CORRECTIONS TO

" ON THE ORDER OF APPROXIMATION OF THE VARIANCE OF MULTIVARIATE REGRESSION ESTIMATES (MRE) FOR FINITE POPULATIONS "

M. A. H. TALUKDER

The same order of approximation of the MRE under regression model II as mentioned in the author's paper Ann. Inst. Statist. Math., 20 (1968), 441–455 (p. 449 of these Annals) is derived directly as follows:

The second term in the expression of $V(\bar{x}_{1lr})$ contains the factor $E\{(\bar{X}-\bar{x})'A_{22}^{-1}(\bar{X}-\bar{x})\}$ which can be simplified as shown below.

Since A_{22}^{-1} is positive definite, there exists a non-singular matrix C of order $(p-1)$ such that

(1) . . . . . . $C'A_{22}^{-1}C=I$, indentity matrix, (p. 339 of the reference)

Now let $x=C_y$ or $y=c^{-1}x$ with $y=(y_2, y_3, \cdots, y_p)'$ and $x=(x_2, \cdots, x_p)'$.

Then $(\bar{x}-\bar{X})=C(\bar{y}-\bar{Y})$ since $\bar{X}=E(x)=CE(y)=C\bar{Y}$. Hence,

$$
\begin{aligned}
(\bar{x}-\bar{X})'A_{22}^{-1}(\bar{x}-\bar{X}) &= \{C(\bar{y}-\bar{Y})\}'A_{22}^{-1}C(\bar{y}-\bar{Y}) \\
&= (\bar{y}-\bar{Y})'C'A_{22}^{-1}C(\bar{y}-\bar{Y}) \\
&= (\bar{y}-\bar{Y})'(\bar{y}-\bar{Y})
\end{aligned}
$$

$$
\begin{aligned}
\therefore \quad E\{(\bar{x}-\bar{X})'A_{22}^{-1}(\bar{x}-\bar{X})\} &= E\{(\bar{y}-\bar{Y})'(\bar{y}-\bar{Y})\} \\
&= \sum_{i=2}^{p} V(\bar{y}_i) = \sum_{i=2}^{p} \frac{V(y_i)}{n} .
\end{aligned}
$$

Since y_i's are linear combinations of $x_2, x_3, \cdots, x_p$ and the coefficients are independent of sample size, n, $V(y_i)$ is of order unity. Thus $\sum_{i=2}^{p} \frac{V(y_i)}{n}$ is of order (p/n) and the second term in the expression of $V(\bar{x}_{1lr})$ is of order (p/n^2).

Hence the exact order of approximation is $(1/n^2)$ for small p.

Reference: Anderson, T. W.—Introduction to Mathematical Statistical Analysis—Wiley and Sons, N.Y.