**MA547** **Fall 2014**

# Design and Analysis of Observational and Sampling Studies

**MINI-PROJECT** **11/6/14**

This mini-project is worth 15% of the course, and you must primarily use materials you learnt from the course or you have read from the two text books. You are required to form teams of three to four students; not less than three or not more than four. You would need to use a computer (e.g., R or SAS) to do this project and distribute the work to your team members.

This is a project on dollar unit sampling. See Section 6.5 Example 6.14 in Sharon's text book for a description of an auditing problem in which dollar unit sampling is implementing to reduce auditing cost.

A sample of 20 companies is taken with probability proportional size (PPS) *without replacement*; the book value of each company is the measure of size. The company states how much (in dollars) it is worth (the book value) and auditor gives a fair value of the worth (the audit value) of each company; each company may overstate its value. Interest is in the total overstatment of the population of all 81 companies.

The book values (BV) for all 81 companies and the audit values (AV) of the 20 sampled companies are shown in the table below.

The project report is due December 11, 2014. This report must address the steps below.

### Project Activities

Use the following steps.

1. Calculate $\pi_i$ and $\pi_{ij}$ for all sampled companies.
2. Obtain the Horvitz-Thompson (HT) estimate of the total audit value and its standard error. Then, obtain the estimate of the total overstatement and its standard error.
3. Compare your answers in (2) with the ones based on random grouping (use four random groups), bootstrap and jackknife.
4. Compare your answers in (2) and (3) with the ones given in Sharon's text book.

Steps (1) and (3) would need significant computing.

| | BV | AV |
|---|---|---|
| 1 | 2459 | |
| 2 | 2343 | |
| 3 | 6842 | 6842 |
| 4 | 4179 | |
| 5 | 750 | |
| 6 | 2708 | |
| 7 | 3073 | |
| 8 | 4742 | |
| 9 | 16350 | 16350 |
| 10 | 5424 | |
| 11 | 9539 | |
| 12 | 3108 | |
| 13 | 3935 | 3935 |
| 14 | 900 | |
| 15 | 7835 | |
| 16 | 1091 | |
| 17 | 2798 | |
| 18 | 5432 | |
| 19 | 2325 | |
| 20 | 1298 | |
| 21 | 5594 | |
| 22 | 2351 | |
| 23 | 7304 | |
| 24 | 7090 | 7050 |
| 25 | 4711 | |
| 26 | 4031 | |
| 27 | 1907 | |
| 28 | 3341 | |
| 29 | 5533 | 5533 |
| 30 | 8251 | |
| 31 | 4389 | |
| 32 | 5697 | |
| 33 | 7554 | |
| 34 | 2163 | 2163 |
| 35 | 8413 | |
| 36 | 2399 | 2149 |
| 37 | 4261 | |
| 38 | 7862 | |
| 39 | 3153 | |
| 40 | 4690 | |
| 41 | 6541 | |
| 42 | 9074 | |

| | | |
|---|---|---|
| 43 | 8941 | 8941 |
| 44 | 3716 | 3716 |
| 45 | 8663 | 8663 |
| 46 | 69540 | 69000 |
| 47 | 8746 | |
| 48 | 7141 | |
| 49 | 6881 | 6881 |
| 50 | 2278 | |
| 51 | 3916 | |
| 52 | 2192 | |
| 53 | 5999 | |
| 54 | 5856 | |
| 55 | 70100 | 70100 |
| 56 | 6467 | 6467 |
| 57 | 7642 | |
| 58 | 8846 | |
| 59 | 2486 | |
| 60 | 2074 | |
| 61 | 21000 | 21000 |
| 62 | 3081 | |
| 63 | 7123 | |
| 64 | 5496 | |
| 65 | 7461 | |
| 66 | 6333 | |
| 67 | 13597 | |
| 68 | 1317 | |
| 69 | 5437 | |
| 70 | 3847 | 3847 |
| 71 | 4030 | |
| 72 | 2620 | |
| 73 | 2416 | |
| 74 | 2422 | 2422 |
| 75 | 2291 | 2191 |
| 76 | 5882 | |
| 77 | 6596 | |
| 78 | 2626 | |
| 79 | 4667 | 4667 |
| 80 | 7571 | |
| 81 | 31257 | 31257 |
| 82 | 1331 | |
| 83 | 5924 | |
| 84 | 4356 | |
| 85 | 6618 | |
| 86 | 5658 | |
| 87 | 6943 | |