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THE OPTIMAL TARIFF FOR A SMALL COUNTRY UNDER
INTERNATIONAL PRICE UNCERTAINTY: A COMMENT

By

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I. INTRODUCTION

In a recent issue of this journal, Jabara and Thompson (1982) argue that the optimal trade policy for a small, undistorted economy operating in an environment of international price uncertainty involves the application of an import tariff. This conclusion is not generally correct. As Helpman and Razin (1978, 119-126) have shown, if international trade in goods is accompanied by international trade in equities, then free trade in goods and equities is the optimal policy for a small country.¹ Even when equity markets are absent, free trade does not necessarily constitute a sub-optimal policy. In Section 2 of this note, I show in the context of the very model used by Jabara and Thompson (henceforth, JT) that if all individuals have identical tastes and endowments, deviations from free trade are required only under the unnatural assumption that the welfare function of the social planner is different from that of the representative individual. The reason is that an economy with identical expected-utility-maximizing individuals achieves, under laissez-faire, exactly the allocation of resources that JT show to be optimal.

In Section 3, I discuss the conditions under which the existence of international price uncertainty does justify government policy intervention. In general, these are that some domestic insurance markets be missing, and that individuals in the economy differ in their endowments or in their attitudes toward risk. In such circumstances, the free market outcome will normally involve an inefficient allocation of risk-exposure across individuals. However, even then, it is likely that other policies will exist that dominate tariffs as instruments of intervention.

II. THE OPTIMAL TARIFF IN THE JT MODEL.

Following JT, I consider a small, open economy in which production and export decisions must be made prior to the resolution of some international price uncertainty.² The country produces two goods, X and Y, and good X is exported subject to exogenous, but random terms of trade, $p^* \equiv p_x/p_y$. That is, for each unit of the export good shipped ex ante, the country receives a random amount, p^* , of the import good, delivered ex post. Let the mean of the international price distribution be $E(p^*) = \bar{p}^*$.

Suppose all individuals have identical preferences and identical endowments of a vector of factors of production. Let $U(C_x^i, C_y^i)$ be the utility function of the representative individual i , where C_x^i and C_y^i are his ex post consumption levels of the two goods. This individual is endowed with the vector of primary factors, $\bar{n}^i$, and seeks to maximize his expected utility.

In such an economy, each individual acts as an entrepreneur and hires factors of production to engage in production. The (random) income of a representative individual is the sum of the payments he receives from the sale of his factor endowment, and the (uncertain) profits he earns in his entrepreneurial ventures. His ex post decision problem is simply to allocate his income, I^i , to maximize $U(C_x^i, C_y^i)$, subject to the budget constraint, $pC_x^i + C_y^i = I^i$ (where p is the relative domestic price that prevails after the international price, p^* , is revealed). Given the incomes of all individuals and the supplies of the two goods (noting that no further production or international trade can take place ex post), p is determined so that the domestic goods markets clear.

Let $V(p, I)$ be the indirect utility function associated with $U(C_x, C_y)$. Then we can describe the ex ante optimization problem of the representative individual as follows. In his role as entrepreneur, the i^{th} individual hires a vector of primary factors, $n_x^i + n_y^i$, to produce the two goods. His outputs, denoted by X^i and Y^i , are given by:

$$X^i = F(n_x^i) \quad (1)$$

$$Y^i = G(n_y^i) \quad (2)$$

In addition, the entrepreneur specifies a level of exports X_e^i , and receives in return $Y_m^i = p \cdot X_e^i$ units of the import good after the terms-of-trade uncertainty is resolved. Let w represent the vector of factor prices. Then the i^{th} representative individual has state-dependent income, in terms of good Y , of

$$I^i = w \bar{n}_i + p[F(n_x^i) - X_e^i] + [G(n_y^i) + p \cdot X_e^i] - w(n_x^i + n_y^i) \quad (3)$$

His problem is to maximize $EV(p, I^i)$ with respect to the choice of n_x^i , n_y^i and X_e^i . The model is closed by the factor-market clearing conditions:

$$\sum_i n_x^i + \sum_i n_y^i = \sum_i \bar{n}^i \quad (4)$$

The first-order conditions for the representative individual's ex ante optimizations are as follows:

$$F'(n_x^i) E p^* V_2 = w E V_2 \quad (5)$$

$$G'(n_y^i) E V_2 = w E V_2 \quad (6)$$

$$E V_2 (p^* - p) = 0 \quad (7)$$

Now, from the envelope property of the indirect utility function, $V_2 = U_2 = U_1/p$.

Setting the left-hand-side of (5) equal to the left-hand side of (6), and rearranging terms, yields:

$$\frac{G'(n_y^i)}{F'(n_x^i)} = \frac{E U_2 p^*}{E U_2} = \bar{p}^* + \frac{\text{Cov}(U_2, p^*)}{E U_2}$$

which, so long as the social planner's welfare function is the same as that of the representative individual, is identical to equation (10) in JT.³

Similarly, substituting U_1/U_2 for p , and U_2 for V_2 , in equation (7) gives:

$$E U_2 p^* - E U_1 = 0,$$

which is identical to equation (9) in JT.⁴ This proves that the decentralized market allocation is exactly the same as the allocation that JT show to be optimal. Hence, no government policy intervention is required. JT were led to their erroneous conclusion that an optimal tariff is needed, because they assumed that the decentralized market outcome under uncertainty would be characterized by equality of the marginal rate of transformation and the mean international price. However, with risk averse individuals, this is generally not the case.

III. TRADE POLICY FOR THE SMALL ECONOMY UNDER PRICE UNCERTAINTY.

Can policy intervention ever be welfare improving for a small economy facing international price uncertainty? If a complete set of contingent commodity markets exists in the small country, then the answer is no. However, in most realistic applications, many insurance markets are absent. It is well known from the theory of distortions that first-best policies (e.g. free trade) may not be optimal in second-best situations.⁵ On this familiar basis an argument can be made for intervention in some circumstances.

Elsewhere, Jonathan Eaton and I have provided an example where tariff intervention is welfare improving for a small economy facing terms-of-trade or technological uncertainty.⁶ In our model, capital must be allocated to one of two sectors prior to the resolution of uncertainty, while labor is allocated ex post. Each individual begins with equal endowments of indivisible, but malleable capital. Once an individual allocates his capital to one sector or the other, it can no longer be used in the alternative

activity. Thus, individuals will differ in their ultimate endowments, and would benefit from trade in insurance claims. If insurance markets are absent, then the market allocation of resources will be inefficient, and some trade policy intervention can improve social welfare.

In general, the laissez-faire allocation under uncertainty will be inefficient whenever insurance markets are missing, and individuals differ in their preferences or endowments.⁷ The role of insurance markets is to ensure an efficient allocation of risk-bearing. In their absence, individuals will take socially sub-optimal economic actions in order to "self-insure".

Consider again the JT model with a utilitarian social welfare function, W . That is, let $W = \sum_i \lambda^i EV^i(p, I^i)$, where λ^i is the weight attached to individual i in social welfare. Suppose now that tastes or endowments differ across individuals. It is straightforward to show that a necessary condition for an unconstrained social optimum is that in every state of nature α ,

$$V_2^i[p(\alpha), I^i(\alpha)] / V_2^j[p(\alpha), I^j(\alpha)] = \lambda^j / \lambda^i \quad \forall i, j$$

It would be fortuitous indeed if the market allocation happened to coincide with the social optimum when tastes and endowments differ, since without insurance markets no mechanism exists in the model to enforce this condition. It is likely in such cases that some feasible policy intervention can be used to move the economy closer to the optimum.

Finally, it should be pointed out that even in those situations of uncertainty and missing markets when a tariff can be used to raise social welfare, a tariff will not generally be a second-best optimal policy instrument. In the context of the JT model, for example, a redistributive income tax-cum-subsidy dominates a tariff as a policy for insurance provision. In general, the theory of second-best policy tells us to intervene to offset as nearly as possible the existing distortion, while minimizing the extent to which new distortions are introduced. With uncertainty and missing insurance markets, the distortion that arises is a suboptimal allocation of income across individuals in any given state of nature. And as is well known, a tariff is not likely to be the best policy instrument for engaging in income redistribution.

FOOTNOTES

1. Helpman and Razin also show that free trade is optimal if domestic equity markets exist in the small country, but equities are not traded internationally.
2. This is not necessarily the most reasonable assumption. Many writers on international trade under uncertainty (e.g., Helpman and Razin, 1978 Newbery and Stiglitz, 1981 and Baron and Forsyth, 1979) have assumed that, whereas production decisions are made ex ante, import and export levels are determined ex post. Some writers (e.g. Eaton, 1979, and Eaton and Grossman, 1981) have also drawn a distinction between various factors of production, by assuming, for example, that capital must be allocated before uncertainty is resolved, but that labor can be hired afterwards.
3. Note that $G'(n_y^i)/F'(n_x^i)$ is (the negative of) the marginal rate of transformation, or $-F'(X_p)$ in the JT notation.
4. Equation (9) in JT actually appears as $EU_1 + EU_{2p^*} = 0$, but a minus sign was dropped in taking the derivative of their equation (2).
5. See, for example, Bhagwati (1971).
6. See Eaton and Grossman (1981). Also, see Cassing, Hillman and Long (1982) for a paper that makes a similar point.
7. It should be mentioned, however, that the underlying reason for the absence of private insurance might be one that also precludes government intervention. For example, if moral hazard exists because some variables are unobservable, it may be wrong to assume that the government has better information regarding these variables than a potential private insurance firm.

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