May 2007

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How Much Do People Really Work in the New Economy?

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Abstract

This question is important because average weekly hours are inputs into productivity and hourly wage estimates. However, the answer to our question is somewhat of a mystery because estimates from the Bureau of Labor Statistics two main sources of hours data tell two very different stories. Between 1976 and 2005 average weekly hours estimated from the BLS's household survey (the Current Population Survey or CPS) indicate that average weekly hours of nonagricultural wage and salary workers increased slightly from 38.1 to 39.1 hours per week. In contrast, average weekly hours estimated from the establishment survey (the Current Employment Statistics survey or CES) indicate that hours fell from 36.1 to 33.8 hours per week. Thus the discrepancy between the two surveys increased from about two hours per week to over five.

Very little research has attempted to reconcile the differences between these two series. Abraham, Spletzer, and Stewart (1998) explored the possibility that differences in workers covered accounted for the divergent trends, but found that this did not explain much. And several studies have examined the accuracy of hours data from household surveys.

Our goal in the current study is to reconcile the differences between the CPS and CES estimates of hours worked and to better understand what these surveys are measuring. To this end, we will exploit data from the new American Time Use Survey (ATUS) and new data on all-employee hours from the CES, as well as historical data from the CES production/nonsupervisory worker and CPS series. We will investigate a number of possible explanations for the discrepancy including differences in reporting of hours with a focus on the difference between hours paid and hours worked (especially off-the-clock work); differences in reference periods (hours worked are higher in CPS reference weeks); differences by industry and changes in industry composition; and a reexamination of differences in coverage (all employees vs. production/nonsupervisory workers). As a part of our investigation, we will further explore whether hours are overreported in the CPS. In particular, do certain groups tend to overreport hours and do people who work longer hours tend to overstate their hours to a greater extent?

I. Introduction

The number of hours that people work for pay is an important economic measure. In addition to being a measure of labor utilization, it is a component of other economic statistics. For example, productivity measures are computed by dividing total output by total hours worked, and hourly wages are often computed by dividing usual weekly earnings by usual weekly hours worked.[1]

Despite its importance, nobody knows how many hours Americans really work because the two principal sources of data on hours worked tell different stories. Figure 1 shows trends in average weekly hours from the Bureau of Labor Statistics' (BLS) household survey, the Current Population Survey (CPS), and its establishment survey, the Current Employment Statistics survey (CES). The CPS data indicate that average weekly hours worked declined in the 1960s and early 1970s then increased in the 1980s. The net effect of these changes is that there has been very little change between 1964 and 2002. In contrast, the CES hours series continued to decline through the 1980s and leveled off in the early 1990s. To illustrate importance of these differences Abraham, Spletzer, and Stewart (1998), in their comparison of alternative wage series, found that the different trends in hours account for all of the divergence between hourly wages derived from the National Income and Product Accounts (NIPA), which use hours from the establishment-based Current Employment Statistics program (CES), and estimates from the March CPS.

The goals of this paper are to reconcile differences between the CPS and CES hours data and to determine how many hours people actually work.

[1] For a discussion of the importance of hours data for measuring real hourly wages, see Abraham, Spletzer, and Stewart (1998,1999) and for productivity see Eldridge Manser, and Otto (2004).

Our first step in reconciling the hours data from the two sources is to reassess the quality of hours data collected in the CPS using data from the American Time Use Survey (ATUS). It has been argued (see Robinson and Bostrom, 1994) that CPS respondents overreport hours and that the extent of overreporting has increased over time. This finding if correct, is consistent with the story that the CES correctly measures the downward trend in hours worked and that the relatively flat trend in CPS hours is due to the increased overreporting of hours by its respondents. Although this finding appears to explain the divergent trends in hours, it also appears to be incorrect. More recent research (Frazis and Stewart 2004, 2007) has shown that CPS hours are reported correctly on average, although there was slight overreporting of hours by some groups (women and college graduates). But because the CPS reference period is the week that contains the 12th of the month, when hours worked tend to be greater, CPS hours are not representative of the entire month.

The analysis we present here follows along the lines of our earlier work, but in a more unified framework. We also extend our analysis to identify factors that might contribute to overreporting of hours.

Next, we examine the reporting of hours in the CES and, to the extent possible, compare these hours to those from the CPS. Our analysis follows along the lines Abraham, Spletzer, and Stewart's (1998,1999) analysis of trends in hourly wages. We perform replications of CES using CPS data, but we also consider other possible explanations not considered in the earlier research. We also take advantage of the recently released hours data for all employees.

II. Are Hours Worked Overreported in the CPS?

It has been argued that responses to retrospective questions, such as those in the CPS, tend to overestimate hours worked and that time-diary estimates are more reliable (Robinson

1985). There are several reasons why this might be the case. The recall task is generally easier in a time-use survey. The reference period is the previous day, so that respondents need not try to recall over longer periods, and because they are reporting individual episodes of work they do not have to add the lengths of different episodes. Paid work that occurs at home or other locations, which respondents may not report when responding to retrospective questions, is counted in time-diary estimates. After the core time diary has been completed, the ATUS asks respondents whether any activities that were not identified as paid work were done as part of their job or business. This question improves identification of paid work activities for self-employed respondents who work at home and others who do not "go to work" in the traditional sense. We can also identify breaks, which allows us to determine how sensitive our results are to alternative definitions of paid work.[2,3] Given these advantages, we will proceed under the assumption that that the time-diary estimates are correct.

The ATUS sample is a stratified random sample that is drawn from households that have completed their participation in the CPS and is representative of the U.S. civilian population. Interviews were conducted every day during the year except for a few major holidays.[4] Thus, the data cover the entire year, except for the days before these holidays.[5]

As in other time-use surveys, respondents are asked to sequentially report their activities on the previous day. The diary day starts at 4:00am and goes through 4:00am of the following day (the interview day), so each interview covers a 24-hour period. The respondent describes

[2] Hamermesh (1990) is one attempt we have seen to examine the effect of paid breaks on wages.
[3] Interviewers prompt respondents by asking "did you take any breaks of 15 minutes or longer?" whenever a work episode is reported. Beginning in 2004, this prompt was incorporated into the instrument. The prompt automatically pops up whenever work episodes of 4 hours or longer are reported.
[4] Reference days before major holidays will be missed, as the telephone centers will be closed. The remaining days in the month that fall on the same day of the week as the missing day will have their weights inflated to make up for the missing day, in effect making the assumption (which we make in the absence of other information) that the activities on the missing day are similar to those on other days with the same day of the week.
[5] For details about the ATUS, see Frazis and Stewart (2007) and Hamermesh, Frazis, and Stewart (2005).

each activity spell (episode), and the responses are translated into 3-tier activity codes. For each episode, the ATUS collects the start and stop times along with other information (see Hamermesh, Frazis, and Stewart 2005, Frazis and Stewart 2007, and Horrigan and Herz 2004 for details). The ATUS does not collect information about secondary activities (for example, listening to the radio while driving) in the time diary. This lack of information on secondary activities should have only a minor impact on time spent in paid work, because most paid work is done as a primary activity.

The ATUS also contains labor force information about the respondent that was collected using a slightly modified version of the monthly CPS questionnaire. These questions allow us to determine whether the respondent is employed, unemployed, or not in the labor force (NILF). One notable difference between ATUS and CPS employment questions is that the reference period in ATUS is the 7 days prior to the interview--the last day being the diary day--instead of the previous calendar week as in CPS. For respondents who are employed, the ATUS asks about usual hours worked, but does not collect actual hours worked.[6]

For this study, we pooled data from 2003 through 2005.[7] We restricted our sample to respondents 16 years and older who worked at a job during the seven days prior to their ATUS interview and reported usual hours.

[6] Even if it were available, there is a potential problem with using estimates of actual hours worked for the previous week, because the procedure used for contacting respondents in ATUS could impart bias into estimates of actual hours for the previous seven days. Each designated person is assigned an initial calling day. If he or she is not contacted on that day, the interviewer makes the next call one week later, thus preserving the assigned day of the week. Individuals who are unusually busy during a particular week (perhaps because they worked long hours) are less likely to be contacted during that week, making it more likely that they are contacted the following week (and asked to report hours for the busy week). Hence, long work weeks would tend to be oversampled, resulting in a correlation between hours worked during the previous week and the probability that that week is sampled.

[7] The combined sample size from 2003-2005 was 29,190. The response rate for the ATUS varies from about 55 percent to 58 percent. It is also worth noting that interviews with fewer than 5 episodes or more than 3 hours of uncodeable activities are not included in the ATUS public-use file.

One drawback of using time-diary data is that the reference period is only one day. Previous researchers (for example, Robinson and Bostrom 1994) constructed synthetic workweeks by generating estimates for each day of the week and adding up the estimates. Our approach is equivalent.[8] Thus, we can compare means for specific demographic groups, but we cannot compare the distributions of hours worked between the two surveys.

As noted above, the detailed information in the ATUS allows us to consider alternative definitions of paid work. In keeping with the focus of this paper, we restrict our measure to hours worked on the main job for wage and salary workers. Results for total hours on all jobs and including all workers are similar. We calculate three different measures of hours worked using ATUS data. Each of these definitions corresponds to a different concept of hours worked. Going from the most restrictive measure to the least restrictive measure, these are:

(1) Time spent in activities coded as "Working at job."
(2) Definition (1) plus activities identified as breaks and time spent in work-related travel (not commuting).[9]
(3) Definition (2) plus activities that were coded as being done for the respondent's job.

We believe that definition (3) is the most appropriate for comparison, because it includes work-related activities, such as entertaining clients. In practice, there is very little difference between definitions (3) and (2) (0.1 hour per week). The difference between definitions (1) and (2) is somewhat larger, 0.4 hour per week.

Our analysis here has two goals. First, we would like to estimate the difference between CPS and ATUS hours estimates, and identify specific factors that contribute to that difference. These factors include things like mode of data collection, differences in reference period,

[8] When computing these measures, we generate separate estimates for weekdays and weekends and take a weighted average of the two estimates.
[9] The inclusion of breaks is justified on the grounds that breaks can be productive (see Hamermesh 1990). Work-related travel is defined as travel between work sites, and we identified travel spells as work-related by looking at the surrounding activities.

differences in responses to other questions such as employment and multiple jobholding, CPS rotation group effects, and differences in sample composition. Second, we isolate mode effects to obtain direct evidence on the accuracy of retrospective questions.

The first row of Table 1 shows hours estimates from the ATUS and the CPS for the 2003-2005 period. The difference between CPS and ATUS estimates of hours worked varies between 1.4 and 1.9 hours per week, depending on the ATUS definition of work, with CPS estimates being larger. To identify the specific factors contributing to these differences, we decomposed them into four terms as follows:

$$
\begin{aligned}
E(H_{i,t}^{ATUS}) - E(H_{i,t}^{CPS}) = & [E(H_{i,t}^{ATUS}) - E(H_{i,t-3,MIS8}^{CPS} \mid i \text{ in ATUS})] \\
& + [E(H_{i,t-3,MIS8}^{CPS} \mid i \text{ in ATUS}) - E(H_{i,t-3,MIS8}^{CPS})] \\
& + [E(H_{i,t-3,MIS8}^{CPS}) - E(H_{i,t-3}^{CPS})] \\
& + [E(H_{i,t-3}^{CPS}) - E(H_{i,t}^{CPS})]
\end{aligned} \tag{1}
$$

where H denotes hours of work, i denotes an individual observation, t denotes the reference month for the estimate, the superscript denotes the survey, and the MIS8 subscript indicates that the observation is in MIS 8 (absence of a third subscript indicates that all Months-in-Sample are included).

The first term in brackets is the difference between the time-diary estimate of hours worked from ATUS and the retrospective-question estimate of hours worked from the CPS MIS 8 interview for ATUS respondents.[10] Thus, it represents changes in the responses of ATUS respondents between their last CPS interview and their ATUS interview. These changes include the effects of differences in data collection mode on reporting of hours of work; differences in the reporting of other variables such as employment and multiple jobholding status; differences

[10] The ATUS interview usually occurs between 2 and 4 months after the CPS MIS 8 interview.

in reference period coverage (the week of the 12th vs. most days of the year); and true changes in hours worked.

The second term is the difference between ATUS respondents and the entire MIS 8 CPS sample in the CPS estimate of hours worked at time *t-3* (three months prior to the ATUS reference period). This term represents the effect of differences in sample composition between CPS and ATUS, due mainly to nonresponse in ATUS. Note that this correction reflects differences in hours of work as of the time of the ATUS respondent's MIS 8 CPS interview, not at the time of the ATUS interview. To the extent that ATUS response propensity is a function of current hours of work, and current hours differ from hours as of MIS 8, this is an imperfect proxy for the effect of sample composition.

The third term is the difference between the MIS 8 sample and the entire CPS sample in the CPS estimate of hours worked at time *t*-3. This term captures rotation-group effects--the well-known phenomenon that responses to certain questions vary systematically with their month in sample.[11] Adding this term to the first term, which is differences in responses between ATUS and MIS 8 portion of the CPS sample, yields an estimate of the average difference in responses between the ATUS and the entire CPS.

The fourth term is the negative of the change in the CPS estimate of hours worked between three months prior to the ATUS reporting period and the ATUS reporting period, and can be thought of as a correction of the first term for the actual change in hours worked between $t-3$ and t.

In summary, the sum of the first, third, and fourth terms is an estimate of the difference in hours reporting between the CPS and the ATUS, corrected for the change in actual hours

[11] For example, the unemployment rate is higher for respondents in their first month of the CPS that it is for respondents in their second and subsequent months. See Bailar (1975).

between the time ATUS respondents were in CPS and when they responded to ATUS. Put differently, the effect of differing survey methods between the CPS and the ATUS on average reported hours can be estimated by taking the difference in reported hours for the same period and subtracting out the sample composition term.

Aggregate results are shown in Table 1. We have not computed standard errors for this draft, so all of the following results are only suggestive. Keep in mind that the decomposition in equation (1) takes the difference between the ATUS and CPS estimates of hours worked, so that negative values indicate overreporting in CPS. The gross difference in hours per week (ATUS minus CPS hours) ranges from −1.9 hours for Definition 1, the measure excluding breaks, to −1.4 hours for Definition 3. For all three of our measure the sample composition effect is 0.5 hours, which yields an adjusted difference between CPS and ATUS hours of between −1.4 and −0.9 hours per week depending on the definition of paid work used. As shown in the table, neither rotation group effects (−0.1 hour) or changes in reported hours (0.0 hours) contribute much to the difference between CPS and ATUS hours.

We now control for differences in reference periods by restricting the ATUS sample to CPS reference weeks. The results are shown in the third set of rows of Table 1. The difference between ATUS and CPS hours estimates changes dramatically. Adjusting for sample composition, the difference ranges from −0.3 to 0.3 hours per week. These results are close to those found using only 2003 data in Frazis and Stewart (2007).

How does this comparison vary across subpopulations? Table 2 shows a variety of comparisons. Women appear to over-report hours in CPS relative to men, and over-reporting appears to increase with education. These results match those from the matched-sample approach used in Frazis and Stewart (2004). In contrast, whereas Frazis and Stewart (2004)

found over-reporting in CPS for full-time workers and under-reporting for part-time workers, we find the opposite here, possibly due to the different method of comparison. Results using the matched-sample approach using 2003-2005 data are shown in Table 3.

Other comparisons in Table 2 are new. Parents of children younger than 18 over-report in CPS relative to non-parents. Interestingly, this effect appears for both men and women. The point estimate for female parents during reference week is that they over-report weekly hours by 2 hours. This may be relevant to the comparison of CES and CPS, as the increasing representation of female parents in the labor force may thus imply increasing over-reporting (or decreasing under-reporting) of hours worked. On the other hand, workers paid hourly tend to under-report hours worked relative to CPS, which would tend to decrease over-reporting over time, as the proportion of hourly workers is increasing.

Note that all of the terms in equation (1) can be conditioned on a vector of covariates. While the samples for each component of (1) will differ, separate regressions can be run for each component and predicted values for differences between ATUS and CPS can be generated by combining the results. This will allow us to see if some of the results in Table 2 are due to correlations with other variables. We plan to do this in future drafts.

Frazis and Stewart (2004) also found no evidence of significant mode effects using a somewhat different approach. They compared ATUS hours worked estimates to estimates for the same respondents from their CPS MIS 8 interview. By matching respondents, they eliminated the sample composition effects. Their restriction to respondents whose usual hours changed very little between their CPS MIS 8 and ATUS interviews was designed to restrict the sample to individuals who worked the same or similar hours at each interview, but it eliminated most differences that arose because of the higher multiple jobholding rate in ATUS. After

adjusting for differences in the treatment of rotation group effects between Frazis and Stewart (2004) and the current paper, their findings were equivalent to a mode effect of 0 to 0.7 hours, which are also quite close to the current results. Replicating the findings in Frazis and Stewart (2004) with 2003-2005 data showed no important differences in results.

We note that these results contrast with Robinson and Bostrom's (1994) findings that hours reported from CPS-style questions have increasingly diverged from those reported in time-use surveys. Abraham, Spletzer and Stewart (1998) cited Robinson and Bostrom's results as a potential explanation of the divergence between CPS and CES hours trends alluded to above; our evidence casts doubt on this explanation.

III. Taking A Closer Look At CES Hours

Abraham, Spletzer, and Stewart (1998) identified several differences in the two surveys that could account for the differences in levels and the divergent trends. First, the CPS measure is person-based whereas the CES measure is job-based so that individuals with more than one job show up more than once. Abraham, Spletzer, and Stewart adjusted the CPS series for multiple jobholding, which narrowed the difference between the two series, but multiple jobholding could not account for the divergent trends because the rate was approximately constant over the period as was hours worked on second jobs. The CPS covers all employees, while the CES hours measure covers only production and nonsupervisory (PNS) workers. Abraham, Spletzer, and Stewart tried several replications of the CES series using CPS data, but were unable to duplicate the downward trend in hours. One potential difficulty is that it appears that many CES respondents appear to have difficulty identifying nonsupervisory workers (in

service providing industries). Their replications came close to duplicating CES hours in goods-producing industries, but not in services-providing industries.

Another difference is that the CPS surveys households, while the CES surveys business establishments. The popular perception is that data provided by households is less reliable that data provided by businesses. In household surveys responses are often given by proxy respondents, and it is possible that these respondents are not very knowledgeable about the individual's work hours. Even if they are knowledgeable, respondents may have difficulty remembering how many hours they actually worked. In contrast, establishments report hours data from payroll records, which are likely to be accurate for hourly employees. But establishments do not have any reason to collect hours data for salaried employees, so it is likely that they simply report the standard workweek of 40 hours for each employee.

The decline in CES hours can be traced to changes in goods-producing and services-providing industries. Figure 2 shows average weekly hours in goods-producing and services-providing industries. Except for cyclical variation , hours per week in goods-producing industries has not changed at all since the mid-1960s. In contrast, average weekly hours in services-providing industries fell between 1964 and about 1992, and have remained roughly constant since that time. Working in the same direction, we see in Figure 3 that the fraction of production/nonsupervisory workers in goods-producing industries has fallen steadily since 1964. Thus the decline in CES hours is due to a shift from goods-producing industries to services-providing industries and a decline in hours worked in services-providing industries. A decomposition of the change indicates that about 35 percent of the 4.6 decline in CES hours was due to the change in composition and that 65 percent was due to declining hours per week in services-providing industries.

In this section, we examine some possible explanations for the divergence between CPS and CES hours.

Multiple Jobholding and Differences in Workers Covered

As noted in the introduction, the CES measure is job-based whereas the CPS measure is person based. The two measures would be the same if each person held only one job. But about 5-6 percent of the population has more than one job at any one time. Abraham, Spletzer, and Stewart (1998) examined whether changes in the multiple jobholding rate could have accounted for the divergent trends in wages. They found that the multiple jobholding rate fluctuated between 4.6 and 5.2 percent between 1962 and 1980, increased 4.9 to 6.2 percent in 1989, and remained at or above 6 percent through the mid-1990s. But these changes in the multiple jobholding rate were too small to be able to explain the divergent trends in wages.

Figure 4 shows the CES weekly hours series along with weekly hours from the CPS that have been adjusted for multiple jobholding. Since the CPS hours measure includes hours on all jobs, our multiple jobholding adjustment simply divides CPS hours estimates by one plus the multiple jobholding rate.[12] As can be seen, the main effect of the multiple jobholding adjustment is to reduce estimates of hours worked from the CPS. However, the adjustment is larger for later years (1980 and later) due to the higher multiple jobholding rate as noted above.

In Figure 5, we investigate whether the restriction of the CES sample to production workers in goods-producing industries and to nonsupervisory workers in services-providing industries could be responsible for the downward trend in weekly hours. We follow the same strategy of replicating the CES sample with CPS data that was used by Abraham, Spletzer, and

[12] Our adjustment is a little simplistic, because it does not account for the fact that CES coverage of main and second jobs may differ. That is a government worker's main job would not be covered by CES, but his second job at a retail store would be. Abraham, Stewart, and Spletzer looked at this issue, and it did not make much difference in their adjustments.

Stewart (1998,1999) in their examination of why the CPS and CES hourly wage series exhibit different trends.[13] They reported two replications. Their Replication #1 series was constructed by assigning workers to the CES sample using a crosswalk provided by the BLS's Employment Cost Index program. This replication did a good job of matching the P/NS ratio, but the wage series, except for the level, looked more like the CPS wage series than the CES series. Further investigation revealed that the Replication #1 series performed well for goods-producing industries, but not for services-providing industries. It appears that establishments in service-providing industries are reporting for nonexempt employees rather than nonsupervisory workers.[14] Thus their Replication #2 is the same as #1 for goods-producing industries, but uses a proxy for nonexempt status in services-providing industries.[15] This replication does a better job of matching the CES wage series, but does not match the CES's P/NS ratio. Hourly wages from both replications (adjusted for multiple jobholding), along with the actual CES hours series are shown in Figure 5.[16]

We can see in Figure 5 that both replications come closer to duplicating the actual CES hours series. There is virtually no difference between the two replications and the actual CES series between 1973 and about 1984. Over this period, all three series exhibit a downward trend and turn up immediately after the 1982 recession. After 1984, the two replications trend upward slightly (Replication #1) or remain approximately constant (Replication #2), while the actual

[13] The CPS data in Figure 5 come from the CPS Outgoing Rotation Group files for 1979-2002 and from the May Supplement files for 1973-1978. The May Supplements were a test of the earnings questions asked of outgoing rotations beginning in 1979. Following Abraham, Spletzer, and Stewart (1998,1999), we assume that the May Supplements are comparable to the ORG data. We did not do a replication using the March data, because hourly/salaried status is not available.

[14] BLS Records Analysis Surveys have shown that a sizeable fraction of employers report for nonexempt employees rather than for nonsupervisory workers. Reasons for this misreporting include misunderstanding of what is being asked for and data unavailability.

[15] Following Abraham, Spletzer, and Stewart, we assumed that all hourly-paid workers were nonexempt, and included occupations that fit the criteria for nonexempt status.

[16] The replications start in 1973, because that was the first year that the CPS collected pay status (hourly vs. salaried).

CES series continues its downward trend. The discrepancy between actual CES hours and the replicated hours increases to about 2 hours per week for Replication #1 and to about 1 hour per week for Replication #2.

Frazis and Stewart (2004) in their examination of matched ATUS/CPS samples found that the CPS understates the multiple jobholding rate by about 4 percentage points. If the rate of underreporting has increased over time, it is possible that multiple jobholding could explain some of the divergence.[17] For example, an increase in underreporting of two percentage points between the early 1980s and 2002 would have decreased CPS hours by about one-half hour per week. This translates to between one-quarter and one-half of the remaining difference to be explained, depending on the replication used. But without any evidence regarding the trend in underreporting we cannot draw any conclusions.

Changes in the Average Length of Pay Period

In this section, we investigate whether increases in the average length of pay period could have resulted in the downward trend in CES hours. Since the CES payroll report includes anybody who worked for the establishment during the pay period, an increase in the average length of the pay period would tend to increase employment, even if the actual number of people employed at any given time has not changed, because a longer pay period will include more job turnover. If hours are reported correctly, then an increase in the average length of a pay period will result in a decline in estimated weekly hours.

[17] Respondents who do not report second jobs also do not report the hours worked on those jobs. Thus the adjusted hours estimate is equal to (HOURSMAINJOB + (MJHRate * HOURSOTHERJOBS))/(1 + MJHRate), which is smaller than the earlier adjustment.

A second way that increasing length of pay period could lead to a decrease in estimated weekly hours is through more representative coverage of the month. Earlier, we noted that people work longer hours during the CPS reference week, which is the week that includes the 12th of the month. If establishments pay workers weekly, then the pay period coincides with the CPS reference week. But if workers are paid biweekly, then one of the weeks will be non-CPS-reference week, which will reduce estimated hours.

Evidence on length of pay period is scant, but we can get a general idea of how things have changed by looking at recent CES data. Weekly pay is more common in goods-producing industries (about 50 percent of establishments), while biweekly pay is more common in services-providing industries (about 50 percent of establishments). This means that even if there has been no within sector changes, the shift in employment toward services-providing industries resulted in an increase in the average length of pay period.

Employment Effects

Our back-of-the-envelope calculations indicate that an increase in the length of pay period cannot have had much of an effect through the employment channel. We used CPS data on month-to-month job changes to calculate a modified employment base. The average monthly job change rate of 3 percent translates into a weekly turnover rate of 1.5 percent, because payroll will include both people who start working for the establishment during the pay period and people who quit. We assume initially that 60 percent of workers are paid weekly and that 40 percent are paid bi-weekly, so that the initial employment base is 102 percent of the true employment base. Increasing the fraction paid bi-weekly to 80 percent increases the employment base to 103 percent. This translates to a decline in average weekly hours of only 0.2 of an hour per week. This effect is too small to have made much of a difference.

[GET BETTER ESTIMATES]

Hours Effects

[USE DATA ON THE DISTRIBUTION OF PAY PERIODICITY IN CURRENT CES MICRODATA AND DATA ON THE INDUSTRIAL COMPOSITOIN OF P/NS WORKERS TO ESTIMATE THE EFFECT OF LENGTHENING PAY PERIODS ON ESTIMATED HOURS]

IV. Accounting for Vacations and Travel in Estimates of Aggregate Hours

[TO BE ADDED]

V. Conclusion

[TO BE ADDED]

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Figure 1: Average Weekly Hours from CPS and CES data

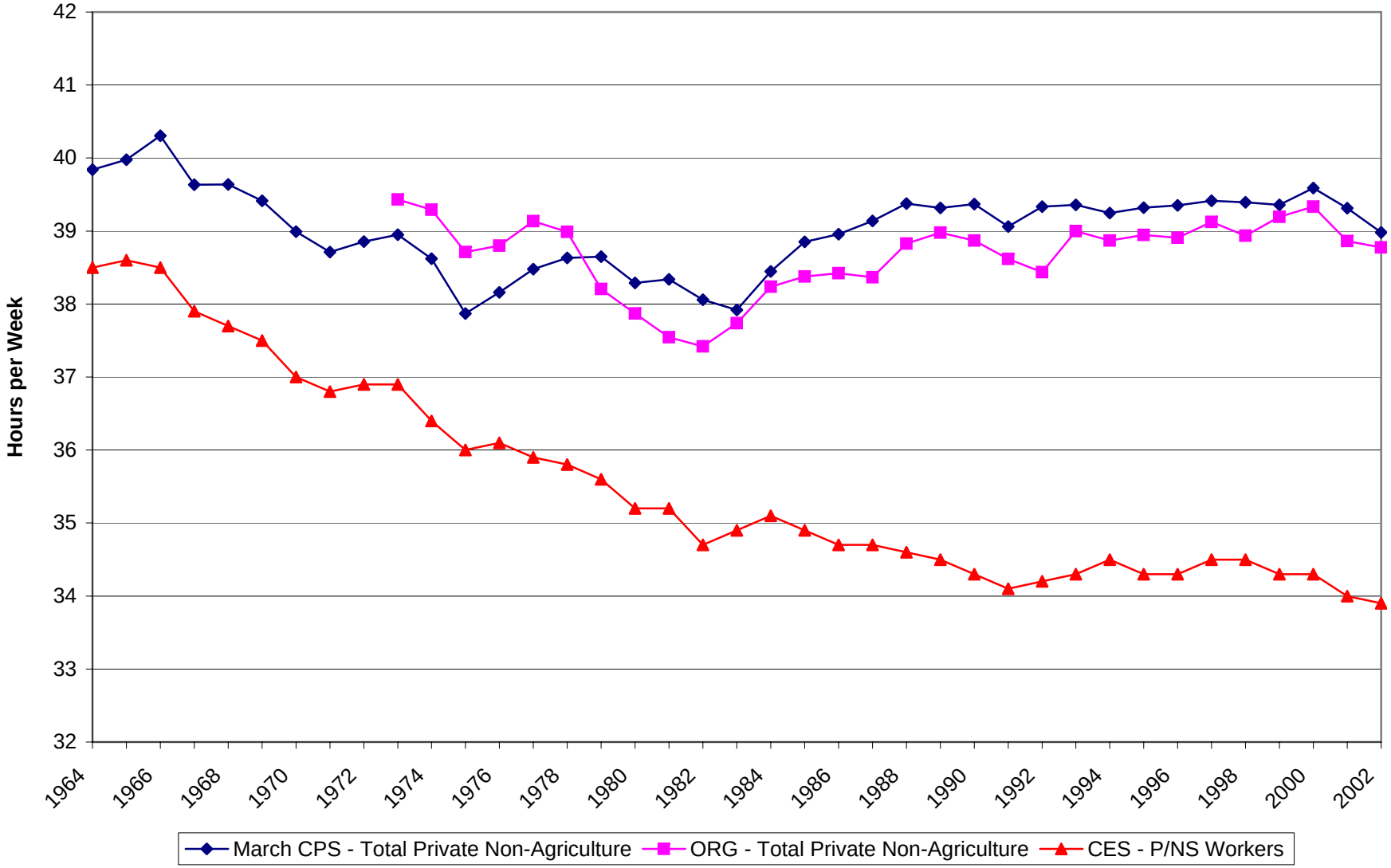

Table 1: Comparison of Time-Diary Estimates of Weekly Hours Worked to Estimates from CPS Questions, Wage and Salary Workers, 2003-2005

Period	2003-2005				10/2002-9/2005		
Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3	CPS Actual hours	ATUS Respondents Actual hours	CPS Actual hours	CPS, MIS-8 Actual hours
Average Hours	36.2	36.6	36.7	38.1	37.5	38.1	38.0
Adjusted difference with CPS	-1.4	-1.0	-0.9				
Gross difference with CPS	-1.9	-1.5	-1.4				
Decomposition:							
ATUS − CPS, ATUS respondents	-1.3	-0.9	-0.8				
ATUS respondents − CPS MIS 8	-0.5	-0.5	-0.5				
CPS MIS 8 − total CPS	-0.1	-0.1	-0.1				
CPS 2003-2005 − CPS 10/2002 - 9/2005	0.0	0.0	0.0				
	-1.9	-1.5	-1.4				
Average Hours--Non Reference Week	35.8	36.3	36.4		37.5		
Adjusted difference with CPS	-1.8	-1.3	-1.2				
Gross difference with CPS	-2.3	-1.8	-1.7				
Decomposition:							
ATUS − CPS, ATUS respondents	-1.7	-1.2	-1.1				
ATUS respondents − CPS MIS 8	-0.5	-0.5	-0.5				
Average Hours--Reference Week	37.2	37.7	37.8		37.4		
Adjusted difference with CPS	-0.3	0.2	0.3				
Gross difference with CPS	-0.8	-0.4	-0.3				
Decomposition:							
ATUS − CPS, ATUS respondents	-0.2	0.3	0.4				
ATUS respondents − CPS MIS 8	-0.6	-0.6	-0.6				

Table 2: Comparision of Time-Diary Estimates of Weekly Hours Worked to Estimates from CPS Questions, 2003-2005, by Selected Characterisitics.

Total and by Gender

Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3
Total			
Average Hours	36.2	36.6	36.7
Adjusted difference with CPS	-1.4	-1	-0.9
Average Hours--Reference Week	37.2	37.7	37.8
Adjusted difference with CPS	-0.3	0.2	0.3
Men			
Average Hours	39.3	39.8	39.9
Adjusted difference with CPS	-1.1	-0.6	-0.5
Average Hours--Reference Week	40.8	41.3	41.4
Adjusted difference with CPS	0.4	0.9	1
Women			
Average Hours	32.7	33.1	33.2
Adjusted difference with CPS	-1.8	-1.4	-1.3
Average Hours--Reference Week	33.3	33.7	33.7
Adjusted difference with CPS	-1.1	-0.7	-0.6

Education

Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3
Less than High School			
Average Hours	38.8	39.4	39.4
Adjusted difference with CPS	1.2	1.8	1.9
Average Hours--Reference Week	39.8	40.4	40.5
Adjusted difference with CPS	2.8	3.4	3.5
High Sshool Graduate			
Average Hours	37.6	38.2	38.3
Adjusted difference with CPS	-0.7	0	0.1
Average Hours--Reference Week	38.5	39.1	39.3
Adjusted difference with CPS	0.4	1	1.2
Some College			
Average Hours	37.2	37.7	37.7
Adjusted difference with CPS	-1.6	-1.1	-1.1
Average Hours--Reference Week	38.2	38.7	38.8
Adjusted difference with CPS	-0.5	0	0.1
College Graduate			
Average Hours	38.2	38.6	38.7
Adjusted difference with CPS	-2.1	-1.8	-1.7
Average Hours--Reference Week	38.5	38.8	38.9
Adjusted difference with CPS	-1.7	-1.4	-1.3

Table 2 (continued): Comparision of Time-Diary Estimates of Weekly Hours Worked to Estiamates from CPS Questions, 2003-2005, by Selected Characterisitics

Parent Status

Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3
Parents			
Average Hours	35.2	35.7	35.8
Adjusted difference with CPS	-2.5	-2	-1.9
Average Hours--Reference Week	36.5	37	37.1
Adjusted difference with CPS	-1.4	-1	-0.8
Non-Parents			
Average Hours	36.9	37.4	37.5
Adjusted difference with CPS	-0.6	-0.1	-0.1
Average Hours--Reference Week	37.8	38.2	38.3
Adjusted difference with CPS	0.6	1	1.1
Male parents			
Average Hours	39.1	39.6	39.8
Adjusted difference with CPS	-2.3	-1.8	-1.7
Average Hours--Reference Week	41	41.5	41.7
Adjusted difference with CPS	-0.6	-0.1	0
Male Non-parents			
Average Hours	39.5	40	40.1
Adjusted difference with CPS	-0.1	0.4	0.5
Average Hours--Reference Week	40.5	41	41.1
Adjusted difference with CPS	1.1	1.6	1.7
Female parents			
Average Hours	31	31.4	31.5
Adjusted difference with CPS	-2.6	-2.2	-2.1
Average Hours--Reference Week	31.4	31.8	31.9
Adjusted difference with CPS	-2.4	-2.1	-2
Female Non-parents			
Average Hours	34.1	34.5	34.6
Adjusted difference with CPS	-1.2	-0.7	-0.7
Average Hours--Reference Week	34.7	35.1	35.1
Adjusted difference with CPS	-0.1	0.3	0.4

Table 2 (continued): Comparision of Time-Diary Estimates of Weekly Hours Worked to Estimates from CPS Questions, 2003-2005, by Selected Characterisitics.

Work Schedule

Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3
Usual Parttime			
Average Hours	22.9	23.1	23.2
Adjusted difference with CPS	-1.9	-1.6	-1.6
Average Hours--Reference Week	23.3	23.5	23.6
Adjusted difference with CPS	-0.8	-0.5	-0.4
Usual Fulltime			
Average Hours	40.4	41	41.1
Adjusted difference with CPS	-1.2	-0.7	-0.6
Average Hours--Reference Week	41.8	42.4	42.5
Adjusted difference with CPS	0.2	0.7	0.8
Hourly			
Average Hours	35.2	35.8	35.9
Adjusted difference with CPS	0.2	0.8	0.8
Average Hours--Reference Week	37.1	37.7	37.8
Adjusted difference with CPS	2	2.5	2.6
Other than Hourly			
Average Hours	39.8	40.2	40.3
Adjusted difference with CPS	-1.4	-1.1	-0.9
Average Hours--Reference Week	39.9	40.2	40.4
Adjusted difference with CPS	-1	-0.7	-0.5

Industry and Occupation

Sample Measure	ATUS Def 1	ATUS Def. 2	ATUS Def. 3
Mgr/Prof			
Average Hours	37.9	38.2	38.3
Adjusted difference with CPS	-1.9	-1.6	-1.5
Average Hours--Reference Week	38.6	39	39.1
Adjusted difference with CPS	-1	-0.7	-0.6
Other than Mgr/Prof			
Average Hours	35.5	35.9	36
Adjusted difference with CPS	-1.3	-0.8	-0.8
Average Hours--Reference Week	36.6	37.1	37.2
Adjusted difference with CPS	-0.1	0.4	0.5
Good producing (Wage and salary)			
Average Hours	40.3	41	41
Adjusted difference with CPS	-1.2	-0.6	-0.5
Average Hours--Reference Week	40.7	41.4	41.5
Adjusted difference with CPS	-0.8	-0.2	-0.1
Not Goods producing (Wage and salary)			
Average Hours	35.1	35.5	35.6
Adjusted difference with CPS	-1.4	-1	-0.9
Average Hours--Reference Week	36.4	36.8	36.9
Adjusted difference with CPS	-0.1	0.3	0.4

Table 3: Comparison of ATUS and CPS Hours Estiamtes for CPS Reference Week from Matched Sample

	Sample Size	ATUS Def 1	ATUS Def 2	ATUS Def 3	ATUS usual hours	CPS usual hours	CPS actual hours
Total	3,499	37.9	38.4	38.5	38.7	38.7	38.0
ATUS − CPS Actual		-0.1	0.4	0.5			
Men	1,584	40.0	40.6	40.7	40.4	40.4	40.0
ATUS − CPS Actual		0.0	0.6	0.7			
Women	1,915	35.6	36.1	36.2	37.0	37.0	36.0
ATUS − CPS Actual		-0.3	0.1	0.2			

Figure 2: CES Production/Nonsupervisory Hours by Sector

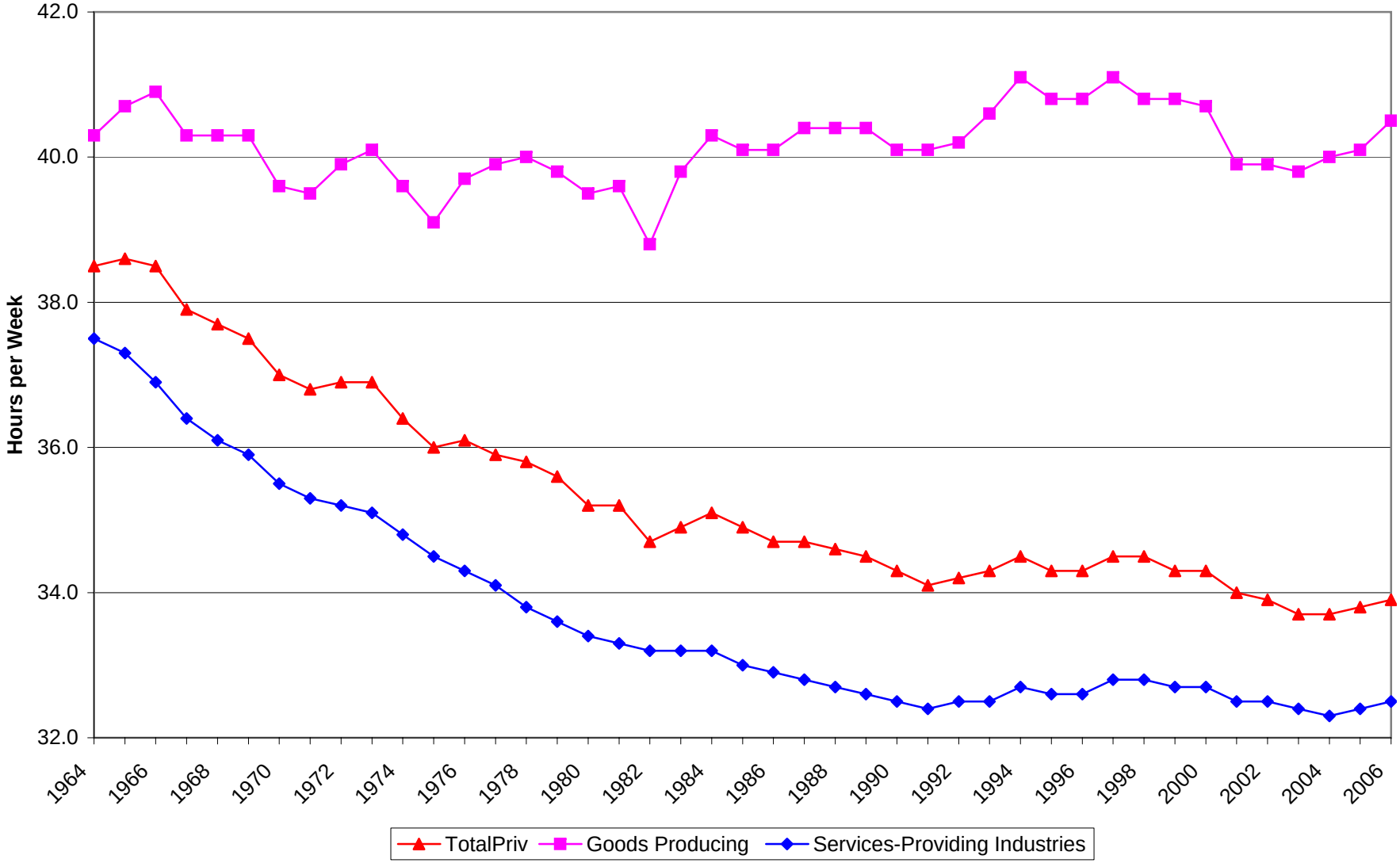

Figure 3: Fraction of CES Production/Nonsupervisory Employment in Goods-Producing Industries

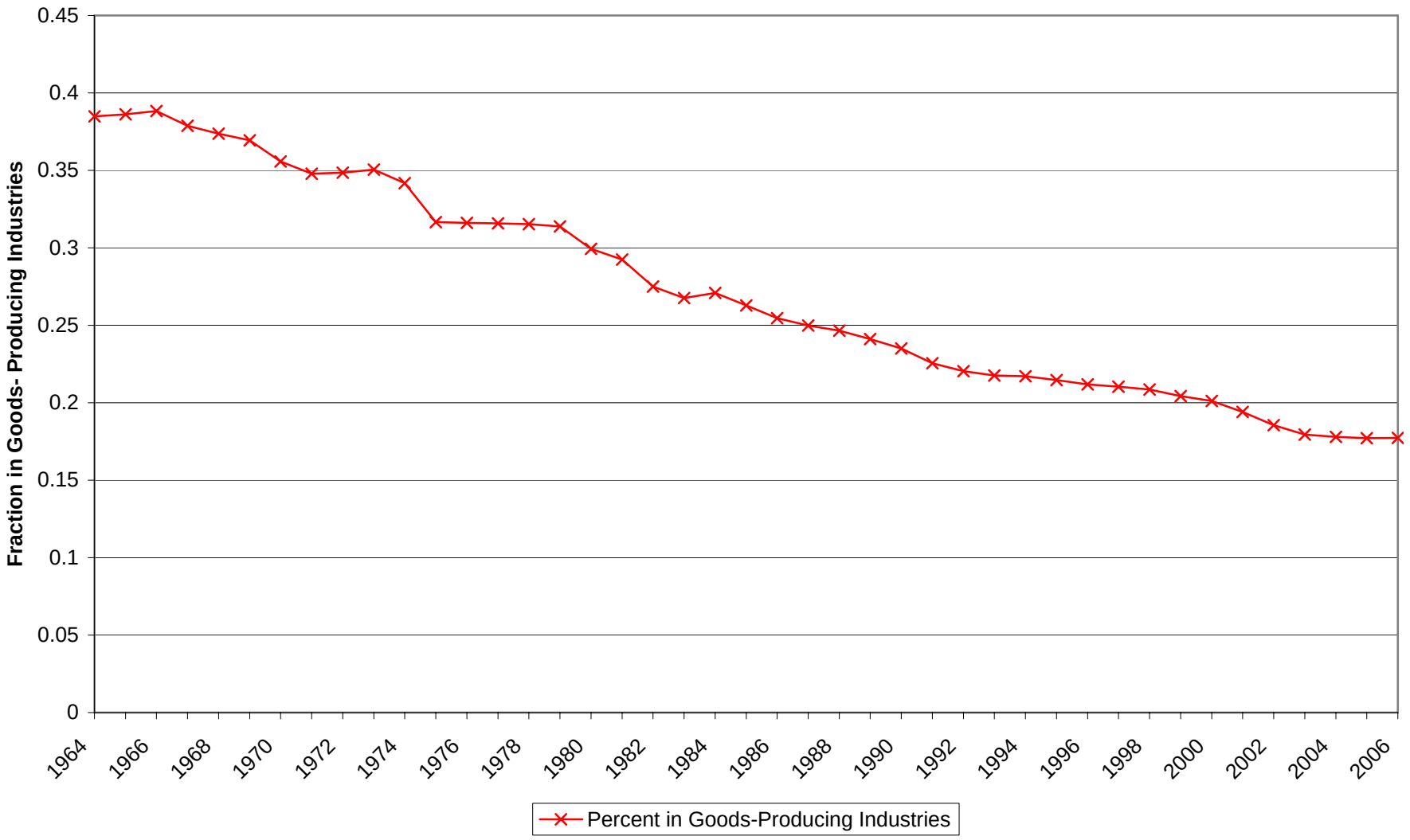

Figure 4: Comparison of CES Weekly Hours to CPS Hours Adjusted for Multiple Jobholding

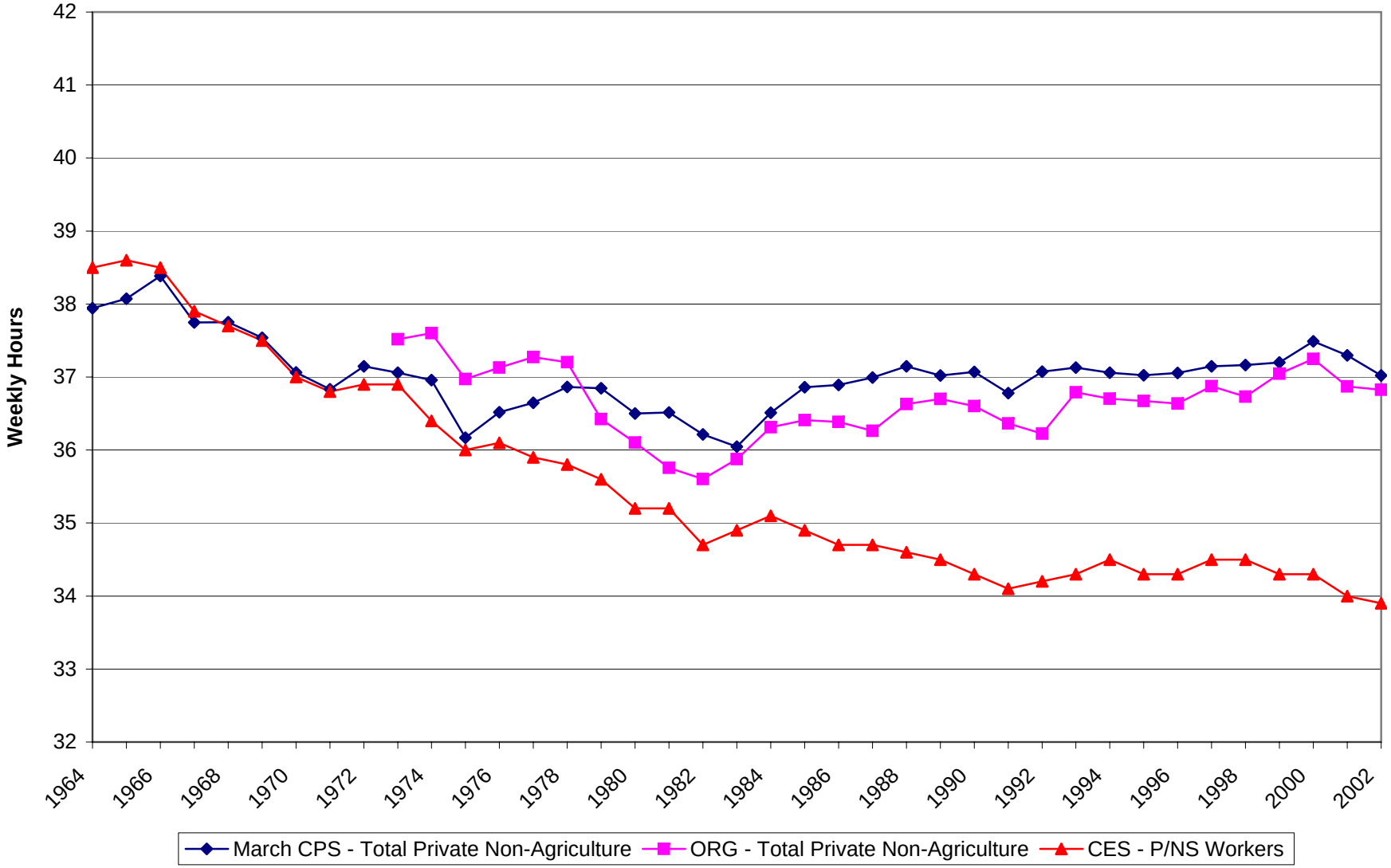

Figure 5: Comparison of CES Weekly Hours to CPS Replications of CES Hours Adjusted for Multiple Jobholding