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Are the New Jobs Good Jobs?

Katharine G. Abraham and James R. Spletzer

3.1 Introduction

Interest in whether the jobs generated in the U.S. economy are "good jobs" or "bad jobs" is a hardy perennial in both the academic and policy worlds. Jobs have multiple attributes—including wages, benefits, hours of work, working conditions, opportunities for advancement, and other characteristics—and changes along any of these dimensions could affect a job's perceived quality (see, for example, Farber and Levy 2000; Clark 1998, 2001, 2005; Kalleberg, Reskin, and Hudson 2000). Interest in job quality, however, most commonly has focused on wages, with jobs that pay higher wages considered to be better jobs. In addition to research that has looked directly at changes in the wage structure, an important strand of the literature on job quality has focused instead on the industry or occupation composition of net additions to employment. The basic strategy in these latter studies is to categorize jobs in different industries, occupations, or industry/occupation

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employment cells according to the average wage paid and then to examine the growth in the number of jobs in higher- versus lower-wage cells. This focus on industry and occupation is appealing for two reasons. Industry and occupation account for a substantial fraction of the overall variation in earnings. Moreover, thinking about jobs in terms of their industry and occupation is a step toward being able to characterize the structural changes that underlie changes in the distribution of earnings.

Previous studies of growth in employment in industry/occupation cells at different positions in the wage distribution have been based on household data from the Current Population Survey (CPS). A concern about these studies is that we know the occupations reported by household survey respondents do not always agree with the occupations recorded by the employers of the same individuals (Mellow and Sider 1983; Mathiowetz 1992). The Occupational Employment Statistics (OES) survey is a very large employer survey designed to produce point-in-time estimates of occupational employment and wages at fine levels of industry, occupation, and geography. Published data from the CPS and the OES are not strictly comparable, but the differences in the occupational distribution of employment in the two surveys nonetheless are striking. In CPS data for 2004, 10.5 percent of employed persons hold management jobs; in contrast, in OES data for the same year, just 4.8 percent of jobs are management positions. In the CPS, 30.3 percent of employed persons hold either administrative or service jobs; in the OES, the share of jobs falling in those categories is 20 percent larger (36.6 percent).[1]

A major goal of the present study is to assess the feasibility of using the OES data to examine year-over-year changes in the composition of employment. The OES program documentation states clearly that the survey is not designed to support such comparisons. Challenges to using the OES data for time series analysis include the design of the survey sample to support estimates based on a rolling three-year sample rather than estimates based on data for a single year, changes in the classification of occupation and industry over time, and other changes in OES survey procedures. The chapter discusses how we have addressed each of these challenges.

Our analysis reexamines trends in the industry and occupational composition of employment over the period from 1996 through 2004, a period that includes the last several years of the economic boom of the 1990s, the 2001 recession, and the labor market's stagnation and eventual recovery following the 2001 recession. The OES data confirm the slow growth of jobs in the middle of the wage distribution found in earlier studies using CPS data but suggest that the CPS exaggerates the growth in high-wage employment while understating the growth in low-wage jobs. An important reason for

1. The CPS figures are reported in table 9 of Employment and Earnings and the OES figures in http://www.bls.gov/oes/2004/may/table1.pdf.

this difference is the faster growth of management employment in the CPS as compared to the OES.

We begin in section 3.2 with a brief review of the relevant literature. Section 3.3 describes the OES and CPS data used in our analysis, explaining in particular how we used the OES data to construct annual estimates of employment by industry and occupation. Empirical results are presented in section 3.4. Section 3.5 offers some concluding thoughts and outlines plans for extending the analysis.

3.2 Literature Review

The most striking fact about recent trends in the U.S. wage structure is the substantial growth in the inequality of earnings since about 1980 (see Lemieux, chapter 1 in this volume). Since the late 1980s, the continued growth in overall earnings inequality in the United States has been the result of a widening gap between the top and the middle of the earnings distribution together with a stable or shrinking gap between the middle and the bottom of the distribution. Autor, Katz, and Kearney (2006) explain these findings with a model in which information technology has increased the demand for the most highly skilled workers, but reduced the demand for middle-skill workers and had little effect on the demand for low-skill workers, a pattern they refer to as polarization in the demand for labor.

Empirical evidence for assessing this hypothesis—and changes in the quality of jobs more generally—has been generated by looking at rates of growth in the number of jobs at different points in the wage distribution. The early literature used information about the industries or the occupations in which net employment growth occurred to draw conclusions about job quality. Both industry and occupation have a strong association with wages but considered independently provide different perspectives on whether the economy has been adding bad jobs or good jobs. As noted by Levine and Labonte (2004) in their review of this literature, 50 percent of the 20 million payroll jobs added between 1993 and 1999 were in the services industry, and 17 percent were in retail trade. These are the two lowest paying of the nine major industries, and figures on job growth by industry have been cited in support of the view that "bad jobs" were being created over this period. Looking at CPS data on employment by occupation for the same seven years, however, management occupations accounted for 33 percent of net job growth and professional occupations for another 31 percent. These are the two highest paying of the eight major occupations, and figures on job growth by occupation have been cited as support for the view that "good jobs" were being created.

In the mid-1990s, the Bureau of Labor Statistics (BLS) began regular publication of employment and wage information from the CPS for industry by occupation cells. Using data cross-classified by ten industries and nine

occupations, Ilg (1996) shows that, during the first half of the 1990s, employment grew more rapidly in industry/occupation cells in the top and the bottom thirds of the earnings distribution than in cells in the middle third of the earnings distribution. In a later article, Ilg and Haugen (2000) show that nearly all of employment growth over the decade from 1989 to 1999 was concentrated among relatively high- and relatively low-paid workers, with the strongest job growth occurring in the highest earnings group and scant employment growth among workers with mid-level wages. Ilg and Haugen use the term "polarization" to describe this pattern of employment growth.

In the academic literature, also using data on CPS employment in industry/occupation cells, Acemoglu (1999) finds that over the decade from 1983 to 1993, employment in job categories that typically pay close to the median of the wage distribution were being replaced by employment in higher- and lower-paying jobs. Autor, Katz, and Kearney (2006) compare the 1980s and the 1990s and show sharp differences between these two decades, with the 1990s being characterized by more rapid growth of employment in occupations at the bottom and top of the wage distribution relative to the middle of the skill distribution. Analyzing household survey data for Britain, Goos and Manning (2007) find similar evidence of polarization in employment growth rates in occupation and industry/occupation cells. Goos, Manning, and Salomons (2009) extend these findings in their analysis of data for sixteen European countries over the 1993 to 2006 time period.

In the U.S. context, it is more difficult to use CPS data from 2000 onward to examine job growth by position in the earnings distribution. First, the CPS industry and occupation classification systems changed in 2003, complicating comparisons that span the break in series. Second, in the updated versions of the published tables used in earlier work by Ilg (1996) and Ilg and Haugen (2000), there are several very large industry/occupation cells that lie near the earnings boundaries that separate the thirds of the earnings distribution, and the assignment of cells to wage categories is sensitive to which year's wage distribution is used to make the assignment.

3.3 Data

In this chapter, we analyze changes in job structure using annual estimates of employment in industry/occupation cells based on the OES and the CPS. Because of changes in the industry and occupation classification structures used in these surveys, much of the work we have done for this chapter has been focused on the creation of consistent industry and occupation employment time series. Working with the microdata records allows us to break large cells that lie near the boundary between wage categories into smaller pieces, thereby avoiding some of the problems encountered by previous analysts working with CPS data for the 2000s. Because the OES data have

been less widely used and are, therefore, less familiar than the CPS data, we describe the OES survey in some detail as well as explain the steps taken to produce estimates that are suitable for our purposes.[2]

3.3.1 The OES Data

The OES survey is an annual mail survey conducted by the BLS in collaboration with its state partners. The survey collects information on occupational employment from approximately 400,000 establishments each year. Self-employed workers, unpaid family workers, agriculture workers, and household employees are excluded from the survey sample.

Since 1996, the OES program has collected information on occupational wages in addition to occupational employment. The first portion of a typical OES survey form is displayed in appendix A. Establishments selected for the OES are asked to report employment in each cell of a matrix in which the rows refer to different occupations and the columns to wage intervals. Generally, for firms with twenty or more employees, the survey forms contain between 50 and 225 occupations, depending on the industry of the establishment completing the form. Prior to 2000, employers receiving these forms were asked to list numerically significant or new occupations that could not be reported in a detailed occupation and, therefore, were reported in an "all other" residual category. This information was used in revising the survey forms for later years. Beginning in 2000, employers have been asked to provide detailed occupational information for workers who cannot be placed in one of the listed occupations.

Since 1999, employers with fewer than ten employees have received a shorter unstructured form that contains no list of likely occupation titles; rather, the employer is asked to provide a brief description of each occupation represented in the establishment's workforce. The information on these forms is coded into occupational categories by survey staff in the state agencies.[3] The OES program also collects data from some large firms electronically. Multiestablishment firms may request that their data be collected through the firm's corporate headquarters rather than directly from individual establishments. These reporters provide the OES program with electronic records containing job title and wage information for their employees. The OES staff then builds crosswalks for coding these firms' data into Standard Occupational Classification (SOC) occupations and OES wage intervals.

The OES program converted from its own occupation coding system to the SOC system in 1999 and from the Standard Industrial Classifica-

2. The OES confidential microdata are available to eligible researchers via procedures described on the BLS Web site (http://www.bls.gov/bls/blsresda.htm).

3. Prior to 1999, several states developed their own unstructured short forms that were used to collect data from some small employers, but this was not a part of the formal survey protocol. Beginning in 2004, states were given the discretion to send unstructured forms to establishments with up to forty-nine employees.

tion (SIC) system to the North American Industry Classification System (NAICS) in 2002. These conversions created numerous breaks in series at the detailed occupation and industry level. Of the 769 detailed occupations included in the SOC when it was introduced in 1999, fewer than half could be cross-walked directly to occupations that previously existed in the old OES classification structure (Bureau of Labor Statistics, 2001, 24 and 175). During the transition to NAICS at the Bureau of Labor Statistics, only about half of establishments could be assigned NAICS codes based on their SIC classification (Mikkelson, Morisi, and Stamas 2000). In this chapter, we have relied upon concordances developed by Matthew Dey of the Bureau of Labor Statistics to construct more aggregated series for nineteen occupations and thirteen industries, listed in table 3B.1, that can be defined with reasonable consistency across the breaks in series.[4] In preliminary analyses using the 247 cells defined using these more aggregated occupations and industries, we noticed a few that were very large, including five with employment in 1996 in excess of 3 million. We further disaggregated these five large cells by splitting the included industries or occupations, as detailed in table 3B.2. These further breakouts add twenty-four cells, for a total of 271 industry/occupation cells.

In working with the data, it became apparent that, over our study period, the OES survey process had changed in other, less well-documented ways. The most important of these changes appear to have been new editing rules and new training for staff that were introduced over several years as part of the process of implementing the SOC. Our efforts to quantify and adjust for the effects of these changes in coding practices are discussed at a later point in the paper.

The wage information provided by establishments in the OES survey is recorded in intervals corresponding to different ranges of hourly and annual rates of pay, as shown in appendix A. Occupational wage data collected by the BLS Office of Compensation and Working Conditions for the National Compensation Survey (NCS) are used to determine the mean hourly wage for each interval. The interval mean for the bottom interval may vary across states depending on the level of the state minimum wage.[5]

The OES survey sample is designed to support detailed point-in-time estimates of staffing patterns and wages developed from a sample pooled over three years rather than estimates based on data collected in a single year. Samples of approximately 1,200,000 establishments are selected for the OES survey on a three-year cycle. Each selected establishment is assigned to an annual or semiannual panel. Prior to 2002, the survey sample was divided into three annual panels, each consisting of approximately 400,000

4. Details of the concordances are available upon request.

5. Kasturirangan, Butani, and Zimmerman (2007) provide further details on how mean hourly wages are calculated in the OES program.

establishments; within each panel, establishments were assigned an October, November, or December reference date. In 2002, the survey transitioned to a design with six semiannual panels. Under this new design, each panel consists of approximately 200,000 establishments; panel samples are drawn for each May and November reference date in each of the three years covered by the survey sample.[6] Survey responses from three annual or six semiannual panels are combined to produce estimates that are benchmarked to employment totals for the most recent reference period. The May 2006 published estimates, for example, rest on data collected for November 2003, May 2004, November 2004, May 2005, November 2005, and May 2006. In our work, we use only the data pertaining to a particular year to produce the estimates for that year. From 2002 onward, because we wanted the data for later years to be as comparable as possible to those for the earlier years, we use only the data from the November panel. Government is excluded from all of our tabulations.

Approximately 80 percent of establishments sampled for the OES provide usable responses; on an employment-weighted basis, the survey response rate is approximately 75 percent. Nearest neighbor hot-deck procedures that take data from another similar establishment are used to impute missing employment information for establishments that do not respond. Missing wage distributions also are imputed using distributions for similar establishments.

The weights used to produce official OES estimates are constructed at the level of cells defined on the basis of industry, establishment size, and geography. As noted in the preceding, the sample units used to produce each set of estimates are divided into panels spread across three years of data collection. Each sampled establishment is assigned a current weight that reflects its probability of selection into the panel to which it belongs.[7] If every cell in a panel contained at least one establishment, the weighted sum of employment calculated for an industry using the current weights would be approximately equal to total national employment in the industry as of the panel reference date(s). There are, however, a very large number of OES sampling cells—as of 2004, the survey was stratified by 343 industries, seven establishment size classes and 686 metropolitan or balance-of-state geographic areas—and individual panels contain a significant number of empty cells. Because employment in the empty cells is not represented, using the current weights to estimate national employment in an industry based

6. Prior to 1996, the three-year sample was divided by industry, with industries accounting for about a third of total employment surveyed in each year. Beginning in 1996, the sample design was changed so that each panel represents all industries. This feature was carried over to the six-panel design introduced in 2002.

7. The current weights also incorporate adjustments for differences between the way a unit was sampled and the way it was reported (e.g., one establishment at a company sampled but data reported for several establishments together).

on the responses to any single panel yields an estimate that lies significantly below the industry's true employment level.

To correct this problem with using the OES current weights for estimation purposes, we adjusted the current weights to ensure that weighted national employment totals would match the national November Current Employment Statistics (CES) estimates for each industry in each year. The adjustment factor for industry j in year t is

$$\text{ADJFACTOR1}_{jt} = \frac{E_{jt}^{\text{CES}}}{\sum_i \text{CURRWT}_{ijt}^{\text{OES}} E_{ijt}^{\text{OES}}}, \tag{1}$$

where ADJFACTOR1 is the industry weight adjustment factor, E is employment, CURRWT is the current weight from the OES data file, i indexes individual establishments, j indexes detailed industries, and t indexes years. These weight adjustment factors were calculated at the most detailed industry level possible.[8]

A further concern with the OES data is that, although the true distribution of employment by size of establishment within each of our thirteen industries appears to have been very stable over the period we study, the distributions in the data vary considerably from year to year. Reasons for this include the uneven distribution of the largest (certainty) units across panels; the effects of a 1999 experiment carried out in selected states to determine the feasibility of collecting data from all certainty establishments every year; and the introduction of establishments with one to four employees, previously represented by establishments with five to nine employees, into the survey sample in 1998. To correct this problem, we introduce a second weight adjustment factor that sets the share of employment in each of the thirteen industries that is accounted for by each of nine establishment size classes equal to the average share in the industry for that size class across the OES benchmark data files for 1998, 2001, and 2004:[9]

$$\text{ADJFACTOR2}_{kst} = \frac{\text{AVESHARE}_{ks}^{\text{BMK}}}{\text{SHARE}_{kst}^{\text{OES}}} \tag{2}$$

where ADJFACTOR2 is the size class weight adjustment factor, AVESHARE is the average share of employment accounted for by the designated size class in the benchmark data, SHARE is the current year share in the OES data, k indexes broad industry, s indexes establishment size class,

8. The SIC classification structure used from 1996 to 2001 contained 934 detailed industries. The weight adjustment factors we applied to the 1996 data were calculated at the four-digit level for 310 of these industries, at the three-digit level for 383 industries, at the two-digit level for 225 industries, and at the one-digit level for 16 industries. For 2004, among the 1,171 detailed NAICS industries, weight adjustment factors were calculated at the five-digit level for 424 industries, at the four-digit level for 520 industries, at the three-digit level for 172 industries, and at the two-digit level for 55 industries.

9. The size class distributions observed across these three years are very similar.

and *t* indexes year. Applying both the industry and the size class adjustment factors yields

$$\text{FINALWT}_{ijkst} = \text{ADJFACTOR1}_{jt} \times \text{ADJFACTOR2}_{kst} \times \text{CURRWT}^{\text{OES}}_{ijkst}. \tag{3}$$

These final weights are used to produce all of the OES estimates we report.

3.3.2 The CPS Data

The more familiar CPS is a monthly household survey that collects information about the labor force status of persons aged sixteen and older. The survey is conducted in person or by telephone. Approximately 60,000 households are interviewed each month, with a single respondent generally reporting for all members of the household. Households selected for the CPS sample are interviewed eight times, with each selected household present in the sample for four months (month in sample (MIS); MIS-1 through MIS-4), out for eight months, and then in for another four months (MIS-5 through MIS-8). The survey sample in each month represents the civilian noninstitutionalized population.

The CPS collects occupation and industry on the main job every month for all employed persons. Occupation and industry on the second job are collected only in MIS-4 and MIS-8, the so-called outgoing rotation groups. Data on earnings on the main job also are collected only for the outgoing rotation groups; earnings on jobs other than the main job are not collected.

In contrast to the OES data, which pertain to *jobs,* the unit of observation in the CPS is the *person.* We use the information on both the main job and any second job collected in the CPS outgoing rotation groups to construct a CPS-based measure of the number of *jobs* in different industry/occupation cells. This measure misses some jobs reported by those who hold three or more jobs, but there are a very small number of such positions.[10] For comparability with the OES data, we exclude unincorporated self-employment jobs, agriculture jobs, and jobs in private households. Government jobs have been dropped from both surveys.

Industry/occupation cells were defined in the CPS jobs data using the same nineteen occupations and thirteen industries as in the OES data. Since 2003, the CPS has employed the 2000 Census occupational classification system, essentially equivalent to the SOC, and the 2000 Census industry

10. In annual estimates for the period since 1994, between 5.2 percent and 6.2 percent of workers in the CPS report that they hold multiple jobs. Unpublished tabulations for 2006 show that just 8.0 percent of these multiple job holders had more than two jobs, almost exactly the same as the 7.8 percent share observed in tests conducted as part of the process of redesigning the CPS questionnaire in the early 1990s (Polivka and Rothgeb 1993). Taken together, these figures imply that less than 1/2 of 1 percent of all workers are multiple job holders holding three or more jobs, and the share holding three or more private-sector wage and salary jobs almost certainly is lower.

classification system, essentially equivalent to NAICS. Prior to 2003, the CPS used the 1990 Census occupation and industry classification systems.

In the transition from the 1990 to the 2000 Census occupation codes in 2003, a number of detailed 1990 Census occupations were split across 2000 Census occupations belonging to different broad occupational categories. In most cases, the numbers of jobs affected were small, but a large number of jobs belonging to three management occupations—Managers, medicine and health; Managers, food serving and lodging establishments; and Management, not elsewhere classified—were reassigned to nonmanagement occupational categories under the 2000 coding structure. Had we followed the usual procedure of bridging all employment in each detailed 1990 occupation to a particular detailed 2000 occupation, management employment would have fallen by 1.5 million on a base of 12.6 million between 2002 and 2003, at the time when the 2000 Census coding was introduced. To avoid this problem, we divided the employment reported in the three occupations across 2000 occupations on a probabilistic basis reflecting the percentage distributions observed in dual-coded CPS data (see www.bls.gov/cps/cpsoccind.htm).[11]

The 1990 Census industry classification system is essentially equivalent to the SIC, and we used the same mapping to our thirteen broader industries for the pre-2003 CPS data as was applied to the pre-2002 OES data. As in the OES, we broke the five largest industry/occupation cells into the smaller pieces shown in table 3B.2. In the CPS, 5 of the resulting 271 industry by occupation cells were empty in one or more years between 1996 and 2004. We collapsed these cells with other cells in the same industry. For consistency, the OES cells also were collapsed in the same way, leaving us with 266 industry/occupation cells for use in our analysis.[12]

For workers paid by the hour, we use the hourly wage on the main CPS job as the measure of hourly earnings. For other workers, hourly earnings are calculated as weekly earnings on the main job divided by usual hours per week on the main job. Hourly wages were averaged across main jobs in an industry/occupation cell and cells assigned a position in the distribution

11. Among Managers, medicine and health, 33.6 percent of pre-2003 jobs were reassigned to the broad category of "Office and administrative support"; 14.4 percent of Managers, food serving and lodging establishments were assigned to the broad category of "All other services"; and among Management, not elsewhere classified (n.e.c.), 11.0 percent were assigned to "Office and administrative support," and 6.6 percent were assigned to "Sales and related." In each case, the employees reassigned to nonmanagement occupations were selected randomly from among a pool of twice the needed size consisting of those in the donor occupation who had the lowest reported hourly wages. In an earlier version of this chapter, we performed a similar adjustment based on data from a sample of approximately 100,000 wage and salary workers who completed the 1990 Census long form and whose occupations were dual-coded using both the 1990 and the 2000 Census occupation systems (Scopp 2003). The effects on our data series were very similar.

12. The five empty cells were Health care practitioners and technical occupations in the Mining, Construction and Information industries and Food preparation and serving occupations in the Mining and Construction industries. Health care practitioners and technical occupations were collapsed into Other professional and technical occupations and Food preparation and serving occupations into All other services, in each case within the same industry.

of average wages by industry and occupation.[13] Wages are imputed for a quarter to a third of CPS respondents, using a hot-deck imputation process that includes major occupation and a set of demographic variables as classifier variables.

For convenience in carrying out our calculations, we make use of the Unicon CPS outgoing rotation group data file. The fact that the composite weights used in CPS estimation are not publicly available for 1996 and 1997 creates minor discrepancies between weighted counts based on the Unicon file and published estimates. More important, the weights for 2000, 2001, and 2002 on the Unicon file that we are using do not incorporate adjustments associated with benchmarking to the 2000 Census. We created adjustment factors for the Unicon weights in these three years based on the ratio of published to constructed employment in each of fifty-three age by race by sex cells.[14] Because the Census Bureau has introduced new population controls several times during our study period, even the published CPS employment counts are not consistent from one year to the next. The most notable inconsistency occurs between 1999 and 2000—estimates from 2000 forward are benchmarked to 2000 Census totals, but the 1999 estimates are not—but there are also smaller inconsistencies attributable to the introduction of new population controls in January 2003 and January 2004. Using a method developed by BLS staff (see DiNatale n.d.; Bureau of Labor Statistics 2008), we constructed a second set of weight adjustment factors that smooth out the spurious fluctuations in estimated employment that result from changes in the population controls. Our estimation weights equal the product of the two weight adjustment factors times the original CPS weights.

3.3.3 Comparability of the OES and CPS Series with Each Other and Over Time

As already noted, we have tried to make the samples from the OES and CPS microdata as similar as possible. The OES data refer to jobs rather than people, and we have used information on second jobs to create a CPS data set that is "jobs-based" rather than "person-based." To the extent possible, consistent industry and occupation definitions have been applied to both data sets. Because the OES does not include them, we have excluded the unincorporated self-employed, agriculture jobs, and private household jobs in the CPS data. In addition, government jobs are excluded from both samples.

One remaining difference is that the two surveys have different reference periods. The OES survey is collected with an October, November, or Decem-

13. Earnings are not recorded for the self-employed incorporated or for second jobs. In addition, we have not calculated a wage rate for persons who reported variable hours of work.

14. We are grateful to Peter Horner of the Bureau of Labor Statistics for guidance regarding the adjustments made to the original CPS weights to incorporate the 2000 Census benchmark and for providing us with the data needed to construct similar adjustment factors ourselves.

ber reference period between 1996 and 2001, and we use the panels with November reference periods from 2002 through 2004. The CPS outgoing rotation group microdata represent all months in the calendar year.

Another difference is that, consistent with the benchmarking of the OES data to CES control totals by industry, the two sets of estimates display somewhat different patterns of aggregate employment growth. As can be seen in figure 3.1, the cumulative growth in CPS employment lags that in OES employment through 2000, but the gap between the two series closes in 2001. These time series patterns broadly reproduce the well-known discrepancy between the behavior of the CES and CPS employment series during this time period (see Bowler and Morisi 2006). The cumulative growth in CPS employment was 9.8 percent between 1996 and 2004; over the same period, OES employment grew 9.3 percent.

As discussed in the preceding sections, the OES switched occupational classification systems in 1999 and industry classification systems in 2002; the CPS switched both occupational and industry classification systems in 2003. Breaks in series associated with these classification system changes are a potential concern. Occupation and industry employment series that reflect all of the adjustments we have made are displayed in appendix C and appendix D. We find it reassuring that the aggregate series seem to move smoothly rather than exhibiting obvious discontinuities at the points of change in the industry and occupation classification structures.

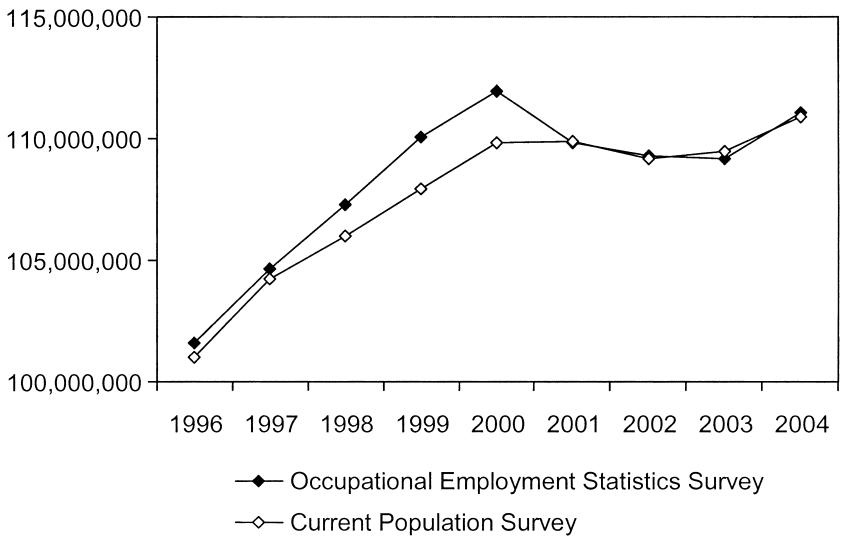

Fig. 3.1 Trend in total employment, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004

Source: Authors' calculations using survey microdata.

3.4 Results

To characterize trends in job growth by position in the wage distribution, we categorized the jobs in each industry/occupation cell as high-wage, middle-wage, or low-wage. These assignments were made based on whether the cell falls in the top third, the middle third, or the bottom third of employment when all of the cells are sorted by mean hourly earnings. Cells that span the 1/3 and 2/3 points in the employment distributions were assigned to either the lower- or the higher-wage category on either side of the boundary to make the total base period employment assigned to each category as equal as possible. We then calculated growth in employment in the cells assigned to each of the three wage categories over the following eight years.

3.4.1 Basic Results

Our basic calculations assign each of the 266 industry/occupation cells defined for each survey an average wage calculated using 2004 data for the same survey. Using the ranking of cells implied by these average wages, the industry/occupation cells accounting for roughly the lowest, middle, and top thirds of 1996 employment were then identified.[15] The cumulative percent growth in employment over the 1996 to 2004 period for the three wage-level categories in the CPS and in the OES is shown in the top panel of table 3.1. Over the nine-year period, the CPS data show substantially more growth in high-paying industry/occupation cells (17.5 percent versus 9.7 percent cumulative growth), and the OES data show somewhat more growth in low-paying industry/occupation cells (12.6 percent versus 9.9 percent cumulative growth). Consistent with there having been a "hollowing out" of the job structure, both data sources show the lowest rate of job growth for the middle wage category.

Graphing the employment series we have constructed allows us to look at the year-to-year patterns of growth by wage level category. Figure 3.2 displays indexes of the number of jobs in each cell wage category over time (1996 = 100). In the CPS, high-wage jobs show more consistent growth than either middle- or low-wage jobs. In the OES, employment growth rates for all three wage categories were very similar between 1996 and 2001, but employment in the middle-wage category then fell sharply and did not regain its relative position.

We can also look at how the *share* of employment in each of the three categories has changed over time. Looking at the data in this way highlights *relative* growth and comparisons are not muddied by differences in overall employment growth between the two data sources. As can be seen

15. In the CPS data, there were 33.5 million jobs in the low-wage category, 34.3 million in the middle-wage category, and 33.2 million in the high-wage category in 1996. In the OES, the three categories included 34.0 million, 33.3 million, and 34.3 million jobs, respectively.

Table 3.1 **Employment growth in industry/occupation cells by wage category, 1996–2004 (cumulative percent change)**

	Industry/occupation cells		
Source of growth estimates	Low-wage	Middle-wage	High-wage
Base calculations: Cells assigned to categories based on 2004 wage rankings			
CPS	9.9	2.3	17.5
OES	12.6	5.6	9.7
Sensitivity analysis: Employment in borderline cells based on 2004 wage rankings split across wage categories			
CPS	9.9	2.4	17.2
OES	12.5	5.7	9.8
Sensitivity analysis: Wage rankings from different years used to assign CPS cells to wage categories			
1996	10.0	3.4	16.2
1997	9.7	3.9	15.9
1998	10.1	2.5	16.9
1999	9.7	2.5	17.3
2000	10.4	1.6	17.6
2001	9.7	3.9	15.9
2002	10.3	2.0	17.4
2003	9.5	2.2	17.9
2004	9.9	2.3	17.5
Sensitivity analysis: Wage rankings from different years used to assign OES cells to wage categories			
1996	13.5	3.9	10.4
1997	13.5	4.4	10.3
1998	13.4	5.0	9.5
1999	13.9	4.0	9.9
2000	12.5	5.3	10.3
2001	12.9	5.2	9.8
2002	12.1	6.6	9.2
2003	11.7	6.2	10.0
2004	12.6	5.6	9.7
2004 CPS wage rankings used to assign cells to wage categories, OES growth applied			
1996 CPS base employment	13.2	3.6	11.5
2004 OES wage rankings used to assign cells to wage categories, CPS growth applied			
1996 OES base employment	8.3	3.2	17.7

Note: CPS = Current Population Survey; OES = Occupational Employment Statistics survey.

in the top panel of table 3.2, in the CPS data, only the share of employment in high-wage industry/occupation cells has risen. In contrast, in the OES data, only low-wage industry/occupation cells have gained significant employment share. The observed share increases in both data sources have come at the expense of a decline in the share of employment in middle-wage industry/occupation cells. This pattern is even more apparent in figure 3.3,

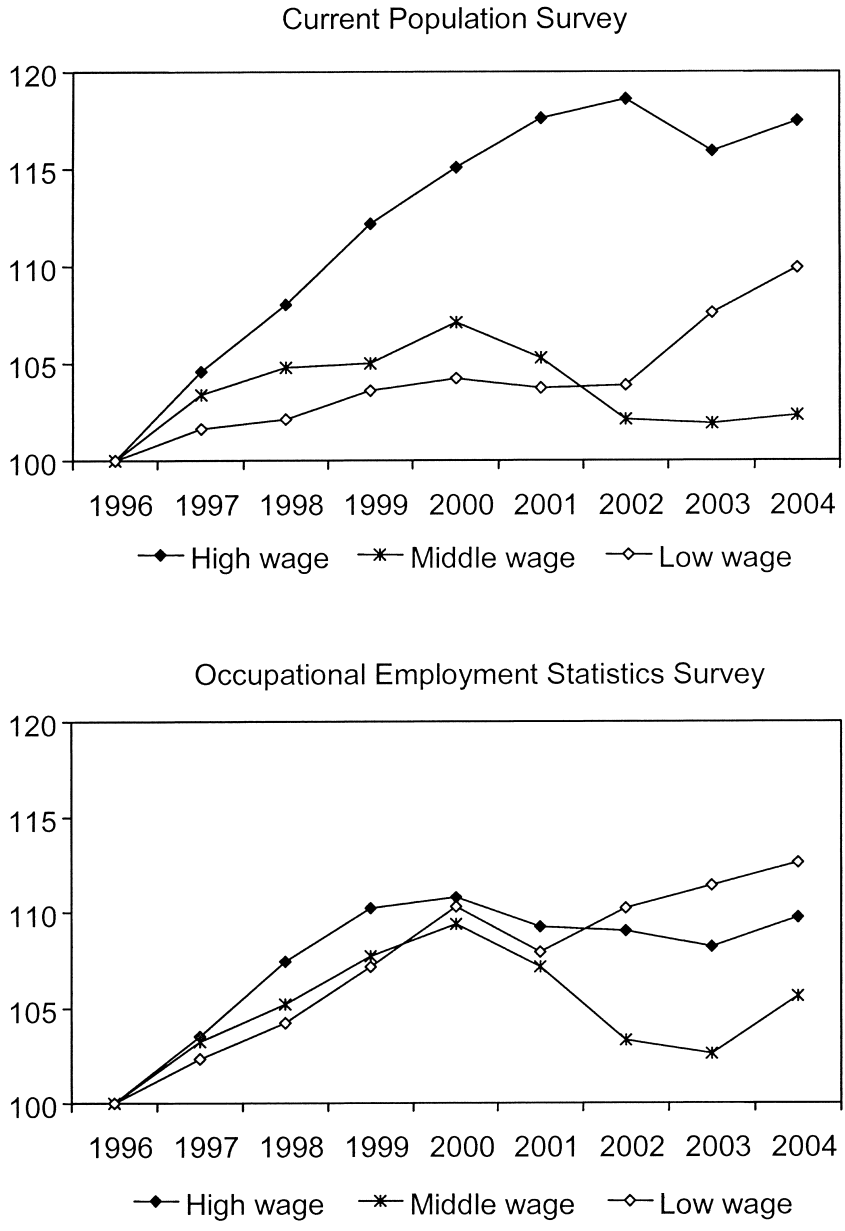

Fig. 3.2 Trends in the number of jobs by wage-level category, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004 (1996 = 100)

Source: Authors' calculations using survey microdata.

Table 3.2 **Change in employment shares in industry/occupation cells by wage category, 1996–2004 (cumulative percent point change)**

	Industry/occupation cells		
Source of share change estimates	Low-wage	Middle-wage	High-wage
Base calculations: Cells assigned to categories based on 2004 wage rankings			
CPS	0.03	–2.33	2.30
OES	0.99	–1.11	0.12
Sensitivity analysis: Employment in borderline cells based on 2004 wage rankings split across wage categories			
CPS	0.03	–2.26	2.23
OES	0.96	–1.10	0.14
Sensitivity analysis: Wage rankings from different years used to assign CPS cells to wage categories			
1996	0.06	–1.98	1.92
1997	–0.03	–1.82	1.85
1998	0.09	–2.23	2.14
1999	–0.05	–2.23	2.28
2000	0.18	–2.50	2.32
2001	–0.05	–1.82	1.87
2002	0.15	–2.42	2.27
2003	–0.10	–2.36	2.47
2004	0.03	–2.33	2.30
Sensitivity analysis: Wage rankings from different years used to assign OES cells to wage categories			
1996	1.26	–1.61	0.35
1997	1.25	–1.55	0.29
1998	1.23	–1.29	0.05
1999	1.42	–1.60	0.18
2000	0.97	–1.26	0.29
2001	1.09	–1.23	0.14
2002	0.89	–0.86	–0.03
2003	0.73	–0.93	0.20
2004	0.99	–1.11	0.12
2004 CPS wage rankings used to assign cells to wage categories, OES growth applied			
1996 CPS base employment	1.17	–1.80	0.63
2004 OES wage rankings used to assign cells to wage categories, CPS growth applied			
1996 OES base employment	–0.46	–1.97	2.43

Note: CPS = Current Population Survey; OES = Occupational Employment Statistics survey.

which graphs the cumulative change in the employment share of jobs in high-, middle-, and low-wage industry/occupation cells.

3.4.2 Sensitivity Analysis

In our basic results, industry/occupation cells that are on the borderline between wage categories are assigned to one or the other so as to make the base period level of employment across the three categories as equal as

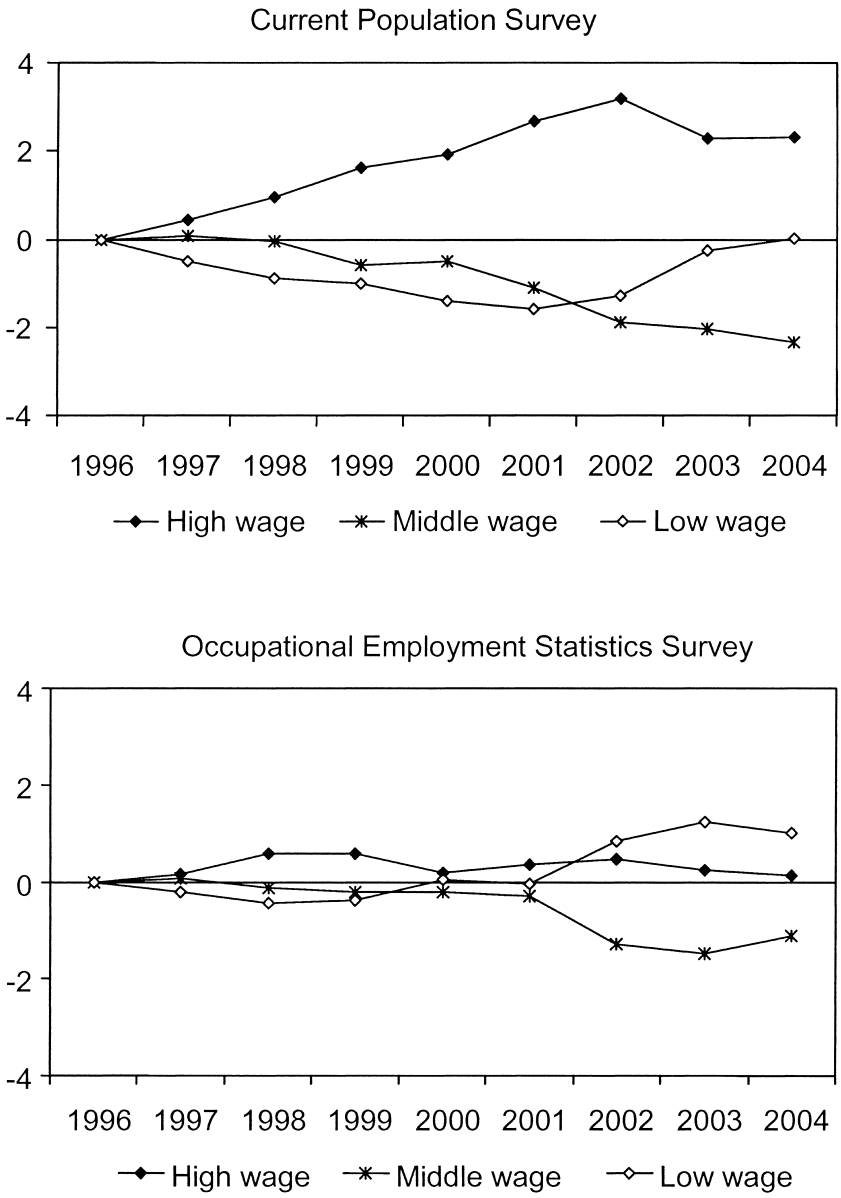

Fig. 3.3 Change in employment share by wage-level category, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004 (cumulative change relative to 1996 share)

Source: Authors' calculations using survey microdata.

possible. An alternative would have been to split employment in these cells across categories to make employment in each of the three categories exactly equal and then carry out the same calculations assuming the same employment growth rate for both pieces of the split cell. As can be seen in the second panel of table 3.1 (for employment growth rates by wage category) and table 3.2 (for changes in employment shares by wage category), this alternative calculation produces results that are virtually identical to those obtained using our original approach.

Other analysts have found that the choice of years used to rank industry/occupation cells by wage level can affect the results obtained. The third panel of table 3.1 shows the rates of growth in high-, middle-, and low-wage CPS employment cells calculated using wage category assignments based on wage rankings for each of the years 1996 through 2004. In all cases, these rankings are applied to the 1996 employment data to form wage categories of approximately equal size. The fourth panel of table 3.1 shows the results of similar calculations using the OES data. The growth rates of employment by wage category in both the CPS and the OES are relatively insensitive to the choice of which year's wage ranking is used to make the assignment of industry/occupation employment cells to the high-, middle-, or low-wage categories. The changes in employment share by wage-level category using wage rankings from different years, shown in the third and fourth panels of table 3.2, are similarly robust to the choice of year used to determine the wage rankings.[16]

3.4.3 Accounting for the Differences between the CPS and OES Results

The CPS and OES data tell somewhat different stories about the pattern of job growth over the 1996 to 2004 period. While both show middle-wage employment growing most slowly and the share of jobs that are middle wage declining, CPS data show substantially faster growth in high-wage jobs, whereas the OES data show more rapid growth in low-wage jobs. We would like to know what accounts for these differences.

One explanation for these differences across the two data sources could be that they reflect differences in the ranking of industry/occupation job cells by wage level. In fact, however, the two surveys are in substantial agreement about relative wage rates across industry/occupation cells. The unweighted correlation between the rank order of the 266 OES industry/occupation cells, sorted by the 2004 OES wage, and the rank order of the 266 CPS industry/occupation cells, sorted by the 2004 CPS wage, is 0.8887.

To further explore the differences between the CPS and OES results, we ask hypothetically what the rate of growth in high-, middle-, and low-wage jobs would have been had we retained the original assignment of

16. The choice of year would have mattered more had we not broken the five industry/occupation cells with employment in 1996 in excess of 3 million into smaller pieces.

industry/occupation cells to wage categories but assumed the growth in each detailed cell's employment from the other survey. The results of those hypothetical calculations are shown in the bottom panel of table 3.1. They make clear that the differences in growth rates by wage category between the two surveys reflect differences in the amount of job growth recorded within comparably defined industry/occupation cells, rather than differences in the ranking of cells by wage level. For example, had the industry/occupation cells in the CPS high-wage category experienced the same growth in employment as the corresponding cells in the OES, the growth in CPS high-wage employment would have been 11.5 percent rather than 17.5 percent, much closer to the 9.7 percent growth in high-wage employment in the OES. Similarly, had the industry/occupation cells in the OES high-wage category experienced the same growth in employment as the corresponding cells in the CPS, the growth in OES high-wage employment would have been 17.7 percent rather than 9.7 percent, very close to the 17.5 percent growth in high-wage employment in the CPS.

Changes in the shares of employment accounted for by high-, middle-, and low-wage jobs under the same hypothetical scenario are shown in the bottom panel of table 3.2. Here, too, it is clear that the differences between the two surveys reflect primarily differences in the amount of growth within industry/occupation cells rather than differences in the ranking of cells by wage level. For example, had employment in each of the CPS industry/occupation cells grown by the same amount as employment in the corresponding OES industry/occupation cell, the share of high-wage jobs in the CPS would have grown by just 0.63 percent rather than 2.30 percent between 1996 and 2004, much closer to the 0.12 percent in the OES data. Similarly, had employment in the OES industry/occupation cells grown by the same amount as employment in the corresponding CPS industry/occupation cells, the share of high-wage jobs in the OES would have grown by 2.43 percent rather than 0.12 percent, very close to the 2.30 percent in CPS data.[17]

3.4.4 Measuring the Number of Management Jobs

Earlier in the chapter, we referred to published data on employment by

17. We experimented with other counterfactuals for helping us to understand the differences between the CPS and OES results, but the counterfactual discussed in the text seems most informative. One alternative was to use the CPS category assignment with the OES data (or vice versa) and look at whether the same differences between the two surveys remain. Because management employment is so much higher in the CPS than in the OES, however, using the CPS (OES) category assignments with the OES (CPS) data produced a high-wage category that was much too small (much too large). A second alternative was to apply the CPS cell growth rates to the OES data, or vice versa, and look at whether the two surveys then tell a more similar story. A troubling feature of this counterfactual is that, because individual cells may be of rather different sizes in the two surveys, large proportional change in a small cell in one survey can have an exaggerated effect in the other survey. Both for the CPS and for the OES, the implied total 2004 employment level obtained using this method significantly exceeds the actual level.

occupation from the CPS and the OES, noting the substantially larger share of management employment in the CPS. These published data differ across the two surveys both in the unit of observation (people versus jobs) and in scope (most important the inclusion of all self-employed persons in the CPS). In table 3.3, we report the distribution of employment in each survey across the occupations that appear in published CPS data, but based on the numbers of wage and salary jobs in the private sector exclusive of agriculture and private households. Defined on a comparable basis, the share of employment in managerial occupations remains markedly higher in the CPS than in the OES, and the shares of employment in service occupations and office and administrative support occupations correspondingly lower.

As has been remarked by others (e.g., Baily and Lawrence 2004), the CPS and OES data also show substantially different *trends* in management employment. Between 1996 and 2004, the number of management jobs across all industries grew by 1.7 million in the CPS (an 18.6 percent increase) but fell by 2.6 million in the OES (a 35.3 percent decrease). The top panel of figure 3.4 shows the number of management jobs, and the bottom panel shows the share of employment accounted for by management jobs. In the CPS, both the number and share of management jobs drifted rather steadily upward through 2002 and then leveled off in 2003 and 2004. In the OES, management employment trended downward, falling especially sharply between 1999 and 2001. The different trends in management employment are the primary reason for the faster growth of employment in the high-wage category in the CPS as compared to the OES.

Our first thought was that business restructuring might explain the different trends in management employment in the two surveys. All else the same, changes in firms' job classification structures to eliminate layers of management would reduce the number of management jobs in the OES. But to the extent that individuals whose jobs were reclassified from, say, "manager" to "team leader" or "lead analyst" continue to describe themselves as managers, this would not be reflected in the CPS, leading to a widening discrepancy between the estimates of management employment in the two surveys. This explanation would lead us to expect the divergence in management employment in the two surveys to be concentrated in the larger establishments that typically have more formal job classification systems. In fact, however, the largest decline in management employment in the OES occurred in the very smallest establishments, suggesting that this cannot be the whole story. We also speculated that job restructuring might have reduced the number of management jobs in the OES while increasing the number of first-line supervisor jobs, without having a corresponding effect in the CPS. As shown in figure 3.5, however, estimated employment of first-line supervisors is higher in the CPS than in the OES and, more important for our purposes, that discrepancy has been very stable over the period covered by our study.

Table 3.3 **Occupational distributions of 2004 employment calculated on a comparable basis using Current Population Survey (CPS) and Occupational Employment Statistics (OES) survey microdata**

Occupational category	Number and percent of jobs from the CPS		Number and percent of jobs from the OES survey	
Management	11,080	10.0%	4,837	4.4%
Business and financial	4,484	4.0%	4,612	4.2%
Professional and related	18,996	17.1%	17,988	16.2%
Service	17,707	16.0%	21,044	18.9%
Sales and related	15,066	13.6%	13,762	12.4%
Office and administrative support	16,187	14.6%	19,550	17.6%
Construction and extraction	5,956	5.4%	5,357	4.8%
Installation and maintenance	4,035	3.6%	4,515	4.1%
Production	12,708	11.5%	14,795	13.3%
Transportation	4,683	4.2%	4,600	4.1%
Total	111,191	100.0%	111,064	100.0%

Notes: The figures for both surveys are in thousands and refer to jobs rather than people. They exclude the self-employed, agriculture jobs, private household jobs, and government jobs. Details of the calculations are provided in the text.

3.4.5 Changes in Coding Procedures in the OES

Although the two series would have diverged even without the sharp drop in management employment in the OES between 1999 and 2001, the decline over those two years was so marked that we were forced to wonder whether it could be a measurement artifact. In contrast to the classification structure it replaced, the SOC includes explicit principles intended to guide the assignment of jobs to occupations. In essence, this guidance states that only individuals who devote at least 80 percent of their time to management activities should be classified as managers. While there was no obvious break in the management employment series between 1998 and 1999 when the SOC was introduced, changes in coding practices associated with the implementation of the SOC that were phased in more gradually could have had an effect.

As part of the implementation of the SOC, the BLS introduced a series of data edits designed to identify questionable occupational assignments. One new set of edits flagged establishments in which employment was reported in a management occupation (e.g., financial manager) without the reporting of employment in any of the expected subordinate occupations (e.g., financial specialists or clerks) for further checking. These edit checks were applied in a limited fashion in 1999 and phased in more fully over the following years.[18]

18. Similar edit checks were introduced for other occupations that should not be expected to appear in isolation, but it is the management edits that are most relevant to our analysis.

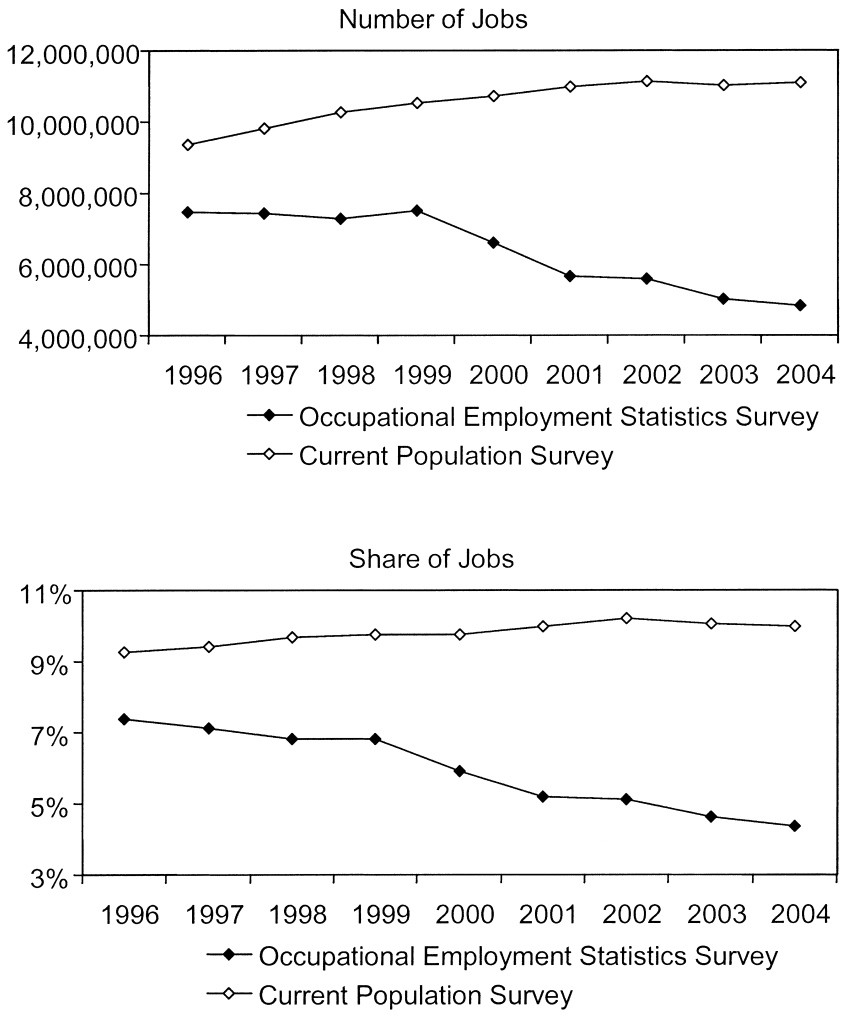

Fig. 3.4 Trend in management employment, levels and shares, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004
Source: Authors' calculations using survey microdata.

To gauge how much the introduction of the dependent-occupation edits on their own might have affected the trend in management employment, we created the counterfactual management employment series shown in the top panel of figure 3.6. The counterfactual series shows how management employment would have trended had the dependent occupation edits been fully implemented in the OES data starting in 1999.[19] For this purpose,

19. Because the occupational classification structure changed in 1999, the dependent occupation edits cannot be applied to data for earlier years.

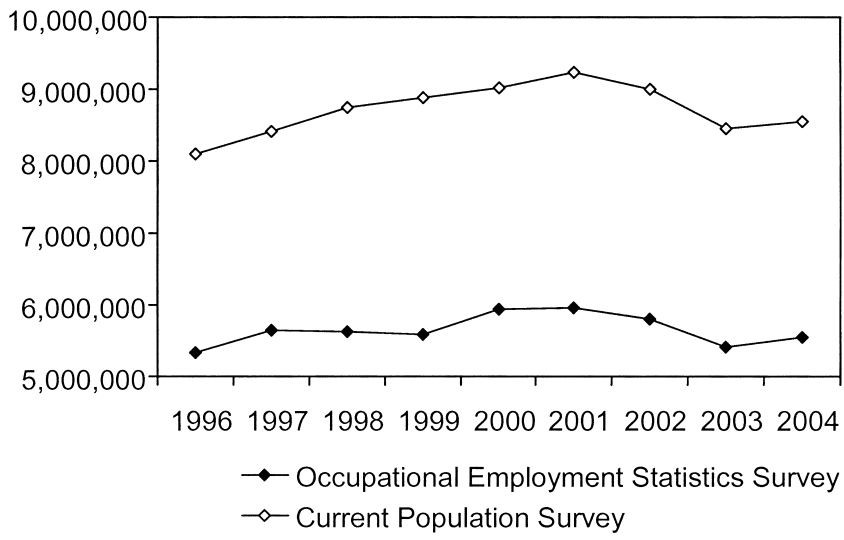

Fig. 3.5 Trend in employment of first-line supervisors, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004
Source: Authors' calculations using survey microdata.

any management employment that is flagged by the dependent occupation test is treated as having been incorrectly classified and subtracted from the management total, though in actuality in some cases it might have been determined that the initial coding was correct. This adjustment has very little effect on the management employment series. In 1999, the actual series was 5.5 percent larger than the counterfactual series; in 2004, it was 2.3 percent larger, the smaller gap a result of the phasing in of the edits in the actual data. These numbers imply that the dependent occupation edit reduced measured management employment by a cumulative total of about 150,000 jobs from 1999 through 2004, a small fraction of the 2.6 million overall decline actually observed between 1996 and 2004.

A second set of edits also first introduced in 1999 was designed to flag establishments with an excessive number of managers. In establishments with fewer than ten employees, the editing system's default parameters flagged the data for establishments in which more than 50 percent of employees were classified as managers as suspect; the threshold percentages fell to 40 percent for establishments with eleven to twenty employees, 30 percent for establishments with twenty-one to thirty employees, and 20 percent for those with thirty or more employees.

To gauge the potential effects of these management share edits, we carried out an exercise similar to that performed for the dependent occupation edits. Specifically, we created a counterfactual management employment series, shown in the bottom panel of figure 3.6, by subtracting the weighted sum of management jobs in excess of the threshold number for sampled

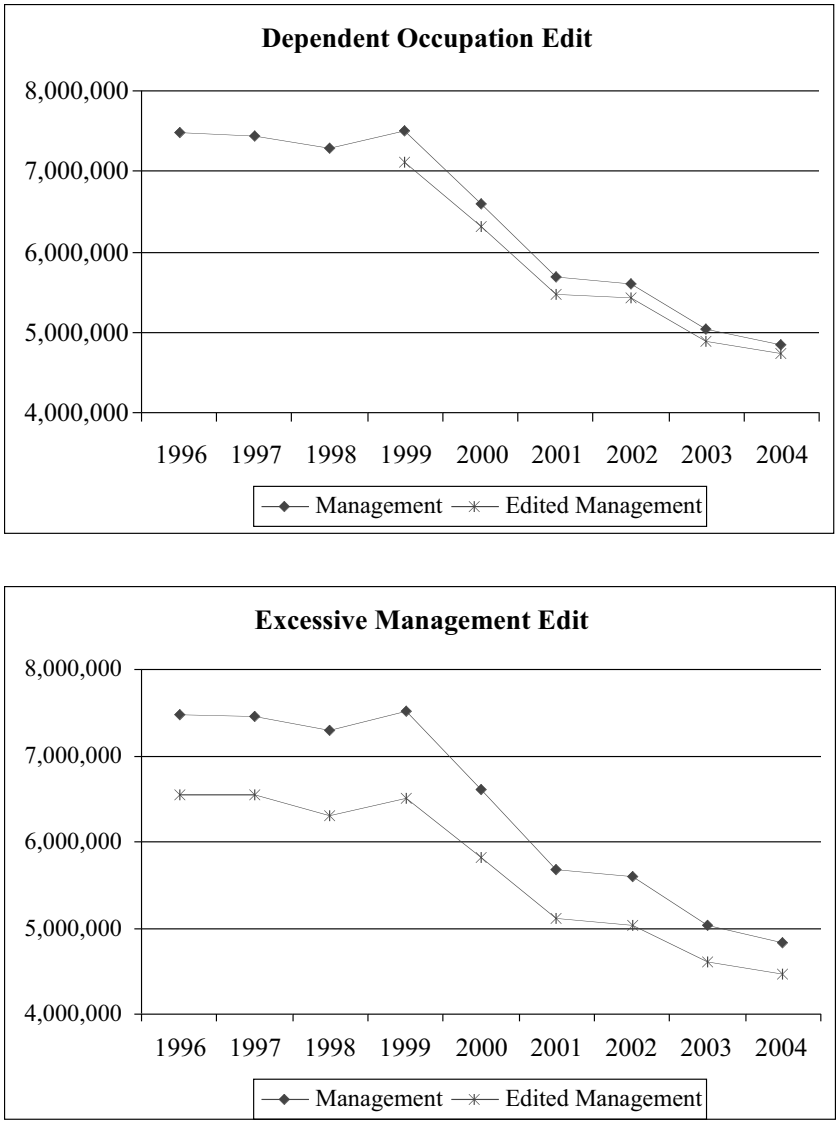

Fig. 3.6 Number of management jobs in the Occupational Employment Statistics survey, with and without corrections for changes in editing rules, 1996 to 2004
Source: Authors' calculations using survey microdata.

establishments in each year from 1996 through 2004. Both the original and the counterfactual management employment series decline sharply between 1999 and 2001. In 1998, the actual series was 15.6 percent larger than the counterfactual series; by 2004, the gap between the two series had fallen to 8.2 percent, reflecting the growing effects of the management share edits

on the actual data. These numbers imply that the management share edits reduced management employment by about 330,000 jobs between 1998 and 2004, still leaving the large majority of the observed decline over our study period unexplained.

Beyond the explicit dependent occupation and management share edits just described, implementation of the SOC also included training designed to explain the new classification structure and coding principles to program staff. This training reinforced the message that jobs previously classified as management positions might be categorized differently under the SOC. Staff who attended SOC training courses in 1999 and later years were instructed that management jobs reported on establishment schedules that did not include an intervening layer of supervision generally should be recoded. It is possible, of course, that someone might legitimately be performing management duties without there being an intervening layer of supervision between them and their subordinates. New SOC training introduced in 2007 attempts to make this clear but occurred after the end of our study period.

The introduction of the unstructured survey form for small establishments in 1999 may have amplified the effects of the SOC training on the OES management employment series. Whereas employers typically are responsible for coding the jobs they report and only a fraction of these schedules can be reviewed, survey staff code all of the occupations reported on the unstructured forms. The "rule" that no job should be coded as a management position unless the schedule also includes a first-level supervisor position is easy to apply and seems to have been embraced as a guide to coding the unstructured schedules. To the extent that changes in coding practices are responsible for the decline in OES management employment, we would expect the decline to have been concentrated in the smallest establishments.

As shown in figure 3.7, the decline in both the number of managers and the share of employment accounted for by managers are indeed most pronounced in the smallest establishment size classes. Interestingly, to the extent that we are able to isolate growth in management employment by unit size in the March CPS Annual Demographic supplement, no similar decline is observed.[20] The overall decline in OES management employment largely reflects a growing share of establishments with no managers—exactly what one would have expected if the cause of the decline were application of the "rule" that jobs should not be coded as management jobs without an intervening layer of supervision.

Under the assumption that, absent the application of the new editing

20. The March CPS asks respondents about the size of the firm (not establishment) for which they worked on the longest job held in the prior year. In those data, management employment increased between 1996 and 2002 in firms with 100 or more employees and was flat in firms with one to nine, ten to forty-nine and fifty to ninety-nine employees. Because the March CPS data differ in several respects from the OES data, the comparison we are making between the two data sources should be considered no more than suggestive. We thank Jay Stewart for providing us with the March CPS microdata.

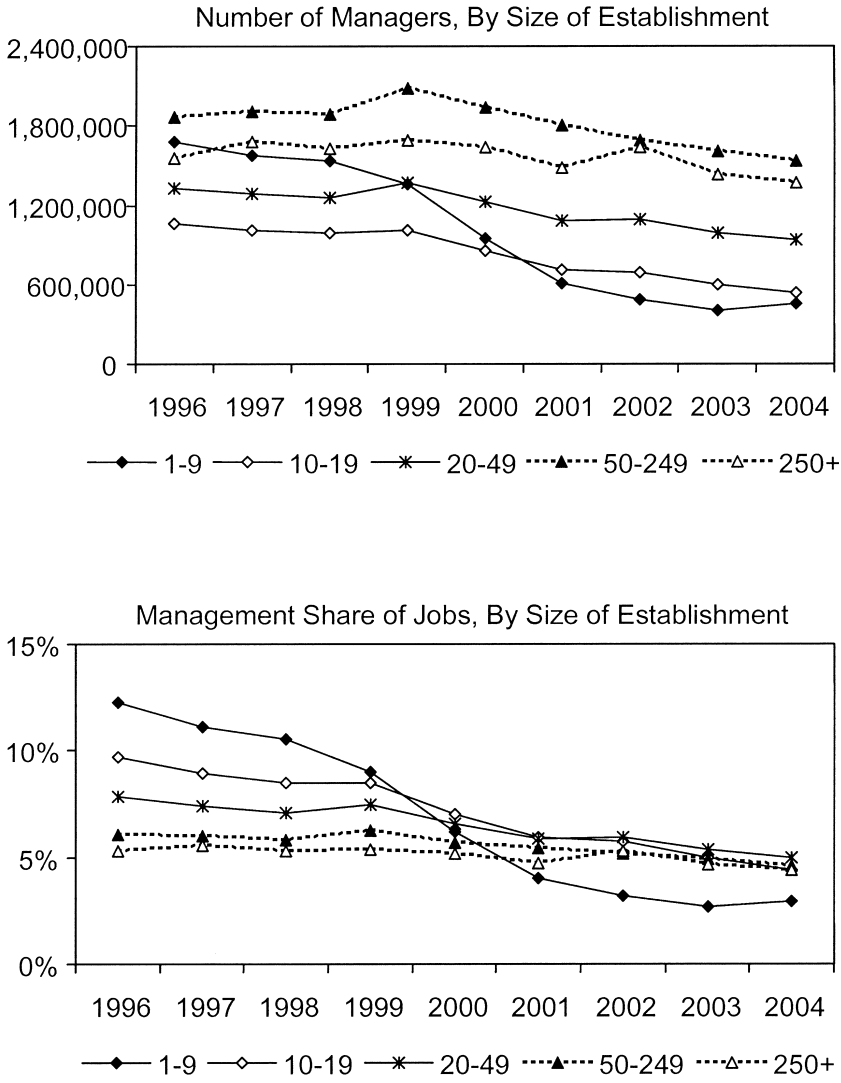

Fig. 3.7 Trend in management employment in the Occupational Employment Statistics Survey, levels and shares, by size of establishment, 1996–2004
Source: Authors' calculations using survey microdata.

rules and the other changes in coding practices, the share of establishments in each establishment size class reporting zero managers, one manager and two or more managers would have held steady between 1998 and 2001, we have devised a method for reversing the effects of these SOC-related changes. To illustrate, between 1998 and 1999, the share of establishments in the one to nine employee size class with no managers increased from 64.9 percent

to 69.6 percent. We randomly select 4.7 percent of all establishments in the size category from among those with no managers and reassign one employee to the management category, selecting that employee from the highest occupational wage interval represented in the establishment's data. After making this adjustment, the data show an increase in the share of establishments in the size class with exactly one manager from 24.2 percent in 1998 to 25.3 percent in 1999. Accordingly, we randomly select 1.1 percent of all establishments in the one to nine employee size class from among those now recorded as having one manager and move all of the employees in the highest nonmanagement-occupation wage interval in each of those establishments into the management category. This adjustment ensures that the shares of establishments in the one to nine employee size class with no manager, one manager, and two or more managers remain constant between 1998 and 1999. Similar adjustments were made to the data for each of five employment size classes (1 to 9, 10 to 19, 20 to 49, 50 to 249, and 500 plus) for 1999, 2000, and 2001. In 2002 and later years, similar adjustments remove from the data the effects of changes in the number-of-managers distribution that occurred between 1998 and 2001 but permit changes that occur in later years to be registered in the data.[21]

The effects of the adjustments just described can be seen in figure 3.8, which plots the number of managers and the management share of employment by establishment size class in our adjusted data. The adjustment removes the sharp declines in management employment between 1999 and 2001 that were apparent in the unadjusted data, especially for the smallest size class. Figure 3.9 displays the aggregate trend in management employment, both in levels and as a share of total employment, in the CPS, the original OES, and the adjusted OES data. In the original OES data, management employment as a share of total employment fell from 6.8 percent in 1998 to 5.2 percent in 2001. Our adjustments do not affect the management share of employment in 1998 (6.8 percent) but raise the management share of employment in 2001 to 6.6 percent. To the extent that the effects of the changes in coding practices that followed the introduction of the SOC in the 1999 round of data collection were fully realized by the completion of the 2001 data collection round, our adjustments should largely have corrected for those effects.

3.4.6 Revised Estimates

Having reverse-engineered the OES data for 1999 through 2004 as best we can to restore the management jobs eliminated by the introduction of the new coding practices associated with the adoption of the SOC, we return to the question of what the data imply about recent changes in the composi-

21. The approach described in the text attempts to make the new OES data consistent with the old OES data. This is because it seemed more feasible to reassign nonmanagement jobs identified as having high wages to the management category (several to one) than to assign management jobs to nonmanagement categories (one to several).

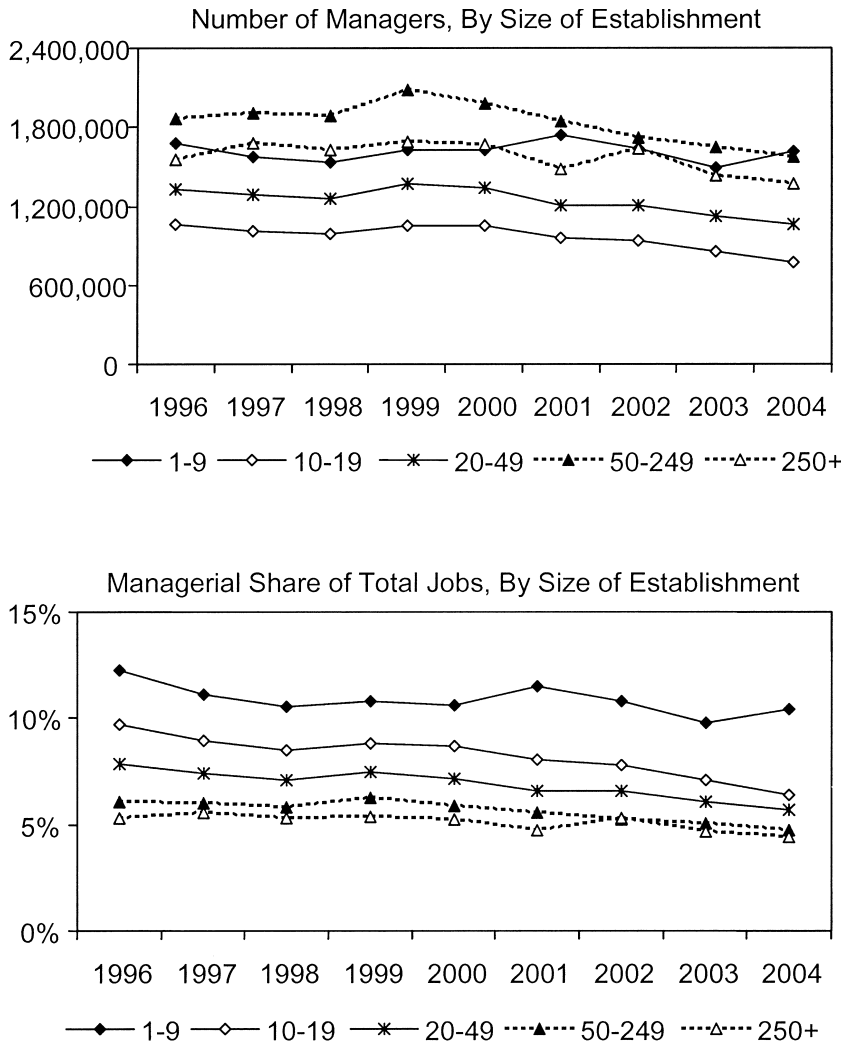

Fig. 3.8 Trend in management employment in the Occupational Employment Statistics Survey, levels and shares, by size of establishment, 1996–2004, after adjustment for comparability of estimates over time

Source: Authors' calculations using survey microdata.

tion of employment. The top panel of table 3.4 shows the percent growth in employment by wage-level category over the 1996 to 2004 period in the CPS, original OES, and adjusted OES data. The adjustments we have made close about a third of the gap in the rate of growth for high-wage jobs between the two data sources, but the CPS growth rate still exceeds the OES growth rate by a substantial margin. The original OES data show employment in

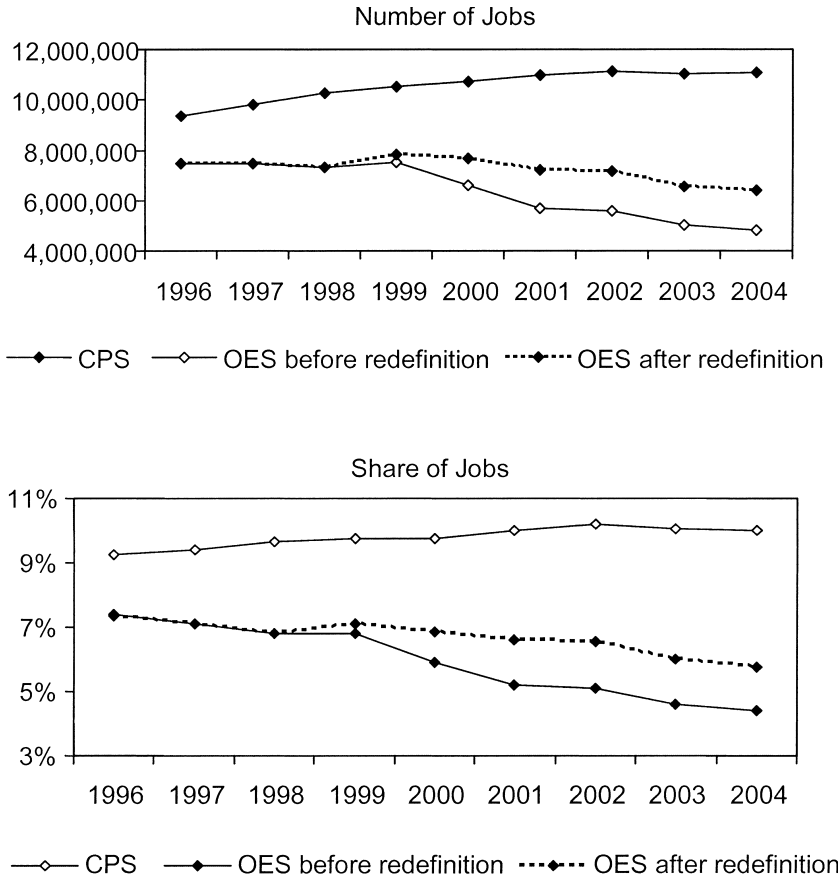

Fig. 3.9 Trend in managerial employment, levels and shares, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004, after adjustment for comparability of OES estimates over time
Source: Authors' calculations using survey microdata.

low-wage jobs to be growing more rapidly than employment in high-wage jobs; in the adjusted data, these growth rates are fairly similar. It remains the case, however, that the OES shows more growth in the number of low-wage jobs than does the CPS. The year-by-year pattern of job growth by wage level category in the adjusted OES data can be seen in figure 3.10; for comparison purposes, the corresponding CPS figures are also displayed.

The bottom panel of table 3.4 shows the change in the employment shares of low-, middle-, and high-wage jobs in the CPS, original OES, and adjusted OES data. As shown previously, in the CPS data, employment share gains are concentrated in the high-wage category, whereas the gains in OES employment share occur predominantly among low-wage jobs. In the

Table 3.4 **Employment growth and employment share changes in industry/occupation cells by wage category, Current Population Survey (CPS), Occupational Employment Statistics survey (OES), and adjusted OES data, 1996–2004 (cumulative percent change)**

	Industry/occupation cells		
Estimate and source	Low-wage	Middle-wage	High-wage
Employment growth rates			
CPS	9.9	2.3	17.5
OES	12.6	5.6	9.7
Adjusted OES	11.6	4.0	12.3
Employment share changes			
CPS	0.03	–2.33	2.30
OES	0.99	–1.11	0.12
Adjusted OES	0.68	–1.60	0.92

adjusted OES data, the share gains at the top and the bottom of the wage distribution are more balanced, with the high-wage share gain slightly larger than the low-wage share gain. As before, however, that the CPS shows larger growth in the high-wage employment share than does the OES, and the reverse is true for growth in the low-wage employment share. Both surveys show declines in the share of middle-wage jobs. For completeness, figure 3.11 displays the year-by-year changes in employment share by wage level category for the CPS and adjusted OES data, leading to the same basic conclusions.

3.5 Conclusion

As will by this point be apparent, working with the OES data to analyze trends in employment by industry and occupation is more complex than we had anticipated. Changes in industry and occupational classification systems are a familiar problem and, while implementation can be difficult, there are familiar strategies for dealing with these problems. Survey changes that are phased in over time and whose effects are not well documented, such as the changes in occupational coding practices in the OES following the adoption of the SOC, are considerably more challenging to address. The OES data have great potential value for studying the evolution of the job structure. Indeed, the BLS occupational projections program already uses these data as a primary source of information about changes in occupational structure over time. Going forward, we would urge that the maintenance of continuity in coding practices and other aspects of survey operations be given a higher priority than has been the case in the past.

Substantively, the CPS data show job growth to be concentrated in the highest-wage jobs, whereas the OES data show substantial relative growth

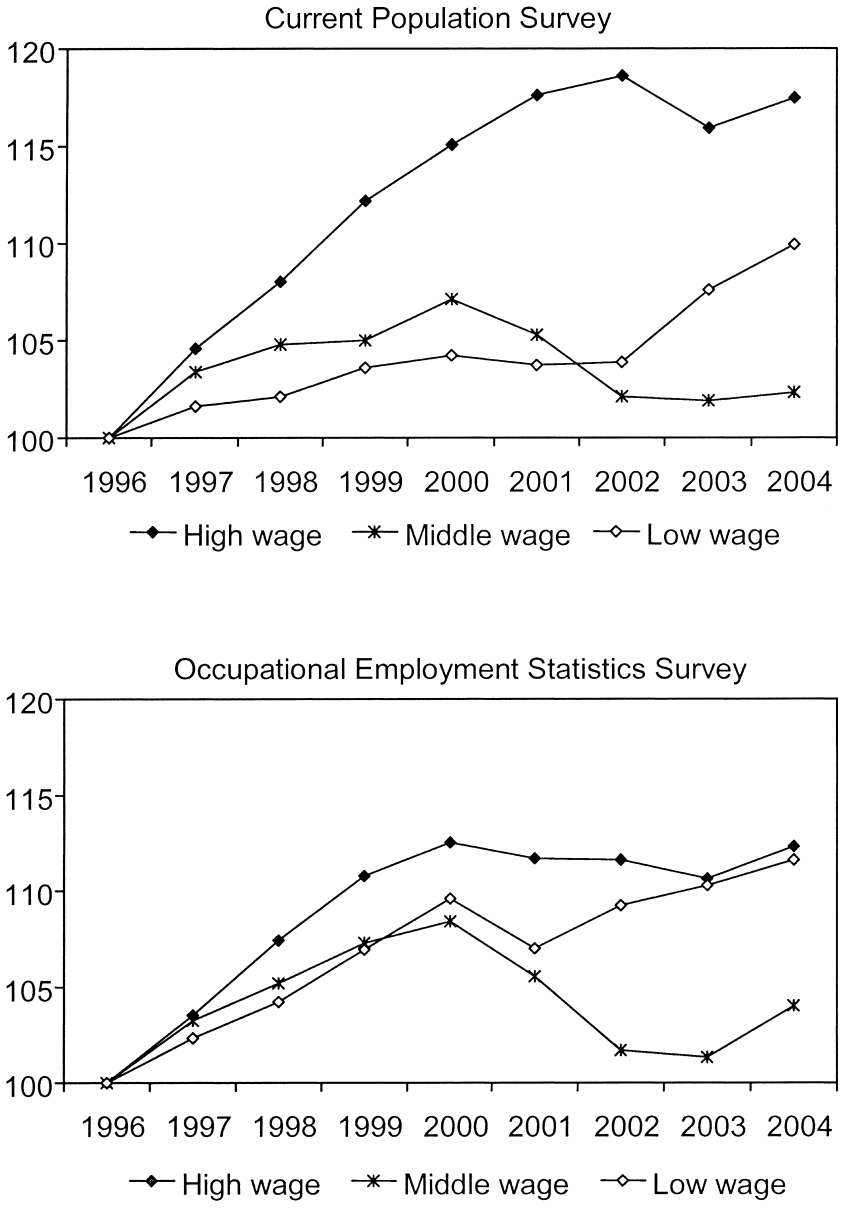

Fig. 3.10 Trends in the number of jobs by wage-level category, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004, after adjustment for comparability of OES estimates over time (1996 = 100)

Source: Authors' calculations using survey microdata.

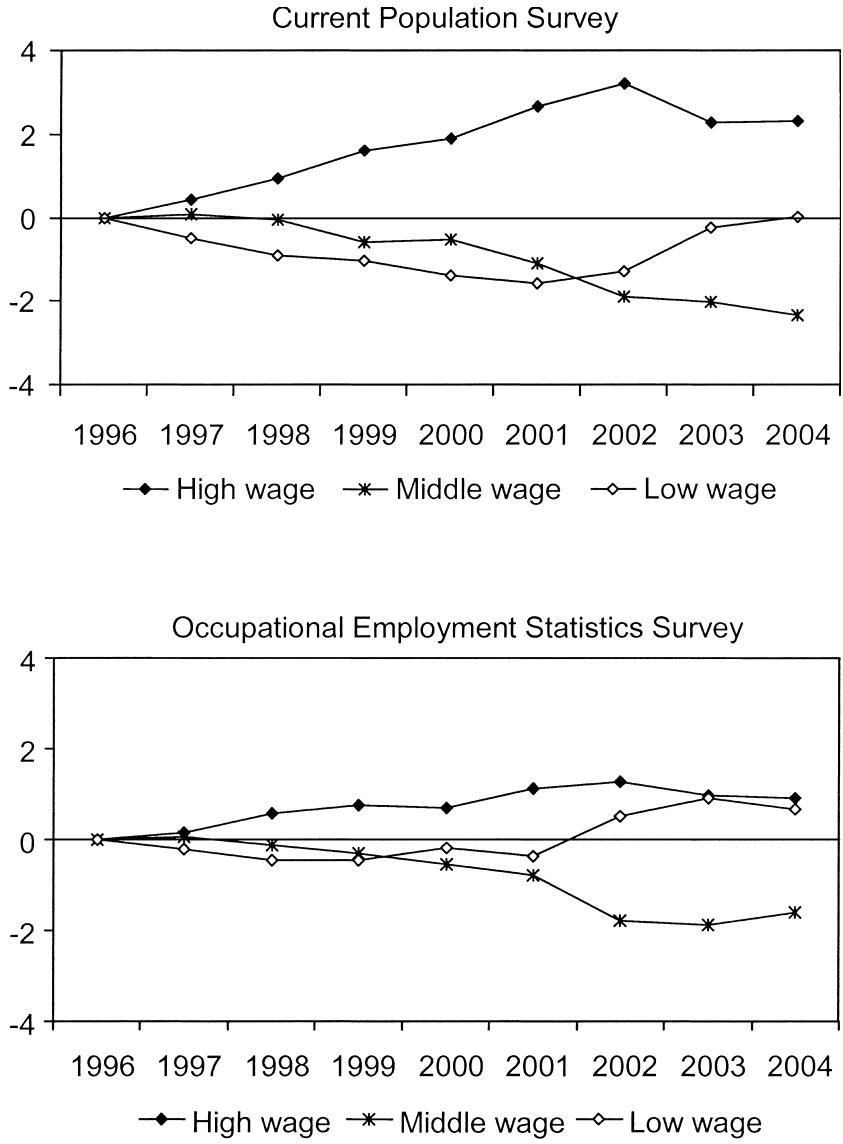

Fig. 3.11 Change in employment share by wage-level category, Current Population Survey and Occupational Employment Statistics Survey, 1996–2004, after adjustment for comparability of OES estimates over time (cumulative change relative to 1996 share)

Source: Authors' calculations using survey microdata.

in low-wage employment. Both in the CPS and in the OES, relative employment gains in jobs at the top or bottom of the wage scale have come at the expense of middle-wage jobs. The greater growth in high-wage jobs in the CPS as compared to the OES is accounted for by growth in management employment. Management employment has trended steadily upward in the CPS, but declined markedly in the OES, and this general characterization is robust to our best efforts to adjust for the effects of changes in coding practices associated with the introduction of the SOC on the number of OES management jobs.

Should we believe that management employment has been stable or growing, as shown in the CPS, or that management employment has been falling, as the OES data seem to be saying? There is ample evidence in other contexts of social desirability bias in reporting in situations in which answers may reflect either positively or negatively on individual survey respondents (see Tourangeau, Rips, and Rasinski [2000, 255–88] for a review of the relevant literature). It seems plausible that individuals responding to household surveys will have a tendency to exaggerate the occupational status of household members and, in an economy that is increasingly white collar, also plausible that the number of people reported to hold management jobs when, in fact, their tasks are more menial might have grown. Further, the business press is replete with reports of corporate restructuring and management downsizing that seem consistent with the decline in management employment that we observe for larger establishments even in the adjusted OES data.

Whatever the explanation for the discrepancy, conclusions about the changing role of managers in today's labor market could be affected by the use of OES information in place of data from the CPS. Osterman (2006), for example, remarks on the fact that, despite years of restructuring and downsizing, the management share of employment has been stable or growing. At least over the period we have studied, however, the OES data tell a different story. The conclusions of sector-specific studies also could be affected by the use of employer-reported rather than individual-reported occupational information. Dietz and Orr (2006), for example, use CPS data to analyze the skill mix of occupations within manufacturing. They conclude that the manufacturing workforce has become substantially more skilled since the early 1980s and that much of the increase in skill level can be accounted for by growth in employment in managerial and professional specialty occupations. Our numbers show that, in the CPS, the management share of jobs in manufacturing grew from 9.1 percent in 1996 to 11.7 percent in 2004. In the OES, in contrast, the management share of manufacturing employment fell from 6.1 percent in 1996 to 4.8 percent in 2004, without adjustments to the OES data, or to 5.2 percent, after the adjustments described earlier in the text. Our findings suggest that it would be worthwhile to reexamine the trends in the occupational composition of manufacturing employment using data from the OES.

The analysis reported in this chapter can be extended in several ways. First, while changes in the industry and occupation classification structures used in the OES have caused numerous breaks in series, it should be possible to exploit more fully the enormous amount of detail in the OES to look at where in the wage distribution job growth has occurred. Further, by attaching job characteristic information to our data files, it should be possible to say something not only about growth in employment at different points of the wage distribution but also about the *characteristics* of the jobs in which growth has occurred and the changing labor market rewards for different job characteristics.[22]

It also should be possible to extend the analysis backward in time. Although OES microdata like those we have analyzed for the 1996 to 2004 period are not available for earlier years, the Occupational Employment Projections (OEP) program at BLS has produced an annual employment matrix based primarily on OES data that tracks the number of jobs in fairly detailed industry/occupation cells defined on a consistent basis over the 1983 to 1998 time period. Because industries were surveyed for the OES only once every three years prior to 1996, industry staffing patterns had to be interpolated in the years between surveys. In addition, occupational wage data were not collected in the OES prior to 1996. Nonetheless, the OEP employment matrix contains information that it should be possible to exploit to examine trends in employment by industry and occupation over a longer period of time.

22. Using data for 2003 and 2004, Abraham and Spletzer (2009) find larger returns to cognitive skills in the OES data than in the CPS, a finding they attribute to more accurate coding of occupations in the OES.

Appendix A

OCCUPATIONAL TITLE AND DESCRIPTION OF DUTIES		NUMBER OF EMPLOYEES IN SELECTED WAGE RANGES (Report Part-time Workers According to an Hourly Rate)												
		A	B	C	D	E	F	G	H	I	J	K	L	T
	Hourly (part-time or full time)	under $6.75	$6.75-8.49	$8.50-10.74	$10.75-13.49	$13.50-16.99	$17.00-21.49	$21.50-27.24	$27.25-34.49	$34.50-43.74	$43.75-55.49	$55.50-69.99	$70.00 and over	Total Employment
	Annual (full-time only)	under $14,040	$14,040-17,679	$17,680-22,359	$22,360-28,079	$28,080-35,359	$35,360-44,719	$44,720-56,679	$56,680-71,759	$71,760-90,999	$91,000-115,439	$115,440-145,599	$145,600 and over	
Management Occupations (Managers in this section have other managers/supervisors reporting to them.)														
Chief Executives- Determine and formulate policies and provide the overall direction of companies or private and public sector organizations within the guidelines set up by a board of directors or similar governing body. 11-1011		A	B	C	D	E	F	G	H	I	J	K	L	T
General and Operations Managers- Plan, direct, or coordinate the operations of companies or public and private sector organizations. Duties include formulating policies, managing daily operations, and planning the use of materials and human resources, but are too diverse in nature to be classified in any one functional area of management or administration 11-1021		A	B	C	D	E	F	G	H	I	J	K	L	T
Marketing Managers- Determine the demand for products and services offered by a firm and its competitors and identify potential customers. Develop pricing strategies with the goal of maximizing the firm's profits or share of the market. 11-2021		A	B	C	D	E	F	G	H	I	J	K	L	T
Computer and Information Systems Managers- Plan, direct, or coordinate activities in such fields as electronic data processing, information systems, systems analysis, and computer programming 11-3021		A	B	C	D	E	F	G	H	I	J	K	L	T

Figure 3A.1 Sample page from Occupational Employment Statistics survey form

Appendix B

Table 3B.1 19 occupation and 13 industry categories

Occupations	Industries
Management	Mining
Business and financial operations	Construction
Engineering	Manufacturing
Life, physical, and social science	Wholesale trade, transportation, and utilities
Computer and mathematical	Retail trade
Health care practitioners and technical	Information
Other professional and technical	Finance, insurance, and real estate
Sales and related	Professional and business services
Office and administrative support	Educational services
Protective service	Health care and social assistance
Food preparation and serving related	Arts, entertainment, and recreation
Building/grounds cleaning and maintenance	Accommodation and food services
All other services	Other services
Production supervisors	
Installation, maintenance, and repair	
Construction and extraction	
Production	
Transportation and material moving	
Production helpers	

Table 3B.2 Industry and/or occupation breakouts applied to five largest industry/occupation cells

Industry/occupation cell	Industry and/or occupation breakouts
Retail trade industry	General merchandise stores; grocery stores; and other retail.
Sales and related occupations	First line supervisors; cashiers; and other sales and related.
Construction industry	No breakouts.
Construction and extraction occupations	Carpenters; electricians; painters; plumbers; and other construction and extraction occupations.
Manufacturing industry	Food, tobacco, textiles and apparel (nondurables); paper, chemicals, petroleum, and plastics (nondurables); lumber, furniture, stone, and fabricated metal (durables); primary metal and transportation (durables); industrial machinery, electrical equipment, instruments (durables); and miscellaneous.
Production occupations	No breakouts.
Health care and social assistance industry	Hospitals; and other health care and social assistance.
Health care practitioners and technical occupations	Physicians; registered nurses; and other healthcare and technical occupations.
Accommodation and food services industry	No breakouts.
Food preparation and serving related occupations	Waiters and waitresses; cooks; and other food preparation and serving related occupations.

Appendix C

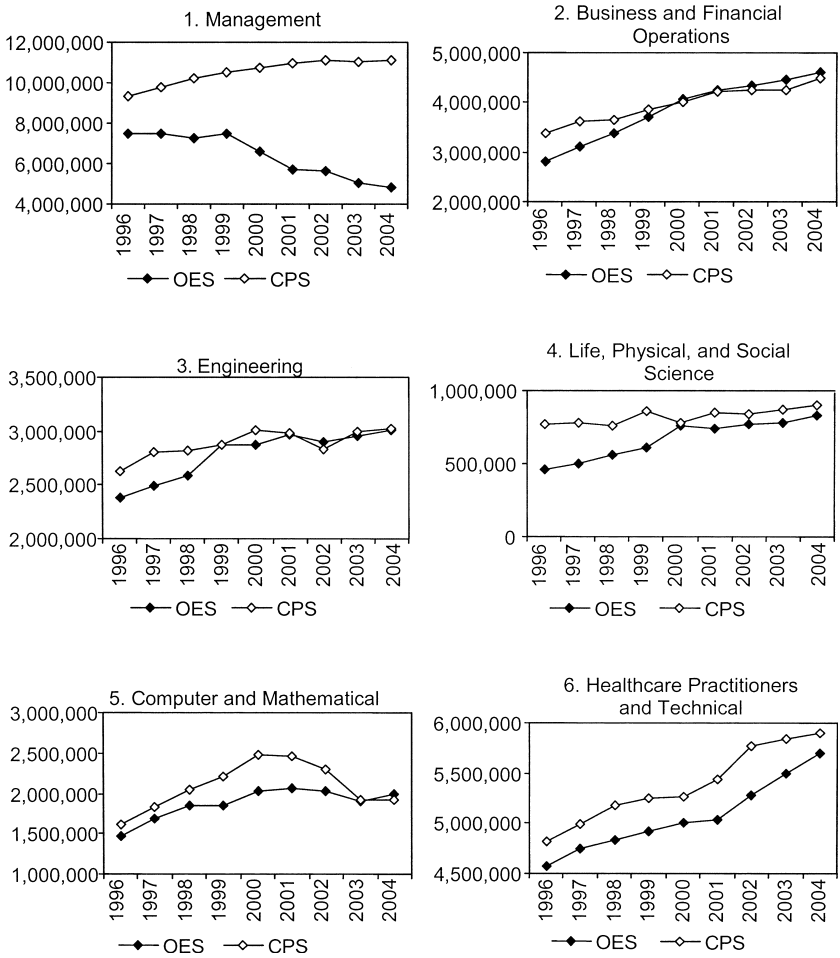

Fig. 3C.1 CPS and OES occupation employment time series, 1996–2004

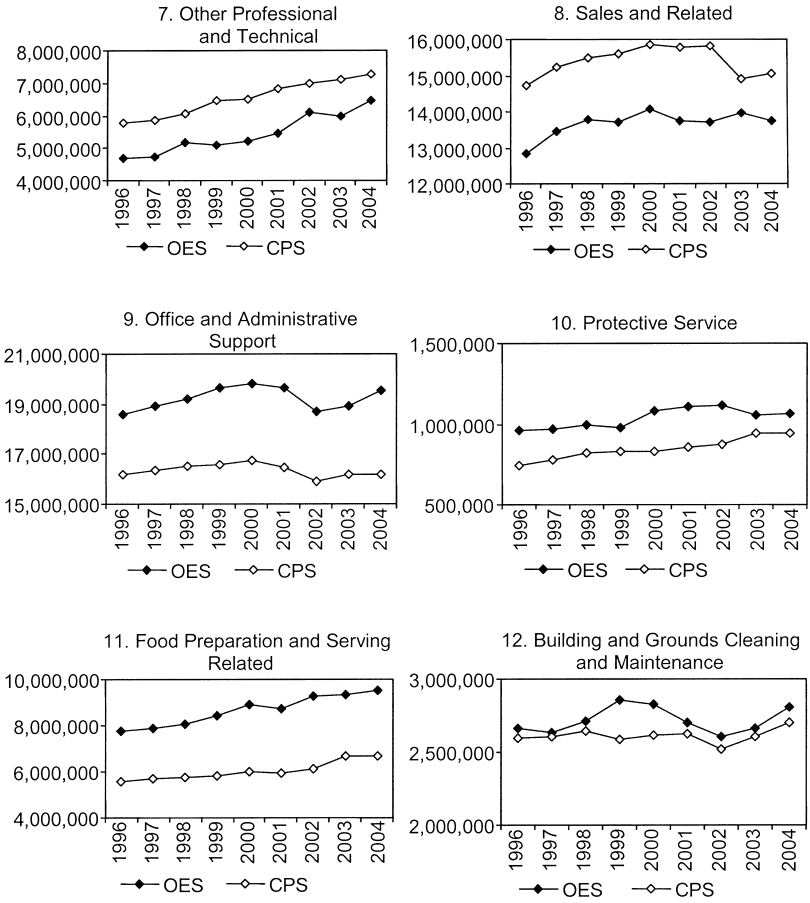
7. Other Professional and Technical
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
8. Sales and Related
16,000,000
15,000,000
14,000,000
13,000,000
12,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
9. Office and Administrative Support
21,000,000
19,000,000
17,000,000
15,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
10. Protective Service
1,500,000
1,000,000
500,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
11. Food Preparation and Serving Related
10,000,000
8,000,000
6,000,000
4,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
12. Building and Grounds Cleaning and Maintenance
3,000,000
2,500,000
2,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS

Fig. 3C.1 (cont.)

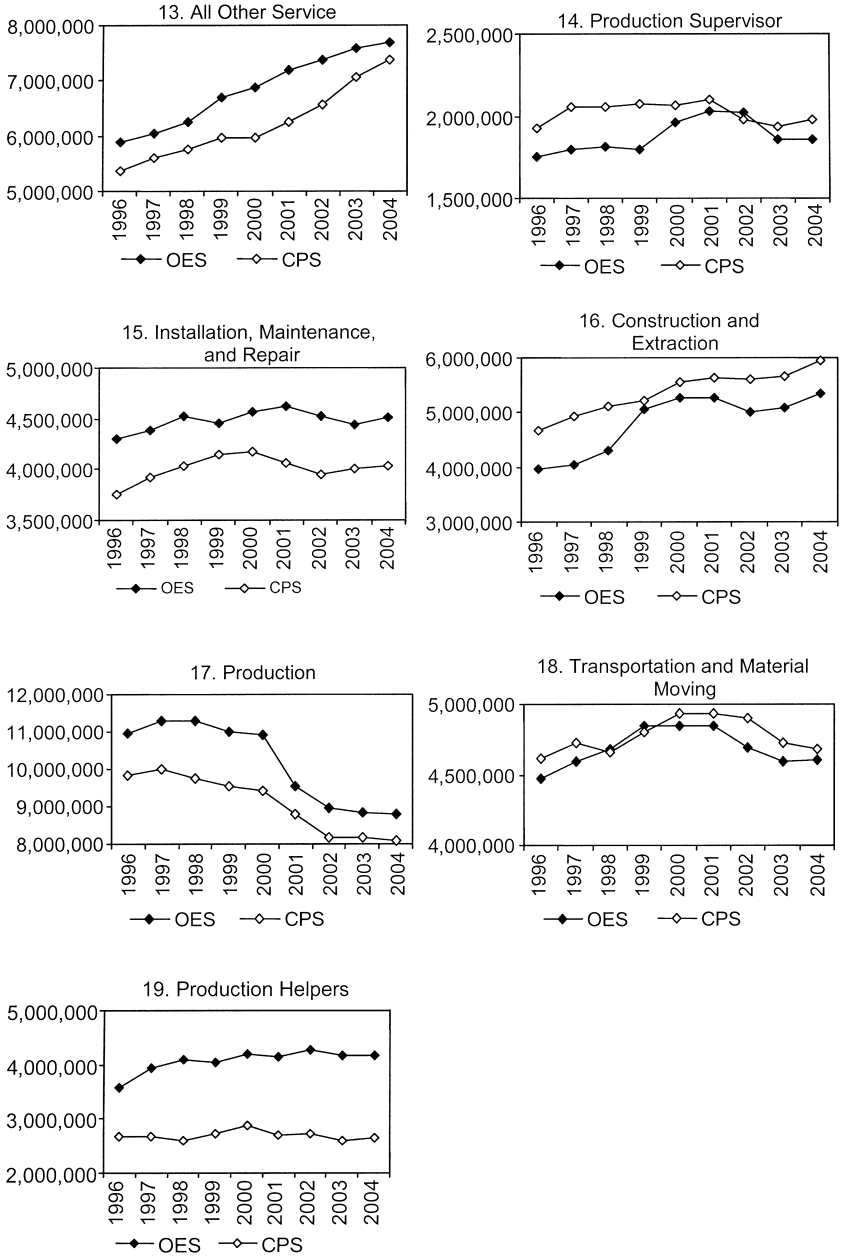
13. All Other Service
8,000,000
7,000,000
6,000,000
5,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
14. Production Supervisor
2,500,000
2,000,000
1,500,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
15. Installation, Maintenance, and Repair
5,000,000
4,500,000
4,000,000
3,500,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
16. Construction and Extraction
6,000,000
5,000,000
4,000,000
3,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
17. Production
12,000,000
11,000,000
10,000,000
9,000,000
8,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
18. Transportation and Material Moving
5,000,000
4,500,000
4,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS
19. Production Helpers
5,000,000
4,000,000
3,000,000
2,000,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS

Fig. 3C.1 (cont.)

Appendix D

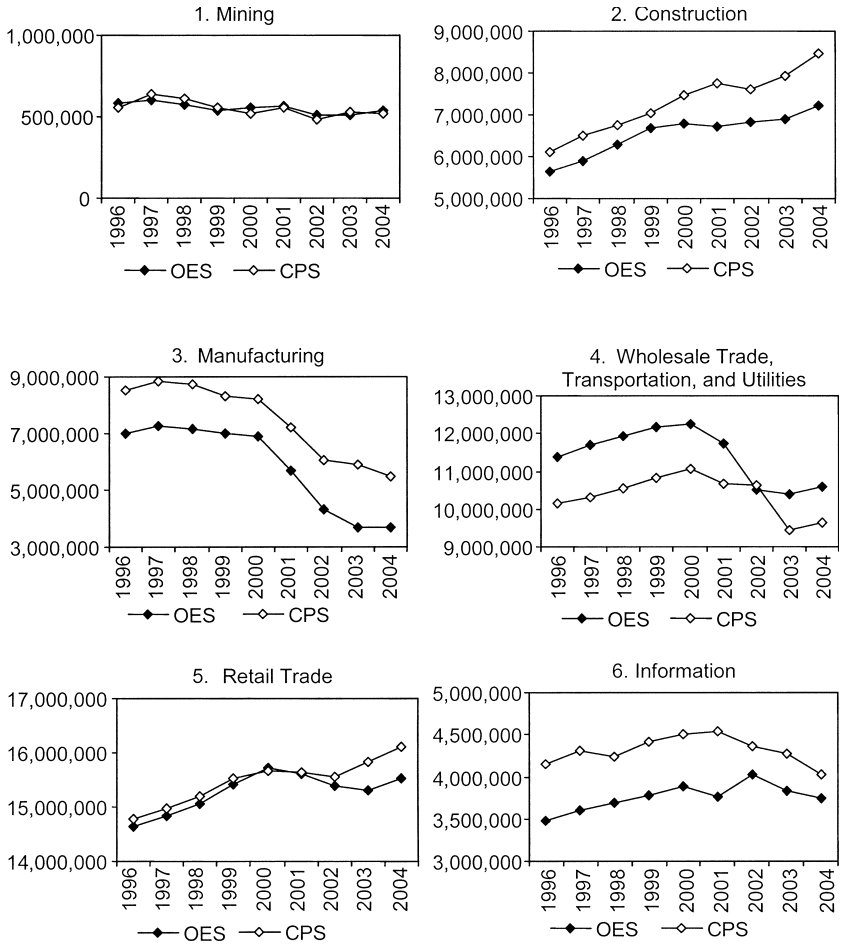

Fig. 3D.1 CPS and OES industry employment time series, 1996–2004

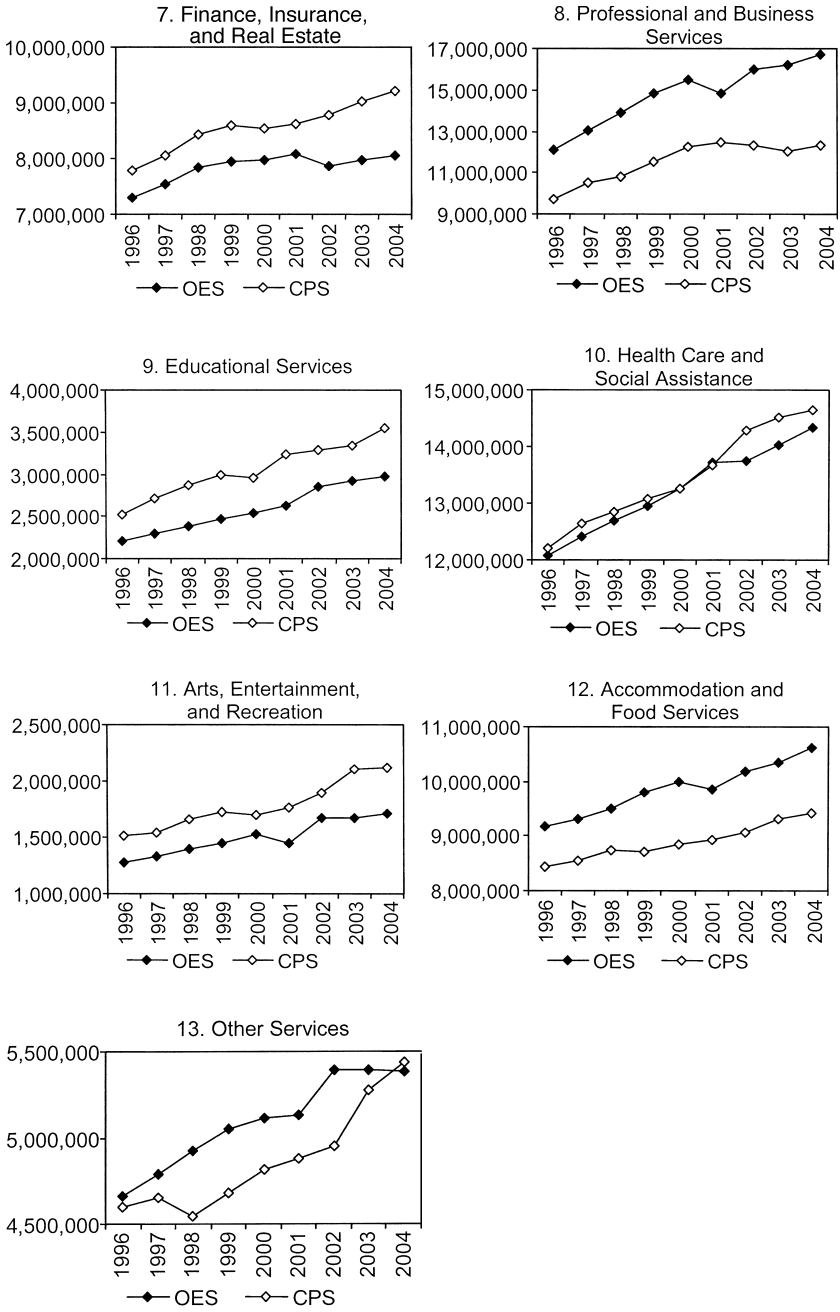
7. Finance, Insurance, and Real Estate
10,000,000
9,000,000
8,000,000
7,000,000
8. Professional and Business Services
17,000,000
15,000,000
13,000,000
11,000,000
9,000,000
9. Educational Services
4,000,000
3,500,000
3,000,000
2,500,000
2,000,000
10. Health Care and Social Assistance
15,000,000
14,000,000
13,000,000
12,000,000
11. Arts, Entertainment, and Recreation
2,500,000
2,000,000
1,500,000
1,000,000
12. Accommodation and Food Services
11,000,000
10,000,000
9,000,000
8,000,000
13. Other Services
5,500,000
5,000,000
4,500,000
1996 1997 1998 1999 2000 2001 2002 2003 2004
OES CPS

Fig. 3D.1 (cont.)

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Comment Erica L. Groshen

What's actually happened to the distribution of U.S. jobs recently? This chapter bolsters the evidence that the share of jobs in the middle-income ranges continues to decline but cannot yet answer the question of what is happening at the upper and lower ends: is the hollowing out caused by disproportionate expansion of low-wage jobs, high-wage jobs, or both? We still don't know. Nevertheless, Abraham and Spletzer make several important methodological contributions that could only be accomplished by careful, even tedious work with normally inaccessible data and supporting information. And extensions of their work on these data holds promise for further progress.

In these comments, I offer my views on the importance of the chapter, consider the challenge of the title, suggest some extensions, and close with my take-aways from the chapter.

Importance of the Paper

The goal of the chapter is to describe, on a granular level, how the distribution of jobs in the United States has changed since the mid-1990s. The answer and further work built on it can provide insight into the causes, consequences, and policy implications of the U.S. labor market's profound transformation. From the causal perspective, this description could help estimate, project, and contrast the impacts of the recent evolution in trade, technology, human resource practices, or corporate structures. In terms of

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