The purpose of this technical report is to explain the decomposition described in the following passage, from page 31 of Where We Stand, 8th edition:

> In inflation-adjusted terms, the gap in earnings per job between the St. Louis MSA and the United States grew by $1,651 between 2012 and 2016. Of this quantity, 61 percent can be attributed to a growing gap in proprietors' income, while the remaining 39 percent is attributable to a growing gap in wage and salary income.

This table relies on the Bureau of Economic Analysis (BEA) Local Area Personal Income and Employment data set, Table CA4. BEA revised this table on November 15, 2018, after the publication of Where We Stand. In addition, the table is now known as Table MAINC4. This document uses the old version of this data in order to show how the calculations were performed.

Table 1 (page 3) contains the data needed to perform this calculation. The following identities are used:

- Earnings (lines 1 and 10) is the sum of employee compensation and proprietors' income.
- Employee Compensation (lines 7 and 16) is the sum of wage and salary income (lines 2 and 11) plus supplements to wages and salaries (lines 3 and 12).
- Employment (lines 5 and 14) is the sum of proprietors' employment and wage or salary workers' employment (not shown on this table).

The 2012 column reflects adjustments for inflation. Monetary values for 2012 were multiplied by the following fraction to arrive at adjusted totals: 241.237/230.338

In 2012, the United States had inflation-adjusted earnings per worker in the amount of $57,548, while earnings per worker in St. Louis came to $57,139, a difference of $410. In 2016, average earnings per job in the United States amounted to just over $58,372, compared to $56,312 in St. Louis, a difference of $2,060. The change in the difference from 2012 to 2016, then, was $1,651.

For a given year (t), a difference in earnings per worker between St. Louis and the United States can be divided into two components: the difference in employee compensation and the difference in proprietors' income, as shown in equation 1:

$$\frac{E_t^U}{L_t^U} - \frac{E_t^M}{L_t^M} = \left[\frac{P_t^U}{L_t^U} - \frac{P_t^M}{L_t^M}\right] + \left[\frac{W_t^U}{L_t^U} - \frac{W_t^M}{L_t^M}\right] \tag{1}$$

where E represents earnings, L represents the total employed labor force, P is proprietors' income, and W is compensation of employees, with the superscript U denoting values for the United States, and M denoting values for the St. Louis Metropolitan Statistical Area. On the right side of the equation, the

term in the first set of brackets is the total amount of the difference in earnings that is attributable to differences in proprietors' income per worker. The term in the second set of brackets represents the total amount of the difference in earnings that is attributable to differences in employee compensation per worker.

Note that the denominator throughout is the total number of workers, including both proprietors and employees. It would, of course, be possible to use average proprietors income (i.e., P^U_t divided by the number of proprietors), and average employee compensation (i.e., W^U_t divided by the total number of employees). But this would require weighting proprietors' earnings by the percentage of the workforce represented by proprietors, and weighting employees' earnings by the percentage of the workforce represented by employees. For example, using the term Q to represent the total number of proprietors, we could replace the term $\dfrac{P^U_t}{L^U_t}$ with the term $\dfrac{P^U_t}{Q^U_t} * \dfrac{Q^U_t}{L^U_t}$. In this case, the Q^U_t terms would cancel out, leaving us with the term $\dfrac{P^U_t}{L^U_t}$ again. Thus, equation 1 merely tells us how much proprietors' income is flowing into households in the United States and St. Louis, and how much in wage and salary compensation in flowing into households. It does not directly address the average earnings for proprietors and employees.

Applying equation 1 to the inflation-adjusted numbers for 2012, computing the term in the first set of brackets shows us that employee compensation per worker was actually higher in St. Louis than in the United States as a whole, by a margin of $675.50. However, proprietors' income per worker was higher in the United States than in St. Louis, by a margin of $1,084.90. Adding these numbers results in the United States having a higher level of earnings per worker by a margin of $409.

Similarly, applying equation 1 to 2016 shows that St. Louis still had higher employee compensation per worker, but the margin had declined to just $36 per worker. However, the United States increased its advantage in proprietors' income to $2,096. This increased the gap in earnings per worker between the United States and St. Louis to $2,060. Thus, the amount of the difference in earnings per worker increased by about $1,651 between the two periods.

Equation 2 shows how we can break down this change into component parts:

$$\left[\frac{E^U_{t+1}}{L^U_{t+1}} - \frac{E^M_{t+1}}{L^M_{t+1}} \right] - \left[\frac{E^U_t}{L^U_t} - \frac{E^M_t}{L^M_t} \right]$$

$$= \left(\left[\frac{P^U_{t+1}}{L^U_{t+1}} - \frac{P^M_{t+1}}{L^M_{t+1}} \right] - \left[\frac{P^U_t}{L^U_t} - \frac{P^M_t}{L^M_t} \right] \right) + \left(\left[\frac{W^U_{t+1}}{L^U_{t+1}} - \frac{W^M_{t+1}}{L^M_{t+1}} \right] - \left[\frac{W^U_t}{L^U_t} - \frac{W^M_t}{L^M_t} \right] \right) \quad (2)$$

On the left side of this equation, the first term in brackets represents the difference in earnings in the second time period, i.e., 2016. The second term in brackets represents the difference in 2012. Thus, the left side of the equation in total represents the change in the earnings differential from 2012 to 2016.

On the right side of the equation, the first term in parentheses represents the change in the proprietors' income differential. The second term in parentheses represents the change in the employee compensation differential.

Applying equation two, the left side of the equation, as already seen, sums to $1,651. On the right side of the equation, the first set of parentheses shows the relative change in wage and salary compensation. St. Louis still had higher employee compensation per worker compared to the United States, but the region's advantage slipped a bit; by 2016, St. Louis's advantage in employee compensation per worker had declined to just $36. Thus, employee compensation in the United States grew more quickly than employee compensation in St. Louis, by a margin of $640. Meanwhile, proprietors' income grew more quickly in the United States than in St. Louis by a margin of $1,011. Thus, the total change in the earnings gap between the United States and St. Louis grew by $1,651.

We may divide the first set of parentheses in equation 2 by $1,651 to show the percentage of income divergence that is attributable to relative changes in proprietors' income. Dividing $1,011 by $1,651 yields 0.612. Thus, 61 percent of the divergence in income between the United States and St. Louis is attributable to differences in the growth of proprietors' income. The other 39 percent is attributable to differences in compensation of wage and salary employees.

Table 1
Components of Earnings
St. Louis MSA and United States, 2012 and 2016
2016 Dollars, in thousands

	2012	2016
United States		
1 Earnings by place of work	9,901,882,000	11,365,731,000
2 Wages and salaries	6,918,166,000	8,074,480,000
3 Supplements to wages and salaries	1,632,251,000	1,868,602,000
4 Proprietors' income 9/	1,351,465,000	1,422,649,000
5 Total employment	178,979,700	193,368,900
6 Average Earnings per Job	55	59
7 Employee Compensation	8,550,417,000	9,943,082,000
8		
9		
St. Louis MSA		
10 Earnings by place of work	91,706	100,543
11 Wages and salaries	65,889	74,336
12 Supplements to wages and salaries	15,111	16,248
13 Proprietors' income 9/	10,707	9,959
14 Total employment	1,667,792	1,755,690
15 Average Earnings per Job (000)	55	57
16 Employee Compensation	80,999	90,584

Source: Bureau of Economic Analysis