Estimates of union density by State

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Researchers, public agencies, labor unions, private analysts, and the media are among those seeking information on union density, defined here as the percentage of non-agricultural wage and salary employees (including public sector employees) who are union members. This report describes the derivation of time-consistent estimates of union density by State for the 1964–2000 period. It also provides an alternative measure of union density—the percentage of nonagricultural wage and salary workers who are covered by a collective bargaining agreement—for the years 1977–2000.

Two sources of data are combined to produce the estimates: compilations from the Current Population Survey (CPS), a monthly survey of U.S. households, and the now discontinued BLS publication *Directory of National Unions and Employee Associations (Directory)*, which contains information reported by labor unions to the Federal Government.[1] Beginning in 1973, estimates are calculated directly from the May 1973 through May 1981 CPS or the January 1983 through December 2000 CPS Outgoing Rotation Group (CPS-ORG) monthly earnings files. Prior to 1973, estimates are calculated based on figures in the BLS *Directories*, scaled to a level consistent with CPS estimates using information on years in which the two sources overlap.

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CPS union density estimates, 1973–present

For years 1973 to the present, estimates are based on CPS data. Beginning in 1983, estimates are based on the CPS-ORG earnings files. Each file includes data for all 12 months of the CPS, with each month including the quarter sample of the CPS-administered supplement containing the union status questions (that is, the outgoing rotation groups or portion of the sample not to be included in the following month's survey). Each observation during a year is unique, although overlap is evident in the samples across pairs of years. Sample sizes average about 177,000 during the 1983–95 period and 157,000 since 1996, with a high of 185,030 observations in 1990 and a low of 152,188 in 1996. In 1983, the average sample weight is 508 (that is, each observation represents 508 in the population), but by 2000, the average weight had risen to 750.

The 1977–81 union density estimates are calculated using data from the May 1977 through May 1981 CPS. Prior to 1981 (beginning in 1973), the May surveys administered the union status questions to all rotation groups, making sample sizes roughly one-third as large as the full-year quarter samples beginning in 1983. The May 1981 CPS administered the union questions to just a quarter sample. The 1982 CPS did not include any union status questions; therefore, the 1982 figures are an average of the 1981 and 1983 CPS estimates. Much of the year-to-year variation in CPS union density estimates prior to 1983, particularly for smaller States, results from sample variability.

For the years 1973–76, two problems are addressed in order to achieve time-consistency. First, prior to 1977, the union membership question did not include the phrase "or employee association similar to a union." Absent any adjustment, union membership density in the CPS is measured as increasing from 22.4 percent in 1976 to 24.1 percent in 1977, despite the fact that membership was falling in years before and after 1977. BLS annual figures based on union financial reports, however, show a 0.4-percentage point decline in union membership density between 1976 and 1977, from 24.5 percent to (coincidentally) the same 24.1 percent found in the CPS.[2] Assuming that a time-consistent CPS series would have fallen by 0.4 percentage points, a multiple of 1.094 is required to adjust upward pre-1977 figures to the post-1977 CPS definition including employee association members (that is, 1.094 times 22.4 percent equals 24.5 percent). The 1.094 national adjustment rate is applied to 1973–76 CPS figures for all States.

Second, prior to 1977, CPS State identifiers exist for 12 large States plus the District of Columbia, with the remaining 38 States combined into ten multi-State groupings. State estimates for these 38 States during 1973–76 are derived as follows: first, by using the May 1977–81 CPS, the ratios of each State's union density to its State-group union density are calculated. Then each State's unionization estimates for 1973–76 are produced by multiplying each year's State-group union density by the State-to-group ratios calculated for the overall 1977–81 period.

Linking BLS *Directory* estimates to the CPS, 1964–72

Union status questions were not regularly collected in the CPS prior to 1973.[3] The approach herein for the 1964–72 period utilizes information from various issues of the former BLS publication *Directory of National Unions and Employee Associations*, scaled to correspond to CPS levels. The *Directory* provided State-level union density estimates for the even-numbered years between 1964 and 1978.[4] Data on union membership were obtained from a mail questionnaire to national unions,

employee associations, and AFL-CIO State organizations. State estimates were requested in these surveys. BLS then aggregated the responses to yield overall State estimates of union membership. These estimates were combined with independent estimates of nonagricultural employment to obtain State-level density estimates.[5]

The *Directory* and CPS data sources overlap for 3 years—1974, 1976, and 1978. Generally, the *Directory* estimates are slightly higher than the CPS estimates. When State-specific ratios of CPS-to-*Directory* densities are averaged over the 3 years (1974, 1976, and 1978), the range is from a low of 0.72 (Missouri) to a high of 1.41 (South Dakota). The median ratio was 1.02, with 22 of 51 being smaller than 1.0. Only four ratios fell below 0.9 and eight exceeded 1.2. Cross section regressions for the 3 years, with the CPS unionization rate estimates regressed on the *Directory* estimates, yielded adjusted R^2s of 0.865 in 1974, 0.859 in 1976 and 0.839 in 1978, and standard errors of 5.0 to 5.1 percentage points. Thus, while the sources of State level estimates for the 3 years of overlap are radically different, the two estimates generally are quite similar.

In order to rescale the *Directory* density figures to a level consistent with the CPS, the State-specific 3-year CPS-to-*Directory* average ratios are applied to the *Directory* estimates for 1964, 1966, 1968, 1970, and 1972. Estimates for the odd-numbered intervening years are computed as simple averages of the adjacent even-year estimates. Thus, a State-specific union density series for the years 1964–72 is obtained based on *Directory* figures rescaled to correspond with CPS levels, while estimates for 1973–2000 are based directly on the CPS. The overall series thus extends across 36 years for all States plus the District of Columbia.[6]

The national series of union membership density for 1964–2000 and coverage density for 1977–2000 are shown in chart 1. Union membership density in nonagricultural wage and salary employment declined throughout the period, from 29.3 percent in 1964 to 24.1 percent in 1977 to 13.6 percent in 2000. Union coverage density declined from 26.9 percent in 1977 to 15.0 percent in 2000.

Membership density figures are shown for 3 selected years, 1964, 1984, and 2000.[7] (See table 1.) Corresponding to the national trend, most States show sizable declines in State unionization. In 2000, the most highly unionized States were New York (25.7 percent) and Hawaii (24.6 percent), while the least unionized States were North Carolina (3.7 percent) and South Carolina (4.1 percent).

Comparison with previous State-level union estimates

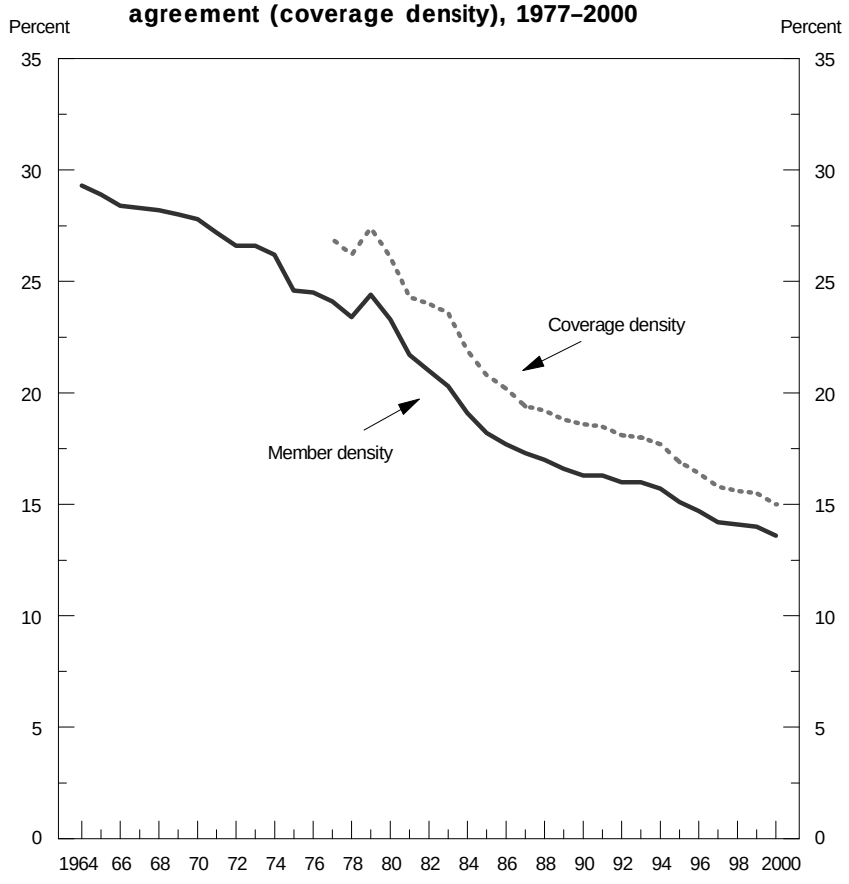
This section provides a brief comparison of the database described in this summary with previous State-level union density estimates. The original sources should be consulted for details. Estimates of State union density prior to the CPS rely on the financial reports made by labor unions to the Department of Labor, along with supplemental information obtained from unions and employee associations not reporting. In addition to the published BLS *Directories*, Leo Troy has used these reports to provide State estimates of full-time equivalent dues-paying membership. His estimates tend to be

Table 1. Union membership as a percentage of onagricultural employment, by State, 1964, 1984, and 2000

	1964	1984	2000
All States	29.3	19.1	13.6
Alabama	21.1	15.2	9.8
Alaska	39.7	24.2	21.9
Arizona	17.6	9.2	6.6
Arkansas	15.0	10.0	5.9
California	33.0	21.6	16.4
Colorado	21.2	13.1	9.1
Connecticut	28.8	20.5	16.4
Delaware	29.2	17.9	13.4
District of Columbia	18.4	17.5	14.7
Florida	14.0	9.6	6.9
Georgia	11.9	10.3	6.3
Hawaii	21.7	29.2	24.6
Idaho	24.8	9.5	7.9
Illinois	35.6	22.6	18.7
Indiana	40.9	25.4	15.7
Iowa	27.7	17.4	13.9
Kansas	21.3	11.9	9.1
Kentucky	25.0	17.3	12.2
Louisiana	18.1	11.1	7.1
Maine	23.8	19.2	14.3
Maryland	24.7	18.4	14.7
Massachusetts	27.7	21.4	14.4
Michigan	44.8	29.4	21.0
Minnesota	37.0	23.1	18.4
Mississippi	15.4	9.7	6.1
Missouri	27.1	20.0	13.3
Montana	37.4	18.6	14.3
Nebraska	23.0	14.0	8.6
Nevada	33.3	23.9	17.3
New Hampshire	24.3	10.4	10.5
New Jersey	39.4	25.0	20.9
New Mexico	14.1	9.8	8.3
New York	35.5	32.3	25.7
North Carolina	8.4	7.5	3.7
North Dakota	17.3	12.7	6.6
Ohio	37.6	23.9	17.5
Oklahoma	15.8	10.4	6.9
Oregon	38.9	25.1	16.5
Pennsylvania	37.7	25.0	17.0
Rhode Island	26.0	22.5	18.3
South Carolina	7.0	4.2	4.1
South Dakota	14.1	11.0	5.7
Tennessee	22.1	13.5	8.9
Texas	13.5	8.0	5.9
Utah	23.8	13.4	7.5
Vermont	18.5	11.5	10.4
Virginia	15.8	10.8	5.7
Washington	44.5	26.3	18.5
West Virginia	36.5	24.1	14.4
Wisconsin	34.0	25.0	17.9
Wyoming	21.0	15.7	8.5

NOTE: Figures represent the percentage of each State's nonagricultural wage and salary employees who are union members. Estimates for the 1964–2000 period are based on a combination of the 1983–2000 Current Population Survey Outgoing Rotation Group (CPS-ORG) earnings files, the 1973–81 May CPS earnings files, and the BLS publication, *Directory of National Unions and Employee Associations* for various years. Figures for all years, 1964 to present, are available from the authors. (See note 7.)

Chart 1. **Percent of nonagricultural wage and salary workers who are union members (member density), 1964–2000, and the percent covered by a collective bargaining agreement (coverage density), 1977–2000**



SOURCES: The 1983–2000 Current Population Survey Outgoing Rotation Group (CPS-ORG) earnings files, the May 1973–81 CPS earnings files, and the *Directory of National Unions and Employee Associations*, various years.

smaller than those in the *Directories*, owing to the BLS use of a less stringent definition of membership. In a 1957 publication, Troy provides state estimates of membership for 1939 and 1953. In a 1985 publication, Troy and Neil Sheflin provide revised State figures for 1939 and 1953, as well as estimates for 1960, 1975, 1980, and 1982.[8]

Compilations by researchers of union microdata from the CPS have provided the primary source for recent estimates of union density for States, as well as for metropolitan areas, detailed industry, and detailed occupation. Richard Freeman and James Medoff provide union membership density figures for all private sector wage and salary workers based on the combined 1973–75 May CPS; Edward Kokkelenberg and Donna Sockell calculate annual State membership density among all wage and salary workers aged 14 and older using the May 1973 through May 1981 CPS; and Michael Curme, Barry Hirsch, and David Macpherson provide State estimates using the BLS definition of all wage and salary workers aged 16 and older based on the monthly CPS Outgoing Rotation Group earnings files beginning in 1983.[9] In addition, Hirsch and Macpherson have provided CPS State union density estimates for all wage and salary workers for each of the years from 1983 to the present, along with separate State estimates for private, public, and private manufacturing sector workers.[10] Their State density figures for all workers and private manufacturing are subsequently reproduced in the annual *Statistical Abstract of the United States,* beginning with the 1995 volume (the State table includes 1983 and the most current year, beginning with 1994). None of the above includes CPS State union density for nonagricultural wage and salary workers, as measured here and in the earlier BLS *Directories.*

The immediate precursor for the database described in this summary is a study by Wayne Vroman regarding interstate differences in unemployment insurance recipiency rates. He constructed a 1966–98 series of State union density rates based on published figures in the BLS *Directories*, CPS State density rates for 1973–81 from the work of Kokkelenberg and Sockell, and CPS State density rates for 1983 forward from Hirsch and Macpherson's annual *Data Book*.[11] The analysis of this report follows the approach used in Vroman's study to integrate the BLS *Directory* and CPS figures, but the database has been extended in time and the methodology has been refined to enhance time consistency. In particular, CPS figures are estimated for all years since 1973, with agricultural workers excluded, and the CPS figures have been adjusted for 1973–76 to account for the change in the union membership question in 1977. This report has provided a description of the new State union database, which will be available to researchers on an on-going basis.

Availability of estimates

The State-level union density databases described in this report are available

Table 2. Nonagricultural wage and salary workers who are union members and those covered by a union contract, 1964–2000

[In percent]

Year	Union members	Covered by union contract
1964	29.3	–
1965	28.9	–
1966	28.4	–
1967	28.3	–
1968	28.2	–
1969	28.0	–
1970	27.8	–
1971	27.2	–
1972	26.6	–
1973	26.6	–
1974	26.2	–
1975	24.6	–
1976	24.5	–
1977	24.1	26.9
1978	23.4	26.2
1979	24.4	27.4
1980	23.3	26.1
1981	21.7	24.3
1982	21.0	24.0
1983	20.3	23.6
1984	19.1	21.9
1985	18.2	20.8
1986	17.7	20.2
1987	17.3	19.4
1988	17.0	19.2
1989	16.6	18.8
1990	16.3	18.6
1991	16.3	18.5
1992	16.0	18.1
1993	16.0	18.0
1994	15.7	17.7
1995	15.1	16.9
1996	14.7	16.4
1997	14.2	15.8
1998	14.1	15.6
1999	14.0	15.5
2000	13.6	15.0

SOURCES: The 1983–2000 Current Population Survey Outgoing Rotation Group (CPS-ORG) earnings files, the May 1973–81 CPS earnings files, and the *Directory of National Unions and Employee Associations,* various years.

from the authors.[12] The data are contained in two spreadsheets, with each row corresponding to a State and the union density figures by year in columns (beginning with the most recent year). The membership density database contains figures from 1964 forward. The coverage density database contains figures for 1977 forward. Following release of the CPS each year, State union density estimates for the previous calendar year will be compiled and added to the membership and coverage databases.

How estimates are calculated

Estimation of State-level union density using the CPS follows the methodology used by BLS to calculate published estimates of national union membership and coverage, the only difference being that agricultural workers are excluded here in order to provide consistency with estimates for earlier years derived from the BLS *Directories*.[13] Union membership and coverage are defined as follows. Beginning in 1977, the CPS included two questions related to union status. There have been no changes in these questions since 1977. Workers are counted as union members if they respond "yes" to the following question, asked to employed wage and salary workers: "On this job, is ___ a member of a labor union or of an employee association similar to a union?" Workers who answer "no" to this question are then asked: "On this job, is ___ covered by a union or employee association contract?" Workers are counted as covered if they are union members or if they are not members but say they are covered by a union contract.

Union membership density in State j is calculated as follows:

$$\%\text{Mem}_j = 100(\Sigma w_{ij} M_{ij} / \Sigma w_{ij}) = 100(\text{Membership/Employment})$$

where i indexes individual CPS respondents and j indexes the State (or metropolitan area, industry, occupation, and so forth) over which density is being calculated. Employment is measured by Σw_{ij}, the sum of the sample weights across the i individuals in State j. Included are all employed wage and salary workers, with the exception of workers whose industry of employment is agriculture, fishing, or forestry.[14] Letting $M_{ij} = 1$ if individual i in State j is a union member, then total union membership is measured by $\Sigma w_{ij} M_{ij}$ and union density by $100(\Sigma w_{ij} M_{ij} / \Sigma w_{ij})$.

$\%\text{Cov}_j$ is calculated identically, except that the dummy variable C_{ij} is substituted for M_{ij}, measuring coverage by a collective bargaining agreement.

$$\%\text{Cov}_j = 100(\Sigma w_{ij} C_{ij} / \Sigma w_{ij}) = 100(\text{Covered / Employment})$$

There are several differences in the union status information available prior to 1977 in the May 1973–76 CPS. First, the membership question did not include the phrase "or employee association similar to a union." Second, there was no union coverage question. And third, not all States were uniquely identified, so many workers have their residence assigned to State groups rather than to a particular State. The addition in 1977 of the phrase "employee association" is estimated to have increased overall union density by about 2 percentage points, with relatively small effects in the private sector and large effects in the public sector. As described in this report, the change in the CPS membership question and the use of State groups prior to 1977 have been addressed in the construction of the union density series. □

Notes

[1] Published through 1970 was the U.S. Department of Labor, Bureau of Labor Statistics, *Directory of National and International Labor Unions in the United States.* Published beginning in 1972 and ending in 1980 was the U.S. Department of Labor, Bureau of Labor Statistics, *Directory of National Unions and Employee Associations.*

[2] BLS, 1979, Bulletin 2079, D*irectory of National Unions and Employee Associations 1979, #2079*, Table 6. Unlike the *Directory* figures used to form the database of this summary (see note 4), this series excludes mem-

bers of "single-firm" unions and local unaffiliated unions and, thus, is not directly comparable to the broader-based biennial figures provided nationally and for States. Both *Directory* series exclude Canadian membership.

[3] A union status question was asked of private sector workers in the March 1966 CPS and of private and public sector workers in the March 1970 CPS. These surveys contain identifiers for large States and State group identifiers for the remaining States.

[4] The *Directory* published each year's figure in the calendar year following the survey, and then "revised" figures two years later in the next *Directory*. The revised State figures for 1964–76 are used here, along with the original figures for 1978, published in the final *Directory*. Bulletin numbers, year of data, and source tables are as follows: *Directory of National Unions and Employee Associations 1979, #2079* (data for 1978, 1976 revised, Table 18); *1977, #2044* (1974 revised, Table 18); *1975, #1937* (1972 revised, Table 18); 1973, *#Un33/9/973* (1970 revised, Table 18); *1971, #1750* (1968 revised, Table 18); the *Directory of National and International Labor Unions in the United States*, *1969, #1665* (1966 revised, Table 10); and 1967, *#1596* (1964 revised, Table 9).

[5] The BLS *Directories* include series for both membership, and membership and employee associations. The former series is roughly comparable to CPS figures that include the phrase "employee association" in the membership question, whereas the latter series is about 3 percentage points higher. The *Directory* appears to overstate member and association membership, whereas respondents in the CPS may understate their affiliation with employee associations. For example, the *Directory* includes some members who are retired, whereas membership in the CPS is measured only among employed workers. Because this summary is an attempt to construct a series time-consistent with figures based on the post-1977 CPS question, the BLS *Directory* numbers based on membership are used throughout. Note that State estimates in the *Directory* are not precise, owing to record-keeping problems at some union headquarters (for example, for the 1978 data, the Bureau had to develop estimates for 28 percent of the 174 national unions).

[6] In the BLS *Directories* the District of Columbia and Maryland are lumped together, while in the pre-1977 CPS, Maryland is included as a part of a State group. In order to obtain separate rates for the District of Columbia and Maryland for the years 1964–72, the following calculations were performed: the CPS union density rate was calculated for the entire 1977-81 period for DC, MD, and DC-MD combined, and then the *Directory* figures were adjusted for DC-MD by the ratio for DC/DC-MD (0.8675) and for MD/DC-MD (1.0199). Calculations then proceeded as described in the text.

[7] Because of space, union membership figures are not shown for all 36 years. However, these data are available from the authors' websites at **http://www.trinity.edu/bhirsch/** or **http://garnet.acns.fsu.edu/~dmacpher**.

[8] See Leo Troy and Neil Sheflin, *U.S. Union Sourcebook: Membership, Finances, Structure, Directory* (West Orange, NJ), Industrial Relations Data Information Services, 1985), Table 7.1.

[9] See Richard B. Freeman and James L. Medoff, "New Estimates of Private Sector Unionism in the United States," *Industrial and Labor Relations Review*, January 1979, pp. 143–74; Edward C. Kokkelenberg and Donna R. Sockell, "Union Membership in the United States, 1973–1981," *Industrial and Labor Relations Review*, July 1985, pp. 497–543; Michael A. Curme, Barry T. Hirsch, and David A. Macpherson, "Union Membership and Contract Coverage in the United States, 1983–1988," *Industrial and Labor Relations Review*, October 1990, pp. 5–33; and Barry T. Hirsch and David A. Macpherson, "Union Membership and Coverage Files from the Current Population Surveys: Note," *Industrial and Labor Relations Review*, April 1993, pp. 574–78. The latter paper makes available on request State unionization rates for 1983 through 1991.

[10] See Barry T. Hirsch and David A. Macpherson, *Union Membership and Earnings Data Book: Compilations from the Current Population Survey* (Washington, D.C., Bureau of National Affairs, annual).

[11] See Wayne Vroman, "Low Benefit Recipiency in State Unemployment Insurance Programs," Draft report to the U.S. Department of Labor, Unemployment Insurance Service, October 1999; Kokkelenberg and Sockell, "Union Membership in the United States, 1973-1981," July 1985; and Hirsch and Macpherson, *Union Membership and Earnings Data Book*, annual.

[12] See note 7 for the authors' URLS.

[13] The Bureau of Labor Statistics publishes national estimates from the CPS each January for the previous calendar year in its *Employment and Earnings.* The Bureau of National Affairs publishes an annual *Data Book* that includes national numbers compiled from the CPS identical to published BLS figures, plus disaggregated union and earnings figures beginning with 1983 for States, metropolitan areas, detailed industries, and detailed occupations. See Hirsch and Macpherson, *Union Membership and Earnings Data Book*, annual. State data for 1995 (the earliest year tabulated) to the present also are available from BLS, provided upon request. Note that the Current Population Survey data are based on place of residence, while data for the *Directory* are based on place of work. Also, the CPS covers only employed union members; the *Directory* data may include retirees. An advantage of the State database described in this article is that by making continuous annual figures readily available, users can observe variability in the estimates and use a moving average across years, if deemed appropriate.

[14] This follows the BLS definition of "nonagricultural" employment.