.S. Department of Labor, is the main provider of workforce data, in conjunction with state employment agencies (the Department of Economic Security in Arizona). The BLS produces various employment series. Occupational data generally are perceived to be superior to industrial data when examining job quality. However, a limited history of occupational data is available by state, with a discontinuity in 1999 when the SOC was

adopted. The BLS currently conducts the Occupational Employment Statistics (OES) survey semiannually; previously the data were collected annually. However, since employers are contacted only once every three years, fully comparable data exist only for three-year comparisons. For this study, data for 2003 were compared to those for 2000.

While national data are available for 735 occupations, withheld data in Arizona limited the analysis to 543 categories available in both 2000 and 2003. This number includes an aggregation of multiple occupations with withheld data within each of the 22 major occupational groups.

The OES dataset also was used for the three comparison states and for four metropolitan areas within Arizona. The number of occupations and occupational aggregations available in both 2000 and 2003 varied widely: 681 in California, 587 in Colorado, 480 in Nevada, 453 in the Phoenix-Mesa metropolitan area, 329 in metro Tucson, 177 in metro Flagstaff, and 147 in metro Yuma.

Bureau of Labor Statistics Industrial Data (ES-202)
The unemployment insurance (ES-202) program — now called the Quarterly Census of Employment and Wages — provides data for the nation, states and counties. Historical data were recalculated by the BLS based on the NAICS, resulting in a consistent time series from 1990 through 2003. Full industrial detail is available from the ES-202 program, but considerable data are withheld and workers not covered by the unemployment insurance program are not included. The number of industries and industry aggregations available for Arizona in every year from 1990 through 2003 is 636.

Because of the quantity of withheld data and the manner in which the data are presented, the processing of industrially detailed annual data is time consuming. Thus, the analysis of ES-202 data for the comparison states and for four metropolitan areas within Arizona was limited to data for 2000 and 2003 (matching the dates available from the OES data). The number of industries and industrial aggregations available in both 2000 and 2003 varied widely: 1,053 in California, 737 in Colorado, 693 in Arizona, 529 in Nevada, 334 in metro Tucson, 246 in the Phoenix-Mesa metropolitan area, 106 in metro Flagstaff, and 90 in metro Yuma.

The unclassified category — establishments for which the NAICS industry is unknown — was excluded from the dataset except for the metropolitan area analysis. In each metropolitan area, the unclassified data could not be distinguished from that of one or more sectors due to the method used by the BLS to maintain confidentiality.

(The most commonly used employment by industry series — monthly estimates from a survey of employers [‘790’ program] — was not included in this study. The main advantage of the 790 series is its timeliness; disadvantages stem from its survey nature and incomplete coverage of employment. In addition, the data have limited industrial detail and inconsistencies over time because of changes in the industrial classification system.)

Bureau of Economic Analysis (BEA)
The BEA, a part of the U.S. Department of Commerce, provides annual employment, wage and salary, earnings, and personal income data for the nation, states, and counties. The primary

source of the BEA data is the ES-202 dataset produced by the Bureau of Labor Statistics, but the BEA adds estimates for those employers not covered by the ES-202 program, thereby producing a more complete dataset. In addition to this broad coverage, an advantage of using the BEA dataset is its relatively lengthy time series, from 1969 through 2003. However, inconsistencies in the time series exist in 1975 and 1988 when updates to the SIC were implemented. The NAICS was implemented in 2001, causing a discontinuity: industry data prior to 2001 cannot be compared to 2001 or later data.

A serious limitation of the BEA data is that only an intermediate level of industrial detail is available, generally corresponding to the 2-digit SIC and 3-digit NAICS. The number of available categories is 74 for the SIC data and 94 for the NAICS data. Even at this moderate level of detail, some data were withheld for Arizona. These data were imputed for this study. Because of the limited sectoral data, this dataset was not used for other states or substate areas.

The BEA recently released compensation data for wage and salary workers for the first time, with history back to 1998 (the 1998-to-2000 data are by SIC). For Arizona and the nation, three measures of industrial mix and change in job quality were calculated from the BEA data for the 2001-to-2003 period: (1) the average wage (the primary measure used in this report) is computed from wage and salary disbursements and wage and salary employment; (2) average compensation — also for wage and salary employment — adds several other types of compensation to wages and salaries: employer payments for pension plans, group health and life insurance, government social insurance, and other supplemental payments; and (3) average earnings adds proprietors' income and other compensation to wage and salary compensation for all workers. The analysis of the three measures combined categories with missing data rather than imputing values for undisclosed data. This technique accounted for a modest difference in Arizona's 2003 industrial mix value but no difference in its job quality scores relative to the data that used imputed values.

Census Bureau County Business Patterns (CBP)

The U.S. Census Bureau, part of the U.S. Department of Commerce, annually reports establishment, employment, and payroll data for the nation, states, and counties. Full industrial detail is available for most sectors, but the public sector, farming, and certain other industries are not included in this dataset. In most subnational areas the employment and payroll data are withheld for many industries and higher-level NAICS categories. The latest data are for 2002.

The conversion to NAICS occurred in 1998 in this series, in contrast to 2001 in the BEA series. To take advantage of the longer NAICS series, the 1998 and 2002 data from CBP were analyzed for this study. The intermediate years (1999 through 2001) were not included because of the processing time. Arizona data were available in both years in 710 categories (mostly industries, but including some aggregations of more than one industry or industry group). Like the ES-202 dataset, the unclassified category was excluded. Because of the significant size of the industries not included in the CBP dataset, an alternative version of the dataset — that adds BEA data for the missing industries — also was used in this project.

Census Bureau Decennial Census (PUMS)
The Public Use Microdata Sample is a very different dataset from the others used in this study. PUMS provides raw data by person for a multitude of variables (including both industry and occupation), while in the other datasets a limited number of indicators (such as employment or wages) are already aggregated into industrial or occupational categories.

Four measures of employment and wages were created from the PUMS dataset for Arizona and the nation for 1999 (much of the economic data in the decennial census is for the prior year, e.g. 1999 from the 2000 census). In order to match the PUMS results to those of other datasets, one measure limits the analysis to people who had wage and salary income, with no consideration to how much the person worked during the year (since the other datasets do not adjust the wage figures for the number of weeks worked during the year or the average number of hours per week worked). The second measure adds self-employment income to wages and salaries to obtain a measure of earnings. Each of these two measures then were adjusted to full-time equivalency: the wage and salary income or earnings figure was divided by the approximate number of hours worked in the year (obtained from the number of weeks worked in 1999 and the average number of hours per week worked), then this hourly wage was multiplied by 2,080 hours.

Conceptually, the full-time-equivalent measure of earnings — the most comprehensive of the four measures — is superior to the others. It was the only measure used for the 1989 data for the state and nation, and only this measure was used for the comparison states and substate areas. Because of the limited sample size, the only substate areas analyzed were Maricopa County (the Phoenix area), Pima County (the Tucson area), and the balance of the state.

The Census Bureau combined some industries prior to producing the PUMS file, so that 264 industries are available from the 2000 census (243 from the 1990 census). Occupations were similarly combined, so that 473 are available for 2000 (504 for 1990).

PUMS has several shortcomings: it is available only every 10 years, both the industrial and occupational codes differ between 1990 and 2000 so that the job quality score cannot be calculated, it is only a 5 percent sample of the population, and it uses an alternative definition of public sector employment. (Most datasets put all public-sector employees in the government sector. The alternative classification assigns most public-sector employees to other sectors, with the remainder placed in the public administration sector). Further, the accuracy/validity of the responses provided by individuals who completed the long-form of the decennial census cannot be verified.

In terms of this project, the accurate reporting of earnings, industry, and occupation in the decennial census is of key importance. On the 2000 census long-form questionnaire, respondents were asked to provide the name of their employer and the “kind of business or industry.” Census Bureau personnel used this information to assign the NAICS industry. Similarly, respondents were asked to state the “kind of work” and the “most important activities or duties,” which were used by the Census Bureau to assign the SOC occupation.

Both the industrial structure and occupational structure reported in the decennial census are considerably different from those of other datasets. These differences are reflected in the results, where estimates of average wage and job quality from the PUMS data are not consistent with those of other datasets, even when the unadjusted wage and salary measure from the PUMS dataset is used for the comparison.

The ES-202 dataset can be used to calculate sectoral employment based on the public administration classification as well as on the government classification. Relative to the ES-202 public administration data for 1999, the 1999 census data report a much lesser share of the workforce employed in the administrative support sector, with other lesser shares in accommodation and food services, management of companies, and retail trade. A greater share of the workforce was in the construction, educational services, and other services sectors. For most sectors, the differentials between the two datasets for Arizona are similar to those for the nation.

The census 1999 occupational data were compared to the OES data (for 2000). The census considerably underreported food preparation and serving and administrative support occupations, with lesser shares also in the transportation and material moving and production occupational groups. Census shares for the management group were much higher, with higher shares also in business and financial occupations. The differentials between the two datasets for Arizona are similar to those for the nation for most occupational groups, but some variation is present, especially in the construction and extraction group and in the sales group.

RESULTS: ARIZONA AND THE UNITED STATES

Assessments of Arizona's industrial and occupational mixes, and of the change in job quality in Arizona and the nation, vary somewhat by dataset. Differences in the results across the datasets in part reflect the variation in availability of industrial detail. Using the NAICS, full 6-digit industrial detail is available from the ES-202 data. The CBP dataset also has full industrial detail but excludes certain important industries. In some cases, PUMS data are available at the 6-digit level, but more commonly the Census Bureau combined categories to the 4-digit (or 3-digit) level. In the construction sector, only 2-digit data are available. The BEA data largely consists of 3-digit detail, though in some sectors only the 2-digit totals are provided.

However, each dataset differs in other ways, which also partially explain the differences in results. For example, various industries are excluded from the CBP dataset. The PUMS dataset uses the public administration definition of government, in which many government employees are classified in other sectors; the sectoral share of public administration was only 6.7 percent in 1999 in Arizona. However, all public-sector employees are included in the government sector in the BEA dataset, which had a sectoral share of 16.4 percent in Arizona in 1999, and in the ES-202 dataset, which had a 14.4 percent sectoral share.

Conceptually, the more industrially detailed the data, the more robust the results will be. However, a practical limitation applies at subnational levels: if an industry has few employees, its average wage may be unrepresentative. Since the subnational average wage is used in calculations of the change in subnational job quality, small industry size may distort the results. The small sample size of the PUMS also is an issue, though the subnational wage data are not used since the job quality score cannot be calculated.

Since the datasets use different definitions of employment, totals do not match, as seen in Table 1. The BEA dataset provides the highest estimate of employment, with the lowest from the CBP (before being supplemented by the BEA data).

Generally, results from the BEA, ES-202, and OES datasets are similar in terms of average wage, ratio of the Arizona average wage to the national average, job quality, and the change in job quality. Results from CBP differ: the average wage is lower, the Arizona average wage is lower relative to the national average, Arizona's industrial mix value is lower, and the change in

TABLE 1
COMPARISON OF MOST RECENT DATA BY DATASET

	Employment		Average Wage		
Dataset	**Arizona**	**U.S.**	**Arizona**	**U.S.**	**Ratio**
2003 BEA	2,408,821	137,137,000	$34,738	$37,154	93.5%
2003 ES-202	2,271,582	127,795,829	35,050	37,765	92.8
2002 CBP	1,945,472	112,400,654	30,747	35,098	87.6
2003 OES	2,275,410	127,420,170	34,030	36,520	93.2

Sources: U.S. Department of Commerce, Bureau of Economic Analysis (BEA); U.S. Department of Commerce, Census Bureau (CBP); U.S. Department of Labor, Bureau of Labor Statistics (ES-202 and OES).

job quality nationally and in Arizona are somewhat different from those of the other datasets. Supplementing the CBP with BEA data reduces the differences in results relative to the other datasets, but the CBP results still are not in line with those from other datasets.

While the CBP presents a more pessimistic view of job quality in Arizona than the BEA, ES-202, and OES datasets, the PUMS data paint a more optimistic picture. The differential in the average wage between Arizona and the nation is less from PUMS, and the Arizona industrial and occupational mixes are assessed more favorably.

A discussion of the average wage is presented first. The effects of industrial mix and occupational mix on the average wage in the latest year then are examined, followed by a focus on changes in job quality over time. Each section compares the results from the different datasets before presenting detail from each dataset.

Average Wage

The overall average wage is not by itself a good measure of job quality. While the overall average wage incorporates job quality, it also reflects such other factors as labor force supply and demand, perceived quality of place, productivity, and cost of living. Similarly, increases over time in the overall average wage do not necessarily indicate improvements in job quality. For example, technological innovations increase productivity and raise wages without any change in job quality.

Arizona's average wage is less than the national average according to each of the datasets. Three datasets place the 2003 difference at 7 percent (about $2,500), but the CBP data show a larger differential of 12 percent (more than $4,000). In contrast, the PUMS dataset indicates that the differential in 1999 was smaller than measured by the other datasets: less than 5 percent compared to 8-to-9 percent from the BEA and ES-202 datasets. The time series from the BEA shows that the average wage differential between the United States and Arizona historically ranged over the economic cycle by between 1 and 5 percent, typically reaching its low point somewhat after the end of a recession. The differential reached 10 percent in 1993, twice the differential of prior economic troughs, before narrowing to 7 percent in 2002 and 2003 — still greater than the historical norm for troughs.

Arizona's occupational mix in 2003 had almost no effect on the state's average wage being below average. The 2003 industrial mix contributed to the subpar wages, but explained only a little more than 1 percentage point (20 percent) of the 7-point differential. In contrast, using the 1999 PUMS data, the industrial mix and occupational mix each had a small positive effect on the state's average wage relative to the national average.

Thus, little (or none using the PUMS data) of the state's subpar wages can be traced to job quality. Similarly, geographic differences in living costs only slightly (if at all) contribute to the average wage differential between Arizona and the United States (see Appendix III). Most of the average wage differential therefore is due to unmeasured factors, such as productivity and labor force supply and demand. No productivity data exist for Arizona. Worker productivity in Arizona could be below the national average due to lesser investments in physical or human capital, which would result in lower wages. Labor market supply and demand factors are a likely

cause of the low wages in Arizona. A substantial number of people seem willing to move to Arizona and accept a substandard wage in exchange for perceived qualitative advantages to living in Arizona, primarily climate. This condition has been called the "sunshine factor."

BEA Average Wage

Calculated from BEA data on wage and salary disbursements and wage and salary employment, Arizona's average wage was $34,738 in 2003 — 6.5 percent ($2,416) less than the national average of $37,154. Adding compensation other than wages and salaries, average total compensation of wage and salary workers was $42,160 in 2003 — 7.9 percent less than the national average. Compensation other than wages and salaries was considerably below the national average in Arizona (13.8 percent less in 2003). Adding all sources of income of proprietors to the compensation of wage and salary workers, average earnings of all workers was $39,230 in 2003 in Arizona, also 7.9 percent less than the national average. Thus, Arizona is slightly further below the national average on both average compensation and average earnings than on average wage. The rest of this subsection is based on the average wage measure.

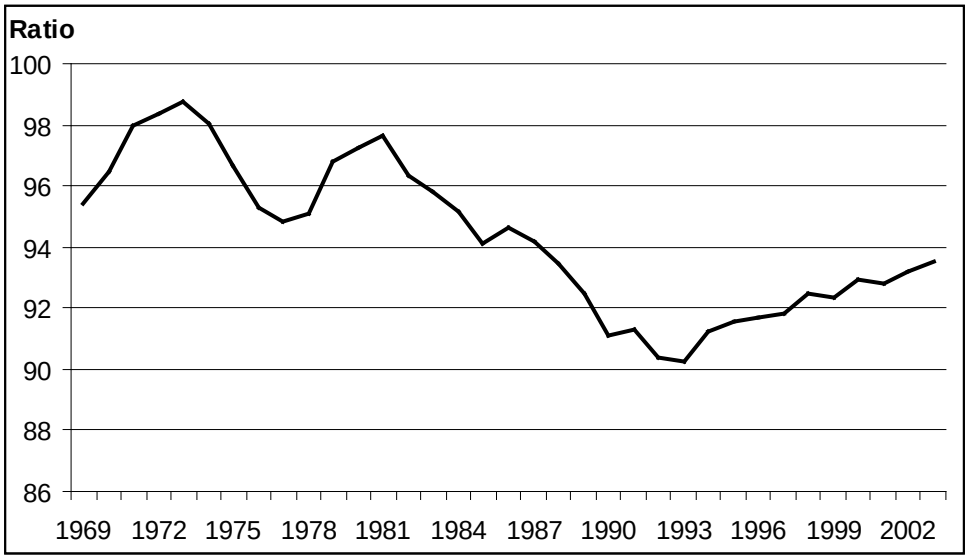
In most years from 1969 through 2003, the percent change in the average wage — adjusted for inflation using the GDP implicit price deflator — was positive but less than 2 percent, both nationally and in Arizona. The strongest gains in the average wage occur in expansionary years and the weakest during recessions. For five consecutive years from 1996 through 2000, the average wage rose by unusually large amounts (at least 2 percent), both nationally and in Arizona. This was followed by two years of essentially no change during and immediately after the recession, before typical growth resumed in 2003 (1.0 percent in the U.S. and 1.3 percent in Arizona).

Expressed as a ratio to the national average, Arizona's average wage has cycled over time, partially related to the economic cycle (see Chart 1). In the 1970s and early 1980s, the ratio peaked just before the start of a recession, at 98.8 in 1973 and 97.6 in 1981. It reached its trough at 94.8 in 1977, two years after the end of the recession. In the 1980s, the ratio rose in just one year, breaking the earlier pattern of rising during expansions. It reached its low of 90.2 in 1993, two years after the end of the recession. Since 1993, the ratio has climbed in most years, though generally by modest amounts. The ratio did not fall during and just after the 2001 recession. Despite this, the 2003 figure of 93.5 still was less than that of all years from the start of the series in 1969 through 1987.

Arizona's average wage in 2003 was sixth highest among 10 western states, as seen in Table 2. The change in the average wage is shown over three time periods. (The years 1984 and 1993 were selected because they represent a similar point in their economic cycle to 2003; 1998 was selected to focus on more recent changes.) Arizona ranked among the top four western states in each time period.

Thus, Arizona's average wage lost ground relative to the national average between the early 1980s and early 1990s, only a portion of which has since been recovered. However, Arizona's average wage performance since 1984 has been slightly better than that of the median western state. Four of nine other western states had a lower average wage in 2003 than Arizona.

CHART 1
ANNUAL RATIO OF AVERAGE WAGE IN ARIZONA TO U.S. AVERAGE, BEA DATA



Source: U.S. Department of Commerce, Bureau of Economic Analysis.

Adjusting for the cost of living (calculated from the ACCRA data presented in Appendix III), Arizona's average wage in 2003 was about 5 percent less than the national average, about the same as in 1982. The differential had been between 9 and 11 percent from 1985 through 1999. Only partially adjusting for the cost of living by averaging the adjusted and unadjusted differentials, Arizona's average wage in 2002 and 2003 was about 6 percent less than the national average. It had been about 5 percent less in 1982 and 1983, but was about 9 percent less from 1990 through 1999.

ES-202 Average Wage

The average wage according to the ES-202 data is similar to that from the BEA data. In 2003, the ES-202 average wage in Arizona of $35,053 was 7.2 percent less than the national average. Like the BEA measure, the ES-202 average wage in Arizona as a ratio to the national average has climbed somewhat from the low point of the early 1990s (see Chart 2).

CBP Average Wage

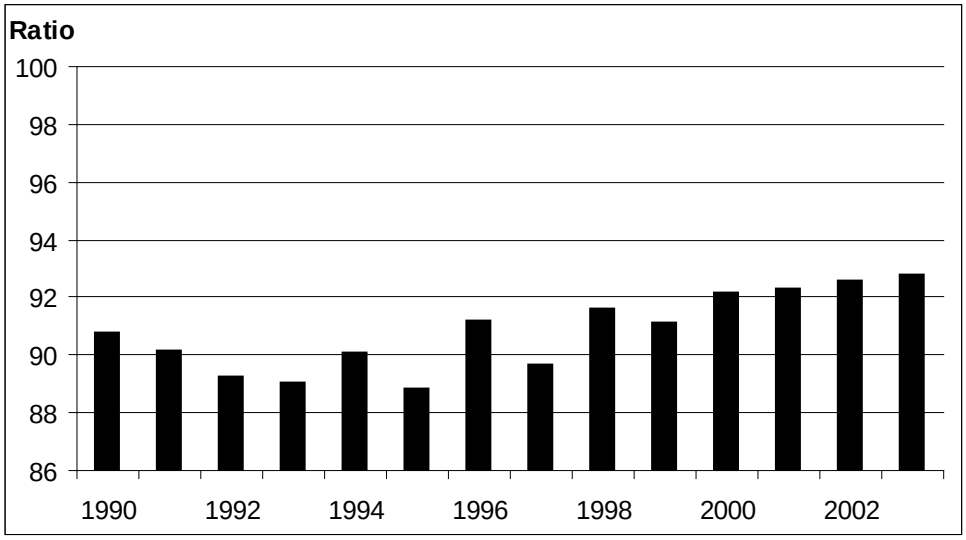
Arizona's average wage based on the County Business Patterns dataset — which excludes government employees, farm workers, and certain other workers — is further below the national average than calculated from BEA or ES-202 data. The 2002 CBP differential was -12.4 percent, compared to -6.8 percent using the BEA data and -7.4 percent based on ES-202 data for the same year. Further, the 1998-to-2002 increase in the average wage was less in Arizona than the national average using the CBP data, while the increase was greater in Arizona using the BEA and ES-202 data. Thus the wage ratio to the U.S. average based on the CBP data fell 2.3 percentage points (from 89.9 to 87.6) over the four years, while the ratios based on the BEA and ES-202 data rose 0.7 and 1.0 percentage points respectively.

TABLE 2
AVERAGE WAGE RATIO TO NATIONAL AVERAGE, 10 WESTERN STATES, BEA DATA

	2003		1984-2003 Change		1993-2003 Change		1998-2003 Change	
1.	CA	112.5	WA	4.1	CO	5.8	CO	2.4
2.	WA	105.7	CA	3.5	WA	4.8	CA	1.9
3.	CO	103.3	CO	1.3	**AZ**	**3.2**	**AZ**	**1.0**
4.	TX	98.0	**AZ**	**-1.7**	TX	1.4	NM	0.1
5.	NV	96.5	OR	-2.5	CA	1.3	TX	-0.6
6.	**AZ**	**93.5**	NV	-3.2	OR	-0.3	WA	-0.9
7.	OR	91.1	TX	-4.0	UT	-1.6	NV	-1.1
8.	UT	83.0	ID	-7.8	NM	-1.6	OR	-1.5
9.	NM	82.0	NM	-8.4	NV	-3.2	UT	-1.5
10.	ID	76.0	UT	-10.0	ID	-4.1	ID	-1.8

Source: U.S. Department of Commerce, Bureau of Economic Analysis.

CHART 2
ANNUAL RATIO OF AVERAGE WAGE IN ARIZONA TO U.S. AVERAGE, ES-202 DATA



Source: U.S. Department of Labor, Bureau of Labor Statistics.

To assess the effect of the industries excluded from the CBP dataset, BEA data for these industries were added to the CBP dataset. This had little effect on the results: the adjusted CBP average wage ratio was 88.2 in 2002, down from 91.1 in 1998.

The average wage is lower in the CBP dataset than in the BEA and ES-202 datasets in most sectors, both nationally and in Arizona. A portion of the lower wage in the CBP dataset results from timing differences: the average wage figure in the ES-202 and BEA datasets is an annual average figure, while the CBP average wage is for the first quarter of the year. In Arizona, the CBP average wage is further below the BEA and ES-202 figures than the national average. The average wage differential between the datasets is greater in Arizona in most sectors.

OES Average Wage

The 2003 ratio of Arizona's average wage to the national average based on the OES data (93.2) was similar to that of the BEA and ES-202 data (93.5 and 92.8). However, the OES ratio dropped slightly (0.4 percentage points) between 2000 and 2003, while the ratios based on the two other datasets each rose 0.6 percentage points.

PUMS Average Wage

The average wage calculated from the PUMS dataset was 6-to-7 percent higher than the averages from the BEA and ES-202 datasets for 1999, with all averages calculated on wages and salaries unadjusted for the number of hours worked. The higher PUMS average wage could in part be due to sampling error, but more likely results from some respondents to the 2000 census misreporting their wages.

Adding self-employment income to wage and salary income hardly raises the average earnings figure for 1999 and barely affects the ratio of the Arizona figure to the national average, as seen in Table 3. Adjusting each of these measures to a full-time-equivalent basis has more effect, raising the dollar average and lowering the ratio of the Arizona figure to the national average. The full-time-equivalent earnings measure is the most comprehensive of the four. Arizona's average on this basis was -6.2 percent below the national average in 1999, compared to -5.8 percent in 1989.

TABLE 3
AVERAGE WAGE IN 1999, PUMS DATA

	Arizona	United States	Ratio
Wages and Salaries	$32,464	$34,016	95.4%
Earnings	32,947	34,574	95.3
FTE Wages and Salaries	35,998	38,482	93.5
FTE Earnings	37,063	39,526	93.8

FTE = full time equivalent

Source: Calculated from U.S. Department of Commerce, Census Bureau, Public Use Microdata Sample (2000).

Job Mix

The job mix refers to a comparison of the occupational or industrial structure of employment in a subnational area to the national average at a point in time. To isolate the effect of differences in the job structure, average wage is held constant in the calculation of job mix by using national wage data. Generally, Arizona's industrial mix has a small depressing effect, and the occupational mix no effect, on its average wage.

Arizona's most recent industrial mix values are negative as calculated from the ES-202, BEA, and CBP datasets, as seen in Table 4. The amount of sectoral detail available by dataset explains part of the variation in the industrial mix across the three datasets. Calculated at a standard 2-digit level, the variation in the industrial mix values is not as great, ranging from -2.2 percent from the BEA data to -3.4 percent from the CBP data. In contrast to these negative values, the PUMS data indicate that the industrial mix was marginally positive in 1999, about 2 points higher than the values from the ES-202 and BEA data.

The state's industrial mix accounted for 20 percent of the average wage differential from the national average according to the 2003 ES-202 and BEA data, and 30 percent based on the 2002 CBP data. In contrast, the occupational mix was not responsible for the state's subpar average wage. According to the OES data, the 2003 occupational mix had a value of just -0.1; the PUMS data indicated a positive value of 0.5 in 1999.

The relatively large sizes in Arizona of the below-average-wage administrative support and accommodation and food services sectors were the main reasons for the state's subpar industrial mix in 2002 and 2003 based on the BEA, ES-202, and CBP datasets. (The PUMS dataset agrees that each of these sectors had a sizable negative effect in 1999.) The relatively small sizes in Arizona of the high-wage management of companies, information, and professional, scientific and technical services sectors also contributed significantly. (These sectors had only slight negative effect in the PUMS data.) Within these sectors, the larger-than-average but low-wage temporary help, employee leasing, telephone call centers, lodging places, and restaurants

TABLE 4
COMPARISON OF ARIZONA JOB MIX VALUES
Based on Unadjusted Wages and Salaries

	Industrial Mix				Occupational Mix	
	ES-202	BEA	CBP*	PUMS	OES	PUMS
1998	-2.0	-1.7	-2.4			
1999	-2.1	-1.7		0.2		0.5
2000	-1.1	-1.4			-0.2	
2001	-1.2	-1.3				
2002	-1.5	-1.3	-3.5			
2003	-1.5	-1.3			-0.1	

* Adjusted for missing industries

Sources: Calculated from U.S. Department of Commerce, Census Bureau (CBP and PUMS) and Bureau of Economic Analysis (BEA), and U.S. Department of Labor, Bureau of Labor Statistics (ES-202 and OES).

industries were specific causes of the state's below-average industrial mix. In addition, the scarcity in Arizona of the high-wage corporate and regional managing offices and research and development industries contributed to the state's subpar industrial mix. Some finance and insurance industries, such as securities and investment banking, also had a negative effect. (The only large negative effects in the PUMS dataset were from the tourism industries of accommodation and food services.)

In contrast, using the BEA, ES-202, and CBP data, positive effects on the state's industrial mix were smaller. Manufacturing and health care and social assistance had the largest positive values. (The PUMS data agree.) The large size of the high-technology industries of electronics (especially semiconductors) and aerospace were the main positive influences. The small size of the low-paying nursing care facilities industry was the largest positive force within the health care sector.

The modestly higher 2003 industrial mix value of the BEA dataset relative to the ES-202 dataset resulted from higher values in the educational services and professional, scientific and technical services sectors. The 2-point difference between the ES-202 and adjusted CBP industrial mix values primarily resulted from a 1.2 point difference in the finance and insurance sector, though the CBP values also were lower in the accommodation and food services; arts, entertainment and recreation; and retail trade sectors.

The 1999 PUMS industrial mix estimate was 2.2 points higher than the ES-202 value for the same year. The PUMS value was considerably higher in the administrative support; professional, scientific and technical services; management of companies; finance and insurance; and agriculture sectors, but was a little lower in several sectors, especially manufacturing.

Based on the OES data, Arizona's occupational mix had almost no net effect on the differential in the overall average wage between Arizona and the nation. (A modest positive effect of 0.5 percent was measured from the PUMS data in 1999.) The largest positive effects on the average wage came from the below-average size of the below-average-paying production occupations group — which mostly consists of lower-wage manufacturing jobs — and the larger-than-average size of the high-paying architecture and engineering group. Arizona had a large number of aerospace, electronics, and electrical engineers, who mostly were employed in high-tech manufacturing industries. (The PUMS data agree with these findings, but add positive effects from the transportation and healthcare support occupational groups.) The largest negative effect came from the large size of the low-paying food preparation and serving group. Arizona's relatively small number of workers in the high-paying health practitioners and technical group also was a negative factor. (The PUMS data agree on the primary importance of the food preparation and serving group; negative effects from the administrative support and construction groups also existed.)

Comparing the 1999 PUMS occupational mix to the 2000 mix from the OES, the higher value from the PUMS data largely resulted from higher values in a few occupational groups: transportation, health practitioners, and food preparation and serving. The PUMS estimate was lower in several groups, particularly management and administrative support.

BEA Industrial Mix

Using moderately detailed sectoral data from the BEA, the negative impact of the industrial mix on Arizona's average wage has lessened since 1992, nearly matching in recent years the record smallest effect measured in 1973 at a little more than 1 percent (see Table 5). As a share of the average wage differential between the U.S. and Arizona, the impact of the industrial mix also has declined to the lowest shares on record in recent years (about 20 percent). Through the early 1980s, the industrial mix accounted for more than half of the smaller overall wage differential.

In contrast, the impact on the average wage differential of factors other than the industrial mix (occupational mix, workforce demographics, supply and demand, etc.) increased substantially from near zero in the early 1970s to nearly 7 percentage points in 1993. Though decreasing since 1993, the 2003 value still was historically high at 5.2 percent.

Despite the negative overall value, a positive industrial mix value occurred in 2003 in half of the 20 sectors (with the sectoral industrial mix value calculated as the sum of the detailed categories within each sector). Most of the values were small (see Table 6). The administrative services sector was the primary cause of the negative overall value.

All of the detailed categories with a job mix value of at least +-0.1 are shown in Table 7. As a group, smaller-than-average categories in Arizona with a higher-than-average wage — such as professional services and chemical manufacturing — were disproportionately responsible for the poor job mix. However, the large size in Arizona of the below-average-paying administrative support category (which includes such activities as employee leasing, call centers, travel arrangement, security services, and janitorial services) was by far the single largest source of Arizona's below average industrial mix in 2003. In contrast, three high-paying categories were larger in Arizona than nationally: electronics manufacturing, manufacturing of transportation equipment other than motor vehicles (mostly aerospace), and credit intermediation. Categories other than the 19 shown in the table had hardly any net effect on the job mix.

The industrial mix value varied slightly across the three measures calculated from the BEA data. In 2003, Arizona's industrial mix had a value of -1.4 based on average wage (this estimate is calculated by combining categories with missing data and is marginally different from the -1.3 figure presented above that used imputed data). The industrial mix value was -1.6 based on average compensation, and -1.1 based on average earnings. The small differences in the industrial mix values indicate that the inclusion of other compensation with wages and salaries worsens the industrial mix value of wage and salary workers, but that the inclusion of proprietors' income improves the industrial mix value of all workers.

TABLE 5
ANNUAL EFFECT OF INDUSTRIAL MIX ON AVERAGE WAGE, BEA DATA

	Percent Difference in Overall Average Wage, AZ v. US	Industrial Mix* as Percent of U.S. Average Wage	Other Factors as Percent of U.S. Average Wage	Industrial Mix Share of Difference
1969	-4.6	-2.8	-1.8	61%
1970	-3.5	-2.1	-1.5	59
1971	-2.0	-2.0	-0.0	100
1972	-1.6	-1.6	-0.1	95
1973	-1.2	-1.2	0.0	100
1974	-2.0	-1.5	-0.5	75
1975	-3.3	-2.1	-1.2	63
1976	-4.7	-2.5	-2.2	54
1977	-5.2	-2.7	-2.4	53
1978	-4.9	-2.6	-2.3	53
1979	-3.2	-1.9	-1.3	60
1980	-2.8	-1.9	-0.9	67
1981	-2.4	-1.5	-0.9	63
1982	-3.7	-1.9	-1.8	52
1983	-4.2	-1.9	-2.3	45
1984	-4.8	-1.9	-3.0	39
1985	-5.9	-1.9	-4.0	33
1986	-5.4	-1.7	-3.7	32
1987	-5.8	-1.8	-4.1	30
1988	-6.5	-2.3	-4.3	35
1989	-7.5	-2.5	-5.0	34
1990	-8.9	-2.6	-6.3	29
1991	-8.7	-2.9	-5.8	34
1992	-9.6	-3.1	-6.5	32
1993	-9.8	-2.9	-6.8	30
1994	-8.7	-2.7	-6.1	31
1995	-8.5	-2.3	-6.2	27
1996	-8.3	-2.0	-6.3	24
1997	-8.2	-1.9	-6.3	23
1998	-7.5	-1.7	-5.8	23
1999	-7.7	-1.7	-6.0	22
2000	-7.1	-1.4	-5.7	20
2001	-7.2	-1.3	-5.9	18
2002	-6.8	-1.3	-5.5	19
2003	-6.5	-1.3	-5.2	20

* Sum by industry of (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

TABLE 6
INDUSTRIAL MIX BY SECTOR IN 2003, BEA DATA

Sector	Job Mix Value*
Health Care and Social Assistance	0.37
Manufacturing	0.27
Other Services	0.24
Educational Services	0.19
Construction	0.12
Transportation	0.06
Utilities	0.04
Arts, Entertainment and Recreation	0.04
Real Estate	0.03
Government	0.01
Retail Trade	-0.05
Wholesale Trade	-0.08
Information	-0.12
Finance and Insurance	-0.12
Mining	-0.13
Agriculture	-0.15
Management of Companies	-0.33
Professional, Scientific and Technical Services	-0.35
Accommodation and Food Services	-0.44
Administrative Support	-0.89
TOTAL	**-1.29**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sector totals are calculated as the sum of the more detailed values within each sector.

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

TABLE 7
INDUSTRIAL MIX BY CATEGORY IN 2003, BEA DATA
Categories with a Job Mix Value of at Least +-0.1

Category	Arizona – U.S. Sectoral Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Sectoral Share Larger in Arizona & Above Average Wage			
Computer and Electronic Product Manufacturing	0.88	1.88	0.78
Other Transportation Equipment Manufacturing	0.63	1.60	0.38
Credit Intermediation	0.86	1.41	0.35
Sectoral Share Smaller in Arizona & Below Average Wage			
Nursing Care Facilities	-0.61	0.61	0.24
Membership Organizations	-0.77	0.73	0.21
Educational Services	-0.80	0.77	0.19
Social Assistance	-0.26	0.53	0.12
Sectoral Share Larger in Arizona & Below Average Wage			
Administrative Support	2.74	0.68	-0.87
Food Services	0.40	0.36	-0.25
Accommodation	0.52	0.63	-0.19
Agricultural Support	0.36	0.51	-0.18
Sectoral Share Smaller in Arizona & Above Average Wage			
Securities	-0.14	3.71	-0.39
Chemical Manufacturing	-0.51	1.75	-0.38
Professional, Scientific and Technical Services	-0.57	1.61	-0.35
Management of Companies	-0.35	1.94	-0.33
Motor Vehicle Manufacturing	-0.58	1.43	-0.25
Machinery Manufacturing	-0.52	1.30	-0.15
Oil and Gas Extraction	-0.09	2.55	-0.14
Publishing	-0.18	1.62	-0.11
Subtotal with a Positive Job Mix Value	-0.07		2.27
Subtotal with a Negative Job Mix Value	1.08		-3.59
Categories Not Shown	-1.01		0.03
TOTAL	**0.00**		**-1.29**

* The sectoral shares are presented as percentages (multiplied by 100)
** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

ES-202 Industrial Mix

Arizona's industrial mix, as calculated from detailed ES-202 data, lowered the average wage 1.5 percent in 2003 relative to the national average, a lesser impact than during the early 1990s when the figure was close to 3 percent (see Table 8). The industrial mix accounted for about 20 percent of the state's shortfall in average wage from the national average in 2002 and 2003. Factors other than industrial mix lowered the average wage by nearly 6 percent in 2003, a lesser effect than during the 1990s.

The sectors most contributing to the state's below average industrial mix in 2003 were administrative support; professional, scientific and technical services; accommodation and food services; and management of companies. The main offsets to these negative factors were manufacturing and health care and social assistance (see Table 9).

The industry with the greatest industrial mix value in 2003 was semiconductor manufacturing. Other high-paying industries with a positive value included other high-tech manufacturing activities — search and navigation instruments and aircraft engines — and wholesaling of electronic products (see Table 10). The largest negative values were in the low-wage employee leasing, temporary help, and tourism-related industries of accommodation and food services. The high-paying corporate and regional offices; research and development in the physical, engineering, and life sciences; and finance industries of investment banking and portfolio management also had negative values.

TABLE 8
ANNUAL EFFECT OF INDUSTRIAL MIX ON AVERAGE WAGE, ES-202 DATA

	Percent Difference in Overall Average Wage, AZ v. US	Industrial Mix* as Percent of U.S. Average Wage	Other Factors as Percent of U.S. Average Wage	Industrial Mix Share of Difference
1990	-9.2	-2.8	-6.4	30%
1991	-9.9	-2.9	-7.0	29
1992	-10.8	-2.9	-7.9	27
1993	-11.0	-2.5	-8.5	23
1994	-9.9	-2.6	-7.3	26
1995	-11.1	-2.6	-8.5	23
1996	-8.8	-2.4	-6.4	27
1997	-10.4	-1.9	-8.5	18
1998	-8.4	-2.0	-6.4	24
1999	-8.9	-2.1	-6.8	24
2000	-7.8	-1.1	-6.7	14
2001	-7.7	-1.2	-6.5	16
2002	-7.4	-1.5	-5.9	20
2003	-7.2	-1.5	-5.7	21

* Sum by industry of (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 9
INDUSTRIAL MIX BY SECTOR IN 2003, ES-202 DATA

Sector	Job Mix Value*
Manufacturing	0.46
Health Care and Social Assistance	0.44
Other Services	0.21
Arts, Entertainment and Recreation	0.20
Transportation	0.11
Wholesale Trade	0.08
Real Estate	0.06
Retail Trade	0.02
Utilities	0.01
Government	-0.02
Mining	-0.02
Educational Services	-0.05
Finance and Insurance	-0.08
Construction	-0.09
Information	-0.21
Agriculture	-0.24
Management of Companies	-0.34
Accommodation and Food Services	-0.53
Professional, Scientific and Technical Services	-0.69
Administrative Support	-0.82
TOTAL	**-1.50**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sector totals are calculated as the sum of the industrial values within each sector.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 10
INDUSTRIAL MIX BY INDUSTRY IN 2003, ES-202 DATA
Industries with a Job Mix Value of at Least +-0.1

Industry	Arizona – U.S. Sectoral Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Sectoral Share Larger in Arizona & Above Average Wage			
Semiconductor Manufacturing	0.84	2.18	0.99
Search and Navigation Instrument Manufacturing	0.24	2.03	0.25
Electronics Parts Wholesale	0.24	1.80	0.20
Sports Teams	0.06	4.16	0.18
Management Consulting Services	0.19	1.92	0.18
Aircraft Engine Manufacturing	0.22	1.69	0.15
Other Credit Intermediation	0.34	1.40	0.14
Sectoral Share Smaller in Arizona & Below Average Wage			
Nursing Care Facilities	-0.74	0.62	0.28
Private Households	-0.28	0.40	0.17
Sectoral Share Larger in Arizona & Below Average Wage			
Employee Leasing Services	1.26	0.72	-0.35
Hotels and Motels	0.72	0.54	-0.33
Temporary Help Services	0.53	0.54	-0.25
Limited Service Restaurants	0.26	0.29	-0.18
Farm Labor	0.27	0.34	-0.18
Full Service Restaurants	0.18	0.36	-0.15
Sectoral Share Smaller in Arizona & Above Average Wage			
Corporate and Regional Managing Offices	-0.38	1.85	-0.32
Research & Development in Sciences	-0.27	2.03	-0.27
Investment Banking	-0.07	4.18	-0.24
Legal Services	-0.25	1.75	-0.19
Portfolio Management	-0.06	4.00	-0.19
Pharmaceutical Preparation Manufacturing	-0.14	2.15	-0.17
Custom Computer Programming	-0.14	2.05	-0.15
Motion Picture Production	-0.11	1.90	-0.10
Subtotal with a Positive Job Mix Value	1.31		2.75
Subtotal with a Negative Job Mix Value	1.80		-3.07
Industries Not Shown	-3.11		-1.18
TOTAL	**0.00**		**-1.50**

* The sectoral shares are presented as percentages (multiplied by 100)

** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

CBP Industrial Mix

Using detailed CBP data for 2002, the industrial mix was responsible for a little more than a third of the overall wage differential between Arizona and the nation (4.3 percentage points of the total of 12.4). Using the adjusted CBP dataset (which adds BEA data for excluded industries), industrial mix accounted for 30 percent of the overall wage differential between the nation and the state (3.5 of 11.8 percentage points).

The average wage figures from the CBP dataset were lower than those from other datasets in 2002 and showed deterioration over time (1998 to 2002) relative to the national average, in contrast to modest improvement according to other datasets. Similarly, the industrial mix calculated from the CBP data was further below average than indicated by the other datasets and lost ground over time, in contrast to improvements registered in the other data.

Large negative industrial mix values in the finance and insurance, accommodation and food services, and administrative support sectors accounted for most of the large negative overall value. Moderate negative values in some sectors were offset by similarly sized positive values in other sectors, particularly manufacturing (see Table 11).

TABLE 11
INDUSTRIAL MIX BY SECTOR IN 2002, CBP DATA

Sector	Job Mix Value*
Manufacturing	0.36
Health Care and Social Assistance	0.31
Other Services	0.30
Educational Services	0.15
Transportation	0.08
Agriculture	0.07
Government	0.01
Utilities	-0.05
Mining	-0.05
Real Estate	-0.06
Arts, Entertainment and Recreation	-0.11
Wholesale Trade	-0.12
Information	-0.16
Retail Trade	-0.26
Construction	-0.32
Management of Companies	-0.32
Professional, Scientific and Technical Services	-0.37
Administrative Support	-0.74
Accommodation and Food Services	-0.88
Finance and Insurance	-1.32
TOTAL	**-3.52**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sector totals are calculated as the sum of the industrial values within each sector. Data from the BEA were added for those industries missing from the CBP dataset.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

Using the unadjusted CBP data, the largest negative effect on the state's average wage came from the investment banking industry, with two other very high-paying finance industries (securities brokers and portfolio management) also relatively small in size (see Table 12). Tourism industries — two restaurant industries and a lodging industry — were among the relatively large, low-paying industries that also contributed negatively. Two temporary help/employee leasing industries and the telemarketing industry also were in this group.

In contrast, three high-paying manufacturing industries were larger in Arizona than nationally: semiconductor manufacturing, aerospace manufacturing other than aircraft, and search and navigation instruments. The relatively small size of some low-paying industries such as religious organizations and nursing care facilities also partially offset the negative impacts on industrial mix. Though the CBP industries shown in Table 12 are more detailed than the BEA categories in Table 7, considerable correspondence is seen in the listings in the two tables. Unlike the BEA data, industries not among the 27 shown in Table 12 had a large net negative effect on job mix. Similarities also are seen with the ES-202 data in Table 10.

OES Occupational Mix

The occupational mix in Arizona has almost no effect on the differential in the state's average wage from the national average. Occupational mix had an effect on the average wage of only -0.2 percent in 2000 and -0.1 percent in 2003. This minimal effect is the result of offsetting differences in the occupational structure between Arizona and the nation.

The relatively large size in Arizona of the high-paid architecture and engineering major group had the largest positive effect on Arizona's occupational mix in 2003 (see Table 13). Aerospace engineers, electronics engineers, and electrical engineers accounted for the bulk of the positive effect.

The smaller-than-national-average size of the lower-than-average-paid production workers occupational group was the other main positive contributor to the state's occupational mix in 2003. Many of the 69 occupations in this group had a small positive job mix value.

The high-paying and relatively large business and financial operations group had a much lesser positive effect on the mix than the architecture and engineering and production groups. The management analysts occupation was largely responsible, with the accountants/auditors and credit analysts occupations also contributing positively.

The fourth-largest positive effect on the mix was the relatively small size of the low-paid transportation and material moving occupational group. Many of the 26 occupations in this group had small positive job mix values.

Four high-paying management occupations were among the top 10 on positive job mix value: sales managers, financial managers, engineering managers, and chief executives. However, the small size of the general and operational managers occupation, which had the largest negative effect of any occupation, largely offset the positive effects of the other management occupations.

TABLE 12
INDUSTRIAL MIX BY INDUSTRY IN 2002, CBP DATA
Industries with a Job Mix Value of at Least +-0.125

Industry	Arizona – U.S. Sectoral Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Sectoral Share Larger in Arizona & Above Average Wage			
Semiconductor Manufacturing	0.54	1.93	0.50
Miscellaneous Aerospace Manufacturing	0.57	1.79	0.45
Search and Navigation Instruments	0.23	1.86	0.20
Scheduled Air Transportation	0.37	1.44	0.17
Aircraft Engine Manufacturing	0.21	1.67	0.14
Engineering Services	0.23	1.58	0.13
Computer Systems Design Services	0.14	1.93	0.13
Other Electronics Wholesale	0.13	2.03	0.13
Sectoral Share Smaller in Arizona & Below Average Wage			
Religious Organizations	-0.53	0.42	0.31
Nursing Care Facilities	-0.68	0.62	0.26
Colleges and Universities	-0.84	0.78	0.18
Sectoral Share Larger in Arizona & Below Average Wage			
Full-Service Restaurants	0.66	0.34	-0.44
Hotels and Motels	0.74	0.50	-0.37
Temporary Help	0.74	0.60	-0.30
Grocery Stores	0.58	0.50	-0.29
Limited-Service Restaurants	0.28	0.28	-0.20
Telemarketing	0.37	0.51	-0.18
Employee Leasing	0.63	0.74	-0.16
Sectoral Share Smaller in Arizona & Above Average Wage			
Investment Banking	-0.11	9.23	-0.88
Securities Brokers	-0.12	4.70	-0.45
Corporate Managing Offices	-0.20	2.16	-0.23
Portfolio Management	-0.06	4.20	-0.20
Research & Development, Physical & Life Sciences	-0.19	1.91	-0.17
Miscellaneous Insurance Carriers	-0.21	1.80	-0.17
Mining other than Metals	-0.22	1.72	-0.16
Misc. Other Transportation Equipment Manufacture	-0.21	1.70	-0.15
Offices of Lawyers	-0.23	1.56	-0.13
Subtotal with a Positive Job Mix Value	0.37		2.61
Subtotal with a Negative Job Mix Value	2.45		-4.46
Industries Not Shown	-2.82		-2.46
TOTAL	**0.00**		**-4.31**

* The sectoral shares are presented as percentages (multiplied by 100)
** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Commerce, Census Bureau.

TABLE 13
OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 2003, OES DATA

Major Occupational Group	Job Mix Value*
Architecture and Engineering	0.51
Production	0.48
Transportation and Material Moving	0.15
Business and Financial Operations	0.15
Management	0.09
Personal Care and Service	0.09
Office and Administrative Support	0.07
Healthcare Support	0.07
Community and Social Services	0.03
Sales and Related	0.01
Protective Service	-0.01
Installation, Maintenance, and Repair	-0.02
Legal	-0.06
Arts, Design, Entertainment, Sports and Media	-0.09
Farming, Fishing, and Forestry	-0.11
Building, Grounds Cleaning and Maintenance	-0.12
Construction and Extraction	-0.13
Life, Physical, and Social Science	-0.13
Education, Training, and Library	-0.14
Computer and Mathematical	-0.25
Health Practitioners and Technical	-0.28
Food Preparation and Serving	-0.46
TOTAL	**-0.12**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The occupational group totals are calculated as the sum of the occupational values within each group.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

The largest negative effect on the state's occupational mix came from the food preparation and serving occupational group, a low-paying group that has a larger-than-average occupational share in Arizona. Three occupations accounted for most of this negative effect: combined food preparation and serving, waiters/waitresses, and dining room attendants.

The small size of the high-paying healthcare practitioners and technical occupational group had the second-largest negative effect on the state's mix. Though the dentists and general practitioners occupations had sizable positive effects, most of the other 34 occupations had a negative effect, most notably registered nurses.

The high-paying but smaller-than-average computer and mathematical occupational group had the third largest negative impact. Relatively few employees in Arizona in two computer software engineer occupations created the greatest negative effects.

The relatively small size and high wages of the education, training, and library group produced a lesser negative impact. Most of its 29 occupations had a negative value. The life, physical, and

social science group had a similar negative effect as the education group, with most of its 24 occupations having a small negative job mix value.

The relatively large size of the low-paying building and grounds cleaning and maintenance group also produced a negative effect. The janitors occupation had one of the largest positive impacts, but the maids and landscapers/groundskeepers occupations had among the largest negative mix values. The farming, fishing and forestry group had a similar negative value, due to the large size of the low-paying farm workers occupation. The legal occupational group had a lesser negative value, as most of its eight occupations were high paying but small in size.

The sales and related group, which includes both high-paid and low-paid occupations, had little net effect on the occupational mix value. The large size of the high-paid technical and scientific sales representatives occupation had the largest positive mix value of any occupation. Retail salespersons (low pay) and real estate brokers (high pay) also had positive effects, but these positives were offset by large negatives in the low-paid cashiers and telemarketers occupations. The remaining 12 occupations in the sales group also had a net negative effect.

Occupations with the largest job mix values are listed in Table 14. Larger-than-average and higher-than-average-paying occupations dominated the occupations with a positive effect. The occupational mix values shown in Table 14 are somewhat smaller than the industrial mix values shown in Tables 7, 10 and 12 since occupational shares in Arizona are not as much different from the national average as sectoral shares.

PUMS Job Mix

Four versions of industrial mix were calculated from the PUMS data for 1999. Average wage of wage and salary employees — the measure comparable to that of the other datasets — had the lowest industrial mix value of 0.2. Adding self-employment income pushed the mix value to 0.3. Adjusting to a full-time-equivalency basis raised the value to 0.4 for wages and salaries and 0.6 for earnings from self employment and wages and salaries. The largest differences across the versions were in the manufacturing sector, where the full-time-equivalent (FTE) measures were 0.3 higher than the unadjusted versions.

The estimates of occupational mix in 1999 ranged from 0.5 for the unadjusted wage and salary measure to 0.7 for the FTE wage and salary version. Both earnings measures had an occupational mix value of 0.6. The values were not much different across the four measures in any of the occupational groups.

The most comprehensive of the measures — FTE earnings — is used in the following discussion and in Tables 15 through 17. By sector, the largest industrial mix value was in manufacturing at 0.9; no other sector had a value of even 0.2. Accommodation and food services had the largest negative value at -0.5, followed by administrative support. By occupational group, the largest positive values were in production and transportation. None of the groups had a large negative value (see Table 15).

TABLE 14
OCCUPATIONAL MIX BY OCCUPATION IN 2003, OES DATA
Occupations with a Job Mix Value of at Least +-0.1

Occupation	Arizona – U.S. Occupational Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Occupational Share Larger in Arizona & Above Average Wage			
Sales Representatives, Technical and Scientific	0.28	1.81	0.23
Sales Managers	0.10	2.54	0.15
Management Analysts	0.15	2.00	0.15
Financial Managers	0.10	2.42	0.14
Aerospace Engineers	0.11	2.15	0.13
Engineering Managers	0.07	2.75	0.12
Chief Executives	0.04	3.79	0.12
Electronics Engineers	0.12	2.05	0.12
Dentists	0.05	3.53	0.12
Miscellaneous Architects and Engineers	0.16	1.63	0.10
Occupational Share Smaller in Arizona & Below Average Wage			
Miscellaneous Production Occupations	-0.65	0.78	0.14
Janitors	-0.30	0.56	0.13
Office Clerks, General	-0.38	0.65	0.13
Nursing Aides	-0.25	0.59	0.10
Occupational Share Larger in Arizona & Below Average Wage			
Combined Food Preparation and Serving	0.47	0.42	-0.27
Customer Service Representative	0.81	0.79	-0.17
Landscapers, Groundskeepers	0.39	0.60	-0.16
Waiters and Waitresses	0.25	0.43	-0.14
Farm Workers	0.23	0.46	-0.12
Cashiers	0.21	0.47	-0.11
Telemarketers	0.29	0.63	-0.11
Maids	0.20	0.49	-0.10
Occupational Share Smaller in Arizona & Above Average Wage			
General and Operations Managers	-0.35	2.45	-0.51
Misc. Health Practitioners and Technicians	-0.15	2.79	-0.27
Miscellaneous Business and Financial Operations	-0.41	1.50	-0.20
Registered Nurses	-0.30	1.45	-0.14
Subtotal with a Positive Job Mix Value	-0.40		1.89
Subtotal with a Negative Job Mix Value	1.64		-2.30
Occupations Not Shown	-1.24		0.29
TOTAL	**0.00**		**-0.12**

* The occupational shares are presented as percentages (multiplied by 100)
** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 15
INDUSTRIAL MIX BY SECTOR AND OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 1999, PUMS DATA

Sector	Job Mix Value*	Occupational Group	Job Mix Value*
Manufacturing	0.85	Production	0.70
Agriculture	0.17	Transportation and Material Moving	0.41
Health Care and Social Assistance	0.17	Sales and Related	0.24
Real Estate	0.16	Healthcare Support	0.19
Transportation	0.15	Management	0.13
Finance and Insurance	0.08	Architecture and Engineering	0.13
Utilities	0.03	Business and Financial Operations	0.09
Wholesale Trade	0.01	Farming, Fishing, and Forestry	0.03
Government	-0.00	Community and Social Services	0.01
Management of Companies	-0.00	Education, Training, and Library	0.00
Construction	-0.01	Computer and Mathematical	-0.01
Educational Services	-0.01	Life, Physical, and Social Science	-0.02
Other Services	-0.02	Protective Service	-0.02
Mining	-0.03	Personal Care and Service	-0.03
Arts, Entertainment and Recreation	-0.04	Arts, Design, Entertainment, Sports and Media	-0.05
Information	-0.05	Installation, Maintenance, and Repair	-0.05
Professional, Scientific and Technical Services	-0.06	Legal	-0.16
Retail Trade	-0.09	Building, Grounds Cleaning and Maintenance	-0.17
Administrative Support	-0.23	Construction and Extraction	-0.17
Accommodation and Food Services	-0.50	Office and Administrative Support	-0.20
		Food Preparation and Serving	-0.22
		Health Practitioners and Technical	-0.23
TOTAL	**0.58**	**TOTAL**	**0.62**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sector totals are calculated as the sum of the more detailed values within each sector.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

Results by industry from the PUMS dataset are summarized in Table 16. Relative to other datasets, the wage differential relative to the overall average is lesser in many industries in the PUMS dataset. Electronics and aerospace manufacturing had the greatest positive effects on the industrial mix. The tourism industries of accommodation and food services had the largest negative effects.

No individual occupation had a very large effect on the occupational mix, as seen in Table 17. Real estate brokers and agents had the largest positive effect.

A cross-tabulation of industry and occupation was made for the FTE earnings measure for 1999. Its mix value was 0.6, half of the combined value of the industrial mix and the occupational mix. A total of nearly 3,000 occupation by industry categories were created, with the number of

observations by category having been considered in creating the categories. Still, the results may be affected by small sample size.

TABLE 16
INDUSTRIAL MIX BY INDUSTRY IN 1999, PUMS DATA
Industries with a Job Mix Value of at Least +-0.05

Industry	Arizona – U.S. Sectoral Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Sectoral Share Larger in Arizona & Above Average Wage			
Miscellaneous Aerospace Manufacturing	0.68	1.50	0.34
Semiconductor & Misc. Electronics Manufacturing	1.18	1.21	0.25
Real Estate	0.59	1.30	0.18
Scheduled Air Transportation	0.36	1.35	0.13
Nondepository Credit Intermediation	0.65	1.19	0.13
Aircraft Engine Manufacturing	0.30	1.25	0.07
Telecommunications other than Wired Carriers	0.17	1.31	0.05
Sectoral Share Smaller in Arizona & Below Average Wage			
Nursing Care Facilities	-0.60	0.71	0.17
Animal Production	-0.34	0.68	0.11
Animal Slaughtering	-0.29	0.68	0.09
Cut and Sew Manufacturing	-0.26	0.67	0.08
Crop Production	-0.23	0.77	0.05
Sectoral Share Larger in Arizona & Below Average Wage			
Accommodation	0.80	0.71	-0.24
Restaurants and Food Services	0.53	0.57	-0.23
Landscaping	0.38	0.78	-0.08
Amusement, Gambling and Recreation	0.36	0.77	-0.08
Services to Buildings other than Landscaping	0.27	0.73	-0.07
Air Force	0.22	0.73	-0.06
Sectoral Share Smaller in Arizona & Above Average Wage			
Industrial and Misc. Chemical Manufacturing	-0.29	1.30	-0.09
Pharmaceutical and Medicine Manufacturing	-0.19	1.45	-0.09
Legal Services	-0.12	1.69	-0.07
Hospitals	-0.63	1.09	-0.06
Motor Vehicle Manufacturing	-0.85	1.06	-0.05
Subtotal with a Positive Job Mix Value	2.21		1.65
Subtotal with a Negative Job Mix Value	0.48		-1.13
Industries Not Shown	-2.69		0.06
TOTAL	**0.00**		**0.58**

* The sectoral shares are presented as percentages (multiplied by 100)
** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Commerce, Census Bureau.

TABLE 17
OCCUPATIONAL MIX BY OCCUPATION IN 1999, PUMS DATA
Occupations with a Job Mix Value of at Least +-0.05

Occupation	Arizona – U.S. Occupation Share*	Ratio of Average Wage to Total, U.S.	Job Mix Value**
Occupational Share Larger in Arizona & Above Average Wage			
Real Estate Brokers and Agents	0.39	1.53	0.21
Aerospace Engineers	0.18	1.76	0.13
Aircraft Pilots and Flight Engineers	0.09	2.36	0.12
Construction Managers	0.17	1.62	0.11
Electrical and Electronics Engineers	0.16	1.66	0.10
Agricultural and Biomedical Engineers	0.26	1.37	0.10
Property Managers	0.12	1.64	0.08
Financial Sales Agents	0.05	2.11	0.06
Sales Representatives, Other Services	0.12	1.41	0.05
Miscellaneous Managers	0.09	1.56	0.05
Occupational Share Smaller in Arizona & Below Average Wage			
Nursing Aides	-0.43	0.64	0.16
Miscellaneous Production Occupations	-0.51	0.76	0.12
Sewing Machine Operators	-0.25	0.53	0.12
Laborers and Material Movers, Hand	-0.34	0.70	0.10
Miscellaneous Assemblers, Fabricators	-0.33	0.74	0.09
Farmers and Ranchers	-0.45	0.82	0.08
Miscellaneous Metal and Plastic Production	-0.23	0.74	0.06
Truck Drivers	-0.31	0.82	0.06
Secretaries and Administrative Assistants	-0.20	0.74	0.05
Hand Packers	-0.13	0.57	0.05
Occupational Share Larger in Arizona & Below Average Wage			
Customer Service Representative	0.54	0.74	-0.14
Grounds Maintenance	0.39	0.72	-0.11
Waiters and Waitresses	0.19	0.53	-0.09
Construction Laborers	0.29	0.77	-0.07
Occupational Share Smaller in Arizona & Above Average Wage			
Chief Executives	-0.10	2.83	-0.18
Miscellaneous Engineers	-0.23	1.72	-0.17
Lawyers	-0.10	2.54	-0.16
Physicians	-0.07	3.33	-0.16
Dentists	-0.02	4.48	-0.06
Subtotal with a Positive Job Mix Value	-1.55		1.90
Subtotal with a Negative Job Mix Value	0.89		-1.14
Occupations Not Shown	0.66		-0.14
TOTAL	**0.00**		**0.62**

* The occupational shares are presented as percentages (multiplied by 100)
** (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100

Source: Calculated from U.S. Department of Commerce, Census Bureau.

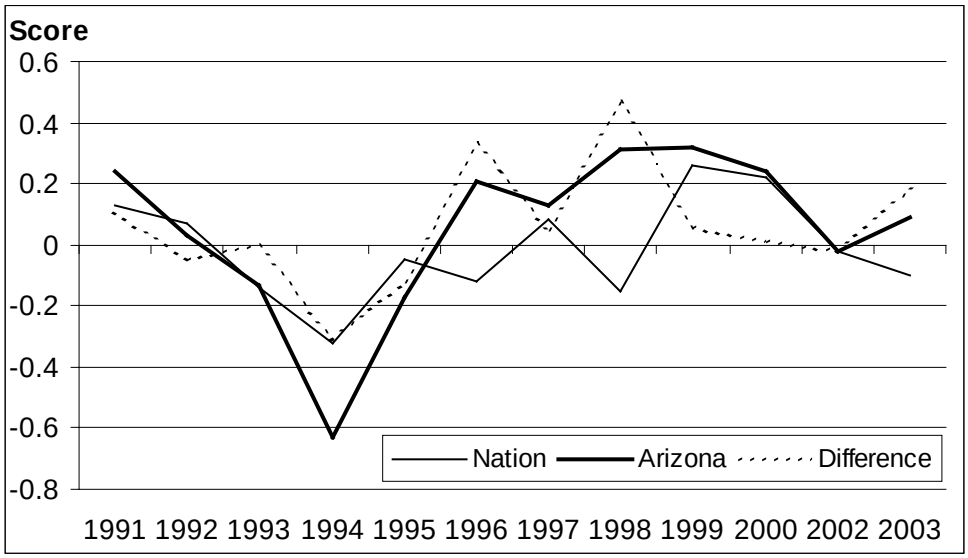
Job Quality

Job quality in this section refers to the change over time in job quality as measured by wages. Job quality scores have been calculated for both Arizona and the nation over various time periods, with the difference between Arizona and the nation also calculated. Generally, job quality has declined somewhat over time both nationally and in Arizona, with the rate of decrease comparable in Arizona to the national average except for a worse performance during the 1982-to-1991 economic cycle. The results are sensitive to the time period selected, the dataset used, and the means of computation, though the differences in results across these dimensions are relatively small.

The ES-202 results can be compared to the BEA results for the 1991-2000 and 2001-03 periods. The ES-202 data, which are more detailed but not as inclusive as the BEA data, generally show a slightly more favorable picture of change in job quality in recent years, both in Arizona and the nation, but the differences between the two series are tiny over longer time periods. Looking at individual years, the ES-202 score was generally higher than the BEA score for the state except in the mid-1990s (see Chart 3).

Results from the CBP dataset for the 1998-to-2002 period are reasonably similar to those of the ES-202 dataset for Arizona, though showing a slightly greater decline in job quality. The CBP results for the nation, however, are rather different, showing a small gain in job quality rather than a decline as measured by the ES-202 data. Thus, while the BEA and ES-202 datasets indicate that job quality in Arizona is declining at about the same pace as the national average (more in some years, less in others), the CBP data indicates a much worse performance in Arizona relative to the national average between 1998 and 2002.

CHART 3
DIFFERENCE IN ANNUAL SCORES, ES-202 MINUS BEA



Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics, and U.S. Department of Commerce, Bureau of Economic Analysis.

The OES occupational data only compare 2003 to 2000. Occupational job quality worsened nationally and in Arizona over this period by amounts not quite as great as those of industrial job quality as calculated from the ES-202 data (see Table 18). The occupational decline was not quite as great in Arizona as nationally, consistent with the lesser drop in industrial job quality as measured by the ES-202 data.

The difference in the job quality scores between Arizona and the nation explains some of the change over time in the Arizona-to-U.S. average wage ratio. For example, Arizona's larger drop in job quality in 1999 corresponds to a decrease in the average wage ratio, while modestly better performance on job quality from 2000 through 2003 explains part of the rise in the average wage ratio. However, over the longer 1991-to-2000 period, gains in the average wage ratio occurred without better performance in job quality in Arizona.

TABLE 18
COMPARISON OF ESTIMATES OF CHANGE IN JOB QUALITY

	Change in Job Quality Score			
	ES-202	**BEA**	**CBP***	**OES****
Arizona				
1998-to-1999	-0.4	-0.6		
1999-to-2000	0.1	0.1		
2000-to-2001	0.1			
2001-to-2002	-0.4	-0.7		
2002-to-2003	-0.2	-0.3		
1998-to-2002	-0.7		-1.0	
1991-to-2000	-1.0	-1.3		
2000-to-2003	-1.0			-0.6
United States				
1998-to-1999	-0.1	-0.2		
1999-to-2000	-0.0	0.1		
2000-to-2001	-0.1			
2001-to-2002	-0.4	-0.7		
2002-to-2003	-0.3	-0.4		
1998-to-2002	-0.6		0.3	
1991-to-2000	-1.1	-0.9		
2000-to-2003	-1.5			-1.0
Difference, Arizona – United States				
1998-to-1999	-0.3	-0.4		
1999-to-2000	0.1	0.0		
2000-to-2001	0.2			
2001-to-2002	0.0	0.1		
2002-to-2003	0.0	0.1		
1998-to-2002	-0.1		-1.4	
1991-to-2000	0.1	-0.4		
2000-to-2003	0.4			0.3

* Adjusted for missing industries
** Based on occupational data, other measures based on industrial data

Sources: Calculated from U.S. Department of Commerce, Census Bureau (CBP) and Bureau of Economic Analysis (BEA), and U.S. Department of Labor, Bureau of Labor Statistics (ES-202 and OES).

Manufacturing has been the sector most responsible for the decline in national job quality since 1969. Manufacturing pays above-average wages, but has experienced decreasing employment over the 35 years while large gains have been registered in other sectors. Until the last economic cycle (1991 to 2001), rapid growth in the low-paying retail trade sector also was a major factor in the national decline in job quality. In the last cycle, rapid growth in the below-average-wage administrative support sector had a sizable negative effect on job quality.

Except during the 1982-to-1991 economic cycle — when most sectors in Arizona contributed to a much worse performance on job quality than the national average — Arizona's decline in job quality has been similar to the national average. In the 1975-to-1982 cycle, manufacturing was a major boost to Arizona's job quality relative to the nation, buts its positive effect was offset by a large negative impact from mining. In the last cycle and continuing in the current cycle, manufacturing has been a large negative factor on Arizona's change in job quality relative to the nation, offset by somewhat better results in several sectors, such as finance and insurance. In the current cycle (since 2001), declines in semiconductor manufacturing employment have had a large negative impact on job quality in Arizona.

Based on occupational data, job quality declined between 2000 and 2003 nationally and in Arizona. The high-paying management occupations group was responsible for the drop in Arizona, with particularly sizable negative effects from the declining occupational shares of the general and operations managers and chief executives occupations. Partially offsetting this large negative impact were positive impacts from the high-paying business and financial operations and health practitioners and technical groups.

The 2000-to-2003 decrease in job quality measured by the occupational data was not as great in Arizona as the national average. This largely resulted from a stronger performance in Arizona in the health practitioners and technical occupational group. At the occupational level, the greatest impact on job quality came from the larger decline in Arizona in the general and operations managers occupation.

BEA Job Quality

Annual scores as well as scores for selected multi-year periods have been produced from the BEA data. Changes in the industry classification system — the 1972 SIC implemented by the BEA in 1975, the 1987 SIC implemented by the BEA in 1988, and the switch to NAICS implemented by the BEA in 2001 — result in inconsistencies in the time series. Scores were produced for 1975 and 1988, but caution is urged in their interpretation. It is not possible to produce a score for 2001. The selection of multi-year periods correspond to the economic cycle except that the unavailability of data for 2001 consistent with earlier years causes the 1991-to-2001 economic cycle to be shortened by a year. Scores were calculated for 1969-to-1975, 1975-to-1982, 1982-to-1991, 1991-to-2000, and 2001-to-2003 using the cumulation of years technique. The Arizona scores shown in Table 19 were calculated using Arizona wage data.

A strong relationship exists between the job quality score and the stage of the economic cycle, both nationally and in Arizona. On average, job quality declines during recessionary and especially early recovery periods. Job quality is flat during the middle and late years of economic expansions. Arizona's change in job quality is roughly equal to the nation in early years of an

TABLE 19
CHANGE IN JOB QUALITY SCORES, ARIZONA AND NATION, BEA DATA

		Score*	
Single Year	**Arizona**	**Nation**	**Difference**
1970	-0.04	-0.34	0.31
1971	-0.25	-0.37	0.12
1972	0.65	0.11	0.54
1973	0.42	0.21	0.21
1974	-0.49	0.04	-0.53
1975**	-1.53	-0.69	-0.84
1976	-0.63	-0.18	-0.45
1977	0.09	0.12	-0.03
1978	0.22	0.16	0.06
1979	0.77	0.28	0.49
1980	-0.10	-0.22	0.12
1981	0.19	-0.02	0.21
1982	-1.13	-0.65	-0.48
1983	-0.55	-0.67	0.12
1984	-0.13	0.12	-0.25
1985	-0.22	-0.16	-0.06
1986	-0.19	-0.37	0.18
1987	-0.25	-0.23	-0.02
1988**	-0.23	0.51	-0.74
1989	-0.48	-0.12	-0.36
1990	-0.14	-0.02	-0.12
1991	-0.45	-0.18	-0.27
1992	-0.39	-0.32	-0.06
1993	-0.26	-0.26	0.00
1994	0.01	-0.08	0.09
1995	-0.15	-0.25	0.10
1996	0.00	-0.06	0.06
1997	0.02	0.07	-0.05
1998	-0.05	0.07	-0.13
1999	-0.61	-0.20	-0.41
2000	0.12	0.10	0.03
2001**			
2002	-0.65	-0.70	0.06
2003	-0.28	-0.35	0.07
Multi-Year* **			
1969-75	-1.23	-1.03	-0.20
1975-82	-0.59	-0.52	-0.07
1982-91	-2.63	-1.11	-1.52
1991-2000	-1.30	-0.93	-0.36
2001-03	-0.92	-1.06	0.13

***** Sum by category of (change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100

** The 1975 and 1988 scores are estimated and the 2001 scores are unavailable due to changes in the industrial classification

*** Calculated by cumulating annual scores

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

expansion, a little higher than the U.S. average in the middle years of expansions, but worse than the national average in later years of expansions and especially during recessions. During the 1969-to-1975 and 1975-to-1982 economic cycles, gains in job quality occurred during middle years of the cycles but losses during recessions were significant, especially in Arizona. During the 1982-to-1991 and 1991-to-2001 cycles, small losses in job quality occurred even during the middle years of the expansions but declines during recessions were modest.

During each of the four economic cycles between 1969 and 2001, job quality decreased, both nationally and in Arizona. The least decline occurred during the 1975-to-1982 cycle. The biggest drop was in the 1982-to-1991 cycle, especially in Arizona. However, when considering the number of years in each cycle, little difference in the annual average rate of loss of job quality across the economic cycles has occurred, except for Arizona's worse performance during the 1982-to-1991 period.

Arizona's decrease in job quality was similar to the national average in three of the four cycles. Between 1982 and 1991, Arizona's score was negative in every year, with an overall decline of 2.6 percent, compared to 1.1 percent nationally. It is during this period that Arizona's average wage as a ratio to the national average dropped considerably. If job quality were the same in 2003 as in 1969, the average wage would be 6.5 percent higher in Arizona and 4.6 percent more nationally.

Since the end of the latest recession in 2001, job quality has dropped both nationally and in Arizona, with the declines in both 2002 and 2003 larger than the historical norms for the first and second years of recovery. Arizona's scores in both 2002 and 2003 were marginally higher than the national average, consistent with the historical record of similar scores during recovery periods. The national scores for 2002 and 2003 are reasonably consistent with those from the Annenberg dataset, with each dataset showing declines in the nation's job quality in both years.

Over the entire 1969-to-2003 period, job quality declined in Arizona in 23 of 33 years; the national score was negative in 22 years. Arizona's score was higher than the national average in half of the years. Nationally, the annual scores have ranged from 0.5 to -0.7, with the lowest score occurring in 2002. Scores in Arizona have been more extreme (from 0.8 to -1.5), as expected of a smaller economy that is more cyclical than the national average. The difference in score between the nation and Arizona has ranged from 0.5 to -0.8. Relative to the nation, Arizona's worst performances were from 1974 to 1976, a recessionary period during which the Arizona economy was hit particularly hard, and from 1988 through 1991, a period during which the Arizona economy slumped earlier than the nation.

As a means of summarizing the detailed industrial data, the categories were aggregated back to the divisional/sectoral level for each of the five multi-year periods shown in Table 19. Results for the last three cycles are shown in Table 20. Except during the 1975-to-1982 period, manufacturing accounted for much of the decrease in job quality in Arizona. The electronics and machinery manufacturing industries were largely responsible for this pattern. Nationally, manufacturing was a major cause of the decline in job quality throughout the 1969-to-2003 period. Many manufacturing industries pay above-average wages but have had a decreasing sectoral share of employment over time.

TABLE 20
CHANGE IN JOB QUALITY SCORES* BY SECTOR/DIVISION
ARIZONA AND NATION, BEA DATA

2001-03			
Sector	**Arizona**	**Nation**	**Difference**
Accommodation and Food Services	-0.02	-0.18	0.16
Health Care and Social Assistance	0.12	-0.04	0.16
Finance and Insurance	0.06	-0.08	0.14
Information	-0.09	-0.18	0.09
Agriculture	0.05	0.01	0.04
Other Services	-0.07	-0.11	0.04
Administrative Support	0.05	0.02	0.03
Arts, Entertainment and Recreation	0.01	-0.01	0.03
Utilities	0.01	-0.01	0.02
Professional, Scientific and Technical Services	-0.04	-0.06	0.02
Government	0.02	0.00	0.02
Transportation and Warehousing	-0.02	-0.03	0.01
Real Estate and Rental	0.00	-0.00	0.00
Educational Services	-0.03	-0.03	0.00
Management of Companies	-0.01	-0.01	-0.00
Construction	-0.03	-0.01	-0.02
Mining	-0.03	-0.01	-0.02
Wholesale Trade	-0.08	-0.02	-0.06
Retail Trade	-0.05	0.03	-0.08
Manufacturing	-0.79	-0.34	-0.45
TOTAL	**-0.92**	**-1.06**	**0.13**
1991-2000			
Division	**Arizona**	**Nation**	**Difference**
Retail Trade	0.56	0.01	0.55
Finance, Insurance and Real Estate	0.43	0.31	0.12
Wholesale Trade	0.02	-0.05	0.07
Agriculture	0.02	-0.01	0.03
Transportation, Communication, Public Utilities	-0.18	-0.15	-0.03
Construction	-0.04	0.02	-0.06
Mining	-0.27	-0.14	-0.13
Government	-0.21	-0.06	-0.16
Manufacturing	-1.00	-0.63	-0.37
Services	-0.62	-0.24	-0.38
TOTAL	**-1.30**	**-0.93**	**-0.36**
1982-91			
Division	**Arizona**	**Nation**	**Difference**
Retail Trade	-0.40	-0.49	0.10
Wholesale Trade	0.02	-0.07	0.09
Government	0.03	0.04	-0.01
Transportation, Communication, Public Utilities	-0.40	-0.28	-0.12
Construction	-0.19	-0.04	-0.15
Mining	-0.57	-0.40	-0.17
Finance, Insurance and Real Estate	0.01	0.18	-0.17
Manufacturing	-1.09	-0.92	-0.17
Agriculture	-0.01	0.18	-0.18
Services	-0.04	0.69	-0.73
TOTAL	**-2.63**	**-1.11**	**-1.52**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. The sector/division figures are calculated as the sum of the scores of the more detailed values within each sector/division. Multi-year scores are calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

Similarly, difficulties in the high-paying mining division caused drops in job quality in Arizona, particularly during the 1975-to-1982 and 1982-to-1991 cycles. Metal mining had the largest negative score of any industry during the 1975-to-1982 cycle and one of the largest drops during the 1982-to-1991 and 1991-to-2000 periods.

From 1969 to 1991, retail trade also contributed to the decreases in job quality, both nationally and in Arizona. Many of the division's low-paid industries experienced above-average employment growth, with particularly large negative scores in Arizona in the eating and drinking places industry. Services replaced retail trade as the secondary cause of declines in job quality during the 1991-to-2000 period, with business services posting a large negative score.

Electronics manufacturing accounted for much of Arizona's decline in job quality score between 2001 and 2003. The transportation equipment other than motor vehicles category (mostly aerospace) had the second largest negative effect (see Table 21). The only positive score of any size was in the ambulatory health care services category.

The generally small difference in job quality scores between Arizona and the nation results from offsetting sectoral and industrial effects that vary across economic cycles. In the 1969-to-1975 cycle, higher scores in Arizona in agriculture and services (especially health services) were more than offset by lower scores in construction, retail trade, and government. Relative to the nation, manufacturing did much better in Arizona during the 1975-to-1982 cycle, particularly in industrial machinery, but mining did much worse. The much lower Arizona score during the 1982-to-1991 cycle largely resulted from the services division (including business services), but nearly all of the other divisions had small negative scores relative to the nation as well. Metal mining and industrial machinery manufacturing had considerably lower scores in Arizona than nationally. Between 1991 and 2000, Arizona's retail trade score was higher than the national average, but was more than offset by lower scores in services (mostly business services) and manufacturing (especially electronics).

Arizona's modestly better score than the national average over the 2001-to-2003 period resulted from slightly higher scores in several NAICS sectors offset by a lower manufacturing score in Arizona. A large negative differential existed in electronics manufacturing, a high-paying activity which experienced a greater decrease in employment sectoral share in Arizona than nationally. Other transportation equipment manufacturing also had a negative differential (see Table 22). Ambulatory health care services and food services had better scores in Arizona than nationally.

Little variation existed in the change in job quality over the 2001-to-2003 period across the three measures calculated from the BEA data. All three measures — average wage, average compensation, and average earnings — show a sizable drop in job quality in 2002, ranging from -0.64 for average wage to -0.71 for average earnings. Each indicates that a lesser decrease occurred in 2003, ranging from -0.35 for average wage to -0.43 for average earnings. In each year on each measure, the declines were not quite as large in Arizona as the nation (all differences round to 0.1).

TABLE 21
2001-03 CHANGE IN ARIZONA JOB QUALITY SCORES BY CATEGORY, BEA DATA
Categories with an Arizona Score of at Least +-0.02

Category	Arizona Change, Sectoral Share	Ratio of Average Wage to Total, AZ	Arizona Score*
Gain in Sectoral Share & Above Average Wage			
Ambulatory Health Care Services	0.49	1.40	0.20
Credit Intermediation	0.18	1.30	0.06
Funds and Trusts	0.02	3.02	0.05
Insurance Carriers	0.08	1.37	0.03
Federal Civilian Government	0.07	1.41	0.03
Loss in Sectoral Share & Below Average Wage			
Agricultural Support	-0.09	0.45	0.05
Administrative Support	-0.16	0.70	0.05
Accommodation	-0.11	0.61	0.04
Gasoline Stations	-0.07	0.53	0.03
Gain in Sectoral Share & Below Average Wage			
Social Assistance	0.14	0.54	-0.07
Food Services and Drinking Places	0.10	0.39	-0.06
Private Households	0.07	0.30	-0.05
General Merchandise Stores	0.11	0.53	-0.05
Educational Services	0.17	0.83	-0.03
Clothing Stores	0.05	0.49	-0.03
Membership Associations	0.08	0.71	-0.02
Nursing and Residential Care Facilities	0.06	0.64	-0.02
Loss in Sectoral Share & Above Average Wage			
Computer and Electronic Product Manufacturing	-0.52	2.08	-0.57
Other Transportation Equipment Manufacturing	-0.21	1.80	-0.17
Wholesale Trade	-0.17	1.47	-0.08
Securities and Investments	-0.04	2.05	-0.05
Professional, Scientific and Technical Services	-0.08	1.49	-0.04
Telecommunications	-0.09	1.44	-0.04
Mining except Oil and Gas Extraction	-0.07	1.43	-0.03
ISPs, Search Portals, Data Processing	-0.08	1.32	-0.02
Heavy Construction	-0.08	1.16	-0.02
Subtotal with a Positive Score	0.41		0.54
Subtotal with a Negative Score	-0.56		-1.35
Categories Not Shown	0.15		-0.09
TOTAL	**0.00**		**-0.90**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

TABLE 22
2001-03 CHANGE IN JOB QUALITY SCORES BY CATEGORY
ARIZONA AND NATION, BEA DATA
Categories with a Difference in Score of at Least 0.02
Between the Nation and Arizona

Category	Score* Arizona	Nation	Difference
Positive Difference			
Ambulatory Health Care Services	0.20	0.06	0.14
Food Services and Drinking Places	-0.06	-0.19	0.13
Securities and Investments	-0.05	-0.15	0.10
Agricultural Support	0.05	0.00	0.05
Telecommunications	-0.04	-0.08	0.05
Accommodation	0.04	0.01	0.03
Machine Manufacturing	-0.01	-0.04	0.03
Administrative Support	0.05	0.02	0.03
Membership Associations	-0.02	-0.05	0.02
Gasoline Stations	0.03	0.01	0.02
ISPs, Search Portals, Data Processing	-0.02	-0.04	0.02
Utilities	0.01	-0.01	0.02
Amusement, Gambling and Recreation	0.01	-0.01	0.02
Motor Vehicle Manufacturing	0.00	-0.02	0.02
Negative Difference			
Computer and Electronic Product Manufacturing	-0.57	-0.23	-0.34
Other Transportation Equipment Manufacturing	-0.17	-0.03	-0.14
Wholesale Trade	-0.08	-0.02	-0.06
General Merchandise Stores	-0.05	-0.01	-0.04
Food and Beverage Stores	-0.00	0.03	-0.03
Apparel Manufacturing	0.00	0.03	-0.03
Mining except Oil and Gas Extraction	-0.03	-0.00	-0.02
Clothing Stores	-0.03	-0.00	-0.02
Subtotal with a Positive Difference	0.19	-0.49	0.68
Subtotal with a Negative Difference	-0.93	-0.23	-0.70
Categories Not Shown	-0.18	-0.34	0.16
TOTAL	**-0.92**	**-1.06**	**0.14**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

ES-202 Job Quality

A consistent NAICS series from 1990 through 2003 allows the complete 1991-to-2001 economic cycle to be measured by the ES-202 data. Similarly, the latest data for 2003 can be compared to those for 1993, the comparable year of the prior economic cycle. In each of these 10-year periods, national job quality dropped. The only individual years to post a gain were 1997, 1999 and 2000. Similarly, job quality in Arizona dropped over both periods, though gains were recorded in five years (see Table 23). Arizona somewhat outperformed the national average in each of the 10-year periods, a better result for Arizona than measured from the BEA data. The

TABLE 23
CHANGE IN JOB QUALITY SCORES, ARIZONA AND NATION, ES-202 DATA

		Score*	
Single Year	**Arizona**	**Nation**	**Difference**
1991	-0.21	-0.05	-0.16
1992	-0.36	-0.25	-0.11
1993	-0.39	-0.40	0.00
1994	-0.62	-0.40	-0.22
1995	-0.32	-0.30	-0.02
1996	0.21	-0.18	0.39
1997	0.15	0.15	0.00
1998	0.26	-0.08	0.34
1999	-0.29	0.06	-0.35
2000	0.36	0.32	0.04
2001	0.28	-0.01	0.29
2002	-0.67	-0.72	0.04
2003	-0.19	-0.45	0.26
Multi-Year**			
1991-2001	-0.72	-1.09	0.36
1993-2003	-0.83	-1.60	0.77
1991-2000	-1.00	-1.08	0.07
2001-03	-0.86	-1.17	0.30

***** Sum by industry of (change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100

** Calculated by cumulating annual scores

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

ES-202 difference in scores between Arizona and the nation were larger than those from the BEA series especially in 1996 and 1998.

ES-202 scores by sector for the 1991-to-2001 and 1993-to-2003 periods are shown in Table 24. The Arizona score was positive in 11 of 20 sectors in the first period and in 12 sectors in the second period. The overall score was negative in each period because of large negative scores in two sectors: manufacturing, a high-paying sector with declines in sectoral share, and administrative support, a low-paying sector with increases in share. Mining and government also contributed to the negative scores. Several sectors had moderately large positive scores in both periods: retail trade; finance and insurance; arts, entertainment and recreation; and professional, scientific and technical services.

Arizona's manufacturing sector experienced a decline in job quality in every year from 1991 through 2003 except 1996. Sizable negatives occurred from 1991 through 1994 and in 1999, 2002 and 2003. Manufacturing was responsible for most of the overall decrease in job quality from 1991 through 1993 and in 1999, 2002 and 2003. The administrative support sector had a negative score in each year from 1991 through 2000. It was the primary cause of the overall decline in job quality in 1995. Among the other 18 sectors, large annual sectoral scores were recorded only occasionally. Combined, the other 18 sectors had a positive effect from 1996 through 2000, but contributed to declines in job quality in 1994 and 2002.

TABLE 24
CHANGE IN JOB QUALITY SCORES BY SECTOR, ARIZONA AND NATION, ES-202 DATA

	Arizona Score*		AZ – US Score*	
Sector	**1991-2001**	**1993-2003**	**1991-2001**	**1993-2003**
Accommodation and Food Services	0.05	0.18	0.37	0.51
Finance and Insurance	0.38	0.48	0.23	0.45
Arts, Entertainment and Recreation	0.39	0.25	0.35	0.29
Other Services	0.22	0.18	0.27	0.26
Health Care and Social Assistance	0.11	0.07	0.28	0.25
Retail Trade	0.58	0.45	0.30	0.23
Wholesale Trade	0.27	0.18	0.30	0.19
Agriculture	0.20	0.19	0.16	0.15
Government	-0.36	-0.20	0.00	0.13
Management of Companies	0.18	0.02	0.13	0.06
Real Estate and Leasing	-0.03	0.04	-0.03	0.04
Information	0.14	0.11	-0.12	0.02
Transportation and Warehousing	-0.01	-0.04	0.01	0.00
Educational Services	-0.03	-0.09	0.02	-0.02
Construction	-0.05	-0.04	-0.05	-0.02
Utilities	-0.24	-0.19	-0.08	-0.03
Mining	-0.30	-0.28	-0.19	-0.18
Professional, Scientific, Technical	0.33	0.29	-0.34	-0.23
Administrative Support	-1.10	-0.85	-0.39	-0.39
Manufacturing	-1.52	-1.57	-0.83	-0.85
TOTAL	**-0.72**	**-0.83**	**0.36**	**0.77**

***** (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. The sector/division figures are calculated as the sum of the scores of industries within each sector. Multi-year scores are calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

The change in job quality in Arizona exceeded the national average in 12 sectors over the 1991-to-2001 period and 13 sectors over the 1993-to-2003 period. The largest positive figure in each period was in accommodation and food services, followed by finance and insurance; arts, entertainment and recreation; retail trade; other services; health care and social assistance; and wholesale trade. Manufacturing, administrative support, and professional, scientific and technical services had lower scores in Arizona than the national average in each period.

The manufacturing and administrative support sectors had lower scores in Arizona than the national average in most years. One or both did significantly worse than the national average from 1991 through 1996 and in 1999 and 2002. The stronger performance in Arizona of the accommodation and food services sector occurred especially from 1998 through 2003. Finance and insurance had higher Arizona scores from 1996 through 2003, especially in 1998, 2002 and 2003.

From the last recession in 2001 through 2003, the only industry with a significant contribution to the change in job quality was semiconductor manufacturing, with a score of -0.6. No other industry had a score of as much as 0.2, either positive or negative (see Table 25). Similarly, only

semiconductor manufacturing had an Arizona score much different from the national average, at -0.6. Arizona's slightly better overall performance resulted from small differences in a number of industries (see Table 26).

TABLE 25
2001-03 CHANGE IN ARIZONA JOB QUALITY SCORES BY INDUSTRY, ES-202 DATA
All Industries with an Arizona Score of at Least +-0.05

Industry	Arizona Change, Sectoral Share	Ratio of Average Wage to Total, AZ	Arizona Score*
Gain in Sectoral Share & Above Average Wage			
Real Estate Credit	0.18	1.93	0.18
Search and Navigation Instrument Manufacturing	0.11	2.01	0.13
Management Consulting	0.15	1.79	0.12
Offices of Physicians	0.11	1.75	0.08
Mortgage Brokers	0.07	1.74	0.06
Loss in Sectoral Share & Below Average Wage			
Discount Department Stores	-0.37	0.51	0.18
Temporary Help	-0.28	0.64	0.11
Food Service Contractors	-0.12	0.40	0.06
Gain in Sectoral Share & Below Average Wage			
Warehouse Clubs	0.50	0.69	-0.14
Limited-Service Restaurants	0.17	0.32	-0.11
Employee Leasing	0.23	0.70	-0.06
Full-Service Restaurants	0.10	0.39	-0.06
Loss in Sectoral Share & Above Average Wage			
Semiconductor Manufacturing	-0.49	2.35	-0.64
Other Electronic Parts Wholesale	-0.13	1.89	-0.12
Miscellaneous Manufacturing	-0.23	1.30	-0.07
Miscellaneous Finance and Insurance	-0.19	1.41	-0.07
Securities Brokerage	-0.07	1.84	-0.06
Subtotal with a Positive Score	-0.15		0.92
Subtotal with a Negative Score	-0.11		-1.33
Industries Not Shown	0.26		-0.45
TOTAL	**0.00**		**-0.86**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 26
2001-03 CHANGE IN JOB QUALITY SCORES BY INDUSTRY
ARIZONA AND NATION, ES-202 DATA
All Industries with a Difference in Score of at Least 0.05
Between the Nation and Arizona

Industry	Score* Arizona	Nation	Difference
Positive Difference			
Discount Department Stores	0.18	0.01	0.17
Search and Navigation Instrument Manufacturing	0.13	0.00	0.13
Real Estate Credit	0.18	0.07	0.11
Management Consulting	0.12	0.01	0.11
Securities Brokerage	-0.06	-0.15	0.09
Food Service Contractors	0.06	-0.01	0.07
Computer and Software Wholesale	0.03	-0.04	0.07
Full-Service Restaurants	-0.06	-0.13	0.07
Miscellaneous Manufacturing	-0.07	-0.13	0.06
Investment Banking	0.01	-0.05	0.06
Temporary Help	0.11	0.06	0.05
Negative Difference			
Semiconductor Manufacturing	-0.64	-0.05	-0.59
Other Electronic Parts Wholesale	-0.12	-0.03	-0.09
Warehouse Clubs	-0.14	-0.06	-0.08
Miscellaneous Finance and Insurance	-0.07	0.00	-0.07
Employee Leasing	-0.06	-0.01	-0.05
Subtotal with a Positive Difference	0.63	-0.36	0.99
Subtotal with a Negative Difference	-1.03	-0.15	-0.88
Industries Not Shown	-0.46	-0.66	0.19
TOTAL	**-0.86**	**-1.17**	**0.30**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by cumulating annual scores.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

CBP Job Quality

Using the CBP data, job quality nationally improved marginally between 1998 and 2002 while Arizona's job quality declined. Adding BEA data for industries excluded from CBP does not appreciably change these results: the national score was 0.3 and the Arizona score was -1.0.

The rest of this subsection is based on the CBP dataset *without* the addition of BEA data for the excluded industries. Aggregating the industry data by sector reveals that the manufacturing sector accounted for almost all of Arizona's negative score for the 1998-to-2002 period. Mining and wholesale trade also had more than marginally negative scores. The score was positive in half of the 20 sectors shown in Table 27, but the only sectors with a score of at least 0.2 were professional, scientific and technical services and finance and insurance. Though the nation's overall score was positive, only eight sectors had a positive score. However, the score was quite high for the finance and insurance sector. Manufacturing and finance and insurance accounted

TABLE 27
1998-2002 CHANGE IN JOB QUALITY SCORES BY SECTOR
ARIZONA AND NATION, CBP DATA

Sector	Score* Arizona	Nation	Difference
Accommodation and Food Services	0.01	-0.13	0.15
Other Services	0.02	-0.08	0.09
Construction	0.07	-0.01	0.08
Professional, Scientific and Technical Services	0.34	0.27	0.07
Auxiliaries	0.07	0.03	0.04
Transportation	0.00	-0.02	0.03
Health Care and Social Assistance	-0.02	-0.04	0.03
Administrative Support	0.01	-0.00	0.02
Agriculture	-0.00	0.00	-0.00
Educational Services	-0.09	-0.08	-0.01
Real Estate	-0.01	0.02	-0.03
Arts, Entertainment and Recreation	-0.06	-0.02	-0.04
Utilities	-0.12	-0.06	-0.06
Information	0.12	0.19	-0.07
Retail Trade	-0.12	0.02	-0.14
Management of Companies	0.02	0.17	-0.15
Mining	-0.23	-0.03	-0.20
Wholesale Trade	-0.27	-0.07	-0.21
Finance and Insurance	0.20	0.77	-0.57
Manufacturing	-1.24	-0.54	-0.70
TOTAL	**-1.30**	**0.39**	**-1.69**

***** (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. The sector figures are calculated as the sum of the industry scores within each sector. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

for much of Arizona's lower overall score than the national average. Arizona had a lower score in 12 of 20 sectors, with none of the positive differentials being large.

Industries with above average wages are disproportionately represented in the CBP results in Table 28, accounting for most of the industries with the largest gains but also more than half of the industries with the largest losses in job quality. Several high-paying manufacturing industries had negative scores, most notably semiconductors and wireless communication equipment. Securities brokerage was the only industry with a similarly large positive score. Several finance industries are included in Table 28, with five showing positive scores but three with negative scores.

Only 11 industries had a score at least 0.05 greater than the nation, compared to 25 with a score at least 0.05 lower (see Table 29). The overall negative difference in score between Arizona and the nation primarily resulted from high-wage industries whose sectoral shares declined relative to the national average. Foremost among these were semiconductor manufacturing, wireless communications equipment manufacturing, and securities brokerage. Grocery stores, a low-wage industry with a growing sectoral share difference between Arizona and the nation, also was a

TABLE 28
1998-2002 CHANGE IN ARIZONA JOB QUALITY SCORES BY INDUSTRY, CBP DATA
Industries with an Arizona Score of at Least +-0.05

Industry	Arizona Change, Sectoral Share	Ratio of Average Wage to Total, AZ	Arizona Score*
Gain in Sectoral Share & Above Average Wage			
Securities Brokerage	0.13	3.19	0.28
Computer Systems Design Services	0.24	1.80	0.19
Data Processing Services	0.27	1.50	0.13
Engineering Services	0.26	1.50	0.13
Sales Financing	0.15	1.86	0.13
Holding Companies	0.04	3.24	0.09
Auxiliaries	0.28	1.26	0.07
Real Estate Credit	0.10	1.69	0.07
Portfolio Management	0.05	2.05	0.06
Offices of Physicians	0.07	1.81	0.05
Loss in Sectoral Share & Below Average Wage			
Hotels and Motels	-0.20	0.57	0.09
Temporary Help	-0.17	0.64	0.06
Pharmacies	-0.14	0.59	0.06
Gain in Sectoral Share & Below Average Wage			
Grocery Stores	0.35	0.73	-0.10
Security Guards	0.14	0.42	-0.08
Other General Merchandise Stores	0.13	0.46	-0.07
Food Service Contractors	0.12	0.46	-0.06
Elementary and Secondary Schools (private)	0.19	0.67	-0.06
Full-Service Restaurants	0.10	0.40	-0.06
Fitness Centers	0.10	0.40	-0.06
Family Clothing Stores	0.09	0.43	-0.05
Loss in Sectoral Share & Above Average Wage			
Semiconductor Manufacturing	-0.40	1.97	-0.39
Wireless Communications Equipment Manufacture	-0.21	2.40	-0.30
Miscellaneous Mining	-0.35	1.60	-0.21
Computer Wholesale	-0.20	2.00	-0.20
Investment Banking	-0.13	2.48	-0.19
Aircraft Engine Manufacturing	-0.17	2.06	-0.18
Electrical Power Generation and Distribution	-0.07	2.67	-0.11
Industrial Process Control Manufacturing	-0.09	1.93	-0.09
Pension Funds	-0.08	2.05	-0.09
International Trade Financing	-0.04	2.87	-0.08
Managing Offices	-0.06	2.18	-0.07
Nonferrous Production	-0.11	1.56	-0.06
Subtotal with a Positive Score	1.08		1.41
Subtotal with a Negative Score	-0.69		-2.51
Industries Not Shown	-0.39		-0.20
TOTAL	**0.00**		**-1.30**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

TABLE 29
1998-2002 CHANGE IN JOB QUALITY SCORES BY INDUSTRY
ARIZONA AND NATION, CBP DATA
Categories with a Difference in Score of at Least .05
Between the Nation and Arizona

Industry	Score* Arizona	Nation	Difference
Positive Difference			
Engineering Services	0.14	-0.01	0.14
Sales Financing	0.13	0.01	0.12
Computer Systems Design Services	0.19	0.08	0.11
Data Processing Services	0.13	0.02	0.11
Employee Leasing	0.03	-0.07	0.11
Miscellaneous Aerospace Manufacturing	-0.01	-0.09	0.09
Miscellaneous Insurance Carriers	0.01	-0.05	0.06
Miscellaneous Motor Vehicle Manufacturing	0.02	-0.04	0.06
Payroll Services	0.05	-0.01	0.06
Hotels and Motels	0.09	0.04	0.05
Drinking Places	0.04	-0.01	0.05
Negative Difference			
Semiconductor Manufacturing	-0.39	-0.04	-0.35
Wireless Communications Equipment Manufacture	-0.30	-0.03	-0.27
Securities Brokerage	0.28	0.54	-0.26
Grocery Stores	-0.10	0.11	-0.21
Mining Other than Metal	-0.21	-0.02	-0.19
Computer Wholesale	-0.20	-0.03	-0.17
Aircraft Engine Manufacturing	-0.18	-0.01	-0.17
Investment Banking	-0.19	-0.04	-0.15
Portfolio Management	0.06	0.15	-0.09
Custom Computer Programming	-0.05	0.04	-0.09
Insurance and Pension Funds	-0.09	-0.00	-0.09
Corporate Managing Offices	-0.07	0.02	-0.09
Industrial Process Control Manufacturing	-0.09	-0.01	-0.08
Security Guards	-0.08	-0.01	-0.07
International Trade Financing	-0.08	-0.00	-0.07
Department Stores	-0.01	0.06	-0.07
Commercial Banking	-0.03	0.04	-0.07
Miscellaneous Financial Investments	0.01	0.07	-0.06
Management Consulting Services	0.02	0.08	-0.06
Physicians' Offices	0.05	0.11	-0.06
Electric Power Generation and Transmission	-0.11	-0.05	-0.06
Holding Companies	0.09	0.14	-0.06
On-Line Information Services	-0.01	0.05	-0.06
Nonferrous Production	-0.06	-0.01	-0.05
Other Apparel Manufacturing	0.01	0.06	-0.05
Subtotal of Categories with a Positive Difference	0.82	-0.13	0.96
Subtotal of Categories with a Negative Difference	-1.73	1.22	-2.95
Industries Not Shown	-0.39	-0.70	0.30
TOTAL	**-1.30**	**0.39**	**-1.69**

* (Change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

significant contributor to Arizona's overall score being lower than the national average. No individual industry had a substantially higher score in Arizona than the national average.

OES Job Quality

Based on occupational data, job quality in Arizona declined between 2000 and 2003, lowering the state's average wage -0.6 percent. The decrease was not as great as the -1.0 national average.

Only nine of the 22 major occupational groups had a negative job quality score in Arizona for the 2000-to-2003 period, but the high-paying management group had a very large negative score (see Table 30). The net score of the other 21 groups was 0.7. Health practitioners and technical and business and financial operations had scores between 0.4 and 0.5. Negative scores of between -0.2 and -0.3 in the computer and mathematical and sales and related groups partially offset the positive values.

TABLE 30
2000-03 CHANGE IN JOB QUALITY SCORES BY OCCUPATIONAL GROUP ARIZONA AND NATION, OES DATA

Major Occupational Group	Score* Arizona	Score* Nation	Difference
Health Practitioners and Technical	0.45	0.04	0.41
Business and Financial Operations	0.41	0.21	0.20
Legal	0.19	0.05	0.15
Food Preparation and Serving	-0.08	-0.20	0.12
Construction and Extraction	0.08	0.00	0.08
Architecture and Engineering	-0.03	-0.09	0.06
Personal Care and Service	-0.09	-0.15	0.06
Building, Grounds Cleaning and Maintenance	0.04	-0.01	0.05
Transportation and Material Moving	0.04	-0.01	0.05
Office and Administrative Support	0.03	-0.02	0.05
Installation, Maintenance, and Repair	0.03	-0.00	0.03
Arts, Design, Entertainment, Sports and Media	0.03	0.02	0.02
Farming, Fishing, and Forestry	0.00	-0.01	0.01
Community and Social Services	0.00	-0.01	0.01
Protective Service	0.04	0.04	0.00
Healthcare Support	-0.08	-0.07	-0.01
Life, Physical, and Social Science	-0.00	0.04	-0.04
Education, Training, and Library	-0.00	0.08	-0.08
Production	0.16	0.32	-0.16
Computer and Mathematical	-0.20	0.00	-0.20
Sales and Related	-0.29	-0.08	-0.20
Management	-1.38	-1.11	-0.27
TOTAL	**-0.64**	**-0.96**	**0.32**

***** (Change over time in occupational share of employment) * (ratio of average wage to overall average wage – 1) * 100. The occupational group figures are calculated as the sum of the occupation scores within each group. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

Arizona's overall change in job quality between 2000 and 2003 was not as negative as the national average. Fifteen of 22 major occupational groups had a higher score in Arizona than nationally. The group that most contributed to the better-than-national-average performance was high-paying healthcare practitioners and technical. Business and financial operations was the only other group with a positive difference of at least 0.2. Three groups had a negative differential between -0.2 and -0.3: management, computer and mathematical, and sales and related.

Two management occupations had the two largest negative scores of any occupation: general and operations managers and chief executives. Marketing managers also posted a negative score, and the other 27 management occupations netted to a negative score. Most of the management occupations had a higher score in Arizona than nationally, but general and operations managers, chief executives, and marketing managers all ranked among the 10 occupations with the largest shortfall from the national average.

The sales and related group includes both high- and low-paying occupations, with the group's average wage not much less than the overall occupational figure. Gains in occupational share in its low-paying cashiers and retail salespersons occupations and declines in share in its high-paying sales engineers and securities sales agents occupations accounted for the group's negative Arizona score. Many of the other occupations had positive scores, including the high-paying real estate brokers and sales representatives (not scientific or technical) occupations. The group's lower score in Arizona than the nation resulted from the securities sales agents, retail salespersons, and especially the cashiers occupations. The real estate brokers score was somewhat better than the national average.

The computer and mathematical group pays high wages but lost occupational share between 2000 and 2003 in Arizona. Most of the occupations in this group had a negative score, particularly computer systems software engineers (partially offset by a positive score in the computer applications software engineers occupation) and computer programmers. Computer systems software engineers accounted for most of the negative differential from the national average, having the third greatest negative score among all occupations.

The low-wage and relatively fast-growth personal care and service group had a small negative score in Arizona due to a negative in the personal and home care aides occupation. The low-paying, fast-growing food preparation and serving group had a similar negative score. The waiters/waitresses and fast food cooks occupations had among the 10 largest negative scores, but the dining room attendants and combined food preparation and serving occupations had among the 10 largest positive scores and the dishwashers occupation also had a positive score. The group's Arizona score was better than the national average, though its occupations were highly mixed between better and worse performances relative to the nation. Positive differentials in the dining room attendants, combined food preparers and servers, dishwashers, food preparation, restaurant cooks, and bartenders occupations were partially offset by negative differentials in the fast food cooks, waiters/waitresses, and nonrestaurant food servers occupations.

The high-paying architecture and engineering group had a modest decline in job quality in Arizona. Its occupations were mixed with positive and negative scores. The industrial engineers

occupation had a sizable negative score, but electronics engineers had the third-largest positive score and aerospace engineers and mechanical engineers also had a positive value. The occupations were split between higher and lower scores relative to the national average. Electronics engineers had one of the top 10 positive differentials but the industrial engineers occupation was among the 10 with the largest negative differential.

In the high-paying health practitioners and technical group, dentists had the largest positive Arizona score of any occupation, the registered nurses occupation posted the fourth-highest score, and general practitioners and pharmacists had lesser positive values. The other 32 occupations had a net score of zero. Dentists and general practitioners each were among the four occupations with the greatest differential in score between Arizona and the nation. Registered nurses and pharmacists also had sizable positive differentials.

Most occupations in the high-paying business and financial operations group had a positive score, particularly accountants and auditors (among the top 10), management analysts, and loan officers. The accountants/auditors, credit analysts, loan officers, and management analysts occupations accounted for the positive differential from the national average. The remaining 19 occupations had the same net score in Arizona as nationally.

The legal group had a small positive Arizona score due to the lawyers occupation having the second-largest positive score. The differential from the national average was positive in the lawyers occupation. The low-paying production group also had a small positive Arizona score, with the team assemblers occupation having the highest score.

The occupations with the largest Arizona scores are shown in Table 31. Occupations with a positive score were disproportionately those with a high wage and rising share. The general and operations managers occupation had a large negative score; the net score of all other occupations was slightly positive.

The occupations with the largest differentials between the Arizona and national scores are listed in Table 32. The general and operations managers occupation again stands out.

PUMS Job Quality

The change in job quality score cannot be calculated from the PUMS data because of the differences between 1989 and 1999 in the industrial and occupational codes used by the Census Bureau. However, the change over time in the industrial mix and occupational mix values provides an indication of the relative change in job quality between Arizona and the nation. Between 1989 and 1999, Arizona's industrial mix value dropped -0.3 percent, indicating that job quality in Arizona worsened slightly relative to the national average. Similarly, the occupational mix value fell -0.5 percent.

TABLE 31
2000-03 CHANGE IN ARIZONA JOB QUALITY SCORES BY OCCUPATION, OES DATA
Occupations with an Arizona Score of at Least +-0.05

Occupation	Change in Share, AZ	Avg Wage Ratio, AZ	Arizona Score*
Gain in Occupational Share & Above Average Wage			
Dentists	0.07	3.67	0.19
Lawyers	0.10	2.81	0.18
Electronics Engineers	0.10	2.29	0.12
Registered Nurses	0.20	1.52	0.11
Accountants and Auditors	0.23	1.45	0.10
Management Analysts	0.14	1.63	0.09
General Physicians	0.03	3.74	0.09
Aerospace Engineers	0.06	2.10	0.07
Real Estate Brokers	0.05	2.30	0.07
Sales Representatives, not Technical or Scientific	0.20	1.33	0.07
Loan Officers	0.11	1.59	0.07
Pharmacists	0.05	2.25	0.06
Computer Software Engineers, Applications	0.03	2.84	0.06
Mechanical Engineers	0.05	1.95	0.05
Loss in Occupational Share & Below Average Wage			
Dining Room Attendants	-0.19	0.44	0.11
Team Assemblers	-0.30	0.64	0.11
Combined Food Preparation and Serving	-0.17	0.44	0.10
Security Guards	-0.23	0.60	0.09
Stock Clerks and Order Fillers	-0.24	0.64	0.09
Miscellaneous Production	-0.46	0.81	0.09
Dishwashers	-0.11	0.41	0.07
Landscaping and Groundskeeping	-0.12	0.56	0.05
Gain in Occupational Share & Below Average Wage			
Cashiers	0.53	0.54	-0.24
Customer Service Representatives	0.52	0.74	-0.13
Waiters and Waitresses	0.25	0.48	-0.13
Cooks, Fast Food	0.24	0.46	-0.13
Retail Sales	0.35	0.69	-0.11
Personal and Home Care Aides	0.19	0.57	-0.08
Teacher Assistants	0.15	0.56	-0.07
Nursing Aides and Orderlies	0.15	0.61	-0.06
Loss in Occupational Share & Above Average Wage			
General and Operations Managers	-0.58	2.24	-0.72
Chief Executives	-0.17	3.21	-0.38
Miscellaneous Architects and Engineers	-0.37	1.47	-0.17
Computer Software Engineers, Systems	-0.10	2.23	-0.13
Industrial Engineers	-0.13	1.84	-0.11
Computer Programmers	-0.13	1.72	-0.09
Marketing Managers	-0.09	1.98	-0.09
Securities and Financial Sales Agents	-0.10	1.67	-0.07
Sales Engineers	-0.05	2.13	-0.05
Subtotal with a Positive Score	-0.40		2.00
Subtotal with a Negative Score	0.66		-2.76
Occupations Not Shown	-0.26		0.12
TOTAL	**0.00**		**-0.64**

* (Change over time in occupational share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 32
2000-03 CHANGE IN JOB QUALITY SCORES BY OCCUPATION
ARIZONA AND NATION, OES DATA
Occupations with a Difference in Score of at Least 0.05
Between the Nation and Arizona

Occupation	Score* Arizona	Score* Nation	Difference
Positive Difference			
Dentists	0.19	0.02	0.17
Miscellaneous Management	-0.01	-0.16	0.16
Lawyers	0.17	0.04	0.13
General Physicians	0.09	-0.03	0.12
Electronics Engineers	0.12	0.01	0.12
Financial Managers	0.02	-0.10	0.12
Material Movers, Hand	0.04	-0.06	0.10
Dining Room Attendants	0.11	0.02	0.09
Team Assemblers	0.11	0.02	0.08
Landscaping and Groundskeeping	0.05	-0.03	0.08
Combined Food Preparation and Serving	0.09	0.02	0.07
Aerospace Engineers	0.07	0.00	0.07
Registered Nurses	0.11	0.04	0.07
Accountants and Auditors	0.10	0.04	0.07
Real Estate Brokers	0.07	0.01	0.06
Dishwashers	0.07	0.01	0.06
Pharmacists	0.06	0.01	0.05
Security Guards	0.09	0.04	0.05
Negative Difference			
General and Operations Managers	-0.72	-0.30	-0.41
Cashiers	-0.24	-0.06	-0.18
Computer Software Engineers, Systems	-0.13	0.03	-0.16
Chief Executives	-0.38	-0.24	-0.14
Customer Service Representative	-0.13	-0.01	-0.13
Industrial Engineers	-0.11	-0.00	-0.11
Packers, Hand	-0.04	0.05	-0.09
Cooks, Fast Food	-0.13	-0.05	-0.08
Miscellaneous Architects and Engineers	-0.17	-0.10	-0.08
Marketing Managers	-0.09	-0.02	-0.07
Maids	-0.05	0.02	-0.06
Miscellaneous Production	0.09	0.15	-0.06
Computer Systems Analysts	-0.03	0.02	-0.05
Retail Salepersons	-0.11	-0.06	-0.05
Subtotal of Categories with a Positive Difference	1.55	-0.10	1.67
Subtotal of Categories with a Negative Difference	-2.24	-0.57	-1.67
Occupations Not Shown	0.05	-0.29	0.32
TOTAL	**-0.64**	**-0.96**	**0.30**

* (Change over time in occupational share of employment) * (ratio of average wage to overall average wage – 1) * 100. Multi-year score calculated by comparing the beginning year to the ending year.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

Summary of Job Mix and Job Quality by Major Occupational Group

The architecture and engineering group had the highest occupational mix value of the 22 major groups in 2003. A decline in the group's job quality was measured in Arizona between 2000 and 2003, but the nation had a larger decrease in job quality. The production group had the second-highest occupational mix value in 2003. It placed fourth on 2000-to-2003 change in Arizona job quality, but the national score was higher.

The third-highest job mix value in 2003 was in the business and financial operations group, which had the second-greatest Arizona job quality score and the second-largest positive differential from the national score between 2000 and 2003. The transportation and material moving group had the fourth-highest job mix in 2003. Its change in Arizona job quality and difference in score from the nation were positive, but not among the leaders. Personal care and service had the fifth-highest job mix. Though its Arizona job quality declined, the differential from the national average was positive. The management group had the sixth-highest job mix in 2003 despite by far having the biggest drop in Arizona job quality and the greatest negative differential from the nation.

The worst job mix value in 2003 was in the food preparation and serving group. It had the fifth-worst change in Arizona job quality between 2000 and 2003 but the difference from the national average was fourth best. The healthcare practitioners and technical group had the second-worst occupational mix despite the best improvement in job quality and the greatest positive difference from the nation.

The computer and mathematical group had the third-worst occupational mix in 2003 following the third-worst decline in job quality between 2000 and 2003 and the third-largest negative differential from the nation. The fourth-lowest job mix value was in the education, training, and library group, which had no change in job quality but the fifth-largest negative differential from the U.S. average. The life, physical and social science group had the fifth-worst mix, with no change in job quality, but a negative differential from the national average.

COMPARISON STATES

Three neighboring states have been analyzed as comparisons to Arizona. California is the dominant western state with strong business ties to Arizona, Colorado is fairly similar in size to Arizona, and Nevada is the nation's other very fast-growing state. The number of comparison states was limited by the lengthy data processing time.

The analyses of the three other states were made using three datasets: detailed ES-202 data were used to determine industrial mix in 2003 and the change in industrial job quality between 2000 and 2003; the OES data were used to calculate occupational mix for 2003 and the change in occupational job quality between 2000 and 2003; and the decennial census data were used for measures of industrial mix and occupational mix in 1989 and 1999. In all cases, state calculations were made in relation to the nation; the results for the other states were compared to those of Arizona.

The industrial mix values from the PUMS data for 1999 have some concordance with the 2000 industrial mix values from the ES-202 data, though the magnitudes vary somewhat. Both datasets indicate that California and Colorado had positive industrial mixes, though the ES-202 data show a stronger value for Colorado. Both datasets show Nevada to have had a large negative value, though the ES-202 data indicate that the difference from the national average is much greater. For Arizona, the PUMS data indicate a slight positive value in 1999 while the ES-202 data show a negative value.

Similarly, the occupational mix values from the PUMS data for 1999 are somewhat different from those calculated from the OES data for 2000. Values from the two datasets are similar for Colorado, but the OES data show a much smaller positive value for California and a much larger negative value for Nevada. In Arizona, a small positive value from PUMS is in contrast to a slight negative value from the OES data.

The PUMS data indicate that declines in Arizona's industrial and occupational mixes occurred between 1989 and 1999, followed by further declines in the industrial mix between 2000 and 2003 according to the ES-202 data and no change in the occupational mix according to the OES data. In California, the industrial mix rose between 1989 and 1999 but then fell by a wider margin between 2000 and 2003. The occupational mix rose more modestly between 1989 and 1999, then held steady from 2000 to 2003. Colorado experienced improvement in each job mix value between 1989 and 1999, followed by declines in each (especially the industrial mix) between 2000 and 2003. Nevada's weak values worsened between 1989 and 1999, but the industrial mix improved between 2000 and 2003 while the occupational mix held steady.

The average wage in 2003 in Arizona was about 7 percent less than the national average based on both the industrial ES-202 data and the occupational OES data. The industrial mix accounted for about 1.5 percentage points of the differential while the occupational mix had hardly any effect. Thus, other factors than job quality lowered Arizona's average wage by more than 5 percentage points.

In Colorado, the ES-202 average wage was 3 percent above average while the OES figure was 6 percent higher than the U.S. average. The 4.5 percentage-point average differential from the two

datasets was explained almost exactly by the industrial mix being 2 percent above average and the occupational mix being less than 3 percent above average.

In California, the average wage was between 12 and 13 percent above the national average on the ES-202 and OES measures. Only 2 of the 12.5 percentage-point average differential was explained by the industrial mix (which had a value of a little more than 1) and occupational mix (which had a value of a little less than 1). The state's high cost of living is a major factor in explaining the remaining 10.5 percentage-point differential.

An even larger differential of 12 percentage points remains in Nevada after adjusting the state's nearly 7 percent below average wage by its 9 percent below average industrial mix and 10 percent below average occupational mix. The cost of living accounts for only a portion of this remaining differential.

Between 2000 and 2003, the average wage in Arizona rose slightly more than the national average based on the ES-202 data but slightly less than average based on the OES data, for an average of no difference from the national average. Since job quality relative to the nation improved slightly based on both industry and occupation, other factors caused upwards of a percentage point decrease in the average wage. Nevada had a similar decrease in wages after adjusting the close to 2 percent relative gain in average wage for the relative improvements in job quality of more than 1.5 percent based on industry and 1 percent based on occupation. In California, the ES-202 average wage relative to the nation fell 4.0 percent, but the OES data showed a gain of close to 2 percent. A decline in job quality based on industry and a slight increase based on occupation netted to about the average change in wage of the two datasets. In Colorado, the relative average wage also fell on the ES-202 measure but rose on the OES measure. The average of the datasets was a decrease of close to 1 percent. Industrial job quality fell 1 percent and occupational job quality dropped 0.5 percent, resulting in a small net positive effect from other factors.

ES-202

Arizona's ES-202 average wage in 2003 was not much less than that in Nevada, but much less than in Colorado and especially California. The higher cost of living in California helps to explain its higher wages, but living costs in Colorado are not much higher than those in Arizona. The increase in the average wage between 2000 and 2003 was greater in Arizona and Nevada than in the two other states, helping to reduce the large differentials. The average wage in Arizona had been marginally higher in 2000 than in Nevada but was marginally less in 2003.

Arizona's industrial mix value in 2003 explained a portion of the state's low average wage. Similarly, California's industrial mix explained a little of the positive differential in its average wage. In contrast, Colorado's industrial mix accounted for about two-thirds of its higher-than-average wages (see Table 33). After adjusting for its industrial mix, Nevada's average wage was above the national average.

The change in industrial job quality between 2000 and 2003 was negative in Arizona, more negative in California and Colorado, but slightly positive in Nevada. Relative to the nation,

TABLE 33
INDUSTRIAL MIX SUMMARY, ARIZONA AND COMPARISON STATES, ES-202 DATA

	Arizona	California	Colorado	Nevada
2003 Average Wage, Difference from U.S.	-7.2%	12.8%	3.1%	-6.5%
2003 Industrial Mix	-1.5	1.3	2.0	-9.0
2000-03 Change, Average Wage Differential	0.5	-4.0	-2.2	2.1
2000-03 Change in Job Quality	-1.0	-2.8	-2.6	0.2
2000-03 Change in Job Quality, Difference from Nation	0.4	-1.3	-1.1	1.6

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

Nevada did better, Arizona did marginally better, but the performances in Colorado and California were modestly worse.

The preceding summary and the values shown in Table 33 are based on calculations at the most detailed level (6-digit industries). In each state, the detailed results differ from those obtained at the summary level (2-digit sectors). The more detailed data produced a better industrial mix value in 2003 but a weaker change in job quality between 2000 and 2003 in each state. The change in job quality relative to the nation was not much different between the detailed and summary data.

Compared to California, Arizona's industrial mix value in 2003 was -2.8 lower. Arizona had significantly lower values in the high-paying information and professional, scientific, and technical services sectors (see Table 34). Arizona also had lower values in the high-paying management of companies sector and in the low-paying administrative support, accommodation and food services, and retail trade sectors. However, Arizona had higher values in the low-paying other services and agriculture sectors. Relative to the national average, the 2000-to-2003 change in job quality was slightly positive in Arizona but negative in California. Arizona's better performance resulted from small differences in several sectors: the high-paying information and management of companies sectors and the low-paying retail trade, accommodation and food services, and other services sectors (see Table 35).

Relative to Colorado, Arizona's industrial mix value in 2003 was -3.5 lower. As in the comparison to California, Arizona's values were considerably lower in the information and professional, scientific, and technical services sectors and lower in administrative support. Agriculture and finance and insurance were other sectors with lower values in Arizona than Colorado. However, Arizona had higher values in manufacturing; accommodation and food services; arts, entertainment, and recreation; and health care and social assistance. Relative to the national average, the 2000-to-2003 change in job quality was slightly positive in Arizona but negative in Colorado. Arizona's better performance relative to Colorado primarily resulted from the information and professional, scientific, and technical services sectors; Arizona did worse in manufacturing.

TABLE 34
INDUSTRIAL MIX BY SECTOR IN 2003
ARIZONA AND COMPARISON STATES, ES-202 DATA

	Industrial Mix Value*			
Sector	**Arizona**	**California**	**Colorado**	**Nevada**
Agriculture	-0.2	-0.9	0.1	0.3
Mining	-0.0	-0.2	0.2	0.3
Utilities	0.0	-0.1	-0.1	0.0
Construction	-0.1	-0.2	-0.1	-0.3
Manufacturing	0.4	0.6	-0.3	-2.0
Wholesale Trade	0.1	0.1	0.1	-0.5
Retail Trade	0.0	0.5	0.1	0.3
Transportation	0.1	0.0	0.1	-0.3
Information	-0.2	0.8	1.4	-0.7
Finance and Insurance	-0.1	-0.1	0.4	-1.1
Real Estate	0.1	0.0	-0.0	-0.1
Professional, Scientific, Technical Services	-0.7	0.8	1.0	-1.0
Management of Companies	-0.3	0.4	-0.3	-0.5
Administrative Support	-0.8	-0.1	0.0	-0.1
Educational Services	-0.1	-0.1	0.0	0.1
Health Care and Social Assistance	0.5	0.4	0.2	0.7
Arts, Entertainment and Recreation	0.2	0.2	-0.2	-0.4
Accommodation and Food Services	-0.5	0.1	-1.0	-4.0
Other Services	0.2	-0.6	0.2	0.4
Government	-0.0	-0.3	0.1	-0.2
TOTAL	**-1.5**	**1.3**	**2.0**	**-9.0**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sectoral figures are calculated as the sum of the industrial values within each sector.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

Arizona's industrial mix value in 2003 was 7.5 higher than Nevada's value. The majority of the difference was in the accommodation and food services and manufacturing sectors. Arizona also had higher values in the finance and insurance; wholesale trade; arts, entertainment, and recreation; information; and transportation sectors, but had lower values in administrative support and agriculture. Arizona did not do as well as Nevada over the 2000-to-2003 period, mostly in the manufacturing sector but also in professional, scientific, and technical services.

OES

Arizona's OES average wage in 2003 was similar to that in Nevada, but much less than in Colorado and California. The increase in the average wage between 2000 and 2003 was less in Arizona than in each of the other three states.

Arizona's occupational mix value in 2003 was quite close to the national average, explaining hardly any of the state's low average wage. California's occupational mix value was only a little above average, explaining little of its positive differential in the average wage. In contrast, Colorado had a strong occupational mix that accounted for nearly half of its higher-than-average wages (see Table 36). Nevada had a very weak occupational mix; after adjusting for its occupational mix, its average wage was above the national average.

TABLE 35
2000-03 CHANGE IN JOB QUALITY BY SECTOR
ARIZONA AND COMPARISON STATES, ES-202 DATA

	Job Quality Score as a Difference from the National Average*			
Sector	**Arizona**	**California**	**Colorado**	**Nevada**
Agriculture	0.0	0.1	-0.0	-0.0
Mining	-0.0	-0.0	0.0	-0.2
Utilities	0.0	0.0	0.0	0.1
Construction	0.0	-0.1	-0.0	-0.1
Manufacturing	-0.6	-0.5	0.1	0.5
Wholesale Trade	-0.1	0.0	-0.1	0.1
Retail Trade	0.0	-0.2	-0.1	-0.1
Transportation	-0.0	0.0	0.0	0.0
Information	0.1	-0.3	-0.8	0.1
Finance and Insurance	0.2	0.1	0.2	0.3
Real Estate	0.0	0.0	0.0	0.0
Professional, Scientific, Technical Services	0.0	-0.2	-0.4	0.4
Management of Companies	0.1	-0.3	0.0	-0.1
Administrative Support	0.1	0.1	0.1	-0.3
Educational Services	-0.0	-0.0	-0.0	0.0
Health Care and Social Assistance	0.1	-0.1	0.0	0.1
Arts, Entertainment and Recreation	0.1	0.1	0.0	0.1
Accommodation and Food Services	0.3	0.0	0.0	0.3
Other Services	0.1	-0.3	0.0	0.0
Government	0.0	0.1	-0.1	0.2
TOTAL	**0.4**	**-1.3**	**-1.1**	**1.6**

***** (Change over time in industrial share of employment) * (ratio of average wage to overall average wage – 1) * 100. The sectoral figures are calculated as the sum of the industrial scores within each sector.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

The change in occupational job quality between 2000 and 2003 was negative in Arizona, California and Colorado, but slightly positive in Nevada. Relative to the nation, Nevada did better, Arizona and California did marginally better, but Colorado's performance was modestly worse.

Compared to California, Arizona's occupational mix value in 2003 was -0.8 lower. The largest negative differences between the Arizona and California values were in the computer and mathematical and the tourism-related food preparation and serving occupational groups (negative values in Arizona v. positive values in California). Smaller negative differences were in the management and arts, design, entertainment, sports and media groups. Arizona's occupational mix values were somewhat higher in the administrative support, farming, production, and transportation and material moving groups (see Table 37). The change in occupational job quality between 2000 and 2003 was fractionally better in California than Arizona. Arizona did somewhat better in the health practitioners and technical and legal groups, but somewhat worse in the management, sales, and production groups.

TABLE 36
OCCUPATIONAL MIX SUMMARY, ARIZONA AND COMPARISON STATES, OES DATA

	Arizona	California	Colorado	Nevada
2003 Average Wage, Difference from U.S.	-6.8%	12.1%	6.0%	-7.1%
2003 Occupational Mix	-0.1	0.7	2.8	-9.9
2000-03 Change, Average Wage Differential	-0.7	1.7	0.5	1.3
2000-03 Change in Job Quality	-0.6	-0.5	-1.3	0.2
2000-03 Change in Job Quality, Difference from Nation	0.3	0.4	-0.4	1.1

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 37
OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 2003 ARIZONA AND COMPARISON STATES, OES DATA

	Occupational Mix Value*			
Major Occupational Group	**Arizona**	**California**	**Colorado**	**Nevada**
Management	0.1	0.3	0.0	-1.7
Business and Financial Operations	0.2	0.3	0.3	-0.7
Computer and Mathematical	-0.3	0.4	1.1	-1.1
Architecture and Engineering	0.5	0.3	0.6	-0.5
Life, Physical, and Social Science	-0.1	0.1	0.1	-0.1
Community and Social Services	0.0	0.0	0.0	0.0
Legal	-0.1	-0.1	-0.1	-0.2
Education, Training, and Library	-0.1	-0.3	-0.1	-0.1
Arts, Design, Entertainment, Sports, Media	-0.1	0.2	0.1	-0.1
Health Practitioners and Technical	-0.3	-0.3	-0.2	-0.6
Healthcare Support	0.1	0.2	0.3	0.4
Protective Service	-0.0	-0.1	0.1	-0.3
Food Preparation and Serving	-0.5	0.1	-0.4	-2.3
Building, Grounds Cleaning, Maintenance	-0.1	0.1	0.0	-1.1
Personal Care and Service	0.1	0.1	-0.0	-1.3
Sales and Related	0.0	0.1	0.1	-1.1
Office and Administrative Support	0.1	-0.2	-0.0	0.1
Farming, Fishing, and Forestry	-0.1	-0.4	0.0	0.1
Construction and Extraction	-0.1	-0.1	0.1	0.0
Installation, Maintenance, and Repair	-0.0	-0.0	0.1	-0.1
Production	0.5	0.1	0.6	0.8
Transportation and Material Moving	0.2	-0.1	0.4	-0.4
TOTAL	**-0.1**	**0.7**	**2.8**	**-9.9**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The occupational group figures are calculated as the sum of the occupational values within each group.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

Compared to Colorado, Arizona's occupational mix value in 2003 was -2.9 lower. The largest difference between the states by far was in the computer and mathematical occupational group (a negative value in Arizona v. a strong positive value in Colorado). Arizona had a lower value in most of the other occupational groups as well. The change in job quality between 2000 and 2003 relative to the U.S. average was slightly positive in Arizona but slightly negative in Colorado. Arizona did better in the management and computer and mathematical groups, but worse in the sales group (see Table 38).

Nevada's occupational mix value in 2003 was quite low, 9.8 lower than in Arizona. The Arizona value was higher than the Nevada value in 15 of 22 occupational groups, by at least 0.8 in nine groups: food preparation and serving, management, personal care, sales, architecture and engineering, building and grounds cleaning and maintenance, computer and mathematical, and business and finance. The change in job quality between 2000 and 2003 relative to the U.S.

TABLE 38
2000-03 CHANGE IN JOB QUALITY BY OCCUPATIONAL GROUP
ARIZONA AND COMPARISON STATES, OES DATA

	Job Quality Score as a Difference from the National Average*			
Major Occupational Group	**Arizona**	**California**	**Colorado**	**Nevada**
Management	-0.3	0.1	-0.6	-0.0
Business and Financial Operations	0.2	0.1	0.1	0.1
Computer and Mathematical	-0.2	-0.2	-0.4	-0.0
Architecture and Engineering	0.1	-0.0	0.2	0.2
Life, Physical, and Social Science	-0.0	-0.0	0.0	0.0
Community and Social Services	0.0	-0.0	0.0	0.0
Legal	0.2	-0.2	-0.0	0.0
Education, Training, and Library	-0.1	-0.0	-0.1	-0.0
Arts, Design, Entertainment, Sports, Media	0.0	0.1	-0.0	0.0
Health Practitioners and Technical	0.1	-0.0	0.2	0.3
Healthcare Support	-0.0	-0.0	0.1	0.1
Protective Service	0.0	0.1	0.1	0.0
Food Preparation and Serving	0.1	0.1	-0.0	0.3
Building, Grounds Cleaning, Maintenance	0.1	0.0	0.0	0.1
Personal Care and Service	0.1	0.0	-0.0	0.2
Sales and Related	-0.2	0.0	0.1	-0.0
Office and Administrative Support	0.1	-0.1	-0.1	0.2
Farming, Fishing, and Forestry	0.0	0.0	-0.0	0.0
Construction and Extraction	0.1	0.0	0.0	0.2
Installation, Maintenance, and Repair	0.0	0.0	0.0	-0.0
Production	-0.2	0.3	-0.0	-0.3
Transportation and Material Moving	0.1	0.1	0.1	-0.1
TOTAL	**0.3**	**0.4**	**-0.4**	**1.1**

***** (Change over time in occupational share of employment) * (ratio of average wage to overall average wage – 1) * 100. The occupational group figures are calculated as the sum of the occupational scores in each group.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

average was not as positive in Arizona as Nevada, which had greater values in more than half of the occupational groups.

PUMS

Based on the PUMS data, the average wage in Arizona was less than in each of the three comparison states in 1999, by wide margins compared to California and Colorado. California's increase in average wage between 1989 and 1999 was a little less than in Arizona, but the increase was slightly greater in Nevada and substantially higher in Colorado (see Table 39).

Arizona's small positive industrial mix value in 1999 was less than the values in California and Colorado, but much greater than the negative value in Nevada. The figures for the occupational mix are similar to those of the industrial mix.

Though the change in job quality score cannot be calculated from the PUMS data, the change over time in the industrial mix and occupational mix values provides an indication of the change in job quality in the states relative to the nation. Between 1989 and 1999, Arizona's industrial mix value fell slightly, compared to gains in California and Colorado and a decrease in Nevada. The decline in occupational mix was similar in Arizona and Nevada, while California and Colorado experienced gains.

The decreases in occupational and industrial job mix in Arizona between 1989 and 1999 correspond to a drop in the average wage differential from the national average. In Colorado, the gains in job mix partially explain the state's large rise in its average wage differential. In California and Nevada, however, changes in job mix were in the opposite direction from their changes in average wage differential.

The similarity in the overall 1999 industrial mix value between California and Colorado extends to the detailed results. Both states had high industrial mix values in the professional, scientific and technical services sector, the information sector, and the retail trade sector — compared to negative values in Arizona and Nevada in each sector. Strong values in the manufacturing sector were matched in Arizona, but the manufacturing value was negative in Nevada. The main reason for California's better overall industrial mix compared to Colorado was Colorado's negative value in the accommodation and food services sector. Arizona had a similar negative value,

TABLE 39
INDUSTRIAL AND OCCUPATIONAL MIX SUMMARY
ARIZONA AND COMPARISON STATES, PUMS DATA

	Arizona	California	Colorado	Nevada
1999 Average Wage, Difference from U.S.	-6.2%	16.3%	4.1%	-1.2%
1999 Industrial Mix	0.6	2.9	2.3	-5.4
1999 Occupational Mix	0.6	3.2	3.6	-5.6
1989-99 Change, Average Wage Differential	-0.4	-2.0	9.2	0.9
1989-99 Change in Industrial Mix	-0.3	0.9	1.4	-1.7
1989-99 Change in Occupational Mix	-0.5	0.5	1.4	-0.7

Source: Calculated from U.S. Department of Commerce, Census Bureau.

while Nevada had a much more sizable negative value. Nevada also had a significant negative value in the arts, entertainment and recreation sector, which includes gambling places (see Table 40).

The occupational mix details also are similar between California and Colorado. Several major occupational groups in each state had sizable positive values, particularly high-paying groups — most notably management — while negative group values were few and generally small. In contrast, the values in the high-paying groups were barely positive in Arizona and highly negative in Nevada. Several low-paying groups also had large negative values in Nevada (see Table 41).

TABLE 40
INDUSTRIAL MIX BY SECTOR IN 1999
ARIZONA AND COMPARISON STATES, PUMS DATA

	Industrial Mix Value*			
Sector	**Arizona**	**California**	**Colorado**	**Nevada**
Agriculture	0.2	-0.0	-0.1	0.3
Mining	-0.0	-0.0	0.0	0.0
Utilities	0.0	-0.1	-0.0	-0.0
Construction	-0.0	0.0	-0.0	-0.0
Manufacturing	0.9	0.7	0.6	-0.2
Wholesale Trade	0.0	0.1	-0.0	-0.0
Retail Trade	-0.1	0.6	0.3	-0.0
Transportation and Warehousing	0.2	-0.0	0.0	0.0
Information	-0.1	0.5	0.5	-0.2
Finance and Insurance	0.1	0.1	0.3	-0.5
Real Estate and Leasing	0.2	0.1	0.2	0.2
Professional, Scientific, Technical	-0.1	0.9	1.0	-0.7
Management of Companies	-0.0	-0.0	-0.0	-0.0
Administrative Support	-0.2	-0.2	-0.0	-0.1
Educational Services	-0.0	-0.0	-0.0	-0.1
Health Care and Social Assistance	0.2	0.3	0.0	0.3
Arts, Entertainment and Recreation	-0.0	0.1	-0.0	-2.3
Accommodation and Food Services	-0.5	-0.0	-0.4	-2.4
Other Services	-0.0	-0.1	0.0	0.2
Government	-0.0	-0.1	-0.1	0.0
TOTAL	**0.6**	**2.9**	**2.3**	**-5.4**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sectoral figures are calculated as the sum of the industrial values within each sector.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

TABLE 41
OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 1999
ARIZONA AND COMPARISON STATES, PUMS DATA

	Occupational Mix Value*			
Major Occupational Group	**Arizona**	**California**	**Colorado**	**Nevada**
Management	0.1	1.1	0.8	-0.7
Business and Financial Operations	0.1	0.3	0.3	-0.3
Computer and Mathematical	-0.0	0.4	0.6	-0.6
Architecture and Engineering	0.1	0.2	0.3	-0.3
Life, Physical, and Social Science	-0.0	0.1	0.1	-0.1
Community and Social Services	0.0	0.0	0.0	0.1
Legal	-0.2	0.3	0.0	-0.3
Education, Training, and Library	0.0	-0.1	-0.0	-0.1
Arts, Design, Entertainment, Sports, Media	-0.1	0.3	0.0	0.0
Health Practitioners and Technical	-0.2	0.2	-0.1	-0.7
Healthcare Support	0.2	0.1	0.2	0.3
Protective Service	-0.0	0.0	0.0	-0.2
Food Preparation and Serving	-0.2	0.2	-0.1	-1.7
Building, Grounds Cleaning, Maintenance	-0.2	-0.1	0.1	-0.7
Personal Care and Service	-0.0	-0.1	-0.0	-0.7
Sales and Related	0.2	0.3	0.4	-0.7
Office and Administrative Support	-0.2	0.0	0.1	0.0
Farming, Fishing, and Forestry	0.0	-0.3	0.0	0.2
Construction and Extraction	-0.2	0.0	-0.2	-0.2
Installation, Maintenance, and Repair	-0.1	0.0	0.1	-0.1
Production	0.7	0.2	0.7	0.9
Transportation and Material Moving	0.4	0.2	0.3	0.1
Military	0.0	-0.0	-0.1	0.0
TOTAL	**0.6**	**3.2**	**3.6**	**-5.6**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The occupational group figures are calculated as the sum of the occupational values within each group.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

SUBSTATE AREAS WITHIN ARIZONA

The analyses of the substate areas were made using three datasets: the detailed ES-202 data were used to determine industrial mix in 2003 and the change in industrial job quality between 2000 and 2003 for four Arizona metropolitan areas — Flagstaff, Phoenix-Mesa, Tucson, and Yuma; the OES data were used to calculate occupational mix for 2003 and the change in occupational job quality between 2000 and 2003 for the same four metropolitan areas; and the decennial census data were used for measures of industrial mix and occupational mix in 1989 and 1999 for Maricopa County, Pima County, and the balance of the state. In all cases, substate calculations were made in relation to the nation. The substate areas are subject to very considerable amounts of data being withheld that may reduce the accuracy of the job quality analysis.

The industrial mix value from the PUMS data for 1999 for Maricopa County was somewhat more positive than the 2000 industrial mix value from the ES-202 data for metropolitan Phoenix (Maricopa and Pinal counties combined). The results from the two datasets are not consistent for metropolitan Tucson (Pima County), with the PUMS data showing a small positive value for 1999 while the ES-202 data indicate a large negative value in 2000.

Similarly, the occupational mix values from the PUMS data for 1999 are more positive for the Phoenix area than those calculated from the OES data for 2000. In Pima County, a small positive value from PUMS is in contrast to a negative value from the OES data.

The PUMS data indicate that modest increases in Maricopa County's industrial and occupational mixes occurred between 1989 and 1999. According to the ES-202 and OES data, this was followed by declines in both measures (especially the industrial mix) between 2000 and 2003 in metro Phoenix. In Pima County, the industrial mix rose between 1989 and 1999 but the occupational mix dipped. Both measures improved between 2000 and 2003. Negative industrial and occupational mix values in the combined area of the 13 counties other than Maricopa and Pima worsened between 1989 and 1999. Large negative values in each measure in 2000 were present in both the Flagstaff and Yuma metro areas. The industrial mix improved in each of these metros between 2000 and 2003, while the occupational mix was flat in the Yuma area and fell a little in the Flagstaff area.

Based on an average of the industrial and occupational data for 2003, the average wage in the Phoenix area was nearly 3 percent less than the national average. With the industrial mix close to average and the occupational mix 1 percent above average, factors other than job quality had a net effect of lowering the average wage by close to 4 percent.

The average wage in the Tucson area averaged about 10 percent below average (nearly 13 percent lower based on ES-202 data but only 8 percent less using OES data). The industrial mix accounted for close to a 5 percent shortfall, but the occupational mix added 1 percent to the average wage. Thus, other factors lowered the average wage nearly 7 percent.

In the Yuma area, the average wage was close to 31 percent below average (35 percent less using ES-202 data and 27 percent less from the OES dataset). Both the industrial mix and occupational mix had large negative effects of 12 to 13 percent, leaving a negative effect from other factors of about 6 percent.

The two datasets agree that the average wage was about 24 percent below average in the Flagstaff area. The industrial mix accounted for more than 12 percent of this shortfall, with the occupational mix responsible for more than 8 percent. The portion unexplained by job quality was only 3 percent. Thus, factors other than job quality had a net negative effect on the average wage in the state's metro areas in 2003, ranging from 3 percent in the Flagstaff area to nearly 7 percent in the Tucson area.

Since wages are higher in metropolitan areas than nonmetro areas nationwide, a better gauge of wages in Arizona's metro areas would be compare them to the national metropolitan average rather than to the overall national average. Comparing to the metro average increases the differential shown in Table 42 by a few percentage points in each metro area.

The average wage in the Phoenix area fell about 1 percent relative to the national average between 2000 and 2003 according to both the ES-202 and OES datasets. Both industrial and occupational job quality slipped, leaving a small decline in the average wage due to other factors. Flagstaff had a minimal decline due to other factors as gains in both industrial and occupational job quality accounted for the small gain (the average of an increase of 5 percent in the ES-202 data but a decrease of close to 2 percent in the OES data) in the average wage. The Tucson area had a sizable gain in average wage relative to the U.S. average of about 4.5 percent in both datasets. With occupational job quality improving some 4 percent and industrial job quality up close to 2 percent, other factors lowered the average wage by more than 1 percent. In the Yuma area, the relative gain in average wage was more than 2 percent. Industrial job quality advanced more than 1 percent and occupational job quality hardly changed. Thus, factors other than job quality had a positive effect of about 1 percent.

ES-202

The ES-202 average wage varied widely across Arizona in 2003, from only a little less than the national average in the Phoenix-Mesa metropolitan area (Maricopa and Pinal counties) to less in the Tucson metro (Pima County) to very substantially lower in the Flagstaff (Coconino County) and Yuma (Yuma County) metro areas. Since the cost of living is near the national average in Phoenix, Tucson, and Yuma and higher than average in Flagstaff, living costs do not moderate the wage differentials from the national average. Except in the Phoenix area, the average wage differentials narrowed between 2000 and 2003.

TABLE 42
INDUSTRIAL MIX SUMMARY, ARIZONA METROPOLITAN AREAS, ES-202 DATA

	Phoenix	Tucson	Yuma	Flagstaff
2003 Average Wage, Difference from U.S.	-2.0%	-12.9%	-34.7%	-24.6%
2003 Industrial Mix	-0.1	-4.7	-12.8	-12.5
2000-03 Change, Average Wage Differential	-0.7	4.5	4.2	4.9
2000-03 Change in Job Quality	-1.4	0.4	0.7	0.3
2000-03 Change in Job Quality, Difference from Nation	-0.2	1.6	1.3	1.4

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

The industrial mix in 2003 was quite close to the national average in the Phoenix area, but considerably below average in the Tucson area and far below average in the Flagstaff and Yuma areas. The industrial mix accounted for half of the average wage differential from the national average in the Flagstaff area and more than a third of the differentials in the Tucson and Yuma areas.

The change in industrial job quality was positive between 2000 and 2003 in the Flagstaff, Tucson and Yuma areas, with the job quality change as a difference from the national average about 1.5 percent in each of these three metro areas (accounting for about a third of the improvement in the average wage ratio in each area). In contrast, industrial job quality in the Phoenix area slipped, by marginally more than the national average — contributing to its decline in relative wage.

In only one of the 20 sectors was the 2003 industrial mix value consistently positive or negative across the four metro areas: slightly positive in the other services sector (see Table 43). Other than the Phoenix area, the value was considerably negative in manufacturing, wholesale trade, information, finance and insurance, and professional, scientific and technical services. The change in job quality between 2000 and 2003 relative to the national average was positive in each area in the information; arts, entertainment, and recreation; accommodation and food services; and other services sectors.

In the Phoenix area, the 2003 industrial mix was barely negative. The value was positive in the majority of the sectors, including sizably positive in the high-paying manufacturing and finance and insurance sectors. However, the administrative support sector had a large negative value. The semiconductor industry was largely responsible for manufacturing's positive value, with aircraft engines also contributing. Several industries contributed to the finance and insurance sector's positive value, particularly securities. Among other sectors, the federal government (including the military) had a sizable negative value.

The change in job quality between 2000 and 2003 was negative in the Phoenix area, slightly more negative than the national average. In most sectors, the change relative to the nation was slightly positive (see Table 44), but the manufacturing sector had a large negative score, mostly due to declines in the size of the semiconductor industry.

The Tucson area had a -4.7 industrial mix value in 2003: 4.6 less than the Phoenix area value. Seven sectors had a negative value of at least -0.4 — the high-paying sectors of finance and insurance (especially the securities industry); professional, scientific and technical services (especially computer related); wholesale trade; manufacturing; and management of companies and the low-paying sectors of accommodation and food services (lodging, restaurants, and drinking places) and administrative support (particularly telemarketing and related activities). Information was the only sector with a positive value of this magnitude, due to a large positive in the software publishers industry. Compared to the Phoenix area, the Tucson area's industrial mix value was considerably lower in the finance and insurance, manufacturing, wholesale trade, and accommodation and food services sectors, but its value was not nearly as negative in the administrative support sector.

TABLE 43
INDUSTRIAL MIX BY SECTOR IN 2003
ARIZONA METROPOLITAN AREAS, ES-202 DATA

	Industrial Mix Value*			
Sector	**Phoenix**	**Tucson**	**Yuma**	**Flagstaff**
Agriculture	0.1	0.3	-10.8***	0.3
Mining	-0.2	-0.0		-0.1
Utilities	0.0	0.1	-0.1	-0.1
Construction	0.0	-0.2	-0.0	-0.1
Manufacturing	0.7	-0.6	-1.5	-1.2
Wholesale Trade	0.2	-0.8	-1.1	-1.1
Retail Trade	0.1	0.0	0.7	-0.6
Transportation	0.0	0.0	-0.0	-0.0
Information	-0.3	0.4	-0.4	-0.9
Finance and Insurance	0.9	-1.4	-2.4	-2.4
Real Estate	0.1	0.0	-0.0	-0.0
Professional, Scientific, Technical Services		-0.8	-0.3***	-2.0
Management of Companies		-0.5		-1.1
Administrative Support	-1.2	-0.4	0.4	1.1
Educational Services	-0.1	-0.1	0.1	0.0
Health Care and Social Assistance	0.1	0.1	0.2	-0.1
Arts, Entertainment and Recreation	-0.0	-0.2	0.3	-0.7
Accommodation and Food Services	-0.2	-0.9	0.3	-5.7
Other Services	0.2	0.0	0.6	0.4
Government	-0.3			
Combined Sectors**	-0.4	0.3	1.3	1.8
TOTAL	**-0.1**	**-4.7**	**-12.8**	**-12.5**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sectoral figures are calculated as the sum of the industrial values within each sector.

** In Phoenix, professional, scientific, and technical services; management of companies; and unclassified are combined. In Flagstaff and Tucson, government and unclassified are combined. In Yuma, mining, management of companies, government, and unclassified are combined with parts of agriculture and professional, scientific, and technical services. All of these combinations were necessitated by the withholding of data, even at the sectoral level.

*** Part

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

The 2000-to-2003 change in job quality in the Tucson area was positive relative to the national average. Most sectors — especially low-paying accommodation and food services (mostly lodging and full-service restaurants) and health care and social assistance (especially offices of physicians) — had positive values and no sector had a sizable negative value.

In the Flagstaff area, the 2003 job mix value was quite negative at -12.5. Accommodation and food services had a value of -5.7 (with lodging and restaurants having large negatives), the value for finance and insurance was -2.4, and four sectors had a value between -1 and -2: professional, scientific and technical services (particularly engineering services and computer system design); manufacturing; wholesale trade; and management of companies. Partially offsetting these negative values were sizable positive values in government (in the federal government industry)

TABLE 44
2000-03 CHANGE IN JOB QUALITY BY SECTOR
ARIZONA METROPOLITAN AREAS, ES-202 DATA

	Job Quality Score as a Difference from the National Average*			
Sector	**Phoenix**	**Tucson**	**Yuma**	**Flagstaff**
Agriculture	0.0	-0.0	-0.3***	-0.0
Mining	-0.0	-0.1		0.0
Utilities	0.0	0.1	0.0	-0.1
Construction	0.0	0.0	-0.0	-0.3
Manufacturing	-0.8	-0.1	0.4	0.7
Wholesale Trade	-0.1	0.1	-0.3	0.0
Retail Trade	-0.1	-0.0	0.0	0.3
Transportation	0.0	0.1	-0.0	-0.0
Information	0.1	0.1	0.4	0.2
Finance and Insurance	0.0	0.2	-0.2	-0.0
Real Estate	0.0	0.1	0.0	-0.0
Professional, Scientific, Technical Services		-0.1	0.3***	0.1
Management of Companies		0.1		-0.1
Administrative Support	0.2	0.1	-0.7	-0.1
Educational Services	0.0	-0.1	-0.0	0.0
Health Care and Social Assistance	0.2	0.3	0.5	-0.0
Arts, Entertainment and Recreation	0.0	0.1	0.3	0.0
Accommodation and Food Services	0.1	0.6	0.4	0.4
Other Services	0.1	0.1	0.2	0.1
Government	0.1			
Combined Sectors**	-0.0	0.2	0.4	0.2
TOTAL	**-0.2**	**1.6**	**1.3**	**1.4**

***** (Change over time in industrial share of employment) * (ratio of average wage to overall average wage – 1) * 100. The sectoral figures are calculated as the sum of the industrial scores in each sector.

** In Phoenix, combination of professional, scientific, and technical services with management of companies, and unclassified. In Flagstaff and Tucson, combination of government and unclassified. In Yuma, mining, management of companies, government, and unclassified are combined with parts of agriculture and professional, scientific, and technical services.

*** Part

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

and administrative support. Despite the very low 2003 industrial mix value, improvement relative to the nation occurred between 2000 and 2003, particularly in manufacturing and accommodation and food services (especially the lodging industry).

Though the Yuma area's 2003 industrial mix value was nearly identical to that of the Flagstaff area, the primary cause was agriculture (a value of -10.8, with several agricultural industries having large negative values), not tourism as in Flagstaff. Otherwise, many of the sectoral values were similar to those in Flagstaff, including a large positive in federal government. The Yuma area's 2000-to-2003 change in job quality relative to the nation was about equal to that in the Flagstaff area. A number of sectors had sizable changes, both positive and negative.

OES

The OES average wage varied widely across Arizona in 2003, from only a little less than the national average in the Phoenix-Mesa metropolitan area to moderately less in the Tucson metro to very substantially lower in the Flagstaff and Yuma metros (see Table 45). The increase in the average wage between 2000 and 2003 was less than the national average in Flagstaff and Phoenix, marginally above average in Yuma, and substantially above average in Tucson.

The occupational mix value in 2003 was a little higher than the national average in the state's two largest metro areas, but considerably below average in the two less populous areas. Thus, the occupational mix explains some of the large negative differential from the national average in the average wage in Flagstaff and Yuma, but none of the differential in Phoenix and Tucson.

The change in job quality between 2000 and 2003 was negative in Flagstaff, Phoenix and Yuma, but strongly positive in Tucson. Relative to the nation, Yuma and Phoenix did slightly worse, Flagstaff did marginally better, and Tucson's performance was considerably better. The improvement in the occupational mix relative to the nation accounted for all of the Tucson area's stronger-than-average gain in the average wage.

In the Phoenix metro area, the occupational mix in 2003 was positive, adding a bit more than 1 percent to the average wage comparison between the metro area and the nation. Three high-paying occupational groups — management, business and financial, and architecture and engineering — had positive mix values (their sectoral shares in the Phoenix area were greater than those nationally) but the other high-paying groups had small negative mix values. Two low-paying groups — sales and production — had positive mix values (their sectoral shares were smaller than average) while the other low-paying and average-paying groups had mix values near zero (see Table 46).

The change in job quality in the Phoenix area from 2000 to 2003 was marginally worse than the national average, with most occupational groups having small mix values. The health practitioners and technical group had a positive value but the management, computer and mathematical, and sales groups had negative values.

The Tucson metro area had a similarly positive occupational mix to the Phoenix area, but the occupational groups responsible were partially different. The only high-paying occupational

TABLE 45
OCCUPATIONAL MIX SUMMARY, ARIZONA METROPOLITAN AREAS, OES DATA

	Phoenix	Tucson	Yuma	Flagstaff
2003 Average Wage, Difference from U.S.	-3.6%	-7.9%	-26.7%	-22.4%
2003 Occupational Mix	1.2	1.2	-11.8	-8.3
2000-03 Change, Average Wage Differential	-1.4	4.3	0.4	-1.6
2000-03 Change in Job Quality	-0.9	3.3	-0.9	-0.4
2000-03 Change in Job Quality, Difference from Nation	-0.3	4.2	-0.1	0.5

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

TABLE 46
OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 2003
ARIZONA METROPOLITAN AREAS, OES DATA

	Occupational Mix Value*			
Major Occupational Group	**Phoenix**	**Tucson**	**Yuma**	**Flagstaff**
Management	0.5	-0.0	-2.0	-1.3
Business and Financial Operations	0.4	-0.3	-0.9	-0.8
Computer and Mathematical	-0.1	0.0	-1.4	-1.3
Architecture and Engineering	0.6	0.7	-0.6	-0.7
Life, Physical, and Social Science	-0.2	-0.0	-0.2	0.3
Community and Social Services	0.0	-0.0	-0.0	-0.0
Legal	-0.0	0.1	-0.3	-0.3
Education, Training, and Library	-0.3	0.3	0.1	0.4
Arts, Design, Entertainment, Sports, Media	-0.1	0.0	-0.1	-0.1
Health Practitioners and Technical	-0.4	0.1	-0.9	-0.3
Healthcare Support	0.2	-0.3	-0.0	0.0
Protective Service	-0.1	0.0	0.2	0.1
Food Preparation and Serving	-0.2	-0.6	0.3	-3.5
Building, Grounds Cleaning, Maintenance	-0.0	-0.2	-0.1	-0.9
Personal Care and Service	0.1	-0.1	0.5	-0.1
Sales and Related	0.3	-0.3	-0.1	-0.9
Office and Administrative Support	-0.0	0.4	0.5	-0.2
Farming, Fishing, and Forestry	0.1	0.1	-7.1	0.1
Construction and Extraction	-0.1	-0.1	-0.2	-0.1
Installation, Maintenance, and Repair	0.0	0.1	0.0	-0.1
Production	0.4	0.8	1.0	0.9
Transportation and Material Moving	0.1	0.6	-0.6	0.4
TOTAL	**1.2**	**1.2**	**-11.8**	**-8.3**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The occupational group figures are calculated as the sum of the occupational values within each group.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

group with much of a positive mix value was architecture and engineering. The low-paying groups of administrative support, production, and transportation had positive mix values but the other low-paying and average-paying groups had negative mix values, particularly food preparation and serving. The change in job quality from 2000 to 2003 was substantially greater than the national average, with most occupational groups having positive mix values. The most significant were in the health practitioners and technical, architecture and engineering, computer and mathematical, and management groups (see Table 47).

Flagstaff's occupational mix value in 2003 was quite low, lowering its average wage -8.3 percent relative to the national average. The large size of the low-paying tourism-related occupational groups of food preparation and serving and building and grounds cleaning and maintenance accounted for half of the shortfall, with the other half coming from negative mix values in most of the high-paying groups, particularly management, computer and mathematical, business and financial, and architecture and engineering. The sales group also had a significant negative value.

TABLE 47
2000-03 CHANGE IN JOB QUALITY BY OCCUPATIONAL GROUP
ARIZONA METROPOLITAN AREAS, OES DATA

	Job Quality Score as a Difference from the National Average*			
Major Occupational Group	**Phoenix**	**Tucson**	**Yuma**	**Flagstaff**
Management	-0.4	0.4	0.3	-0.7
Business and Financial Operations	0.2	0.1	0.1	0.1
Computer and Mathematical	-0.4	0.7	0.1	0.1
Architecture and Engineering	-0.0	0.8	-0.2	0.1
Life, Physical, and Social Science	-0.1	0.1	-0.1	0.1
Community and Social Services	0.0	-0.1	0.2	0.1
Legal	0.2	0.1	0.2	-0.1
Education, Training, and Library	-0.1	0.1	-0.1	0.1
Arts, Design, Entertainment, Sports, Media	0.0	-0.0	0.0	-0.0
Health Practitioners and Technical	0.4	0.8	-0.9	-0.7
Healthcare Support	-0.0	0.0	-0.1	-0.0
Protective Service	0.0	-0.0	-0.4	-0.2
Food Preparation and Serving	0.2	0.2	0.2	0.8
Building, Grounds Cleaning, Maintenance	0.1	-0.2	0.4	0.1
Personal Care and Service	-0.1	0.1	0.3	0.0
Sales and Related	-0.4	0.2	0.6	1.0
Office and Administrative Support	0.1	0.2	-0.1	-0.1
Farming, Fishing, and Forestry	0.0	0.0	0.2	0.1
Construction and Extraction	0.1	0.2	0.0	0.0
Installation, Maintenance, and Repair	0.1	0.1	-0.1	0.1
Production	-0.2	0.3	-0.3	-0.3
Transportation and Material Moving	0.1	0.1	-0.3	0.1
TOTAL	**-0.3**	**4.2**	**-0.1**	**0.5**

***** (Change over time in occupational share of employment) * (ratio of average wage to overall average wage – 1) * 100. The occupational group figures are calculated as the sum of the occupational scores within each group.

Source: Calculated from U.S. Department of Labor, Bureau of Labor Statistics.

In contrast, the small size of the low-paying production and transportation groups produced positive effects on the occupational mix.

Despite the low occupational mix value in 2003, the change in job quality between 2000 and 2003 was slightly better in Flagstaff than the national average. The food preparation and serving and sales groups accounted for the positive difference, with the management and health practitioners and technical groups largely offsetting the positive values.

The large size of the low-paying farming occupational group accounted for the majority of the very low occupational mix value in 2003 in the Yuma metro area. However, nearly all of the high-paying groups — especially management and computer and mathematical — had a negative value that cumulated to a value nearly as negative as in farming. The other low-paying and average-paying groups had a net positive value. The decline in job quality in the Yuma area between 2000 and 2003 was essentially equal to the national average, with mixed results by

occupational group. A large decrease in the health practitioners and technical group was offset by moderate increases in several low-paying groups.

PUMS

Significant differences in the industrial and occupational mixes existed across Arizona in 1999 according to the PUMS data. Both mixes were favorable in Maricopa County, slightly positive in Pima County, but sizably negative in the balance of the state (see Table 48).

The average wage in 1999 varied widely between Maricopa County (equal to the national average), Pima County (14 percent less than average), and the balance of the state (19 percent less than average). After accounting for industrial mix and occupational mix, wages in Maricopa County were 6 percent below average. The differential was similar in the balance of the state (7 percent below average) but was much larger in Pima County (15 percent). Thus, the wide differences in the occupational and industrial mixes between Maricopa County and the balance of the state explain nearly all of the large difference in the average wage between the two areas. In contrast, the smaller differences in the occupational and industrial mixes between Maricopa County and Pima County account for only a portion of the wage differential between the two areas.

Half of the 2-percentage-point difference in the 1999 industrial mix value between Maricopa County and Pima County occurred in the finance and insurance sector with another sizable portion in the professional, scientific and technical services sector, each of which had a positive value in Maricopa County but a negative value in Pima County. Maricopa County had a less negative value in accommodation and food services but had a lesser positive value in manufacturing and retail trade, compared to Pima County.

The positive manufacturing value in Maricopa County largely resulted from the large size of the high-paying electronic components (mostly semiconductors), aircraft, and other aerospace industries (missiles and space vehicles), while the latter industry had a very large positive value in Pima County. In each county, the small sizes of the low-paying crop production, animal production, and nursing care industries, and the large size of the above-average-paying real estate agents industry, boosted the industrial mix value. The large size of the low-paying accommodation industry lowered the mix value in each county. Maricopa County's industrial

TABLE 48
INDUSTRIAL AND OCCUPATIONAL MIX SUMMARY
ARIZONA SUBSTATE AREAS, PUMS DATA

	Maricopa	Pima	Balance
1999 Average Wage, Difference from U.S.	0.2%	-13.8%	-19.4%
1999 Industrial Mix	2.7	0.7	-5.6
1999 Occupational Mix	3.3	0.7	-6.7
1989-99 Change, Average Wage Differential	-0.6	-1.3	-2.0
1989-99 Change in Industrial Mix	0.2	0.9	-2.6
1989-99 Change in Occupational Mix	0.2	-0.3	-2.5

Source: Calculated from U.S. Department of Commerce, Census Bureau.

mix also was boosted by the air transportation industry, while the low-paying restaurants and military industries lowered the value in Pima County.

The large negative industrial mix value for the balance of the state resulted from negative values in most sectors, including large negatives in professional, scientific and technical services; accommodation and food services; finance and insurance; retail trade; information; and agriculture (see Table 49). These negative values indicate that the balance of the state had relatively small shares of employment in high-paying sectors and large shares in low-paying sectors, particularly those related to tourism and agriculture.

A number of industries had sizable negative industrial mix values in the balance of the state, including high-paying legal services, computer services, consulting, and insurance carriers and low-paying crop production, accommodation, restaurants, and military. No industry had much of a positive value, with the greatest figures in metal ore mining, electrical power generation, nursing care, and miscellaneous government activities.

TABLE 49
INDUSTRIAL MIX BY SECTOR IN 1999
ARIZONA SUBSTATE AREAS, PUMS DATA

	Industrial Mix Value*		
Sector	**Maricopa**	**Pima**	**Balance**
Agriculture	0.3	0.4	-0.3
Mining	-0.1	-0.0	0.0
Utilities	0.0	-0.1	0.1
Construction	-0.0	-0.0	-0.0
Manufacturing	1.0	1.5	-0.1
Wholesale Trade	0.1	-0.0	-0.1
Retail Trade	0.0	0.4	-0.8
Transportation and Warehousing	0.2	0.2	-0.1
Information	0.1	-0.1	-0.5
Finance and Insurance	0.5	-0.5	-0.8
Real Estate and Leasing	0.2	0.2	0.1
Professional, Scientific, Technical	0.5	-0.2	-1.5
Management of Companies	0.0	-0.0	-0.0
Administrative Support	-0.3	-0.3	0.0
Educational Services	-0.0	0.0	0.0
Health Care and Social Assistance	0.3	0.3	-0.1
Arts, Entertainment and Recreation	0.0	-0.1	-0.2
Accommodation and Food Services	-0.2	-0.8	-1.1
Other Services	-0.0	-0.2	0.1
Government	0.1	-0.1	-0.2
TOTAL	**2.7**	**0.7**	**-5.6**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The sectoral figures are calculated as the sum of the industrial values within each sector.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

More than half of the 2.5 percentage-point differential in the 1999 occupational mix between Maricopa County and Pima County was in the high-paying management occupational group. Values also were higher in Maricopa County in the high-paying business and financial, computer and mathematical, and legal groups and in the low-paying food preparation and serving, personal care, and sales groups. Values were higher in Pima County than in Maricopa County in the health practitioners and technical and administrative support groups (see Table 50).

Most occupations in Maricopa and Pima counties did not have sizable mix values. In Maricopa County, the largest positive values were in the nursing aides and real estate agents occupations, with the largest negative value in the customer service representatives occupation. In Pima County, the aerospace engineers occupation had a large positive figure, with other positive values in the postsecondary education and real estate agents occupations. The chief executives occupation had a large negative value.

TABLE 50
OCCUPATIONAL MIX BY OCCUPATIONAL GROUP IN 1999
ARIZONA SUBSTATE AREAS, PUMS DATA

	Occupational Mix Value*		
Major Occupational Group	**Maricopa**	**Pima**	**Balance**
Management	0.9	-0.7	-1.7
Business and Financial Operations	0.3	-0.0	-0.6
Computer and Mathematical	0.2	-0.0	-0.7
Architecture and Engineering	0.4	0.5	-0.4
Life, Physical, and Social Science	-0.1	0.2	-0.0
Community and Social Services	0.0	-0.0	-0.0
Legal	0.0	-0.2	-0.6
Education, Training, and Library	-0.0	0.2	-0.0
Arts, Design, Entertainment, Sports, Media	-0.1	0.1	-0.1
Health Practitioners and Technical	-0.2	0.3	-0.6
Healthcare Support	0.2	0.0	0.2
Protective Service	-0.0	-0.0	-0.1
Food Preparation and Serving	0.1	-0.6	-0.8
Building, Grounds Cleaning, Maintenance	-0.1	-0.1	-0.4
Personal Care and Service	0.1	-0.3	-0.1
Sales and Related	0.7	-0.1	-0.9
Office and Administrative Support	-0.4	-0.1	0.2
Farming, Fishing, and Forestry	0.2	0.3	-0.5
Construction and Extraction	-0.2	-0.1	-0.2
Installation, Maintenance, and Repair	-0.0	-0.1	-0.1
Production	0.6	0.8	0.8
Transportation and Material Moving	0.5	0.7	0.1
Military	0.1	-0.0	-0.1
TOTAL	**3.3**	**0.7**	**-6.7**

* (Arizona – U.S. employment share) * (ratio of average wage to overall U.S. average wage - 1) * 100. The occupational group figures are calculated as the sum of the occupational values within each group.

Source: Calculated from U.S. Department of Commerce, Census Bureau.

In the balance of the state, few occupational groups had a positive mix value, with only the production group having a large positive value. In contrast, several groups had large negative values, including the high-paying groups of management, business and finance, computer and mathematical, architecture and engineering, legal, and health practitioners and technical, and the low-paying groups of food preparation and serving, building and grounds cleaning and maintenance, sales, and farming.

Among the occupations with large negative values in the balance of the state were the high-paying occupations of chief executives, lawyers, physicians, marketing managers, computer software engineers and the low-paying agricultural workers, cooks, and cashiers occupations. The largest positive values (though small) were in some production occupations and the real estate agents occupation.

Though the change in job quality score cannot be calculated from the PUMS data, the change over time in the industrial mix and occupational mix values provides an indication of the change in job quality in the substate areas relative to the nation. Between 1989 and 1999, Maricopa County's industrial and occupational mix values rose slightly. Pima County had a larger gain than Maricopa County in industrial mix, but experienced a small decrease in occupational mix. Significant declines in both industrial and occupational mix occurred in the balance of the state.

The decreases in job mix in the balance of the state between 1989 and 1999 were greater than the drop in the average wage differential from the national average. In Maricopa County, a fall in its average wage differential occurred despite modest gains in job mix. Similarly, a decrease in the average wage differential in Pima County was measured despite a small net gain in job mix.

APPENDIX I
USE OF ARIZONA OR NATIONAL WAGE DATA

In some industrial and occupational categories, the average wage in Arizona is much different from the national average. A large difference is more likely in categories with relatively little employment in Arizona, but the average wage figures are considerably different in some categories with more substantial employment. The average wage differential may result from differences within the category between the nation and the state in occupational mix, industrial mix, or other factors. For example, the broader the industrial category, the more likely a substantial internal industrial mix difference exists.

Because the average wage ratio in some categories is much different between Arizona and the nation, the job quality score for Arizona can vary noticeably depending on whether state or national wage data are used. For a noticeable difference in score to occur, the change in categorical share over time also must be sizable.

Using the BEA data, the Arizona job quality score was lower using Arizona wages than national wages in most years. Differences were large in each year from 1992 through 2000 and in some years before that. However, the score was higher using Arizona wages in both 2002 and 2003.

For any particular time period, relatively few industrial categories generally are responsible for the variation in score between the two measures of wages. From 1969 through 1987, large declines in sectoral share in the military and farm categories, coupled with considerably higher wages in Arizona than nationally, were largely responsible for the lower score based on Arizona wage data. In the 1982-to-2000 period, large increases in sectoral share in business services, coupled with a lower average wage in Arizona, caused much of the lower score based on Arizona wage data.

A large difference in Arizona score over the 1991-to-2000 period between that calculated using national wages and that using Arizona wages resulted particularly from three categories: business services, securities brokers, and health services. Each caused the score based on Arizona wages to be lower than that based on national wages by a larger degree than in earlier periods. In business services, the average wage was consistently low in Arizona relative to the national figure. In 2000, the category's average wage ratio was greater than 1 nationally but less than 1 in Arizona. Business services had a huge gain in employment sectoral share between 1991 and 2000. Health services had a higher average wage in Arizona than nationally, but the differential lessened between 1991 and 2000. Following a long period of rising employment sectoral share, health services' share fell between 1991 and 2000. In the security brokers category, the employment sectoral share rose between 1991 and 2000 while the average wage in Arizona fell much further behind the national average.

APPENDIX II
COMPARISON OF EPI MEASURE TO JOB QUALITY SCORE

The formula used to measure change in job quality created for this project differs from that used by the Economic Policy Institute. This project's formula sums over all categories: [(change over time in sectoral share of employment) * (ratio of average wage to overall average wage – 1) * 100]. The EPI splits the categories into two groups: those with an increasing sectoral share and those with a declining share. The EPI formula sums over all categories of each group: [(change in sectoral share of employment / sum of group's change in sectoral share) * average wage].

To compare the results of the two formulae, the EPI methodology was applied to the BEA dataset. The percent difference in the weighted wage between the expanding sectoral share group and the declining share group is presented in Table A1 for selected time periods.

The EPI measure and the score generally correspond closely: (1) the sign is always the same; (2) the rank order across the six time periods is similar for Arizona and the nation; and (3) the magnitude of the differential in the two measures generally is similar across the time periods (e.g. the EPI measure is 12 times greater than the score for the 1969-to-1974 period for Arizona).

Relative to the EPI measure, the score has the advantage of simplicity of the formula and ease of calculation in a spreadsheet. In addition, the categorical scores can be used directly to identify the categories with the largest positive and negative influences on job quality.

TABLE A1
COMPARISON OF EPI MEASURE TO JOB QUALITY SCORE, BEA DATA

	EPI			Score		
	Arizona	**Nation**	**Difference**	**Arizona**	**Nation**	**Difference**
1969-74	4%	-6%	10%	0.32	-0.31	0.63
1975-82	-4	-7	3	-0.36	-0.42	0.06
1982-87	-15	-19	4	-1.39	-1.29	-0.10
1988-92	-25	-17	-8	-1.55	-0.72	-0.83
1992-2000	-10	-10	0	-1.00	-0.70	-0.30
2001-03	-25	-36	11	-0.90	-1.08	0.18

Source: Calculated from U.S. Department of Commerce, Bureau of Economic Analysis.

APPENDIX III
COST OF LIVING

An area's cost of living is reflected in its wage structure, though not perfectly. Thus, if living costs in Arizona were below average, it would help explain the state's subpar wages. However, some economists question whether wages should be adjusted, at least fully, for the cost of living. For example, Dumond, Hirsch and MacPherson (1999) argue that a partial adjustment for living costs may best approximate a real wage.

Since the analysis of job quality presented in this report covers the 1969-to-2003 period, an estimate of the cost of living over the same period is desirable. However, limited data are available on how much it costs to live in one place relative to another. No cost-of-living data by state are regularly produced, though various researchers estimated state indexes from the 1970s through the early 1990s. In "Arizona Per Capita Personal Income and Components" (1996), the CBR estimated the cost of living by state relative to the national average for the 1979-80 and 1989-90 periods from the published studies. As part of this study, two additional cost-of-living indexes were constructed for Arizona, each expressed as a ratio to the national average.

The first method uses housing data from the decennial censuses for 1970 through 2000, with the rationale that most of the geographic differences in living costs result from variations in housing costs (for example, see the March 2004 issue of *AZB/Arizona Business*). The decennial censuses report median home value and median contract rent. Weighted by the proportion of residences that are owned or rented, these values were used to compute a ratio of Arizona housing costs relative to the national average. Assuming that other living costs were the same in Arizona as the national average, the housing cost ratio was weighted by housing's proportion of total expenses (estimated at 28 percent). The result shows the cost of living in Arizona to have been within 1 percent of the national average in 1970, 1990 and 2000, but 4 percent higher in 1980.

The second method uses 1982-to-2004 data from the American Chamber of Commerce Researchers Association (ACCRA). The ACCRA data are by city, with participation in the quarterly study voluntary by local chambers of commerce. The study measures the cost of living of households earning above average incomes. The cities of Phoenix and Tucson have consistently participated in the study since the early 1980s. Flagstaff, Lake Havasu City, Prescott and Yuma generally have participated since about 1990 and Sierra Vista began in 1998. Annual averages were constructed for each year for each place. The Phoenix index was used as a proxy for all of Maricopa County and was weighted by the county's proportion of the state's population. The same was done for Pima County using the Tucson data. An average of the other participating places was used as a proxy for the balance of the state, weighted by the proportion of the state's population living in the 13 less populous counties.

The resulting time series shows that Arizona's cost of living relative to the national average varies somewhat with the economic cycle, being highest during expansions and lowest during periods of economic weakness. (This cyclical pattern relative to the national average also was noted in the inflation rates calculated from the Metropolitan Phoenix Consumer Price Index, which was produced by the CBR from 1975 through 1998.) Between 1982 and 2001, Arizona's cost of living calculated from the ACCRA data ranged from equal to the national average to

about 5 percent higher — generally from 1 to 3 percent higher. It fell to 3 percent lower in 2002 and has since climbed back to the national average.

The various cost-of-living estimates are summarized in Table A2. The ACCRA and Census methods produce similar results for 1990 and 2000. Combining these two series back to 1970 indicates that living costs in Arizona have at times been slightly higher than the national average, but usually are quite close to average. Thus, the state's subpar wages are not related to a below-average cost of living.

However, the average of other studies used in the 1996 report indicated that Arizona's cost of living was somewhat below average. If living costs are only partially considered, as suggested by Dumond et al., then even the living costs estimated from the other studies have only a slight effect in explaining why real wages in Arizona consistently have been less than the national average.

TABLE A2
ARIZONA COST OF LIVING RELATIVE TO THE NATIONAL AVERAGE

	ACCRA	Census	Average of Studies
1970		.99	
1980		1.04	.98
1982	1.02		
1983	1.02		
1984	1.03		
1985	1.04		
1986	1.05		
1987	1.04		
1988	1.03		
1989	1.02		
1990	1.01	1.00	.95
1991	1.01		
1992	1.00		
1993	1.02		
1994	1.02		
1995	1.01		
1996	1.02		
1997	1.03		
1998	1.02		
1999	1.02		
2000	1.01	1.01	
2001	1.00		
2002	.97		
2003	.99		
2004	1.00		

Source: Calculated from American Chamber of Commerce Researchers Association, U. S. Department of Commerce, Census Bureau, and other data.

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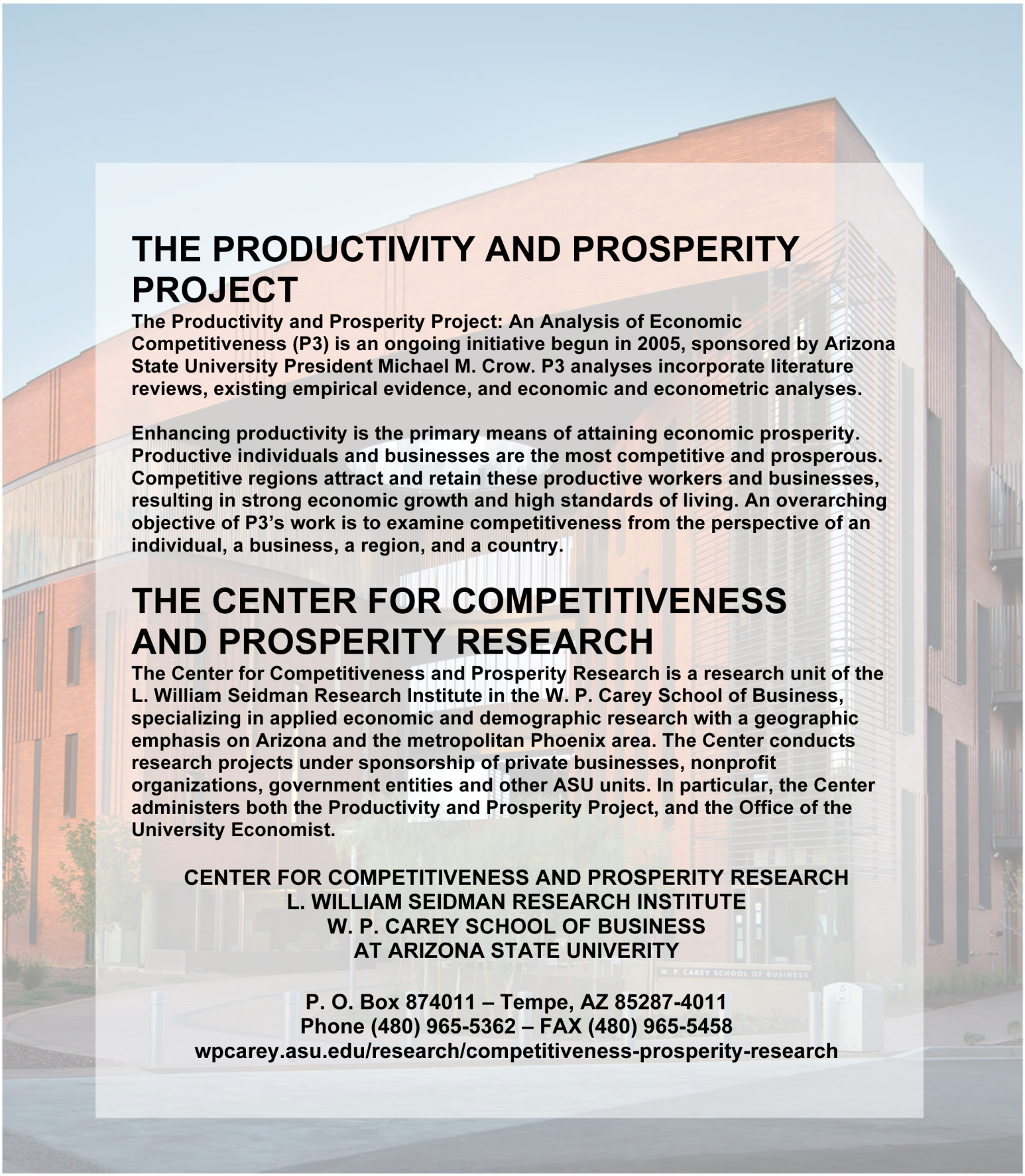

THE PRODUCTIVITY AND PROSPERITY PROJECT

The Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3) is an ongoing initiative begun in 2005, sponsored by Arizona State University President Michael M. Crow. P3 analyses incorporate literature reviews, existing empirical evidence, and economic and econometric analyses.

Enhancing productivity is the primary means of attaining economic prosperity. Productive individuals and businesses are the most competitive and prosperous. Competitive regions attract and retain these productive workers and businesses, resulting in strong economic growth and high standards of living. An overarching objective of P3's work is to examine competitiveness from the perspective of an individual, a business, a region, and a country.

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CENTER FOR COMPETITIVENESS AND PROSPERITY RESEARCH
L. WILLIAM SEIDMAN RESEARCH INSTITUTE
W. P. CAREY SCHOOL OF BUSINESS
AT ARIZONA STATE UNIVERITY

P. O. Box 874011 – Tempe, AZ 85287-4011
Phone (480) 965-5362 – FAX (480) 965-5458
wpcarey.asu.edu/research/competitiveness-prosperity-research

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