August 6, 2004

Effects of Job Changing on Payroll Survey Employment Trends

Background

Differences in employment trends between the Bureau of Labor Statistics (BLS) household and payroll employment series over the past several years have given rise to a number of theories about the source of the differences. One theory is that the rate at which workers change jobs may have a significant influence on measured employment growth in the payroll survey (also known as the Current Employment Statistics or CES), but not the household survey (the Current Population Survey or CPS). Because CES is a count of jobs not workers, if workers change jobs *within the payroll survey reference period*, both jobs are counted. Because CPS is a count of persons, this phenomenon does not affect that survey's estimates. If job changer rates are steady over time, this effect would raise the level of the payroll employment series, but not affect the trends. If the job changer rate is variable however, especially if it is cyclically sensitive, it could affect reported job growth trends from the payroll survey in a way that is not mirrored by the household survey. This effect might then help explain some of the recent divergences between the household and payroll survey employment trends. Specifically the CES grew faster than the CPS during the rapid expansion period of the mid-to-late 1990s, and the CES has shown slower growth than the CPS since the last official business cycle peak in March 2001. If job changer rates increase during expansionary periods and decline during recessionary and slow growth times, the job changer effect may explain some of the apparently cyclical nature of CES and CPS divergences.

As an example of how this phenomenon could work, consider that if a worker is employed by a firm with a weekly pay period and leaves in the middle of the week to immediately start work at another firm with a weekly payroll, both of his jobs would be counted by the payroll survey. If on the other hand, the worker leaves the first employer at the end of the week, and goes to work for the second employer at the beginning of the next week, he will not be double counted. He will be counted at the first job in month one and at the second job in the following month. If there are more workers changing jobs during expansionary periods than during recessionary periods, the reported payroll survey employment trends will be affected by this phenomenon.

There are no data available to indicate how frequently workers change jobs within payroll periods, as opposed to between pay periods; however, there are data on job changing rates available from the household survey which can be used to approximate the possible effect of job changing rates on payroll survey employment trends.

The source of the job changer series is a question in the monthly CPS interview which asks: "Last month, it was reported that you worked for (*name provided by respondent in previous month*). Do you still work for (*name provided by respondent in previous month*)?" The phrase "at your main job" is tagged onto the end of the

question for persons who report being multiple job holders during the week of the 12th of the month. The question is asked only of persons who report being employed in consecutive months. The job changer series is available only back to February 1994, when the above question was added to the CPS interview.

Using this information, BLS has completed preliminary research into possible job changer effects on the payroll survey employment trends; results are presented here. Additional research is also underway. Although results are not yet available from the second phase of the research, the approach is briefly described in this paper, along with results from the first stage research.

An Initial Method for Estimating Job Changer Effects

The first method of estimating the effect of job changing on the CES employment trends uses the job change rates from the CPS to make a rough estimate of this potential effect. The method is rough because there is no hard information about how frequently workers change jobs *within* payroll reference periods as opposed to *between* payroll reference periods. It is mainly when workers change jobs within payroll reference periods that the potential for counting both jobs exists. There could also be some effect if a worker changes between reference periods, but is still on the payroll of the first employer because he is in a paid leave status at the first job for some period of time after starting the new job. Again, as with the first issue, there is no hard data on the extent of this phenomenon. The approach and results presented here are similar to the method used by researchers at the Council of Economic Advisors to estimate a job changer effect on the payroll employment series.

The basic approach was to adjust the published CES total nonfarm employment series using CPS job changer data, along with CES length of pay period information, and assumptions about the probability of a worker appearing on two payrolls within one pay period. The CPS job changer rate indicates how many workers change jobs from one month to the next; however the shorter the pay period, the less likely that the job change occurred within the payroll survey reference period, which is defined as the pay period that includes the 12th of each month. For example, if a worker is on a weekly pay period, the method used here assumes a one in four chance that he changed jobs during the reference week. If the pay period is monthly the assumption is that there is a 100% chance.

The length of pay period distributions for the CES sample members and subsequent adjustment to the CPS job changer rate are as follows:

Length of pay period	Frequency in CES sample	Probability of change within reference period	Weighted average calculation
Weekly	45%	.25	.11
Bi-weekly or semi-monthly	43.4%	.50	.22
Monthly	11.6%	1.0	.12
Total	100%		45%

The next step in the process was to adjust the CES published employment series, using the following calculation for each month to derive a monthly time series:

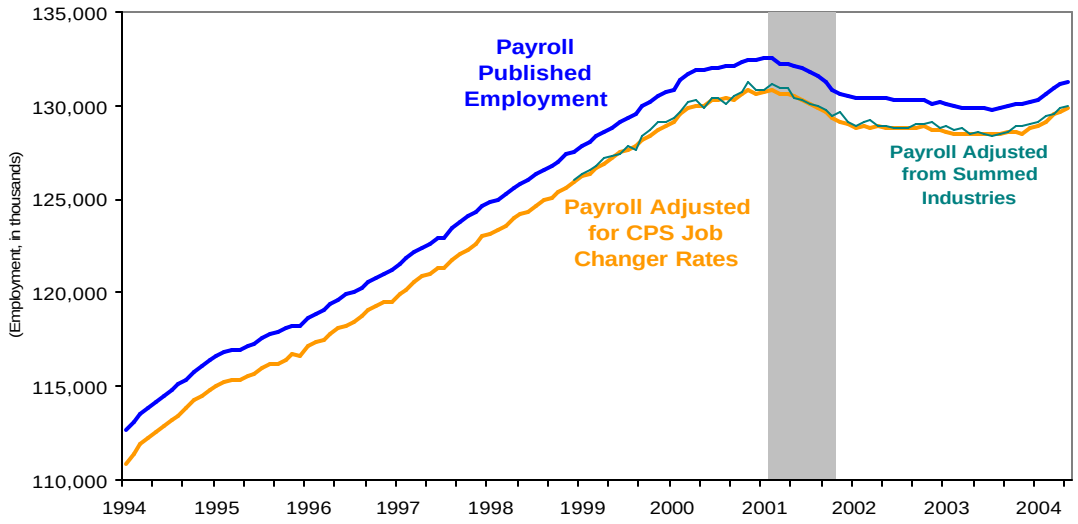
Adjusted CES Employment = published CES employment level –((.45) * (CPS job change rate) * (published CES employment level))

Results

The calculations to derive an adjusted nonfarm employment series were done both directly at the total nonfarm level and at the industry sector level with the results aggregated to form an estimate for total nonfarm. Both methods yielded similar results, although the industry specific method generated a more variable series, as expected because the CPS job changer rates are more variable at industry levels than at the total nonfarm level.

A comparison of the published total nonfarm employment series with the job changer adjusted series is shown on chart 1 for February 1994 through June 2004. Adjusting for job changers lowers the overall level of the nonfarm employment series because it removes the assumed double count of workers who changed jobs during the payroll reference period. The adjusted series however shows the same overall trend as the published nonfarm employment series, as shown by chart 1 below (please see Appendix A for the data series).

Chart 1 - CES Published Employment and CES Adjusted for CPS Job Changer Rate (Seasonally Adjusted)



Payroll Adjusted for CPS Job Changer Rates directly at the TNF level. Payroll Adjusted from Summed Industries, which accounts for industry specific information and sums to TNF, is available only from 1999 forward.

In comparing specific time periods, the employment change measured by the published series differs somewhat from the adjusted series. The amount of the difference depends on the time period referenced. Table 1 shows several comparison points coinciding with business cycle and employment series peaks and troughs. The job changer adjusted series gives a slightly different picture of the trends during the most recent recession and

for the time period after the recession, but does not change the overall trends presented by the published nonfarm employment series.

Table 1: Comparison of published nonfarm employment series changes with series adjusted for job changer effects

Numbers in thousands

Reference period	Seasonally adjusted total nonfarm employment change *as published*	Seasonally adjusted total nonfarm employment change *after estimated adjustment for job changers*	Difference
Business cycle peak to trough: March 2001-November 2001	-1,636	-1,516	120
Business cycle peak to current: March 2001 –June 2004	-1,267	-1,016	251
Business cycle trough to current: November 2001 – June 2004	369	500	-131
Employment series peak to trough: March 2001 – August 2003	-2,718	-2,383	335
Employment series trough to current: August 2003 – June 2004	1,451	1,367	84

The largest effect is in the measurement of change from the employment series peak in March 2001 to its trough in August 2003. The published series shows a decline of 2.7 million while the adjusted series shows a decline of 2.4 million.

The CES/CPS Gap

In terms of the CES/CPS employment series gap that emerged most prominently following the March 2001 business cycle peak, adjusting for job changer rates in the payroll survey closes the gap only slightly for a short period up until 2002.

Overall, using the adjusted CES series does not help explain the gap of the mid to later 1990s when published CES data were showing stronger growth than the CPS employment series, as indicated by table 2 below.

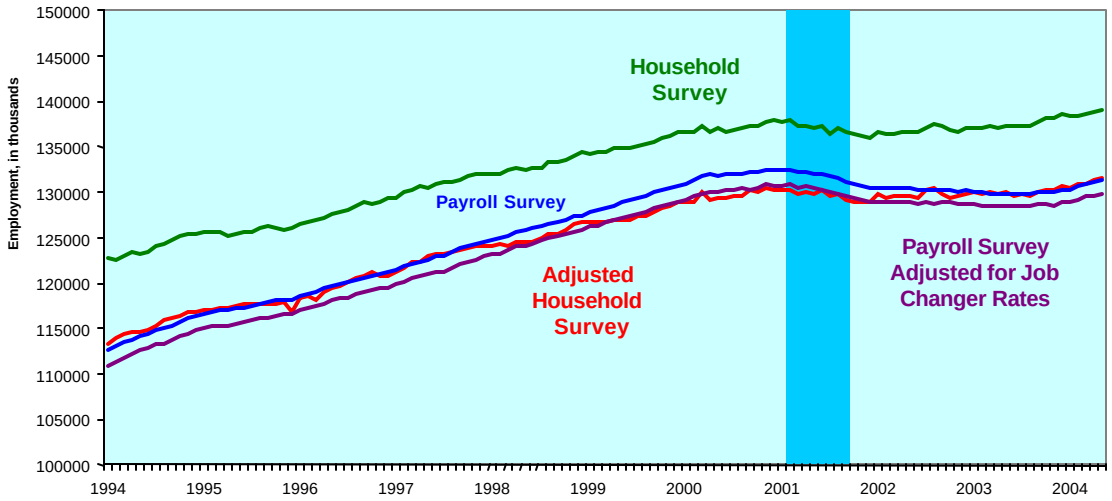
Table 2: Comparison of nonfarm employment series changes with series adjusted for job changer effects

Numbers in thousands

Reference period	Seasonally adjusted total nonfarm employment change, as published	Seasonally adjusted total nonfarm employment change, after estimated adjustment for job changer effects	Published payroll total nonfarm employment change less CPS adjusted employment change	Adjusted total nonfarm payroll employment change less CPS adjusted employment change
February 1994-January 1996	5,527	5,849	2,031	2,353
January 1996 – January 1998	6,437	6,331	-748	-854
January 1998 – January 2000	6,101	5,923	1,244	1,066
February 1994 – March 2001	19,842	20,034	2,941	3,133

As a summary view, Chart 2 shows a comparison of the CES adjusted for job changer rates against the CPS employment series smoothed and adjusted to CES scope from 1994 to the present. The chart illustrates that overall, adjusting for job changer effects is not a major factor in explaining the CES/CPS gap.

Chart 2 - Household and payroll survey employment, seasonally adjusted, 1994 - 2004



NOTE: The household series presented here has been smoothed for population control revisions. The "adjusted" household series has been smoothed for population control revisions and adjusted to an employment concept more similar to the payroll survey. The "adjusted" payroll series is derived by applying job changer rates supplied by the household survey to the original payroll series. Shaded area indicates recession.

SOURCE: Bureau of Labor Statistics, August 6, 2004.

Limitations of the Research

The premise about the effect of job changing on CES employment data rests with the assumption that large numbers of workers are changing jobs within the payroll survey reference period. There is no hard data to indicate how frequently workers change jobs within as opposed to between reference periods. There is no information available on how often workers' job changes are associated with changes in pay period lengths; for example a worker in a weekly payroll job moving to a monthly payroll job. The assumption in this research was that workers always stay within the same pay frequency. In other words, workers on a weekly payroll will move to another job with a weekly pay period. If other assumptions are made, results change somewhat.

Additional Research

BLS also is exploring another method to measure potential job changer effects on the payroll survey employment data. This second approach uses regression analysis to approximate the extent to which the nonfarm payroll employment series is affected by the job changer effect. An advantage of this approach is that it is not necessary to make assumptions about the likelihood of workers changing jobs within the payroll survey reference period. These assumptions are a major limitation in the initial method described above. While the regression work is ongoing, early indications are that it produces similar results to those attained from the initial research presented above.

Appendix A

Date	Job Changer Rate	Rate Adjusted for Length of Pay Period*	Payroll Emp Adj for Job Changer Rate (All Job Holders)	Payroll Employment, as published (SA)
Feb-94	0.036452876	0.016403794	110817	112665
Mar-94	0.033799499	0.015209774	111412	113133
Apr-94	0.031995026	0.014397762	111856	113490
May-94	0.031837454	0.014326854	112198	113829
Jun-94	0.031342832	0.014104274	112529	114139
Jul-94	0.031625937	0.014231672	112869	114498
Aug-94	0.031142128	0.014013957	113192	114801
Sep-94	0.033830077	0.015223535	113402	115155
Oct-94	0.030070839	0.013531878	113800	115361
Nov-94	0.029681348	0.013356607	114239	115786
Dec-94	0.030711576	0.013820209	114452	116056
Jan-95	0.030551841	0.013748328	114777	116377
Feb-95	0.030558661	0.013751397	114985	116588
Mar-95	0.029732303	0.013379536	115245	116808
Apr-95	0.030813775	0.013866199	115349	116971
May-95	0.031225998	0.014051699	115318	116962
Jun-95	0.031489168	0.014170125	115528	117189
Jul-95	0.02964912	0.013342104	115696	117260
Aug-95	0.029792918	0.013406813	115962	117538
Sep-95	0.029418071	0.013238132	116218	117777
Oct-95	0.031821555	0.0143197	116237	117926
Nov-95	0.031114534	0.01400154	116417	118070
Dec-95	0.028843109	0.012979399	116676	118210
Jan-96	0.028683516	0.012907582	116666	118192
Feb-96	0.028000268	0.01260012	117132	118627
Mar-96	0.028952215	0.013028497	117333	118882
Apr-96	0.029618253	0.013328214	117460	119047
May-96	0.030261557	0.013617701	117750	119376
Jun-96	0.029430415	0.013243687	118062	119647
Jul-96	0.029933201	0.013469941	118260	119875
Aug-96	0.030720398	0.013824179	118418	120078
Sep-96	0.028512755	0.01283074	118753	120296
Oct-96	0.027554882	0.012399697	119039	120534
Nov-96	0.028043777	0.012619699	119301	120826
Dec-96	0.02773806	0.012482127	119493	121003
Jan-97	0.03105374	0.013974183	119538	121232
Feb-97	0.028717425	0.012922841	119956	121526
Mar-97	0.030431909	0.013694359	120174	121843
Apr-97	0.028561711	0.01285277	120564	122134
May-97	0.028204118	0.012691853	120843	122396
Jun-97	0.029395911	0.01322816	121020	122642

Date	Job Changer Rate	Rate Adjusted for Length of Pay Period*	Payroll Emp Adj for Job Changer Rate (All Job Holders)	Payroll Employment, as published (SA)
Jul-97	0.029365389	0.013214425	121294	122918
Aug-97	0.029162822	0.01312327	121298	122911
Sep-97	0.031047497	0.013971374	121693	123417
Oct-97	0.031155768	0.014020096	122021	123756
Nov-97	0.031369377	0.01411622	122312	124063
Dec-97	0.03152068	0.014184306	122597	124361
Jan-98	0.029097851	0.013094033	122997	124629
Feb-98	0.030175093	0.013578792	123119	124814
Mar-98	0.029346355	0.01320586	123312	124962
Apr-98	0.029730137	0.013378562	123564	125240
May-98	0.029082285	0.013087028	123997	125641
Jun-98	0.029376421	0.01321939	124182	125846
Jul-98	0.030049112	0.0135221	124264	125967
Aug-98	0.029257874	0.013166043	124659	126322
Sep-98	0.028614929	0.012876718	124914	126543
Oct-98	0.029077499	0.013084874	125077	126735
Nov-98	0.028471808	0.012812313	125393	127020
Dec-98	0.030472044	0.01371242	125618	127364
Jan-99	0.028156527	0.012670437	125862	127477
Feb-99	0.029223233	0.013150455	126191	127873
Mar-99	0.029238311	0.01315724	126313	127997
Apr-99	0.029638909	0.013337509	126667	128379
May-99	0.02910457	0.013097057	126909	128593
Jun-99	0.028891366	0.013001115	127175	128850
Jul-99	0.029022876	0.013060294	127458	129145
Aug-99	0.029438453	0.013247304	127625	129338
Sep-99	0.029331895	0.013199353	127815	129525
Oct-99	0.029680696	0.013356313	128211	129947
Nov-99	0.031479418	0.014165738	128397	130242
Dec-99	0.031186917	0.014034113	128704	130536
Jan-00	0.030774732	0.013848629	128920	130730
Feb-00	0.03011992	0.013553964	129102	130876
Mar-00	0.030621184	0.013779533	129559	131369
Apr-00	0.031223671	0.014050652	129827	131677
May-00	0.032003344	0.014401505	130008	131908
Jun-00	0.031503291	0.014176481	130013	131883
Jul-00	0.02907008	0.013081536	130316	132043
Aug-00	0.029430621	0.013243779	130267	132015
Sep-00	0.02850622	0.012827799	130409	132104
Oct-00	0.030092752	0.013541738	130345	132134
Nov-00	0.029476414	0.013264386	130562	132317
Dec-00	0.027299081	0.012284586	130814	132441
Jan-01	0.030095923	0.013543165	130595	132388
Feb-01	0.030226334	0.01360185	130690	132492
Mar-01	0.027779147	0.012500616	130851	132507
Apr-01	0.028069027	0.012631062	130566	132236

Date	Job Changer Rate	Rate Adjusted for Length of Pay Period*	Payroll Emp Adj for Job Changer Rate (All Job Holders)	Payroll Employment, as published (SA)
May-01	0.026941728	0.012123778	130634	132237
Jun-01	0.025823764	0.011620694	130552	132087
Jul-01	0.029007109	0.013053199	130249	131972
Aug-01	0.029727736	0.013377481	130067	131831
Sep-01	0.028581285	0.012861578	129872	131564
Oct-01	0.027074653	0.012183594	129604	131203
Nov-01	0.026076349	0.011734357	129335	130871
Dec-01	0.026377546	0.011869896	129108	130659
Jan-02	0.025825303	0.011621387	128977	130494
Feb-02	0.026605324	0.011972396	128843	130404
Mar-02	0.02639619	0.011878286	128898	130447
Apr-02	0.026125181	0.011756332	128846	130379
May-02	0.025698015	0.011564107	128873	130381
Jun-02	0.027075733	0.01218408	128817	130406
Jul-02	0.026379822	0.01187092	128748	130295
Aug-02	0.024815189	0.011166835	128851	130306
Sep-02	0.024863201	0.01118844	128802	130259
Oct-02	0.025755539	0.011589993	128831	130342
Nov-02	0.024682847	0.011107281	128858	130305
Dec-02	0.024576209	0.011059294	128657	130096
Jan-03	0.025918593	0.011663367	128672	130190
Feb-03	0.023901937	0.010755872	128632	130031
Mar-03	0.024853901	0.011184255	128468	129921
Apr-03	0.024084096	0.010837843	128493	129901
May-03	0.023913123	0.010760905	128475	129873
Jun-03	0.024373211	0.010967945	128435	129859
Jul-03	0.023463561	0.010558602	128443	129814
Aug-03	0.02262208	0.010179936	128468	129789
Sep-03	0.024468738	0.011010932	128426	129856
Oct-03	0.022850262	0.010282618	128608	129944
Nov-03	0.024381428	0.010971643	128600	130027
Dec-03	0.026077867	0.01173504	128509	130035
Jan-04	0.023551167	0.010598025	128814	130194
Feb-04	0.024234877	0.010905695	128856	130277
Mar-04	0.024964682	0.011234107	129162	130630
Apr-04	0.024598317	0.011069243	129504	130954
May-04	0.025718797	0.011573459	129644	131162
Jun-04	0.023784721	0.010703124	129835	131240

* - Rate adjusted for Length of Pay is the Job Changer rate multiplied by the probability of any job changer holding two positions with different employers across pay periods within the same industry (in this case, this is 0.45 for Total nonfarm).