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Immiserizing Foreign Aid: The Roles of Tariffs and Nontraded Goods

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Research Department

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Abstract

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International trade theory has pointed out that factor accumulation could immiserize a country if it is sufficiently biased toward the export sector, or if it is biased toward an import-competing sector in the presence of tariff protection. This paper analyzes the impact of aid, in the form of an increase in the capital stock used only in the nontraded sector, on real income. Yano and Nugent (1999) discussed this issue, but their analysis turned out to be incorrect. This paper demonstrates that whether aid in the form of an increase in capital specific to the nontraded sector reduces welfare depends on how aid affects the price of the nontraded good and on whether imports and the nontraded good are substitutes or complements in demand.

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I. INTRODUCTION

Recently, rich countries have pledged to increase the amount of foreign aid that they provide to poor countries and this has rekindled interest in the question of how aid affects the recipient country. While there is a general perception that aid will be beneficial, there is a large literature in international trade theory that shows that it may actually reduce the welfare of a recipient country by deteriorating its terms of trade (see for example, Bhagwati, Brecher, and Hatta (1983) and Jones (1975) for a discussion of this issue). Apart from possible adverse terms-of-trade effects, aid in the form of an increase in the supply of a factor of production, could also immiserize a recipient country if it has distortions in place. For example, in the context of the standard two-good, two-factor model of international trade, Johnson (1967) showed that in the presence of a tariff, factor accumulation could reduce a country's real income if it is biased toward production of the tariff-protected good and if it leads to a reduction in the value of output at world prices.

Yano and Nugent (1999) examined the impact of aid provided in the form of an increase in capital on a small, tariff-distorted economy and concluded that aid may reduce the recipient's welfare—a phenomenon they call the “transfer paradox”—as a result of adjustments in the nontraded sector, although they did not specify exactly how this might occur. The purpose of this paper is to demonstrate that the analysis in Yano and Nugent (1999) is incorrect for two main reasons. First, they used a model structure that, ironically, precluded any adjustment in the price of nontraded goods. Second, they made some assumptions that are inconsistent with standard results from international trade theory regarding how increases in a factor endowment affect sectoral outputs.

This paper presents the correct conditions under which a small, tariff-distorted economy could be harmed by aid provided in the form of capital used only in the nontraded sector. The welfare effect of this type of aid depends on how the aid affects the price of the nontraded good and on whether imports are a substitute or a complement with the nontraded good in demand. The next section lays out the basic features of Yano and Nugent's model and points out the problems with their analysis. Section III provides a correct analysis of the welfare effect of aid on a small country with a tariff distortion in place and a nontraded sector. Section IV concludes.

II. THE YANO AND NUGENT MODEL

Yano and Nugent adopt a three-good (exports, imports, and a nontraded good) two-factor (labor and capital) model of international trade. They assume that: (i) the country is small so that the prices of the two traded goods are exogenously given; and (ii) labor and capital are “mobile domestically but not internationally.” With an initial ad-valorem tariff in place (t), and exogenous world prices of exports (p_1^*) and imports (p_2^*), Yano and Nugent correctly state that that the domestic price of exports is:

$$p_1 = p_1^* \tag{1}$$

and the domestic price of imports is

$$p_2 = p_2^*(1+t) \quad (2)$$

where p_1 and p_2 are the domestic prices of exports and imports respectively. Yano and Nugent *incorrectly* state that the price of the nontraded good, p_N , is determined in the market. Using the zero-profit conditions for their model structure, it can be seen easily that the price of the nontraded good is determined by the prices of the two traded goods and is therefore exogenous.

To see this, the zero-profit conditions are:

$$wa_{L1} + ra_{K1} = p_1^* \quad (3)$$

$$wa_{L2} + ra_{K2} = p_2^*(1+t) \quad (4)$$

$$wa_{LN} + ra_{KN} = p_N \quad (5)$$

where w is the wage rate, r is the rental rate on capital, and a_{ij} is the amount of factor i per unit of good j (i =labor and capital, $j=1,2,N$), which depends on the factor prices. As Jones (1965) pointed out, these zero-profit conditions form the building blocks of general equilibrium trade models characterized by constant returns to scale. For exogenous values of p_1^* , p_2^* , and t , equations (3) and (4) determine both w and r . Thus, the price of the nontraded good, p_N , is determined by equation (5), once w and r are known; it is not determined from the condition that demand equal supply of the nontraded good, but from cost considerations alone.² Therefore, in Yano and Nugent's model, p_N does not adjust to bring about equilibrium in the market for nontraded goods. Rather, since p_N is determined by the prices of traded goods, output of the nontraded good (X_N) will be determined by demand to ensure that the nontraded goods market clears. As a consequence, aid must lead to an increase in the output of the nontraded good in their model, provided it is a normal good.

The fact that the price of the nontraded good cannot adjust in Yano and Nugent's model is simply a consequence of the structure of their model: a three-good model with two traded goods and two factors of production that are mobile across all sectors. Since p_N cannot change in their model, the only way that a nontraded sector can influence the welfare effect of aid is by altering how sectoral outputs respond to the aid—that is through

² In general, a basic result from trade theory is that when the number of traded goods equals the number of mobile factors, the traded goods' prices are sufficient alone to determine the factor prices. See Woodland (1982) for a discussion of this result.

Rybczynski effects. Direct substitution of $dp_N = 0$ into equation (17) of Yano and Nugent's paper reveals that the welfare effect of aid is just the direct effect and the "Johnson effect" as they term it—there is no "nontraded goods" effect.

To see this, the budget constraint for the economy can be written as:

$$G(P_E, P_M, P_N, V) + tP_M^*(E_M - G_M) = E(P_E, P_M, P_N, U), \quad (6)$$

where $G(P_E, P_M, P_N, V)$ is the economy's GDP function, $E(P_E, P_M, P_N, U)$ is the expenditure function, P_j and P_j^* are the domestic and world prices of good j respectively, U is the level of utility, V is a vector of factor endowments, and t is the ad-valorem tariff rate on imports. The subscripts E, M, and N denote the exportable, importable, and nontraded sector respectively and a subscript next to the expenditure or GDP function represents partial differentiation with respect to that variable. Totally differentiating equation (6) gives the welfare effect of aid as a function of a change in the vector of factor endowments, dV :

$$dU [E_U - tP_M^* E_{MU}] = tP_M^* [(E_{MN} - G_{MN})dP_N - G_{MV}dV] + G_V dV \quad (7)$$

where E_{MN} captures how domestic demand for the imported good (E_M) changes as a result of a change in the price of the nontraded good and G_{MN} measures how output of the imported good (G_M) changes as a result of changes in the price of the nontraded good. Since p_N is pinned down by the prices of the two traded goods alone in Yano and Nugent's model, $dP_N = 0$ in equation (7) which means:

$$dU [E_U - tP_M^* E_{MU}] = [G_V - tP_M^* G_{MV}]dV \quad (8)$$

Since the left-hand side of equation (8) is positive in stable models, aid will reduce welfare if:

$$[G_V - tP_M^* G_{MV}] < 0 \quad (9)$$

Expanding the terms in equation (9) gives:

$$G_V - tP_M^* G_{MV} = p_E^* \frac{\partial X_E}{\partial V} + p_M^* (1+t) \frac{\partial X_M}{\partial V} + p_N \frac{\partial X_N}{\partial V} - tP_M^* \frac{\partial X_M}{\partial V} < 0, \quad \text{or,} \quad (10)$$

$$G_V - tP_M^* G_{MV} = p_E^* \frac{\partial X_E}{\partial V} + p_M^* \frac{\partial X_M}{\partial V} + p_N \frac{\partial X_N}{\partial V} < 0$$

that is, aid will reduce the welfare of the recipient country if it reduces the value of production, measured at world prices for the traded goods and the (exogenous) market price

of the nontraded good. Since all prices in the Yano and Nugent model are exogenous, the welfare effect of aid depends only on how sectoral outputs change in response to changes in factor endowments, that is, the Rybczynski effects. The condition given in equation (10) is similar to the one derived by Johnson (1967) and explicated in Caves and Jones (1973) for the effect of factor accumulation on welfare in a small, tariff-distorted economy in which there are two traded goods and two mobile factors.

It turns out that the assumptions Yano and Nugent make about how sectoral outputs respond to changes in factor endowments are also incorrect in that they consider combinations of sectoral output changes that violate the Rybczynski theorem. For example, Yano and Nugent state that “If a transfer affects neither the import-competing sector nor the nontraded sector (i.e. if $\kappa_2 = \kappa_N = 0$), as equation (16) shows, the transfer unambiguously increases the recipient’s welfare.”³ In the authors’ notation, κ_i denotes the “marginal propensity to develop”, defined as $\kappa_i = \frac{p_i \partial X_i}{r \partial K}$, where $\frac{\partial X_i}{\partial K}$ captures how output of sector i responds to changes in the supply of capital—the Rybczynski effects.

The problem with Yano and Nugent’s conclusion quoted above is that it ignores the fact that aid in the form of an increase in capital, which is the type they consider, *must reduce the output of at least one good*. In other words, it is not possible in a three-sector model with two mobile factors to have a case where $\kappa_2 = \kappa_N = 0$, implying $\kappa_1 = 1$. Since labor and capital are employed in all three sectors in Yano and Nugent’s model, an increase in the endowment of capital must cause the output of some good to rise and the output of some other good to fall, provided factor intensities differ across sectors and there is no specialization. Which sector experiences a rise in output and which one a fall depends, among other things, on factor intensities, but a situation in which an increase in capital leads to no change in the outputs of the import-competing and the nontraded good is impossible under standard assumptions about production behavior in a three-good, two-factor, international trade model. This result is an extension of the well-known Rybczynski theorem (1955) in international trade theory.

In Yano and Nugent’s model then, an increase in capital will cause the demand for the nontraded good to rise, leading to an increase in the output of the nontraded good, although p_N remains unchanged. This expansion of the nontraded sector will occur regardless of the factor intensity of the sector, provided the nontraded good is normal. Expansion of the nontraded sector requires it to use more labor and capital, leaving less for the two traded sectors. Which traded sector expands and which one contracts depends on the factor intensities in each sector. In general, as shown by both Komiyama (1967) and Ethier (1972), in the context of a three-good, two-factor model in which one of the three goods is nontraded, an increase in an endowment

³ See page 439 of Yano and Nugent (1999). Presumably this is because $\kappa_1 = 1$.

will cause output of both the nontraded and the traded good that is intensive in the expanding factor to rise, while output of the other traded good will fall.

Thus, somewhat ironically, the presence of a nontraded sector essentially plays no role in influencing the welfare effect of aid in Yano and Nugent's model. This conclusion stems from the fact that the price of the nontraded good in their model is determined by the prices of the traded goods and therefore cannot change in response to aid. As a consequence, the only way in which aid can immiserize the recipient country in Yano and Nugent's model is if it leads to a sufficiently large increase in the output of the importable good—the “Johnson effect” as they call it. The next section considers a model in which the price of the nontraded good can adjust in response to aid.

III. AN ALTERNATIVE MODEL WITH P_N FLEXIBLE

There are two ways that Yano and Nugent's model could be modified so as to allow the price of the nontraded good to adjust in response to aid. One is to assume that each sector uses a specific factor and that labor is mobile across all sectors. The other is to adopt a model that includes two traded goods, a nontraded good, and *three* mobile factors. The first option will be analyzed in detail below and the second option will be discussed briefly at the end of this section. These two types of model structure give rise to different notions of a “transfer paradox.” A situation in which aid immiserizes a country in a specific-factor's model could be thought of as a “short-run paradox,” while a situation in which aid immiserizes a country in a model in which all factors are mobile could be characterized as a “long-run paradox.”

A. A Specific-Factors Model

Assuming each sector uses sector-specific capital and labor is mobile across all sectors, equations (3) through (5) are modified as follows:

$$wa_{LE} + r_E a_{KE} = p_E^* \quad (11)$$

$$wa_{LM} + r_M a_{KM} = p_M^* (1+t) \quad (12)$$

$$wa_{LN} + r_N a_{KN} = p_N \quad (13)$$

where r_j is the return to capital in sector j . The full-employment conditions become:

$$a_{LE} X_E + a_{LM} X_M + a_{LN} X_N = L \quad (14)$$

$$a_{KE} X_E = K_E \quad (15)$$

$$a_{KM} X_M = K_M \quad (16)$$

$$a_{KN} X_N = K_N \quad (17)$$

where L is the economy's endowment of labor, X_j is output of sector j , and K_j is the amount of capital specific to sector j .

Under these assumptions, the price of the nontraded good will no longer be determined by the prices of the traded goods—it will be determined by the requirement that the quantity of the nontraded good demanded equal the quantity supplied:

$$E_N(p_E, p_M, p_N, U) = G_N(p_E, p_M, p_N, V) \quad (18)$$

The demand for the nontraded good E_N , equals the derivative of the expenditure function with respect to the price of the nontraded good, p_N , while G_N , the supply of the nontraded good, equals the derivative of the GDP function with respect to the price of the nontraded good.

Rewriting equation (7), the welfare effect of aid, given in the form of an increase in the amount of capital used only in the nontraded sector, is given by:

$$dU [E_U - tP_M^* E_{MU}] = [G_V - tP_M^* G_{MV}] dV + tP_M^* (E_{MN} - G_{MN}) dP_N \quad (19)$$

Since $[E_U - tP_M^* E_{MU}] > 0$ in stable models, the only way for immiserization to occur is if:

$$[G_V - tP_M^* G_{MV}] dV + tP_M^* (E_{MN} - G_{MN}) dP_N < 0 \quad (20)$$

or if:

$$[G_V - tP_M^* G_{MV}] dV < -tP_M^* (E_{MN} - G_{MN}) dP_N \quad (21)$$

Using equations (11) through (17), an increase in K_N must cause output of the imported good to fall at constant prices, so $G_{MV} < 0$ in equation (21).⁴ Therefore, since the

⁴ Formally, $\hat{X}_M = \left[\frac{-\sigma_M \theta_{LM} \theta_{KE} \theta_{KN} \lambda_{LN}}{\lambda_{KN} (\lambda_{LE} \sigma_E \theta_{KM} \theta_{KN} + \lambda_{LM} \sigma_M \theta_{KE} \theta_{KN} + \lambda_{LN} \sigma_N \theta_{KE} \theta_{KM})} \right] \hat{K}_N$ where σ_j is the

elasticity of substitution between labor and capital in sector j , θ_{ij} is the cost-share of factor i in good j , λ_{ij} is the share of factor i employed in sector j , and a “ \wedge ” denotes proportional

change, i.e. $\hat{X}_M = \frac{dX_M}{X_M}$.

left-hand side of equation (21) must be positive, immiserization requires that the right-hand side of equation (21) be positive and greater than $(G_V - tP_M^* G_{MV})$. Notice that the larger the reduction in the output of the imported good (i.e. the more negative is G_{MV}), the smaller the likelihood of immiserization, because the left-hand side of equation (21) becomes more positive. This accords with intuition: output of the importable good is too large as a result of the tariff distortion. Therefore, the larger the contraction in its output, the larger the welfare gain.

Using equation (21) and the fact that $(G_V - tP_M^* G_{MV})$ must be positive, then immiserization can only occur when $(E_{MN} - G_{MN})$ and dP_N are of opposite sign. That is, immiserization can only occur if an increase in capital used only in the nontraded sector results in: (i) an increase in the price of the nontraded good ($dP_N > 0$) and imports and the nontraded good are complements in demand ($(E_{MN} - G_{MN}) < 0$); or (ii) a decline in the price of the nontraded good ($dP_N < 0$) and imports and the nontraded good are substitutes in demand ($(E_{MN} - G_{MN}) > 0$). In both cases, aid will lead to a reduction the demand for imports, which exacerbates the effect of the tariff distortion.

To see how p_N is affected by aid, totally differentiate equation (18), which gives

$$dP_N = \frac{1}{(E_{NN} - G_{NN})} [G_{NV} dV - E_{NU} dU] \quad (22)$$

Substituting the expression for dU from equation (7) into (22) gives the effect of aid on the price of the nontraded good:

$$dP_N = \left[\frac{G_{NV}(E_U - tP_M^* E_{MU}) + E_{NU}(tP_M^* G_{MV} - G_V)}{(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU}) + E_{NU}tP_M^*(E_{MN} - G_{MN})} \right] dV \quad (23)$$

Substituting equation (23) for dP_N in equation (19) gives the welfare effect of foreign aid in the form of a change in the recipient country's factor endowments, dV :

$$\begin{aligned} dU(E_U - tP_M^* E_{MU}) &= G_V dV - tP_M^* G_{MV} dV \\ &+ tP_M^*(E_{MN} - G_{MN}) \left[\frac{G_{NV}(E_U - tP_M^* E_{MU}) + E_{NU}(tP_M^* G_{MV} - G_V)}{(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU}) + E_{NU}tP_M^*(E_{MN} - G_{MN})} \right] dV \end{aligned} \quad (24)$$

As noted before, in stable models, $(E_U - tP_M^* E_{MU}) > 0$, so the effect of aid on welfare depends on the sign of the right-hand side of equation (24).

In general, in the presence of a tariff, a transfer will affect welfare depending on how it alters imports. With no terms-of-trade effects, the tariff initially leads to a reduction in welfare, because it reduces imports below the optimum: it raises domestic production and reduces domestic consumption of the importable good. So if a transfer increases imports, as well as tariff revenue, then welfare will increase; if imports and tariff revenue decline, welfare falls.

The results derived above show that immiserization is only possible when dP_N and $(E_{MN} - G_{MN})$ are of opposite sign. The following two sections examine in more detail the circumstances under which immiserization is possible.

Cases in which the Price of the Nontraded Good Rises

If aid causes the price of nontraded goods to rise, equation (23) must be positive and this could only occur if both the numerator and denominator of equation (23) are of the same sign. Furthermore, for aid to immiserize, equation (21) must be satisfied. Therefore, the following three conditions must be satisfied for aid to immiserize:

$$G_{NV}(E_U - tP_M^*E_{MU}) + E_{NU}(tP_M^*G_{MV} - G_V) > 0 \quad (25)$$

$$(E_{NN} - G_{NN})(E_U - tP_M^*E_{MU}) + E_{NU}tP_M^*(E_{MN} - G_{MN}) > 0 \quad (26)$$

$$(G_V - tP_M^*G_{MV})dV < -tP_M^*(E_{MN} - G_{MN})dP_N \quad (27)$$

Equation (27) requires that $(E_{MN} - G_{MN}) < 0$ since $dP_N > 0$ and the left-hand side is positive. However, equation (26) requires that $(E_{MN} - G_{MN}) > 0$, since $(E_{NN} - G_{NN}) < 0$: an increase in the price of the nontraded good must reduce the excess demand for the nontraded good, provided markets are stable. Thus, immiserization is not possible in this case.

Alternatively, if both the numerator and the denominator of equation (23) are negative, then the following three conditions must be satisfied in order for aid to immiserize:

$$G_{NV}(E_U - tP_M^*E_{MU}) + E_{NU}(tP_M^*G_{MV} - G_V) < 0 \quad (28)$$

$$(E_{NN} - G_{NN})(E_U - tP_M^*E_{MU}) + E_{NU}tP_M^*(E_{MN} - G_{MN}) < 0 \quad (29)$$

$$(G_V - tP_M^*G_{MV})dV < -tP_M^*(E_{MN} - G_{MN})dP_N \quad (30)$$

Equation (29) requires:

$$(E_{MN} - G_{MN}) < \frac{-(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU})}{tP_M^* E_{NU}} \quad (31)$$

and equation (30) requires:

$$(E_{MN} - G_{MN}) < \frac{(G_V - tP_M^* G_{MV})dV}{-tP_M^* dP_N} \quad (32)$$

The right-hand side of equation (31) is positive, so any negative value for $(E_{MN} - G_{MN})$ will satisfy it, but the right-hand side of (32) is negative (since $dP_N > 0$). Thus, any value for $(E_{MN} - G_{MN})$ that satisfies (32) will satisfy both (31) and (32). Thus, immiserization is possible in this case, provided the degree of complementarity between imports and the nontraded good is sufficiently high. Note that it is not sufficient that imports and the nontraded good be complements—the degree of complementarity must be high enough to satisfy (32).⁵

Intuitively, if aid pushes up the price of the nontraded good, then the demand for the imported good will decrease if the two goods are complements in demand. Since consumption of the imported good is already “too low” because of the tariff, the decline in the demand for imports will worsen welfare.

Cases in which the Price of the Nontraded Good Falls

Aid in the form of an increase in the amount of capital used only in the nontraded sector could result in a decline in the price of the nontraded good, if, at constant prices, the Rybczynski effect outweighs the increase in demand for the nontraded good, as shown in equation (23). For the price of the nontraded good to fall, equation (23) must be negative and this could only occur if the numerator and denominator of equation (23) have opposite signs. Furthermore, for aid to immiserize, equation (21) must be satisfied. For the case where the numerator of (23) is positive and the denominator negative, the following three conditions must be satisfied in order for aid to immiserize:

$$G_{NV}(E_U - tP_M^* E_{MU}) + E_{NU}(tP_M^* G_{MV} - G_V) > 0 \quad (33)$$

⁵ Ghosh (1979) considers a three-good, two-factor model, similar to Yano and Nugent’s model and concludes that gross complementarity between the import and the nontraded good increases the likelihood of immiserization. But, as in Yano and Nugent’s model, the price of the nontraded good cannot change in Ghosh’s model as a result of assumptions about the number of goods and factors.

$$(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU}) + E_{NU} tP_M^* (E_{MN} - G_{MN}) < 0 \quad (34)$$

$$(G_V - tP_M^* G_{MV})dV < -tP_M^* (E_{MN} - G_{MN})dP_N \quad (35)$$

Equation (34) can be satisfied if:

$$(E_{MN} - G_{MN}) < \frac{-(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU})}{tP_M^* E_{NU}} \quad (36)$$

and equation (35) requires:

$$(E_{MN} - G_{MN}) < \frac{(G_V - tP_M^* G_{MV})dV}{-tP_M^* dP_N} \quad (37)$$

The right-hand sides of (36) and (37) are both positive, so values for $(E_{MN} - G_{MN})$ that satisfy both would lead to immiserization. Note that it is possible for immiserization to occur if imports and the nontraded good are substitutes in demand when $dP_N < 0$, but the degree of substitutability is limited by (36) and (37).

The final case to consider is the one in which the numerator of (23) is negative and the denominator is positive. For immiserization to occur in this case, the following three conditions must hold:

$$G_{NV}(E_U - tP_M^* E_{MU}) + E_{NU}(tP_M^* G_{MV} - G_V) < 0 \quad (38)$$

$$(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU}) + E_{NU} tP_M^* (E_{MN} - G_{MN}) > 0 \quad (39)$$

$$(G_V - tP_M^* G_{MV})dV < -tP_M^* (E_{MN} - G_{MN})dP_N \quad (40)$$

Equation (39) can be satisfied if:

$$(E_{MN} - G_{MN}) > \frac{-(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU})}{tP_M^* E_{NU}} \quad (41)$$

and equation (40) requires:

$$(E_{MN} - G_{MN}) < \frac{(G_V - tP_M^* G_{MV})dV}{-tP_M^* dP_N} \quad (42)$$

The right-hand sides of (41) and (42) are both positive, so the value of $(E_{MN} - G_{MN})$ that satisfies (41) and (42) must be:

$$0 < \frac{-(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU})}{tP_M^* E_{NU}} < (E_{MN} - G_{MN}) < \frac{(G_V - tP_M^* G_{MV})}{-tP_M^* dP_N} \quad (43)$$

Thus, aid can immiserize in this case, provided imports and the nontraded good are substitutes, but only for values of $(E_{MN} - G_{MN})$ that satisfy (43). There is no guarantee that

such a value for $(E_{MN} - G_{MN})$ exists because $\frac{-(E_{NN} - G_{NN})(E_U - tP_M^* E_{MU})}{tP_M^* E_{NU}}$ might be greater than $\frac{(G_V - tP_M^* G_{MV})}{-tP_M^* dP_N}$.

B. A Model with All Factors Mobile

In a model with three goods and three mobile factors, the price of the nontraded good will adjust in response to aid. In this type of model, the condition for aid to immiserize the recipient country is exactly the same as for the specific-factors model (equation 21). In the specific-factors model, the left-hand side of equation (21) is positive, $(G_V - tP_M^* G_{MV}) > 0$, because output of the importable good must fall as a result of aid provided in the form of an increase in capital specific to the nontraded sector, i.e. $G_{MV} < 0$ when $\hat{K}_N > 0$. With all factors mobile, however, information on factor intensities is required to determine how output of the importable good would respond to an increase in capital (the sign of G_{MV}), and therefore how aid affects the sign of $(G_V - tP_M^* G_{MV})$. When all factors are mobile, $(G_V - tP_M^* G_{MV})$ could be positive or negative depending on factor intensities across sectors. Except for this one difference, the analysis of the likelihood that aid in the form of an increase in capital could immiserize the recipient country is the same for a model in which all factors are mobile as in the specific-factors model.

IV. CONCLUSION

Yano and Nugent (1999) analyzed the welfare impact of aid, provided in the form of an increase in capital, on a small, tariff-distorted economy and concluded that the recipient country could be harmed by aid as a result of adjustments in a country's nontraded sector, but they did not specify exactly what the nature of these adjustments needed to be. Their analysis suffered from two major errors. First, the price of the nontraded good cannot adjust in their model, because the prices of the two traded goods determine the wage and rental rate and therefore pin down the price of the nontraded good independently of demand. Also, Yano and Nugent incorrectly assumed that aid could result in no sector experiencing a reduction in output, contrary to theory.

This paper has shown that for a small, open economy with a tariff distortion in place and in which the price of the nontraded good can adjust, the welfare effect of aid depends crucially on how it affects the price of the nontraded good and on whether the imported good is a substitute or a complement for the nontraded good in demand. In particular, when aid in the form of an increase in capital specific to the nontraded sector leads to an increase in the price of the nontraded good, immiserization can only occur if the imported good is a complement in demand for the nontraded good and the degree of complementarity must be sufficiently high to satisfy equation (32). Immiserization is **not** possible if the imported good is a substitute in demand for the nontraded good when the price of the nontraded good increases. Instead, if aid in the form of increase in capital specific to the nontraded sector leads to a decline in the price of the nontraded good, immiserization is only possible if the imported good is a substitute in demand for the nontraded good, but the degree of substitutability is limited by equations (36) and (37). This is probably the case for which the chance of immiserization is greatest, since it requires that imports and the nontraded good be substitutes in demand. In the empirical section of their paper, Yano and Nugent present some evidence that imports and nontraded goods are substitutes. However, this paper has shown that the degree of substitutability must satisfy certain restrictions.

Yano and Nugent stressed that “overexpansion” of the nontraded sector could engender immiserization. Indeed, in the context of a specific-factors’ model, an increase in the amount of capital used only in the nontraded sector must cause output of the nontraded good to rise and output of all other goods (including imports) to fall. Thus, in a sense, including a nontraded good probably *reduces* the chances that aid specific to the nontraded sector will result in immiserization because it causes output of the tariff-distorted import sector to decline, which is welfare improving.

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