**Data Appendix**

**A Retirement Data**

Data on the retirement of teachers comes from the American Community Survey (ACS) from 2010 to 2016.[[1]](#footnote-1)

**Classifying teachers:**

Describe clearly this person’s chief job activity or business last week. If this person had more than one job, describe the one at which this person worked the most hours. If this person had no job or business last week, give information for his/her last job or business.

We classify an individual as a teacher following Harris and Adams (2007). This includes: kindergarten teachers, primary and secondary school teachers, special education teachers, and other teachers not otherwise classified. This excludes all post-secondary teachers.

**Worked within the last year:**

When did this person last work, even for a few days?

1. Within the past 12 months
2. 1 to 5 years ago – SKIP to [L]
3. Over 5 years ago or never worked – SKIP to question 47

The population of teachers is restricted to those who report working in the last year. Retired teachers are defined as individuals whose most recent reported occupation was a teacher and who worked last year, but are currently not in the labor force.

**Retirement status:**

LAST WEEK, did this person work for pay at a job (or business)?

1. Yes  SKIP to question 30
2. No Did not work (or retired)

LAST WEEK, was this person on layoff from a job?

1. Yes  SKIP to question 35c
2. No

Has this person been informed that he or she will be recalled to work within the next 6 months OR been given a date to return to work?

1. Yes  SKIP to question 37
2. No

During the LAST 4 WEEKS, has this person been ACTIVELY looking for work?

1. Yes
2. No  SKIP to question 38

LAST WEEK, could this person have started a job if offered one, or returned to work if recalled?

1. Yes, could have gone to work
2. No, because of own temporary illness
3. No, because of all other reasons (in school, etc.)

We use employment status from the ACS to determine whether an individual is employed. Employment status in the ACS is categorized as (1) employed, (2) unemployed, or (3) not in the labor force. It is determined by the respondents answers to the above questions.

**B Other Occupation Categories**

We define two occupation groups as counterfactuals for teachers. The first are state government employees who are not teachers. We identify state government employees using the following ACS question:

Was this person Mark (X) ONE box.

1. an employee of a PRIVATE FOR-PROFIT company or business, or of an individual, for wages, salary, or commissions?
2. an employee of a PRIVATE NOT-FOR-PROFIT, tax-exempt, or charitable organization?
3. a local GOVERNMENT employee (city, county, etc.)?
4. a state GOVERNMENT employee?
5. a Federal GOVERNMENT employee?
6. SELF-EMPLOYED in own NOT INCORPORATED business, professional practice, or farm?
7. SELF-EMPLOYED in own INCORPORATED business, professional practice, or farm?
8. working WITHOUT PAY in family business or farm?

The second, and broader, counterfactual group consist of individuals from the following occupation categories: management, business, science, and arts occupations; business operations specialists; financial specialists; computer and mathematical occupations; architecture and engineering occupations; life, physical, and social science occupations; community and social services occupations; legal occupations; arts, design, entertainment, sports, and media occupations; sales and related occupations; and office and administrative support occupations. We classify individuals into these categories using the ``most recent occupation’’ question listed above.

**C Accuracy of Retirement Classification**

Because the ACS does not contain a precise measure of retirement, there is some noise in our constructed measure. We define an individual as retired if she worked within the last year but was not working at the time of the survey. This definition of retirement will not capture individuals who retire from teaching and immediately start working elsewhere without a break in service. Note that in the window of time observed in the ACS, an individual must not be currently working but may later return to work. Most teacher pension plans require a break in service before returning to a covered or non-covered employment within that same plan. Thus, our measure of retirement should capture most job separations.

As evidence that there is not differential measurement error in our definition of retirement by Social Security inclusion, we conduct a study of ``observed’’ versus ``unobserved’’ exits. We begin by calculating the weighted total number of teachers age 25 to 75 by age, first for the years 2011-2016 then for 2010-2015. Teachers are defined as individuals whose most recent primary occupation is teaching and who reported working in the last year. This includes individuals who are currently teachers or who are unemployed or not in the labor force. We then calculate the ``loss’’ of teachers from age  in year  to *a* in *t*, which we term unobserved exits.

 (3)

Note that unobserved exits could theoretically be negative if there are new entrants to teaching. This measure of unobserved exits will include teachers who move directly into another occupation after retiring as well as sampling errors. To make our estimate of unobserved exits comparable by age group, we scale it by the sum of observed exits from teaching and our estimate of unobserved exits. This produces a fraction of exits that are ``missed’’ by our measure of retirement.

 (4)

For younger ages, we anticipate a large number of missed exits due to job switching without a period of non-employment. However, as individuals age, we expect that departures will be more likely to lead to a termination of employment, at least for some period of time. Note that even if a teacher returns to work at a later age, we will observe the exit if she spends a period of not working first. Figure A1 presents graphically the measured ``missed’’ exits by age at time *t*. For younger ages, the data are noisier and indicate not only unobserved exits but also new entrants (i.e., negative values). However, by age 56, where we begin our analysis, nearly all missing teachers are captured by our definition of retirement. The dark line represents states where teachers are covered by Social Security, while the lighter line includes teachers not part of Social Security. Importantly, we observe that the age-specific loss rates are nearly identical between the two groups of states from age 55 through age 70. We do not observe any systematic difference in missing teachers between to the two groups of states at any age. We interpret these findings as strong evidence that our measure of retirement is a good approximation and that Social Security inclusion is not correlated with better quality measures of retirement.

Figure A1: Estimates of Missed Teachers by Age

Table A1: Summary Statistics: Pension Parameters and Macroeconomic Conditions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | All | Not included in SS | Included in SS | Difference:(3)-(2) |
| Eligible for Full Retirement | 0.6341 | 0.6462 | 0.6264 | -0.0198\*\*\* |
|  | (0.4817) | (0.4782) | (0.4838) | [0.0040] |
| Funding Ratio | 0.7280 | 0.6612 | 0.7709 | 0.1097\*\*\* |
|  | (0.1547) | (0.1185) | (0.1600) | [0.0011] |
| Percent of Required Contribution Paid | 0.8192 | 0.7674 | 0.8524 | 0.0850\*\*\* |
|  | (0.2582) | (0.2589) | (0.2522) | [0.0023] |
| Unemployment Rate (%) | 7.1839 | 7.5727 | 6.9340 | -0.6387\*\*\* |
|  | (2.1206) | (2.2326) | (2.0059) | [0.0177] |
| Real Income Per Capita | 42.3953 | 43.0516 | 41.9734 | -1.0782\*\*\* |
| (In Thousands of Dollars) | (4.1823) | (4.4842) | (3.9184) | [0.0346] |
| Real GDP Per Capita | 49.3823 | 52.6089 | 47.3083 | -5.3005\*\*\* |
| (In Thousands of Dollars) | (9.0726) | (8.8783) | (8.5768) | [0.0716] |
| Observations | 88788 | 34356 | 54432 | 88788 |

Sample of all teachers. Means weighted at the person level with SD in parentheses and SE in brackets.

Table A2: Age-Specific Retirement Rates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | All | Not included in SS | Included in SS | Difference:(3)-(2) |
| 50-59 Years Old | 0.0649 | 0.0633 | 0.0659 | 0.0026 |
|  | (0.2463) | (0.2435) | (0.2481) | [0.0025] |
| 60 Years Old | 0.1370 | 0.1409 | 0.1344 | -0.0065 |
|  | (0.3438) | (0.3480) | (0.3411) | [0.0112] |
| 61 Years Old | 0.1590 | 0.1652 | 0.1551 | -0.0100 |
|  | (0.3657) | (0.3713) | (0.3620) | [0.0129] |
| 62 Years Old | 0.2180 | 0.1914 | 0.2348 | 0.0434\*\*\* |
|  | (0.4129) | (0.3934) | (0.4238) | [0.0144] |
| 63 Years Old | 0.2253 | 0.2243 | 0.2260 | 0.0017 |
|  | (0.4178) | (0.4171) | (0.4182) | [0.0156] |
| 64 Years Old | 0.2331 | 0.2058 | 0.2508 | 0.0450\*\*\* |
|  | (0.4228) | (0.4043) | (0.4335) | [0.0169] |
| 65 Years Old | 0.2825 | 0.2675 | 0.2927 | 0.0252 |
|  | (0.4502) | (0.4426) | (0.4550) | [0.0207] |
| 66 Years Old | 0.3113 | 0.2779 | 0.3334 | 0.0556\*\* |
|  | (0.4630) | (0.4480) | (0.4714) | [0.0233] |
| 67 Years Old | 0.3361 | 0.3184 | 0.3489 | 0.0305 |
|  | (0.4724) | (0.4658) | (0.4766) | [0.0276] |
| 68 Years Old | 0.3654 | 0.3419 | 0.3824 | 0.0405 |
|  | (0.4815) | (0.4744) | (0.4860) | [0.0308] |
| 69 Years Old | 0.3543 | 0.3359 | 0.3683 | 0.0324 |
|  | (0.4783) | (0.4723) | (0.4824) | [0.0332] |
| 70 Years Old | 0.3871 | 0.3502 | 0.4145 | 0.0643 |
|  | (0.4871) | (0.4770) | (0.4926) | [0.0395] |
| Total | 0.1221 | 0.1182 | 0.1247 | 0.0065\*\* |
|  | (0.3275) | (0.3228) | (0.3304) | [0.0026] |
| Observations | 88788 | 34356 | 54432 | 88788 |

Sample of all teachers. Weighted at the person level with SD in parentheses and SE in brackets.

Table A3: Age-Specific Teacher Labor Force Participation Rates

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) |
|  | All | Not included in SS | Included in SS | Difference:(3)-(2) |
| 50-59 Years Old | 0.0610 | 0.0599 | 0.0617 | 0.0018 |
|  | (0.0366) | (0.0347) | (0.0378) | [0.0031] |
| 60 Years Old | 0.0563 | 0.0562 | 0.0564 | 0.0002 |
|  | (0.0417) | (0.0402) | (0.0426) | [0.0035] |
| 61 Years Old | 0.0509 | 0.0503 | 0.0513 | 0.0010 |
|  | (0.0398) | (0.0343) | (0.0430) | [0.0032] |
| 62 Years Old | 0.0429 | 0.0444 | 0.0420 | -0.0024 |
|  | (0.0335) | (0.0323) | (0.0343) | [0.0029] |
| 63 Years Old | 0.0376 | 0.0380 | 0.0373 | -0.0007 |
|  | (0.0323) | (0.0296) | (0.0340) | [0.0027] |
| 64 Years Old | 0.0327 | 0.0350 | 0.0313 | -0.0038 |
|  | (0.0280) | (0.0257) | (0.0293) | [0.0023] |
| 65 Years Old | 0.0268 | 0.0289 | 0.0254 | -0.0035 |
|  | (0.0256) | (0.0249) | (0.0259) | [0.0022] |
| 66 Years Old | 0.0213 | 0.0234 | 0.0200 | -0.0034\* |
|  | (0.0213) | (0.0195) | (0.0223) | [0.0018] |
| 67 Years Old | 0.0180 | 0.0203 | 0.0166 | -0.0037\*\* |
|  | (0.0194) | (0.0173) | (0.0204) | [0.0016] |
| 68 Years Old | 0.0143 | 0.0165 | 0.0129 | -0.0036\*\* |
|  | (0.0175) | (0.0163) | (0.0181) | [0.0015] |
| 69 Years Old | 0.0130 | 0.0154 | 0.0116 | -0.0038\*\* |
|  | (0.0185) | (0.0166) | (0.0195) | [0.0015] |
| 70 Years Old | 0.0106 | 0.0127 | 0.0094 | -0.0033\*\* |
|  | (0.0166) | (0.0141) | (0.0178) | [0.0013] |
| Total | 0.0478 | 0.0481 | 0.0476 | -0.0005 |
|  | (0.0378) | (0.0354) | (0.0393) | [0.0009] |
| Observations | 8064 | 2184 | 5880 | 8064 |

Sample of all teachers. Weighted at the person level with SD in parentheses and SE in brackets.

Table A4: Logit Regression Coefficient Estimates for Married Teachers by Gender

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | (1) | | (2) | |
|  | Married Women | | Married Men | |
| Included in SS | 0.0833 | (0.0828) | 0.0403 | (0.1238) |
|  | [0.0053] |  | [0.0020] |  |
| 60 Years Old | 0.6328\*\*\* | (0.1679) | 0.6969\*\*\* | (0.2550) |
| 61 Years Old | 0.7722\*\*\* | (0.0962) | 0.6852\*\*\* | (0.2629) |
| 62 Years Old | 1.0079\*\*\* | (0.0803) | 1.0912\*\*\* | (0.1881) |
| 63 Years Old | 1.1113\*\*\* | (0.1021) | 1.1820\*\*\* | (0.3235) |
| 64 Years Old | 0.9174\*\*\* | (0.1044) | 0.8712\*\*\* | (0.1947) |
| 65 Years Old | 1.4885\*\*\* | (0.1681) | 1.1909\*\*\* | (0.2033) |
| 66 Years Old | 1.5525\*\*\* | (0.1203) | 1.1139\*\*\* | (0.2512) |
| 67 Years Old | 1.3906\*\*\* | (0.1233) | 1.3585\*\*\* | (0.3213) |
| 68 Years Old | 1.5043\*\*\* | (0.1992) | 1.7547\*\*\* | (0.2169) |
| 69 Years Old | 1.7040\*\*\* | (0.2087) | 1.4665\*\*\* | (0.1877) |
| 70 Years Old | 1.7089\*\*\* | (0.2127) | 1.6123\*\*\* | (0.2153) |
| Included in SS and 60 Years Old | -0.2720 | (0.1842) | -0.1014 | (0.2832) |
|  | [-0.0233] |  | [-0.0067] |  |
| Included in SS and 61 Years Old | -0.1497 | (0.1121) | -0.0269 | (0.3044) |
|  | [-0.0095] |  | [0.0016] |  |
| Included in SS and 62 Years Old | 0.0785 | (0.1250) | -0.0205 | (0.2207) |
|  | [0.0286] |  | [0.0031] |  |
| Included in SS and 63 Years Old | -0.0468 | (0.1437) | -0.3472 | (0.3444) |
|  | [0.0067] |  | [-0.0490] |  |
| Included in SS and 64 Years Old | 0.1381 | (0.1314) | 0.3682 | (0.2252) |
|  | [0.0393] |  | [0.0639] |  |
| Included in SS and 65 Years Old | -0.1287 | (0.1995) | 0.2150 | (0.2367) |
|  | [-0.0097] |  | [0.0466] |  |
| Included in SS and 66 Years Old | -0.0265 | (0.1810) | 0.5206\* | (0.2976) |
|  | [0.0125] |  | [0.1050] |  |
| Included in SS and 67 Years Old | 0.4143\*\*\* | (0.1532) | 0.2059 | (0.3483) |
|  | [0.1117] |  | [0.0495] |  |
| Included in SS and 68 Years Old | 0.3155 | (0.2541) | 0.1077 | (0.2972) |
|  | [0.0900] |  | [0.0323] |  |
| Included in SS and 69 Years Old | -0.1275 | (0.2513) | 0.5394\*\* | (0.2465) |
|  | [-0.0101] |  | [0.1246] |  |
| Included in SS and 70 Years Old | 0.0700 | (0.2625) | 0.5582\* | (0.3233) |
|  | [0.0356] |  | [0.1344] |  |
| Observations | 45717 |  | 15196 |  |
| 2011 | 0.0579 | (0.0581) | 0.0874 | (0.1146) |
| 2012 | 0.1308\* | (0.0679) | 0.1525 | (0.1259) |
| 2013 | 0.1716\* | (0.0961) | -0.1069 | (0.1371) |
| 2014 | 0.0807 | (0.0984) | 0.0359 | (0.1459) |
| 2015 | 0.1345 | (0.1181) | 0.1398 | (0.1762) |
| 2016 | 0.0898 | (0.1284) | 0.1440 | (0.1797) |
| Advanced Degree | -0.2598\*\*\* | (0.0398) | -0.1698\*\*\* | (0.0658) |
| African American | -0.0043 | (0.2624) | -0.7227\*\*\* | (0.2713) |
| Other Race | -0.0406 | (0.1078) | -0.1655 | (0.2935) |
| Hispanic Origin | -0.2540\*\*\* | (0.0805) | -0.5570\*\*\* | (0.1989) |
| Spouse is < 50 Years Old | -0.1523 | (0.1183) | -0.2439\* | (0.1359) |
| Spouse is 60 Years Old | 0.1821\*\*\* | (0.0671) | 0.2162\* | (0.1262) |
| Spouse is 61 Years Old | 0.1251\* | (0.0698) | 0.1040 | (0.1155) |
| Spouse is 62 Years Old | 0.1731\*\*\* | (0.0651) | 0.0617 | (0.1368) |
| Spouse is 63 Years Old | 0.0420 | (0.0772) | 0.0902 | (0.1014) |
| Spouse is 64 Years Old | 0.2059\*\*\* | (0.0698) | 0.1024 | (0.1379) |
| Spouse is 65 Years Old | 0.1748\*\* | (0.0849) | 0.1548 | (0.1653) |
| Spouse is 66 Years Old | 0.0673 | (0.0879) | -0.2145 | (0.1397) |
| Spouse is 67 Years Old | 0.0314 | (0.1038) | 0.3537\*\* | (0.1737) |
| Spouse is 68 Years Old | 0.0127 | (0.1026) | -0.0578 | (0.2386) |
| Spouse is 69 Years Old | -0.0072 | (0.1140) | -0.1490 | (0.2101) |
| Spouse is 70 Years Old | -0.0045 | (0.1131) | -0.4214 | (0.3320) |
| Spouse is > 70 Years Old | -0.1727\* | (0.0916) | -0.0405 | (0.3274) |
| Spouse is a Teacher | -0.0066 | (0.0582) | 0.1789\*\*\* | (0.0671) |
| Spouse is Not in Labor Force | 0.6971\*\*\* | (0.0426) | 0.9316\*\*\* | (0.0622) |
| Spouse Has Advanced Degree | 0.1912\*\*\* | (0.0350) | 0.3041\*\*\* | (0.0768) |
| Spouse is African American | -0.2552 | (0.2429) | 0.4649\* | (0.2692) |
| Spouse is Other Race | -0.2219\* | (0.1194) | -0.0069 | (0.1479) |
| Spouse is Hispanic Origin | -0.0765 | (0.0983) | 0.0454 | (0.1648) |
| Eligible for Full Retirement | 0.3805\*\*\* | (0.0581) | 0.4909\*\*\* | (0.1245) |
| Funding Ratio | 0.1671 | (0.2533) | 0.1206 | (0.3951) |
| Percent of Required Contribution Paid | -0.0276 | (0.1154) | -0.1279 | (0.1510) |
| Unemployment Rate | 0.0396\* | (0.0228) | 0.0878\*\* | (0.0386) |
| Real Income Per Capita (In $1,000s) | 0.0037 | (0.0112) | 0.0160 | (0.0149) |
| Real GDP Per Capita (In $1,000s) | -0.0052 | (0.0050) | -0.0005 | (0.0061) |
| Observations | 45717 |  | 15196 |  |

Standard errors clustered at the state level in parentheses. Marginal effects in brackets.

\* *p* < 0:10, \*\* *p* < 0:05, \*\*\* *p* < 0:01

Notes: Teacher retirement data are derived from the 2010-2016 American Community Surveys, see text for details. The dependent variable is the probability of retiring in the past year. The model includes all covariates as presented in Table 4, Column (3), plus additional spousal characteristics as indicated.

1. Steven Ruggles, Katie Genadek, Ronald Goeken, Josiah Grover, and Matthew Sobek. Integrated Public Use Microdata Series: Version 7.0 American Community Survey. Minneapolis: University of Minnesota, 2017 [↑](#footnote-ref-1)