Answers to the Problem Set 1

Econometrics (Ph.D.)

Sugarkhuu Radnaa

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Problem 1

(a) The bias and variance of the estimators are as follows:

Estimator	**Bias**	**Variance**
$\hat{\theta}$ *(mean(x2) estimator)*	0.00012	0.01341
$\bar{\theta}$ *(max. estimator)*	-0.01981	0.00038

(b) I prefer $\hat{\theta}$. Although the variance of $\bar{\theta}$ is smaller than that of $\hat{\theta}$, it has larger absolute bias. Indeed, the bias will be present even in the limit for $\hat{\theta}$ as the probability that any given number and, in that regard, the maximum of the support of the uniform distribution to be drawn randomly is 0. Hence, the estimate will always be biased. On the other hand, $\hat{\theta}$ is unbiased estimator. It is however not a clear cut whether the biasedness is more undesirable than the high variance (efficiency).

Problem 2

(a) Mean and variance of the variables education and earnings are as follows:

Variable	**Mean**	**Variance**
Education	13.92462	7.531989
Earnings	55091.53068	2.727145*10^9

(b) The sample analog estimates of the covariance and correlation are as follows:

Covariance	55089.99
Correlation	0.38438

The higher earnings is associated (no causality) with higher education.

(c) A 90% confidence interval for the mean of education and a 99% confidence interval for the mean of earnings are as follows:

	lower	**upper**
Education90	13.90458	13.94466
Earnings99	54494.35280	55688.70857

(d) Yes. The sufficiently large sample sizes coupled with the Central Limit Theorem easily permits the normality assumption.