

## A First Lesson in Econometrics

Every budding econometrician must learn early that it is never in good taste to express the sum of two quantities in the form:

$$1 + 1 = 2. \quad (1)$$

Any graduate student of economics is aware that

$$1 = \ln e, \quad (2)$$

and further that

$$1 = \sin^2 q + \cos^2 q. \quad (3)$$

In addition, it is obvious to the casual reader that

$$2 = \sum_{n=0}^{\infty} \frac{1}{2^n}. \quad (4)$$

Therefore equation (1) can be rewritten more scientifically as

$$\ln e + (\sin^2 q + \cos^2 q) = \sum_{n=0}^{\infty} \frac{1}{2^n}. \quad (5)$$

It is readily confirmed that

$$1 = \cosh p \sqrt{1 - \tanh^2 p}, \quad (6)$$

and since

$$e = \lim_{\delta \rightarrow \infty} \left(1 + \frac{1}{\delta}\right)^{\delta}, \quad (7)$$

equation (5) can be further simplified to read:

$$\begin{aligned} \ln \left[ \lim_{\delta \rightarrow \infty} \left(1 + \frac{1}{\delta}\right)^{\delta} \right] + (\sin^2 q + \cos^2 q) \\ = \sum_{n=0}^{\infty} \frac{\cosh p \sqrt{1 - \tanh^2 p}}{2^n}. \end{aligned} \quad (8)$$

If we note that

$$0! = 1, \quad (9)$$

The work on this paper was supported by no one. The author would like to credit an unknown but astute source for the original seeds for the analysis.

and recall that the inverse of the transpose is the transpose of the inverse, we can unburden ourselves of the restriction to one-dimensional space by introducing the vector  $X$ , where

$$(X')^{-1} - (X^{-1})' = 0. \quad (10)$$

Combining equation (9) with equation (10) gives

$$[(X')^{-1} - (X^{-1})']! = 1, \quad (11)$$

which, when inserted into equation (8) reduces our expression to

$$\begin{aligned} \ln \left\{ \lim_{\delta \rightarrow \infty} \left\{ [(X')^{-1} - (X^{-1})'] + \frac{1}{\delta} \right\} \right\} + (\sin^2 q + \cos^2 q) \\ = \sum_{n=0}^{\infty} \frac{\cosh p \sqrt{1 - \tanh^2 p}}{2^n}. \end{aligned} \quad (12)$$

At this point it should be obvious that equation (12) is much clearer and more easily understood than equation (1). Other methods of a similar nature could be used to simplify equation (1), but these will become obvious once the young econometrician grasps the underlying principles.

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