Vol XXXVII
No. 2

APRIL-
JUNE
1982

ISSN 0019-5014

INDIAN JOURNAL OF AGRICULTURAL ECONOMICS

INDIAN SOCIETY OF
AGRICULTURAL ECONOMICS,
BOMBAY

DETERMINANTS OF SUGARCANE ACREAGE FLUCTUATIONS IN UTTAR PRADESH: A COMMENT

In a research note published in a recent issue of this *Journal*, Lal and Singh examine the determinants of sugarcane acreage fluctuations in Uttar Pradesh.[1] Their conceptual model follows Nerlove's partial adjustment model, in which, using their equation (I), one can write

$$Y_t^* = a + b\,P_{t-1} + U_t \qquad \ldots.(1)$$

where, Y_t^* is long run supply, P_{t-1} is lagged price, and a, b are parameters to be estimated.

The variations in Y_t^* were hypothesized to be related to those in actual supply, as shown in equation (2).

$$Y_t = Y_{t-1} + r\,(Y_t^* - Y_{t-1}) \qquad \ldots.(2)$$

Substituting equation (2) into (1) yields their equation (IV), which can be written as

$$Y_t = A + B\,P_{t-1} + C\,Y_{t-1} + V_t \qquad \ldots.(3)$$

where $A = ar$, $B = br$, $C = (1-r)$, and $V_t = rU_t$.

In the estimation of equation (3) above, Lal and Singh used a double logarithmic transformation, because "it yielded consistently better results with respect to signs, values and levels of significance of the regression coefficients" (p. 103). Another reason given for the choice of logarithmic form was that it "... also provided ready made estimate of short run elasticities" (p. 103).

We contend that their estimated equation is inconsistent with the hypothesized adjustment pattern between short run (actual) supply and long run supply. This comment, furthermore, suggests a different hypothesis of partial adjustment that is consistent with their estimated equation.

Let us examine the coefficient r from equation (2) above. Solving this equation for r, one gets

$$r = \frac{Y_t - Y_{t-1}}{Y_t^* - Y_{t-1}} \qquad \ldots.(4)$$

If quantities are expressed in log form, Lal and Singh's equation (III) would suggest an r equivalent to

$$r = \frac{\log Y_t - \log Y_{t-1}}{\log Y_t^* - \log Y_{t-1}} \qquad \ldots.(5)$$

which is tantamount to

$$r = \frac{\log\left(\frac{Y_t}{Y_{t-1}}\right)}{\log\left(\frac{Y_t^*}{Y_{t-1}}\right)} \qquad \ldots.(5.1)$$

1. Jagdish Lal and Katar Singh, "Determinants of Sugarcane Acreage Fluctuations in Uttar Pradesh", *Indian Journal of Agricultural Economics*, Vol. XXXVI, No. 1, January-March 1981, pp. 101-109.

Or

$$r\left[\log\left(\frac{Y_t^*}{Y_{t-1}}\right)\right] = \log\left(\frac{Y_t}{Y_{t-1}}\right) \quad \ldots.(5.2)$$

Equation (5.2) above is totally different than what they had hypothesized in their equation (III). It should be obvious that the coefficient of adjustment in Lal and Singh's estimated model is totally different from the one they had hypothesized.

A more logical hypothesis can now be presented to replace Lal and Singh's equations (I) to (IV). Let us assume that long run supply of sugarcane is determined in the following fashion:

$$Y_t^* = a\, P_{t-1}^b\, U_t \quad \ldots.(6)$$

We may postulate the relationship between short run and long run elasticities as follows:

$$\left(\frac{Y_t^*}{Y_t}\right) = \left(\frac{Y_t^*}{Y_{t-1}}\right)^{\lambda} \quad 0 < \lambda < 1 \quad \ldots.(7)$$

That is, the ratio (Y_t^*/Y_t) will be closer to unity than will the ratio (Y_t^*/Y_{t-1}) because there may tend to be greater coincidence between short and long run supply in the year t than between them in successive years.[2] Solving equation (7) above for Y_t^* and substituting it in equation (6), we get

$$\left(\frac{Y_t}{Y_{t-1}^{\lambda}}\right)^{1/(1-\lambda)} = a\, P_{t-1}^b\, U_t \quad \ldots.(8)$$

Solving for Y_t and taking logs of both sides results in equation (9)

$$\log Y_t = (1-\lambda)\log a + b(1-\lambda)\log P_{t-1} + \lambda \log Y_{t-1} + V_t \quad \ldots.(9)$$

$$= a^* + b^* \log P_{t-1} + c^* \log Y_{t-1} + V_t \quad \ldots.(9.1)$$

where $V_t = (1-\lambda)\log U_t$

One should note that the coefficient c* is a direct estimate of the coefficient of adjustment. Therefore, the estimated adjustment coefficients in Lal and Singh's Table I are incorrect.[3] The computation of their long run elasticity is, however, correct. Since, the short run price elasticity of supply is equal to b*, and the long run price elasticity (b) is estimated by

$$b = \frac{b^*}{1-c^*} \quad \ldots.(10)$$

Although Lal and Singh have used this method to estimate their short and long run elasticities, as demonstrated above, their conceptual model is totally inconsistent with their estimated model. One must therefore be concerned about the implications of changing the functional form specification of one's model after its conceptual development.

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2. For details of this postulation, see Marc Nerlove and W. Addison, "Statistical Estimation of Long-run Elasticities of Supply and Demand", *Journal of Farm Economics*, Vol. 40, No. 4, November 1958, pp. 861-880; Marc Nerlove, "Estimates of the Elasticities of Supply of Selected Agricultural Commodities", *Journal of Farm Economics*, Vol. 38, No. 2, May 1956, pp. 496-509; and Ira Horowitz, "An Econometric Analysis of Supply and Demand in the Synthetic Rubber Industry", *International Economic Review*, Vol. 4, No. 3, September 1963, p. 330.

3. In Lal and Singh's paper, this coefficient was estimated as $(1-b_1)$. What we are showing in our comment is that in the case of logarithmic functional form, the coefficient b_1 is the estimate of the coefficient of adjustment.

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DETERMINANTS OF SUGARCANE ACREAGE FLUCTUATIONS IN UTTAR PRADESH: REPLY

In their comment on our note, "Determinants of Sugarcane Acreage Flucuations in Uttar Pradesh" published in the January-March 1981 issue of this *Journal*, the critics have contended that our "estimating equation is inconsistent with our hypothesized adjustment pattern between short run (actual) supply and long run supply" and that the adjustment coefficients in our Table I are incorrect. Our reactions to these criticisms are as follows:

We agree with the critics' comment that the form of our estimating equation is different from that of our hypothesized equation and we ourselves have given the justification for this deviation as quoted by the critics in their comments. We hold that at the time of formulating a hypothesis, a researcher generally specifies only a particular form of a model; the model is then tested for its fitness, and if not found fit, it is replaced by another model which gives a better fit. This is exactly what we did in our study. We started with the Nerlove's partial adjustment model and ended up using a double-log transformation of it for estimating the values of its parameters. Of course, in this process we inadvertently made an error of not mentioning the implications of this change for our original hypothesis explicitly, but implictly, our hypothesized form of the relationship was $Y_t^* = a\, P_{t-1}^b\, U_t$ as suggested by the critics. This has been done in most of the papers on supply response published in this *Journal* so far.

Given our estimating equation, we hold that our estimates of the adjustment coefficients presented in Table I are correct; certainly they are not what is implied by our original hypothesis. We do not see why one should call them incorrect.

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