THE ROLE OF "AGRICULTURAL SURPLUSES" IN ECONOMIC DEVELOPMENT

PETER J. LLOYD

I

WRITERS ON ECONOMIC DEVELOPMENT acknowledge the importance of the development of the agricultural sector in promoting the development of an economy. The role of the agricultural sector is frequently expressed in terms of generating an "agricultural surplus." However, an "agricultural surplus" means different things to different authors. To some, it refers to the excess of food production over the food consumption by the agricultural sector which is available to feed a growing industrial population [8]. To many others it is a catchphrase that indicates the necessity of generating savings out of income in the sector which accounts for over one half of national output in a large number of developing countries [for example, 1]. Another still-growing group of writers emphasize the supply of unskilled labor supposedly available to the industrial sector from the rural sector at some constant real wage.[1] Others have concentrated on the advantages and disadvantages of exporting the surplus domestic production over domestic absorption of this sector in exchange for imports of capital and consumer goods. Fundamentally, these views are merely expressions of the fact that the agricultural sector, or any other producing sector, may supply primary resources of labor, capital, or foreign exchange or intermediate inputs to other producing sectors of an economy. However, in many instances the distinction between alternative concepts of an "agricultural surplus," and especially the distinction between a food surplus and a "saving" surplus has not been made clear. This paper seeks to present a simple two-sector model which clearly differentiates between three concepts of an agricultural surplus—a surplus of food production over the consumption in the agricultural sector (Z^1), a surplus of domestic production over domestic absorption of the output of this sector which is available for export (Z^3), and saving out of agricultural income (Z^2)—and considers the role of these three surpluses in the growth of an economy. The model is intended to apply to a low per capita income economy in which agriculture is the dominant sector. It is too oversimplified in some respects to be accepted as a realistic representation of all aspects of agricultural production and consumption in any

[1] This is the Lewis model of economic development with unlimited supplies of labor. Since the presence of "unlimited" supplies of labor is a special feature that is characteristic of only some of the developing countries the general model below is not based on this assumption; but it does not exclude the possibility of unlimited supplies of labor, as we note in the text below.

developing country but this simplicity aids in indicating the essential differences and relationships among alternative concepts of a surplus.

In Section II below the two-sector model is developed and used to distinguish between alternative concepts of an agricultural surplus and their contributions to national output. Section III demonstrates the effects of changes in taxation of agricultural incomes or tariff levels. No one surplus is an adequate measure of the extent of the agricultural sector's contribution to national economic development. Indeed, we see that a policy which increases one kind of agricultural surplus may well reduce other surpluses. It may also reduce national output.

II

We shall assume that there are only two sectors in our economy, an agricultural sector (Sector 1) and an industrial sector (Sector 2) producing "food" and "manufactures" respectively. "Food" need not consist entirely of food in the strict sense; it may also include handicraft products and services.[2] Food and manufactures are exchanged between sectors. Manufactures can be consumed or invested in either sector but food sales to the manufacture sector are entirely for consumption. The nature of capital formation in this model is discussed more fully later. A two-sector model enables us to trade the commodity flows as well as the monetary flows between sectors.

Some resources of labor and capital can be moved between the two sectors and such movement traces out a transformation curve which is the locus of all combinations of output of the two sectors which can be attained in the absence of international trade, given the resource endowment and technology of the economy. (International trade will be introduced later.) This transformation locus is given by the equation

$$V(X_1, X_2) = 0\,, \quad \frac{dX_1}{dX_2} < 0\,, \quad \frac{dX^2_1}{dX^2_2} < 0 \quad \text{and} \quad X_1 \geq x^*_1 P_1 = X^*_1\,. \quad (1)$$

Subscripts refer to the sectors. The symbols are pnemonic as far as possible. Lower-case letters represent ratios or *per capita* variables; thus, q is the ratio of the price of manufactures to the price of food, y_i, c_i, s_i, are disposable income, consumption and saving respectively in the i'th sector. X_1 and X_2 are the outputs of Sectors 1 and 2 respectively and X^*_1 is the subsistence level of "food" consumption required by the agricultural population.

The assumption of a given transformation curve obviates the need to drive opportunity costs explicitly from assumptions concerning sector production functions and the employment of factors and enables us to concentrate on the derivation of alternative notions of an agricultural surplus. Production of X_1 and X_2 are determined by demand and supply. The movement of q, the relative price of manufactures and food, changes factor rewards in the two sectors to induce the

[2] The assumption that there is one price of food relative to manufactures in Equation (13) below implies that the price of food in the strict sense relative to the price of any other goods that may be produced in this sector remains fixed.

movement of labor and perhaps also capital between the two sectors, but these movements are not traced out explicitly.

The first two restrictions of Equation (1) imply the transformation locus is strictly convex, i.e., there are positive increasing opportunity costs for all levels of production of X_1 and X_2. Let $\bar{X}_1$ and $\bar{X}_2$ be the maximum production of X_1 and X_2 when all moveable resources are employed in the agricultural and manufacturing sectors respectively. The third constraint on the production possibilities represents the minimum food needs of the agricultural population. x^*_i is the subsistence level of food consumption required per head of population in the agriculture sector. A similar constraint on the minimum level of consumption *per capita* has been utilized in recent growth models [6, 10, 11]. It is also very closely related to the classical notion of a "wage fund" which determines the number of workers that can be productively employed. This assumption suffices to introduce the necessity of a minimum level of food production to maintain the population of the agricultural sector. The greater $(X^*_1/\bar{X}_1)$, that is the greater the food required to sustain the agricultural sector, the smaller the potential output of the industrial sector. The actual surplus of food is defined as the production of the agricultural sector which is in excess of its own demand for its own output:

$$Z^1 = X_1 - d_{11}P_1 . \tag{2}$$

Total demand of this sector is demand for its own output *per capita* (d_{11}) multiplied by the sectoral population (P_1). This surplus will depend on the demand conditions.

The demand for food *per capita* in each sector (d_{1i}) is a function of the sector's *per capita* disposable income and the relative price of food to manufactures:

$$d_{1i} = f_i\left(y_i, \frac{1}{q}\right) \qquad i = 1, 2 \tag{3}$$

where

$$y_i = \frac{Y_i - T_i}{P_i} \qquad i = 1, 2 . \tag{4}$$

National income and the income of both sectors are expressed in units of food, i.e., food is the numeraire commodity:

$$Y_1 = X_1 \tag{5}$$

$$Y_2 = qX_2 \tag{6}$$

and $$Y = X_1 + qX_2 . \tag{7}$$

Total taxation receipts from each sector are taken simply as a proportion of the income of each sector:

$$T_i = t_i Y_i \qquad i = 1, 2 . \tag{8}$$

Total population is given exogenously:

$$P = \bar{P} . \tag{9}$$

Population in the manufacturing sector will be assumed to vary in direct proportion to the output of the sector.

$$P_2 = \frac{X_2}{\bar{X}_2}\bar{P}. \tag{10}$$

As noted previously the relationship in Equation (10) could be derived explicitly from assumptions concerning the production functions and factor employment. For example, if there were unlimited supplies of labor available to the manufacturing sector at a fixed real wage, producers of manufactures maximize profits, there is constant returns to scale in manufacturing and if the ratio of population to labor employed in this sector is constant, then the population in this sector is proportional to $(X_2/\bar{X}_2)$ as in Equation (10).

One implication of Equation (10) is that *per capita* output is constant in the manufacturing sector whereas the *per capita* output of the agricultural sector declines as the production of food is increased. This is so because $X_2/P_2 = \bar{X}_2/\bar{P}_2$ and $X_1/P_1 = \{X_1/(\bar{X}_2 - X_2)\}\bar{X}_2/\bar{P}$. These properties are desirable, given a fixed supply of land. We may note that *per capita income* in the manufacturing sector increases with output since $Y_2/P_2 = q\,(X_2/P_2)$.

The food market is in equilibrium[3] when demand and supply are equated by the movement of q:

$$D_1 = \sum_i d_{1i}P_i = \sum_i f_i\left(y_i, \frac{1}{q}\right)P_i \tag{11}$$

$$= X_1. \tag{12}$$

Finally, we assume that the relative price of manufactures to food is equal to the costs of transformation in production,

$$q = \frac{q_{x2}}{q_{x1}} = -\frac{dX_1}{dX_2}. \tag{13}$$

Hence, the relative price of manufactures to food, or the terms of trade between the agriculture and the industrial sectors as some authors prefer to call this ratio, is determined by supply and demand.[4]

The sub-system of equation (1)–(13) appears to give us sixteen independent equations whereas we have seventeen variables. This sub-system is closed by noting that $P = P_1 + P_2$. We assume a unique equilibrium solution exists. It is obvious from Equation (11) that the production of food is the greater the greater the income and price elasticities of demand for food and the greater the total population (provided the income-elasticity of demand for food is less than unity in each sector).

To determine consumption and saving in both sectors and in the aggregate we shall assume that both sectors have different saving functions.[5] Saving *per*

[3] Walras' Law makes it unnecessary to consider separately the equilibrium of the market for manufactures.

[4] This method of determining the intersectoral terms of trade is certainly an improvement over the method used by Dale W. Jorgenson in his well-known model [3]. In his model this ratio is determined by the requirement that the real wage rate in the industrial sector be a multiple of that in the agricultural sector. It is not directly affected by the demand and supply of either food or manufactures.

[5] A recent study of sectoral saving ratios in several developing countries by Toshiyuki Mizo-

capita in each sector is

$$s_i = \left(\frac{S}{P}\right)_i = g_i(y_i), \qquad i = 1, 2 \tag{14}$$

where $0 < dg_i/dy_i < 1$, is the marginal propensity to save out of disposable sectoral income. The complementary consumption function in *per capita* terms is

$$c_i = y_i - s_i . \tag{15}$$

Aggregate saving by the private sector is

$$S^* = \sum_i g_i(y_i)P_i . \tag{16}$$

Sectoral saving is an increasing function of disposable income and a decreasing function of sectoral population. The influence of population *per se* on saving enters through the specification of the saving function in *per capita* terms.

Thus aggregate private saving depends on national income, its distribution between sectors and on total population.

The government sector plays a role as a tax collector and spender but not as a producer. Government expenditure on current goods and services is a function of total taxation receipts:

$$F = h(T) . \tag{17}$$

Aggregate saving including saving by the government is

$$S = S^* + (T - F) . \tag{18}$$

Hence

$$\frac{\partial S}{\partial T_i} = \left(1 - \frac{dF}{dT}\right) - \frac{\partial S_i}{\partial Y_{di}} . \tag{19}$$

That is, an increase in total taxation receipts at any level of income will increase aggregate saving only if the marginal propensity of the government sector to save out of its taxation receipts $(1 - dF/dT)$ is greater than the marginal propensity of the taxed sector to save out of its disposable income. We are ignoring here any changes in production between sectors following the change in taxation.

Although we have specified total demand for agricultural production and aggregate consumption we do not yet know how consumption is divided between the consumption of food and manufactures, nor do we know the composition of investment. In a two-sector model we have several choices concerning the nature of investment. If the two sectors are an agricultural and industrial sector both of which produce goods for consumption, as we are assuming here, we could assume that part of the output of both sectors is consumed and the remainder is invested. This would mean that we have two investment goods which presumably may be allocated to increase the productive capacity of either sector. Or, we could assume that the output of the industrial sector really consists of the production of a

guchi has in fact shown that the saving ratio tends to be significantly higher among farm families than among non-farm families, even though the incomes of farm families are lower than those of non-farm families [7, p. 29].

consumption industrial good and an investment industrial good.[6] This choice means that we have in fact three sectors with two relative prices and so on. Alternatively, we may assume that all of the output of the agricultural sector is consumed whereas part of the homogeneous output of the industrial sector is consumed and the remainder is invested[7] (or used to provide current government services). While this assumption is not wholly accurate it seems the most reasonable of the three choices and it is the one adopted here. Investment goods produced by the manufacturing sector can be used to increase the capital stock of either sector. This assumption permits capital formation in the agricultural sector through the use of agricultural labor directly to expand agricultural production capacity by improved drainage, irrigation, and other works.[8] It does not, however, permit agricultural production to be used for capital formation in the manufacturing sector.

This assumption implies that the demand for industrial goods for consumption is defined residually as the difference between food output (and consumption) and aggregate consumption, measured in food units. The consumption of manufactures *per capita* is, in each sector,

$$d_{2i} = (c_i - d_{1i})\frac{1}{q} \qquad i = 1, 2 \tag{20}$$

where c is consumption *per capita* in food units. Total consumption of manufactures is

$$D_2 = \sum_i d_{2i} P_i \,. \tag{21}$$

The relationships between sectoral production, taxation and saving and investment cna be seen readily in terms of national income identities. From Equation (20) we obtain the disposition of *per capita* income in each sector

$$\frac{Y_i}{P_i} = d_{1i} + q d_{2i} + s_i + u_i \,, \qquad i = 1, 2 \tag{22}$$

where u_i is taxation per head of population in the i^{th} sector.
Hence,

$$Y = D_1 + qD_2 + S + T = C + S + T \,. \tag{23}$$

National outlay as given above is also equal to national output and national expenditure on consumption, government current goods and services and investment:

$$Y = X_1 + qX_2 = C + I + F \,. \tag{24}$$

Hence,

$$I + G = (X_2 - D_2)q = S + T \,. \tag{25}$$

The combined aggregate investment expenditure and government expenditure on current goods and services is equal to that part of the output of the industrial sector

[6] J. M. Hornby uses this device in a recent paper [2].
[7] Dale Jorgenson, for example, makes this assumption [3].
[8] To avoid a contradiction with Equation (1) in this case, we can assume that a known (but not necessarily fixed) proportion of agricultural labor is used in capital formation activities.

which is not consumed. It must also equal total saving by the private sector plus taxation receipts. The collection of taxes by the government sector gives it command over industrial goods which it can use either to finance its current expenditure or to add to the private investment expenditures.

We can now explore the saving concept of "agricultural surplus." Private saving in the agricultural sector is given by Equation (14). This saving will be the greater, the greater the production of the agricultural sector, the greater the propensity to save out of disposable income, the lower agricultural taxation and the smaller the agricultural population, *ceteris paribus*. However, the saving surplus which is the contribution of the agricultural sector to capital formation is defined to include in addition capital formation financed by the government sector from taxes on agricultural incomes. Thus

$$Z^2 = g_i(y_i)P_i + hu_iP_i \tag{26}$$

where h is the proportion of taxation receipts saved by the government. As noted before, aggregate investment will be increased when agricultural taxes are increased only if the marginal propensity of the government to save, that is to not spend on the provision of current government goods and services, exceeds that of the agricultural sector income recipients. Alternatively, that portion of government taxes on agricultural incomes which is spent by the government on providing current services could also be regarded as part of the surplus from this sector in the sense of that portion of agricultural income which is not spent on consumption and which, therefore, is available for capital formation or the provision of current government services. However, we have preferred to define this surplus more narrowly in order to have a measure of agricultural sector's contribution to capital formation.

We now introduce foreign trade. We shall assume that demand and supply conditions are such that our country has a comparative advantage in the production of food, and that the exchange rate is pegged. Further, let us assume that the foreign supply of the import good, manufactures, to the home country is perfectly elastic at the ruling world price (r_2) but that the foreign demand for the home country's exports of food (X'_1) is less than perfectly elastic and therefore the price received per unit of export declines as the quantity exported by the home country increases. Algebraically,

$$r_2 = \bar{r}_2 \tag{27}$$

$$r_1 = j(X'_1)\,. \tag{28}$$

Primes indicate the quantities exported and imported respectively of food and manufactures. The surplus available for international trade is simply domestic production of food less domestic consumption:

$$Z^3 = X_1 - D_1 = X'_1\,. \tag{29}$$

If international trade is balanced in the sense that imports of manufactures are restricted to purchases from current export receipts, the quantity of manufactures imported is given by

$$X'_2 = X'_1 \frac{j(X'_1)}{\bar{r}_2}. \tag{30}$$

The assumptions concerning the elasticity of foreign demand and supply represent the case of a country which is a sufficiently small purchaser of its import commodity on world markets to have no influence on world prices but is a sufficiently large exporter of its export good to influence the world price of its export good. Many developing countries conform to this case, chiefly because their exports in many instances are concentrated on the production of a few primary products the bulk of whose supplies on the world markets come from only a few countries.[9] Under these conditions the commodity terms of trade of the home country r_1/r_2 continuously decline as the quantity of food exported is increased. It is more helpful to look at the relationship between the changes in the quantities of the export and import good. From Equation (30),

$$\frac{dX'_2}{dX'_1} = \frac{1}{\bar{r}_2}\left[j(X'_1) + X'_1 \frac{dr_1}{dX'_1}\right] = \frac{r_1}{\bar{r}_2}\left[1 + \frac{1}{\varepsilon}\right], \quad -\infty < \varepsilon < 0 \tag{31}$$

where ε is the elasticity of foreign demand is price-inelastic the actual quantity of manufactures imported will decline as the quantity of food exported is increased. In fact, Equation (30) is the equation of the offer curve of the rest of the world and the term $(1 + 1/\varepsilon)$ in Equation (31) is the elasticity of the offer curve.

The system is completed in the same manner as with the closed economy. National income is still the value of production in food units:

$$Y = Y_1 + qX_2. \tag{32}$$

One may note that expenditure on the two goods individually is no longer equal to domestic production of these goods but national expenditure in units of food is equal to national income:

$$E = X_1 - X'_1 + q(X_2 + X'_2) = X_1 + qX_2. \tag{33}$$

The taxation and demand for food functions are unchanged but the supply of food to the domestic market is the total production of the agriculture sector less the exports of food $(X_1 - X'_1)$. In the absence of trade barriers or transport costs, we assume that the domestic price ratio of manufactures to food is equal to the terms of trade at which they exchange internationally:

$$q = \frac{r_2}{r_1} = -\frac{dX_1}{dX_2}. \tag{34}$$

Finally, the equilibrium condition in the food market is

$$D_1 = \sum_i f_i\left(y_i, \frac{1}{q}\right)P_i = X_1 - X'_1. \tag{35}$$

Let us consider the three surpluses when international trade is free. The food surplus must be redefined as $[X_1 - d_{11}P_1 - X'_1]$; that is the production of the

[9] Many examples could be cited. However, we should also remember that this assumption is less applicable to those developing countries with more diversified exports such as Hong Kong, Taiwan, Korea, and Mexico.

agricultural sector less exports and the food consumption in the agriculture sector. Production for domestic consumption ($X_1 - X'_1$) is the greater, the greater the income and price elasticities of domestic demand for food. (From Equation (35).) The saving surplus of the agricultural sector is still $[g_1(y_1)P_1 + hu_1P_1]$. It is also the greater, the greater the propensity of agricultural sector income recipients to save out of their disposable incomes and the lower the agricultural population, as with the closed economy. However, the trade surplus in the sense of the domestic production of the agricultural sector in excess of the domestic demand for food $[X'_1 = X_1 - D_1]$, may be the smaller, the larger the domestic income and price elasticities of demand for food.[10] Thus when the savings and food surpluses increase the trade surplus may decrease. The sizes of all three surpluses depend on demand conditions as well as on supply conditions, according to the system of equations above. Finally one may note that a small trade surplus which arises because of the limited ability of the country to produce food in relation to domestic demand will make the terms of trade more favorable as only small quantities of the export good are traded internationally.

III

We can now consider alternative government policies concerning the agricultural sector and their implications for various agricultural "surpluses" and for national income. The two instruments of government policy we can consider directly are the effects of increasing taxation of incomes in the agricultural sector and the effects of an imposition of a tariff on imports of the manufacturing sector. Both policies have been discussed separately in the literature on economic development but their implications for different agricultural surpluses and for agricultural production have not been explored. In addition, we shall examine the effects of an expansion of agricultural production due to say, investment or an increase in factor productivities in this sector, on agricultural surpluses and national income.

Let the government raise the proportion of agricultural income which it collects as taxes, t_1. This disturbance will reduce agricultural disposable incomes and the aggregate demand for food.[11] Agricultural production will fall and the price of manufactures relative to food will rise until the demand for food again equals the supply. The trade surplus declines. (This follows from Equation (30).) Household saving in the agricultural sector will fall since both population and disposable income per head of population in this sector will fall. Household saving in the manufacturing sector must increase as both disposable income per head and population will increase in that sector and government saving will increase unless its expenditure on current goods and services increases as rapidly as its taxation receipts. (From Equation (16) and (17).) The decline in the saving surplus of

[10] This result follows for example when the home country is completely specialized in food production; in this case domestic production is invariant to increases in the demand for food.

[11] The exact change in production, saving, etc., can be obtained by differentiating the system of equations with respect to t_1.

the agricultural sector may be more than offset by increased saving in the manufacturing and government sectors.

Consider the second policy of imposing a tariff on imports of manufactures. When trade is introduced the effect is to increase the consumption (or strictly the consumption and investment) possibilities that are available to income earners of the country. However, free trade does not lead to the maximum consumption possibility locus. Free trade leads to overtrading. If the world price of the export commodity depends on the quantity of the export good offered by the home country, there is a divergence between the average international exchange ratio (X'_1/X'_2) and the *marginal* exchange ratio dX'_1/dX_2. Clearly the maximum consumption possibility locus is obtained if the home country trades only to the point that the marginal cost of obtaining X_2 through international trade is exactly equal to the domestic opportunity cost in terms of X_1, that is until $dX'_2/dX'_1 = dX_2/dX_1 = -q$. Any further requirements of X_2 can be obtained most cheaply by shifting resources from the production of X_1 for the local markets to the production of X_2. However, these consumption possibilities are only attainable if the domestic producers of X_2 can compete with the more efficient foreign producers. This will require a tariff on the imported (or exported) commodity to equate the relative price of imported manufactures to food including the tariff to the domestic cost ratio dX_1/dX_2. From Equation (31), we find the required ad valorem tariff (calculated on the foreign price) is

$$t = \frac{1}{\epsilon}. \tag{36}$$

This result is a manifestation of the familiar terms of trade argument for tariff protection. The tariff in Equation (36) is the optimal tariff.[12] Any tariff level which restricted trade will raise the domestic price of manufactures to food and increase the production of manufactures, relative to the free trade position. This reduces the food and savings surplus[13] from the agricultural sector and the trade surplus but it would increase the total availability of goods to the home country. The effect on aggregate saving of trade restriction will depend upon the tax rates and the marginal propensities to save in both sectors. This provides another illustration of the inadequacy of a single concept of agricultural surplus to measure the contribution of agriculture output to national output.

The third possible event we shall explore is the effects on real income when an increase in factor supplies or factor productivities increases the food production of the home country with no change in population or manufacturing output. An increase in production increases national income *in food units* but, when international trade occurs, the change in national expenditure is less because of the negative effect of the ensuing deterioration of the commodity terms of trade

[12] A simple derivation of the formula for the optimal tariff is given by [5, Appendix D]. A more rigorous derivation is provided by [4, pp. 169–73].

[13] The saving surplus measured in terms of manufactures is decreased both because of the reduction in the income of the agricultural sector in terms of food and because of the increase in the relative price of manufactures.

(i.e., the increase of q). The change in national expenditure is usually measured by the expression

$$dE = dX_1 - X'_2 dq \,. \tag{37}$$

The negative effect is the greater the greater the initial quantity of imports and the greater the deterioration in the terms of trade. The change in the terms of trade can be obtained by differentiating Equation (30) with respect to X_1:

$$\begin{aligned} &- X'_1 \frac{d(1/q)}{dX_1} - \frac{1}{q} \frac{dX'_1}{d(1/q)} \frac{d(1/q)}{dX_1} + \frac{\partial X'_2}{\partial q} \frac{dq}{dX_1} \\ &\quad = - \frac{\partial X'_2}{\partial (X_1 - T_1)} \frac{d(X_1 - T_1)}{dX_1} \,. \end{aligned} \tag{38}$$

Hence,

$$\frac{dq}{dX_1} = \frac{- m_2}{X'_2(1 + \epsilon + \eta)} > 0 \tag{39}$$

where

$$\epsilon = \frac{\partial X'_1}{\partial (1/q)} \frac{1}{q X'_1} < 0$$

and

$$\eta = \frac{\partial X'_2}{\partial q} \frac{q}{X'_2} = \frac{\partial D_2}{\partial q} \frac{q}{X'_2} < 0$$

and

$$m_2 = q \frac{\partial X'_2}{\partial (X_1 - T_1)} (1 - t) \,.$$

The increase in real income in food units leads to an increase in the demand for imports of manufactures, unless the import good is an inferior good which is scarcely possible in our model. This will move the terms of trade of the expanding home country adversely compared with the pre-expansion trade equilibrium. (The denominator of Equation (39) is assumed to be negative.)[14]

Substituting Equation (39) in Equation (37), the change in national expenditure is

$$dE = dX_1 \frac{1 + \epsilon + \eta + m_2}{1 + \epsilon + \eta} \,. \tag{40}$$

National expenditure will actually be reduced, i.e., the home country will be unable at the post-expansion terms of trade to purchase the pre-expansion budget of goods, if the absolute sum of the elasticities of demand for imports of the home country and the foreign country are less than unity plus the home country's marginal propensity to spend on the imported manufactures. This is the condition for "immiserizing growth." Evidently, this possibility is the greater the greater the propensity to spend on imports and the lower the elasticities of import demand. However, this possibility should not cause much concern. First, the

[14] This is reasonable. Moreover, this restriction is required for the dynamic stability of the model.

condition implies that the foreign elasticity of import demand is inelastic (since η, the uncompensated price elasticity of demand for imports in the home country, is greater than m_2 in absolute value). Second, if the country produces both food and manufactures this will reduce the possibility since the increase in the relative price of manufactures in the domestic country after the expansion of agricultural output leads it to increase its own production of manufactures, thereby reducing its import demand and the decline in the terms of trade.[15] (Algebraically, domestic supply of the import good with some positive price elasticity, will lower the value of m_2.) Moreover, the home country cannot be made worse off if it pursues a suitable policy of trade restriction. This follows because its own production possibilities have increased and its trade possibilities given by the foreign offer are unchanged. The perverse effects could not arise if an optimal tariff is employed since this requires the foreign elasticity of demand to be greater than unity.[16] This possibility is an extreme illustration of the fact that part of the gains from increased production in the export sector of the home country will accrue to the rest of the world, especially if the foreign elasticity of demand for the export good and the flexibility of home production are low. In terms of surpluses the food surplus will probably increase as the food production has increased while the agricultural population was assumed constant and the saving surplus must increase. The trade surplus will increase in terms of the quantity of food exported but may decrease in terms of manufactures imported because of the adverse movement of the terms of trade.

These three examples and the underlying model show that each surplus is important but that an increase in one surplus may be combined with a decrease in one or both of the other "agricultural surpluses" in each case. Moreover, reduction in the saving surplus may coincide with an increase in national output as in the case of an imposition of a tariff on imports of manufactures and the converse is possible when agricultural output is expanded as in the third case. No one concept is a reliable indicator of the contribution or changes in the contribution of the agricultural sector to national output. The discussion of the implications of any policy concerning the agricultural sector is best cast in terms of the effects of the policy on national output, aggregate saving or other target variables rather than in terms of one or more concepts of an "agricultural surplus."

[15] The general condition for "immiserizing growth" when specialization is incomplete has been derived by [4, pp. 81–88] and by [9, pp. 52–56]. Sodersten allows for growth in the rest of the world.

[16] Nor could it arise if the country were strictly a price-taker on world markets, i.e., the foreign demand for its exports, as well as the foreign supply of its imports, were perfectly price-elastic.

REFERENCES

1. CHELLIAH, R. J. "Taxation and Economic Surplus," in *Readings in Taxation in Developing Countries,* eds. R. M. Bird and O. Oldman (Baltimore: Johns Hopkins University Press, 1967).
2. HORNBY, J. M. "Investment and Trade Policy in the Dual Economy," *Economic Journal,* Vol. 78 (March 1968), pp. 96–107.
3. JORGENSON, D. "The Development of a Dual Economy," *Economic Journal,* Vol. 71 (June 1961), pp. 309–41.
4. KEMP, M. *The Pure Theory of International Trade* (Englewood Cliffs, N. J.: Prentice-Hall Inc., 1964).
5. KINDLEBERGER, C. P. *International Economics* (Homewood, Ill.: Irwin Inc., 1968).
6. LEFEBER, L. "Planning in a Surplus Labor Economy," *American Economic Review,* Vol. 58 (June 1968), pp. 343–73.
7. MIZOGUCHI, T. "International Comparison of Saving Ratios by Occupational Groups," *Hitotsubashi Journal of Economics,* Vol. 7 (March 1966).
8. NICHOLLS, W. H. "An 'Agricultural Surplus' as a Factor in Economic Development," *Journal of Political Economy,* Vol. 71 (February 1963), pp. 1–29.
9. SODERSTEN, B. *A Study of Economic Growth and International Trade* (Stockholm: Almquist and Wicksell, 1964).
10. TSIANG, S. C. "A Model of Economic Growth in Rostovian Stages," *Econometrica,* Vol. 32 (October 1964), pp. 619–48.
11. UZAWA, H. "Optimal Growth in a Two-Sector Model of Capital Accumulation," *Review of Economic Studies,* Vol. 31 (January 1964), pp. 1–24.