A NOTE ON LOSSES FROM PRICE STABILIZATION

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In a recent article in this journal, Tisdell (1) has taken up the question of price stabilization as it affects *both* the growers and users of a raw material, in this case wool. He has constructed a model which purports to show conditions under which a reduction in the variability of wool prices by the operation of a self balancing buffer stock scheme will reduce (a) the producer surplus of growers and (b) the average (or expected) profits of processors.[1]

While applauding this integrated approach to the problem of commodity price stabilization, we hold serious reservations about the relevance of Tisdell's conclusions. These suffer from a mistaken inference drawn by Tisdell concerning the effects of a stable versus unstable price regime on the expected total costs of wool users.

The Tisdell Model

Growers, in the absence of a stabilization scheme, face with certainty a demand curve for their product which varies in a known way between the levels D_1 and D_2 as shown in Figure 1. The industry supply schedule

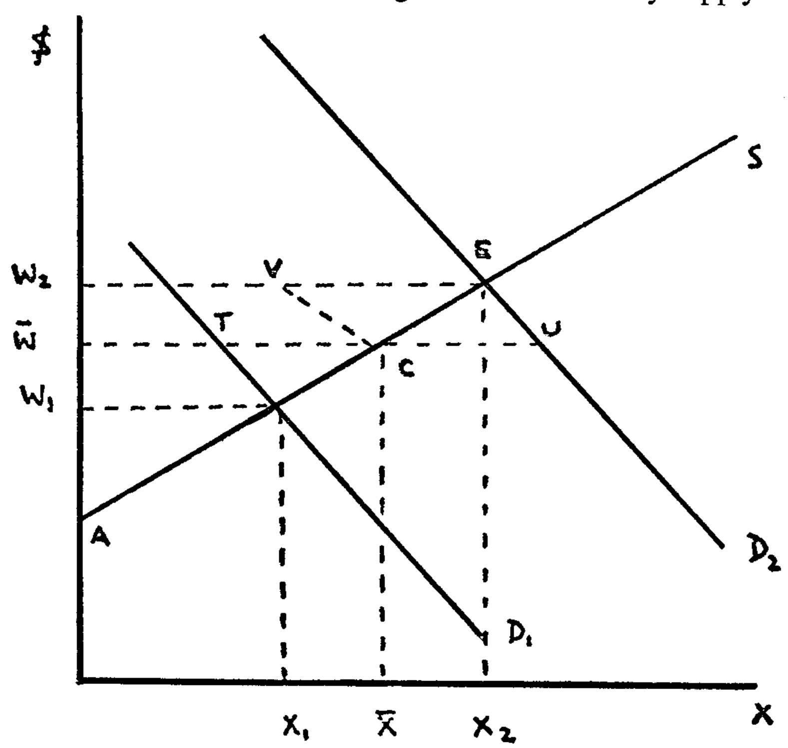

FIGURE 1—The wool market under stable and unstable prices.

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[1] Throughout this note, the term 'average' is used interchangeably with 'expected' in reference to quantities weighted by their relative frequencies of occurrence.

AS is non-stochastic and has an elasticity between zero and infinity. All price variation (from W_1 to W_2) therefore arises as a result of *parallel* shifts in the demand curve. Although Tisdell does not remark on it, the supply schedule AS is presumably linear in the relevant range. At least this is suggested by the geometry of his model.

Under these conditions with D_1 and D_2 occurring half of the time, symmetric purchases and sales by the stabilizing authority to hold price at its average level $\overline{W}$ result in a loss in producer surplus of the amount $\frac{1}{2}$ CEV.

As a result of price stabilization the processors throughput of wool increases in variability from $x_2 - x_1$ under unstable prices to $u - t$ under stable prices. The presence of increasing marginal costs in the processing industry would then lead to increased total processing cost on average under stabilization while the average cost of wool purchases would remain unaltered.

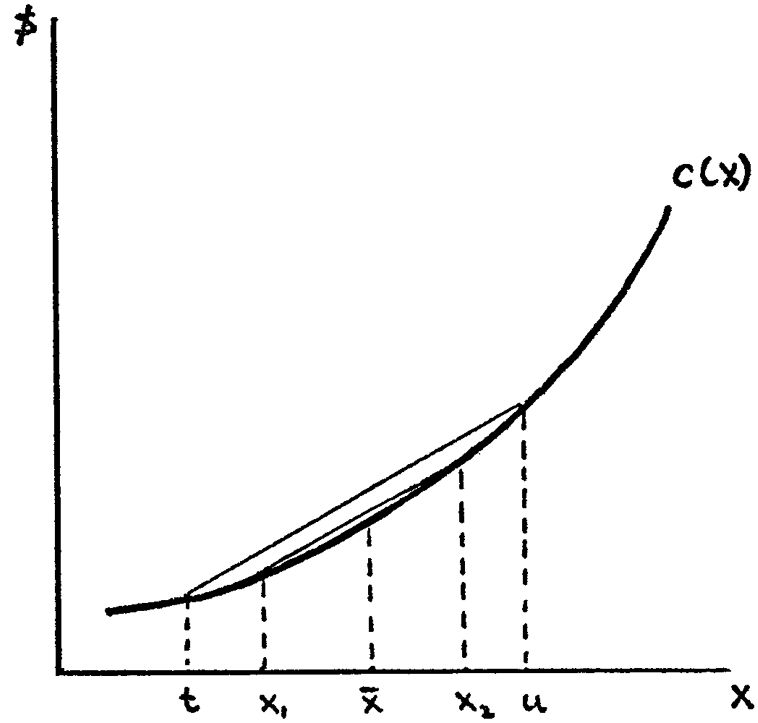

FIGURE 2—Wool processing costs as a function of throughput of wool.

The Ambiguity of the Processor's Average Total Costs

If we accept the separability of total costs of the wool processor into wool purchase costs and other costs, including processing (which, for Tisdell's argument presumably do not depend parametrically on wool *prices*) then convexity of processing costs in wool throughput will indeed lead to higher total processing costs on average under price stabilization. That average total costs should rise, however, does not follow from the assumptions of the model, as the following example, which is consistent with Tisdell's model, demonstrates.

Suppose the demand curves for wool D_1 and D_2 are industry demand curves aggregated over identical firms and have the form

$$D_1 : X_1 = \alpha_1 + \beta W$$

$$(1) \quad D_2 : X_2 = \alpha_2 + \beta W$$

where X_1 and X_2 are the quantities of wool demanded in each instance

W the price of wool

$\alpha_2 > \alpha_1 > 0, \quad \beta < 0$

Under an unstable price regime, given a supply schedule of positive slope, suppose that two prices rule in the equilibrium states corresponding to D_1 and D_2, namely $\overline{W} - \lambda$ and $\overline{W} + \lambda$. And in the spirit of Tisdell's model, further suppose that D_1 and D_2 prevail each with relative frequencies of $\frac{1}{2}$.

Average Total Expenditure on Wool: Price Unstable (TR_u)

$$(2) \quad TR_u = \tfrac{1}{2}(\overline{W} + \lambda)[\alpha_2 + \beta(\overline{W} + \lambda)] + \tfrac{1}{2}(\overline{W} - \lambda)[\alpha_1 + \beta(\overline{W} - \lambda)]$$

$$= \frac{(\alpha_2 + \alpha_1)\overline{W}}{2} + \frac{\lambda(\alpha_2 - \alpha_1)}{2} + \beta[\overline{W}^2 + \lambda^2]$$

Average Total Expenditure on Wool: Price Stable (TR_s)

Now presume the stabilization mechanism to be at work so that all wool is sold to processors at the average price $\overline{W}$. Demand curves D_1 and D_2 continue to prevail with the same frequency. Then processors' average total expenditure on wool with prices stable is (TR_s).

$$(3) \quad TR_s = \tfrac{1}{2}(\alpha_2 + \beta\overline{W})\overline{W} + \tfrac{1}{2}(\alpha_1 + \beta\overline{W})\overline{W}$$

$$= \frac{(\alpha_2 + \alpha_1)\overline{W}}{2} + \beta\overline{W}^2$$

$$(4) \quad TR_u - TR_s = \frac{\lambda(\alpha_2 - \alpha_1)}{2} + \beta\lambda^2$$

(4) is only equal to zero if

(5) a) $\lambda = 0$ (perfectly elastic supply)

or b) $\lambda = \left|\frac{\alpha_2 - \alpha_1}{2\beta}\right|$

That 5 b) is a result which is inconsistent with the model can be shown through reference to Figure 3.

In Figure 3, the demand functions of Equations (1) are represented in conjunction with an upward sloping supply function for wool. The interval z can be shown by an argument on similar triangles to be equal to $\frac{\alpha_2 - \alpha_1}{2}$.

Furthermore

$$(6) \quad \operatorname{Tan}\theta = \frac{y}{\lambda} = |\beta|$$

Thus

$$(7) \quad \lambda = \frac{y}{|\beta|} < \frac{z}{|\beta|} = \left|\frac{\alpha_2 - \alpha_1}{2\beta}\right|$$

and (4) can be rewritten as

$$(8) \quad TR_u - TR_s = \lambda(z - y) > 0$$

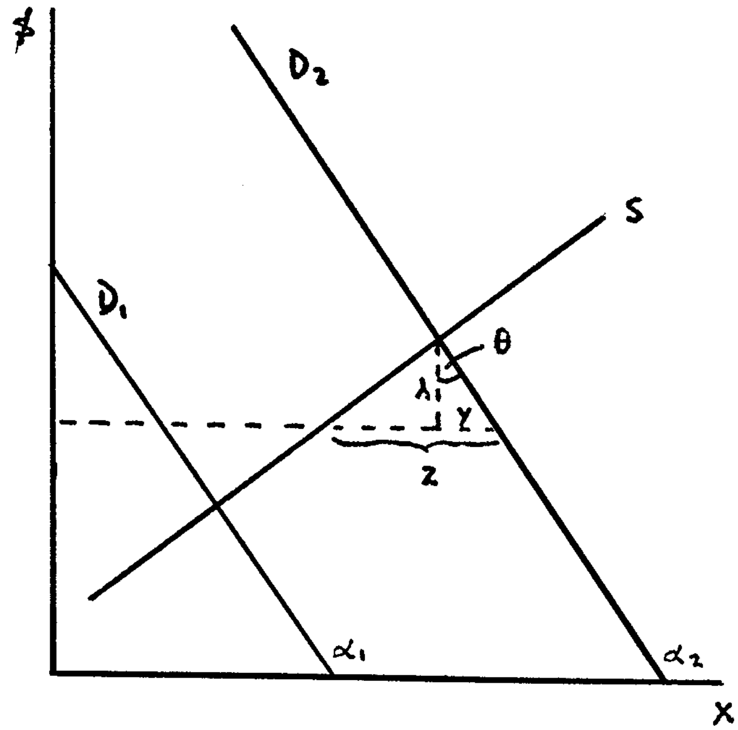

FIGURE 3—Wool purchase costs and price instability.

Result (8) establishes that if the demand schedules D_1 and D_2 are taken to represent the demands of the processing industry for wool, then the average total expenditure on wool purchases of that industry under an unstable price regime will be *higher* than under a stable one.

Whether or not the reduction in these wool purchase costs under stabilization would be sufficient to offset the increased processing costs would then depend on the degree of convexity of processing costs in throughput, the elasticity of supply of wool and therefore the variability of prices under the unstable system. Even playing by Tisdell's highly restrictive rules an improvement in net revenue of processors due to stabilization cannot be ruled out.

[1] Tisdell, C., "Some Circumstances in which Price Stabilization by the Wool Commission Reduces Incomes". *Australian Journal of Agricultural Economics*, August 1972, Vol. 16, No. 2, pp. 94-101.