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Measuring Nonproduction and Supervisory Hours for Productivity Measurement

Lucy Eldridge
U.S. Bureau of Labor Statistics and CRIW
Eldridge.Lucy@bls.gov

Sabrina Wulff Pabilonia
U.S. Bureau of Labor Statistics
Pabilonia.Sabrina@bls.gov

Jay Stewart
U.S. Bureau of Labor Statistics and CRIW
Stewart.Jay@bls.gov

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Abstract: We evaluate the BLS's current practice of using a ratio adjustment from the CPS to estimate nonproduction and supervisory worker hours and examine how switching to the new CES all-employee hours series would affect productivity estimates. We also use CPS data to simulate the CES hours data, including the effect of standard-workweek reporting in the CES. Comparing these simulated hours to the OPT hours worked series and the actual self reported CPS hours worked, we find that using the CES series for nonproduction workers misses variation in actual hours worked, but that the effect on measured productivity is rather small because nonproduction worker are a relatively small portion of the workforce.

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Introduction

Labor is an important input to the production process, and the correct measurement of hours worked is critical for accurately measuring productivity. The main source of hours data for BLS productivity statistics is the BLS Current Employment Statistics (CES) survey, also known as the establishment survey. BLS prefers the CES hours data for measuring productivity over data from the Current Population Survey (CPS), also known as the household survey,[1] because: (1) the output data come from establishments and therefore the reporting of hours is likely to be more consistent with the reporting of output data, (2) industry coding is more accurate in the establishment survey, and the larger sample provides better industry coverage and reduces the variability of industry level estimates[2], and (3) the employment estimates from the establishment survey are benchmarked to the employment universe each year, instead of every ten years as is done for the household survey.

However, historically, the CES did not collect hours data for nonproduction and supervisory workers (henceforth referred to as nonproduction workers). To estimate hours worked for these workers, the BLS currently uses data from the CPS to estimate the ratio (henceforth referred to as the CPS ratio) of nonproduction worker average weekly hours to production and nonsupervisory worker average weekly hours (henceforth referred to as production workers). This ratio is then applied to CES production worker hours data that have been adjusted to an hours worked basis (explained below) to arrive at an estimate of nonproduction worker hours worked.

[1] Many countries use hours data from their household survey rather than establishment data.
[2] The CPS sample is not stratified by industry, and the CES sample is six times larger than the CPS. The CPS also allows for proxy respondents.

Since the second quarter of 2006, the CES program has been publishing hours for all employees, in addition to hours for production workers.[3] Using this hours series may seem to be preferable to the current approach that uses the CPS ratio to construct hours for nonproduction workers; however, it is not clear if the CES all-employee series can accurately capture actual hours worked for nonproduction and supervisory employees. The CES questionnaire explicitly instructs respondents to report the standard workweek for salaried workers and nonproduction workers are more likely than production workers to be salaried. This type of reporting is problematic for productivity measures because the standard workweek for salaried employees will not necessarily capture the actual number of hours worked. Using the CES all-employee hours series could result in a different level of average weekly hours as well as miss cyclical movements in hours worked by salaried workers.[4] Therefore, it is not clear that using the CES all-employee hours series would be an improvement over the current approach.

The goal of this study is to determine whether the BLS should use the new CES all-employee hours series or continue to estimate nonproduction worker hours worked by applying the CPS ratio adjustment to CES production worker hours. We seek to determine the extent to which adopting the CES all-employee hours series would result in BLS productivity measures missing some of the trend and cyclical changes in hours worked by nonproduction and supervisory workers.

[3] Note that we will use the term workers and employees interchangeably throughout the paper.
[4] Even though the stated concept for the CES hours measure is hours paid, we assume that the CES production worker hours series captures cyclical movements in hours worked because most production workers are paid hourly, which means that the two concepts are roughly equivalent.

II. Nonproduction Employee Hours for BLS Productivity Measures

The primary source of data used to construct hours measures for BLS productivity statistics is the monthly payroll survey of over 400,000 establishments conducted by the BLS CES program. The CES collects data monthly on employment for all employees and total hours paid for production workers in goods industries and for nonsupervisory workers in service industries. Employment includes all employees who worked or were on paid leave during the pay period that includes the 12th day of the month. Hours paid include all hours worked during the pay period plus hours of paid leave. The hours data are converted to a weekly number using conversion factors that vary depending on the number of days in the month. The CES computes average weekly hours by dividing total hours worked during the pay period by total employment.

For major sector productivity measures, CES average weekly hours paid are adjusted to an hours-worked basis using an hours-worked to hours-paid ratio estimated from the National Compensation Survey (NCS).[5] This adjustment ensures that changes in vacation, holiday, and sick pay, which are viewed as changes in labor costs, do not affect the growth in hours worked. Total annual hours worked by production workers are calculated as:

$$AWH_P^{CES} \times \left(\frac{HW}{HP}\right)_P \times N_P \times 52 \qquad (1)$$

where AWH_P^{CES} represents measured average weekly hours for production workers obtained from CES hours, $(HW/HP)_P$ represents the hours-worked to hours-paid ratio for production workers from the NCS[6], and N_P is the employment of production employees.

To estimate average weekly hours for nonproduction employees, data from the BLS household survey (CPS) are used to construct a CPS ratio of the average weekly hours worked

[5]NCS data are not available at this time to convert data below the major industry group level to an hours-worked basis; this is the topic of on-going research within the BLS Office of Productivity & Technology. The same basic calculation is made for industry measures, with the implied assumption that HW/HP for production workers is equal to one.

[6] Prior to 2000, the annual Hours at Work Survey was used.

by nonproduction employees relative to the average weekly hours worked by production employees. Together with CES hours and employment data, the CPS ratio is used to calculate the total hours worked by nonproduction employees. Total annual hours worked by nonproduction employees are calculated as:

$$AWH_P^{CES} \times \left(\frac{HW}{HP}\right)_P \times \frac{AWH_{NP}^{CPS}}{AWH_P^{CPS}} \times N_{NP} \times 52 \qquad (2)$$

where AWH_{NP}^{CPS} and AWH_P^{CPS} represent CPS measures of average weekly hours worked for nonproduction and production workers respectively,[7] and N_{NP} is the employment of nonproduction employees.[8] In this study, we focus on nonproduction employees, who account for approximately 20 percent of total hours worked in the private nonfarm sector.

The use of the CPS ratio to estimate nonproduction worker average weekly hours was introduced in 2004 as an improvement to previous estimation techniques.[9] Prior to 2004, BLS adjusted the hours of production workers in the manufacturing sector using the ratio of office to non-office worker hours extrapolated from a survey that was last conducted in 1978. In the non-manufacturing sector, OPT assumed that supervisory workers worked the same hours as nonsupervisory workers. With the publication of the CES all-employee average weekly hours in 2006, the OPT must investigate whether this new data could improve upon the current CPS ratio approach to measuring nonproduction worker hours.

[7] The same basic calculation is made for industry measures, with the implied assumption that HW/HP for production workers is equal to one.

[8] To construct the nonfarm business statistics, annual hours worked by production and nonproduction employees are constructed for 14 NAICS major industry groups, hours of employees of nonprofit institutions are removed, and then the data are aggregated. Total hours for all persons are the sum of production and nonproduction employee hours, and hours worked by the unincorporated self-employed, unpaid family workers and employees of government enterprises. Average weekly hours for the unincorporated self-employed, unpaid family workers and employees of government enterprises are taken directly from the CPS; remaining data are obtained from various sources. Employment counts for employees in agricultural services, forestry and fishing come from the BLS 202 program, based on administrative records from the unemployment insurance system. The number of employees of government enterprises comes from the BEA.

[9] See Eldridge, Manser, and Otto (2004).

III. CES Nonproduction Worker Hours Data

The hours concept used in the CES is hours paid, which means that hours of paid leave are included in the reported hours. In addition, the CES questionnaire explicitly instructs respondents to report the standard workweek for salaried workers. Research using ATUS data reveals that approximately 39 percent of production employees are paid a salary, while 69 percent of nonproduction employees are paid a salary.[10] Because business establishments typically do not keep track of the hours worked by their salaried employees and are instructed to report only the standard workweek, actual hours for nonproduction workers may be inaccurate and cyclical movements in the series may be missed. In this paper, we calculate the average weekly hours paid for nonproduction workers as the employment weighted difference between the all-employee average weekly hours and the production worker average weekly hours series. Quarterly CES average weekly hours are calculated as a three-month average and are seasonally adjusted using the Census Bureau's X-12 procedure.

Figure 1 compares an average weekly hours series for nonproduction workers constructed using OPT's current methodology and both an hours-paid (CESNP-paid) and an hours-worked (CESNP) series based on the all-employee CES hours data.[11] The latter is constructed by multiplying the CES hours paid by a NCS hours-worked-to-hours-paid ratio for nonproduction workers. Because the hours-worked-to-hours-paid ratios do not vary significantly over time, the two CESNP series behave in a similar manner; however, the AWH-paid are higher than the AWH-worked.

[10] The American Time Use Survey (ATUS) is drawn from the final CPS interview. These percentages are from 2006 data (See Eldridge and Pabilonia 2010).

[11] This constructed OPT series will differ slightly from the data underlying the published series as a result of the seasonal adjustment techniques used because it is constructed from more aggregate CES data for production workers.

For the aggregate private nonfarm sector, the OPT estimates of average weekly hours worked are higher than the CESNP average weekly hours worked. This could be the result of the CPS ratio adjustment capturing some hours worked that may not be paid. In Appendix A, we present figures comparing the OPT and CESNP average weekly hours series for nonproduction workers by 14 major NAICS industry groups. We find significant differences across industries. For several industries (nondurable goods, finance and real estate, and education and health services prior to 2009), the AWH levels are relatively similar given the two estimation procedures. However, for most industries the OPT series produces a significantly higher level of average weekly hours worked than the CESNP series. We suspect that some of this may be due to either the misreporting of industry by workers in the CPS or their misreporting of management status, which would put them in the nonproduction worker status (Mellow and Sider 1983; Abraham and Spletzer 2009). Comparing consistent employment data for employees from the CES and CPS, we find three industries where misclassification of industry in the CPS is evident: utilities, information and professional and business services. For utilities and information, the CPS data is capturing 70% and 60% more employees, respectively, than exist in the CES data, while CPS data is accounting for 40% too few employees in the professional and business services industry (See Table A.2 in the Appendix). In these particular industries, the difference between the CESNP and OPT average weekly hours is undoubtedly affected by the CPS ratio not capturing the correct workers. Interestingly, in transportation and warehousing, retail trade and other services prior to 2009, the CESNP average weekly hours worked series exceed the OPT series. However, in these industries, the CPS data does a better job matching the CES employment. For retail trade, CPS respondents appear to be classifying themselves correctly into retail trade; however, the CPS classification of nonproduction workers understates the

number of nonproduction employees by about 10%. In transportation and warehousing, the high average weekly hours for nonproduction workers from the CES relative to the OPT series cannot be explained by a misclassification of workers in the CPS. In transportation and warehousing, CPS respondents are misclassifying themselves somewhat, resulting in an overstatement of employment by only 10%. However, these extra workers would have to have incredibly low AWH in order to pull the OPT series down so dramatically. In this case, it is more likely that something is being misreported in the CES, resulting in this unreasonably high level of AWH.

Productivity compares the growth in output with the growth in hours; therefore, the differences in the growth of the two average weekly hours worked series are more relevant for productivity estimation. Figure 2 shows the quarter-to-quarter growth rates of the CESNP average weekly hours worked series for nonproduction employees and the OPT series over the 2006-2010 period and Figure 3 shows the difference in the growth rates of the two series. The most significant difference in the series occurs in 2009 where the difference increases to 2 percentage points; otherwise, the difference in growth rates is generally small (1 percent or less), suggesting that using the CES all-employee hours series would not have much of an effect on measured productivity growth at the major sector level. Looking at the 14 NAICS major industry groups (see Table A.1 in Appendix), we find that the difference in the annual average growth rate over the entire period is less than 2% for most industries. However, with the exception of the durable goods industry, all industries have at least one year in which the difference in the growth rate between the two series exceeded 2%, with some differences as high as 14% (14% in 2008-2009 for other services, 12% in 2009-2010 for transportation and warehousing, 11% in 2006-2007 for mining, 9% in 2008-2009 for utilities). Thus, a change in

methods would make a substantive difference on the less aggregated productivity statistics and therefore the merits and shortcomings of using each approach must be weighed carefully.

IV. Simulating CES Data Using the CPS

Because the CES all-employee hours series is too short to allow for any meaningful comparisons, our strategy is to simulate the CES nonproduction worker hours data using the CPS, and then compare it to the OPT hours worked series for these workers.

The CPS collects data on employment and hours from a sample of approximately 60,000 households. The reference period for the CPS differs slightly from the CES in that CPS reference period is the week that includes the 12th day of the month, rather than the pay period that includes the 12th day of the month. The CPS collects information about the usual and actual hours worked on the individual's main job and any other jobs that he or she may have. For the main job, the CPS collects class of worker, industry, occupation, and whether the individual is paid hourly. Information on the second job is more limited. Only class of worker, industry and occupation are collected, and only for one-quarter of the sample.[12] There is no information on whether individuals are paid hourly on their second jobs. Because this detailed information about second jobs was only collected on a regular basis starting in 1994, we restrict our analysis to the 1994-2010 period.

In constructing the CPS dataset, our goal was to make the data as comparable to the CES data as possible. The most significant difference between the two datasets is that CES collects information on jobs, while the CPS collects information on people. The two concepts would be the same if there were no multiple jobholders. To put the CPS data on a jobs basis, we created

[12] This limited information is collected for the outgoing rotations (one-quarter of the CPS sample interviewed in its fourth or eighth month).

duplicate observations for second jobs so that each observation is a job rather than a person.[13] For each job, we determined whether it was in the private nonfarm sector using industry coding and whether the job would be considered production or nonsupervisory in the CES using occupation coding. Jobs that are not in the private nonfarm sector are out of scope,[14] as are jobs in industries not covered by the CES. The classification of jobs as production or nonproduction was based on industry and occupation codes using the Employer Cost Index (ECI) definitions, which are also used by the productivity program when constructing the CPS ratio.

Using the CPS, we constructed a quarterly average weekly hours series that approximates the hours-paid concept used by the CES and then converted it to hours worked using the NCS hours-worked-to-hours-paid ratio. We refer to this series as "simulated CESNP". To estimate the hours paid, hours for salaried workers are top-coded at 40. This simulates the CES instructions to report standard workweek hours for salaried employees.[15] In addition, we include the usual hours (top-coded at 40) of individuals who did not work during the previous week, but were paid for their time off.[16]

The CPS collects information on whether the individual is paid hourly on their main job. For observations where the hourly-paid indicator variable was missing, we imputed hourly-paid status using predicted values from a logit model that included demographic and job characteristics as right hand side variables. For the observations with imputed hourly status, we used the predicted values to proportionally adjust the top-coded hours. For example, if the predicted probability of being paid hourly is 0.6, and the individual worked 45 hours last week,

[13] A small fraction of multiple jobholders have more than two jobs. Because the fraction is so small and there is no information on third jobs, we assume that all multiple jobholders hold only two jobs. Note that even after making these adjustments, there remain known discrepancies between CES and CPS data (see Bowler and Morisi, 2006, and Frazis and Stewart, 2004 and 2010).

[14] Thus, for individuals with two jobs, it is possible for one job to be in scope while the other is out of scope.

[15] We are implicitly assuming that no salaried workers are paid for more than 40 hours.

[16] We dropped observations in which individuals reported that their usual hours vary. In the next draft of the paper, we will impute usual hours using industry-specific average hours.

the top-coded hours would be 43 hours (= 40 + (45 – 40)×0.6). We assumed that all second jobs are hourly. Average weekly hours are constructed by summing the top-coded self-reported hours and dividing by the number of jobs.[17] In the denominator, we included jobs where individuals were employed and working, as well as jobs where individuals were employed not at work if they were paid for their time off. We included these nonworkers to be consistent with the CES employment counts. This inclusion primarily affects scaling.

Figure 4 shows that the simulated CESNP series does a very good job of replicating the actual CES hours worked measure for nonproduction workers over the 2006-2010 period – at most a 0.56 hour difference in average weekly hours. Figure 5 compares the OPT hours worked series to the simulated CESNP series for the 1994-2010 period. We can see that the simulated CESNP series is about 3 hours less than the OPT series prior to 1999, but then the gap narrows to 2 hours in the later years. The CPS ratio adjustment used by BLS to construct the nonproduction worker hours series captures off-the-clock work by salaried workers, which leads to the higher level of hours from the OPT series. Figure 6 shows the quarter-to-quarter growth in the two series. The OPT series is more volatile than the simulated series. To quantify the differences, we computed standard deviations for the series in Figure 6. For the quarter-to-quarter changes, the standard deviation for OPT hours-worked series is 0.7, while the standard deviation of the simulated CESNP series is 0.5. The latter feature has important implications for productivity measurement, because productivity measures compare the growth in output to the growth in hours.

The pattern is similar for the year-to-year changes in Figure 7; however, we see more evidence of cyclical patterns. The declines in average weekly hours during the recessions of the

[17] In the Unicon ORG files, **ernwgt** = 0 for 15 year-olds from 1998 on. Therefore, including 15-year-olds required that we use the CPS final weight (appropriately adjusted to match population totals) rather than earner study weight.

early and late 2000s are greater for OPT hours worked than for the simulated CES series. In addition, the increase in OPT hours worked is greater than the increase in the simulated CES series in the recovery phase of these recessions. Thus, it appears that average weekly hours for nonproduction employees based on the CES series may miss some of the cyclical changes in work hours.

Although the difference in average weekly hours growth is observable for nonproduction workers, it is important to keep in mind that nonproduction workers are only 20 percent of total employment. Given that productivity growth is reported only to the first decimal place, the difference in the percentage change in nonproduction hours would have to be rather significant to have any meaningful effect on measured productivity growth. Figure 8 shows the effect of using the simulated CESNP series for nonproduction workers on the growth of total hours. The two series in Figure 8 were constructed using the OPT hours series for production workers and hours for nonproduction workers using OPT methods and simulated CESNP. It is clear that the series track fairly closely.

OPT uses a CPS ratio adjustment in their current methodology for estimating nonproduction worker hours. A ratio was adopted because it was expected that the influence of any reporting biases in the CPS would be lessened by this approach, assuming that reporting biases are similar between production and nonproduction workers. Hours worked can be directly computed using the self-reported actual hours worked from the CPS. Caution should be used when taking this approach because of the volatility in the data, which is very apparent in the industry level data. In addition, second job data is only available in the outgoing rotation, which reduces the survey sample to less than 15,000 respondents. To illustrate this, we constructed the CPS average weekly hours worked ("CPS hours worked") series, which is derived by summing

the self-reported actual hours worked on each job last week and dividing by the number of jobs. Figure 9 compares actual CPS hours-worked and simulated CES hours-worked series and the OPT hours-worked series. We observe that the CPS actual hours-worked series always exceeds the other series and is more variable when hours change significantly. This is consistent with literature on over reporting tendencies in the CPS, especially among workers that work longer hours; nonproduction workers typically worker longer hours than production workers.

Figures 10 and 11 show quarter-to-quarter and year-to-year changes respectively. In both figures, it is clear that the there is much greater variability in the CPS hours worked series. For the quarter-to-quarter changes, the standard deviations for CPS hours-worked and simulated CESNP were 1.3 and 0.5. Even after dropping the largest changes the standard deviation of CPS hours-worked was still larger by 0.6 (0.96 vs. 0.37). Thus, there is more significant volatility in the self-reported CPS actual hours series. The pattern is similar for the year-to-year changes in Figure 10. Again, we see more of a cyclical pattern to the year-over-year growth rate. Thus, it appears that using the CPS actual hours-worked series to derive total hours works would result in increased volatility in the hours series, which may be due to reporting issues rather than real movements in hours. When we create a total person hours series using the CPS actual hours, we see that the series track fairly closely, except when there are more dramatic changes in hours in late 1999 and 2009 (Figure 12) when the difference can vary over 0.6 percentage points.

V. Comparing CPS-ratio Approach and CES All-Employee Approach

The CES all-employee hours series would simplify BLS procedures for estimating total hours worked for nonproduction employees and alleviate the need to use data from the CPS to construct the nonproduction/production worker hours-worked ratio. Using CPS data requires

significant effort to obtain consistency, classify industries accurately, and identify production and nonproduction workers correctly. In addition, the CPS has a smaller sample size and permits proxy responses and there are concerns about accurate self reporting of hours.[18] There is a fairly large body of research that uses time-diary data to examine the accuracy of hours data in household surveys such as the CPS. Some researchers (Robinson and Bostrom, 1994; and Otterbach and Sousa-Poza, 2009) have found that respondents in household surveys tend to over-report hours worked compared to time-diary measures, and that the extent of over-reporting increases with the number of hours worked. The over-reporting of long work weeks could introduce a cyclical bias to hours measures based on household data. Eldridge and Pabilonia (2010) found that nonproduction workers tend to work longer hours than nonproduction workers and are more likely to bring unpaid work home from the office. However, research by Frazis and Stewart (2004, 2007, and 2010) compares hours worked in the CPS and the ATUS, and finds that on average the CPS hours reports accurately measure overall hours worked, although there are significant differences between CPS and ATUS hours for some groups.

Frazis and Stewart also find that hours worked during the CPS reference week are not representative of the entire month. The CPS reference week was chosen specifically to minimize the effects of holidays on estimates and, not surprisingly, they find that average weekly hours are higher (by about 1.5 hours per week) in CPS reference weeks compared to non-reference weeks. This difference should not have much effect on measured productivity growth as long as the growth rates of hours worked in reference and non-reference weeks are similar. In addition, the reference week effect is likely to be the same among production and nonproduction workers and therefore will not impact the CPS ratio adjustment.

[18] See Frazis and Stewart (2010) for a comparison of trends in CPS and CES average weekly hours.

Using the CES all-employee hours series would greatly simplify the production of hours estimates, and it does not appear that the topside productivity estimates would change very much; however, there are other factors to consider. An important consideration for using the CES all-employee hours series is that the CES instructs respondents to report standard workweeks for salaried employees.[19] This instruction does not have much of an effect on the production worker hours series because most production workers are paid hourly, so that they are paid for all of the hours they work. Thus, hours paid and hours worked are the same for the majority of production workers, except for paid vacations. In contrast, variations in hours actually worked by salaried workers will be missed. In addition, salaried employees often report working more than 40 hours in a week to the CPS and any unpaid overtime will not be captured in the CES because there is no reason for employers to keep track of these hours. In addition, although the topside CES nonproduction worker hours series appear to track the CPS nonproduction worker hours series reasonably well, this is not the case when looking at individual industries. In some industries, the CPS and CESNP series exhibit very different behavior. Before considering any change in methodology, these differences need to be investigated further.[20]

VI. Summary and Conclusions

With the introduction of the new CES all-employee hours, the BLS productivity program must consider its methodology for estimating nonproduction worker hours and determine whether using this new, more-direct, measure of hours for nonproduction workers will improve measures of hours and productivity. The CES all-employee hours series would simplify BLS

[19] The BLS adjusts its hours paid measure to arrive at hours worked. However, this adjustment only accounts for paid leave—it does not account for off-the-clock work done by salaried workers.
[20] We will investigate these differences in the next draft of this paper.

procedures for estimating total hours worked for the private nonfarm sector. However, an important consideration in using the CES all-employee hours series is that the CES instructs respondents to report standard workweeks for salaried employees and thus variation in hours actually worked by salaried workers will be missed.

In this study, we used CPS data to simulate the effect of the CES instructions for salaried workers and compared our "simulated CESNP" series to the OPT hours-worked series for the same group of workers. We find that it matters whether we use the OPT hours-worked series, which incorporates hours-worked data from the CPS, or an hours-worked series for nonproduction workers based on the all-employee CES data. There is considerably more quarter-to-quarter variation in hours worked, which should not be too surprising. Despite the large differences in estimated growth rates of nonproduction worker hours, the impact on overall productivity growth is rather small because these workers represent only 20 percent of employment at the major sector level. In addition, there is considerable industry variation that needs to be investigated.

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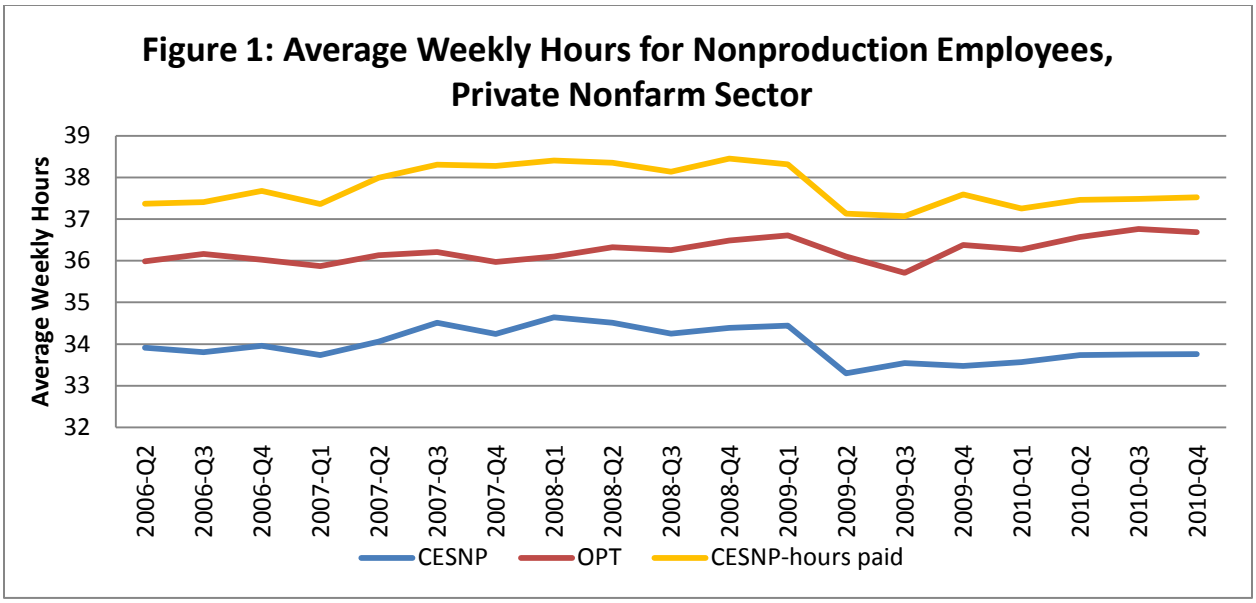
Figure 1: Average Weekly Hours for Nonproduction Employees, Private Nonfarm Sector
Average Weekly Hours
39
38
37
36
35
34
33
32
2006-Q2
2006-Q3
2006-Q4
2007-Q1
2007-Q2
2007-Q3
2007-Q4
2008-Q1
2008-Q2
2008-Q3
2008-Q4
2009-Q1
2009-Q2
2009-Q3
2009-Q4
2010-Q1
2010-Q2
2010-Q3
2010-Q4
CESNP
OPT
CESNP-hours paid

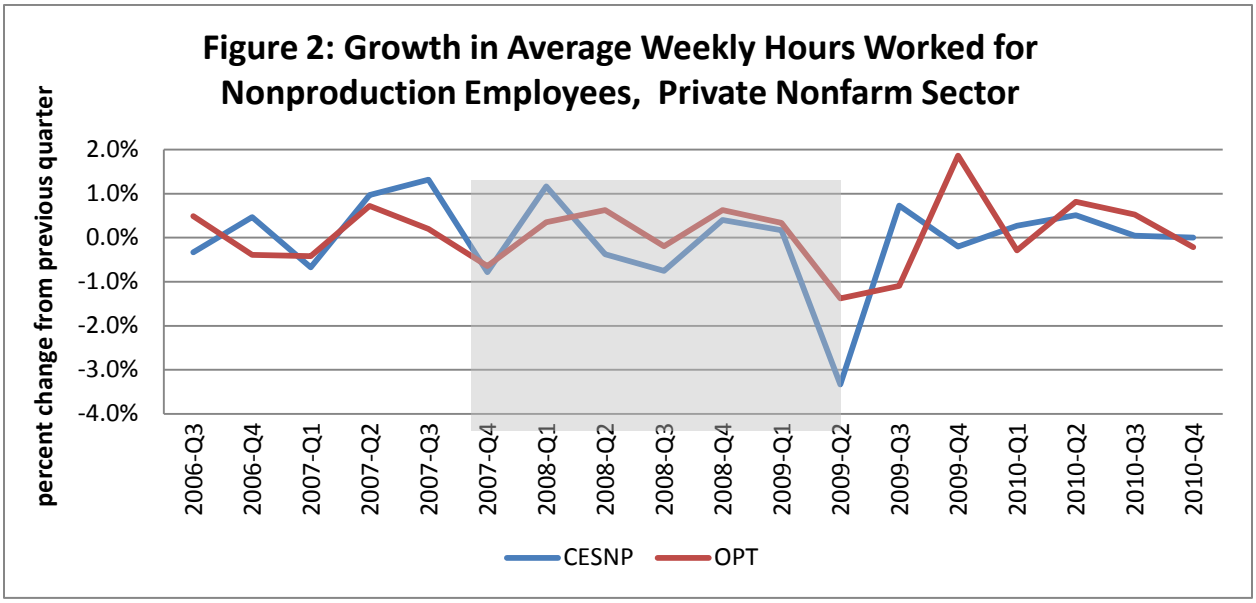
Figure 2: Growth in Average Weekly Hours Worked for Nonproduction Employees, Private Nonfarm Sector
percent change from previous quarter
2.0%
1.0%
0.0%
-1.0%
-2.0%
-3.0%
-4.0%
2006-Q3
2006-Q4
2007-Q1
2007-Q2
2007-Q3
2007-Q4
2008-Q1
2008-Q2
2008-Q3
2008-Q4
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2010-Q3
2010-Q4
CESNP
OPT

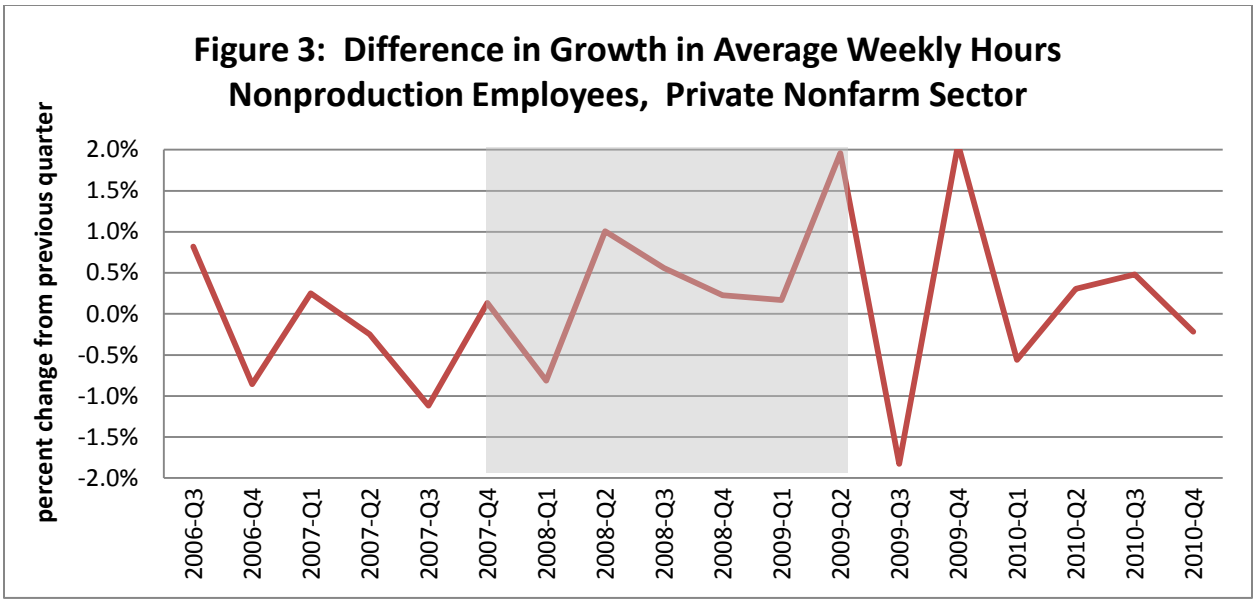


Figure 3: Difference in Growth in Average Weekly Hours
Nonproduction Employees, Private Nonfarm Sector
percent change from previous quarter
2.0%
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
-2.0%
2006-Q3
2006-Q4
2007-Q1
2007-Q2
2007-Q3
2007-Q4
2008-Q1
2008-Q2
2008-Q3
2008-Q4
2009-Q1
2009-Q2
2009-Q3
2009-Q4
2010-Q1
2010-Q2
2010-Q3
2010-Q4

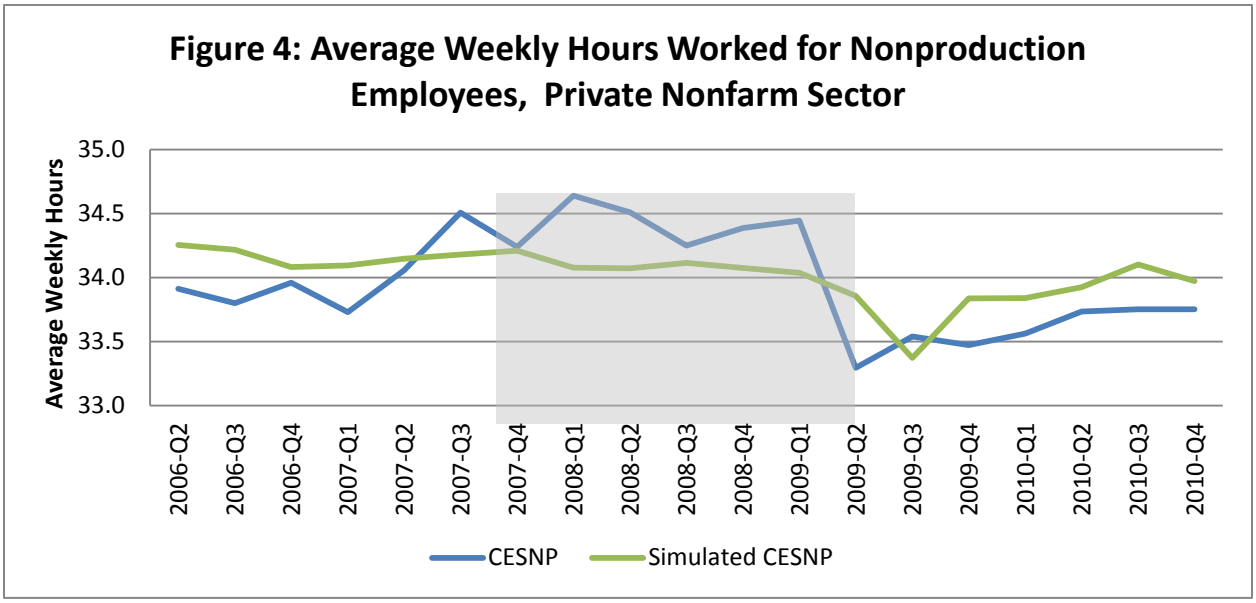


Figure 4: Average Weekly Hours Worked for Nonproduction
Employees, Private Nonfarm Sector
Average Weekly Hours
35.0
34.5
34.0
33.5
33.0
2006-Q2
2006-Q3
2006-Q4
2007-Q1
2007-Q2
2007-Q3
2007-Q4
2008-Q1
2008-Q2
2008-Q3
2008-Q4
2009-Q1
2009-Q2
2009-Q3
2009-Q4
2010-Q1
2010-Q2
2010-Q3
2010-Q4
CESNP
Simulated CESNP

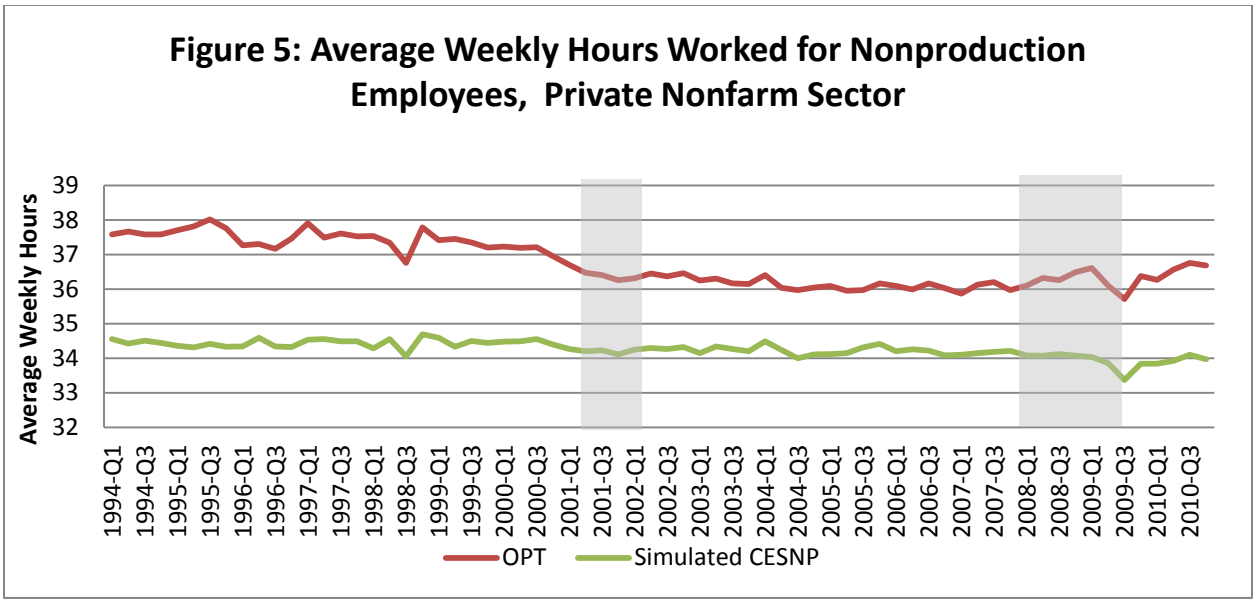


Figure 5: Average Weekly Hours Worked for Nonproduction Employees, Private Nonfarm Sector
Average Weekly Hours
39
38
37
36
35
34
33
32
1994-Q1
1994-Q3
1995-Q1
1995-Q3
1996-Q1
1996-Q3
1997-Q1
1997-Q3
1998-Q1
1998-Q3
1999-Q1
1999-Q3
2000-Q1
2000-Q3
2001-Q1
2001-Q3
2002-Q1
2002-Q3
2003-Q1
2003-Q3
2004-Q1
2004-Q3
2005-Q1
2005-Q3
2006-Q1
2006-Q3
2007-Q1
2007-Q3
2008-Q1
2008-Q3
2009-Q1
2009-Q3
2010-Q1
2010-Q3
OPT
Simulated CESNP

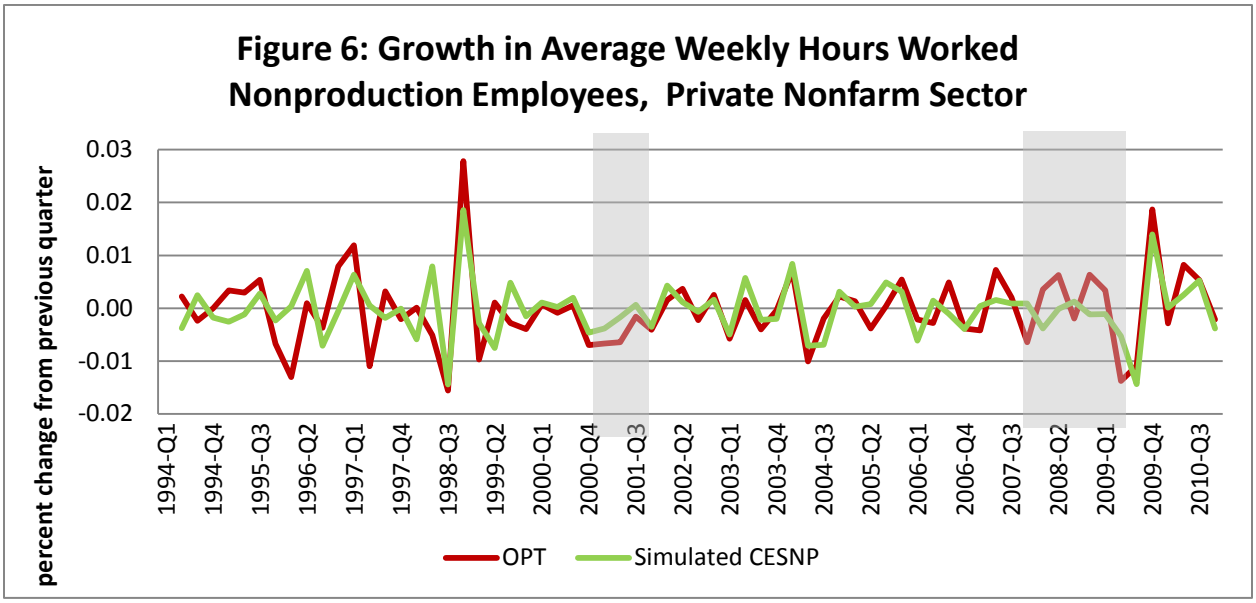


Figure 6: Growth in Average Weekly Hours Worked Nonproduction Employees, Private Nonfarm Sector
percent change from previous quarter
0.03
0.02
0.01
0.00
-0.01
-0.02
1994-Q1
1994-Q4
1995-Q3
1996-Q2
1997-Q1
1997-Q4
1998-Q3
1999-Q2
2000-Q1
2000-Q4
2001-Q3
2002-Q2
2003-Q1
2003-Q4
2004-Q3
2005-Q2
2006-Q1
2006-Q4
2007-Q3
2008-Q2
2009-Q1
2009-Q4
2010-Q3
OPT
Simulated CESNP

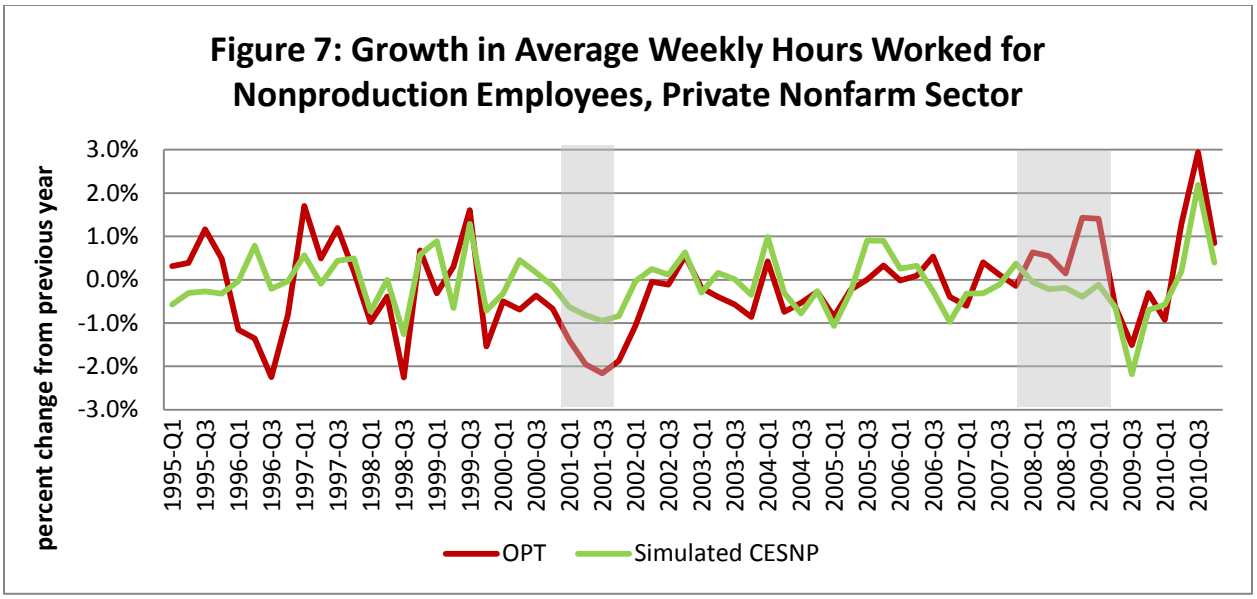


Figure 7: Growth in Average Weekly Hours Worked for Nonproduction Employees, Private Nonfarm Sector
percent change from previous year
3.0%
2.0%
1.0%
0.0%
-1.0%
-2.0%
-3.0%
1995-Q1
1995-Q3
1996-Q1
1996-Q3
1997-Q1
1997-Q3
1998-Q1
1998-Q3
1999-Q1
1999-Q3
2000-Q1
2000-Q3
2001-Q1
2001-Q3
2002-Q1
2002-Q3
2003-Q1
2003-Q3
2004-Q1
2004-Q3
2005-Q1
2005-Q3
2006-Q1
2006-Q3
2007-Q1
2007-Q3
2008-Q1
2008-Q3
2009-Q1
2009-Q3
2010-Q1
2010-Q3
OPT
Simulated CESNP

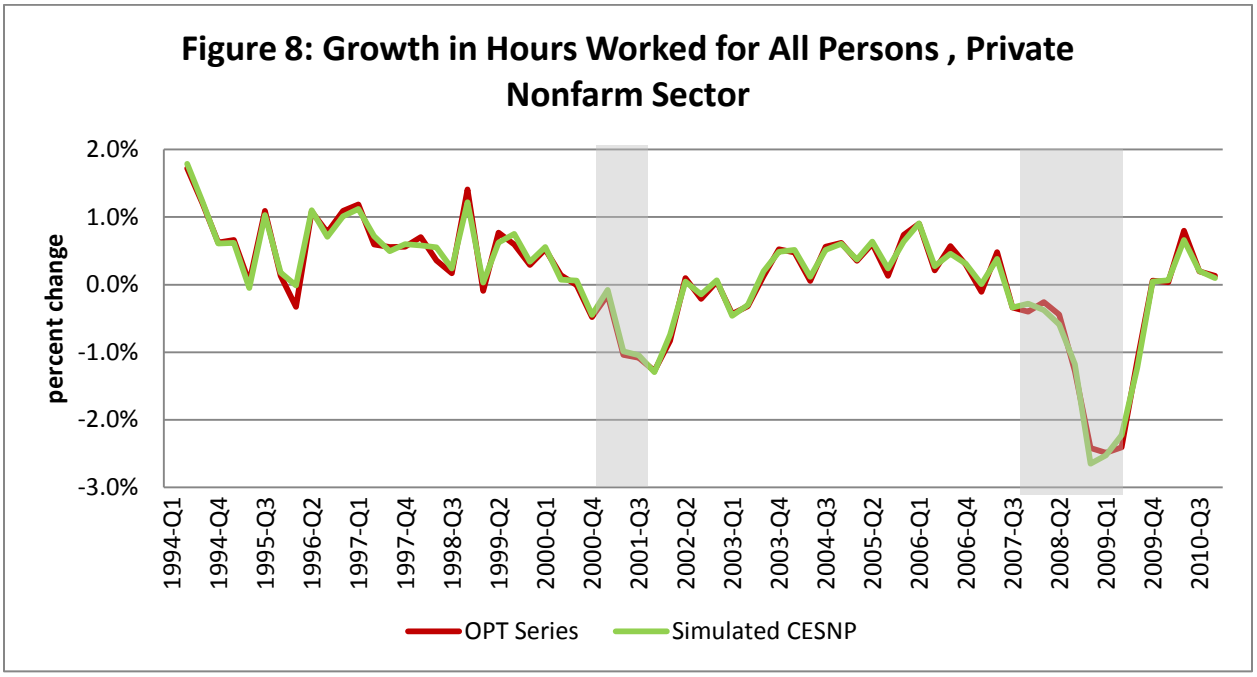


Figure 8: Growth in Hours Worked for All Persons , Private Nonfarm Sector
percent change
2.0%
1.0%
0.0%
-1.0%
-2.0%
-3.0%
1994-Q1
1994-Q4
1995-Q3
1996-Q2
1997-Q1
1997-Q4
1998-Q3
1999-Q2
2000-Q1
2000-Q4
2001-Q3
2002-Q2
2003-Q1
2003-Q4
2004-Q3
2005-Q2
2006-Q1
2006-Q4
2007-Q3
2008-Q2
2009-Q1
2009-Q4
2010-Q3
OPT Series
Simulated CESNP

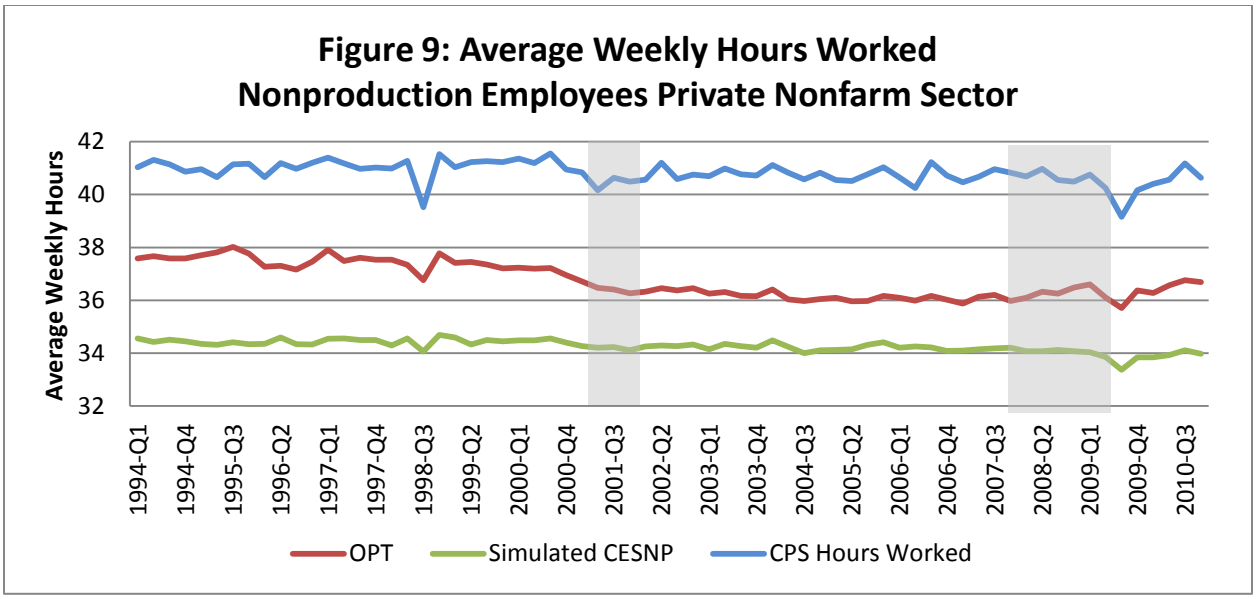


Figure 9: Average Weekly Hours Worked
Nonproduction Employees Private Nonfarm Sector
Average Weekly Hours
42
40
38
36
34
32
1994-Q1
1994-Q4
1995-Q3
1996-Q2
1997-Q1
1997-Q4
1998-Q3
1999-Q2
2000-Q1
2000-Q4
2001-Q3
2002-Q2
2003-Q1
2003-Q4
2004-Q3
2005-Q2
2006-Q1
2006-Q4
2007-Q3
2008-Q2
2009-Q1
2009-Q4
2010-Q3
OPT
Simulated CESNP
CPS Hours Worked

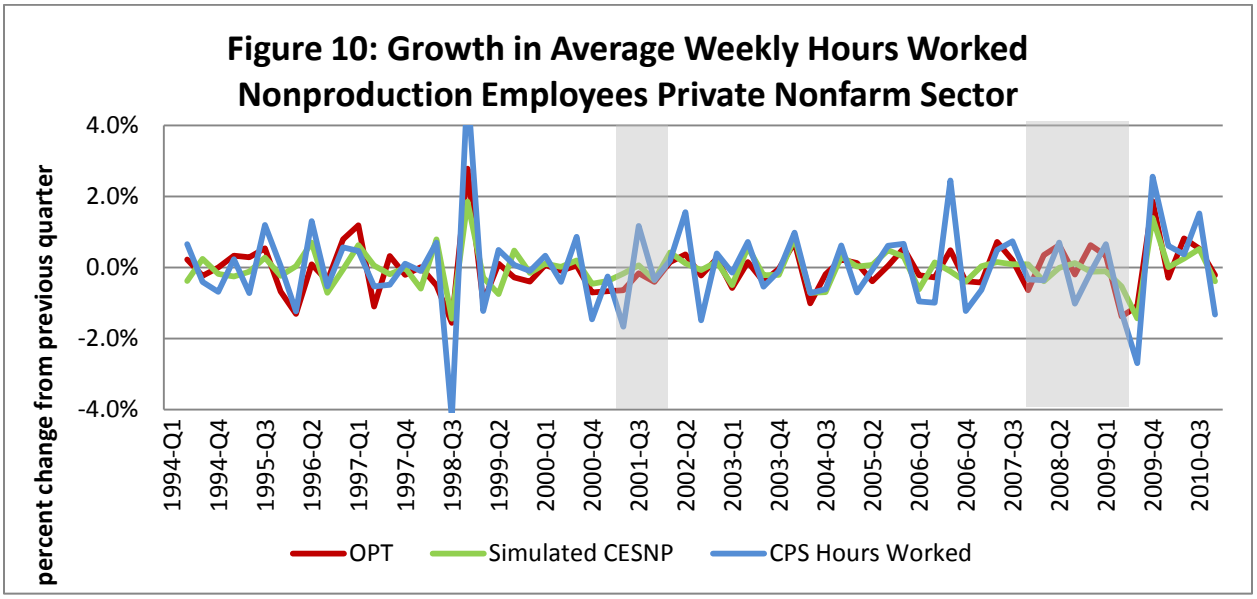


Figure 10: Growth in Average Weekly Hours Worked
Nonproduction Employees Private Nonfarm Sector
percent change from previous quarter
4.0%
2.0%
0.0%
-2.0%
-4.0%
1994-Q1
1994-Q4
1995-Q3
1996-Q2
1997-Q1
1997-Q4
1998-Q3
1999-Q2
2000-Q1
2000-Q4
2001-Q3
2002-Q2
2003-Q1
2003-Q4
2004-Q3
2005-Q2
2006-Q1
2006-Q4
2007-Q3
2008-Q2
2009-Q1
2009-Q4
2010-Q3
OPT
Simulated CESNP
CPS Hours Worked

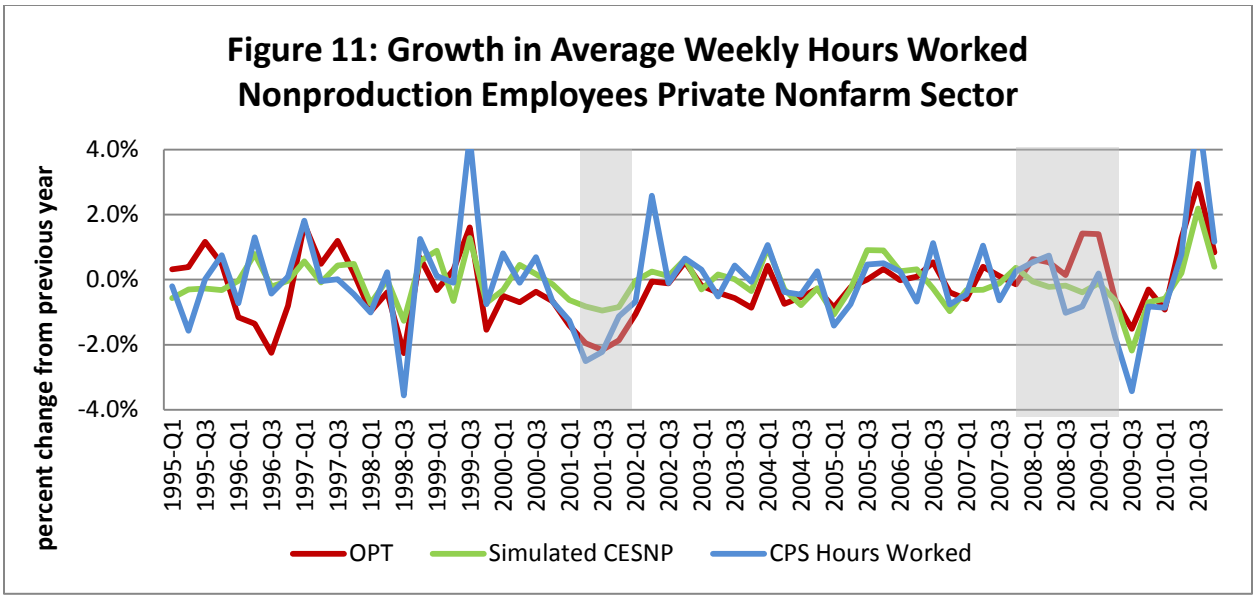


Figure 11: Growth in Average Weekly Hours Worked
Nonproduction Employees Private Nonfarm Sector
percent change from previous year
4.0%
2.0%
0.0%
-2.0%
-4.0%
1995-Q1
1995-Q3
1996-Q1
1996-Q3
1997-Q1
1997-Q3
1998-Q1
1998-Q3
1999-Q1
1999-Q3
2000-Q1
2000-Q3
2001-Q1
2001-Q3
2002-Q1
2002-Q3
2003-Q1
2003-Q3
2004-Q1
2004-Q3
2005-Q1
2005-Q3
2006-Q1
2006-Q3
2007-Q1
2007-Q3
2008-Q1
2008-Q3
2009-Q1
2009-Q3
2010-Q1
2010-Q3
OPT
Simulated CESNP
CPS Hours Worked

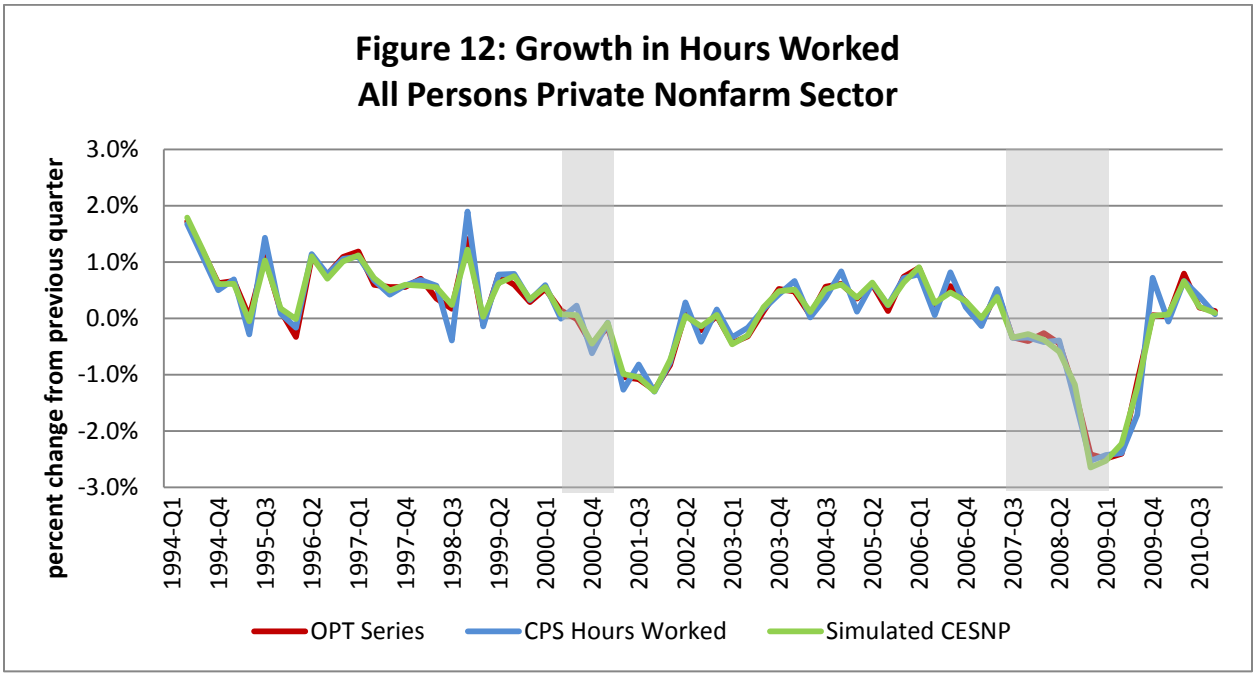
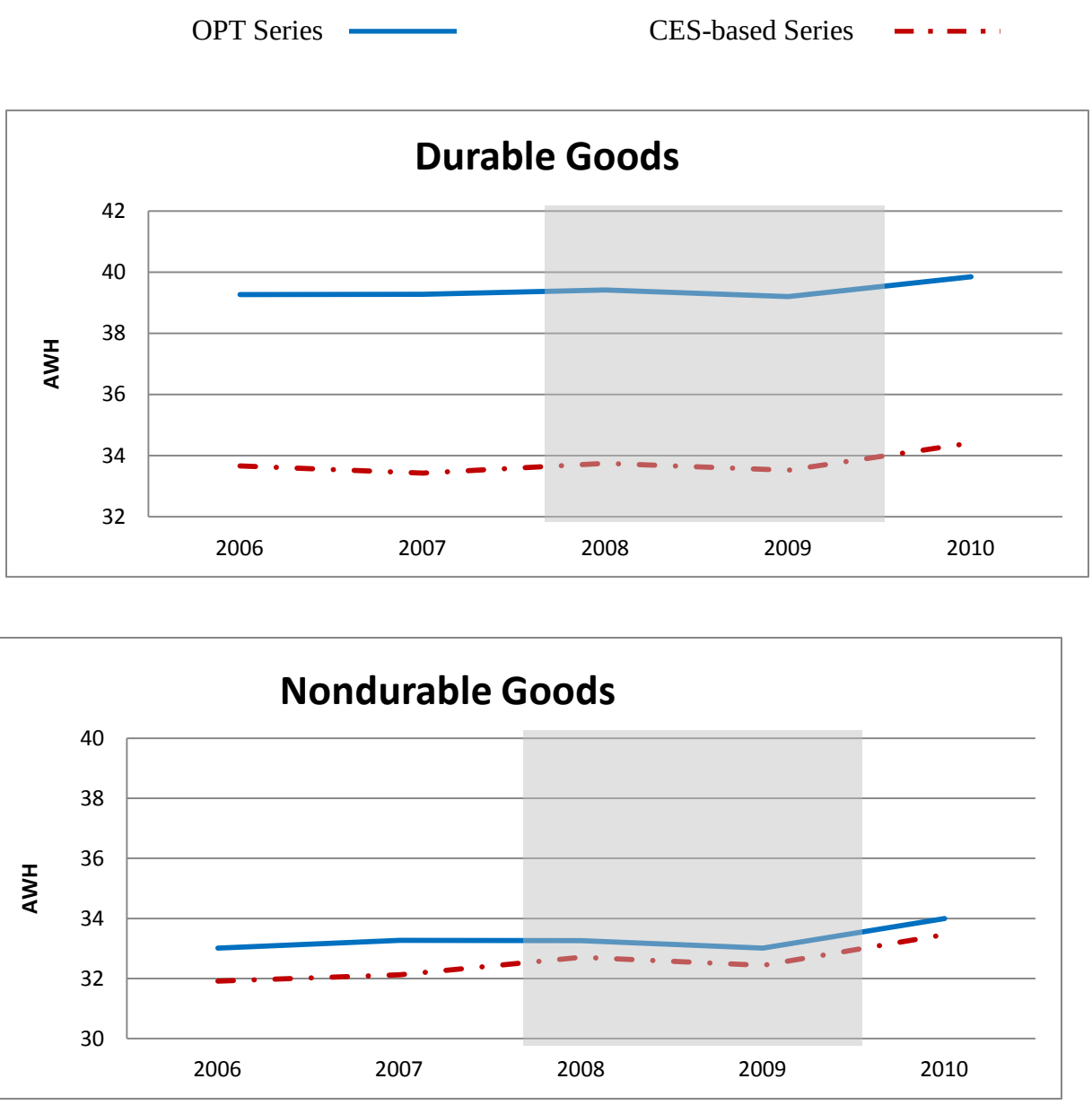
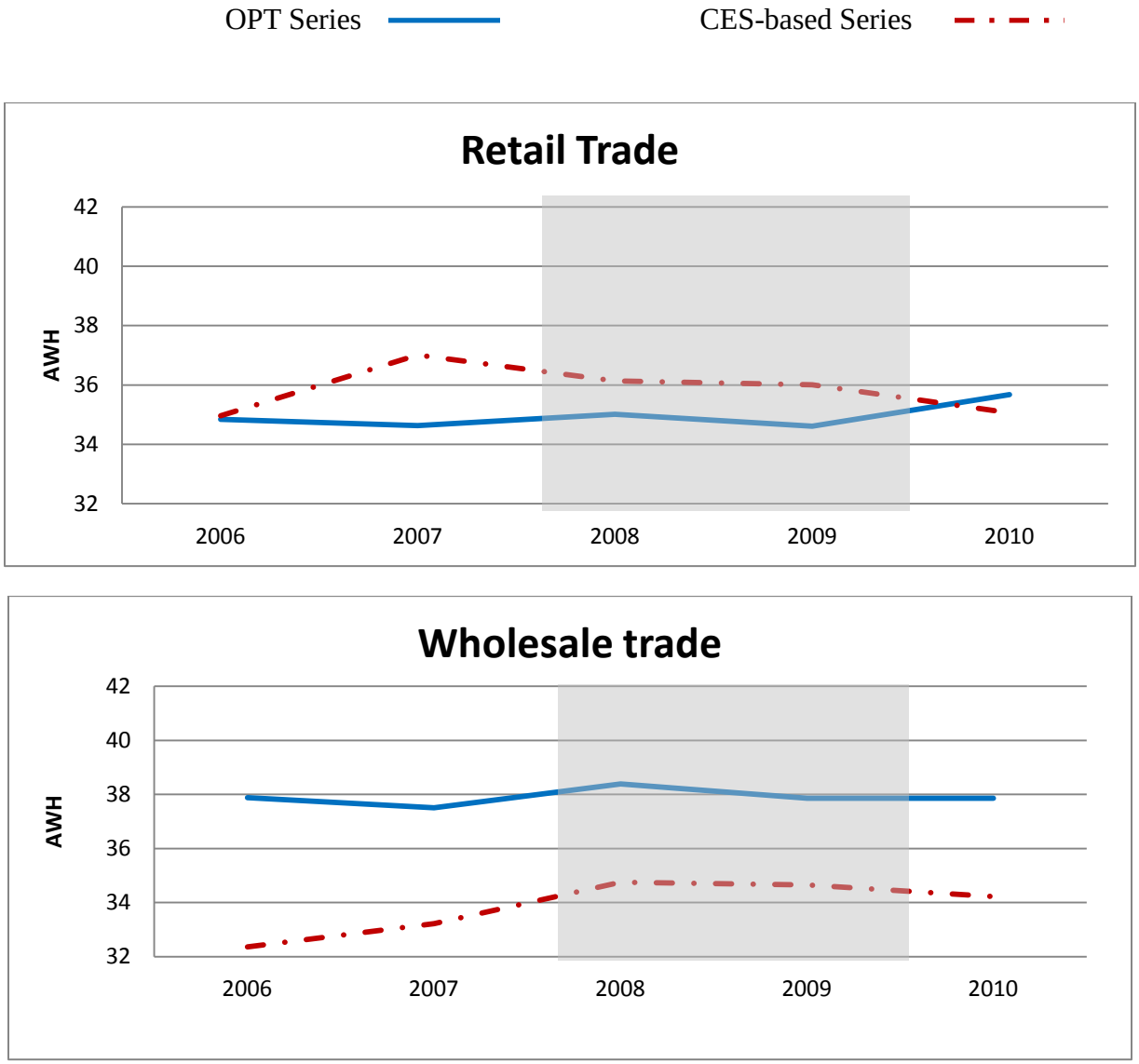


Figure 12: Growth in Hours Worked
All Persons Private Nonfarm Sector
percent change from previous quarter
3.0%
2.0%
1.0%
0.0%
-1.0%
-2.0%
-3.0%
1994-Q1
1994-Q4
1995-Q3
1996-Q2
1997-Q1
1997-Q4
1998-Q3
1999-Q2
2000-Q1
2000-Q4
2001-Q3
2002-Q2
2003-Q1
2003-Q4
2004-Q3
2005-Q2
2006-Q1
2006-Q4
2007-Q3
2008-Q2
2009-Q1
2009-Q4
2010-Q3
OPT Series
CPS Hours Worked
Simulated CESNP

APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group

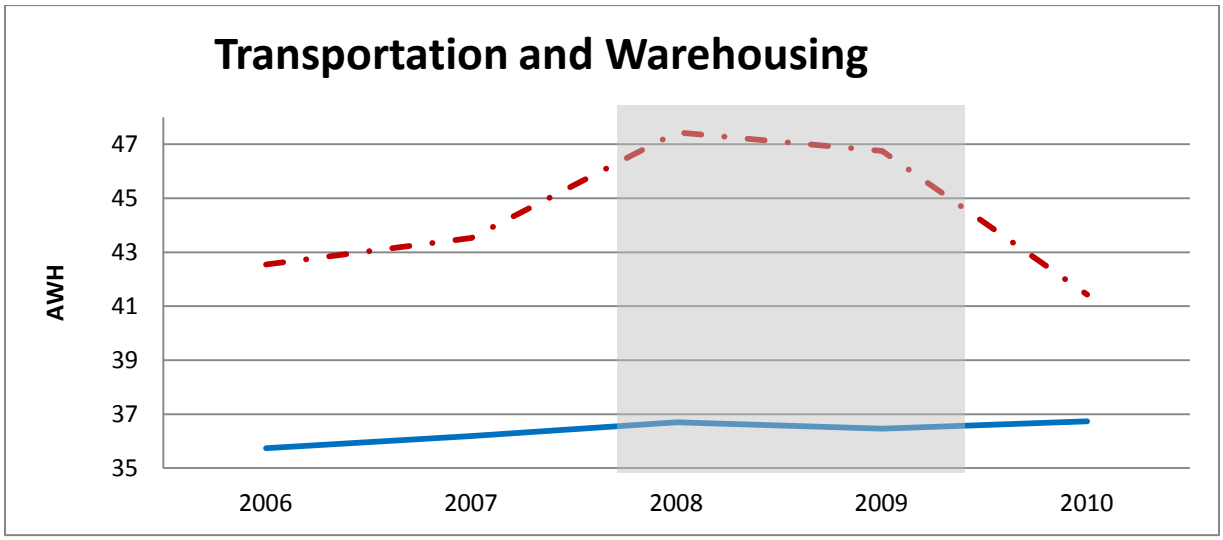


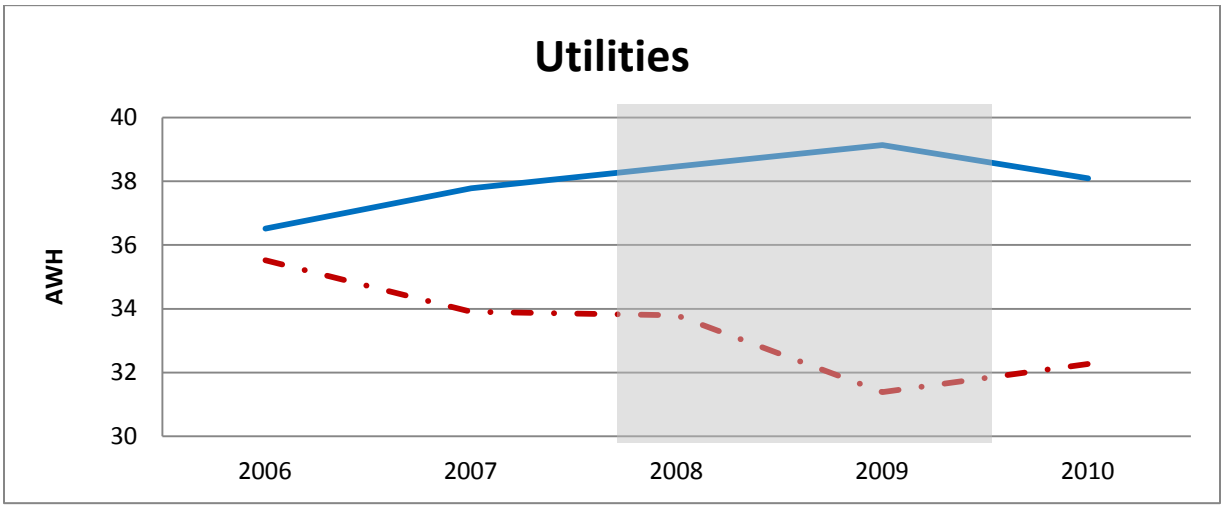
APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group



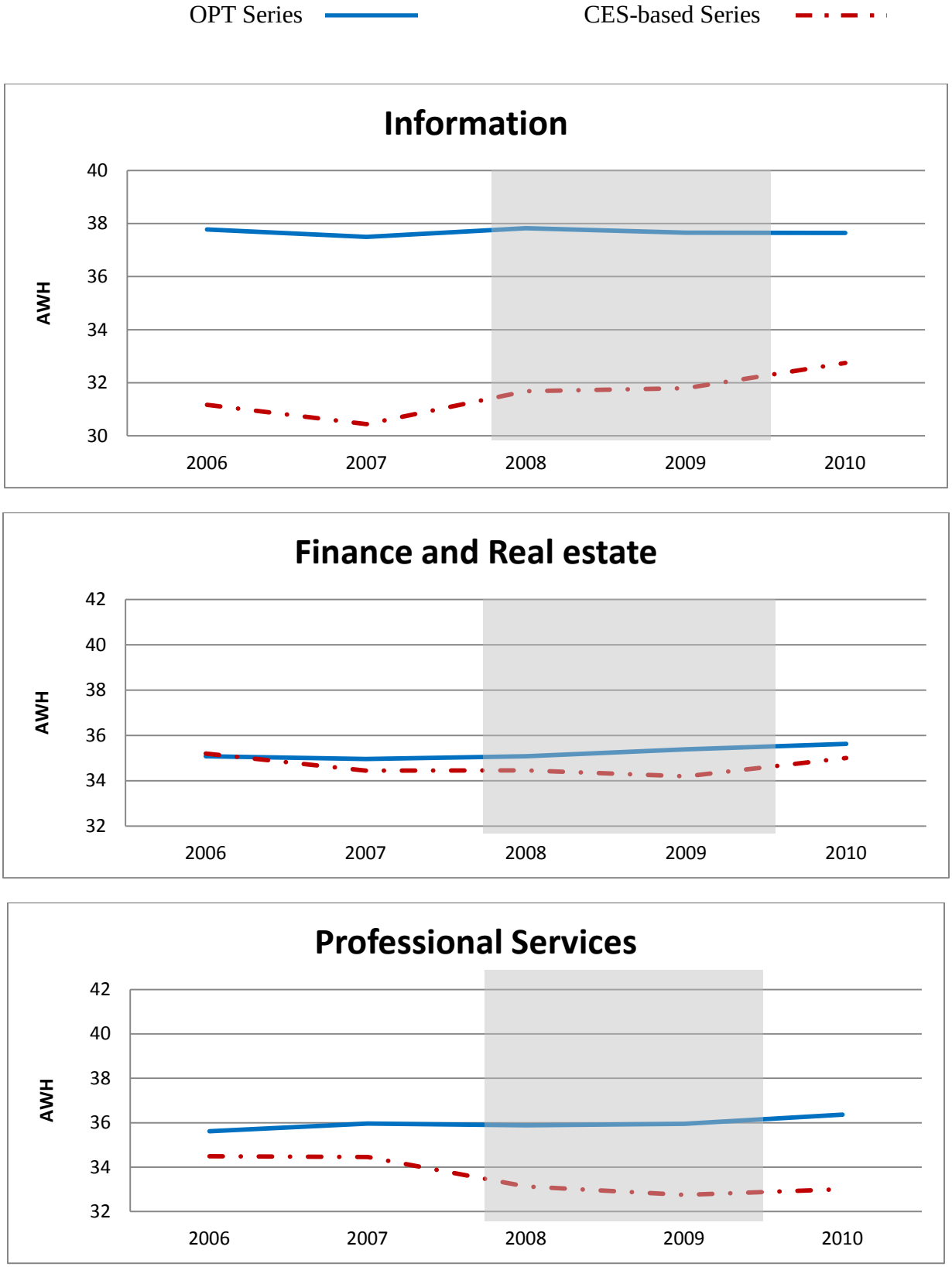
APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group

OPT Series — CES-based Series

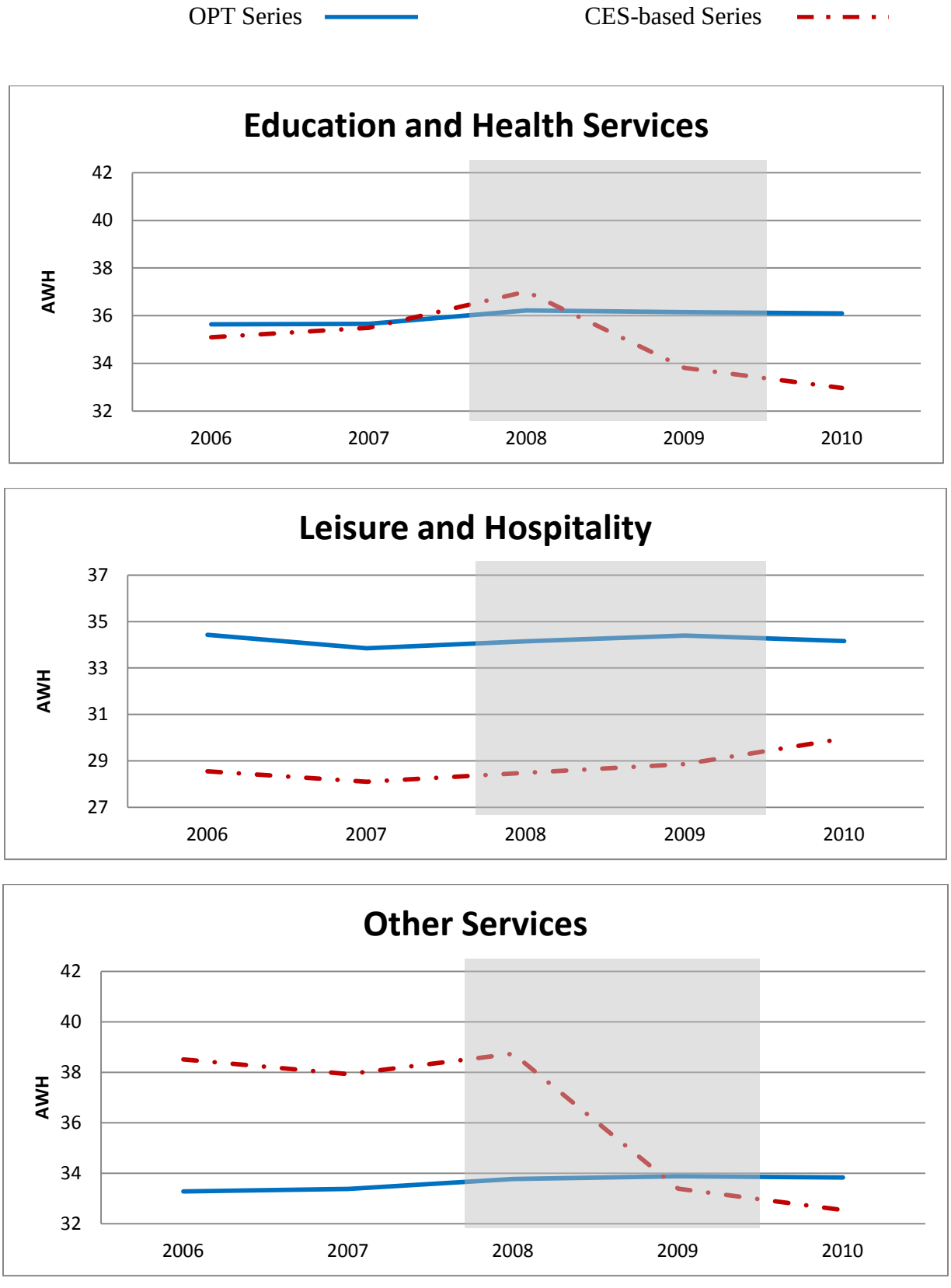




APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group



APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group



APPENDIX:
Average Weekly Hours Worked for Nonproduction Workers,
by Major Industry Group

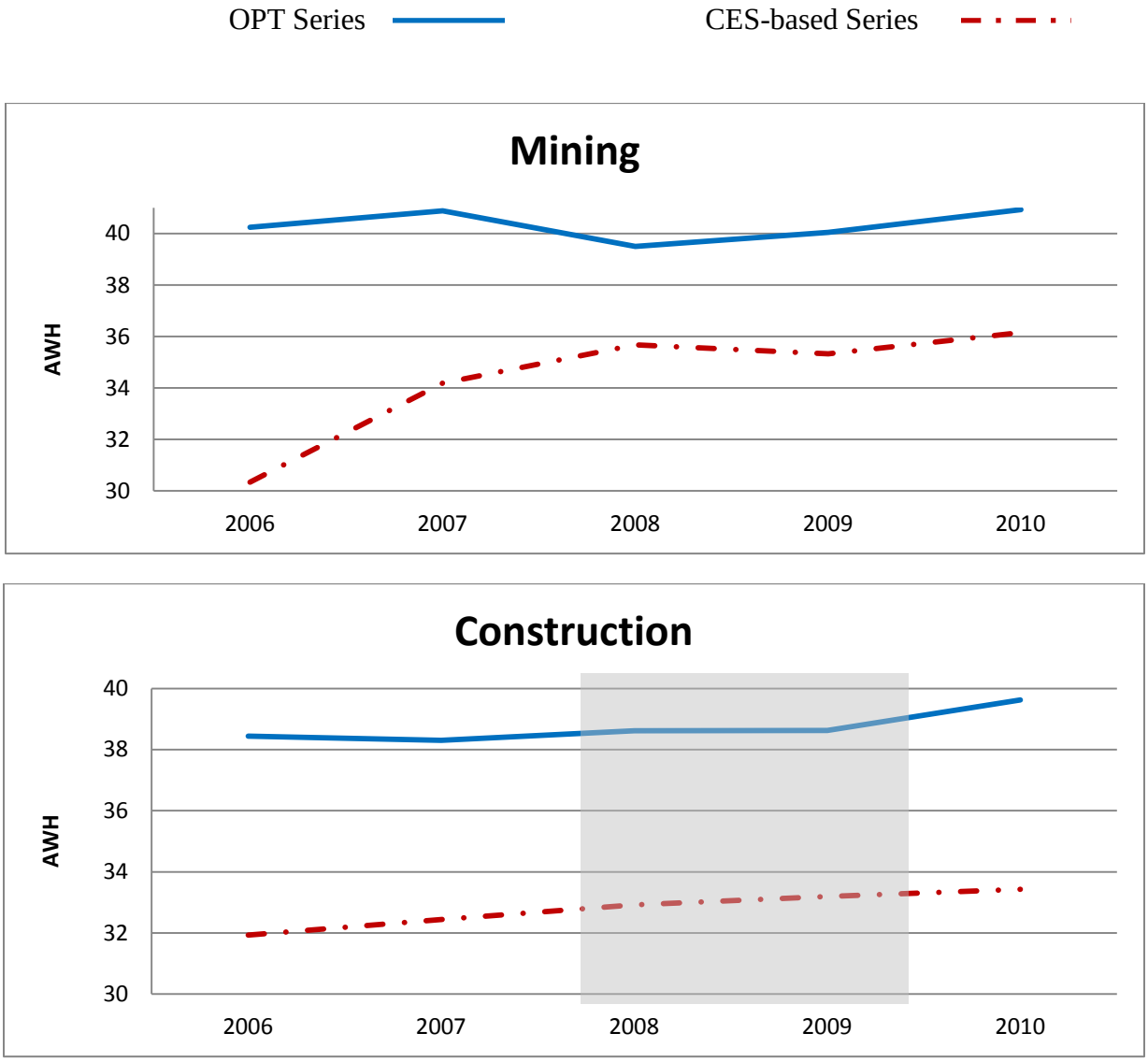


Table A.1: Growth in Average Weekly Hours Worked of Nonproduction Workers, by Major Industry Group

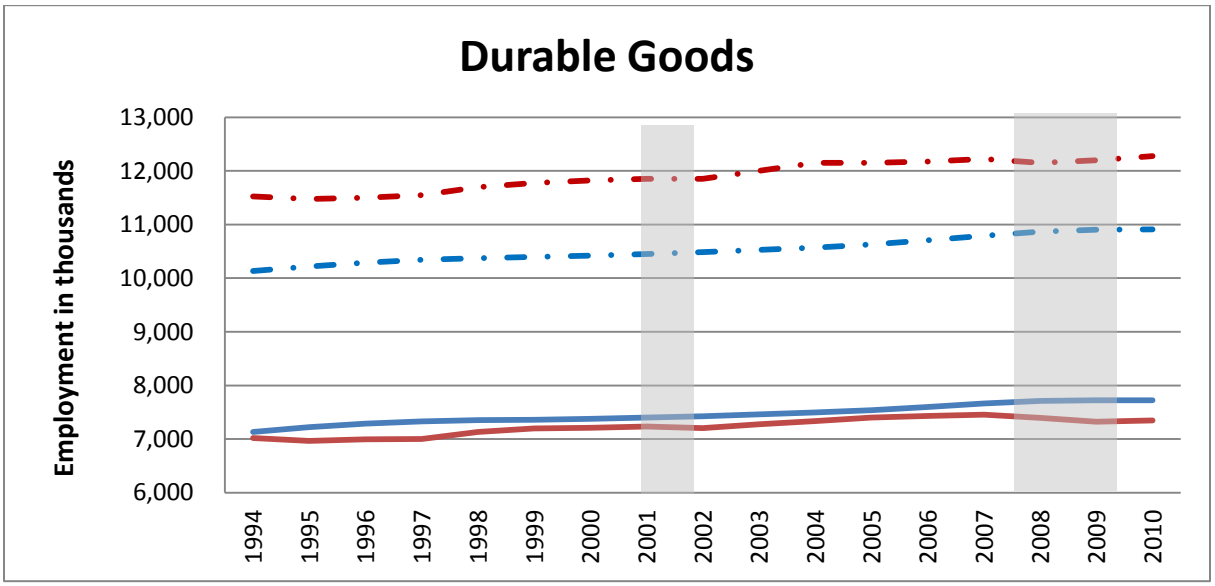
Major Industry Group	Methodology	Average annual growth from previous year				Average annual growth
		2007	2008	2009	2010	2006-2010
MINING and Logging	OPT	0.016	-0.034	0.014	0.022	0.004
	All employee- based	0.127	0.044	-0.010	0.023	0.045
	Difference	-0.111	-0.078	0.024	-0.001	-0.041
Construction	OPT	-0.003	0.008	0.000	0.026	0.008
	All employee- based	0.016	0.015	0.008	0.007	0.012
	Difference	-0.020	-0.007	-0.008	0.019	-0.004
Durable	OPT	0.000	0.004	-0.005	0.017	0.004
	All employee- based	-0.007	0.010	-0.007	0.027	0.006
	Difference	0.007	-0.006	0.001	-0.010	-0.002
Nondurable	OPT	0.008	0.000	-0.008	0.030	0.007
	All employee- based	0.007	0.018	-0.008	0.032	0.012
	Difference	0.001	-0.019	0.001	-0.002	-0.005
Wholesale	OPT	-0.010	0.023	-0.014	0.000	0.000
	All employee- based	0.027	0.046	-0.003	-0.012	0.014
	Difference	-0.036	-0.023	-0.011	0.012	-0.014
Retail	OPT	-0.006	0.011	-0.011	0.031	0.006
	All employee- based	0.059	-0.024	-0.004	-0.026	0.001
	Difference	-0.065	0.035	-0.008	0.057	0.005
Transportation and Warehousing	OPT	0.013	0.014	-0.007	0.007	0.007
	All employee- based	0.023	0.090	-0.014	-0.114	-0.007
	Difference	-0.010	-0.076	0.008	0.121	0.014

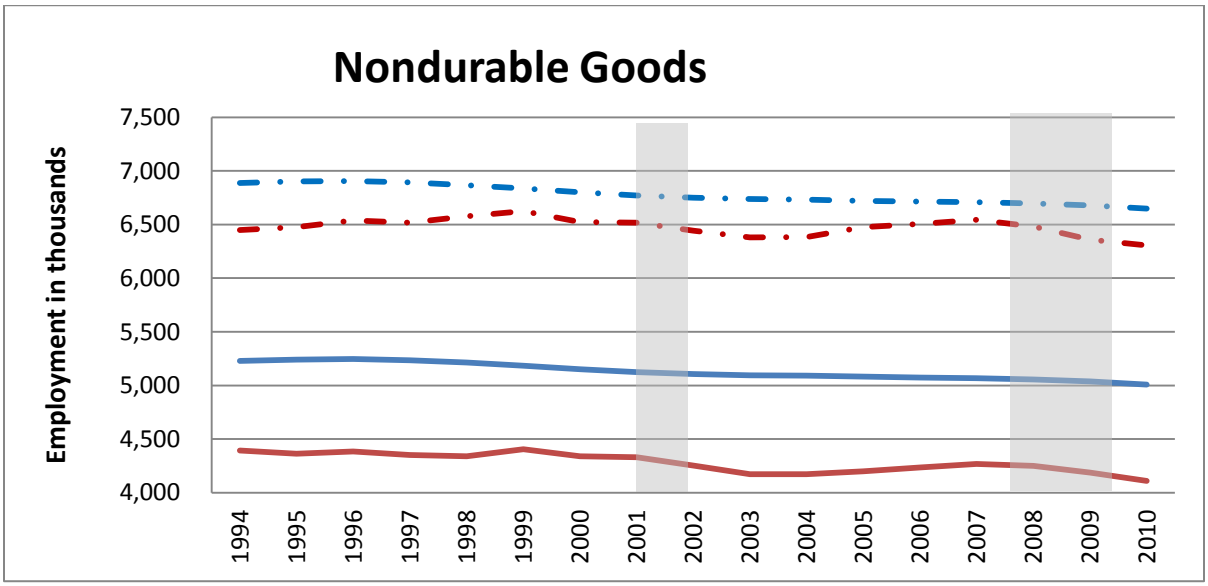
Table A.1: Growth in Average Weekly Hours Worked of Nonproduction Workers, by Major Industry Group

Major Industry Group	Methodology	Average annual growth from previous year				Average annual growth
		2007	2008	2009	2010	2006-2010
Utilities	OPT	0.035	0.018	0.017	-0.027	0.011
	All employee- based	-0.045	-0.003	-0.071	0.028	-0.024
	Difference	0.080	0.021	0.089	-0.055	0.034
Information	OPT	-0.008	0.009	-0.004	0.000	-0.001
	All employee- based	-0.024	0.041	0.004	0.030	0.012
	Difference	0.017	-0.032	-0.008	-0.030	-0.013
Finance	OPT	-0.004	0.004	0.009	0.007	0.004
	All employee- based	-0.023	0.000	-0.007	0.024	-0.002
	Difference	0.020	0.003	0.016	-0.017	0.006
Professional and Business Services	OPT	0.010	-0.002	0.002	0.011	0.005
	All employee- based	0.000	-0.038	-0.011	0.008	-0.011
	Difference	0.010	0.036	0.013	0.004	0.016
Education and Health Services	OPT	0.001	0.016	-0.002	-0.001	0.003
	All employee- based	0.009	0.043	-0.086	-0.025	-0.016
	Difference	-0.008	-0.027	0.084	0.023	0.019
Leisure and Hospitality	OPT	-0.016	0.009	0.007	-0.007	-0.002
	All employee- based	-0.016	0.014	0.013	0.038	0.012
	Difference	-0.001	-0.005	-0.006	-0.045	-0.014
Other Services	OPT	0.003	0.012	0.004	-0.002	0.004
	All employee- based	-0.017	0.022	-0.138	-0.025	-0.042
	Difference	0.020	-0.010	0.142	0.023	0.046

Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

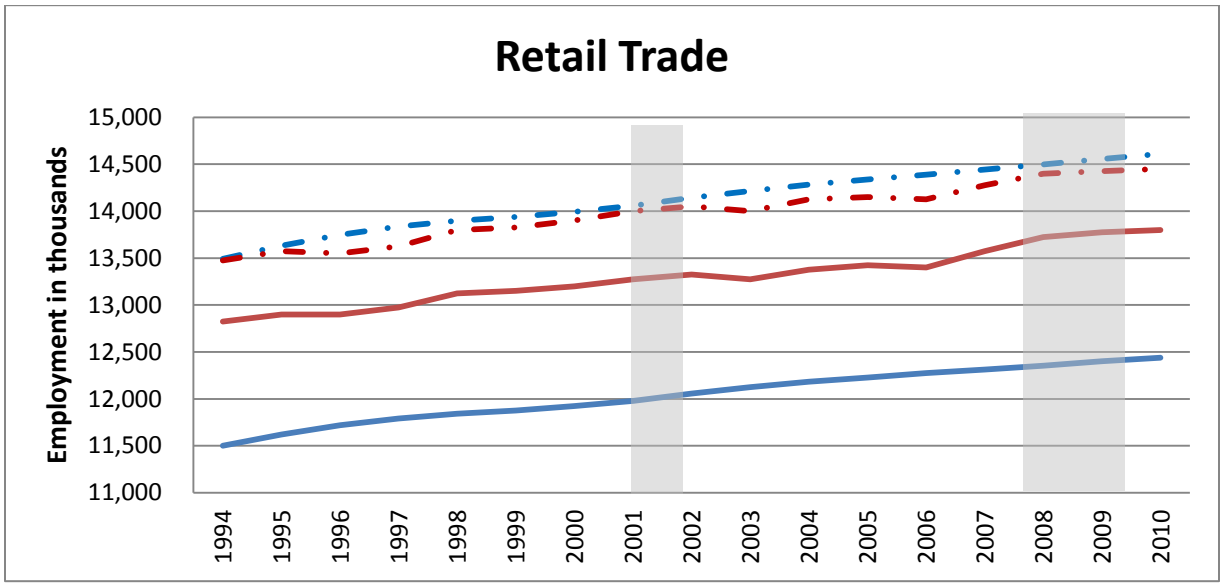
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers

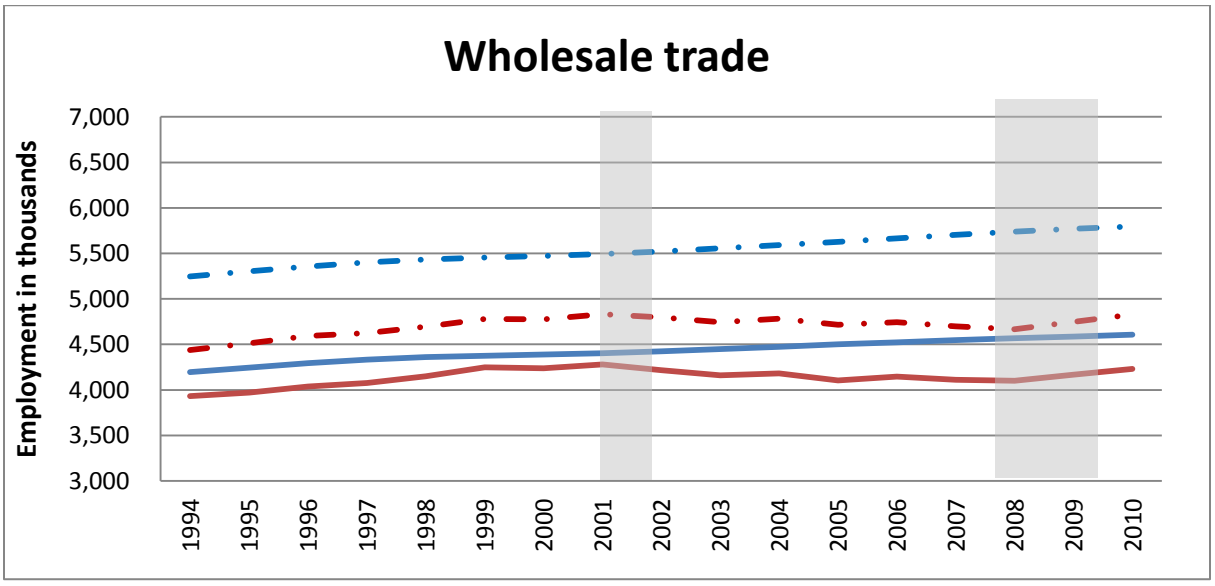




Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

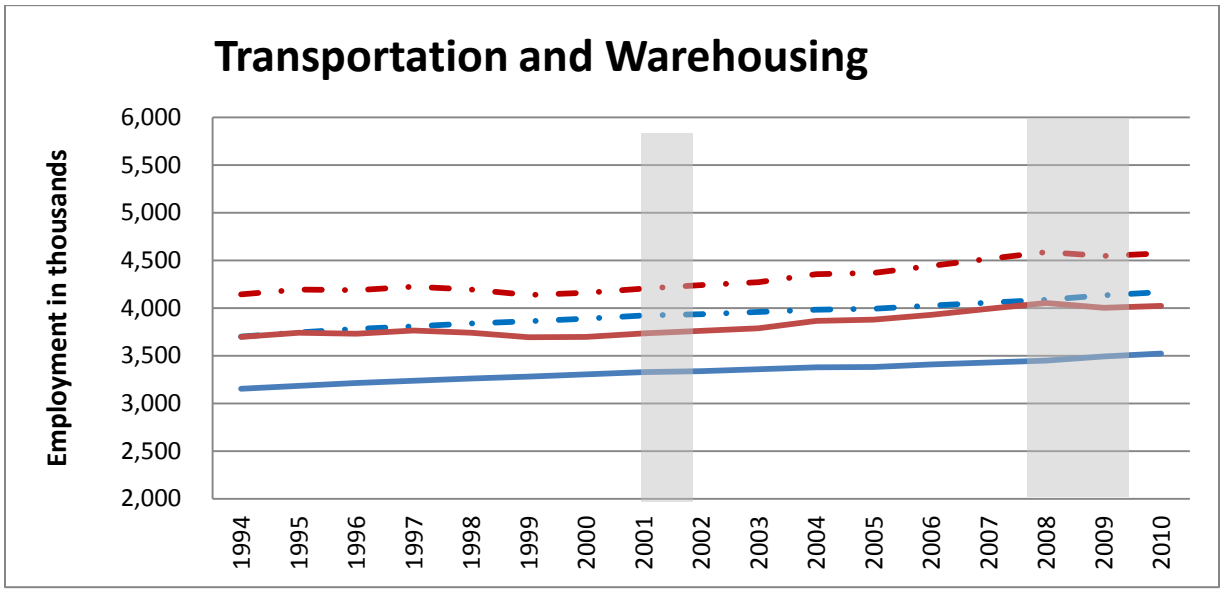
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers

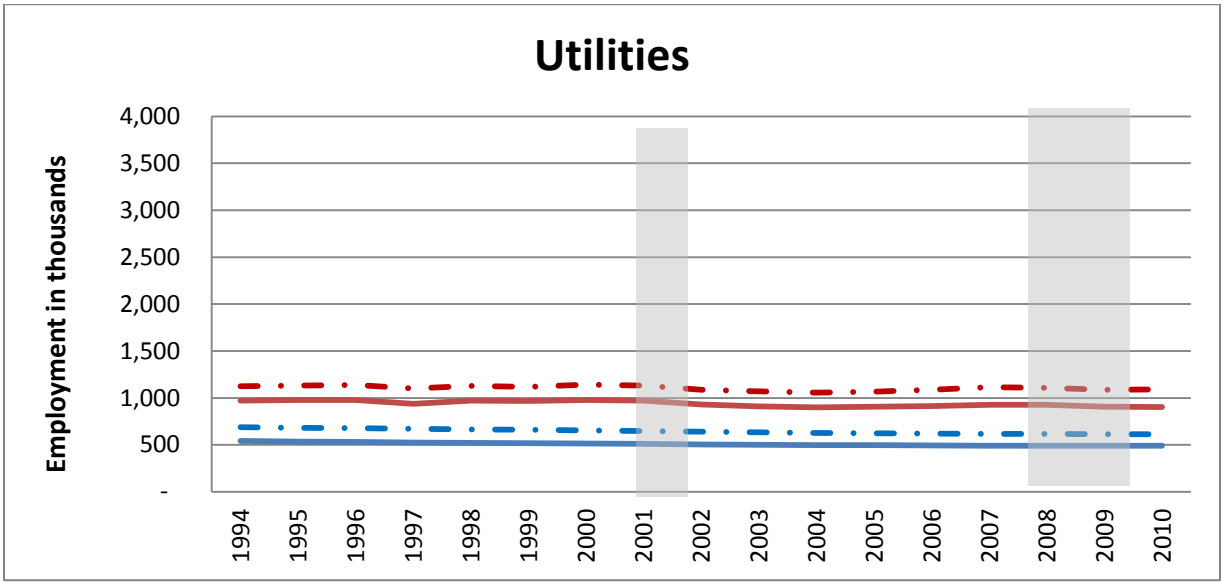




Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

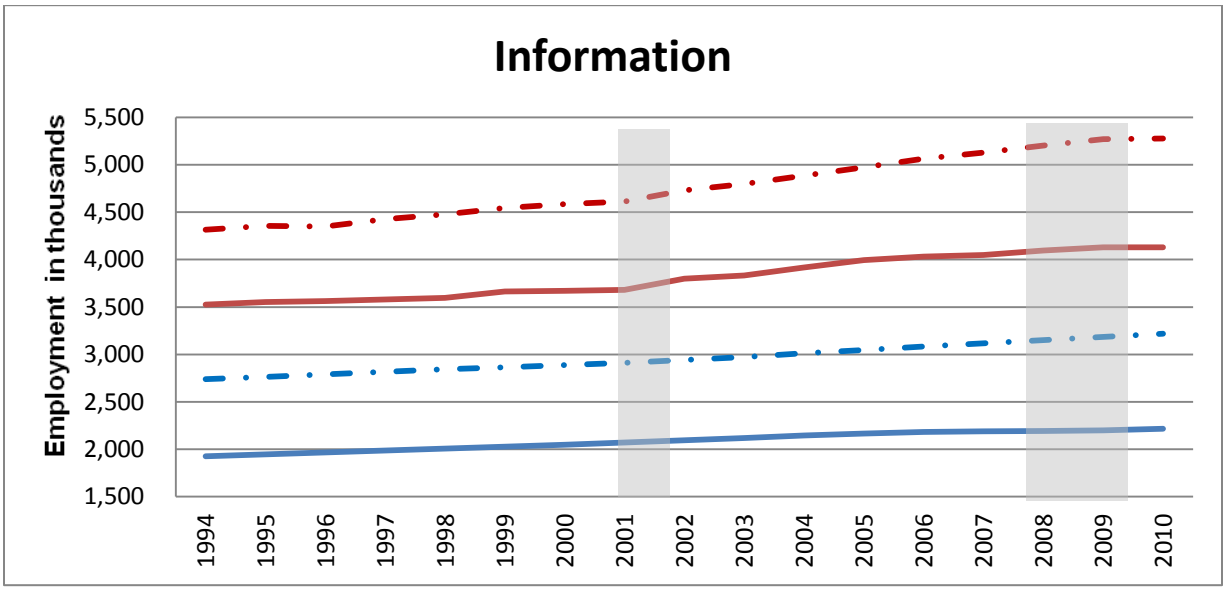
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers

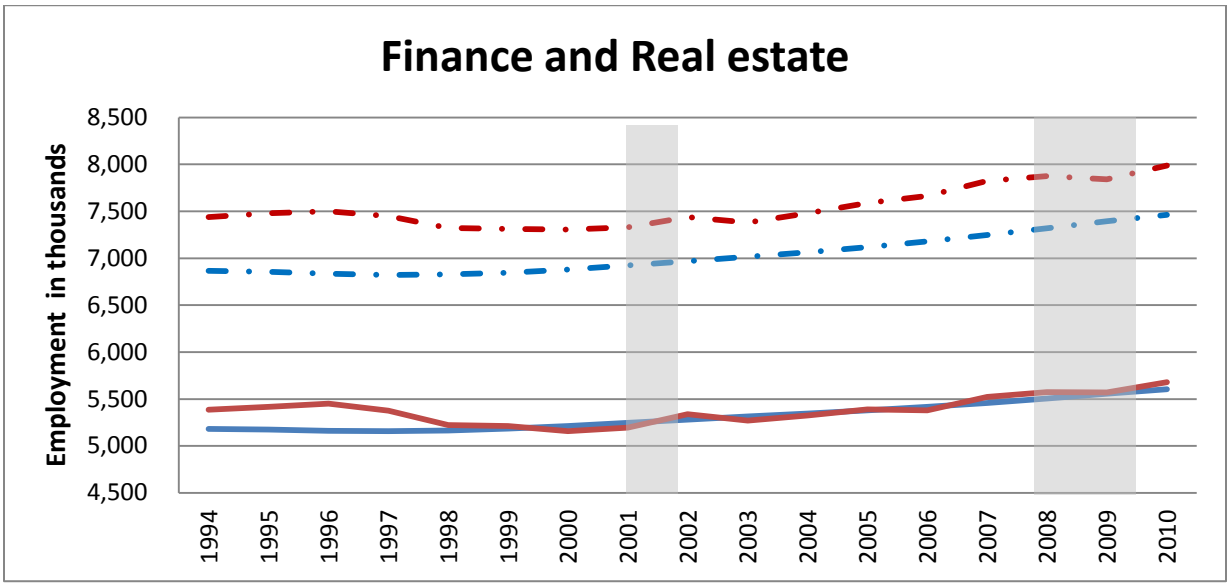




Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

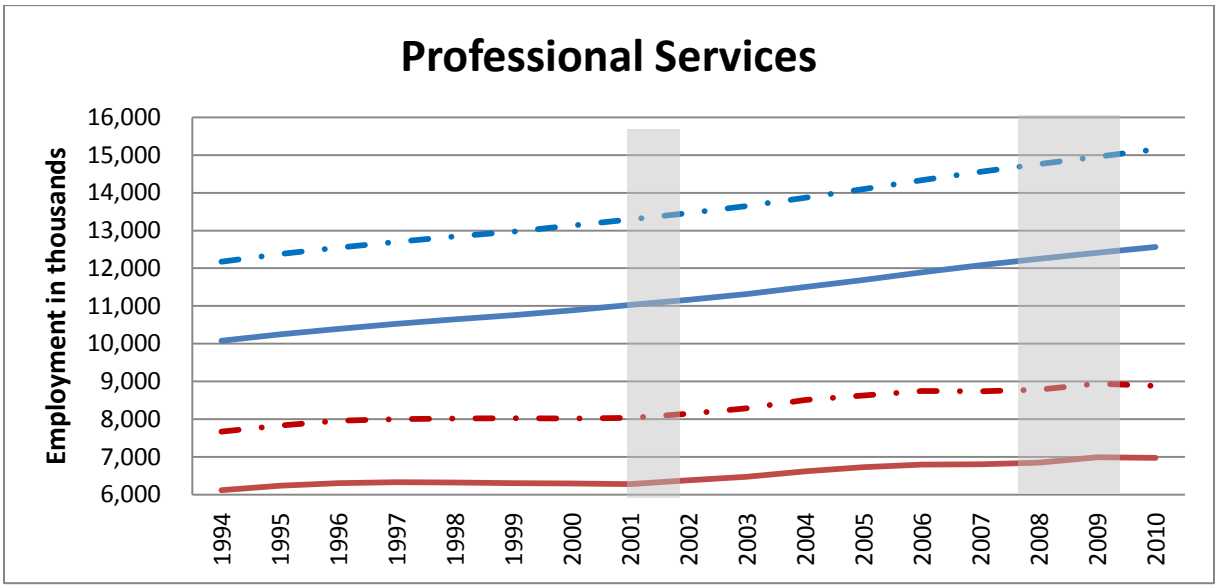
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers

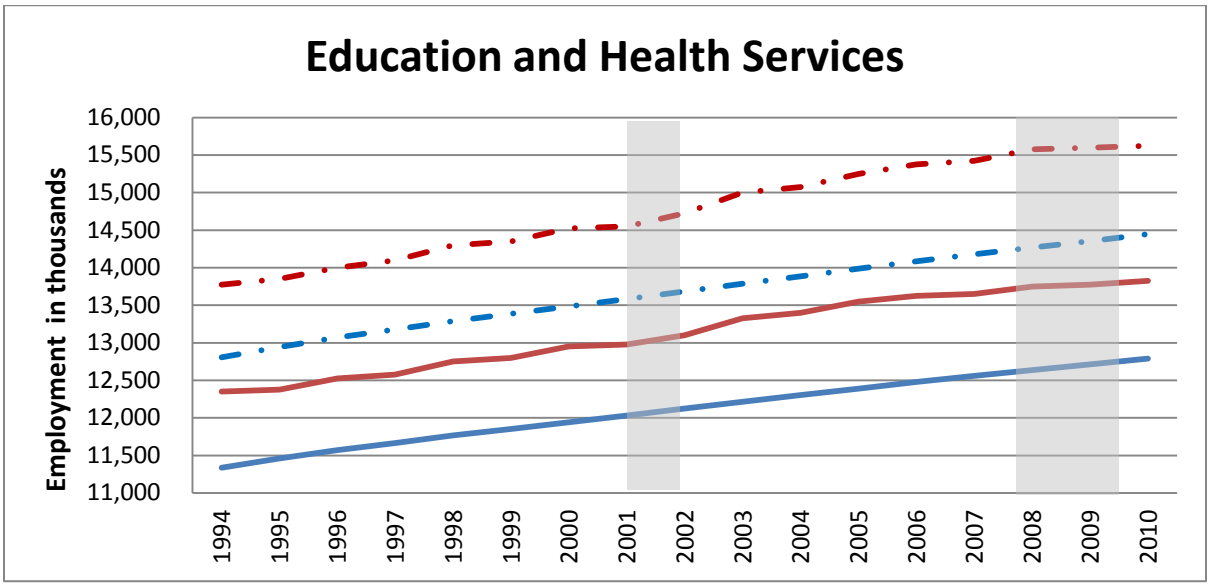




Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

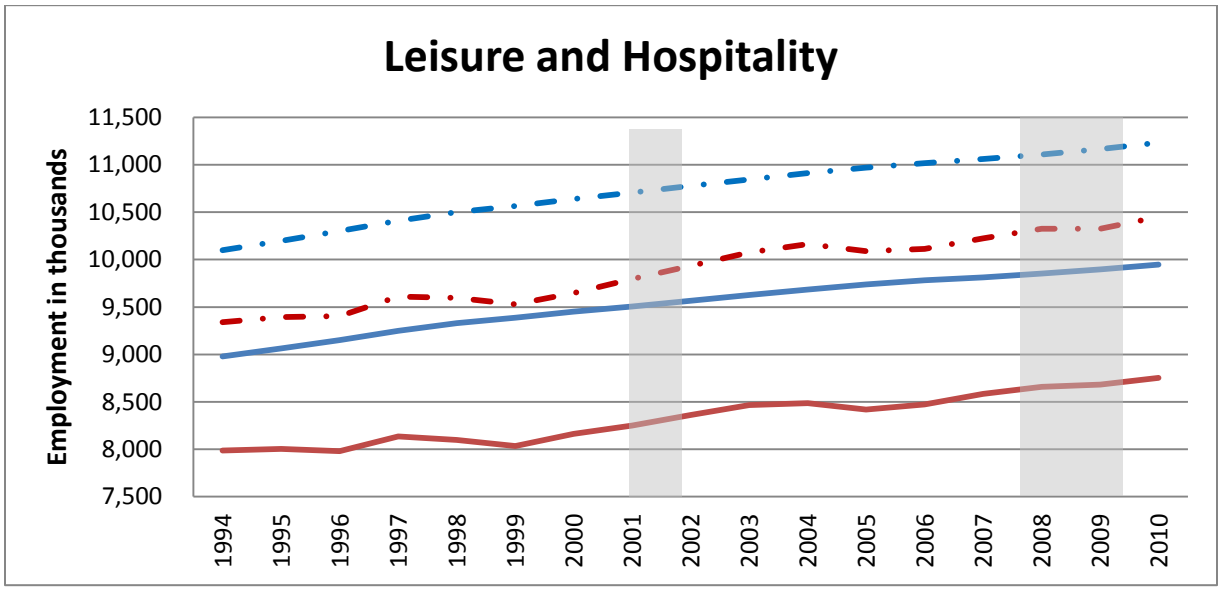
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers

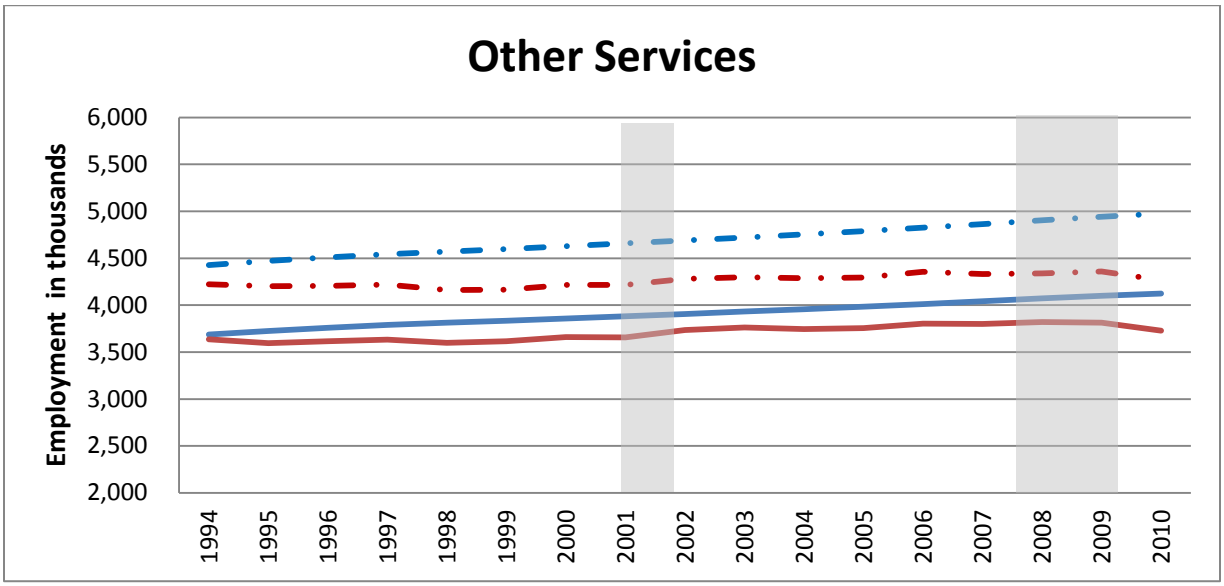




Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

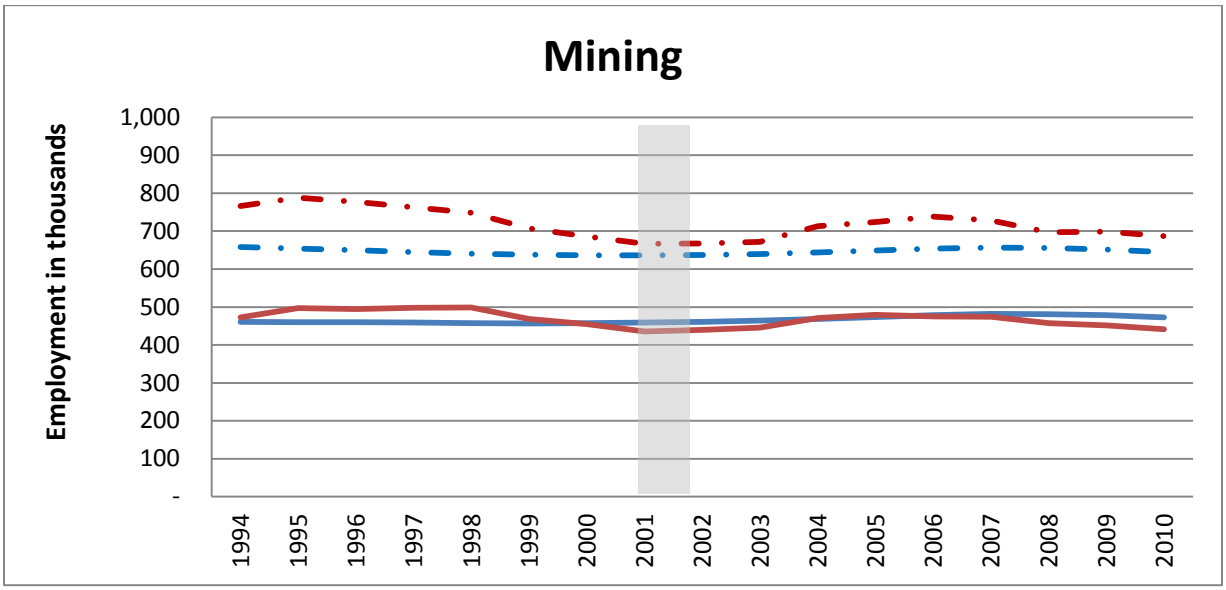
CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers





Wage and Salary Worker Employment, by Major Industry Group
(in thousands)

CES-all employees
CPS-based -all employees
CES-production workers
CPS-based -production workers



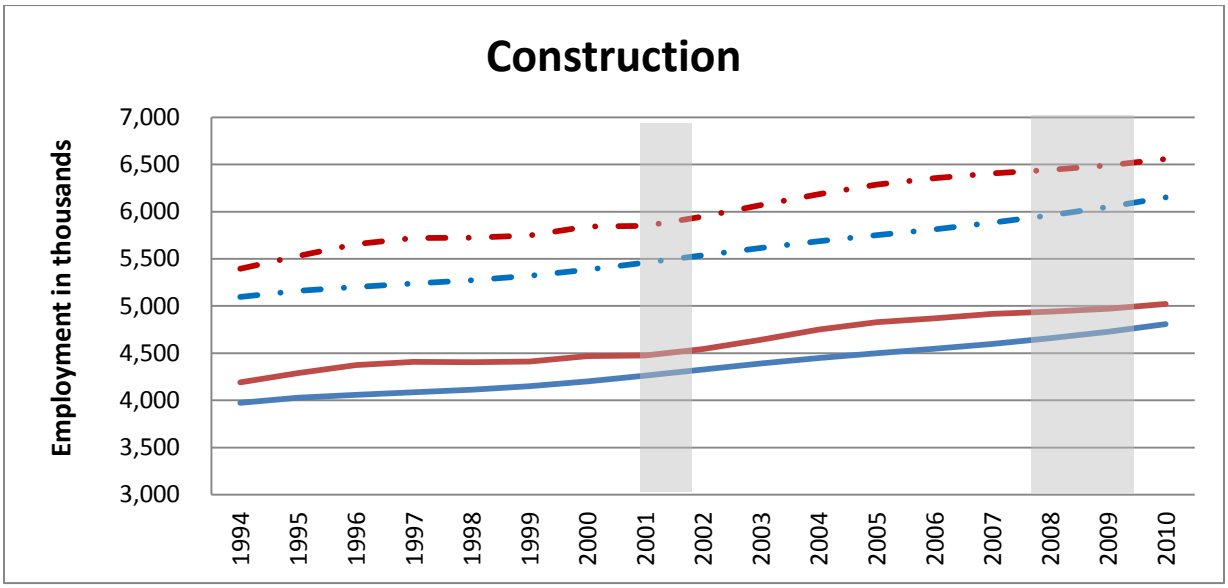


Table A.2 Comparison of Employment Data from CES and Data Constructed from the CPS-based

Major Industry Group		Data Source	1994-1999	2000-2005	2006-2010
MINING and Logging	Employment	CES	648	640	652
		CPS-based	758	688	710
		Relative Difference	17%	7%	9%
	Nonproduction worker share	CES	29%	28%	27%
		CPS-based	36%	34%	35%
		Difference	6%	6%	9%
Construction	Employment	CES	5,215	5,572	5,970
		CPS-based	5,629	6,029	6,449
		Relative Difference	8%	8%	8%
	Nonproduction worker share	CES	22%	22%	22%
		CPS-based	23%	23%	23%
		Difference	1%	2%	2%
Durable	Employment	CES	10,292	10,514	10,835
		CPS-based	11,588	11,971	12,205
		Relative Difference	13%	14%	13%
	Nonproduction worker share	CES	29%	29%	29%
		CPS-based	39%	39%	39%
		Difference	10%	10%	10%
Nondurable	Employment	CES	6,882	6,753	6,689
		CPS-based	6,531	6,454	6,440
		Relative Difference	-5%	-4%	-4%
	Nonproduction worker share	CES	24%	24%	25%
		CPS-based	33%	34%	35%
		Difference	9%	10%	10%
Wholesale	Employment	CES	5,366	5,543	5,735
		CPS-based	4,606	4,774	4,736
		Relative Difference	-14%	-14%	-17%
	Nonproduction worker share	CES	20%	20%	20%
		CPS-based	12%	12%	12%
		Difference	-8%	-8%	-8%

Table A.2 Comparison of Employment Data from CES and Data Constructed from the CPS-based

Major Industry Group		Data Source	1994-1999	2000-2005	2006-2010
Retail	Employment	CES	13,757	14,171	14,499
		CPS-based	13,642	14,038	14,335
		Relative Difference	-1%	-1%	-1%
	Nonproduction worker share	CES	15%	15%	15%
		CPS-based	5%	5%	5%
		Difference	-10%	-10%	-10%
Transportation and Warehousing	Employment	CES	3,789	3,947	4,094
		CPS-based	4,180	4,266	4,533
		Relative Difference	10%	8%	11%
	Nonproduction worker share	CES	15%	15%	16%
		CPS-based	11%	11%	12%
		Difference	-4%	-4%	-4%
Utilities	Employment	CES	675	638	617
		CPS-based	1,124	1,093	1,097
		Relative Difference	67%	71%	78%
	Nonproduction worker share	CES	22%	21%	20%
		CPS-based	14%	15%	17%
		Difference	-8%	-6%	-4%
Information	Employment	CES	2,803	2,962	3,151
		CPS-based	4,411	4,763	5,187
		Relative Difference	57%	61%	65%
	Nonproduction worker share	CES	29%	29%	30%
		CPS-based	19%	20%	21%
		Difference	-11%	-9%	-9%
Finance	Employment	CES	6,843	6,995	7,320
		CPS-based	7,416	7,420	7,838
		Relative Difference	8%	6%	7%
	Nonproduction worker share	CES	24%	24%	25%
		CPS-based	28%	29%	29%
		Difference	4%	5%	5%

Table A.2 Comparison of Employment Data from CES and Data Constructed from the CPS-based

Major Industry Group		Data Source	1994-1999	2000-2005	2006-2010
Professional and Business Services	Employment	CES	12,603	13,584	14,750
		CPS-based	7,920	8,274	8,820
		Relative Difference	-37%	-39%	-40%
	Nonproduction worker share	CES	17%	17%	17%
		CPS-based	21%	22%	22%
		Difference	4%	5%	5%
Education and Hrealth Services	Employment	CES	13,113	13,734	14,267
		CPS-based	14,063	14,854	15,520
		Relative Difference	7%	8%	9%
	Nonproduction worker share	CES	11%	11%	11%
		CPS-based	11%	11%	12%
		Difference	-1%	0%	0%
Liesure and Hospitality	Employment	CES	10,346	10,808	11,116
		CPS-based	9,479	9,950	10,287
		Relative Difference	-8%	-8%	-7%
	Nonproduction worker share	CES	11%	11%	11%
		CPS-based	15%	16%	16%
		Difference	4%	5%	5%
Other Services	Employment	CES	4,520	4,707	4,902
		CPS-based	4,195	4,265	4,330
		Relative Difference	-7%	-9%	-12%
	Nonproduction worker share	CES	17%	17%	17%
		CPS-based	14%	13%	12%
		Difference	-3%	-4%	-5%