Formulas for All Employee Hours and Earnings Series from the Current Employment Statistics Program

---

Variable definitions and notes

All sample measures (shown in lower case) are based on a matched sample with current being the month estimated.

For gross monthly earnings (GE), the matched sample includes reporting units that have reported all data types (all employees (ae) and gross monthly earnings (ge)) for both the previous and the current month.

For average weekly hours and average hours earnings, the matched sample includes reporting units that have reported all three data types (ae, total hours paid (aewh), and total regular pay (aepr)) for both the previous and the current month.

Average weekly overtime (AEAWOH) estimates are calculated for manufacturing industries only.

For AEAWOH, the matched sample includes reporting units that have reported all four data types (ae, aewh, aepr, and total overtime hours worked (aeotwh)) for both the previous and the current month.

The Weighted Link and Taper (WLT) Estimator makes use of the parameters α and β (=1-α) in its formulas.

i = a matched sample unit;

I = the set of all matched CES reports;

w_i = weight associated with the CES report;

$ae_{c,i}$ = current-month reported All Employees;

$ae_{p,i}$ = previous-month reported All Employees;

$\hat{AE}_c$ = current-month estimated All Employees;

$\hat{AE}_p$ = previous-month estimated All Employees;

$\hat{AEAHE}_{c,i}$ = current-month estimated All Employees Average Hourly Earnings;

$\hat{AEAHE}_{p,i}$ = previous-month estimated All Employees Average Hourly Earnings;

$\hat{AEAWH}_{c,i}$ = current-month estimated All Employees Average Weekly Hours;

$\hat{AEAWH}_{p,i}$ = previous-month estimated All Employees Average Weekly Hours;

$\hat{AEAWOH}_{c,i}$ = current-month estimated All Employees Average Weekly Overtime Hours;

$\hat{AEAWOH}_{p,i}$ = previous- month estimated All Employees Average Weekly Overtime Hours;

$aepr_{c,i}$ = current-month reported All Employees Weekly Payroll;

$aepr_{p,i}$ = previous-month reported All Employees Weekly Payroll;

$aeotwh_{c,i}$ = current-month reported All Employees Overtime Weekly Hours;

$aeotwh_{p,i}$ = previous-month reported All Employees Overtime Weekly Hours;

$aewh_{c,i}$ = current-month reported All Employees Weekly Hours;

$aewh_{p,i}$ = previous-month reported All Employees Weekly Hours;

$ge_{p,i}$ = previous-month reported Gross Earnings;

$ge_{c,i}$ = current-month reported Gross Earnings;

$\hat{GE}_c$ = current-month estimated Gross Earnings;

$\left(\frac{\hat{GE}}{AE}\right)_c$ = current-month estimated Gross Earnings Ratio;

$\left(\frac{\hat{GE}}{AE}\right)_p$ = previous-month estimated Gross Earnings Ratio;

Weighted link and taper estimator for gross monthly earnings:

$$\hat{GE}_c = \left[\left(\hat{AE}_c \right) \times \left(\frac{\hat{GE}}{AE} \right)_c \right], \text{ where}$$

$$\left(\frac{\hat{GE}}{AE} \right)_c = \alpha \times \left(\frac{\hat{GE}}{AE} \right)_p + \beta \times \left(\frac{\sum_i w_i \times ge_{p,i}}{\sum_i w_i \times ae_{p,i}} \right) + \left(\frac{\sum_i w_i \times ge_{c,i}}{\sum_i w_i \times ae_{c,i}} \right) - \left(\frac{\sum_i w_i \times ge_{p,i}}{\sum_i w_i \times ae_{p,i}} \right)$$

Ratio Estimator (alternative estimator) for gross monthly earnings:

$$\hat{GE}_c = \left[\left(\hat{AE}_c \right) \times \left(\frac{\hat{GE}}{AE} \right)_c \right], \text{ where}$$

$$\left(\frac{\hat{GE}}{AE} \right)_c = \left(\frac{\hat{GE}}{AE} \right)_p \times \left(\frac{\left(\frac{\sum_i w_i \times ge_{c,i}}{\sum_i w_i \times ae_{c,i}} \right)}{\left(\frac{\sum_i w_i \times ge_{p,i}}{\sum_i w_i \times ae_{p,i}} \right)} \right)$$

Weighted link and taper estimator for all employee average weekly hours:

$$\hat{AEAWH}_c = \alpha \times \hat{AEAWH}_p + \beta \times \left(\frac{\left(\sum_i w_i \times aewh_{p,i} \right)}{\left(\sum_i w_i \times ae_{p,i} \right)} \right) + \left(\frac{\left(\sum_i w_i \times aewh_{c,i} \right)}{\left(\sum_i w_i \times ae_{c,i} \right)} \right) - \left(\frac{\left(\sum_i w_i \times aewh_{p,i} \right)}{\left(\sum_i w_i \times ae_{p,i} \right)} \right)$$

for all $i \in I$

Weighted link and taper estimator for all employee average hourly earnings:

$$\hat{AEAHE}_c = \alpha \times \hat{AEAHE}_p + \beta \times \left(\frac{\left(\sum_i w_i \times aepr_{p,i} \right)}{\left(\sum_i w_i \times aewh_{p,i} \right)} \right) + \left(\frac{\left(\sum_i w_i \times aepr_{c,i} \right)}{\left(\sum_i w_i \times aewh_{c,i} \right)} \right) - \left(\frac{\left(\sum_i w_i \times aepr_{p,i} \right)}{\left(\sum_i w_i \times aewh_{p,i} \right)} \right)$$

for all $i \in I$

Weighted link and taper estimator for all employee average weekly overtime hours:

$$\hat{AEAWOH}_c = \alpha \times \hat{AEAWOH}_p + \beta \times \left(\frac{\left(\sum_i w_i \times aeotwh_{p,i} \right)}{\left(\sum_i w_i \times ae_{p,i} \right)} \right) + \left(\frac{\left(\sum_i w_i \times aeotwh_{c,i} \right)}{\left(\sum_i w_i \times ae_{c,i} \right)} \right) - \left(\frac{\left(\sum_i w_i \times aeotwh_{p,i} \right)}{\left(\sum_i w_i \times ae_{p,i} \right)} \right)$$

for all $i \in I$