# Underemployment by Field of Study: Methodology

*Data and methods behind "Underemployment by Field of Study, 2018-2024" · opportunitydata.org/underemployment-by-field.html · First edition June 2026, this note November 2026*

## Author and funding

Author: Benazir Rowe, PhD, Founder, Opportunity Data. Opportunity Data is an independent research platform; this analysis was produced without external funding or client sponsorship. Every source, sample restriction, classification rule, weighting choice, caveat, and sensitivity check used on the page is documented in this note. The sensitivity checks in section 8 were computed on November 3, 2026 from the same cached microdata pulls the page was built on.

## 1. What it measures

Underemployment is the share of recent graduates working in a job that does not typically require a bachelor's degree. The recent-graduate population is people aged 22 to 27 who hold a bachelor's degree or higher and are not enrolled in school. A field's underemployment rate is the person-weighted share of its employed graduates in non-degree jobs. The unemployment rate reported alongside it is unemployed over the labor force for the same population. All figures are national.

## 2. Data sources

Outcomes: U.S. Census Bureau, American Community Survey one-year public-use microdata (PUMS), survey years 2018, 2019, and 2021 through 2024, retrieved through the Census Bureau API (api.census.gov/data/{year}/acs/acs1/pums). Variables: age (AGEP), educational attainment (SCHL), school enrollment (SCH), field of degree (FOD1P), occupation (SOCP), employment status (ESR), and the person weight (PWGTP). Two pulls per year: graduates (SCHL 21 to 24, ages 22 to 27, then SCH equal to 1), and prime-age workers (ages 30 to 54, ESR 1 or 2) for the occupation classification. Employed is ESR 1 or 2; unemployed is ESR 3; the labor force is ESR 1 to 3.

Benchmark: Federal Reserve Bank of New York, The Labor Market for Recent College Graduates, used to calibrate the level of the series and to validate the field ordering. The benchmark figure on the page is 42.5 percent for September 2026, from the November 2, 2026 release with 2026:Q3 data; the calibration target was the Fed's 2023 level of about 41 percent.

## 3. Defining a college job

An occupation is a college-level job if, pooled over the 2018-2024 prime-age sample, at least 59 percent of its employed workers aged 30 to 54 hold a bachelor's degree or higher; otherwise it is a non-degree job, and a graduate employed in it is counted as underemployed. The earlier methodology page gave the cutoff as 60 percent; the calibrated value is 0.59 on a 0.01 grid, and 0.59 is what the published series uses. At that cutoff 155 of the 525 occupations with prime-age workers in the pool are college-level.

The cutoff is calibrated, not chosen: it is the grid value whose 2023 overall rate is closest to the New York Fed's recent-graduate figure of 41 percent, and it is then held fixed across all years. An earlier version recomputed the cutoff from each year's workforce. Because the share of workers holding degrees rises over time, that made the college-job bar a moving target and manufactured an apparent decline that was credential inflation in the comparison group. The classification is now computed once, pooled across the series, so the only thing that changes from year to year is where graduates work.

## 4. Field of study

Field of study is the first reported field of bachelor's degree (FOD1P), mapped from the Census Bureau's 174 detailed codes to the 73-category taxonomy shared with the companion snapshot, Recent Graduate Outcomes by Field of Study, so the two line up. The crosswalk (fod_map.py) assigns each detailed code to exactly one category. Double majors and graduate fields are not separately modeled.

## 5. Time frame and the 2020 gap

The series starts in 2018 because the Census Bureau moved from the 2010 to the 2018 Standard Occupational Classification that year, and splicing the two coding systems introduced a discontinuity that read as a trend. There is no 2020 point because the Bureau released no standard 2020 one-year file. The 2025 one-year PUMS had not been posted as of November 3, 2026.

## 6. Validation against the New York Fed

Beyond the overall calibration, the field-level estimates track the Fed's published by-major snapshot, with the same ordering: criminal justice 69.2 percent here against 65.8 in the Fed table; sociology 57.1 against 52.0; communications 49.2 against 53.0; psychology 45.5 against 48.3; computer science 23.0 against 19.1; nursing 10.4 against 12.8; all fields 40.9 against about 41 (2023 estimates). Differences of a few points are expected: the Fed classifies occupations from O*NET education requirements, this series from the workforce degree share. The next check is the Fed's February 2027 by-major table against the 2024 estimates.

## 7. Testing for real trends

Each field's path is fit with a weighted least-squares trend over the six survey years, weighting each year by the inverse of its sampling variance. The variance treats underemployment as a binomial proportion from the field's unweighted employed sample size, inflated by a design-effect factor of 1.5 (standard errors 1.22 times binomial) to allow for the ACS's complex sample. A trend is reported as rising or falling only when the slope's z statistic is at least 1.96 in absolute value. By this test the page flags 14 of 73 fields, all falling. Reproducing the test from the cached pulls flags 16 fields: the page's 14 plus Ethnic Studies (z -1.97) and Sociology (z -2.01), both of which sit at the threshold and were left unflagged by the page's rounding. The overall series has a fitted slope of -0.66 points per year (z -12.4); the 2023-to-2024 rise of 1.9 points has z 4.06 on 51,146 and 51,729 employed respondents, and 49 of 73 fields rose in 2024.

## 8. Sensitivity checks (computed November 3, 2026)

Reproduction. Rebuilding the series from the cached pulls at the 0.59 cutoff gives overall rates of 44.9, 43.7, 42.1, 41.1, 40.0, 41.8 percent against the page's 44.9, 43.8, 42.2, 41.1, 40.0, 41.9; the largest field-year difference is 1.25 points, from the calibration grid. Criminal justice reproduces at slope -1.15 and z -3.8 against the page's -1.16 and -3.83.

Cutoff. The level of the series moves with the cutoff, as a calibrated parameter must; the ordering of fields does not. The table gives the overall rate by year, the Spearman rank correlation of field averages with the baseline, how many of the baseline's five highest and five lowest fields stay in place, and the number of fields flagged by the trend test.

| Cutoff | Overall, 2018, 2019, 2021, 2022, 2023, 2024 | Rank corr. | Top 5 / bottom 5 kept | Flagged (falling) |
|---|---|---|---|---|
| 0.50 | 37.6, 36.7, 35.4, 34.6, 33.5, 35.3 | 0.954 | 5 / 4 | 14 (14) |
| 0.55 | 41.5, 40.2, 38.9, 38.0, 36.6, 38.3 | 0.966 | 5 / 4 | 14 (14) |
| 0.59 (baseline) | 44.9, 43.7, 42.1, 41.1, 40.0, 41.8 | 1.000 | 5 / 5 | 16 (16) |
| 0.60 | 47.0, 46.1, 44.6, 43.4, 42.4, 44.2 | 0.997 | 5 / 5 | 13 (13) |
| 0.65 | 49.4, 48.8, 47.1, 45.8, 45.0, 46.9 | 0.989 | 4 / 4 | 9 (9) |
| 0.70 | 59.0, 58.4, 56.5, 55.9, 55.4, 56.5 | 0.891 | 3 / 3 | 14 (14) |

## 8a. Classification window

Pooling the prime-age degree shares over 2009-2024 instead of 2018-2024, at the same cutoff, gives overall rates of 45.0, 43.9, 42.2, 41.2, 40.1, 41.9 (rank correlation 1.000 with the baseline, 15 fields flagged); recalibrating on the longer pool returns the same cutoff of 0.59. The classification window does not move the result.

## 8b. Design effect

The number of flagged fields depends on the variance inflation: 21 fields at a factor of 1.0 (pure binomial), 16 at 1.5 (the page's convention), 11 at 2.0, and 9 at 2.25 (standard errors 1.5 times binomial). Every flagged field falls under every factor; no field is flagged as rising under any of them. The direction of the finding is robust; the count is a function of the screen.

## 8c. Weighting

Unweighted rates (each respondent counted once) give overall rates of 43.9, 42.1, 41.6, 40.5, 39.6, 41.7 and a rank correlation of 0.995 with the weighted baseline, with 7 fields flagged. The person weights change the level by about a point and do not change the ordering.

## 8d. Trend window

Fitting 2018 through 2023 only, before the 2024 rise, flags 20 fields, all falling. Including 2024 reduces the count to the baseline figure because the 2024 rise flattens the fitted slope in fields that had been falling. The 2024 rise is itself outside sampling noise (z 4.06 for the overall change) and broad (49 of 73 fields).

## 8e. Checks not possible from the cached pulls

The cached graduate records do not carry age or enrollment status, both of which were applied as filters at retrieval. Age-band and enrollment sensitivities therefore require new pulls and are scheduled for the 2025 rerun. The classification cannot be recomputed per year from the cache either; the per-year variant was rejected on the earlier build for the credential-inflation reason given in section 3.

## 9. Limitations

Cross-sectional, not longitudinal: the ACS is a new snapshot each year, so the series measures how a field looks over time, not how individual graduates move. Person-level persistence claims come from the New York Fed and from Burning Glass Institute and Strada's Talent Disrupted, not from this series. The workforce-degree-share rule approximates the Fed's O*NET-based definition, and levels can differ by a few points for a given field. Twenty of the 73 fields have fewer than 200 employed respondents in at least one year and are flagged on the page. The 1.5 design-effect factor is a screen, not replicate-weight variance estimation. First major only.

## 10. Versioning and next validation

Inputs: ACS one-year PUMS for 2018, 2019, and 2021 through 2024; New York Fed release of November 2, 2026 for the benchmark. The series will be extended when the 2025 one-year file is posted, with the occupation classification held at the pooled cutoff so the new year is comparable, and the age-band and enrollment sensitivities will be added at that rerun. Next validation: the New York Fed's February 2027 by-major table against the 2024 field estimates.

## 11. Published data and provenance

Date-versioned files for recomputation: **underemployment-by-field.csv** (field, year, underemployment and unemployment rates, unweighted employed sample) and **underemployment-sensitivity-checks-20261103.csv** (every figure in section 8). Analysis page: **opportunitydata.org/underemployment-by-field.html**; web edition of this note: **opportunitydata.org/underemployment-methodology.html**. Data files are date-versioned; every deploy of the site is timestamped (RFC 3161) with public Wayback snapshots.

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