Simulation Study Summary Report

# Background

Performed a simulation study to compare the performance of three estimators (mean, trimmed mean, and median) of the population mean by comparing their BIAS and MSE.

# Results

See table below for BIAS and MSE results.

Table 1. Bias and Mean Square Error of Estimators for the Population Mean [[1]](#footnote-23)

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Mean** | **20% Trimmed Mean** | **Median** |
| **Sample Size = 50** |  |  |  |
| % Outliers = 0 | -0.001 (0.019) | 0.003 (0.022) | 0.007 (0.031) |
| % Outliers = 5 | 0.124 (0.035) | 0.051 (0.027) | 0.048 (0.035) |
| % Outliers = 10 | 0.322 (0.121) | 0.154 (0.048) | 0.130 (0.051) |
| **Sample Size = 100** |  |  |  |
| % Outliers = 0 | -0.001 (0.010) | 0.001 (0.011) | 0.002 (0.015) |
| % Outliers = 5 | 0.158 (0.034) | 0.069 (0.016) | 0.057 (0.019) |
| % Outliers = 10 | 0.327 (0.117) | 0.164 (0.041) | 0.139 (0.038) |
| **Sample Size = 150** |  |  |  |
| % Outliers = 0 | 0.001 (0.006) | 0.002 (0.007) | 0.000 (0.010) |
| % Outliers = 5 | 0.174 (0.036) | 0.082 (0.015) | 0.072 (0.016) |
| % Outliers = 10 | 0.326 (0.112) | 0.160 (0.034) | 0.136 (0.030) |

# Conclusions

Mean is superior when proportion of outliers is low (< 5%), but the median becomes superior as the proportion increases. However, for higher proportions the performance of all three estimators suffers.

1. Results reported as Bias (Mean Square Error); Bias and Mean Square Error based on average over 1000 simulation runs. [↑](#footnote-ref-23)