Two-Sample Z-Test

The **TWO-SAMPLE Z-TEST** is used to compare the means of two samples to see if it is feasible that they come from the same population. The null hypothesis is: the population means are equal. The Z-test is preferred to the t-test for large samples (N > 30) or when the variance is known, otherwise, the sample standard deviation is a more biased estimate of a population standard deviance than is allowable, and using a two-sample t-test should be considered (see the **COMPARING MEANS** command).

Assumptions

1. Normal but independent populations.
2. Variances for populations are known.

How To

- ✓ Run**: STATISTICS->BASIC STATISTICS->TWO-SAMPLE Z-TEST FOR MEANS...**
- ✓ Select two variables.
- ✓ Enter **VARIANCES** for both populations (known).
- ✓ Enter the **HYPOTHESIZED MEANS DIFFERENCE**. A value of 0 (zero) indicates that the means are hypothesized to be equal.

Results

MEAN, VARIANCE, SAMPLE SIZE – the mean, variance and size of an input variable. See the **DESCRIPTIVE STATISTICS** procedure for more information.

MEAN DIFFERENCE – difference between the means.

STANDARD ERROR - estimated standard error for the difference between means.

$$s = \sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}$$

Z (TEST STATISTIC) – *z-score*, the distance between means in units of the standard error.

$$z = \frac{\bar{x}_1 - \bar{x}_2}{s}$$

Z – $\alpha\%$ critical value for z.

P(Z<=z) P-LEVEL – probability of observing the sample statistic as extreme as the test statistic. If the null hypothesis is $\bar{x}_1 = \bar{x}_2$ and the *two-tailed* p-value is less than α (0.05), the conclusion is that, statistically, the means are significantly different.

References

Sprinthall, R. C. (2011). Basic Statistical Analysis (9th ed.). Pearson Education.