SUPPLEMENTARY APPENDICES FOR

# UNIONS AND INEQUALITY OVER THE TWENTIETH CENTURY: NEW EVIDENCE FROM SURVEY DATA

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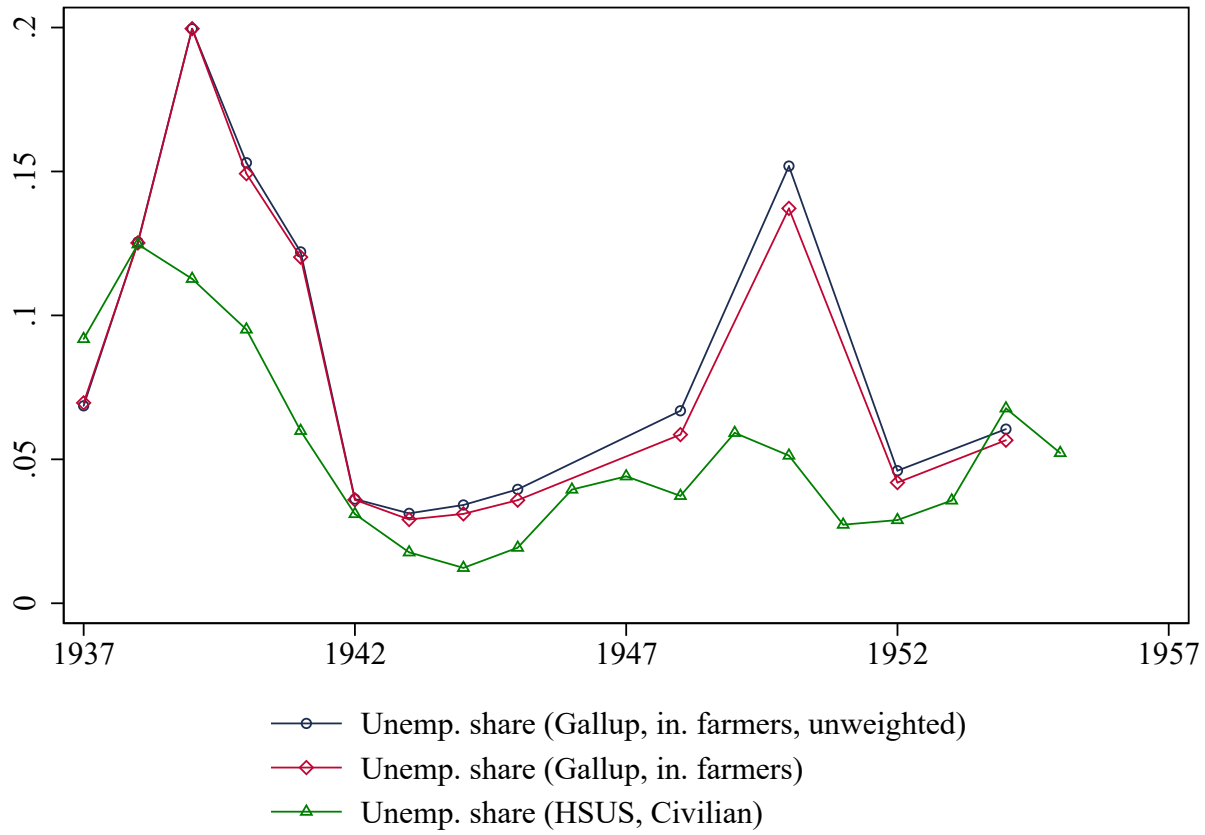
# Appendix A. Supplementary Figures and Tables Noted in the Text

Appendix Figure A.1: Comparing unemployment rates in Gallup and the HSUS

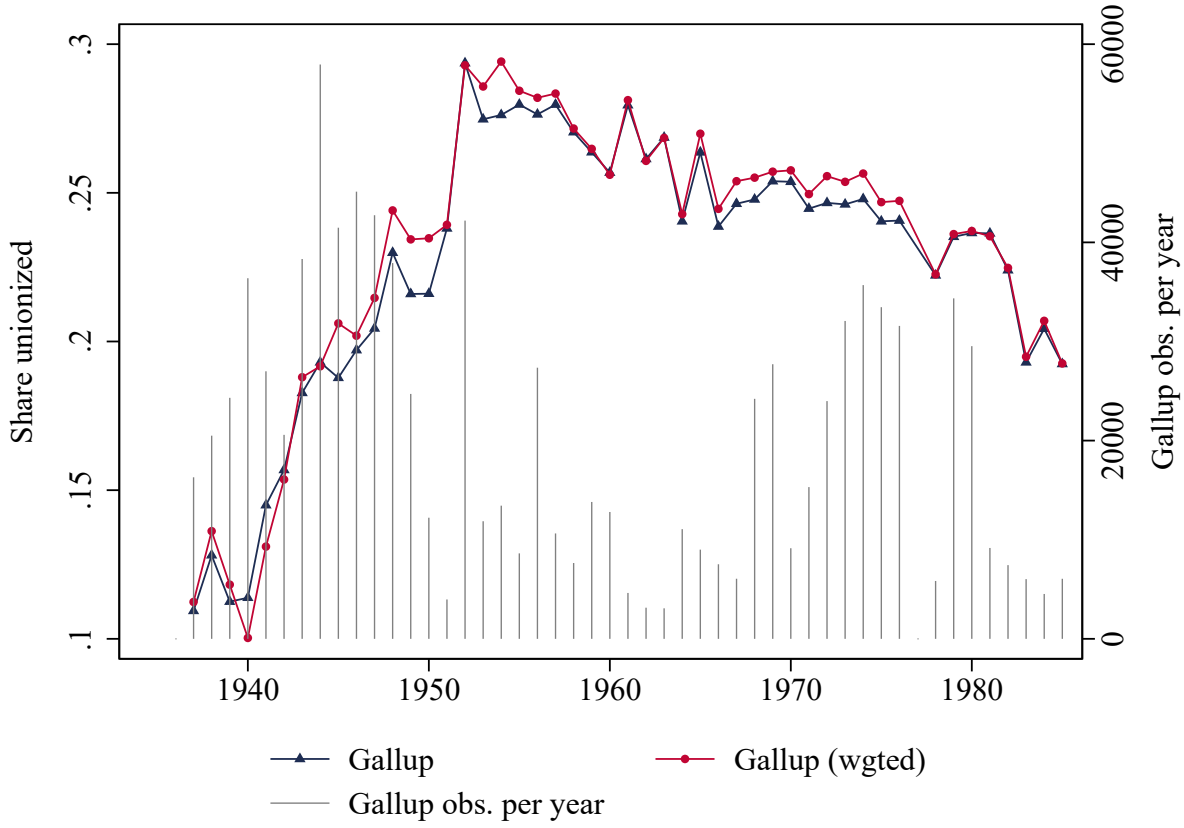



*Data sources:* Gallup and Historical Statistics of the United States (HSUS)
*Notes:* Sample in Gallup includes farmers

Appendix Figure A.2: Age distribution in Gallup, by gender, 1937-1952

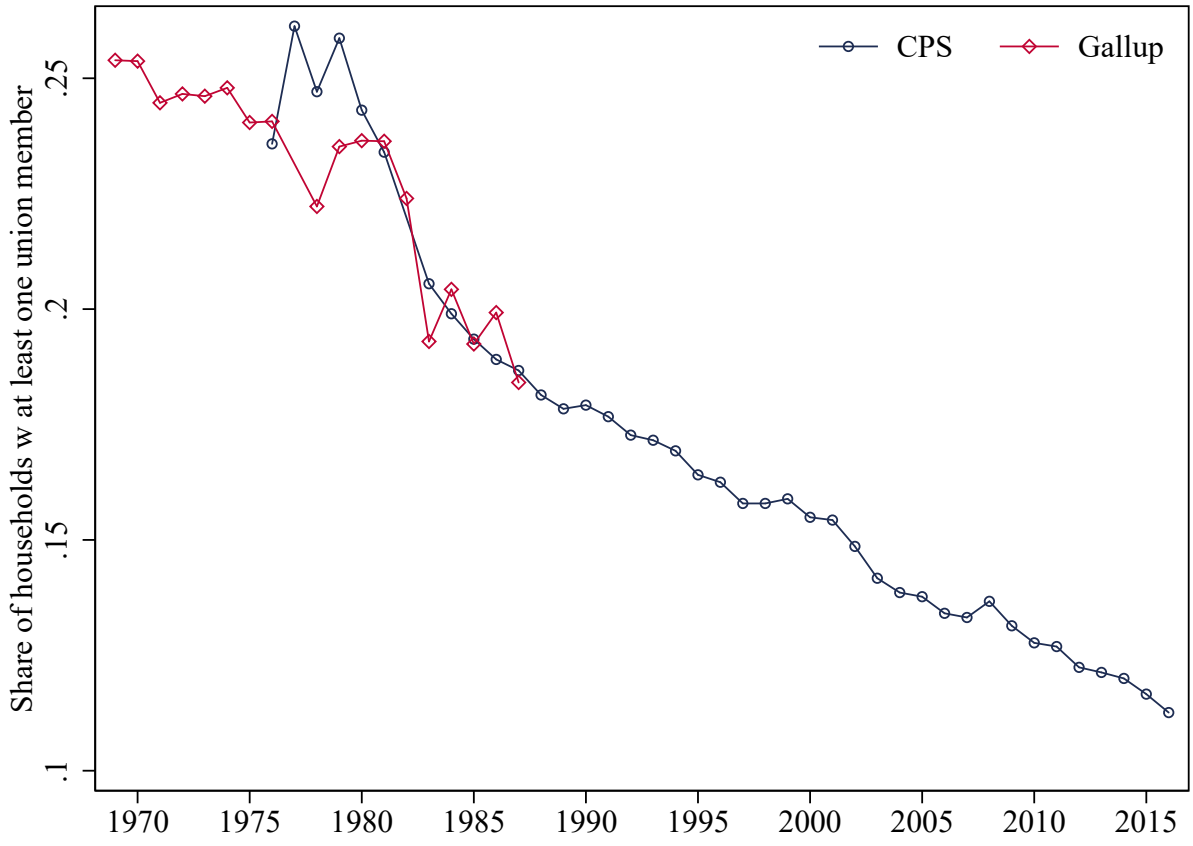

*Data sources:* Gallup microdata.

Appendix Figure A.3: Union share of households in the Gallup data (weighted vs. unweighted)



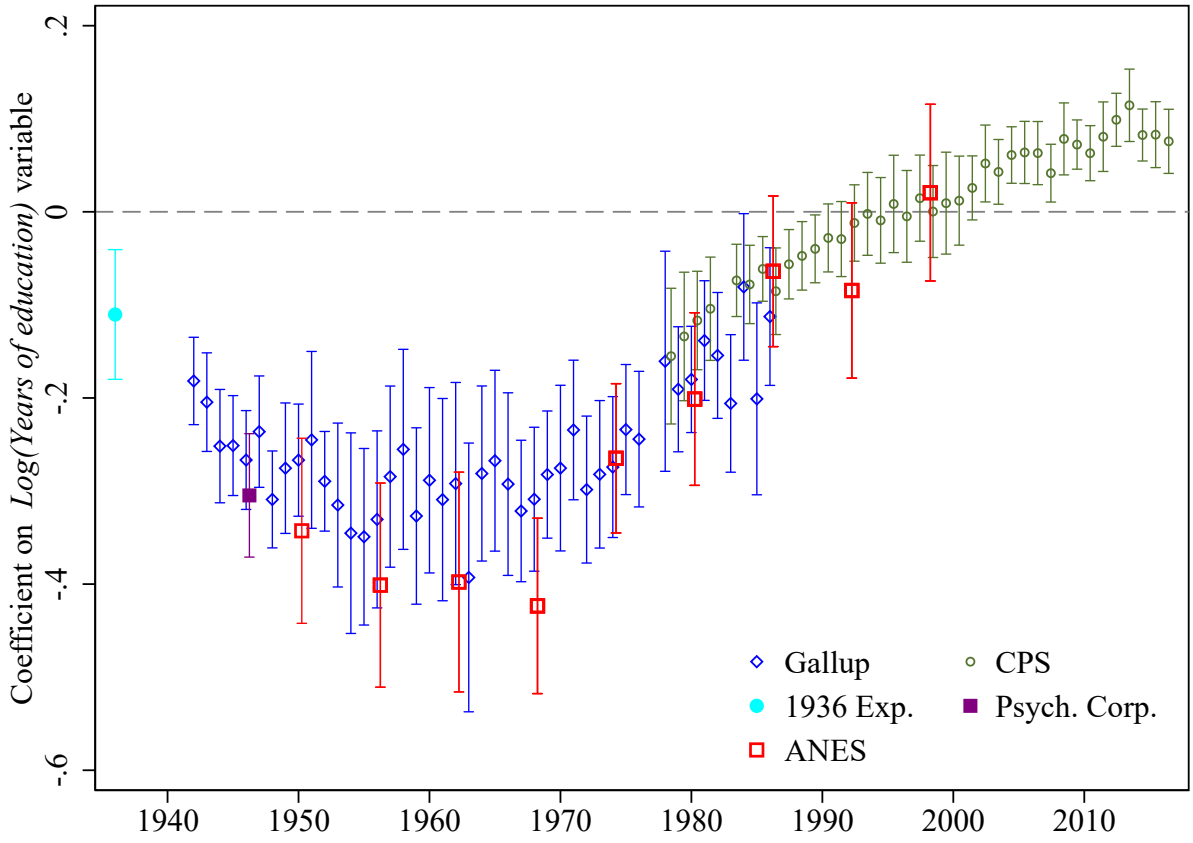

*Data sources:* Gallup. See Section 3 and Appendix C for more detail on data and weight construction.

Appendix Figure A.4: Comparing union density in Gallup and CPS, 1970–present



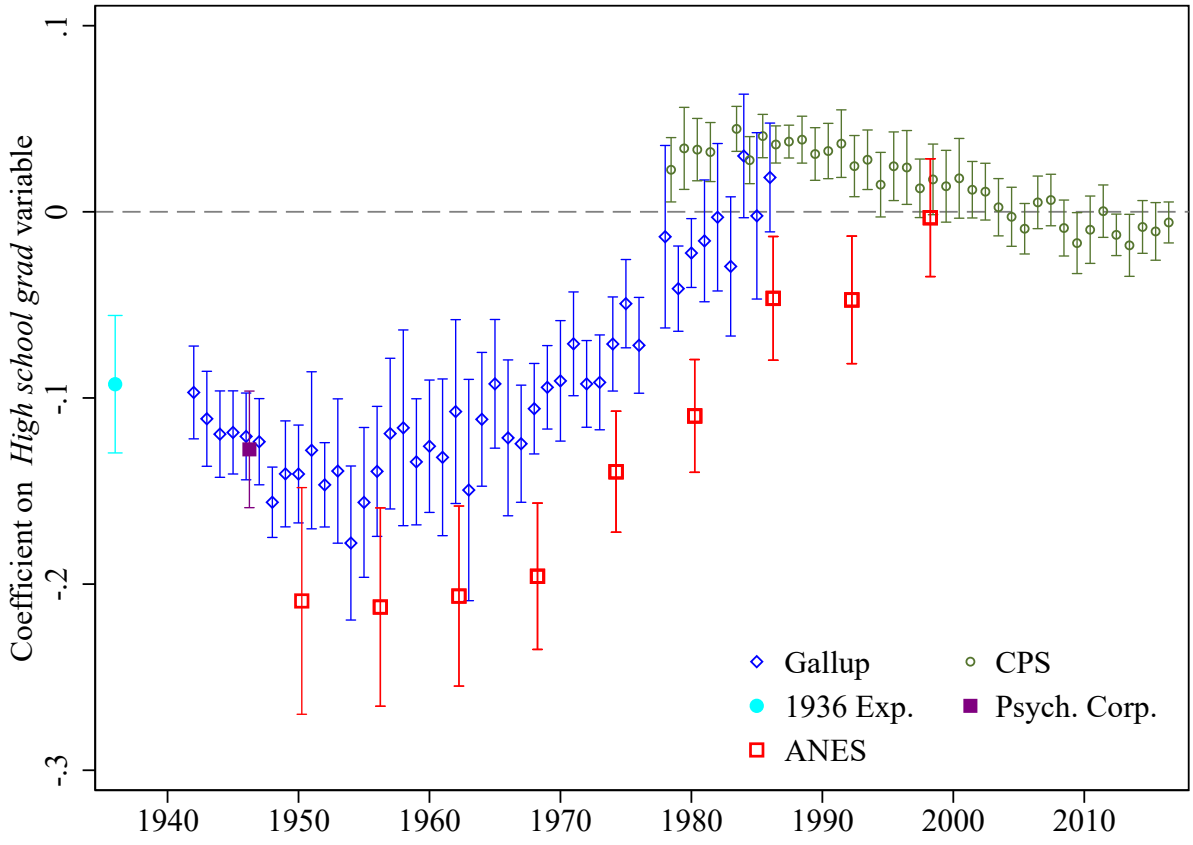

*Data sources:* Gallup and Current Population Survey

Appendix Figure A.5: Selection of union households by log years schooling




*Sources*: Gallup, 1937–1986. CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946.
*Notes*: For each data source, we estimate, separately by data source and year, household union status on *Log Years Education*, state $s$ and survey-date $t$ fixed effects, age and its square, and gender. We plot in this graph the coefficients on *Log Years Education* from each of these estimations. We control for survey-date and state fixed effects, age and its square, and gender. For the ANES, because the samples are smaller, we group surveys into six-year bins. Standard errors are clustered by state.

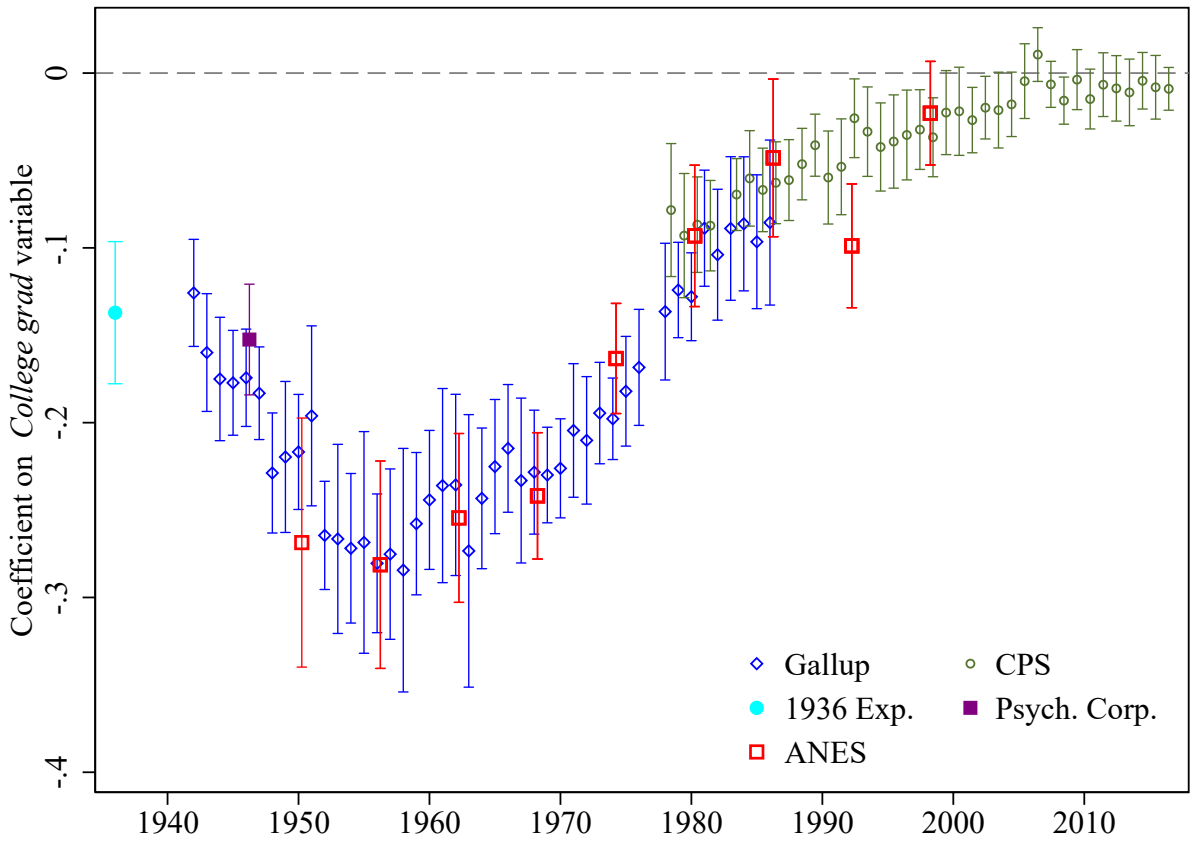
Appendix Figure A.6: Selection of union households by high-school graduation




*Sources*: Gallup, 1937–1986. CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946.

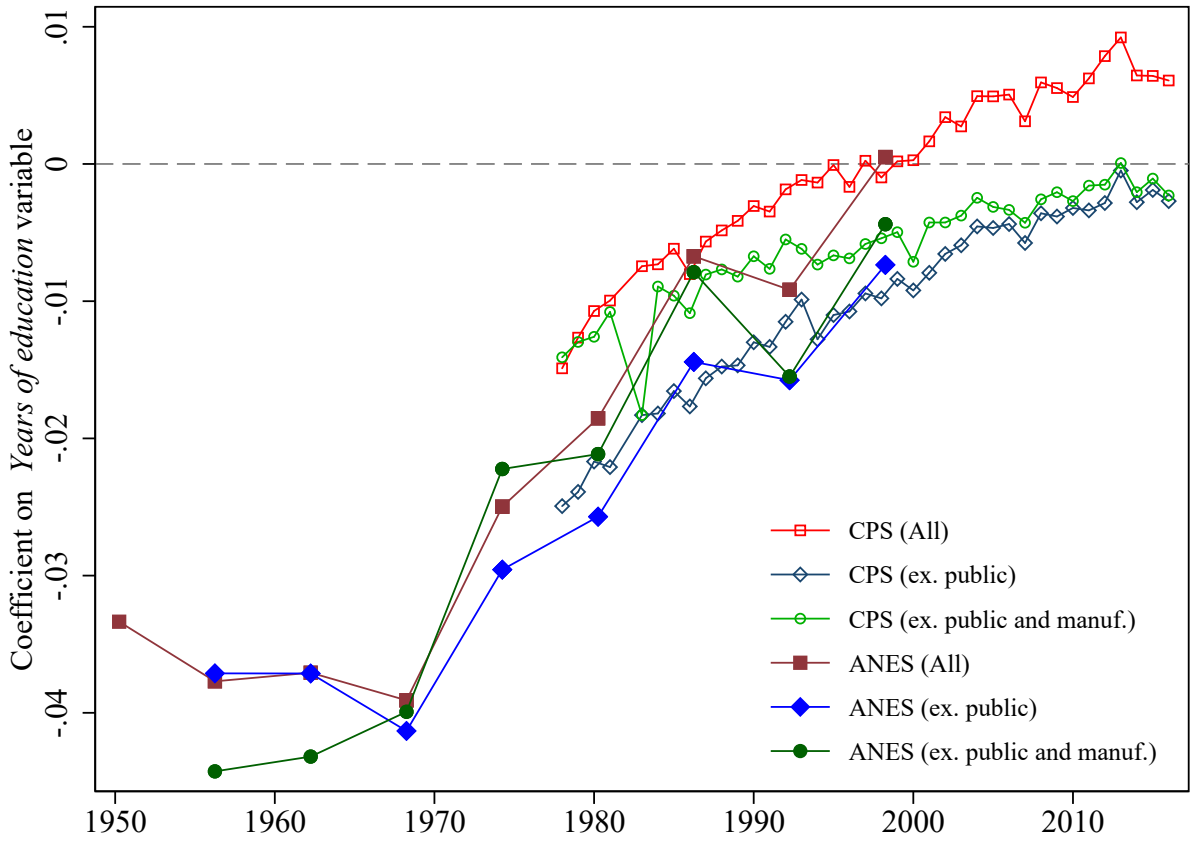
*Notes*: For each data source, we estimate, separately by data source and year, household union status on a *High School Grad* dummy variable, state $s$ and survey-date $t$ fixed effects, age and its square, and gender. We plot in this graph the coefficients on *High School Grad* from each of these estimations. We control for survey-date and state fixed effects, age and its square, and gender. For the ANES, because the samples are smaller, we group surveys into six-year bins. Standard errors are clustered by state.

Appendix Figure A.7: Selection of union households by college graduation



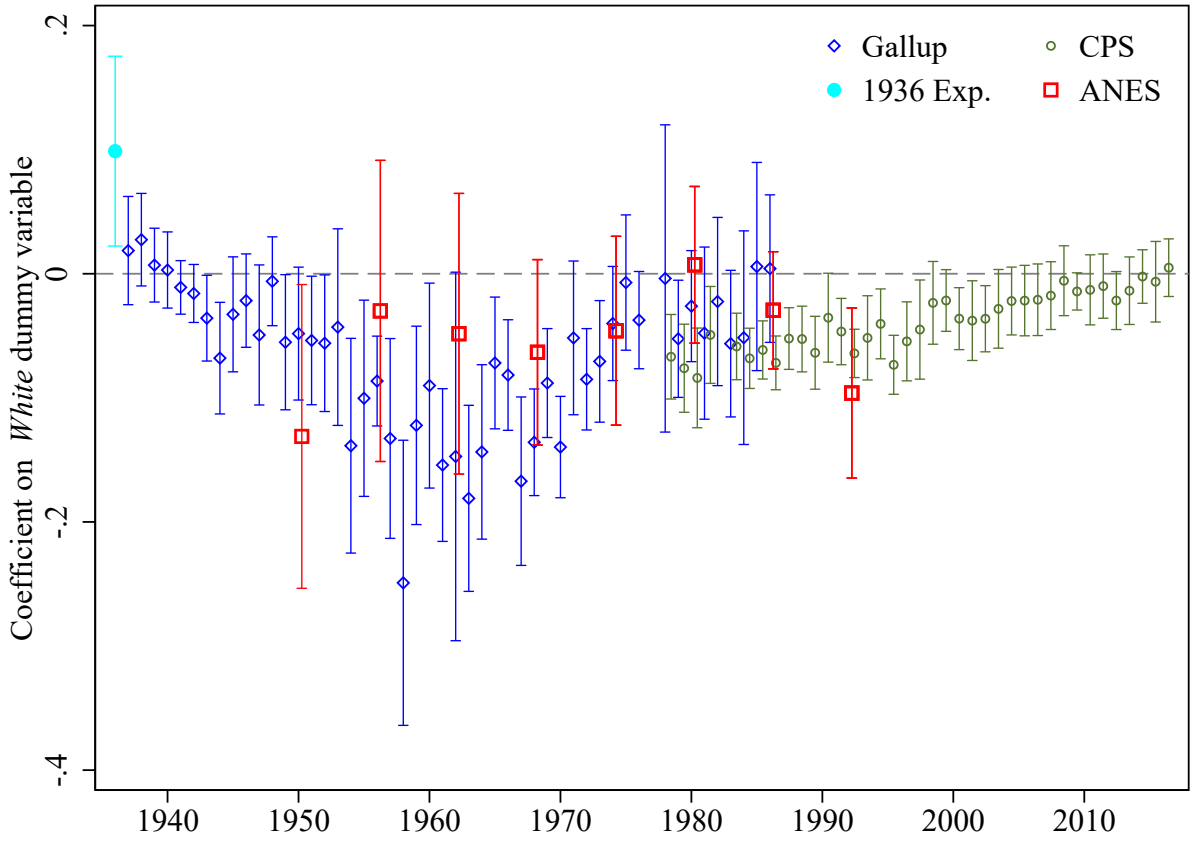

*Sources*: Gallup, 1937–1986. CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946.
*Notes*: For each data source, we estimate, separately by data source and year, household union status on a *College Grad* dummy variable, state $s$ and survey-date $t$ fixed effects, age and its square, and gender. We plot in this graph the coefficients on *College Grad* from each of these estimations. We control for survey-date and state fixed effects, age and its square, and gender. For the ANES, because the samples are smaller, we group surveys into six-year bins. Standard errors are clustered by state.

Appendix Figure A.8: Selection of union households by education in the ANES and CPS (dropping households with a public- or manufacturing-sector worker)



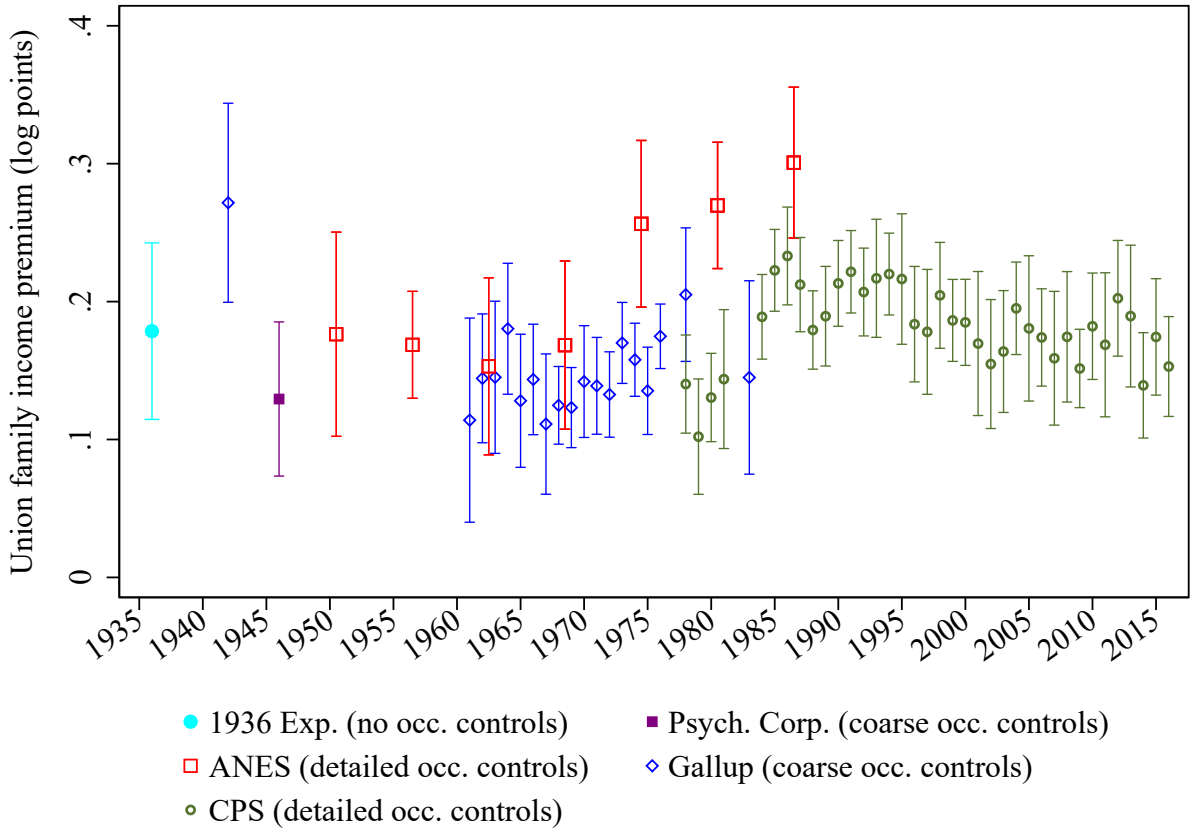

*Sources*: CPS, 1978–2016; ANES, 1952–1996.
*Notes*: For each data source, we estimate, separately by data source and year, household union status on a *Years of education* variable, state $s$ and survey-date $t$ fixed effects, age and its square, and gender. We plot in this graph the coefficients on *Years of education* from each of these estimations. We control for survey-date and state fixed effects, age and its square, and gender. For the ANES, because the samples are smaller, we group surveys into six-year bins. Note that we only include ANES and CPS in this graph, because other data sources do not allow us to identify industrial sectors of workers in the household.

Appendix Figure A.9: Selection of union households by race (dropping Southern states)



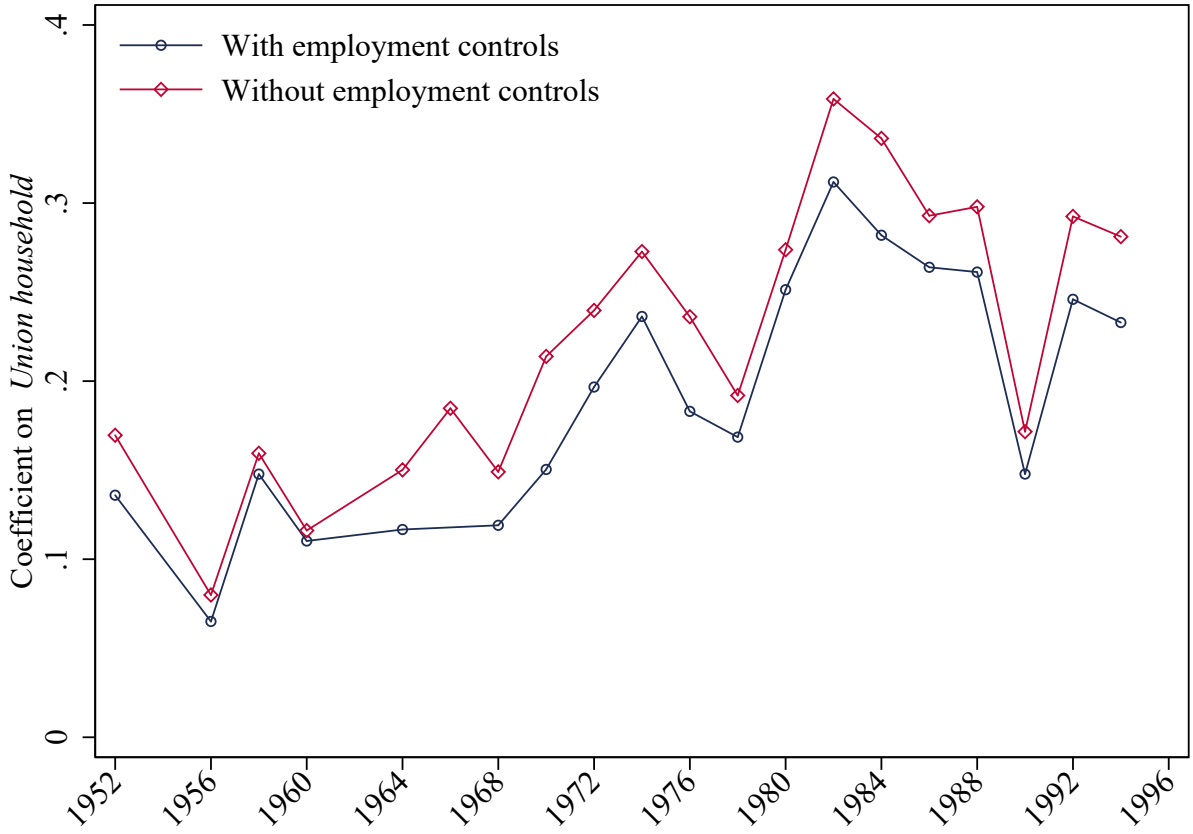

*Data sources*: Gallup data, 1937–1986; CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996. See Section C for a description of each data source.
*Notes*: For each data source, we estimate, separately by data source and year, household union status on a *White* dummy variable, state $s$ and survey-date $t$ fixed effects, age and its square, and gender. We plot in this graph the coefficients on $White$ from each of these estimations. For the ANES, because the samples are smaller, we group surveys into six-year bins. Note that we cannot use the U.S. Psychological Corporation survey in this figure because, while it has state identifiers (thus we can thus control for state fixed effects) the codebook does *not* provide the state names that correspond to the codes (so we cannot drop the South). Confidence intervals are based on standard errors clustered by state.

Appendix Figure A.10: Estimates of the union family income premium (including occupation controls when available)



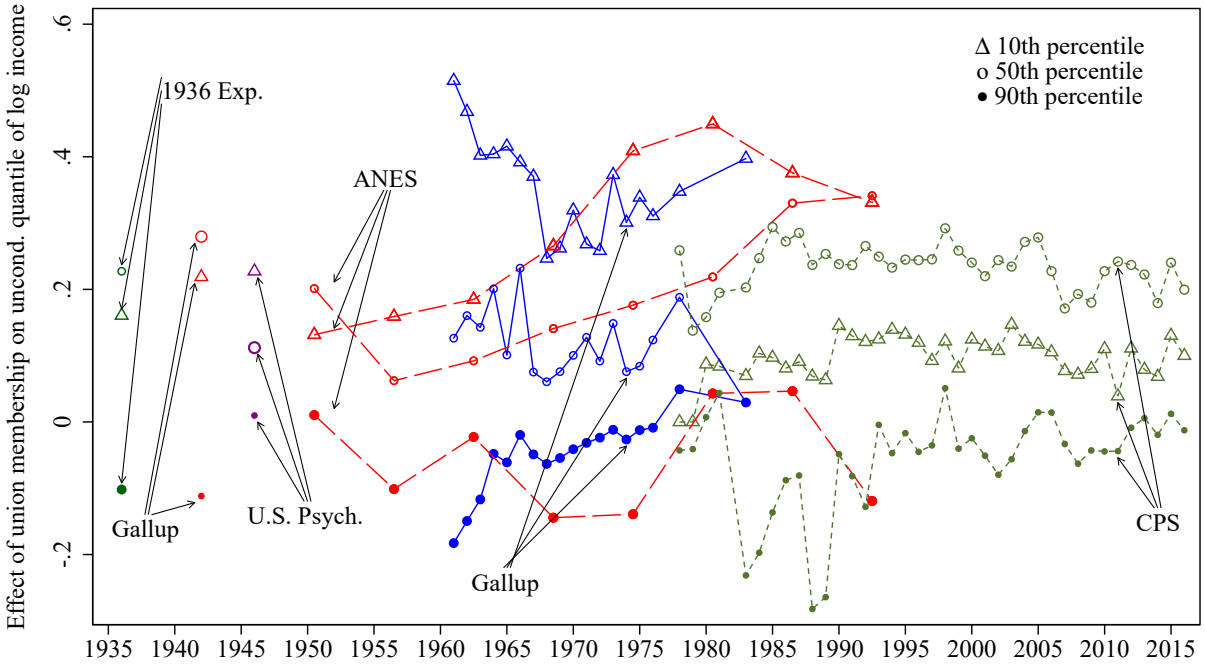

*Data source:* Gallup data, 1942, 1961–1974; CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946. See Section C for a description of each data source. See Appendix B for details on family income variable construction.
*Notes:* Each plotted point comes from estimating equation (3), which regressed log family income on controls for age, gender, race, state and survey-date fixed effects and (in most cases) fixed effects for the occupation of the head. For the ANES, because the samples are smaller, we group surveys into six-year bins. The plotted confidence intervals are based on standard errors clustered by state.

Appendix Figure A.11: Estimates of the union family income premium from ANES (with and without employment status controls)



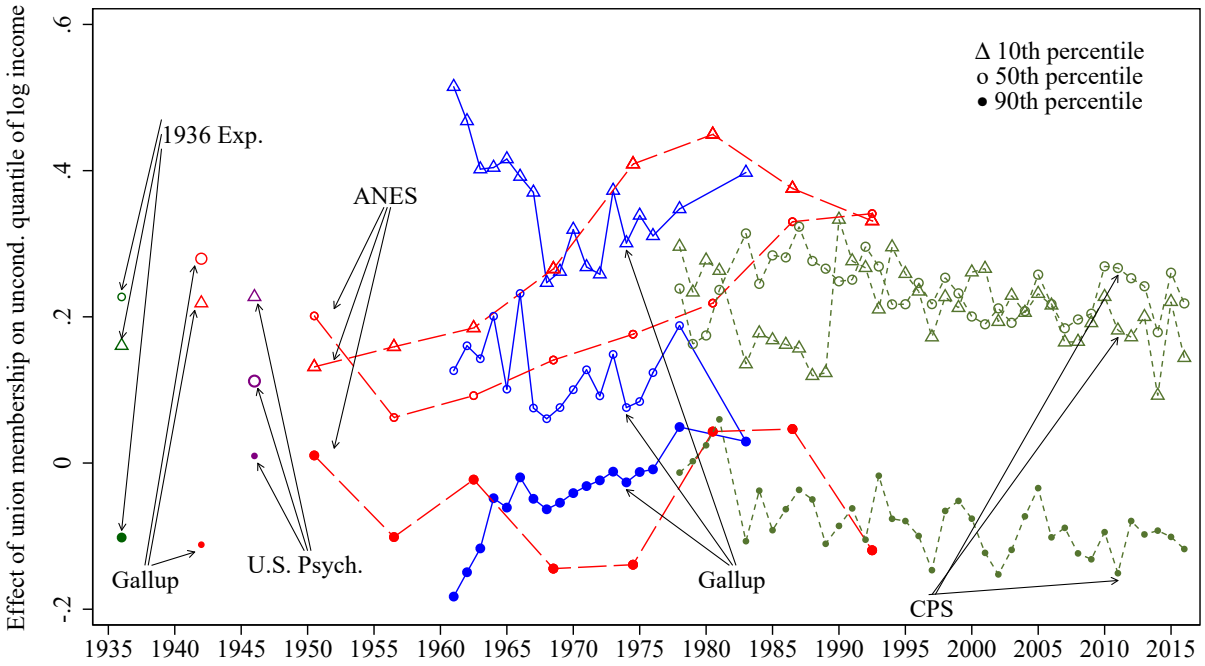

*Data source:* See Section 3 for a description of ANES data.
*Notes:* Each plotted point comes from estimating equation (3), which regresses log family income on controls for age, gender, race, state and survey-date fixed effects. In addition, the first series also includes an indicator for the household head being employed and a separate indicator for the respondent being employed. See Section 6.1 for more detail.

Appendix Figure A.12: Effects of union density on family income quantiles




*Data source:* Gallup data, 1942, 1961–1974; CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946. See Section C for a description of each data source. See Appendix B for details on family income variable construction.
*Notes:* Each plotted point comes from estimating equation (5), which regresses the recentered influence function (RIF) for the specified quantile on controls for age, gender, race, educational attainment fixed effects, household employment status controls, state and survey-date fixed effects. Occupation controls are not included. The plotted confidence intervals are robust to heteroskedasticity.

Appendix Figure A.13: Effects of union density on family income quantiles (using *unbinned* CPS family income)




*Data source:* Gallup data, 1942, 1961–1974; CPS, 1978–2016; BLS Expenditure Survey, 1936; ANES, 1952–1996, U.S. Psych. Corporation, 1946. See Section C for a description of each data source. See Appendix B for details on family income variable construction.
*Notes:* Each plotted point comes from estimating equation (5), which regresses the recentered influence function (RIF) for the specified quantile on controls for age, gender, race, educational attainment fixed effects, household employment status controls, state and survey-date fixed effects. Occupation controls are not included. The plotted confidence intervals are robust to heteroskedasticity.

Appendix Table A.1: Comparing Gallup and IPUMS, 1950–1980

| | 1950 | | 1960 | | 1970 | | 1980 | |
|---|---|---|---|---|---|---|---|---|
| | Census | Gallup | Census | Gallup | Census | Gallup | Census | Gallup |
| South Share | 0.242 | 0.117 | 0.259 | 0.138 | 0.271 | 0.247 | 0.296 | 0.256 |
| —*South* | | | | | | | | |
| Female | 0.516 | 0.505 | 0.521 | 0.518 | 0.529 | 0.507 | 0.529 | 0.503 |
| Age | 44.61 | 44.31 | 45.07 | 47.64 | 45.94 | 46.35 | 45.20 | 46.13 |
| Black | 0.200 | 0.0849 | 0.182 | 0.147 | 0.160 | 0.129 | 0.159 | 0.160 |
| HS grad. | 0.294 | 0.373 | 0.366 | 0.372 | 0.473 | 0.529 | 0.619 | 0.635 |
| —*Non-South* | | | | | | | | |
| Female | 0.515 | 0.504 | 0.517 | 0.512 | 0.528 | 0.506 | 0.528 | 0.503 |
| Age | 46.67 | 43.75 | 45.96 | 45.87 | 46.27 | 45.38 | 45.28 | 44.10 |
| Black | 0.0530 | 0.0454 | 0.0611 | 0.0586 | 0.0709 | 0.0614 | 0.0782 | 0.0874 |
| HS grad. | 0.385 | 0.473 | 0.450 | 0.531 | 0.579 | 0.659 | 0.710 | 0.755 |
| Observ. | 296223 | 182171 | 5388972 | 95064 | 2444218 | 138098 | 7475162 | 128507 |

*Sources*: Gallup surveys and 1950–1980 IPUMS.
*Notes*: We use the Gallup definition of the "South": all eleven states of the former Confederacy plus Oklahoma. All Census results use IPUMS person weights.

Appendix Table A.2: Comparing Gallup and IPUMS in 1940

| | Gallup | Census | Census | Gallup | Census |
|---|---|---|---|---|---|
| *–Demographics* | | | | | |
| Black | 0.0290 | 0.0895 | 0.0906 | 0.0325 | 0.0357 |
| Female | 0.338 | 0.505 | 0.344 | 0.341 | 0.343 |
| Age | 40.45 | 39.61 | 40.06 | 40.40 | 40.55 |
| HS Graduate | 0.493 | 0.278 | 0.266 | 0.494 | 0.290 |
| College Graduate | 0.0720 | 0.0472 | 0.0499 | 0.0709 | 0.0543 |
| *–Geography* | | | | | |
| Northeast | 0.0835 | 0.0660 | 0.0629 | 0.0946 | 0.0854 |
| Mid Atlantic | 0.262 | 0.253 | 0.241 | 0.297 | 0.327 |
| East Central | 0.207 | 0.187 | 0.186 | 0.235 | 0.252 |
| West Central | 0.176 | 0.127 | 0.129 | 0.200 | 0.175 |
| South | 0.118 | 0.258 | 0.263 | - - | - - |
| Rocky Mountain | 0.0751 | 0.0284 | 0.0308 | 0.0851 | 0.0418 |
| Pacific Coast | 0.0784 | 0.0754 | 0.0818 | 0.0888 | 0.111 |
| *–Occupation* | | | | | |
| Professional | 0.0780 | 0.113 | 0.122 | 0.0793 | 0.129 |
| Farmer | 0.209 | 0.156 | 0.159 | 0.185 | 0.109 |
| Propietors, managers, officials | 0.0104 | 0.0928 | 0.0875 | 0.0106 | 0.0933 |
| Clerks (white collar) | 0.294 | 0.0535 | 0.0539 | 0.301 | 0.0609 |
| Skilled workmen and foremen | 0.0906 | - - | - - | 0.0953 | - - |
| Sales workers | - - | 0.0462 | 0.0457 | - - | 0.0499 |
| Craftsmen | - - | 0.142 | 0.139 | - - | 0.153 |
| Operatives | - - | 0.146 | 0.147 | - - | 0.159 |
| Unskilled or semi-skilled labor | 0.190 | - - | - - | 0.200 | - - |
| Laborers | - - | 0.0932 | 0.0973 | - - | 0.0944 |
| Service workers (priv. HH) | - - | 0.0103 | 0.0105 | - - | 0.00626 |
| Other service workers | - - | 0.0477 | 0.0468 | - - | 0.0508 |
| No answer, N/A, etc. | 0.0826 | 0.0999 | 0.0920 | 0.0836 | 0.0949 |
| HH/gender adjustment | N/A | N/A | Yes | N/A | Yes |
| Ex. S/SW? | No | No | No | Yes | Yes |
| Observations | See notes | 736832 | 736832 | See notes | 544375 |

*Sources*: Gallup surveys and 1940 IPUMS.

*Notes*: The Gallup sample size varies substantially by variable during this period. For the col. (1) sample, all demographics except for education and all geographic variables have a sample size around 159,000 (with small variations due to missing observations). The occupation codes have a sample size of roughly 21,000. The high school completion indicator has a sample size of 5,700. In col. (4) each sample size is roughly twelve percent smaller. "HH / gender adjustment" underweights women and people in large households in the IPUMS, to better match Gallup sampling (which only sampled one person per household and had a target female share of one-third). "Ex S/SW" excludes Southern and Southwestern states (all eleven states of the former Confederacy plus Oklahoma). Note that occupation categories are coarser in Gallup than in the Census (but unfortunately, Gallup categories do not nest Census categories). We do our best to match occupation across these different categorizations. All Census results use IPUMS person weights.

Appendix Table A.3: Summary statistics from supplementary data sets

| | (1) ANES | (2) BLS exp. dataset | (3) U.S. Psych. Corp. | (4) NORC |
|---|---|---|---|---|
| Union household | 0.254 | 0.141 | 0.184 | 0.274 |
| Female | 0.548 | 0.0346 | 0.507 | 0.514 |
| White | 0.858 | 0.920 | 0.879 | 0.903 |
| Age | 39.67 | 40.85 | 39.11 | 39.84 |
| HS graduate | 0.360 | 0.405 | 0.470 | 0.403 |
| South | 0.277 | 0.232 | | |
| Log fam. inc. | 9.380 | 7.121 | 3.720 | 7.913 |
| Sample period | 1952-1988 | 1936 | 1946 | 1950 |
| Observations | 30757 | 4058 | 4956 | 1106 |

Notes: See Section 3 for details on the data sources.

Appendix Table A.4: Gallup selection results through 1950, robustness to weights

| | Dependent variable: Union household | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Years of education | -0.0250*** | -0.0293*** | -0.0265*** | -0.0267*** | -0.0237*** |
| | [0.00229] | [0.00191] | [0.00233] | [0.00240] | [0.00221] |
| Dept. var. mean | 0.233 | 0.215 | 0.200 | 0.203 | 0.193 |
| Weighting scheme | Baseline | None | White x Sth | Raking | Schickler |
| Observations | 198257 | 208986 | 198257 | 195565 | 59275 |

*Sources*: See Section 3 and Appendix C for details.

*Notes:* All regressions include state and survey-date fixed effects and include ages 21–64. Baseline weights are those we use throughout the paper (weights to make Gallup match interpolated Census cells for $White \times South \times Education\,categories$ (16 cells)). $White \times Sth$ are analogous, but match only on those four cells. Raking weights are constructed by matching yearly marginal mean population shares by $Black$, $Female$, and $Region$ to interpolated census shares. See Deville *et al.* (1993) for more details. "Schickler weights" are taken from Schickler and Caughey (2011), match on $Black$ and whether a residence has as phone, and are only available through 1945. Standard errors in brackets, clustered by state. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.5: Is selection into unions a function of union density (using state-year variation in union density, instead of annual variation as in Table 1)?

| | Dep't var.: At least one household member is in a union | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Yrs. educ x State-year union density | -0.0803*** [0.0147] | -0.0839*** [0.0123] | -0.0772*** [0.0145] | -0.0812*** [0.0123] |
| White x State-year union density | | | -0.293*** [0.0586] | -0.279*** [0.0664] |
| Dep't var. mean | 0.203 | 0.178 | 0.203 | 0.178 |
| Year FE? | Yes | Yes | Yes | Yes |
| Drop pub. sect. HH? | No | Yes | No | Yes |
| Observations | 1134257 | 998146 | 1134257 | 998146 |

*Sources*: Gallup, 1937–1976, CPS, 1977-2015.

*Notes*: These regressions test whether selection into union households by education and by race is a function of union density. All regressions include state and year fixed effects, and controls for age (and its square), race, gender and education. Dropping public sector households is only done in the 1977-2015 CPS sample. Standard errors are clustered by state. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$

Appendix Table A.6: Estimating family union income premium and reporting coefficients on additional covariates, by data source and time period

| | Dep't var: Logged family income | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Union household | 0.212*** | 0.255*** | 0.0836*** | 0.163*** | 0.150*** | 0.234*** |
| | [0.0372] | [0.0348] | [0.0229] | [0.00289] | [0.0360] | [0.0189] |
| Years of educ., | | 0.132*** | 0.108*** | 0.0974*** | 0.107*** | 0.111*** |
| respondent | | [0.00549] | [0.00587] | [0.000612] | [0.00700] | [0.00465] |
| Years of educ., | 0.0915*** | | | | | |
| household head | [0.00766] | | | | | |
| White | 0.632*** | 0.406*** | 0.255*** | 0.385*** | 0.394*** | 0.327*** |
| | [0.0720] | [0.0618] | [0.0469] | [0.00501] | [0.0626] | [0.0381] |
| Respondent is female | | -0.112*** | -0.155*** | -0.113*** | -0.163*** | -0.122*** |
| | | [0.0300] | [0.0254] | [0.00271] | [0.0329] | [0.0149] |
| Household head is | -0.892*** | | | | | |
| female | [0.168] | | | | | |
| Age | 0.0834*** | 0.0589*** | | 0.0619*** | 0.0597*** | 0.0579*** |
| | [0.00820] | [0.00968] | | [0.000796] | [0.00765] | [0.00396] |
| Age squared, divided | -0.899*** | -0.671*** | | -0.741*** | -0.679*** | -0.587*** |
| by 1,000 | [0.0917] | [0.120] | | [0.00972] | [0.0927] | [0.0463] |
| Age 30-39 | | | 0.202*** | | | |
| | | | [0.0412] | | | |
| Age 40-49 | | | 0.193*** | | | |
| | | | [0.0295] | | | |
| Age 50-59 | | | 0.199*** | | | |
| | | | [0.0426] | | | |
| Data source | Exp. survey | Gallup | U.S. Psych. | Gallup | ANES | ANES |
| Year(s) in sample | 1937 | 1942 | 1946 | 1961-1975 | 1952-1970 | 1972-1990 |
| Observations | 4157 | 2524 | 2373 | 177099 | 2628 | 11777 |

*Sources*: See Section C for details.

*Notes:* All regressions include state fixed effects. For Gallup, survey date fixed effects are included and for ANES, year fixed effects. We control for number of employed individuals in the household, except in the Gallup and U.S. Psych. data, where this control is not available. For the U.S. Psych. survey, age is given in categories, not in years, and the omitted age category in the regression is "under 30" (and we drop any observation above age 60). Otherwise, all other samples include ages 21–64. Standard errors in brackets, clustered by state. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$

Appendix Table A.7: Paid vacation as a function of union status (Gallup, 1949)

| | Dep't var: Do you (or husband) get paid vacation? | | | | |
|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) |
| Union household | 0.220*** | 0.183*** | 0.288** | 0.280* | 0.121*** |
| | [0.0332] | [0.0308] | [0.126] | [0.143] | [0.0312] |
| White x Union household | | | -0.111 | | |
| | | | [0.127] | | |
| Years educ. x Union household | | | | -0.00964 | |
| | | | | [0.0130] | |
| Low-skill labor x Union | | | | | 0.149*** |
| | | | | | [0.0493] |
| Dept. var. mean | 0.523 | 0.526 | 0.526 | 0.526 | 0.526 |
| State FE? | Yes | Yes | Yes | Yes | Yes |
| Demographic controls? | Yes | Yes | Yes | Yes | Yes |
| Occupation FE? | No | Yes | Yes | Yes | Yes |
| Observations | 1895 | 1864 | 1864 | 1864 | 1864 |

*Data sources:* Data from a Gallup survey in May 1949. For details on Gallup data, see Section 3 and Appendix C.

*Notes*: The dependent variable is a dummy. Demographic controls include respondent's age and its square, education (four fixed effects), gender and race. When occupation controls are added, they refer to the head of the household. Low-skill occupation dummy in the final column refer to the Gallup categories of "unskilled and semi-skilled labor." Standard errors are in brackets and clustered by state. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.8: Ease of finding a job "just as good as" the one you have, as function of union status (Gallup, 1939)

| | Would be easy to find another job just as good | | | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Union household | -0.122*** | -0.123*** | -0.0951*** | -0.1000*** |
| | [0.0278] | [0.0256] | [0.0288] | [0.0298] |
| Mean, dept. var. | 0.499 | 0.499 | 0.499 | 0.495 |
| State FE | Yes | Yes | Yes | Yes |
| Demogr. controls | No | Yes | Yes | Yes |
| Educ. controls | No | No | Yes | Yes |
| Occup. controls | No | No | Yes | Yes |
| Ex. South | No | No | No | Yes |
| Observations | 1952 | 1952 | 1952 | 1686 |

*Notes*: Data from a Gallup survey in March 1939. The exact wording of the question from which we create the outcome variable is: "If you lost your present job (business, farm), how hard do you think it would be for you to get another job (business, farm) just as good?" We code the responses "impossible" and "quite hard" as zero and "fairly hard" and "easy" as one. Demographic controls include respondent's age and its square, education (four fixed effects), gender and race. When occupation controls are added, they refer to the head of the household. Low-skill occupation dummy in the final column refer to the Gallup categories of "unskilled and semi-skilled labor." Standard errors are in brackets and clustered by state. $^{*}p < 0.1,^{**} p < 0.05,^{***} p < 0.01$

Appendix Table A.9: Aggregate college-high-school premium as a function of union density (additional specifications)

| | Dep't var: College High School Premium | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Educ. Share Ratio | -0.382** | -0.287** | -0.334** | -0.307** | -0.239 | -0.218 | -0.391* |
| | (0.178) | (0.140) | (0.163) | (0.152) | (0.195) | (0.167) | (0.227) |
| Union Density (Gallup) | | -1.507*** | | | | | |
| | | (0.481) | | | | | |
| Union Density (BLS) | | | -0.973* | | | | |
| | | | (0.570) | | | | |
| Union Density (Average) | | | | -1.338** | -1.556** | -1.712*** | -1.370** |
| | | | | (0.535) | (0.720) | (0.581) | (0.575) |
| Mean, dept. var | 0.512 | 0.512 | 0.512 | 0.512 | 0.512 | 0.512 | 0.512 |
| Controls? | No | No | No | No | Yes | Yes | Yes |
| Time Polynomial? | Cubic | Cubic | Cubic | Cubic | Cubic | Quadratic | Quartic |
| Observations | 49 | 49 | 49 | 49 | 49 | 49 | 49 |

*Sources*: The college premium was created using Census and CPS data. See Appendix B for details on variable construction.

*Notes*: This table shows companion specifications to the regressions reported in cols. (1) and (2) in the main Table 2. All regressions include "time polynomial" controls, either up to quadratic, cubic or quartic level. "Controls" include the federal minimum wage, unemployment rate for civilian men, and top marginal tax rates."Union Density (Average)" uses the mean of BLS and Gallup Union Density Series. Standard errors are robust to heteroskedasticity and AR(1) serial correlation. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.10: Aggregate male 90/10 ratio as a function of union density (additional specifications)

| | Dep't var: Log Percentile 90-10 Men | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Educ. Share Ratio | -0.175** | -0.100 | -0.103 | -0.096 | -0.084 | 0.156 | -0.189 |
| | (0.076) | (0.095) | (0.087) | (0.093) | (0.127) | (0.211) | (0.158) |
| Union Density (Gallup) | | -1.185*** | | | | | |
| | | (0.416) | | | | | |
| Union Density (BLS) | | | -1.465*** | | | | |
| | | | (0.395) | | | | |
| Union Density (Average) | | | | -1.407*** | -1.456** | -3.242*** | -1.328** |
| | | | | (0.421) | (0.636) | (0.582) | (0.566) |
| Mean, dept. var | 1.376 | 1.376 | 1.376 | 1.376 | 1.376 | 1.376 | 1.376 |
| Controls? | No | No | No | No | Yes | Yes | Yes |
| Time Polynomial? | Cubic | Cubic | Cubic | Cubic | Cubic | Quadratic | Quartic |
| Observations | 49 | 49 | 49 | 49 | 49 | 49 | 49 |

*Sources*: The Log 90-10 Percentile for Men was created using Census and CPS data. See Appendix B details on variable construction.

*Notes*: This table shows companion specifications to the regressions reported in cols. (3) and (4) in the main Table 2. All regressions include "Time Polynomial" controls, either up to quadratic, cubic or quartic level. "Controls" include the federal minimum wage, unemployment rate for civilian men, and top marginal tax rates."Union Density (Average)" uses the mean of BLS and Gallup Union Density Series. Standard errors are robust to heteroskedasticity and AR(1) serial correlation. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.11: Aggregate Gini coefficient as a function of union density (additional specifications)

| | Dep't var: Gini Coefficient | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Union Density (Gallup) | -0.083 | | | | | |
| | (0.053) | | | | | |
| Union Density (BLS) | | -0.120*** | | | | |
| | | (0.040) | | | | |
| Union Density (Average) | | | -0.132** | -0.106** | -0.216*** | -0.127** |
| | | | (0.054) | (0.053) | (0.046) | (0.050) |
| Mean, dept. var | 0.410 | 0.410 | 0.410 | 0.410 | 0.410 | 0.410 |
| Educ. Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Addit. controls? | No | No | No | Yes | Yes | Yes |
| Time Polynomial? | Cubic | Cubic | Cubic | Cubic | Quadratic | Quartic |
| Observations | 65 | 65 | 65 | 65 | 65 | 65 |

*Sources*: The Gini Coefficient is calculated from social security data by Kopczuk *et al.* (2010).
*Notes*: This table shows companion specifications to the regressions reported in cols. (5) and (6) in the main Table 2. All regressions include "Time Polynomial" controls, either up to quadratic, cubic or quartic level. "Controls" include the federal minimum wage, unemployment rate for civilian men, and top marginal tax rates. "Union Density (Average)" uses the mean of BLS and Gallup Union Density Series. "Educ. Controls" include College-High School Share Ratio using CPS, Gallup Data and Census (interpolated) data. Standard errors are robust to heteroskedasticity and AR(1) serial correlation. $^{*}p < 0.1, ^{**}p < 0.05, ^{***}p < 0.01$

Appendix Table A.12: Aggregate top-ten income share as a function of union density (additional specifications)

| | Dep't var: Top 10 Income Share | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Union Density (Gallup) | -16.285 | | | | | |
| | (10.664) | | | | | |
| Union Density (BLS) | | -37.049** | | | | |
| | | (14.165) | | | | |
| Union Density (Average) | | | -33.638** | -15.570 | -35.340*** | -13.626 |
| | | | (14.413) | (12.497) | (12.292) | (14.119) |
| Mean, dept. var | 35.848 | 35.848 | 35.848 | 35.848 | 35.848 | 35.848 |
| Educ. Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Addit. controls? | No | No | No | Yes | Yes | Yes |
| Time Polynomial? | Cubic | Cubic | Cubic | Cubic | Quadratic | Quartic |
| Observations | 70 | 70 | 70 | 70 | 70 | 70 |

*Sources*: The Top 10 percent income share is calculated from IRS data and updated by Piketty and Saez (2003).
*Notes*: This table shows companion specifications to the regressions reported in cols. (7) and (8) in the main Table 2. All regressions include "Time Polynomial" controls, either up to quadratic, cubic or quartic level. "Controls" include the federal minimum wage, unemployment rate for civilian men, and top marginal tax rates. "Union Density (Average)" uses the mean of BLS and Gallup Union Density Series. "Educ. Controls" include College-High School Share Ratio using CPS, Gallup Data and Census (interpolated) data. See Appendix for variable construction. Standard errors are robust to heteroskedasticity and AR(1) serial correlation.
$^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$

Appendix Table A.13: State-Year College High School Premium as a function of union density (additional specification)

| | Dep't var: College High School Premium | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Household union share | -0.166*** | -0.442*** | -0.435*** | -0.510*** | -0.438*** | -0.434*** |
| | 0.046 | 0.118 | 0.118 | 0.122 | 0.102 | 0.104 |
| Mean, dept. var. | 0.490 | 0.490 | 0.490 | 0.497 | 0.497 | 0.497 |
| R-squared | 0.707 | 0.696 | 0.701 | 0.678 | 0.763 | 0.764 |
| Education Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Shares | No | No | No | Yes | Yes | Yes |
| Income covars. | No | No | Yes | Yes | Yes | Yes |
| Policy covars. | No | No | No | No | No | Yes |
| Split-Sample IV | No | Yes | Yes | Yes | Yes | Yes |
| State-spec. quad. | No | No | No | No | Yes | Yes |
| Min. Year | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Max. Year | 2009 | 2009 | 2009 | 2009 | 2009 | 2009 |
| Observations | 1640 | 1640 | 1640 | 1505 | 1505 | 1505 |

*Sources*: College High School Premium was created using Census and CPS data. See Appendix B details on variable construction.

*Notes*: This table shows companion specifications to the regressions reported in cols. (1) and (2) in the main Table 3. IV estimates are from split-sample-IV regressions (see Section 7.3 for estimating equations). All regressions include state and year fixed effects; $South \times Year$ fixed effects; and state-year education controls (both from Gallup and CPS at the annual level, and interpolated from the IPUMS Census at the decade level). "Industry shares" controls for state-year share of employment in all one-digit industry categories. "State-spec. quad." indicates that state-specific quadratic time trends are included. "Income covars." indicate that state-year GDP and state-year share of households filing taxes are included. "Policy covars." indicate that state-year minimum wage and a "policy liberalism" index (from Caughey and Warshaw, 2016) are included. Standard errors are clustered at the state level. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$

Appendix Table A.14: State-Year male 90/10 ratio as a function of union density (additional specification)

| | Dep't var: Log Percentile 90-10 Men | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Household union share | -0.133** | -0.296** | -0.272** | -0.361*** | -0.247*** | -0.244** |
| | 0.062 | 0.118 | 0.119 | 0.116 | 0.094 | 0.095 |
| Mean, dept. var. | 1.386 | 1.386 | 1.386 | 1.398 | 1.398 | 1.398 |
| R-squared | 0.671 | 0.669 | 0.685 | 0.681 | 0.790 | 0.790 |
| Education Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Shares | No | No | No | Yes | Yes | Yes |
| Income covars. | No | No | Yes | Yes | Yes | Yes |
| Policy covars. | No | No | No | No | No | Yes |
| Split-Sample IV | No | Yes | Yes | Yes | Yes | Yes |
| State-spec. quad. | No | No | No | No | Yes | Yes |
| Min. Year | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Max. Year | 2009 | 2009 | 2009 | 2009 | 2009 | 2009 |
| Observations | 1640 | 1640 | 1640 | 1505 | 1505 | 1505 |

*Sources*: Log 90-10 Percentile for Men was created using Census and CPS data. See Appendix B details on variable construction.

*Notes*: This table shows companion specifications to the regressions reported in cols. (3) and (4) in the main Table 3. IV estimates are from split-sample-IV regressions (see Section 7.3 for estimating equations). All regressions include state and year fixed effects; $South \times Year$ fixed effects; and state-year education controls (both from Gallup and CPS at the annual level, and interpolated from the IPUMS Census at the decade level). "Industry shares" controls for state-year share of employment in all one-digit industry categories. "State-spec. quad." indicates that state-specific quadratic time trends are included. "Income covars." indicate that state-year GDP and state-year share of households filing taxes are included. "Policy covars." indicate that state-year minimum wage and a "policy liberalism" index (from Caughey and Warshaw, 2016) are included.Standard errors are clustered at the state level. $^{*}p < 0.1$,$^{**}p < 0.05$,$^{***}p < 0.01$

Appendix Table A.15: State-Year Gini coefficient as a function of union density (additional specification)

| | Dep't var: Gini Coefficient | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Household union share | -0.027** | -0.063*** | -0.058** | -0.076*** | -0.074*** | -0.074*** |
| | 0.011 | 0.024 | 0.023 | 0.025 | 0.023 | 0.024 |
| Mean, dept. var. | 0.376 | 0.376 | 0.376 | 0.378 | 0.378 | 0.378 |
| R-squared | 0.712 | 0.710 | 0.720 | 0.718 | 0.783 | 0.783 |
| Education Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Shares | No | No | No | Yes | Yes | Yes |
| Income covars. | No | No | Yes | Yes | Yes | Yes |
| Policy covars. | No | No | No | No | No | Yes |
| Split-Sample IV | No | Yes | Yes | Yes | Yes | Yes |
| State-spec. quad. | No | No | No | No | Yes | Yes |
| Min. Year | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Max. Year | 2009 | 2009 | 2009 | 2009 | 2009 | 2009 |
| Observations | 1640 | 1640 | 1640 | 1505 | 1505 | 1505 |

*Sources*: The Gini Coefficient was created using Census and CPS data. See Appendix B details on variable construction.

*Notes*: This table shows companion specifications to the regressions reported in cols. (5) and (6) in the main Table 3. IV estimates are from split-sample-IV regressions (see Section 7.3 for estimating equations). All regressions include state and year fixed effects; $South \times Year$ fixed effects; and state-year education controls (both from Gallup and CPS at the annual level, and interpolated from the IPUMS Census at the decade level). "Industry shares" controls for state-year share of employment in all one-digit industry categories. "State-spec. quad." indicates that state-specific quadratic time trends are included. "Income covars." indicate that state-year GDP and state-year share of households filing taxes are included. "Policy covars." indicate that state-year minimum wage and a "policy liberalism" index (from Caughey and Warshaw, 2016) are included. Standard errors are clustered at the state level. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.16: State-year top-ten income share as a function of union density (additional specification)

| | Dep't var: Top 10p. Income | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Household union share | -2.124** | -5.342*** | -6.158*** | -3.994** | -3.087** | -3.147** |
| | 0.960 | 2.065 | 2.103 | 1.727 | 1.410 | 1.399 |
| Mean, dept. var. | 36.606 | 36.608 | 36.608 | 36.964 | 36.964 | 36.964 |
| R-squared | 0.782 | 0.779 | 0.805 | 0.832 | 0.915 | 0.915 |
| Education Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Shares | No | No | No | Yes | Yes | Yes |
| Income covars. | No | No | Yes | Yes | Yes | Yes |
| Policy covars. | No | No | No | No | No | Yes |
| Split-Sample IV | No | Yes | Yes | Yes | Yes | Yes |
| State-spec. quad. | No | No | No | No | Yes | Yes |
| Min. Year | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Max. Year | 2009 | 2009 | 2009 | 2009 | 2009 | 2009 |
| Observations | 3108 | 3107 | 3107 | 2723 | 2723 | 2723 |

*Sources*: The Top 10 percent share of income data comes from Frank (2015) and is discussed in the text.

*Notes*: This table shows companion specifications to the regressions reported in cols. (7) and (8) in the main Table 3. IV estimates are from split-sample-IV regressions (see Section 7.3 for estimating equations). All regressions include state and year fixed effects; $South \times Year$ fixed effects; and state-year education controls (both from Gallup and CPS at the annual level, and interpolated from the IPUMS Census at the decade level). "Industry shares" controls for state-year share of employment in all one-digit industry categories. "State-spec. quad." indicates that state-specific quadratic time trends are included. "Income covars." indicate that state-year GDP and state-year share of households filing taxes are included. "Policy covars." indicate that state-year minimum wage and a "policy liberalism" index (from Caughey and Warshaw, 2016) are included. Standard errors are clustered at the state level. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

Appendix Table A.17: Log state-year GDP per capita as a function of union density

| | Dep't var: Log GDP/Cap | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Household union share | 0.071*** | 0.130*** | 0.142*** | 0.140*** | 0.018 | 0.020 |
| | 0.023 | 0.050 | 0.050 | 0.050 | 0.039 | 0.040 |
| Mean, dept. var. | -5.379 | -5.378 | -5.378 | -5.322 | -5.322 | -5.322 |
| R-squared | 0.998 | 0.998 | 0.998 | 0.998 | 0.999 | 0.999 |
| Education Control | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry Shares | No | No | No | Yes | Yes | Yes |
| Share returns. | No | No | Yes | Yes | Yes | Yes |
| Other covars. | No | No | No | No | No | Yes |
| Split-Sample IV | No | Yes | Yes | Yes | Yes | Yes |
| State-spec. quad. | No | No | Yes | No | Yes | Yes |
| Min. Year | 1940 | 1940 | 1940 | 1940 | 1940 | 1940 |
| Max. Year | 2009 | 2009 | 2009 | 2009 | 2009 | 2009 |
| Observations | 3108 | 3107 | 3107 | 2723 | 2723 | 2723 |

*Sources*: Log State GDP/Cap data comes from Frank (2015).
*Notes*: IV estimates are from split-sample-IV regressions (see Section 7.3 for estimating equations). All regressions include state and year fixed effects; $South \times Year$ fixed effects; and state-year education controls (both from Gallup and CPS at the annual level, and interpolated from the IPUMS Census at the decade level). "Industry shares" controls for state-year share of employment in all one-digit industry categories. "State-spec. quad." indicates that state-specific quadratic time trends are included. "Income covars." indicate that state-year GDP and state-year share of households filing taxes are included. "Policy covars." indicate that state-year minimum wage and a "policy liberalism" index (from Caughey and Warshaw, 2016) are included. Standard errors are clustered at the state level. $^{*}p < 0.1,^{**}p < 0.05,^{***}p < 0.01$

# Appendix B. Sample Selection and Construction of Key Variables

## B.1. Sample Selection

To construct our main Gallup sample, we apply the following selection criteria to the population of recorded Gallup survey respondents from years 1937 through 1987. First, we eliminate respondents to surveys in which the union membership question was not asked. Second, we remove any respondents younger than 21 or older than 64. Third, we remove respondents who identify themselves as farmers. Fourth, we remove respondents who live in Alaska, Hawaii, or Washington D.C.

Our CPS sample is taken from the May supplements in years 1976 to 1981 and both May and March supplements in years 1983 to 2015. We excluded armed forces from our sample. For state-year measures, the state identifiers are only available starting in 1979, and so our CPS-based series begins there. We excluded Alaska, DC and Hawaii from time series, additionally we excluded Idaho from the state-year analysis to make it comparable with the Gallup sample.

## B.2. Variable Construction

**Union Density** In both CPS and Gallup, union density is calculated as the number of households with at least one reported union member between 21 and 64 years old divided by the total number of households. We use the CPS to construct both household union density at the aggregate time-series level as well as the state-year level.

**College-High School Share Ratio** To construct college-high school share ratio in both CPS and Gallup samples, we first calculate the share of respondents aged 21 to 64 years in each of three categories: high school or less, some college, and college or more. The college-high school share ratio is calculated as the ratio of college share plus half of some college share relative to high school share plus half of some college share in each year:

$$CollegeHSShareRatio_t = \frac{ShareCollege_t + 0.5 * ShareSomeCollege_t}{ShareHighSchool_t + 0.5 * ShareSomeCollege_t} \tag{9}$$

**Family Income** Our Gallup measure of family income covers years 1942 and 1961 through 1974. Gallup family income is derived from the responses to survey questions of the following form: "Which best represents the total annual income, before taxes, of all the members of your immediate family living in your household?" Responses are coded into income bins which vary across surveys. We construct a harmonized income measure by calculating the midpoint of each interior binned response and multiplying bounds on top- and bottom-coded responses by factors of 1.25 and 0.75, respectively. Our CPS measure of family income is taken from the May and March supplements in years 1978 through 2015. This measures combines all reported income from household members 15 years and older. To construct this variable in early CPS years (May and March before 1990), we use the family income variable, which is binned into 12 categories. For the following years (CPS March only) we use the family income variable non-binned, which reports the total income for the respondent's family.

**College premium, 90-10 wage ratio and Gini coefficient** While our RIF analysis constructs measures of aggregate income inequality using family income variable defined above, our time series analysis calculates the college premium, 90-10 wage ratio and Gini coefficient following Goldin and Katz (2009). Each measure uses the log weekly earnings of 18 to 64 year-old full-time and full-year wage and salary workers setting unemployed and NILF to zero. Estimation controls include a full-time dummy, a female dummy, a non-white dummy, a quartic in experience and the interaction of female with non-white and the quartic in experience.

# Appendix C. Background on Gallup Data

## Gallup Sampling

Documentation for Gallup surveys prior to 1950 describe the sampling procedure as follows:

> Prior to 1950, the samples for all Gallup surveys, excluding special surveys, were a combination of what is known as a purposive design for the selection of cities, towns, and rural areas, and the quota method for the selection of individuals within such selected areas. The first step in obtaining the sample was to draw a national sample of places (cities, towns, and rural areas). These were distributed by six regions and five or six city size, urban rural groups or strata in proportion to the distribution of the population of voting age by these regional-city size strata. The distribution of cases between the non-south and south, however, was on the basis of the vote in presidential elections. Within each region the sample of such places was drawn separately for each of the larger states and for groups of smaller states. The places were selected to provide broad geographic distribution within states and at the same time in combination to be politically representative of the state or group of states in terms of three previous elections. Specifically they were selected so that in combination they matched the state vote for three previous elections within small tolerances. Great emphasis was placed on election data as a control in the era from 1935 to 1950. Within the civil divisions in the sample, respondents were selected on the basis of age, sex and socioeconomic quotas. Otherwise, interviewers were given considerable latitude within the sample areas, being permitted to draw their cases from households and from persons on the street anywhere in the community.

Beginning in 1950, Gallup's sampling procedure changed. The following excerpt is taken from post-1950 Gallup survey documentation on sampling:

> All Gallup polls since 1950, excluding certain special surveys, have been based on a national probability sample of interviewing areas. Refinements in the sample design have been introduced at various points in time since then. However, over this period the design in its essentials has conformed to the current procedure, as follows:
>
> 1. The United States is divided into seven size-of-community strata: cities of population 1,000,000 and over; 250,000 to 999,999; and 50,000 to 249,999; with the urbanized areas of all these cities forming a single stratum; cities of 2,500 to 49,999; rural villages; and farm or open country rural areas.
> 2. Within each of these strata, the population is further divided into seven regions: New England, Middle Atlantic, East Central, West Central, South, Mountain, and Pacific Coast.
> 3. Within each size-of-community and regional stratum the population is arrayed in geographic order and zoned into equal-sized groups of sampling units.

4. In each zone, pairs of localities are selected with probability of selection proportional to the size of each locality's population–producing two replicated samples of localities.
5. Within selected cities for which population data are reported by census tracts or enumeration districts, these sample subdivisions are drawn with probability of selection proportional to the size of the population.
6. For other cities, minor civil divisions, and rural areas in the sample for which population data are not reported by census tracts or enumeration districts, small, definable geographic areas are drawn, with the probability of selection proportional to size where available data permit; otherwise with equal probability.
7. Within each subdivision selected for which block statistics are available, a block or block cluster is drawn with probability of selection proportional to the number of dwelling units.
8. In cities and towns for which block statistics are not available, blocks are drawn at random, that is, with equal probability.
9. In subdivisions that are rural or open country in character, segments approximately equal in size of population are delineated and drawn with equal probability.
10. In each cluster of blocks and each segment so selected, a randomly selected starting point is designated on the interviewer's map of the area. Starting at this point, interviewers are required to follow a given direction in the selection of households, taking households in sequence, until their assigned number of interviews has been completed.
11. Within each occupied dwelling unit or household reached, the interviewer asks to speak to the youngest man 18 or older at home, or if no man is at home, the oldest woman 18 or older. This method of selection within the household has been developed empirically to produce an age distribution by men and women separately which compares closely with the age distribution of the population. It increases the probability of selecting younger men, who are at home relatively infrequently, and the probability of reaching older women in the household who tend to be under-represented unless given a disproportionate chance of being drawn from among those at home. The method of selection among those at home within the household is not strictly random, but it is systematic and objective and eliminates interviewer judgement in the selection process.
12. Interviewing is conducted at times when adults are most likely to be at home, which means on weekends or if on weekdays, after 4:00 p.m. for women and after 6:00 p.m. for men.
13. Allowance for persons not at home is made by a "times-at-home" weighting procedure rather than by "call-backs." this procedure is a standard method for reducing the sample bias that would otherwise result from underrepresentation of persons who are difficult to find at home.

14. The pre-stratification by regions is routinely supplemented by fitting each obtained sample to the latest available census bureau estimates of the regional distribution of the population. Also, minor adjustments of the sample are made by educational attainment (by men and women separately), based on the annual estimates of the census bureau derived from their current population survey. The sampling procedure described is designed to produce an approximation of the adult civilian population living in the United States, except for those persons in institutions such as hospitals.

### Gallup Weighting Procedure

To construct weights, we use post-stratification methods (i.e., cell-weighting). Specifically, we weight observations in the Gallup data so that the annual proportions of education-race-region cells in Gallup match the corresponding proportions in U.S. Census data. The process involves several steps: First, we construct comparable measures of education (less than high school, high school graduate, some college, college graduate), race (white, non-white), and region (South, non-South) in both Gallup and Census data. Second, we construct annual proportions of each education-race-region cell for each dataset. In the Census data, we apply representative household weights and linearly interpolate values for intercensal years to best approximate the "true" annual proportions of each cell. Third, we generate cell-specific weights $w_{ct}$ by applying the following formula:

$$w_{ct} = \frac{\pi_{ct}^{C}}{\pi_{ct}^{G}} \tag{10}$$

where $c$ denotes a particular education-race-region cell (e.g., white Southerners with a college degree), and $\pi_{ct}^{C}$ and $\pi_{ct}^{G}$ denote annual cell proportions for Census and Gallup, respectively. Finally, we let $w_{it} = w_{ct}$ for each respondent $i$ in year $t$ corresponding to cell $c$ in the Gallup data and re-normalize so $\sum_{i}^{N_t} \frac{w_{it}}{N_t} = 1$ for each year $t$.

We repeat the procedure above for several alternative cell definitions (e.g., education-race-age-state, age-gender-region). Our preferred weights use education-race-region cells because we find this definition makes our sample as representative as possible without compromising comparability across surveys or creating excessively small or "empty" cells.[46] For surveys without education data, we use race-region weights.

### Comparing Gallup to Census Microdata

We begin with Gallup data from 1950 onward, returning shortly to earlier data. Table A.1 compares Gallup data to 1950–1980 Census data. To summarize how the *actual* (unweighted) Gallup observations compare to the full U.S. adult population, we compare unweighted Gallup data to Census IPUMS tabulations. Given Gallup's well-documented under-sampling of the South, we show results separately for Southern and non-Southern states.

[46]For a more thorough discussion of post-stratification weighting, including optimal cell "fineness," see Berinsky (2006b)

In 1950 and 1960, Gallup exhibits some under-sampling of the South, but, by 1970, this bias had disappeared. From 1950 to 1960, Gallup under-sampled blacks in both the South and the Non-South. This bias continued in the South through 1970, to a smaller degree. These biases reflect the substantial disenfranchisement of blacks, particularly in the South during this period. Age and gender appear representative in Gallup in both regions in each decade.

Gallup respondents outside the South are more educated than their Census counterparts, with the largest gap being a high school completion difference of ten percentage points in 1950. In the South, except for 1950, Gallup and IPUMS show similar levels of education. Gallup Southern respondents have higher high school completion rates than those in the Census in 1950, not surprising as it was still under-sampling Southern blacks in that year. Later in the paper we will show results with the Gallup data both unweighted and weighted to match Census characteristics, but Table A.1 gives some sense of how much "work" the weights must do.

Table A.2 looks separately at 1940, given that Gallup's sampling procedures were quite different during its earlier years. In fact, in 1940, very few Gallup surveys ask about education (the summary statistics we present for that variable are based on only 5,767 observations), so in this table we include occupation categories as supplemental proxies for socio-economic status. The first column shows, again, unweighted Gallup data. Col. (2) presents summary statistics for all adults in the 1940 IPUMS. Perhaps the most striking discrepancy is gender: consistent with their stated methodology at the time, Gallup over-samples men. Col. (3) adjusts the Census sampling so that men are sampled at the Gallup frequencies and also down-weights large households (since Gallup only interviews one person per household). Comparing col. (1) versus (3) shows, as expected, that Gallup significantly under-samples the South.

Consistent with concerns about Gallup over-sampling the affluent, Gallup respondents in 1940 are substantially more educated than their Census counterparts. Unfortunately, given that only in 1942 does Gallup begin to regularly include an education question, the Gallup sample for which we have an education measure in 1940 is quite small (about 5,700 individuals, relative to over 150,000 for the other Gallup variables in 1940). Given the small education sample in 1940, we use occupational categories to further explore socio-economic status in Gallup versus the 1940 Census. Gallup and IPUMS use different occupation categories—Gallup's are much coarser and unfortunately IPUMS categories do not completely nest Gallup categories—so comparisons are not straightforward. Consistent with the concerns cited earlier that Gallup over-sampled the well-to-do, Gallup respondents appear to have slightly higher-status occupations relative to their Census counterparts. For example, "professionals" and "proprietors, managers, officials" appear more numerous in Gallup (these categories are especially useful because IPUMS categories fully nest these Gallup occupations). Reassuringly, farmers and farm laborers are similarly represented in both samples (these two Gallup categories are also fully nested in IPUMS categories, again easing comparisons across data sources).

For the most part, these patterns hold when we drop Southern states from both samples (the final two columns of Table A.2). Importantly, outside of the South, Gallup appears to sample blacks in proportion to their population, even in the very early years of its existence. Also, outside the South, Gallup appears to accurately sample the remaining six regions of

the US.[47]

In general, we show results with Gallup data using weights to match (interpolated) Census IPUMS summary statistics, even though the need for weights is not obvious after 1950 or 1960. From 1937 until 1941, we weight so that Gallup matched the IPUMS in terms of $White \times South$ cells, given that the summary statistics show that Gallup sampling along these dimensions appears suspect in the early years. Beginning in 1942 (the first year in which Gallup surveys ask the union and education questions in the same survey) we weight by $White \times Education \times South$, where $Education \in \{\text{No high school degree, HS degree, Some college, College graduate}\}$, thus giving us $2 \times 4 \times 2 = 16$ cells on which to match. In practice, however, our results are very similar with and without weights.

[47] We use Gallup-defined geographic regions in this table.

# Appendix D. Existing Measures of Union Density Pre-Dating the Current Population Survey

The CPS first asks respondents their union status in 1973, and then only in selected months until 1983 from which time information on union status was collected each month in the CPS as part of the outgoing rotation group supplement. Before this survey, the primary sources for union density are the BLS and Troy/NBER historical time series mentioned in the introduction. The data underlying these calculations are union reports of membership and dues revenue when available, and a variety of other sources when not available. Neither of these data sources ever used representative samples of individual workers to calculate union density.

In general, the data derived from union reports likely become more accurate by the 1960s. Post-1959 the BLS collected mandatory financial reports from unions as a condition of the Labor-Management Reporting and Disclosure (Landrum-Griffin) Act, and Troy and Sheflin (1985) incorporate these data into their estimates of union density. Beginning in 1964, the BLS disaggregates union membership counts by state, and Hirsch *et al.* (2001) splice these reports together with the CPS to form state-year union density panel beginning in 1964 and continuing through today.[48]

Before the 1960s, however, union data were far less standardized. In the remainder of this section, we detail the methodology of the two most widely used data sources on aggregate union density: the BLS and Troy series.

## D.1. The BLS Estimate of Early Union Density

The BLS series is based on union-reported membership figures starting in the late 1940s. Prior to 1948, the methodology for calculating union membership does not appear standardized. For example, the 1945 Monthly Labor Report notes as its sources: "This study is based on an analysis of approximately 15,000 employer-union agreements as well as employment, union membership, and *other data available to the Bureau of Labor Statistics* [emphasis ours]" (Bureau of Labor Statistics, 1945)[49]

It is obviously hard to verify information from unspecified "sources available to the BLS" but even in instances where the BLS can rely on union membership reports, concerns arise. A key issue is that unions had important incentives to over-state their membership and until the late 1950s faced no penalty for doing so. In the early and mid-1930s, the main umbrella organization for local unions was the American Federation of Labor (AFL). They were often charged with over-stating their membership, presumably to inflate their political influence.

[48]Freeman *et al.* (1998) constructs a time-series of union density from 1880 to 1995, splicing together the official series from the BLS with series constructed from the CPS. Freeman reports alternative series constructed by other scholars (Troy (1965), Troy and Sheflin (1985),Wolman (1924), and Galenson (1960)) in the Appendix to his paper.

[49]For example, one alternative source the BLS used was convention representation formulas. "Convention formulas" specified the number of seats, as a function of membership, each union would have at the umbrella organization convention. Inverting this formula and using the convention records, rough estimates of union membership could be formed.

For example, a 1934 *New York Times* story casts doubt on the AFL's claim to represent over six million workers, noting that "complete and authoritative data are lacking" and that the figures provided by the AFL "are not regarded as accurate."[50] Individual unions also had an incentive to inflate the numbers they reported to the AFL. For example, the number of seats each union would receive at the annual convention was based on a formula to which membership was the main input.

If anything, these incentives to over-report likely grew after 1937, when the Committee on Industrial Organization broke away from the AFL to form a rival umbrella organization, the Congress of Industrial Organizations (CIO). Both federations of labor, the AFL and CIO, now competed for local unions to join their umbrella organizations, as well as for sympathies of government officials, tasks that were aided by a public perception that the federation was large and growing. Based on our read of *New York Times* articles on unions in the late 1930s and early 1940s, one of the most common if not the most common topic is the conflict between the two federations.[51] Individual unions still had incentives to compete for influence within their given federation, and thus inflate membership.

Membership inflation became such an issue that the federations themselves may not have known how many actual members they had. In fact, the CIO commissioned an *internal* investigation into membership inflation, conducted by then-United Steelworkers of America president Philip Murray. Murray's 1942 report concluded that actual CIO membership was less than fifty percent of the official number the federation was reporting. (Galenson, 1960)

## D.2. The Troy Estimates of Early Union Density

In his NBER volumes estimating union density, Troy is well aware of the problems documented above with the BLS estimates. For this reason, he defines membership as "dues-paying members" and proceeds to estimate union membership using unions' financial reports where available, presumably under the assumption that financial reports were less biased than membership reports. For each union, he divides aggregate union dues revenue by average full-time member dues to recover an estimate of union membership. While Troy is cognizant of the limitations of his data and methodology, he believes the biases are largely *understating* union membership (e.g. some groups, such as veterans, pay lower than average or no dues).

But union financial reports, like membership reports, are also not verified until the late 1950s. Nor is it obvious that union revenue data are not similarly inflated (in fact, the AFL accused the CIO of lying about their income data, as we mention in footnote 51). Moreover, revenue data are largely incomplete for the 1930s and 1940s. For example, in his

[50] See, *"Organized Labor is Put at 6,700,000"*, New York Times, May 1935. reporting that "For one thing, complete and authoritative data are lacking, and this is especially true during times of depression, when some unions drop unemployed workers from the rolls and exempt them from paying dues. . . . . The [AFL] reported an average membership of 2,609,011 for the year ended Aug. 31, 1934. These official figures, which are not regarded as an accurate measure of the movement, are far below the peak figure of 4,078,740 for 1920."

[51] As just one example, a 1938 *NYT* headline and subtitles read: "Green Says Lewis Falsified Report; A.F.L. Head Alleges Statement on C.I.O. membership is an 'Amazing Inflation; Questions Income Data," referring to AFL head William Green and CIO head John Lewis, respectively.

1940 estimates, Troy (1965) notes that the sources for 54.4% of his total is *not* in fact from financial reports, but instead an "Other" category, which includes personal correspondence with unions, asking their membership.[52] As such, for these early years, the Troy data in fact appears to face the same issue with membership-inflation as does the BLS data.[53]

In addition, Troy imputes the membership of many CIO unions in the late 1930s and 1940s by assigning them the membership of their AFL counterpart in the same sector.[54] This procedure likely over-states CIO membership, given that the AFL was believed to be twice as large as the CIO during this period (we also find this 2:1 ratio in our Gallup data), though obviously that average ratio may vary by sector.

In summary, while a likely improvement over the BLS series, it is difficult to believe that Troy's estimates (or Troy and Sheflin (1985)) are without extensive mismeasurement. Given the limitations of the existing pre-CPS data on union density, in the next section we introduce a new source: Gallup and other opinion surveys.

## D.3. Other Pre-CPS State-Year Measures of Union Density

The only sources of state-year data on union density prior to the CPS we are aware of are measures created by Hirsch *et al.* (2001) from BLS reports (which begin disaggregating union membership regionally, often by state, in 1964) from 1964-1977, and measures created by Troy and Sheflin (1985) for the years 1939 and 1956. Our Gallup measure is quite highly correlated (correlation = .724) with the existing Hirsch-Macpherson measures (individual union density as a fraction of non-farm employment) for the 1964-1986 years, which are where there is overlap. This correlation increases to .75 when we restriction attention to the CPS years with state identifiers (1978-1986).

The historical Troy measures for 1939 and 1956 are constructed from even more fragmentary records than the annual series we discuss above (as many union reports did not disaggregate either revenue or membership by state), we are also correlated with these data in both cross-sections and changes (1939 correlation = 0.78, 1953 correlation = 0.75, correlation in changes =0.5).

[52] "Other" is down to 10% by 1960 (Troy (1965)).

[53] Troy (1965) also only presents validation exercises for his post-1950 data, comparing reported measurement with that inferred from dues receipts for the Chemical and Rubber Workers in 1953, leaving it open whether the BLS or Troy (or neither) is correct for the pre-1950 series.

[54] From Troy (1965) [pp. A53]: "The average membership per local industrial union is arbitrarily estimated to be 300, and this figure is multiplied each year by the number of such unions reported by the ClO. The estimate of an average membership of 300 is deemed a fair one since the average membership of the local trade and federal labor unions of the AFL, a class of unions similar to the local industrial unions of the CIO, varies from a low of 82 in 1937 to a high of 193 in 1948."

## Appendix E. Details on RIF Regressions

In this appendix section we outline the recentered influence function approach of Firpo *et al.* (2009), adapted for our outcome measures. The relevant property of a recentered influence function is that its expectation equals the distributional statistic of interest. For quantile $\tau$ denoted $Q_\tau$, the quantile RIF is given by $RIF(y, Q_\tau) = Q_\tau + \frac{\tau - \mathbf{1}(y_h < Q_\tau)}{f_y(Q_\tau)}$, and taking expectations verifies that $E[RIF(y, Q_\tau)] = Q_\tau$.

Firpo *et al.* (2009) show that a regression of the RIF on covariates yields the approximate effect of the covariates on the distributional statistic of interest (applied to the unconditional distribution). The intuition is that the marginal effect of an increase in union density to a given statistic is given by the average effect of each union individual on that statistic (each observation's "influence"). The estimate for $\beta$ in equation (5) is therefore the effect of a change in union density on the probability that a household's income is less than the value of the quantile $\tau$, i.e., $\frac{dF(Q_\tau)}{dUnion}$, divided by the density of household income at $Q_\tau$ ($\frac{dF(Q_\tau)}{dQ_\tau}$). The resulting coefficient thus measures $\frac{dQ_\tau}{dUnion}$ the marginal change in the value of the quantile at $\tau$ in response to a small change in $Union$. The RIF of the Gini is not particularly illustrative and we omit it here. For further examples and exposition of distributional regressions see Havnes and Mogstad (2015) and Dube (2017).

Extending this to the 90-10 ratio immediately suggests the following RIF, and inspection confirms that $E[RIF(y_h, Q_{.9} - Q_{.1}] = Q_{.9} - Q_{.1}$.

$$RIF(y_h, Q_{.9} - Q_{.1}) = Q_{.9} - Q_{.1} + \frac{.9 - \mathbf{1}(y_h < Q_{.9})}{f_y(Q_{.9})} - \frac{.1 - \mathbf{1}(y_h < Q_{.1})}{f_y(Q_{.1})} \tag{11}$$

One limitation of our historical data is that the income distribution is binned, sometimes very coarsely, so the kernel density used to estimate $f$ will be biased. We can assess this using the CPS where we have both the unbinned family income (which is still topcoded) as well as the binned version. While the exact magnitude and precision of the RIF estimates are sensitive to the binning procedure, the qualitative pattern in the 90-10 ratio is not. Appendix Figure A.13 shows the percentiles with unbinned data; while the effect on the median is unchanged, the effect on the 90th and the 10th percentiles are both more positive than the binned analogue in Appendix Figure A.12, which roughly cancels out in the corresponding 90-10 ratio.