

Examining the Discrepancy in Employment Growth  
between the CPS and the CES

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## **Examining the discrepancy in employment growth between the CPS and the CES**

BLS has two monthly surveys that provide information on current labor market conditions—the Current Employment Statistics (CES) or establishment survey and the Current Population Survey (CPS) or household survey. Both surveys provide an estimate of employment in the United States each month. The CPS also provides information on the number of unemployed and persons not in the labor force.

The estimates of over-the-month employment change from these two surveys usually do not match in size or even direction. This is not surprising given the many differences in the surveys, including sample size, estimation procedures, coverage, and definitions. Over longer periods of time, however, one would expect the separate measures of employment to track somewhat closely, particularly after accounting for coverage differences. Historically that has been the case, at least after the revisions that are part of each survey's normal estimation procedures.<sup>1</sup> As can be seen in chart 1, the surveys do show the same overall trend in employment for the last half century. Starting in the late 1980s, however, and continuing throughout the 1990s, the establishment survey showed a greater rate of employment growth than the household survey. This is true even when the comparison is restricted to the more comparable nonagricultural wage and salary employment, the universe for the establishment survey. The recent introduction of new population controls for the household survey reduced the gap, but did not eliminate it.

This paper reviews findings from BLS research into the *growth* of the discrepancy in the two surveys' employment estimates during the 1990s. In examining this discrepancy, we consider the impact or possible impact of several factors including: universe and concept differences in the surveys, population controls used in the CPS, undercoverage of certain population groups, differences in reference periods, and reporting issues. The contribution of some of these factors to the gap can be demonstrated. For others, their possible impact can only be roughly gauged from existing data.

## **Differences in Surveys**

When studying the CES-CPS discrepancy it is important to bear in mind that their employment estimates differ because these are two distinct surveys that serve two *different* purposes. The CES survey or establishment survey produces an estimate of nonfarm payroll employment. It is a survey of nonagricultural employers (including government) that is designed to provide data on the employment, hours, and earnings of workers on nonfarm payrolls.<sup>2</sup> In contrast, the CPS or household survey provides statistics on the employment status of the civilian noninstitutional population and related demographic, social, and economic characteristics.<sup>3</sup>

The surveys differ in their universes, concepts of employment, reference periods, and other methodologies. Any of these differences are potential sources of the discrepancy in employment growth. Thus, understanding these differences is key to attempts to explain the discrepancy. The following section examines the mechanisms through which each potential factor might have contributed to the growth in the employment discrepancy during the 1990s. This process rules out some potential factors as the explanation of the employment growth gap.

## **Universe and Conceptual Differences**

CES nonfarm payroll employment is an estimate of the total number of persons employed full or part time in nonfarm establishments (including government<sup>4</sup>) during the pay period that includes the 12<sup>th</sup> of the month. Basically, persons are considered employed if they receive pay for *any* part of the reference pay period. CES employment therefore includes workers on an establishment payroll who are on paid sick leave, holiday or vacation, or who work during only part of the specified pay period, even if they are unemployed or on strike during the rest of the pay period.

In the CES, persons on the payroll of more than one establishment during the pay period are counted in each establishment that reports them—whether the duplication is due to job turnover or multiple jobholding.

Persons are not considered employed if they receive no pay at all for the pay period. Since the unincorporated self-employed and unpaid family workers do not have the status of paid employees, they are excluded. Also excluded from the employment estimate are private household workers, persons who are on layoff, leave without pay, or strike for the entire pay period and persons who were hired but have not yet started work during the pay period.

The CPS uses a much broader definition of employment. It includes persons working in agriculture and nonwage and salary workers, that is, the unincorporated self employed and at least some unpaid workers in family businesses.

The CPS classifies people as employed if, during the calendar week that includes the 12<sup>th</sup> of the month, they did any work at all (at least 1 hour) as paid employees, worked in their own business, profession, or on their own farm for profit, or worked without pay at least 15 hours in a family business or farm. People also are counted as employed if they were temporarily absent from their jobs because of vacation, illness, bad weather, childcare problems, maternity or paternity leave, labor-management dispute, job training, civic or military duty, or other family or personal reasons--whether or not they were paid or were seeking other jobs during their time off.

The CPS counts each employed person only once—even if someone holds more than one job. For purposes of assigning class of worker, occupation, and industry classification, multiple jobholders are classified and counted in the job at which they usually worked the greatest number of hours. Included in the total number of the employed are employed citizens of foreign countries who are temporarily in the U.S. but not living on the premises of an embassy. Excluded are persons whose only activity consisted of work

around their own house (such as painting, repairing, or housework) or volunteer work for religious, charitable, and other organizations.

It is possible to use information from the CPS to adjust its estimate of employment to something more akin to that from the CES. Many analysts routinely perform such reconciliation calculations when comparing the surveys. These differences in the employment definitions are a logical place to start in any examination of the differences in employment growth trends.

Table 1 shows the CES and various CPS time series used in reconciliation calculations. The selection of the time period 1994 to 2000 to illustrate the reconciliation calculations and growth in the discrepancy was somewhat arbitrary. We choose 1994 as the starting point because that was when the multiple jobholding data series used became regularly available. The year 2000 was selected as the end point because it was the last full year of the economic expansion, the period in which CES employment growth significantly outpaced the CPS. In addition, the 2000 CPS data are shown before the recent Census 2000-based population control revision so that we can illustrate the growth gap between the surveys before and after the revision. Annual averages were used instead of monthly data because some of the components used in the reconciliation are not seasonally adjusted or not available on a monthly basis.

Much of the conceptual difference between the two surveys is removed by comparing CPS nonagricultural wage and salary employment to the CES estimate; that is, by removing agricultural employment, the unincorporated self employed, and unpaid family workers (see steps 1-3 of table 1). Using other data from the CPS, it is possible to further reconcile the CPS employment concept with that of the CES. As shown in steps 4 and 5 of table 1, we also remove from the CPS employment estimates of private household workers and persons who did not receive pay during the reference period. Then we add in multiple jobholders with secondary nonagricultural wage and salary jobs (step 6).<sup>5</sup> (Table 2 shows annual average employment for CES, CPS, and adjusted CPS for each year from 1994 to 2000.)

Even after the adjustment for the surveys' quantifiable differences, the cumulative discrepancy remains substantial. Even if an additional adjustment is made for multiple jobholders who hold more than one extra job, the growth gap persists.<sup>6</sup> This suggests that the discrepancy in employment growth may have been caused by non-quantifiable conceptual or universe factors (which we will discuss in this section) or by other factors (which will be discussed in following sections).

We examined several potential sources of discrepancy that stem from universe and conceptual differences and are not routinely or readily quantified. These include secondary civilian jobs of active duty military personnel, the CPS age minimum, employment among the institutional population, and foreign commuters employed by U.S. companies. Although the data to examine these possible affects are limited, the evidence that is available suggests these factors are not the chief sources of the gap in employment growth.

*Secondary civilian jobs of active duty military personnel*

The CPS sample reflects the civilian noninstitutional population, so active duty military personnel are ineligible to participate in the CPS. However, active duty military personnel holding secondary civilian nonfarm payroll jobs are counted in the CES for their civilian jobs.

If the number of civilian jobs held by active duty military personnel had increased during the 1990s, this would have increased CES but not CPS employment and therefore would have contributed to the discrepancy in employment growth. Since military personnel cannot be identified separately in the CES estimates, the effect of their civilian jobholding on the discrepancy cannot be quantified. However, the level of the Department of Defense active duty military personnel fell during the 1990s.<sup>7</sup> Only the most radical assumptions about changes in secondary employment of the active duty military (that none were employed before and nearly all are now) would explain a significant proportion of the employment growth gap.

### *CPS age minimum*

To be eligible to participate in the CPS, individuals must be 15 years of age or over. However, CPS data are published only for persons 16 years of age and over, since younger persons are limited in their work activities by child labor laws and compulsory school attendance. The CES is not limited by age, so the CPS age minimum is a potential factor in the employment discrepancy's growth if the number of workers under age 16 increased.

Unpublished CPS data for 15-year-old nonagricultural wage and salary workers,<sup>8</sup> (the closest estimate of 15-year-olds that are counted in the CES) however, indicate that these workers were an insignificant factor in the discrepancy's growth. From 1994 to 2000, the annual average level of 15-year-old nonagricultural wage and salary workers increased only slightly. (See table 1.) The change amounted to a very small portion of the growth in the discrepancy in CES and adjusted CPS employment in the mid-to-late 1990s.

No data are available to assess the direct effect of workers under 15, but they should not be a large hidden factor in the discrepancy in any case. Even if their employment had increased during the recent expansion, it seems unlikely to have had any greater impact on the discrepancy's growth than the number of employed 15-year-olds.

### *Commuters to the U.S.*

Another difference in the surveys' employment universes is the CPS exclusion of workers commuting to work into the U.S. from Mexico or Canada. The CPS estimates include only persons who live in the U.S. However, daily commuters from foreign countries are counted in the CES estimates if they appear on U.S. business establishments' payroll records. Although, conversely, the CES will not capture U.S. residents who work in Canada and Mexico, these workers are presumed to be less numerous than those coming into the U.S. Therefore, the net commuter effect is assumed to boost the CES employment estimates.

Since foreign commuters cannot be identified in the CES, their effect on the discrepancy cannot be quantified. Nonetheless, BLS has attempted to investigate this issue, looking at the difference between CES employment and CPS nonagricultural wage and salary employment estimates from 1994 to 2000 at the state level.<sup>9</sup> If daily commuters contributed significantly to the employment gap, the differences in the surveys' estimates should have been pronounced in states that border Mexico and/or Canada.

This limited analysis, however, did not provide any clear-cut answers. The primary Mexican border states—Texas, Arizona, and California—had significant discrepancies in growth between the CES and CPS employment measures. Texas, for instance, had the largest discrepancy of any state, and Arizona exhibited a fairly substantial gap relative to its size. California's difference, on the other hand, was not exceptionally large relative to its size. Among the Canadian border states, only New York and Minnesota had notable discrepancies although in the case of New York, the difference relative to the size of the state was not exceptional. In addition, a number of non-border states exhibited substantial gaps: Florida, Massachusetts, Ohio, North Carolina, Pennsylvania, Virginia, Maryland, and Indiana. No consistent pattern of discrepancy existed among either Mexican or Canadian border states, nor were there any obvious common factors among the states that registered the largest differences. That being said, many of the states with large discrepancies appear to be ones that may have seen a significant influx of undocumented aliens during the past decade. (Undocumented workers are discussed in a later section.) (See table 3.)

In addition to comparing state-level estimates, we attempted to gauge the potential effect foreign commuters had by looking at overall growth in seven metropolitan areas near border crossings: San Diego, El Paso, Laredo, McAllen, Brownsville, Detroit, and Buffalo. Using CES annual average employment estimates for 1994-2000, total employment growth for these areas was 611,000 over the time period. Even assuming a large proportion of this growth was due to foreign commuters, it would resolve little of the cumulative discrepancy in two surveys from the mid-to-late 1990s. Consequently, while foreign commuters may contribute to the employment survey differences in some

states, they are not likely to play a major role in the overall discrepancy between the national CES and CPS estimates. (See table 4.)

Since the conceptual differences between the surveys do not appear to account for much of the gap in employment, other factors need to be considered. One characteristic of the gap is useful in determining what other factors are likely to be reasonable explanations. As can be seen from chart 1, the gap was not the result of a one-time break. Rather, the size of the discrepancy widened over time. This suggests that an explanation, or explanations, are phenomena that became more prevalent during the decade. One factor that fits this criterion and which can be demonstrated to have contributed to the gap was the understatement of population controls used in CPS estimation.

### **Population Controls**

The distribution of the population selected for the monthly CPS sample may differ somewhat, by chance, from the population as a whole in such characteristics as age, sex, race, ethnicity, and state of residence. Because these characteristics are closely correlated with labor force participation and other principal measurements made from the sample, the survey estimates can be substantially improved when weighted appropriately by the known distribution of these population characteristics

Monthly independent population controls developed by the Population Division of the U.S. Census Bureau provide the base to which the monthly CPS results are applied to estimate current employment levels. If the controls understate the level of population growth, the growth in CPS employment also will be understated. The intercensal population projections are adjusted every 10 years to reflect new information from the decennial census. Following the 1980 and 1990 censuses, changes to population estimates led to sizable increases in CPS employment and the narrowing of past discrepancies in CPS and CES employment growth.<sup>10</sup> Indeed, when population controls based on information of Census 2000 were introduced retroactively to the CPS, they raised the level of CPS employment in 2000 by 1.7 million. These revised estimates

significantly narrowed the cumulative gap in employment growth between the CES and CPS from the 1990s. (See table 1.) Moreover, an estimated higher level of population growth from 2000 to 2002 increased CPS employment by an additional 533,000 over previous estimates. Finally, an adjustment to intercensal population estimates made in January 2003 boosted CPS employment by 576,000. Since population controls can have such a large impact on CPS employment estimates, the following section describes their derivation during the 1990s and changes made to their estimation following Census 2000.

The monthly independent population controls for the nation by age, sex, race, and Hispanic origin and for states by selected age groups and broad race categories are developed using the basic demographic accounting formula whereby the population from the latest decennial data are updated using data on the components of population change – births, deaths, and net international migration; with net internal migration as an additional component in the state population estimates. The estimates begin with the latest decennial census as the base and incorporate the latest available information on births and deaths along with the latest estimates of net international migration. Data on births and deaths are supplied by the National Center for Health Statistics. The net international migration component in the population estimates includes: (1) legal migration to the U.S., (2) emigration of foreign born and native people from the U.S., (3) net movement between the U.S. and Puerto Rico, (4) estimates of temporary migration, and (5) estimates of net residual foreign-born population, which include unauthorized migration.

Following the 1990 decennial census, BLS chose to use CPS population controls that used as its base the 1990 Census with adjustments obtained from the Post-Enumeration Survey (PES), a post-census quality control check that assessed the estimated undercount.<sup>11</sup> The Census Bureau's Population Estimates Program further modified the 1990 Census race data for use in the production of post-1990 population estimates and projections. Because of needs to have census data comparable with the reporting categories used by state and local agencies and for compiling other administrative data used in producing population estimates and projections, the Census Bureau developed a

procedure to assign an Office of Management and Budget (OMB) race category--White; Black or African American; American Indian and Alaska Native; Asian; and Native Hawaiian and Other Pacific Islander--to those who reported "Some other race" in the census.

The adjusted and modified base data were updated throughout the decade using the latest information on births and deaths available from the National Center for Health Statistics. During the 1990s, the core data source for the estimation of international migration was the Immigration and Naturalization Service (INS) public use immigrant file. This annual file contains records for citizens of foreign countries immigrating or establishing legal permanent residence in the U.S. and accounts for the majority of international migration to the U.S. However, the file contains no information on emigration, undocumented immigration, or nonimmigrant moves into the country. Research conducted at the Census Bureau (Robinson, 1994) produced an allowance of 225,000 net unauthorized migrants per year. The intercensal estimates developed throughout the 1990s incorporated this annual allowance as a constant.

The remaining category of foreign-born migration to the United States, not included in the administrative immigrant data from INS is the flow of legal temporary residents; persons who reside in the country long enough to consider themselves "usual residents" while they are here, but who do not have immigrant visas. These include foreign students, scholars, some business persons (those who establish residence), and some professionals who are provided a special allowance to work. INS data on nonimmigrants would provide records of admission for temporary visa holders; however, there would be no reliable data source for their departures. The stock of this category of foreign-born persons enumerated in the 1990 census was estimated at 488,000. The intercensal estimates developed during the 1990s assumed this number to remain constant throughout the decade. As noted earlier, the administrative data from the INS contained no data on the emigration of legal permanent residents of the United States to abroad. The estimates developed throughout the 1990s assume a constant emigration of 222,000 per year, of

whom 195,000 are foreign-born (Ahmed and Robinson, 1994) and 27,000 are native born emigrants.

A final class of international migration that can only be estimated roughly as a net flow is the movement of persons from Puerto Rico and the outlying areas to the United States. No definitive administrative data exist for measuring volume, direction, or balance of these migration flows. The migratory balance from all areas except Puerto Rico is assumed to be zero. For Puerto Rico, we assumed an allowance of roughly 7,000 net migration (arrivals minus departures) per year.

After each decennial point, the intercensal estimates are rebenchmarked to use the new decennial census population as its base and start the estimation forward with estimates of the components of population change. As part of the evaluation process, the Census Bureau Population Division compared the set of intercensal estimates developed for the weighting of the April 2000 CPS (developed in April 2000 using the 1990 census adjusted as the base population) to Census 2000 consistent data. The Census 2000 count of the total civilian noninstitutional population was 2.7 million higher than the 1990 based estimate. In particular, the Census 2000 count of Hispanic males was much larger than the estimated number. In reviewing the estimates developed during the 1990s, the Population Division has speculated that the difference between the 1990 based estimate and the Census 2000 count (error of closure) is due to a combination of factors including the differences in coverage (a difference that occurred even with the adjustment in 1990 for undercount) and a failure in the estimates to account for a larger number of residual foreign born population.<sup>12</sup>

Additional studies carried out by the Census Bureau Population Division as part of the estimates evaluation indicated that the estimates of unauthorized migrants that were used in the 1990 based intercensal estimates were too low. The evaluations indicated that the residual foreign born population increased by about 5 million during the 1990 to 2000 decade rather than the 2.25 million (10 x 225,000) assumed in the 1990 based estimates. The results of the evaluations also confirmed the Population Division's reservations that

an assumption concerning the annual flow of the residual foreign born population, developed at the onset of the decade, could be used unchanged throughout the decade. In response to these concerns, the Population Division has undertaken an aggressive project to study and develop estimates of the size, characteristics and impact of the foreign born population.

Beginning in January 2003, the independent population controls used to weight the CPS shifted to a Census 2000 base. Consistent with a December 2001 decision and reaffirmed again in March 2003, the Census Bureau decided that the intercensal population estimates would be based on the official Census 2000 results rather than on a population base adjusted using revised estimates of census coverage.

Thus, for the post 2000 period, the independent estimates used to weight the Current Population Survey begin with the Census 2000 results as enumerated. Consistent with the modifications introduced in 1990, the Census 2000 data by race have been modified to assign each of the persons in the "Some other race" category in the census to an OMB race category. The modified race data include 31 race groups which are the single and multiple race combinations of the OMB race categories: White; Black or African American; American Indian and Alaska Native; Asian; and Native Hawaiian and Other Pacific Islander. Identical to the 1990 decade, the monthly independent population controls for the nation by age, sex, race, and Hispanic origin and for states by selected age groups and broad race categories are developed using the basic demographic accounting formula whereby the population from the latest decennial data are updated using data on the components of population change – births, deaths, and net international migration; with net internal migration as an additional component in the state population estimates. Data on births and deaths continue to be supplied by the National Center for Health Statistics.

In an effort to use continuously updated data rather than once-a-decade measures used in the 1990s, for the first time, the national estimates of the international migration component incorporated data available from the Census 2000 Supplementary Survey

(C2SS) and the 2001 Supplementary Survey (SSO1) along with estimates developed from the Demographic Analysis and Population Estimates (DAPE) project.<sup>13</sup>

An estimate of the net change in the combined components of legal immigration to the United States, emigration of the foreign born population from the United States, temporary migrants, and the net residual foreign-born population for the July 1, 2000 to July 1, 2001 period were developed from the survey data. The C2SS data on the foreign born population were survived forward and compared to the estimates of the foreign born population derived from the SS01 data. The estimates from the DAPE project provided the estimates of the emigration of the native population and the net movement between the United States and Puerto Rico.

Independent estimates of each of the components of international migration are not available. However, the analysis of the data supplied by the Immigration and Naturalization Service on the flow of legal permanent residents for the 2000 to 2001 period support the estimates derived from the survey data.

It is important to remember that the increased study of the size and characteristics of the foreign born population along with new ways of estimating the annual flows of international migration components are in the infancy stages. As such, new methodologies that result from future studies are likely to lead to alternative measures of the annual flows of international migration.

Although the post Census changes to CPS population controls eliminated a substantial proportion of the gap in employment growth that had accumulated over the decade, a substantial discrepancy remained after these adjustments. Thus, additional factors related to both surveys have been considered. Some that have been examined include undercoverage of certain population groups in the household survey, the reporting of undocumented workers, the sample used for the household survey during the 1990s, the effect of reference period differences in the surveys, and response error in both surveys.

## **Undercoverage**

Even when assuming the underlying population controls are precise, CPS employment estimates are subject to potential measurement inaccuracies due to undercoverage.

Undercoverage refers to bias in the household data that can occur when housing units are missed in the sample or when persons in sample households are missed. Research has shown that undercoverage in the CPS differs by age, sex, race, and Hispanic origin. In general, it is more significant among the male population than among females and also more significant among blacks, persons of Hispanic origin, and other races than among the non-Hispanic white population. The likelihood of undercoverage is estimated by examining coverage ratios—the estimated number of persons in a given population group as measured by the survey divided by an independent population level for that group.<sup>14</sup> Based on data from 1996, for example, the CPS covered about 92 percent of the population 16 years of age and over as measured by the 1990 decennial census (adjusted for the census undercount). For blacks, though, the coverage ratio was only 83 percent, with black males age 20 to 29 having the lowest coverage rate of any age/race group, just 66 percent. It should be made clear, however, that persons missed in the survey are accounted for in the final CPS estimates, but they are assigned labor force characteristics like their cohorts who were surveyed. Bias may then affect the estimates because those missed may differ in their labor force characteristics from those surveyed.<sup>15</sup>

A wide range of procedures is in place to prevent undercoverage from entering into the survey process at all, such as quality control reviews of housing unit lists used for the sample frame. To reduce undercoverage bias that does occur, the CPS methodology includes a ratio adjustment procedure that utilizes independent age-sex-race-Hispanic-origin population controls. Three sets of independent population controls are updated and used each month.<sup>16</sup> This second-stage ratio adjustment, however, cannot fully compensate for potential biases if, to some extent, missed persons in missed households and missed persons in interviewed households have different characteristics than interviewed persons in the same age-sex-race-origin group.

## **Reporting of Undocumented Workers**

Another possible source of discrepancy between the CES and CPS employment may occur in the reporting of undocumented workers. While it is an undisputed fact that these workers are part of the U.S. economy, how many there are and their relative prevalence in the labor force remains a subject of debate. Regardless of the extent to which undocumented workers are employed by U.S. businesses, though, they probably are more likely to be reflected in the CES employment figures than in the CPS. Employers provide the data to the CES program and to administrative tax authorities such as the state unemployment insurance programs and they generally would be inclined to include undocumented employees in their reports. This is based on the presumption that undocumented workers are using false identification information, such as a Social Security number, and are doing so with or without the knowledge and assistance of the employer. If the employer does not realize that the worker is undocumented, they would have no reason to omit them from employment surveys and administrative tax reports. If the employer is in fact knowingly hiring an undocumented worker, it may be in their best interest to report the employee in surveys and tax reports and claim ignorance if discovered by authorities. (While employer participation in the CES survey is voluntary, reporting and remitting tax payments to state unemployment insurance programs--the source of the CES benchmark employment levels--is mandatory and carries monetary penalties for noncompliance.) This hypothesis is supported by reports from the Social Security Administration (SSA) about significant growth in the number of W-2 statements (reports of wages paid) submitted by employers where the employee names and Social Security numbers fail to match official SSA records. SSA Audit Reports note a strong correlation between many of these unmatched W-2s (known as “suspended wage items”) and industries and employers that tend to hire immigrant workers.<sup>17</sup>

With regard to the household survey, although the CPS survey materials and interviewers routinely provide reassurances about confidentiality to potential and actual respondents, undocumented residents probably are more likely than legal residents to refuse to

participate in the CPS. If they do participate, they may not be forthcoming about their labor market activities or a proxy respondent for the household may omit them from the household roster altogether. These scenarios would all result in undercoverage bias in the household employment estimates, as previously discussed.

Given the likelihood that the proportion of undocumented workers in the economy grew in the 1990s, this may represent another source of discrepancy between the CES and CPS, one that would reflect the widening gap exhibited during that time. Because estimates of the overall number of undocumented workers are imprecise, and because such workers cannot be identified in either the CES or CPS, BLS cannot quantify their possible effect on the discrepancy.

### **Current Population Survey Sample**

Although the CPS sample is scientifically designed to represent the civilian noninstitutional population of the nation, not all sub-state areas in the country are included. In designing the sample frame for the CPS, the Census Bureau has divided the entire United States into geographically defined *primary sampling units*, or PSUs-- typically a single populous county or a group of smaller contiguous counties within a state. In general, metropolitan areas fall into the category known as self-representing PSUs and are always selected in the sample. PSUs in nonmetropolitan areas, however, are stratified into groups of like size with similar unemployment patterns and demographic characteristics. Only one of the nonmetropolitan PSUs (referred to as a nonself-representing PSU) is selected from each of the resulting strata for the survey and it is used to represent the other PSUs in its stratum. If the selected nonself-representing PSUs experienced less growth than the PSUs they represented, it could have resulted in understated employment levels in the CPS during the 1990s and hence contributed to the discrepancy between the household and payroll surveys.

BLS researched the possibility of missed employment growth in the nonself-representing strata of the CPS sample by examining the employment trends in those counties from

1994 to 2000. Employment data from the BLS Covered Employment and Wages, better known as ES-202, program were used because they are available at the county level and represent a universe employment count not subject to sampling error.<sup>18</sup>

Collectively, growth in the nonself-representing counties tracked well with growth in the counties not in the sample. Between 1994 and 2000, employment in the nonself-representing counties grew by 12.4 percent, compared with 10.0 percent for the counties not in the sample. (See table 5.)

On a state-by-state basis, only 5 states<sup>19</sup> registered discernibly greater growth in the not-in-sample counties than in the nonself-representing counties. Even in these 5 states, employment growth in the non-sample counties did not significantly outpace growth in the nonself-representing counties. The average rate of growth in the not-in-sample counties was 10.9 percent from 1994 to 2000 compared with 6.3 percent in the nonself-representing counties. Individually, none of the 5 states showed a particularly large disparity in growth between the non-sample and nonself-representing counties. At most, there was only about a 7 percentage point difference in growth rates between the non-sample and nonself-representing counties of these states.

In summary, the results of the research indicate that understated employment growth in the nonself-representing sample strata did not occur and so was not a source of discrepancy between the CPS and CES surveys during the mid-to-late 1990s. Overall, employment in the nonself-representing counties increased somewhat more than in the counties not in the sample. Even among the small number of states where the not-in-sample counties experienced greater growth than nonself-representing counties, the relative differences were minor.<sup>20</sup>

### **Different Reference Periods**

Under certain assumptions, differences in employment growth as measured by the two surveys could arise due to the difference in the length of the reference periods. The CPS

counts the number of persons who are employed during its reference period, which is the *calendar week* that includes the twelfth of the month. The CES employment count is comprised of the number of workers that employers report from their payroll records for the CES reference period, which is the *pay period* including the twelfth of the month. As employers' pay periods differ, the CES reference period is not limited to only one calendar week, as is true for the CPS, but may be biweekly, monthly, or some other frequency longer than one week. With a longer reference period, the CES has a greater chance than CPS to pick up new hires each month. In combination with other factors, this might account for a portion of the growing discrepancy in employment witnessed in the 1990s. In addition, job turnover can affect the establishment employment given that the same person potentially can be counted in two jobs (old and new) during the same reference period by the establishment survey. The effect could be compounded further if a greater share of establishments had longer pay periods in the 1990s than in earlier years.

The following examples help illustrate how CES might count more employment than CPS. 1) During a multi-week reference period, the CES might count as employed a newly hired person who during the first week (the CPS reference week) was unemployed or not in the labor force in the CPS. Of course, there will always be some persons moving from employment to unemployment or outside the labor force to offset this increase. During an expansion, however, the net change in employment from the overall flow of persons in and out of employment and the labor force would tend to be positive and might show an increasing trend during periods of particularly rapid economic growth.

2) If a person leaves one job and starts another during a relatively short time span, they could appear on both employers' payrolls for the CES reference period. They would be counted twice—once for each job—in the CES survey but only be counted once as an employed *person* in the CPS. This would have the same effect as multiple jobholding and inflate CES employment growth. (But since they would not be classified as multiple jobholders in the CPS, they would not be accounted for in the reconciliation process.)

The issue here is not that the CPS reference week is any less representative than other weeks in the month with regard to employment status changes. Rather, it is simply that the CPS reference week presents a narrower time frame in which to capture these changes. In terms of comparing the one-week CPS reference period to the CES pay period concept, the typically longer CES reference period potentially allows it to capture more payroll employment movements in a given month. This would tend to have a positive effect on CES employment, especially in expansions.

It is generally more common for persons to enter the labor force or change jobs rapidly during an expansion and less likely during a recession. It also is the case that during expansions, CES employment tends to increase faster than CPS employment; in contractions, CES employment tends to decline more rapidly than CPS employment. This pattern might partly explain why the employment discrepancy increases during expansions and diminishes during recessions—the CES may be picking up more jobs in expansions due to greater net movement into the workforce and increased job-to-job movement.

An increase in job-to-job movement during individual pay periods coupled with an increase in the proportion of multi-week pay periods reported in the CES could have resulted in higher employment growth in CES than CPS in the 1990s. Over time there has been a trend toward longer pay periods in the CES. From its 1962 investigation of the two surveys, the Gordon Committee reported that at least one-fifth of the total CES establishments had pay periods longer than a week.<sup>21</sup> Since then, the length of pay periods has grown. By 1998, nearly half (47 percent) of the CES private establishments reported pay periods that were biweekly, semimonthly, or monthly.<sup>22</sup>

According to CES data, reporters in the services industry division tend to have pay periods longer than one week, whereas manufacturing firms tend to have week-long pay periods. (Sixty-seven percent of services reporters have pay periods longer than a week, compared to only 26 percent of those in manufacturing.)<sup>23</sup> The services division's 39-percent employment growth (from 1992 to 2000, based on annual averages) might have

been subject to potential inflation by the effect of its reporters' longer pay periods picking up more new hires and double-counting due to turnover. And, since employment in the services division amounts to a third of total CES employment (according to 2000 annual averages), and it has the most reporters of all the industry divisions, this might have affected the CES employment estimate and, consequently, the surveys' growing employment discrepancy.

To further determine the likelihood that lengthened pay periods and rapid job changing have played a role in the growing employment discrepancy, BLS looked at available data on job changing and turnover. Since the CPS redesign of 1994, respondents classified as employed in consecutive survey periods have been asked whether they still work for the employer that they named in the prior survey period. The resulting information (not normally tabulated or published) can be used as a proxy measure to evaluate job changing over relatively short time periods.<sup>24</sup> A review of these data over the period 1994 to 2000 showed that although a significant number of persons indicated their employer changed, there was no increase in their relative proportion over the time period.

While the BLS does not have labor turnover statistics for the 1990s,<sup>25</sup> outside data are available from the Bureau of National Affairs (BNA, Inc.). The BNA is a non-governmental source of turnover rates, based on job separations reported by firms in their survey.<sup>26</sup> The BNA reported that in 1999 employee turnover reached its highest level in nearly two decades.<sup>27</sup> By industry, non-manufacturing firms experienced a particularly sharp rise in turnover in 1999. The BNA data, however, are perhaps a less precise proxy for job-to-job changes because they merely reflect separations; the separated employees may or may not move into other employment right way.

The authors of a BLS working paper from 1976 examined the possibility of workers' being double-counted in the payroll survey due to labor turnover. They used a quit variable to measure the proportion of workers who would account for some of the job turnover effect on the employment discrepancy. However, the authors found that the results were inconclusive.<sup>28</sup>

In summary, increased job-to-job movement and lengthened pay periods could potentially contribute to the growing discrepancy between the CES and CPS employment estimates and might help explain at least some of the cyclical pattern that the gap has historically exhibited. The proxy data available on job-to-job movement and turnover, however, do not provide clear-cut evidence as to whether rapid job changing was a definite component of the increasing employment gap. Even if the relative frequency of job changing was stable in the 1990s, though, the increased proportion of employers with longer pay periods may have heightened the probability of jobchangers being doublecounted in the CES. Unfortunately, the effects on the discrepancy are not known because double-counting in the CES due to job-to-job turnover cannot be identified nor can the general effects of the differing survey reference periods be measured.

### **Estimation Methodology in the Current Employment Statistics Survey**

#### *Noncovered Employment in the CES Benchmark*

Employment data from the CES survey are benchmarked annually.<sup>29</sup> The principal source of benchmark data for private industries comes from employment data provided to state employment security agencies by employers covered by state unemployment insurance (UI) laws and shared with the BLS as the basis of the aforementioned ES-202 program. The ES-202 data represent almost 98 percent of nonfarm employment. BLS supplements this primary benchmark with universe counts for Federal employees derived from summaries prepared by the U.S. Office of Personnel Management for the executive, legislative, and judicial branches. In addition, BLS uses several other sources to establish benchmarks for industries partially covered or exempt from mandatory UI coverage, accounting for the nearly 2.5 percent residual nonfarm employment.<sup>30</sup> This residual employment is referred to as the “presumed noncovered.” The contribution of presumed noncovered employment to an affected industry ranges from less than 0.05 percent in newspaper publishing to 100 percent in Class I railroads.

If the presumed noncovered benchmark estimates were to overstate growth, they could be a source of discrepancy with the CPS. The statistical reliability of the benchmark sources for presumed noncovered employment varies to some degree. Some sources provide a complete count of employees such as those covered by the Railroad Retirement Act; others, like the Annual Survey of Government Employment, have a calculated sampling error. Presumed noncovered employment derived from *County Business Patterns* is a universe count but is subject to non-sampling error and to variability in reporting practices. These latter sources are available only on a one- or two-year lagged basis. BLS extrapolates the current level of non-covered employment based on the trends in the UI-covered portion of these industries, introducing another potential source of error.

As part of the BLS research, the presumed noncovered benchmark sources underwent review for upward bias. No discernible pattern of overstatement was identified in any of the presumed noncovered benchmarks. Over the ten-year period from 1990 to 1999, presumed noncovered employment contributed 790,000 (excluding Federal government employment) to the increase in employment in the CES program. The relative amount of employment growth over this time period contributed by the presumed noncovered sector also makes it unlikely to have played any significant role in the gap between the CES and CPS employment estimates.

### **Response Error Issues**

Response error is inevitable when collecting data. BLS has procedures and mechanisms in place to minimize its occurrence and to identify and correct such errors wherever possible. In spite of best practices, however, some level of error will remain. For that reason, we address some specific types of response error that could be factors in the gap between CES and CPS employment in the mid-to-late 1990s.

### *Response Error in the Current Employment Statistics Survey: Paycheck Counts*

Response errors in the CES survey and its principal benchmark, the ES-202 program, can lead to inconsistencies between these two establishment data series, as well as contribute to the discrepancy between the employment measured by the CES and CPS surveys. In particular, reporting errors caused by employers submitting a paycheck count rather than an actual employment level will overstate employment data from establishment sources like CES and ES-202. This is because in addition to issuing paychecks for regular earnings, some employers issue separate checks to workers for bonuses, vacation pay, and other special pay. Consequently, reporting a count of checks issued in lieu of the actual number of workers on the payroll for the pay period often will cause some employees to be counted more than once. Detecting this type of response error through routine data editing can be quite difficult since it typically causes only a modest overstatement in the individual establishment's employment level, not enough to be flagged for follow up and correction by standardized data editing programs. The cumulative effect of this type of reporting error, however, can be significant.

In 1992, BLS discovered this type of paycheck count reporting error among numerous establishments nationwide that used third party payroll processing services. It led to an unusually large—and widely publicized—downward benchmark revision of 640,000 to CES employment for 1991.<sup>31</sup> If this type of reporting error continued to exist on a widespread basis, it could be a contributing factor in the gap between CES and CPS employment in the 1990s. Furthermore, if the use of third party payroll processing and/or payroll software has been on the rise in the past decade, and some large and growing amount of employment was overstated by these sources, it also could account for some of the growth in the discrepancy.

Since the 1991 benchmark, BLS has undertaken several studies aimed at determining the causes of paycheck counts and related reporting errors and also made significant efforts to prevent them. In a 1996 Response Analysis Survey, BLS conducted 8,000 telephone interviews of CES and ES-202 reporters to review reporting practices for both programs

and the concepts and definitions of employment. Results indicated that 94 percent of the respondents in both programs reported unduplicated employee counts. BLS also analyzed the quality of reports from payroll processing firms, interviewing a large sample of 250 firms.<sup>32</sup> From the information they provided, BLS estimated that the approximate coverage of employees reported by all such payroll firms was 24 million.<sup>33</sup> Ninety-five percent of the employment reported by payroll firms was correct; that is, they provided an unduplicated count of employees.<sup>34</sup>

Concurrent with undertaking these studies, BLS implemented procedures to educate ES-202 and CES respondents using means such as special brochures and targeted telephone interviews with larger employers and employers with large differences in employment reported to the two programs. BLS also initiated increased communication and cooperation with third party payroll processing firms and payroll software developers and has developed a close relationship with trade associations representing the interests of payroll processors and professionals. These outreach efforts have continued though at a reduced level. Although BLS cannot quantify the response error that may occur from paycheck counting, the outreach practices reduces the possibility that widespread reporting errors are present in the establishment data and play more than a minor role in the discrepancy between CES and CPS employment.

#### *Employment among the prison population*

The CPS sample represents the civilian noninstitutional population. By definition, it excludes persons in institutions such as prisons. The CES employment definition also excludes prisoners employed in government-sponsored prison work programs or as contract workers for private firms. However, it is unclear as to whether such workers might have been included in the CES benchmark data.<sup>35</sup> Given this uncertainty, along with the fact that the prison population has swollen in recent years, and frequent media reports on increased use of prison labor, we looked at the possible effect of prison workers on the employment discrepancy's growth in the 1990s. According to the Bureau of Justice Statistics, as of June 30, 2000, 1.3 million persons were in Federal and State prisons.<sup>36</sup> The Correctional Industries Association reported that the total number of U.S.

inmates employed in industries was nearly 84,000 in 1999, an increase of about 27 percent since 1990.<sup>37</sup> Based on these data, it would seem that even if all incarcerated workers were included inadvertently in the CES, they would account for only a small proportion of the employment discrepancy.

### *Response error in the Current Population Survey*

Response error may occur in the CPS for different reasons—for example, the respondent might misinterpret the question.<sup>38</sup> Response error can originate from many different sources.<sup>39</sup> This section examines the respondent, time in sample, and interview mode. Each of these three potential sources of response error is examined in terms of whether it could have produced a clear understatement of CPS employment or has increased over time. We also discuss the following indicators of potential nonsampling error—proxy reporting rates, month-in-sample indexes, and mode-of-interview biases.<sup>40</sup> Overall, it has been determined that CPS response error has not contributed to the growth in the CES-CPS employment discrepancy in the 1990s because it has neither generated a clear understatement of CPS employment nor has it increased over time.

### Respondent

In order to collect all the information for the household timely and efficiently, the interviewer generally interviews any knowledgeable household member 15 years of age or older. Respondents who provide labor market information for other household members are called proxy reporters.<sup>41</sup> Nonsampling error may occur because some household members may not know or be able to report correct information for other household members.<sup>42</sup> There has been concern that since it is a potential source of response error, the use of proxy reporting in the CPS might have heightened the CES/CPS employment discrepancy by affecting the CPS employment estimate. According to research, self-reporting is more reliable than proxy reporting, especially when there are motivational reasons for self and proxy respondents to report differently.

However, in some circumstances, such as in responding to sensitive questions, proxy reporting is more accurate.<sup>43</sup>

Generally, the level of proxy reporting in the CPS has been around 50 percent.<sup>44</sup> Since the incidence of proxy reporting has not changed during the 1990s, it would seem an unlikely source of increasing response error in the CPS and therefore could not have contributed to the growth of the CES-CPS employment discrepancy.

### Time in sample

A sample household in the CPS has eight interviews during a 16-month period. First, a household is interviewed 4 consecutive months, then is not in the sample for the next 8 months, is interviewed the next 4 months, and then retires from the sample.<sup>45</sup> Overall, though, since the sample rotation pattern has been the same since 1953, it could not have caused an increasing amount of response error and therefore it is unlikely that it affected the growth of the CES-CPS employment discrepancy.

### Interview mode

A household's first and fifth months' interviews are done in person whenever possible. The remaining months' interviews may be done over the telephone either by the field interviewer or an interviewer from a centralized telephone facility.<sup>46</sup> With the implementation of the revised CPS in January 1994, there was an increased reliance on the use of centralized telephone centers for conducting interviews. Telephone interviewing is the preferred data collection method because it is more time and cost efficient. Approximately 60 percent of the households in any given calendar month are interviewed by telephone.<sup>47</sup>

The major difference in a computer-assisted personal interview (CAPI) and a computer-assisted telephone interview (CATI) is that a CAPI case is likely to be done by the same interviewer all months in sample (MIS), whereas a CATI case has a definite change in

interviewer between MIS 1 and 2 and 5 and 6. Cases in centralized telephone centers often have different interviewers each month. However, it is not clear whether the results from the centralized CATI or the CAPI interviews are more accurate.<sup>48</sup>

BLS tested the effect of centralized telephone interviewing on selected labor force characteristics using data from January to December 1996. All cases within eligible primary sampling units were randomly assigned to the CATI panel or the control (CAPI) panels. No significant differences were found between the CATI test and control panels for the labor force participation rate or the employment-population ratio.<sup>49</sup> Therefore, it seems that interview mode would not have affected the CPS employment estimate or the CES-CPS discrepancy.

### **Note on changes at business turning points**

Generally, analysts of the employment data consider the establishment survey a better gauge of monthly job growth than the household survey. Due to its larger sample size, establishment survey estimates tend to be less volatile than those from the household survey. In addition, the payroll survey estimates are anchored annually to the near universe count of jobs from the ES-202 program. The household survey has no such benchmark to an administrative count of jobs.

Some analysts contend, however, the household survey provides a more accurate picture of change at business cycle turning points. The foundation for this contention is the difficulty measuring the birth and death of new firms. To the extent that the establishment survey might over or understate the birth and death of new firms, it could over or understate employment growth. Generally, the contention has been that the establishment survey overstates job growth going into a downturn because it is not fully accounting for business closures and understates growth coming out of the downturn because it is not fully capturing new business formation. The CES redesign undertaken in 2000 addressed this criticism by updating the sampling frame and CES sample more frequently—twice a year—and redrawing the full sample every year.

Clearly, gauging business activity at turning points is difficult, and it may remain a potential issue for the establishment survey. However, there also is an issue with the household survey that may have affected the estimates for the period from 2000 through 2002. As discussed above, one determinant of CPS employment growth is the estimated level of population growth. In February 2003, the new population controls for 2000, 2001, and 2002 were introduced. These new population estimates included not only a one-time bump for the difference between prior estimates and the results of Census 2000 but also a slightly higher population growth rate from 2000 through 2002. This higher population growth in turn raised the level of CPS employment growth for the period. As shown in chart 2, CPS-CES employment over those 3 years tracked more closely prior to the introduction of the new population controls.

While the population growth estimates are reviewed each year, they are not adjusted for changing economic conditions. It could be argued that one of the key factors in population growth, undocumented immigration, is responsive to those economic conditions. That certainly seemed to be the case in the 1990s, when CES showed more employment growth each year than the CPS, in part because the estimate of population growth was too low. Population growth may have eased as the labor market softened in the early part of this decade. The boost in estimated population growth introduced from January 2000 forward could be an overstatement and could be resulting in an overstatement of employment growth from the household survey.

Finally, those wishing to analyze the employment data around the recent business cycle turning point should bear in mind that both surveys underwent significant changes to their methodology since the last economic downturn during the early 1990s. Moreover, the labor market itself underwent major transformations during that decade. Thus, the observed behavior of the surveys during past business cycles may not be a good predictor of their behavior in the current situation.

**NOTE TO REVIEWERS:** In accordance with our usual practice, BLS will make a preliminary announcement on the size of the March 2003 benchmark revision on October 3, 2003, in the Employment Situation news release. This preliminary estimate of the benchmark will be presented at the FESAC conference.

## **Summary**

During the 1990s, employment growth as measured by the CPS lagged growth as measured by the establishment survey. The quantifiable universe and definitional factors between the surveys explained only part of this discrepancy. The update of CPS population controls following Census 2000 narrowed but did not close the gap. To date, then, BLS has not been able to pinpoint a source or sources of these differing trends in employment growth. It may be that multiple factors, including CPS undercoverage, survey reference period differences and rapid job changing, and miscellaneous reporting and response errors are all likely to have contributed to varying degrees.

## **Questions for consideration by FESAC**

Of the areas discussed for which information is incomplete or unavailable, which would seem most promising for further study? Can you suggest approaches for further research in these areas?

Are there other explanations for the discrepancy that BLS should investigate?

Are there other data sets that might be useful for research into this issue?

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<sup>1</sup> The surveys have shown differing trends for substantial periods in the past. These differences were examined in several articles, including Green, Gloria, "Comparing employment estimates from household and payroll surveys," *Monthly Labor Review*, December 1969, pp 9-20; National Commission on Employment and Unemployment Statistics, *Counting The Labor Force*, Labor Day 1979, pp 193-199; Christopher G. Gellner, "A 25-year look at employment as measured by two surveys," *Monthly Labor Review*, July 1973, pp 14-23; and Paul O. Flaim, "How many new jobs since 1982? Two surveys differ," *Monthly Labor Review*, August 1989, pp 10-15.

<sup>2</sup> For more information on the establishment survey, refer to Chapter 2 of the *Handbook of Methods*, on the Internet at [http://www.bls.gov/opub/hom/homch2\\_itc.htm](http://www.bls.gov/opub/hom/homch2_itc.htm) (last visited Nov. 14, 2001).

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<sup>3</sup> For more information on the household survey, refer to the “Technical notes to household survey data published in *Employment and Earnings*,” on the Internet at <http://www.bls.gov/cps/cpstn952.htm> (last visited Nov. 14, 2001).

<sup>4</sup> The CES employment statistics for government refer to civilian employees only.

<sup>5</sup> The availability of monthly multiple jobholding data from the CPS since 1994 has helped in reconciling this part of the CES-CPS employment growth gap. In the monthly internal reconciliation process, the number of multiple jobholders who are classified as nonagricultural wage and salary workers on their secondary jobs is added to the unadjusted CPS employment estimate.<sup>5</sup> This is done so the CPS employment estimate will more closely match the payroll survey’s “job count.” In years prior to 1994, monthly multiple jobholding estimates were imputed from information collected less frequently. During the period of the employment discrepancy’s growth in the 1990s, the number of multiple jobholders who were nonagricultural wage and salary workers on their secondary jobs increased but the growth in multiple jobholders during this period accounted for only a small share of the growth in the discrepancy between the CES and otherwise-adjusted CPS estimates. While the CES-CPS employment discrepancy grew substantially and increasingly, multiple jobholding exhibited unsteady and then dampened growth. So although multiple jobholding does contribute to the CES-CPS employment discrepancy, it did not contribute much to the discrepancy’s *growth*.

<sup>6</sup> In addition to identifying persons who have more than one job during the survey reference week, the CPS has information on the number of jobs held up to 4 or more. About 93 percent of multiple jobholders have 2 jobs. The number of persons holding 3 or more jobs remained around 550,000 from 1994 to 2000. Further, the class of worker and industry status is only collected for the primary and second job, so it is not known to what extent 3<sup>rd</sup> and 4<sup>th</sup> jobs would be nonagricultural wage and salary employment.

<sup>7</sup> For more information see *Department of Defense Active Duty Military Personnel Strength Level, Fiscal Years 1950 – 2000*, Department of Defense, Directorate for Information Operations and Reports, Statistical Information Analysis Division--Personnel, on the Internet at <http://web1.whs.osd.mil/mmids/mmidshome.htm> (visited April 23, 2001).

<sup>8</sup> Nonagricultural wage and salary workers are a class of worker from the Current Population Survey. CPS wage and salary workers receive wages, salary, commissions, tips, or pay in kind from a private employer or from a government unit. This is the group of employed persons from the CPS that is most closely related to the CES employment estimate of nonfarm payroll employees. For more information, see “Collection and Coverage,” from “Technical notes to household survey data published in *Employment and Earnings*,” Labor Force Statistics from the Current Population Survey, Bureau of Labor Statistics, on the Internet at <http://www.bls.gov/cpstn1.htm> (visited Feb. 28, 2001).

<sup>9</sup> The 2000 CPS data were not adjusted for Census 2000 population controls.

<sup>10</sup> Following the 1990 decennial census, BLS chose to use CPS population controls that incorporated the results and adjustments obtained from the Post-Enumeration Survey (PES), a post-census quality control check that assessed the estimated undercount. Thus, BLS began the decade estimating CPS employment using the best available data for the population controls. Even using the PES-adjusted population controls, however, the total revision in 1990 was an increase of just 880,000, or 0.75 percent of the prior year’s employment. This was far less significant than the approximate 2 percent upward revision introduced from the 1980 census. For more information on the Post-Enumeration Survey, see *Current Population Survey: Design and Methodology*, Technical Paper 63, pp. D-20-D-22. On the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Mar. 16, 2001).

<sup>11</sup> Using this population base and the subsequent procedures described implies the assumption of a constant size undercount.

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<sup>12</sup> In 1999, Juhn and Potter of the Federal Reserve Bank of New York published an article on the discrepancy in which they proposed that CPS employment levels likely were understated due to perceived deficiencies in the census population data (“Explaining the Recent Divergence in Payroll and Household Employment Growth,” Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, December 1999, Vol. 5, No. 16, pp. 1-6, on the Internet at [http://www.ny.frb.org/rmaghome/curr\\_iss/ci5-16.html](http://www.ny.frb.org/rmaghome/curr_iss/ci5-16.html)). They hypothesized that an undercount of the working-age population data underlying the CPS employment figures could explain a sizable portion of the discrepancy between the two series. They further observed that the demographic groups most likely to be undercounted were those “whose employment status is very sensitive to business cycle fluctuations.” In Juhn and Potter’s assessment, these factors taken together could account not only for a significant portion of the gap itself, but also explain its cyclical behavior and marked increase through the 1990s. They illustrated their case with the example of black men, a demographic group widely acknowledged as prone to be undercounted, particularly the younger cohorts. Increases in employment among black men during the 1990s expansion were likely to be captured fully in the payroll survey, they asserted, but understated in the household survey. For the overall population, they projected that an undercount of 2 percent could translate into a gap of 2 million between the household and payroll surveys, if half of that 2 percent found employment during the latter half of the decade.

<sup>13</sup> See Deardorff and Blumerman, 2001, "Evaluating Components of International Migration: Estimates of the Foreign-Born Population by Migrant Status in 2000", Population Division Working Paper Series No. 58.

<sup>14</sup> For additional information on the calculation of the CPS coverage ratios, see *Current Population Survey: Design and Methodology*, Technical Paper 63, U.S. Department of Labor and U.S. Department of Commerce, March 2000, page 16-1, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Mar. 16, 2001).

<sup>15</sup> For a detailed discussion of coverage error in the CPS, see *Current Population Survey: Design and Methodology*, Technical Paper 63, U.S. Department of Labor and U.S. Department of Commerce, March 2000, pp. 15-2-15-4 and pp. 16-1-16-2, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Mar. 16, 2001).

<sup>16</sup> For more information on the second-stage ratio adjustment process, see *Current Population Survey: Design and Methodology*, Technical Paper 63, pp. 10-5-10-7. On the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Mar. 16, 2001).

<sup>17</sup> See “Patterns of Reporting Errors and Irregularities by 100 Employers with the Most Suspended Wage Items,” Audit Report A-03-98-31009, September 1999, and “The Social Security Administration’s Earnings Suspense File Tactical Plan and Efforts to Reduce the File’s Growth and Size,” Evaluation Report A-03-97-31003, February 2000, Office of the Inspector General, Social Security Administration. On the Internet at <http://www.ssa.gov/oig/index.htm> (visited April 16, 2001).

<sup>18</sup> The BLS Covered Employment and Wages, or ES-202, program produces a complete count of employment and wages for workers covered by state unemployment insurance (UI) laws and federal government workers covered by Unemployment Compensation for Federal Employees. The program serves as a virtual census of nonfarm employment and wages with significant geographic and industry detail and is the primary benchmark for the CES employment estimates. In this analysis, the ES-202 employment data were adjusted to a concept similar to CES by omitting private households and agricultural industries that are not included in the CES. For more information on the ES-202 program, see <http://www.bls.gov/cew/home.htm>.

<sup>19</sup> Alaska, Georgia, Idaho, Oklahoma, and Wyoming.

<sup>20</sup> Nationwide, the ES-202 employment (as adjusted to a CES concept) rose by 17.1 million, or 15.3 percent, over the 1994-2000 period. When evaluated by county-defined categories corresponding to the

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CPS sample, employment in the self-representing counties grew by 15.5 percent, compared with the 12.4 percent in the nonself-representing counties, and 10.0 percent in the non-sample counties. Seven states and the District of Columbia are comprised entirely of self-representing PSUs (Connecticut, Delaware, District of Columbia, Massachusetts, New Hampshire, New Jersey, Rhode Island, and Vermont) and therefore were not directly relevant for the research. A ninth state—Hawaii—has PSUs defined at the sub-county level that prevented its inclusion. Data for the remaining 42 states, then, were the basis for the comparison of the nonself-representing and the non-sample counties.

It should be noted that, at any point in time, the ES-202 program has a small proportion of employment that cannot be classified in specific counties. These include employer reports that do not provide county detail, employer reports for which the county information is temporarily unavailable, and a very small number of cases where the UI-covered employment is based in foreign locations. In 1994, 1.3 percent of the ES-202 employment in this research was not classifiable by county; in 2000, it was 2.0 percent. The employment associated with the unknown county locations was categorized separately in this research. There is no reason to believe that this employment is more likely to fall into one CPS sample category over another, that is, self-representing versus nonself-representing or not in sample. Hence, their exclusion should not have had any notable effect on the results of the analysis.

<sup>21</sup> *Measuring Employment and Unemployment*, President's Committee to Appraise Employment and Unemployment Statistics, 1962, p. 360.

<sup>22</sup> See Getz, Patricia, Jurgen Kropf, and Michael Roosma, "Causes and Treatments of Non-Economic Fluctuations in Average Weekly Hours and Average Hourly Earnings Series," Bureau of Labor Statistics, 1999, on the Internet at <http://www.bls.gov/ore/pdf/st990180.pdf> (visited Feb. 27, 2001), p. 3.

<sup>23</sup> See Getz, Patricia, Jurgen Kropf, and Michael Roosma. Page 3.

<sup>24</sup> It should be noted that the CPS question that asks whether the respondent's employer has changed was not designed to gather or track information about job changing. Rather, the question is used as an indicator of whether the industry in which the respondent is employed has changed and hence to determine whether the individual's industry and occupation information should be carried forward.

<sup>25</sup> In the late 1990s, BLS initiated a new survey program, the Job Openings and Labor Turnover Survey (JOLTS), which gathers data on labor turnover by industry from a sample of 16,000 business establishments. The earliest data available are for December 2000. For more information, see the JOLTS homepage on the BLS Internet site at <http://www.bls.gov/jlt/> (visited Jan. 11, 2002).

<sup>26</sup> The Bureau of National Affairs is a private publisher. BNA's rates of permanent separation exclude layoffs, reductions-in-force, long-term leaves of absence, and departures of temporary staff. BNA's quarterly turnover data are derived from a survey of human resource and employee relations executives representing a cross-section of U.S. employers, both public and private.

<sup>27</sup> See "Economy Spurs Highest Turnover Rates in Nearly 20 Years, BNA Survey Finds," *BNA press release*, March 13, 2000, on the Internet at <http://www.bna.com/press.trn98r1.htm> (last visited Jun. 4, 2001).

<sup>28</sup> For more information, see Joseph R. Antos, Anthony J. Barkume, J. Welton Mixon, and Jack E. Triplett, "Why Employment Estimates Differ: A Study of Discrepancies between BLS Household and Payroll Estimates," Working Paper 65, Bureau of Labor Statistics, October 1976, pp. 12-14. The authors constructed the quit variable by multiplying the manufacturing quit rate (produced from the former BLS Labor Turnover Survey until the end of 1981) by the estimate of total nonfarm payroll employment. This provided an estimate of the total number of quits in the nonagricultural sector. However, the authors identified two measurement problems that produced errors in the estimate. The quit rates were only available for manufacturing and mining and therefore were not perfectly correlated with economy-wide averages. In addition, the reference periods for turnover and employment data differed.

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<sup>29</sup> Annual benchmark revisions are a standard part of the CES estimation process. Benchmarking is a re-anchoring of the sample-based employment estimates to total nonfarm employment counts.

<sup>30</sup> The U.S. Census Bureau's *County Business Patterns*, based on data for employees covered under Social Security laws, augment the ES-202 for non-office insurance sales workers, child daycare workers, religious organizations, and private schools and hospitals. The Annual Census of Governments conducted by the Census Bureau provides benchmarks for State and local government hospitals and educational institutions. Universe data for interstate railroads are obtained from the Railroad Retirement Board.

<sup>31</sup> For further information about the 1991 CES benchmark revision, see Patricia M. Getz, "BLS Establishment Estimates Revised to March 1991 Benchmarks," *Employment and Earnings*, Vol. 39, No. 6, June 1992, pp. 6-11, and "Revision of Payroll Survey Employment Estimates to March 1991 Benchmarks," Bureau of Labor Statistics, Office of Employment and Unemployment Statistics, June 3, 1992.

<sup>32</sup> See Goldenberg, Karen L, Susan E. Moore, and Richard J. Rosen, "Commercial Payroll Software and the Quality of Employment Data," at <http://stats.bls.gov/orest/st940240.htm> (visited March 12, 2001).

<sup>33</sup> It should be noted that payroll processing firms are more likely to provide the unemployment insurance tax reports that are the source of ES-202 employment than they are to file the CES survey on behalf of the employer. Hence, most response errors stemming from third party payroll processing firms probably will originate in the ES-202 program. Since the ES-202 is the primary benchmark for the CES employment, though, the CES employment also will reflect any overstatements from the ES-202.

<sup>34</sup> BLS also contacted and interviewed payroll software developers in this latter study. Using information about the number of leased or licensed software products and the number of copies of payroll software sold, it was estimated that approximately 25 to 40 million employees are covered by such payroll software products. This estimate could substantially increase if user-developed software is also considered. The accuracy obtained from the software products was not readily determined, since many components of correct reporting were the responsibility of the end users. Software product accuracy, then, is probably similar to the percentage of incorrect reports received from respondents using self-developed software or no software at all.

<sup>35</sup> Generally speaking, prison workers should not be included in the payroll employment data. The CES program considers these workers out of the survey's scope. However, the primary employment benchmark data for the CES come from State unemployment insurance (UI) tax reports provided to BLS for the ES-202 program (see endnote 18). Prison workers were not formally excluded under federal UI coverage law until 1997. Even though excluded under federal law, States can choose to cover such workers under State law; whether any States do so cannot be readily determined. More importantly, though, government and private employers in practice could be including prison workers inadvertently in their CES reports and/or their unemployment insurance tax reports. Although BLS has not identified any instances where prison workers have been reported in error, the inclusion of other out-of-scope and non-covered workers in establishment data has occurred on occasion. Such reporting errors are extremely difficult to detect.

<sup>36</sup> *Prison and Jail Inmates at Midyear 2000*, Bulletin, (Bureau of Justice Statistics, March 2001), on the Internet at <http://www.ojp.usdoj.gov/bjs/pub/pdf/pjim00.pdf> (visited Apr. 24, 2001).

<sup>37</sup> See *2000 CIA Directory*, Correctional Industries Association. For more information, the CIA website may be accessed on the Internet at <http://www.correctionalindustries.org> (visited June 13, 2001).

<sup>38</sup> For more information, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, 15-6, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

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<sup>39</sup> For more information on sources of response error, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, pages 15-6 – 15-8, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>40</sup> For more information about indicators of potential nonsampling error, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, Chapter 16, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>41</sup> For more information about the respondent, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, pages 7-3, 15-7, and 16-10, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>42</sup> See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, page 16-10, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>43</sup> See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, page 15-7, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>44</sup> See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, page 16-10, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>45</sup> For more information about the rotation of the CPS sample, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, page 3-15, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

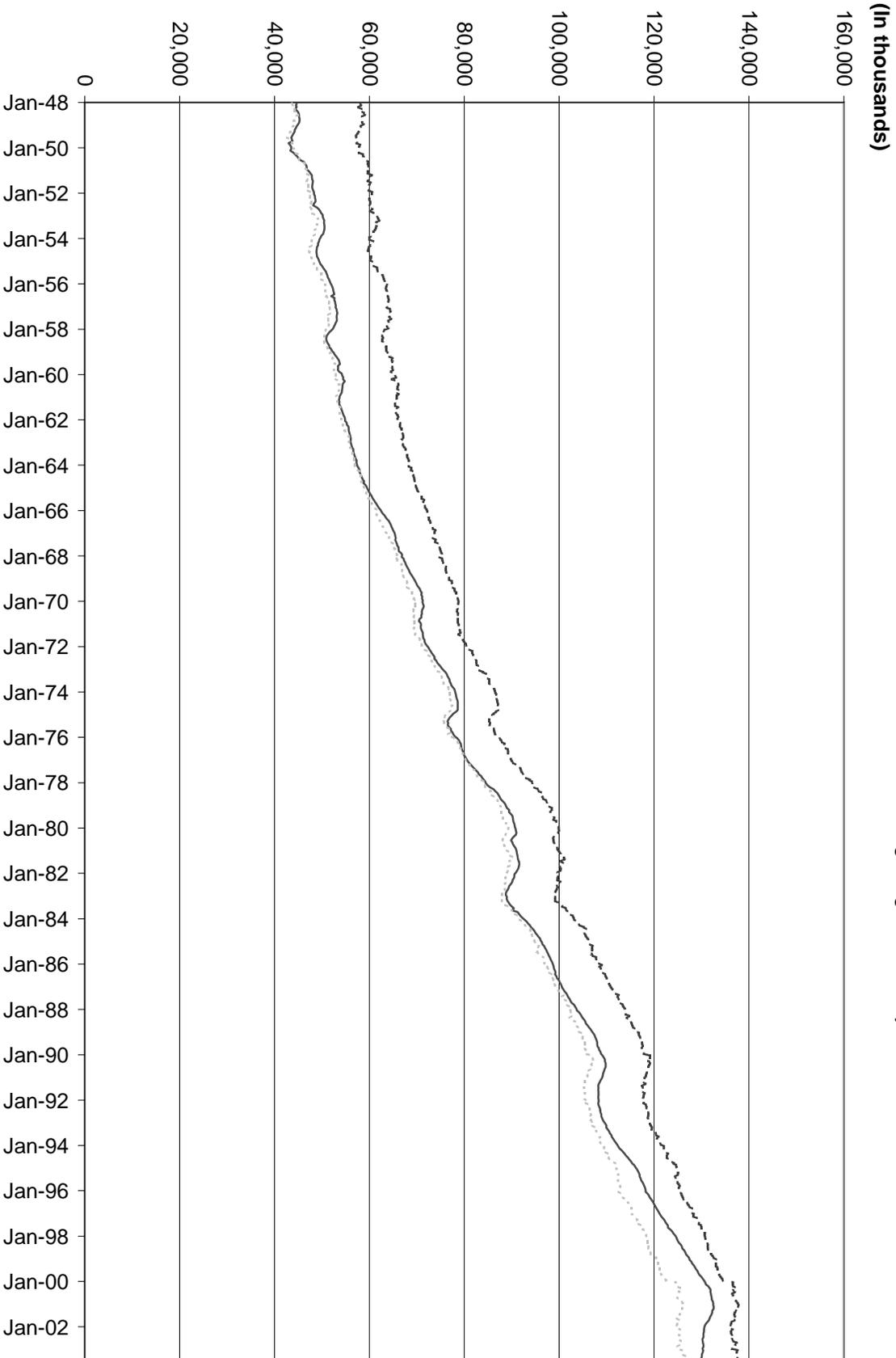
<sup>46</sup> A household's initial interview is to be done in person by a field representative. For households in the second, third, and fourth months in sample, the field representative may conduct the interview over the telephone (this must be approved by the respondent). The fifth-month interview must be done in person. The purpose of the in-person interview is to reestablish the relationship with the household after its being out of the survey for 4 months. Households in their sixth, seventh, or eighth month-in-sample are eligible for telephone interviewing. See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, pp. 7-3 - 7-5, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>47</sup> See *BLS Handbook of Methods*, Chapter 1. "Labor Force Data Derived from the Current Population Survey," U.S. Department of Labor, Bureau of Labor Statistics, pages 9-10, reprinted from April 1997, on the Internet at <http://www.bls.gov/opub/hom/home.htm> (visited Jan. 10, 2002). For a discussion of the incidence of telephone interviewing in the CPS and related indicators, see *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, pages 16-6 – 16-7, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>48</sup> See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, page 16-7, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

<sup>49</sup> See *Technical Paper 63 Current Population Survey: Design and Methodology*, March 2000, pages 16-7 - 16-8, on the Internet at <http://www.census.gov/prod/2000pubs/tp63.pdf> (visited Jan. 10, 2002).

**Chart 1. Employment from CES, CPS total, and CPS Nonag Wage and Salary, 1948-2003**



Note: CPS data for January 2000 forward reflect Census 2000-based population controls.

**Table 1. Reconciliation of employment estimates from the CES and the CPS***Adjusting the discrepancy between 1994 and 2000 for routinely quantified conceptual and universe differences*

Annual averages, in thousands

| Item   | 1994           | 2000                 | Growth        |
|--|----------------|----------------------|---------------|
| CES employment   | 114,291        | 131,785              | 17,494        |
| CPS employment   | 123,060        | <sup>1</sup> 135,208 | 12,148        |
| <u>Discrepancy in CES and CPS employment estimates</u>                 | <u>-8,769</u>  | <u>-3,423</u>        | <u>5,346</u>  |
| <i>Reconciliation for quantified differences in CES and CPS:</i>       |                |                      |               |
| CES employment   | 114,291        | 131,785              | 17,494        |
| CPS employment   | 123,060        | <sup>1</sup> 135,208 | 12,148        |
| <i>Adjust CPS to better match CES estimate</i>                         |                |                      |               |
| Less:  |                |                      |               |
| 1. Agricultural employment   | 3,409          | <sup>1</sup> 3,305   | -104          |
| 2. Nonagricultural unincorporated self-employed persons                | 9,003          | <sup>1</sup> 8,674   | -329          |
| 3. Nonagricultural unpaid family workers                               | 131            | <sup>1</sup> 101     | -30           |
| 4. Nonagricultural private household wage and salary workers           | 966            | <sup>1</sup> 890     | -76           |
| 5. Unpaid absences, nonagricultural wage and salary workers            | 1,991          | <sup>1</sup> 1,998   | 7             |
| Plus:  |                |                      |               |
| 6. Multiple jobholders with secondary wage and salary jobs             | 4,916          | <sup>1</sup> 5,284   | 368           |
| 7. Agricultural services wage and salary workers <sup>2</sup>          | 716            | <sup>1</sup> 964     | 248           |
| <u>Adjusted CPS employment</u>   | <u>113,192</u> | <u>126,488</u>       | <u>13,296</u> |
| <u>Discrepancy in CES and adjusted CPS employment</u>                  | <u>1,099</u>   | <u>5,297</u>         | <u>4,198</u>  |
| <i>Additional adjustments to the CPS</i>                               |                |                      |               |
| Plus: 15-year-old nonagricultural wage and salary workers <sup>3</sup> | 354            | 433                  | 79            |
| Plus: multiple jobholders with more than 2 jobs <sup>3</sup>           | 524            | 545                  | 21            |
| Plus: Census 2000 population control revision to CPS                   |                | 1,683                | 1,683         |
| <u>Adjusted(2) CPS employment</u>                                      | <u>114,070</u> | <u>129,149</u>       | <u>15,079</u> |
| <u>Discrepancy in CES and adjusted(2) CPS employment</u>               | 221            | 2,636                | <b>2,415</b>  |

Note: Shaded area illustrates the routine monthly reconciliation exercise carried out by BLS to make the CPS better match the CES concept. Since January 2003, the monthly reconciliation has been modified somewhat from this example in terms of the data series used. Conceptually, however, the adjustments are the same.

<sup>1</sup> These data reflect CPS employment estimates prior to revisions incorporating the Census 2000-based population controls.

<sup>2</sup> This subset of agricultural employment, based on the 1987 Standard Industrial Classification (SIC) and 1990 Census Industrial Classification, was included in the CES survey's scope and hence added back in to the CPS after removing total agricultural employment in step 1. Due to the redefinition of the agricultural sector under the North American Industry Classification System (NAICS) and the derivative 2002 Census Industrial Classification, this adjustment is no longer necessary in current reconciliation exercises.

<sup>3</sup> Special CPS microdata tabulations. This information is not routinely tabulated from the CPS .

**Table 2. Employment as measured by the CES and CPS, annual averages, 1994-2000**  
(Numbers in thousands)

| Year | Levels  |         |                           | Cumulative change since 1994 |        |                           | Discrepancy in growth since 1994 |                                     |                                     |
|------|---------|---------|---------------------------|------------------------------|--------|---------------------------|----------------------------------|-------------------------------------|-------------------------------------|
|      | CES     | CPS     | CPS nonag wage and salary | CES                          | CPS    | CPS nonag wage and salary | CES minus CPS                    | CES minus CPS nonag wage and salary | CPS minus CPS nonag wage and salary |
| 1994 | 114,291 | 123,060 | 110,517                   |                              |        |                           |                                  |                                     |                                     |
| 1995 | 117,298 | 124,900 | 112,448                   | 3,007                        | 1,840  | 1,931                     | 1,167                            | 1,076                               | 640                                 |
| 1996 | 119,708 | 126,708 | 114,171                   | 5,417                        | 3,648  | 3,654                     | 1,769                            | 1,763                               | 1,229                               |
| 1997 | 122,776 | 129,558 | 116,983                   | 8,485                        | 6,498  | 6,466                     | 1,987                            | 2,019                               | 1,234                               |
| 1998 | 125,930 | 131,463 | 119,019                   | 11,639                       | 8,403  | 8,502                     | 3,236                            | 3,137                               | 2,442                               |
| 1999 | 128,993 | 133,488 | 121,323                   | 14,702                       | 10,428 | 10,806                    | 4,274                            | 3,896                               | 3,343                               |
| 2000 | 131,785 | 135,208 | 123,128                   | 17,494                       | 12,148 | 12,611                    | 5,346                            | 4,883                               | 4,198                               |

Note: The CPS data series reflect estimates prior to revisions incorporating the Census 2000-based population controls.

**Table 3. Difference between CES and CPS nonagricultural wage and salary employment growth for selected states, 1994 and 2000 annual averages**

(In thousands)

| State                      | CES employment |        | CPS nonagricultural wage and salary employment |                   | Cumulative difference in growth, 1994-2000 |
|----------------------------|----------------|--------|--|-------------------|--|
|                            | 1994           | 2000   | 1994   | 2000 <sup>1</sup> |  |
| Mexican border             |                |        |  |                   |  |
| Arizona                    | 1,692          | 2,243  | 1,686  | 2,061             | 176  |
| California                 | 12,160         | 14,488 | 12,267   | 14,292            | 304  |
| New Mexico                 | 657            | 745    | 624  | 705               | 7  |
| Texas                      | 7,751          | 9,433  | 7,828  | 8,858             | 652  |
| Canadian border            |                |        |  |                   |  |
| Alaska                     | 259            | 284    | 251  | 267               | 9  |
| Idaho                      | 461            | 560    | 466  | 543               | 22   |
| Maine                      | 532            | 603    | 488  | 574               | -14  |
| Michigan                   | 4,147          | 4,674  | 4,173  | 4,637             | 64   |
| Minnesota                  | 2,310          | 2,676  | 2,178  | 2,389             | 154  |
| Montana                    | 340            | 388    | 330  | 373               | 4  |
| New Hampshire              | 523            | 622    | 534  | 594               | 39   |
| New York                   | 7,831          | 8,635  | 7,430  | 7,930             | 304  |
| North Dakota               | 295            | 328    | 258  | 277               | 13   |
| Vermont                    | 264            | 299    | 254  | 282               | 7  |
| Washington                 | 2,304          | 2,711  | 2,223  | 2,613             | 18   |
| Total, border states       |                |        |  |                   | 1,758                                      |
| Selected non-border states |                |        |  |                   |  |
| Florida                    | 5,799          | 7,081  | 5,776  | 6,640             | 417  |
| Massachusetts              | 2,904          | 3,323  | 2,743  | 2,903             | 259  |
| Ohio                       | 5,076          | 5,625  | 4,838  | 5,139             | 247  |
| North Carolina             | 3,359          | 3,934  | 3,133  | 3,466             | 242  |
| Pennsylvania               | 5,192          | 5,691  | 4,999  | 5,271             | 227  |
| Virginia                   | 3,004          | 3,517  | 2,979  | 3,279             | 213  |
| Maryland                   | 2,146          | 2,450  | 2,408  | 2,499             | 213  |
| Indiana                    | 2,713          | 3,000  | 2,670  | 2,749             | 208  |

<sup>1</sup> Not adjusted for Census 2000 population controls

**Table 4. Growth in CES employment in selected metropolitan areas near border crossings, 1994 and 2000 annual averages**

(In thousands)

| Metropolitan Area                                   | 1994  | 2000  | Change,<br>1994-<br>2000 |
|---|-------|-------|--------------------------|
| Mexican border                                      |       |       |                          |
| Brownsville-Harlingen-San Benito,<br>El Paso, Texas | 91    | 109   | 19                       |
| Laredo, Texas                                       | 231   | 256   | 26                       |
| McAllen-Edinburg-Mission, Texas                     | 57    | 69    | 12                       |
| San Diego, California                               | 119   | 157   | 38                       |
|   | 955   | 1,194 | 239                      |
| Canadian border                                     |       |       |                          |
| Buffalo-Niagara Falls, New York                     | 535   | 558   | 24                       |
| Detroit, Michigan                                   | 1,950 | 2,204 | 254                      |
| Total   |       |       | 611                      |

**Table 5. Employment growth in nonself-representing and not-in-sample counties, 1994 and 2000 annual averages<sup>1</sup>**

(In thousands)

| Employment                       | 1994    | 2000    | Change,<br>1994-<br>2000 | Percent<br>change,<br>1994-<br>2000 |
|----------------------------------|---------|---------|--------------------------|-------------------------------------|
| Total, United States             | 111,796 | 128,929 | 17,133                   | 15.3                                |
| Self-representing counties       | 87,088  | 100,555 | 13,467                   | 15.5                                |
| Nonself-representing counties    | 7,830   | 8,802   | 971                      | 12.4                                |
| Counties, not in CPS Sample      | 15,440  | 16,981  | 1,541                    | 10.0                                |
| Non-classifiable counties        | 1,438   | 2,591   |                          |                                     |
| as a percent of total employment | 1.3     | 2.0     |                          |                                     |

<sup>1</sup> ES-202 employment, as adjusted to a CES concept by removing private households and agricultural industries not included in the CES

Chart 2. Employment from the household and establishment surveys,  
January 2000 - August 2003

