**Homework 9. Variance Estimation**

**MSDS 6370**

**Objective:**

* For the student to learn more about replication methods for variance estimation.
* For the student to learn more about using SAS to implement the jackknife and BRR (Balanced Repeated Replication) methods of variance estimation for complex survey design.

**Introduction**

Asynchronous Lecture 9 focused on replication methods of variance estimation for complex survey designs. In particular, the discussion focused on the jackknife and BRR methods of variance estimation. This assignment builds on that discussion and extends it by exploring more options in SAS PROC SURVEYMEANS for implementing variance estimation.

**Exercise 1**

*1. In the video this week, you are asked to compute the jackknife and BRR estimates of variance for the toy data we examined.*

*Submit the spreadsheet with the completed calculations for homework this week.*

*Fill in the last two rows of the table below:*

|  |  |
| --- | --- |
| method of estimation for standard error | Standard error estimate |
| Taylor linearization without fpc | 0.009348 |
| Taylor linearization with fpc (as given in video) | 0.007637 |
| SAS computed jackknife estimate | 0.009425 |
| SAS computed BRR estimate | 0.009447 |
| jackknife estimate from spreadsheet calculation | 0.018467 |
| BRR estimate from spreadsheet calculation | 0.011133 |

**Exercise 2**

*2. Go to the PROC SURVEYMEANS documentation. Look in the details section, under the topic “Replication Methods for Variance Estimation.” Read the intro, discussion of BRR, and the jackknife in this section.*

*a. What is the purpose of the REPWEIGHTS (replicate weights) statement?*

It provides replicate weights for jackknife or BRR variance estimates. It employs weight adjustments for each replicate in jackknife and BRR variance estimations.

*b. What does the documentation say about what you must specify about the design if you use a REPWEIGHTS statement?*

CLUSTER and STRATA statements do not need to be specified if REPWEIGHTS is included. The number of weights should equal the number of replicates and replicate coefficients can be specified using JKCOEFS or REPCOEFS options. Degrees of freedom are equal to the number of REPWEIGHTS variables.