Project 6: Generating Weighted Average Annual Collection Year Education Expenditure and Standard Error

Project 6

So far – we've only looked at sample estimates. Instead, we want to look at population estimates. We'll calculate the education means based on the composition of the household

In this project you will:

- Learn about weighting in the CE
- Calculate collection year population estimates

Weight – FINLWT21

- The sum of FINLWT21 each quarter equals the U.S. Population (in CUs).
- The sum of FINLWT21 for four quarters equals 4 times the U.S. Population.
- FINLWT21 is the starting point for calculating expenditure weights and population weights

Expenditure Weights

- Basic definition: The expenditure weight is the number of similar CUs that a CU represents in any given quarter. It is the weight used when aggregating to expenditure totals.

FIRST LOOK: QUARTERLY WEIGHTS AND ESTIMATES

Population

Quarter 1 Population: 24 CUs

Sample

Quarter 1 Sample: 3 CUs

Quarterly Estimates

CU	Quarterly Expenditure (TOTEX4)	Weight (FINLWT21)	Weighted Quarterly Expenditures
Joness	$3,500	8	$28,000
Browns	$2,000	7	$14,000
Jenkins	$8,000	9	$72,000
POPULATION		**24**	**$114,000**

Quarterly Estimates

CU	Quarterly Expenditure (TOTEX4)	Weight (FINLWT21)	Weighted Quarterly Expenditures
Joness	$3,500	8	$28,000
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Quarterly Estimates

POPULATION		**24**	**$114,000**

Weighted quarterly average:
$114,000 / 24 = $4,750

SECOND LOOK: ANNUAL WEIGHTS AND ESTIMATES

Population

Annual Population: 27 CUs

Sample

Annual Estimates

Quarter 1	Population	Quarterly weighted aggregate
Quarter 1	24	$114,000
Quarter 2	26	$110,400
Quarter 3	28	$116,200
Quarter 4	30	$125,000

Annual Estimates

Quarter 1	Population	Quarterly weighted aggregate
Quarter 1	**24**	**$114,000**
Quarter 2	**26**	**$110,400**
Quarter 3	**28**	**$116,200**
Quarter 4	**30**	**$125,000**

Annual aggregate:
114,000+110,400+116,200+125,000
=$465,600

Annual Estimates

Quarter 1	Population	Quarterly weighted aggregate
Quarter 1	24	$114,000
Quarter 2	26	$110,400
Quarter 3	28	$116,200
Quarter 4	30	$125,000

Annual mean:
Annual Aggregate / population
= $465,600 / ???

Population Weights

- Need to adjust FINLWT21
  - Sum of FINLWT21 for each quarter = US population
    - Need to adjust for number of quarters
    - Simple – divide FINLWT21 by the number of quarters you are analyzing. So when using one year of data divide by 4.

Quarterly Estimates

Quarter 1	Population	Quarterly weighted aggregate
Quarter 1	**24**	**$114,000**
Quarter 2	**26**	**$110,400**
Quarter 3	**28**	**$116,200**
Quarter 4	**30**	**$125,000**
		$465,400

Annual mean:
Annual Aggregate / average population
= $465,400 ÷ ((24+26+28+30)/4)
= $465,400 ÷ 27
= $17,237

NOTE: Another way to do this is to create a separate population weight for each household:

popweight = finlwt21 / 4

Calculating a Standard Error

- To compute actual standard errors, use all 44 replicate weights (WTREP01-WTREP44) and FINLWT21.

Project 6 Steps

1. Multiply quarterly education expenditures by FINLWT21 to obtain weighted aggregates (*NOT the annualized education expenditures!*)
2. Create population weights by dividing FINLWT21 by the number of quarters in our sample (4)
3. Aggregates: Sum the weighted estimates by each group
4. Populations: Sum the population weights by each group
5. Means: Calculate annual means for each of the group by dividing the aggregates by the populations
6. Create a new variable that sums the squared difference between each of the replicate means (WTREP01-WTREP44) and the actual mean:

$$diff_{total} = ((m_1 - m_0)^2) + ((m_2 - m_0)^2) + ((m_3 - m_0)^2) + ((m_4 - m_0)^2) + \cdots + ((m_n - m_0)^2)$$

7. Calculate the Standard Error

$$SE = \sqrt{\frac{diff_{total}}{n}}$$

Project 6 Results

Weighting Mean & Standard Error

Count	Number of Children	Education Expenditure Mean	Education Expenditure Standard Error
15,688	0 children	$945.66	$75.80
4,421	1 child	$1711.19	$229.32
3,359	2 children	$1978.37	$234.84
1,328	3 children	$1651.54	$227.12
645	4 or more children	$890.49	$199.87

Weighting in Diary

- Same concept as the interview but *WEEKLY* expenditures

- Following the same steps as quarterly interview estimates:
  - Aggregate FINLWT21 * EXPENDITURE
  - Divide the aggregate by the sum of FINLWT21
    - ➔ Average WEEKLY expenditure for the quarter.

- To move to annual average weekly estimates:
  - Aggregate FINLWT21*EXPENDITURE / 4 (to account for 4 quarters of weekly estimates)
  - As in Interview → to get the population, sum FINLWT21 and divide by number of quarters (4) .

NOTE: THE DIVISION BY 4 WILL CANCEL WHEN CALCULATING THE AVERAGE!!