User Guide for Published Estimates: Location and Owner Characteristics

When comparing estimates between different classes of matched SBPS respondents, it is important to note that differences between estimates across classes of businesses (e.g., rural and urban) may not be statistically significant. In order to determine if the difference between two estimates are statistically significant, a user of the SBPS may use the survey estimates and standard errors provided in the download files to construct confidence intervals.

Consider rural estimates for the first question of the SBPS in Phase 1. Question 1 asks about the overall experience of small businesses during the pandemic; response 1 indicates a large negative effect was reported by businesses. For rural businesses, the estimate is 42.9% for "Large negative effect" with a standard error of 1.76. For urban businesses, the estimate is 52.6% for "Large negative effect" with a standard error of 0.4.

The following can be used to test whether differences between estimates are statistically significant. The difference between estimates is calculated as:

$$\hat{d}_{ij} = \hat{X}_i - \hat{X}_j$$

where $\hat{d}_{ij}$ is the difference between estimates $\hat{X}_i$ and $\hat{X}_j$. The measure of error or MOE for a 90% confidence interval on the difference is approximately:

$$MOE\left(\hat{d}_{ij}\right) = 1.645 * \sqrt{\sigma^2(\hat{X}_i) + \sigma^2(\hat{X}_j)}$$

where $\sigma^2(\hat{X}_i)$ and $\sigma^2(\hat{X}_j)$ are the variances for $\hat{X}_i$ and $\hat{X}_j$, respectively. The variances may be approximated by the square of the standard error for the estimates. A 90% confidence interval for the difference is used to determine whether the difference is significantly different from zero at the 90% confidence level. If the interval includes zero, the difference is not significantly different from zero at the 90% confidence level.

$$\hat{d}_{ij} \pm 1.645 * \sqrt{\sigma^2(\hat{X}_i) + \sigma^2(\hat{X}_j)}$$

The difference between the urban and rural estimates in the example given above is:

$$\hat{d}_{urban\,rural} = 52.6\% - 42.9\% = 9.7\%$$

The MOE is calculated as:

$$MOE\left(\hat{d}_{urban\,rural}\right) = 1.645 * \sqrt{(1.76)^2 + (0.4)^2} = 2.97\%$$

The 90% confidence interval for the difference is

$9.76\% \pm 2.97\%$ or [6.79%, 12.63%]

Because the interval does not include zero, we can state that we are confident at the 90% level that difference between the rural and urban estimates is significantly different.