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Import Instability and Tariffs: Some Welfare Implications of Price Stabilization

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I. Introduction

The welfare effects of price stability and/or instability have been discussed by many authors. Some 30 years ago, Waugh (1944) demonstrated that consumers could benefit from price instability. Later Oi (1961) showed this can also be the case for producers. Massel (1969) integrated these results and found that both consumers and producers could be better off by price stability if *actual compensation* was paid. Bieri and Schmitz (1974) considered the welfare effects of price instability when markets are noncompetitive, regulated by either a producer marketing board or a pure middleman.

Recently, Heuth and Schmitz (1972), and Bieri and Schmitz (B-S) (1973) extended the above analyses to international trading situations. Heuth and Schmitz, using a free trade model, showed that price instability caused outside a country's border can be preferable for both consumers and producers. B-S, using a model with monopoly power—either in the form of tariffs or marketing boards—rather than a free trade model, showed that international price stability is preferred for an importing country regardless of the source of instability when tariffs are in effect, but that this is not true when trade is restricted by export marketing boards rather than by tariffs.[1] This striking discrepancy between the two models of the welfare effects in an importing country has an important policy implication; in real trading situations, it is a very common practice to impose tariffs, and therefore stabilizing prices by buffer stocks must be preferable for an importing country so long as the B-S conclusion is correct. This is particularly so for agricultural products, with which most of the authors in the literature of welfare effects of price stabilization are concerned, and to which this type of analysis can safely be applied.

My special thanks to an unknown referee, whose penetrating comments have made my analysis clear and compact. I also acknowledge the helpful comments of Paul R. Johnson, Martin Bronfenbrenner, Tom J. Grennes, and Marie Thursby.

[1] B-S (1974) also showed that an exporting country can prefer instability regardless of the type of monopoly power in trade if the source of instability is external.

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In this note I show that if the importing country does not have complete monopsony power, in contrast to the B-S assumption, it does not necessarily prefer price stabilization even if tariffs are imposed. I consider changes in the supply conditions in the exporting country as the only sources of instability; it is reasonable to disregard changing demand situations in the importing country not only because it simplifies my analysis but also because the demand for agricultural products is fairly stable compared with the frequent shifts in supply. I also introduce a new notion of "optimal" tariffs related to price stability.

II. Analysis of Welfare Effects

Throughout the analysis I assume perfect competition in production in the importing country as well as in the supply from the exporting country.

We can assume various alternative behaviors of the government of the importing country. B-S (1973) implicitly assume that the government has complete monopsony power and that it maximizes producers' returns, that is, both profits and producers' surplus. Even if the government has complete monopsony power, it can also be assumed to maximize profits only; that is, it sets the marginal cost equal to the marginal revenue expressed in the domestic price. However, I feel the complete monopsony assumption is very awkward and unrealistic and reject its use for the following reasons. First, in real agricultural trades tariffs are usually set only for the purpose of protecting domestic suppliers and may be below the "optimal" levels in the usual partial equilibrium sense. Second, it is contradictory to assume complete monopsony power since the importing country's government on the one hand is assumed to *know* exactly the changing marginal costs and therefore the changing foreign supply conditions, but on the other hand is assumed to assign equal probabilities for possible foreign supply conditions because it *does not know* them. In the following discussion, instead of assuming that the government has complete monopsony power and sets different optimal tariff rates for any shifts in foreign excess supply (as in the case of B-S), I assume that in this partial equilibrium framework the tariff rate is given exogenously and is constant for any exogenous shifts in foreign excess supply.

Let me set up the model for the case in which a tariff is imposed but no buffer stocks are created by the government. Let us consider two situations corresponding to two fluctuating excess supplies and their prices. Without loss of compatibility with the geometric analysis by B-S (1973), I consider the following linear model.[2]

[2] If a quota is imposed instead of a tariff and it is allocated so as to ensure perfect competition among quota holders, the following analysis can equally be applied (see, e.g., Bhagwati [1965]).

Situation 1		Situation 2	
$ED_{M1} = \alpha_0 - \alpha_1 P_{M1}$	(1)	$ED_{M2} = \alpha_0 - \alpha_1 P_{M2}$	(1′)
$ES_{x1} = -\beta_0 + \beta_1 P_{x1}$	(2)	$ES_{x2} = -\beta_0' + \beta_1 P_{x2}$	(2′)
$P_{x1}(1 + t) = P_{M1}$	(3)	$P_{x2}(1 + t) = P_{M2}$	(3′)
$ES_{x1} = D_{M1}$	(4)	$ES_{x2} = D_{M2}$	(4′)

$$\beta_0 \leq \beta_0' \quad (5)$$

where α_i, $\beta_i (i = 0, 1)$, and β_0' are all nonnegative constants. Equation (1) states that the domestic excess demand is a function of domestic price; equation (2) that the foreign excess supply is a function of foreign price; equation (3) that the domestic price exceeds the foreign price by the amount of the tariff; and equation (4) that the foreign excess supply equals domestic excess demand. Equations (1′)–(4′) correspond to definitions (1)–(4) above except in the excess supply function from the exporting country (2′); the intercept can shift subject to (5).[3]

For each situation we have four equations and five unknowns: ED_M, ES_x, P_M, P_x, and t. If t is given, the remaining unknowns are determined. Consequently, corresponding to every t, there will be some levels of quantities and prices.

Now, assume the government of the importing country assigns equal probabilities to P_{M1} and P_{M2} and stabilizes them at $P_u = (P_{M1} + P_{M2})/2$ through a costless storage activity.[4] As has been shown by Heuth and Schmitz (1972), the net social loss (S.L.) for consumers and producers due to price stabilization is depicted in figure 1 by $maP_{M1}P_u - dmP_uP_{M2}$. It can be expressed algebraically as:

$$\begin{aligned} \text{S.L.} &= \alpha_1(P_u - P_{M1})^2 \\ &= \alpha_1\{(\beta_0' - \beta_0)(1 + t)/2[\alpha_1(1 + t) + \beta_1]\}^2 \geq 0. \end{aligned} \quad (6)$$

The government's tariff revenue can generally be expressed as $[t/(1 + t)]P_M ES_x$. Therefore, the difference between the gains and losses in tariff revenues due to price stabilization (R.G.), that is, $jklP_u +$

[3] We have also analyzed the situation in which β_0 and/or β_1 may shift and obtained essentially the same results. In this case, however, the market is not necessarily cleared by the government's buffer stock policy and, as the referee pointed out, the government's expected gain from stabilization should be taken into account for a further investigation.

[4] Introducing a proportional storage cost function needs only minor modifications of algebra and does not change the main conclusions below.

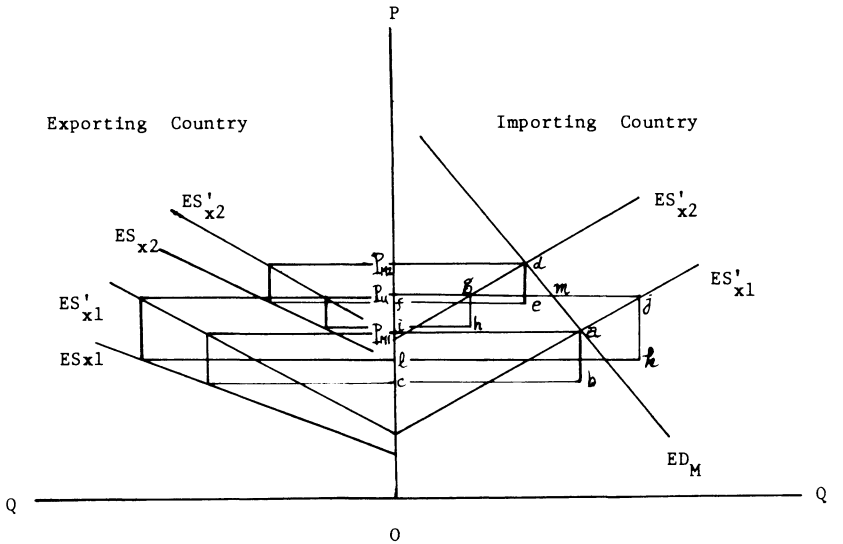

FIG. 1.—Welfare effects with tariffs

$ghiP_u - abcP_{M1} - defP_{M2}$ in figure 1, can be expressed as:

$$\text{R.G.} = \left(\frac{t}{1+t}\right)(P_u - P_{M1})\left[-\beta_0 + \frac{\beta_1}{1+t}P_{M1} - \left(\beta_0' + \frac{\beta_1}{1+t}P_{M2}\right)\right]$$

$$= \left(\frac{t}{1+t}\right)(P_u - P_{M1})(ES_{x1}' - ES_{x2}') \tag{7}$$

$$= \alpha_1(\beta_0' - \beta_0)^2 t(1+t)/\{2[\alpha_1(1+t) + \beta_1]^2\} \geq 0,$$

where ES_{x1}' and ES_{x2}' are foreign excess supplies, with tariffs expressed in terms of domestic prices, for situations 1 and 2, respectively. It is clear from (7) that the tariff revenue under price stability is greater than the tariff revenue generated from instability if a tariff is imposed and a shift in the excess supply function occurs; this is the B-S result.

Next, let us compare the social losses expressed by (6) with the revenue gains expressed by (7). Subtracting (6) from (7), we get the net gain,

$$\text{N.G.} = -[\alpha_1(\beta_0' - \beta_0)^2(1 - t^2)]/\{4[\alpha_1(1+t) + \beta_1]^2\}, \tag{8}$$

which can be negative in contradiction to the B-S conclusion cited in the previous section. The sign of (8) critically depends on the value of t. Assuming $\beta_0' > \beta_0$, it is seen that the net gain after an actual compensation payment from the government to consumers and producers becomes positive, zero, and negative according to:

$$t \gtreqless 1. \tag{9}$$

Therefore, $t = 1$ is the critical value of the tariff rate for discriminating positive and negative net gains in the importing country. It should be noted that this critical point does not depend on any underlying parameters, although it does depend on the assumption of linearity.

What is the "optimal" tariff policy in this situation? Here, the optimal tariff is defined as the one which maximizes (8), the net gain in the importing country attained after the government has stabilized prices and made an actual compensation to consumers and producers. This is quite a different notion of the usual optimal tariff which does not take price stabilization into consideration. Differentiating (8), we find

$$d(\text{N.G.})/dt > 0, \text{ for } t \geq 0. \tag{10}$$

That is, the net gain is a monotone increasing function of $t(\geq 0)$ and therefore a unique maximum cannot be attained; the larger the value of t, the greater the net gain. Therefore, no optimal tariff policy exists in this case, provided that there is no tariff redundancy.

The above analysis shows that the importing country can benefit net positive welfare only by imposing more than 100 percent tariff rates. Therefore, under usual tariff rates of less than 100 percent, the importing country prefers price instability to stability. Note that I have assumed no prior knowledge of the foreign excess supply conditions, in contrast to the B-S case. If prior knowledge of them is available, we can of course attain the usual unique optimal tariffs corresponding to given foreign supply situations. Also note that our analysis above assumes a competitive foreign supply and therefore that there are no governmental interventions or counterpolicies on the export side.[5]

III. Conclusion

With particular reference to trade in agricultural products, I have analyzed some welfare effects of price stabilization by the government of an importing country. In contrast to the B-S analysis, I have assumed that the importing country has no complete monopsony power: tariffs are imposed only for the purpose of protecting a small domestic supply and the tariff rate is given exogenously.

The net gain of the importing country, after the governmental compensation payment, is positive if the tariff rate is greater than 100 percent. However, if there is no tariff redundancy the optimal tariff rate does not exist, since the net welfare gain is a monotone increasing function

[5] Assuming that the government of the exporting country has complete monopoly power and sets the marginal revenue equal to the marginal cost, we can also show algebraically that the importing country prefers price instability to stability.

of tariff rate. Under usual circumstances, with less than 100 percent tariff rates, the importing country loses in net welfare by stabilization and therefore prefers price instability to stability.

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