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YALE UNIVERSITY

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THE RESPONSIVENESS OF AGRARIAN ECONOMIES AND THE IMPORTANCE OF Z GOODS

Stephen Hymer and Stephen Resnick

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Abstract

A significant portion of labour time in rural areas in underdeveloped countries is devoted to non-agricultural activities to satisfy a variety of needs for clothing, shelter, entertainment, ceremony, etc. This paper proposes a model of an agrarian sector taking these Z goods into account and analyzes how these inferior methods of rural production are replaced by superior methods of manufacturing as the economy, in the process of development, moves towards greater specialization and exchange.

The model specifies a rural economy that produces two goods, F and Z (agricultural and non-agricultural respectively), and can exchange food for manufactured goods from the city. A comparative analysis of this model is used to derive a Hicks-Slutsky type equation of supply responsiveness. The model stresses the importance of the demand characteristics in determining supply responsiveness. It also provides a useful framework for defining incentive goods and for analyzing whether imports by the rural area of raw materials and capital goods embodying technological change are export biased or import biased.

A Heckscher-Ohlin two-good, two-factor model is used to analyze the relation between increased food production and outward migration of labour, the relation between size of farm and productivity, and the possibility of overcoming imperfections in the land and labour market by removing product market imperfections.

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Stephen Hymer and Stephen Resnick*

I. INTRODUCTION

Theoretical models of underdeveloped countries often postulate an agrarian sector allocating its labour between only two major activities, agriculture and leisure. The empirical evidence of anthropologists, economic historians and agronomists suggests, however, that the time devoted to agricultural production and leisure often accounts for only a portion of total labour time. The remainder is spent in a variety of manufacturing, construction, transportation, and service activities to satisfy the needs for clothing, shelter, entertainment and ceremony.[1] The purpose of this paper is to consider some models of the

*Our concern with the Z good has been an outgrowth of our empirical studies of the agrarian sector in Ghana and the Philippines, but the phenomenon is also appropriate to the experience of other countries. In particular, we have been influenced by Peter Schran's work on Communist China, see, for example, his "Handicrafts in Communist China," The China Quarterly, January-March, 1964. We were very fortunate in being able to discuss our ideas with other members of the Growth Center, and to benefit from the general oral tradition as well as the detailed comments of: Dick Cooper, Charles Frank, Don Huddle, Vahid Nowshirvani, Janet Pack, Bill Parker, Hugh Patrick, Clark Reynolds, Michael Todaro and Brian Van Arkadie.

[1] The literature on Z activities is vast: perhaps the most detailed is found in the writings by economic anthropologists. A sample of such studies describing the many activities -- processing of food and fuels, spinning, weaving of textiles, metal working, dressing and tanning of leather, manufacture and repair of tools and implements, pottery and ceremonial objects, as well as investment in house-building, fence repairing, and services such as protection, transport and distribution -- can be found in the following:

R. Diaz, Van Oppenfield, M., and Van Oppenfield, J., Case Studies of Farm Families, Laguna Province Philippines. University of Philippines, 1960.

J. Ingram, Economic Change in Thailand Since 1850. Stanford University Press, 1955.

J. Halpern, A Serbian Village. New York: Columbia University Press, 1958.

M. Herskovits, Economic Anthropology; A Study in Comparative Economics. (2nd ed.) New York: Knopf, 1952.

G. Dalton (ed.), Tribal and Peasant Economies, Readings in Economic Anthropology. Garden City, New York: Natural History Press, 1967.

decision-making process of rural economies when the set of alternatives is enlarged to include these non-agricultural non-leisure activities. For simplicity, we shall denote these non-agricultural activities, whether carried on in the household or in small-scale service and artisan establishments in the village, as Z, a purposefully vague title to indicate the heterogeneity of the group.

The stress on the complexity and variety of alternatives available to agrarian economies has important implications for development strategies. The rural economy, when viewed in terms of the more complex model, has considerably more flexibility in reallocating effort and adjusting consumption in response to changing product prices and factor availabilities than is indicated by the simpler labor-leisure model. The traditional way of posing the problem, in our view, fails to do justice to the possibilities of resource reallocation within the agrarian economy.

The present model by focusing on the possibility of readjustments suggests the importance of a somewhat neglected avenue for government policy, namely the reduction in barriers to mobility within a country in order to capture the static and dynamic gains from internal trade creation and specialization. A government policy that concentrates on reducing transport and marketing costs of the agricultural sector, for example, can bring about important increases in productivity as farmers relinquish Z activities to produce more food, and, within agriculture, concentrate on producing a smaller variety of foodstuffs while consuming a wider variety. More generally, by removing the intersectoral immobilities that block development, the government provides the opportunity for sectors to specialize according to comparative advantage thus increasing global productivity and providing a catalyst for growth. The economy moves from an inferior to a superior production possibilities curve.

shops or feeder industries supporting larger manufacturing establishments.[2]

Our basic model follows.[2a] The rural sector can produce two goods Z and F, according to its production possibility curve:

$$\phi(F, Z) = 0$$

It can also sell whatever amount of F it wishes to obtain M a manufactured good from an urban or foreign sector according to an exchange equation:

$$M = P(F - \bar{F})$$

where P represents the given rate of exchange between F and M [the price of food (P_F) divided by the price of manufactured goods (P_M)] and $\bar{F}$ is the amount of food consumed by the rural sector. We further assume that the agrarian economy has a set of community indifference curves, $U(Z, \bar{F}, M)$, and maximizes its utility subject to its production and trading constraints. This model enables us to generate offer curves showing the response of an agrarian economy to change in the demand for labour and food generated by a development program.

The use of a production possibilities curve, $\phi(F, Z)$ requires some justification. The possibility of choice in production between Z and F is basic to our approach towards agrarian economies. In some underdeveloped countries no choice may exist; ~~agriculture~~ Z is carried on in the off-crop season when the opportunity cost of labour is zero. Boserup's analysis suggests this is not the

[2] Z', especially the low productivity services, are an urban sponge, absorbing the flow of displaced agrarian workers, and manifesting the misery of urban life - shanty towns and their parasitical inhabitants. This pool of redundant labour provides the surplus labor for manufacturing regardless of whether there is disguised unemployment in agriculture or not. This type of dualistic society is often the creation of misguided industrial policies which prematurely establish a pool of low productive Z' activities.

[2a] See Tyutaro Komiya, "Non-traded Goods and the Pure Theory of International Trade," International Economic Review, Vol. 8, No. 2, June 1967, for an interesting model with many features similar to ours. There is an important difference, however, between our model and his reflecting the difference between international trade and intersectoral trade. In international trade literature, it is most frequently assumed that both countries can produce the same goods. It is an inherent feature of the trading pattern between the agrarian and urban economy that the two sectors cannot produce the same goods. This has important implications for some theorems.

We might also note that Z has its urban counterpart in the ubiquitous small-scale service and manufacturing establishments of developing countries, which we might denote as Z'. The reason for distinguishing Z and Z' is not one merely of geography but also one of economic structure. The analysis of the relationship of Z' to manufacturing has many things in common with the relationship between Z and agriculture, but it also has important differences.

In the rural economy it seems reasonable to assume there is a high degree of mobility between Z and food production and that labour is allocated efficiently to each of the activities. In the urban economy this is decidedly not the case. The marginal productivity of labour in Z' does not equal the marginal productivity in manufacturing or in agriculture: there is no necessary equality between the rural wage rate, the Z' wage rate, and the manufacturing (large-scale organized systems) wage rate. This is because urban employment is not a perfect substitute for rural employment and may require a lower or higher wage depending upon whether there is bias in tastes towards "city lights" or not and whether other imperfections, such as poor knowledge of the labour market, are also present. For similar reasons the Z' wage rate does not equal the manufacturing wage rate: there is a downward rigidity to manufacturing wages because of nutritional and incentive requirements for efficiency as well as institutional factors such as unionization and minimal wage legislation. Z', in fact, exhibits a range of productivities; from those in which productivity is lower than the wage, as in the cases of shoeshine boys, mail runners, cigarette girls, to those in which the marginal product of labour approaches or is equal to the manufacturing wage rate, as for example small-scale machine

usual case and that choice is possible in agricultural methods of cultivation and their corresponding labour requirements.[3]

She suggests five basic systems of land use differing in their labour land ratio and their capital and seasonal labour requirements. Agrarian societies react to changing conditions by adjusting their system of cultivation. Thus, population growth leads to more land intensive systems. One way to satisfy the increased demand for labour in agriculture is to apply it in the off-seasons. Typically, a switch to higher labour land ratios will lengthen the agricultural employment season. For example, rain-fed agriculture will be replaced by labour intensive irrigated agriculture. The short peak season demand so characteristic of short fallow systems of cultivation then disappears.

Boserup's analysis can be schematically represented in terms of fixed coefficients by the following tableau:

	I Forest Fallow	II Bush Fallow	III Short Fallow	IV Annual Cropping	V Multi-Cropping
I Direct labour required	a_{11}	a_{12}	a_{13}	a_{14}	a_{15}
II Indirect labour required for					
a. Irrigation				a_{24}	a_{25}
b. Capital goods		a_{32}	a_{33}	a_{34}	a_{35}
c. Intermediate goods				a_{44}	a_{45}

As the economy switches from activity I to, say V, the amount of labour required per unit of output increases if we count both the direct and indirect labour requirements. The significant feature of Boserup's approach is that she views these various techniques as existing simultaneously and not as representing technological innovations. Thus as any one moment in time one can observe various activities existing side-by-side while through time one can observe

[3] E. Boserup, The Conditions of Agricultural Growth; the Economics of Agrarian Change under Population Pressure. Chicago: Aldine, 1965.

movements toward more labour intensive techniques or away from them depending upon the food needs of the society and the available labour.

Boserup herself dealt mainly with the case in which the exogenous factor is population growth. Her approach can be used equally well to explore the change in production resulting from an expansion of demand and commercialization.

II. THE IMPORTANCE OF Z ACTIVITIES

Typically agriculture is not the predominant activity in many agrarian societies whether measured by time spent on food production or by contribution to well being. The production of food satisfies only one need and in many cases is not the major problem. As Adam Smith said, "The desire for food is limited in every man by the narrow capacities of the human stomach but the desire of the conveniences and ornaments of buildings, dress, equipage, and household furniture, seems to have no limit or certain boundary."[4] A proper focus for analysis of underdeveloped countries, then, is how these other desires are met and how they can be modified by industrialization.

In the most "primitive" economies, the working day in agriculture is short (perhaps a few hours now and then as a supplement to hunting and gathering), and there are likely to be long periods of little if any agricultural work at all. In the absence of a landlord class, Z good production is likely to be within the domain of the household or family.[5] Nevertheless, the household may not provide for all of its needs, and no doubt even here there exists some form

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[4] A. Smith, The Wealth of Nations. New York: Random House, Modern Library Edition, 1957, p. 164.

[5] Veblen notes that industrial employment is considered in traditional societies as drudgery or menial to be performed by women and lower classes and not by the leisure class. This may perhaps explain the neglect of Z activities.

T. Veblen, The Theory of the Leisure Class, Modern Library edition, 1934, pp. 4 and 5.

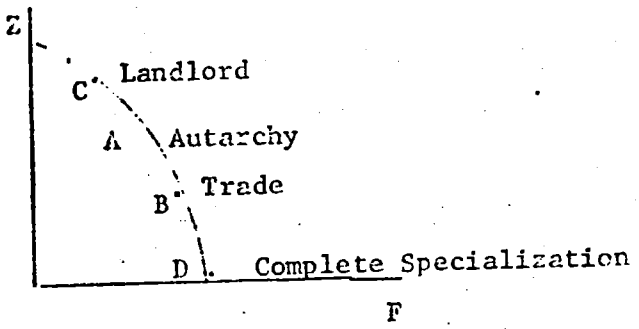
of barter trade among family units. Perhaps those who do specialize in certain goods for exchange become the rural artisans of the forthcoming agrarian society. The more advanced and developed the traditional economy the more flourishing this trade. The high costs of transportation and distribution, however, usually limit the total amount that can be exchanged. Considerable effort may be devoted to trade because costs per unit are high, but the total volume of goods exchanged will usually be low. Inferior means of transportation and communicatic in these economies imply a rudimentary division of labour and lack of specialization. Nonetheless, the standard of living may be high.

The composition of output in these isolated units is marked by a low proportion of labour time spent in food production relative to non-agricultural activities as compared to the situation in an area specialized in producing agricultural products for sale to other regions. Even if land is very poor or scarce, sustaining only a very low standard of living, and if the growing of food for subsistence is the most time-consuming activity, it will still be necessary to provide clothing, housing, and a minimum of tools and utensils.

If an autarchic agrarian economy such as the one just described is opened up to trade with a manufacturing sector, domestic or foreign, it obtains a new set of transformation possibilities. It can now specialize on producing certain food items in demand in the city or abroad and import manufactured goods to replace the previous domestically produced goods. The economy now goes through a process of home goods substitution, the opposite of import substitution that takes place when outside barriers to trade are raised. In our terminology, the production of Z goods declines and is replaced by M goods while the production and sale of F rises to pay for imports. Land will be used more intensively, the

pattern of cultivation will change, and seasonal "unemployment" will be reduced. Income distribution is also likely to change from the former one of more or less equality to one of inequality as land becomes relatively scarce and ownership takes on new importance.

This model can be illustrated by a simple diagram representing the production possibilities curve between Z and F:



Point A indicates the economy in autarchy. The opening of trading opportunities moves the economy to point B where some food is exported for manufactured goods placing the society on a higher social indifference curve. Point D indicates complete specialization in food production. The introduction of a landlord class whose tastes favor Z goods may move the society to point C away from specialization in food production, while the possibility of trading food for manufacture reverses this process moving the landlord economy towards Point B.

The existence of a landlord class introduced a qualitative as well as quantitative change in the structure of production. In landlord societies, a significant share of demand is generated by a few people with large incomes Their choice among various Z goods will be quite different and may require certain people within their domain to work for them part time or even full time producing types of Z goods that cater to a leisure class taste pattern or, perhaps, even require full time service activities from the population such as

household servants or soldiers. Furthermore, when rent is large, there is likely to be specialization in those Z goods provided to the landlord class. This specialization may be characterized by the introduction of urban centers where the former rural artisan class now becomes the new urban one.[6] The ratio of Z to F is likely to be high (Point C).

Lastly, in the most advanced economies, when the agricultural sector becomes highly specialized, Z goods may decline almost completely. Farmers may produce only one crop and rely on imports from other sectors for most of their consumption needs, including food requirements (Point D in the diagram). The models of underdeveloped economies that stress a simple labour leisure choice may paradoxically work best in highly developed countries where in fact high income makes leisure a possibility.[7]

In our view then, a major substitution that occurs in the process of development is often not the replacement of leisure or idleness by work but rather the shift from inferior methods of home production to superior methods based on

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[6]The system of taxation that the landlord class introduces can have an effect on agricultural methods similar to that of population growth. Suppose that the introduction of landlords polarizes the society into food producers in the country and Z good producers in the city. The extent of the food surplus depends on output per man in agriculture. The landlord has an incentive to maximize food surpluses in rural areas. He thus forces longer hours of work to raise output per man rather than per man hour. Following the Boserup analysis this will lead to land intentive methods of agriculture. For the peasant, the taxation of food will lead to an incentive to substitute Z for F but this may be offset by the income effect. The higher the tax, the poorer the farmer and perhaps the greater the proportion of time spent on F.

[7]S. Linder, The Theory of the Haunted Leisure Class, stresses, however, that a rising standard of living implies an increase in time devoted to maintaining and enjoying the variety of consumer goods available in highly developed countries. Z activities may be most prominent in the poorest and richest societies. This study of Linder's (in unpublished form) was made available to us during his stay at the Growth Center, fall of 1966.

specialization and exchange.[8] The diffusion of scientific technology takes place in part by a change in location of production from the farm to the village to the city. The rate at which this can proceed depends upon the degree to which the manufacturing sector can produce new goods to replace Z and the ability of the agricultural sector to reallocate its production towards F and its consumption towards M, i.e., its elasticity of substitution in supply between Z and F. If, however, the manufacturing sector fails to provide the incentive goods or, indeed, provides shoddy goods to the rural sector, there can be a retreat to Z and away from specialization and exchange.

Omitting Z from the model can result in a misspecified system and sometimes in important errors in predicton and planning. One example is illustrated in studies on the definition and measurement of labour surplus. Some of these studies define surplus as the difference between the number of labour hours required to produce a given crop output and the total available hours of an agrarian population. This measure overestimates the surplus available for manufacturing at zero opportunity cost because of the omission of other important rural activities.[9] Similarly, national income estimates may exaggerate the growth of output because they omit many Z activities and fail to measure their

[8] Herbert Simon has a very interesting model on precisely this point. He considers a case in which Z goods are capital goods (horses and their pasture) and explores the implications of technological change in the industrial sector which produces a capital good (tractors) that can substitute for Z.

H.A. Simon, Models of Man. New York: John Wiley, 1957, p. 207.

[9] Pepelasis and Yotopoulos, in one of the more recent and detailed examinati find virtually no "chronic surplus labour" in Greek agriculture. It is interest that they gathered estimates of labour requirements not only for farming, but al for husbandry, forestry, fishing, and agricultural transport, part of which are activities and this perhaps accounts for a greater utilization of labour than other studies.

A. Pepelasis and P. Yotopoulos, Surplus Labor in Greek Agriculture 1953-1960. Athens: Center of Economic Research, 1962.

decline. This can be a particularly important defect when an attempt is made to evaluate the welfare position of the agricultural sector under forced industrialization policies.

The problem we wish to explore in this paper takes place in the context of an industrialization program designed to change the development track of the economy to one of steady growth and modernization. The growth of a new manufacturing sector creates a demand for labour from the rural sector and for food to maintain these workers in the urban economy. If the rural economy is inflexible, rising wages and food prices will slow down the growth of the economy. It has therefore been argued that an agricultural revolution to break this bottleneck is a prerequisite for an industrial revolution. Other views have suggested that disguised unemployment provides a surplus in agriculture which can be used to finance the initial stages of a development program assuming the appropriate institutions to capture and transfer the surplus are available.

We wish to discuss an alternative possibility for economies where no labour surplus exists. The gains from static reallocation of producton within the agrarian economy even without a technological revolution may provide a sufficient initial impetus to assure adequate supplies of food, labour and exportable agricultural produce to maintain a modernization program in its early phases.[10] A program which makes it possible and profitable for agrarian economies to decrease time devoted to Z and increase consumption of M may generate food and labour surplus for use in other sectors. This possibility depends upon high elasticities of response in the agrarian sector, and our analysis of demand and production relationships is intended to present the argument that this is very likely to be true

[10] Where the initial reallocation process has moved smoothly so that static efficiency is achieved in the agrarian economy, the dynamic process requires the provision of specific capital and incentive goods to the rural sector to insure the continued supply of food and labour to the growing manufacturing sector.

An appropriate government policy then would be to create through planning and improved information a better communication grid and transportation network to improve efficiency in allocation. The efficiency of a development strategy depends upon the realization that linkages among sectors are not technological alone but may also be created by government. As trade and communications barriers are reduced, specialization will be encouraged. The economy moves to a higher production possibilities curve as further division of labour takes advantage of different endowments, tastes, etc., for different regions and, hopefully, specialization leads to increased technology and learning-by-doing.[11]

III. THE SUPPLY RESPONSE OF AGRICULTURAL PRODUCTS[12]

The method of Hicksian comparative statics is useful for exploring the effect of a change in price on the supply of food, i.e., a quasi-Slutsky equation for peasant agriculture. This approach enables us to decompose the effects of a change in price into various parts which can be analyzed theoretically and empirically.

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[11] In the literature on economic development, the importance of removing trade barriers, overcoming fragmentation, and increasing specialization and division of labour is stressed by Furtado, Kindleberger, and Myint. See, for example,

C. Furtado, "Development and Stagnation in Latin America: A Structuralist Approach" Studies in Comparative International Development. 1965, Vol. I.

C. Kindleberger, Economic Development. (2nd ed.), New York: McGraw Hill, 1965. [Ch. 20].

U. Hla Myint, The Economies of the Developing Countries. London: Hutchinson, 196

[12] A brilliant theoretical exploration of responsiveness of peasant economies to price and other incentives is found in Sen, Fisk and Shand.

A. Sen, "Peasants and Dualism with or without Surplus Labor," Journal of Politica Economy, Vol. LXXIV, October 1966.

E. Fisk, "Planning in a Primitive Economy: Special Problems of Papua - New Guinea Economic Record, Vol. 38, December 1962.

_____, "Planning in a Primitive Economy: From Pure Subsistence to the Productio of a Market Surplus," Economic Record, Vol. 40, June 1964.

R. Shand, "The Development of Trade and Specialization in a Primitive Economy," Economic Record, Vol. 41, June 1965.

One of the limitations of this method is that it concentrates on initial and final equilibria and ignores the adjustment process and time taken to substitute F for Z in production and M for Z in consumption. It should be remembered, however, that in using this analysis we are thinking of decades rather than years. The problem is posed in terms of an agrarian economy's long-run adjustment to, say, the opening of trade or to an industrialization program. The use of comparative statics to generate continuous curves tracing out a locus of long-run equilibrium positions provides a first approximation to understand the discontinuous jumps inherent in this development process.

The agrarian economy in equilibrium is characterized by three sets of equalities between marginal rates of substitution and transformation.[13]

1. $MRS_{ZF} = MRT_{ZF}$

2. $MRS_{FM} = MRT_{FM} = \frac{P_F}{P_M}$

3. $MRS_{ZM} = MRT_{ZF} MRT_{FM} = MRT_{ZF} \cdot P_F/P_M$

The first condition simply states that the marginal rate of substitution between Z and F in consumption must equal the marginal rate of Z and F in production. The second says that the marginal rate of substitution in consumption between food and manufactured goods must equal the community's ability to transform food into manufacturing, i.e., the terms at which it can exchange the two goods in the market place. The third condition shows the equality of the marginal rate

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[13] The necessary conditions for a maximum are derived from setting the partial derivatives of the following Lagrangean expression equal to zero:

$$U(Z, \bar{F}, M) + \lambda_1 (\varphi[F, Z]) + \lambda_2 (P_F F - P_F \bar{F} - P_M M)$$

It is assumed that the second order conditions are satisfied as well.

of substitution in consumption of Z and M with the marginal rate of transformation of Z and M. For the community to transform Z into M requires two stages: it must transform Z into F and then exchange F into M.

It is simplest to begin with the case in which all F is sold on the market and none consumed within the rural economy. The model thus consists of three goods: one which is produced but not consumed (the F good); one which is consumed but not produced (the M good); and one which is consumed and produced but not traded (the Z good).

The model is illustrated geometrically as follows.

Figure 1A Production possibilities curve for Z and F

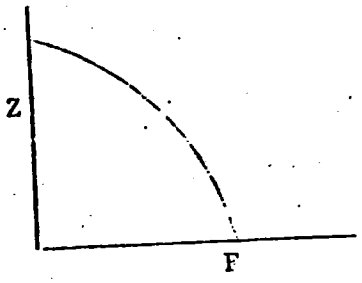

Figure 1B Terms of trade between M and F

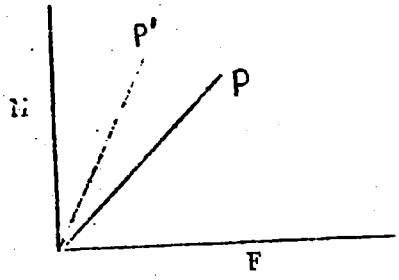

Figure 1C Consumption possibilities between Z and M

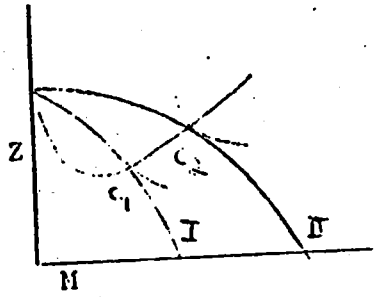

Figure 1A shows the production possibilities between Z and F, and Figure 1B the rate of exchange between F and M. By combining the two we can obtain the consumption possibilities between Z and M (Figure 1C). Consumption takes place at

the point of tangency between the consumption possibilities curve and the indifference curve. A rise in the price of food from P to P' shifts the consumption possibility curve from I to II and the consumption point from C_1 to C_2. By varying price from zero to infinity we can trace out a consumption path which shows the combination of Z and M consumed at various points.

If point C_2 is higher than C_1, the production of Z increases with an increase in the price of food. This means that production and, therefore, sale of food decreases (since in this model, all food is exported). The U shaped offer curve in Figure 1C implies, then, that raising the price of food at first leads to an increase in the amount of food marketed, but eventually a decrease as the supply curve of F turns back. The reason for the turning point is that two effec are at work. A rising price of F means that M goods become cheaper relative to Z and this encourages the agrarian sector to substitute M for Z in consumption. However, the increase in P_F also implies an increase in income to the rural household, and this may lead it to spent a higher fraction of its income on Z.

This behavior can be easily shown algebraically. Differentiating the tangency conditions totally and solving for $\frac{dZ}{dP_F}$ yields:[14]

$$\frac{dZ}{dP_F} = \frac{1}{|D|}\left[P_M U_M \phi_Z \phi_F + F P_F U_{MI} \phi_Z \phi_F - F P_M U_{ZI} \phi_F^2\right]$$

This may be rewritten as:

$$\frac{dZ}{dP_F} = \frac{MRT_{FZ} U_M P_M}{|D|} + \frac{F(MRT_{FZ} U_{MI} P_F - U_{ZI} P_M)}{|D|}$$

where MRT_{FZ} represents the marginal rate of transformation of Z into F. The firs

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[14] Partial derivatives are denoted by subscripted variables; $|D|$ is the determinant of the coefficient matrix assumed to be >0.

term in this expression is the substitution effect and the second the income effect.[15] This solution can be rewritten as follows:

$$\frac{dZ}{dP_F} = S_{ZI} + FI_Z$$

The first term S_{ZI} is the substitution of Z for M that results from a change in the price of food with income held constant (note that there is no market price for Z, only a shadow price) while I_Z is the change in the consumption of Z that results from a change in income when prices are held constant.

The substitution effect must be negative. This follows from the convexity of the utility function. An increase in the price of food leads consumers to substitute M for Z at a constant level of income. If this were the only effect, we could safely predict that a rise in the price of food would lead to a decrease in the production of Z and an increase in the production and hence the sale of F.

The second term will be positive and will act to offset the first term unless Z is an inferior good, i.e., I_Z is negative. If I_Z is positive, i.e., more Z is consumed at higher incomes with constant prices, the possibility of a backward bending supply curve for F emerges. The strength of this effect depends on F, the amount of food goods produced. As the agrarian sector becomes specialized, the income effect, because it is weighted by F, takes on greater importance. Elasticity of supply should tend to decline as price increases. If Z is an inferior good, the opposite is true. The income effect will be negative and

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[15] The equation for $\frac{dZ}{dP_F}$ differs from the usual Slutsky equation insofar as it contains MRT_{FZ}, i.e., a production relation in both terms. If the production possibility curve were a straight line, MRT_{FZ} would be a constant which could arbitrarily be set equal to one. The equation would then be identical to a pure consumption model. Though this is not the case in the present model, the qualitative conclusions of the text are not affected by this feature.

becomes more important the more the agrarian economy specializes in food production. Supply elasticity will increase as price increases and the offer curve will not bend backward.

This result suggests an important reason for rejecting the labour leisure model. We would normally assume that leisure is a superior good. If Z is interpreted to mean the activity which produces leisure, this model predicts an eventual backward bending supply curve of food. The more prosperous the agrarian economy, the less responsive it would be to price incentives and the greater the likelihood that it would react to a price increase by producing less. Since this type of behavior does not seem to be consistent with empirical evidence, which suggest instead high positive elasticities, the simple labour leisure choice as postulated in most theoretical agrarian models may not be relevant.[16] In con-

[16] For some empirical evidence on price response see:

M. Bateman, "Aggregate and Regional Supply Functions for Ghanian Cocoa, 1946-1962, Journal of Farm Economics, Vol. 47, May 1965.

J. Behrman, "The Price Elasticity of the Marketed Surplus of a Subsistence Crop," Journal of Farm Economics, Vol. 48, November 1966.

E. Dean, The Supply Responses of African Farmers; Theory and Measurement in Malawi. Amsterdam: North-Holland, 1966.

W. Falcon, "Farmer Response to Price in a Subsistence Economy: The Case of West Pakistan," American Economic Review, Vol. 54, May 1964.

R. Krishna, "Farm Supply Response in India - Pakistan: A Case Study of the Punjab Region," Economic Journal, Vol. LXXIII, September 1963.

M. Manghas, A. Recto, and V. Ruttan, "Price and Market Relationships for Rice and Corn in the Philippines," Journal of Farm Economics, Vol. 48, August 1966.

trast, there are a number of reasons for suggesting that Z activities are likely to be inferior goods and that, therefore, high responsiveness is to be expected. These are discussed in Section IV below.[17]

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[17] The results of this model can easily be compared with those of Sen, op. cit. Sen's model does not contain Z goods but instead postulates the peasant choosing between leisure and food production. For comparison we may therefore think of Z as referring to leisure rather than to a physical good. Sen's criterion for whether or not the amount of labour devoted to F increased or not is whether $(U_M + U_{MM} \cdot H) \cdot F'(L_F)$ is negative or positive [where $F'(L_F)$ is the marginal product of labour in food production]. Compared to Sen's result, we found that the production of Z would fall (and the amount of labour devoted to F rise) if

$$(U_M P_M \phi_Z \phi_F + F P_F U_{ZM} \phi_Z \phi_F - F P_M U_{ZM} \phi_F^2) < 0$$

Assuming that only labour is allowed to vary between F and Z production ($\bar{L} = L_F + L_Z$) and holding land fixed ($\bar{T} = \bar{T}_F + \bar{T}_Z$) so that $dZ = -Z'(L_Z)dL_F$, and letting $P_M = 1$ so that $P_F F = H$, we have:

$$\frac{dL_F}{dP_F} Z'(L_Z) = [MRT_{FZ}(U_M + HU_{MM}) + FU_{ZM}] \frac{1}{|D|}$$

If we let $Z'(L_Z) = 1$, the expression reduces to:

$$\frac{dL_F}{dP_F} = [F'(L_F) \cdot (U_M + HU_{MM}) + FU_{ZM}] \frac{1}{|D|}$$

We thus have a similar equation as Sen except for the term $U_{ZM}F$. The reason this term is not found in Sen's formula is that he assumes independent utility, i.e., he assumes that the utility of the peasant household is the sum of the utility from consumption and the negative utility of work, and that there is no interaction between them. In other words, Sen assumes that the disutility of work depends upon the amount of work alone regardless of the level of income.

If we now allow for the possibility that some food is consumed within the agrarian economy, we have the following Slutsky equations:[18]

$$\frac{d\bar{F}}{dP_F} = \frac{\lambda_2(\phi_Z D_{13} + D_{33})}{|D|} + (F - \bar{F})\frac{D_{43}}{|D|}$$

$$\frac{dZ}{dP_F} = \frac{\lambda_2 (\phi_Z D_{11} + D_{31})}{|D|} + (F - \bar{F})\frac{D_{41}}{|D|}$$

which can be rewritten as

$$\frac{d\bar{F}}{dP_F} = S_{\bar{F}\bar{F}} + (F - \bar{F})I_{\bar{F}}$$

$$\frac{dZ}{dP_F} = S_{\bar{F}Z} + (F - \bar{F})I_Z$$

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[18] D_{ij} refers to the cofactor of the element in the ith row and jth column of the following system:

$$\begin{bmatrix} (U_{ZZ} - \lambda_2 P_F \phi_{ZZ}) & U_{ZM} & U_{Z\bar{F}} & -P_F \phi_Z \\ U_{MZ} & U_{MM} & U_{M\bar{F}} & -P_M \\ U_{\bar{F}Z} & U_{\bar{F}M} & U_{\bar{F}\bar{F}} & -P_F \\ -P_F \phi_Z & -P_M & -P_F & 0 \end{bmatrix} \begin{bmatrix} d_Z \\ d_M \\ d_{\bar{F}} \\ d\lambda_2 \end{bmatrix} = \begin{bmatrix} \lambda_2 \phi_Z \, dP_F \\ \lambda_2 \, dP_M \\ \lambda_2 \, dP_F \\ (\bar{F} - F)dP_F + M \, dP_M \end{bmatrix}$$

It is interesting to note that in the case in which one good is non-traded the production and utility decisions cannot be separated. This can be seen readily from our derived Slutsky equations or by inspecting the above coefficient matrix. If Z were a traded rather than a non-traded good, the utility-production dichotomy would hold. This can easily be seen as follows. The Lagrangean expression would be:

$$U(\bar{F}, \bar{Z}, M) + \lambda_1[\phi(F, Z)] + \lambda_2(P_F F + P_Z Z - P_F \bar{F} - P_Z \bar{Z} - P_M M).$$

Differentiating the first order conditions, the system could be written so that the coefficient matrix appears in block triangular form:

$$\begin{bmatrix} U & \vdots & \alpha \\ \cdots & \vdots & \cdots \\ o & \vdots & \phi \end{bmatrix} X = y$$

where U is defined to be the familiar utility block of consumption theory containing U_{ij}'s and P_i's as elements, ϕ the production block, α the so-called connecting coefficients, X the vector of unknowns partitioned so that the elements corresponding to the ϕ coefficients are the unknown production variables (e.g., dZ and dF), and y the vector of constants. Solving the production block independently we have

liere the important factor to note is that the income effect is weighted by the net amount of food supplied on the market or what is called, in the literature the marketable surplus.[19]

In the first equation, if $(F - \bar{F}) > 0$, and the income effect is positive, we have to weigh the substitution against the income effect to find the net change. If, on the other hand, food is an inferior good, then the income effect would be negative and $\frac{d\bar{F}}{dP_F} < 0$. In fact, it is likely that as farmers specialize in food production and if, for instance, the peasant can substitute processed food (our M good) for his original food, then indeed one might expect a negative income effect. Thus, as specialization continues and the agricultural surplus grows and bulks large in the income effect, the own demand elasticity for food would probably diminish.

$$dZ = P_Z \hat{\lambda}\, dP_F \frac{i}{|D|} \quad \text{and} \quad dF = -P_Z \phi_Z \hat{\lambda}\, dP_F \frac{1}{|D|}$$

where $\hat{\lambda} = \frac{\lambda_2}{\lambda_1}$ and $|D|$ is the determinant of the subsystem. Substituting back into the budget constraint and simplifying terms, we have

$$(\bar{F} - F)dP_F + (\bar{Z} - Z)dP_Z + \ldots dP_I + \hat{\lambda}\, P_Z \frac{1}{|D|}\, dP_F[P_Z - P_F \phi_Z]$$

But from our first order conditions, we know that $P_Z = P_F \phi_Z$. Therefore, the original system can be written as

$$U X_1 = V_1 \quad \text{where} \quad X_1 = (d\bar{Z}\ d\bar{F}\ dI\ d\lambda_2)^T$$

and no production relations appear in this system. This result can be contrasted with our indecomposable coefficient matrix of a non-traded good system.

[19] See J. Hicks, Value and Capital. (Second ed.), Oxford: Clarendon Press, 1957, p. 313.

The second equation is more difficult to analyze because the sign of the substitution effect can be either negative or positive depending upon whether $\bar{F}$ is a complement or a substitute for Z. However, as the development process continues, and assuming a negative income effect (where Z is inferior), it is likely that the elasticity of food output with respect to price would increase, i.e., $\frac{dZ}{dP_F} < 0 \Rightarrow \frac{d\bar{F}}{dP_F} > 0$. Here it is assumed that even if $\bar{F}$ and Z are substitutes in consumption so that $S_{\bar{F}Z} > 0$, the negative income effect weighted by the marketable supplus is sufficient to make $\frac{dZ}{dP_F} < 0$.[20] Obviously, if $\bar{F}$ and Z are complements and Z is assumed to be inferior, both effects will work towards $\frac{dZ}{dP_F}$ being negative.

Once again we have shown that taste patterns in rural sectors are important in determining the size of the marketable surplus. Here, however, the final conditions become somewhat complex. It is not sufficient for only Z to be inferior; we now require, where $\bar{F}$ and Z are substitutes, that the negative income effect outweigh the positive substitution effect. Even if this were the case, a further condition requires F itself to be an inferior good. Of course, it is possible for one to outweigh the other.[21] In general, the establishment

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[20] "Sellers usually derive large parts of their incomes from some particular thing which they sell. We shall therefore expect to find many cases in which the income effect is just as powerful as the substitution effect, or is dominant," Hicks, ibid., p. 36.

[21] Food, for example, may not be inferior but Z may be. Thus, even though $\frac{d\bar{F}}{dP_F} > 0$, the negative income elasticity on the side of Z could work for $\frac{dZ}{dP_F} < 0$ and a net positive surplus. In terms of elasticities, our results can be seen as follows:

$$\varepsilon_{SP} = -\varepsilon_{ZP}\frac{Z}{S} - \varepsilon_{\bar{F}P}\frac{\bar{F}}{S}$$

where ε_{SP} is the elasticity of the marketable surplus $(F - \bar{F})$ with respect to the price of food. If, for example, $\varepsilon_{ZP} < 0$, but $\varepsilon_{\bar{F}P} > 0$ and $|\varepsilon_{ZP}| > |\varepsilon_{\bar{F}P}|$, then $\varepsilon_{SP} > 0$.

of a food processing industry in the manufacturing sector (usually one of the first industries) would work for an increased supply of food from the rural area through its influence on demand.

We may end by noting that the model can be translated easily into a two crop model where, say, F_1 is rice and F_2 is vegetables, and Z is considered to be only rest time. This model would demonstrate that switching of crops -- for instance expanding rice at the expense of vegetables -- can be a way of bringing about an increase in the marketable surplus. In some cases, what is taken as increased rice productivity (because of increased rice production) may be nothing more than a movement along a production possibilities schedule.[22]

IV. THE IMPORTANCE OF DEMAND

Our model stresses the importance of tastes and human needs in the rural economy in determining the supply elasticity of farm produce. The higher the elasticity of substitution of M for Z and F and the lower the income elasticity of demand for Z and F, the greater the elasticity of supply. The determination of the magnitude of these elasticities requires research on the agrarian society's consumption technology, i.e., the empirical investigation of Engel's curves for rural economies including Z. For the moment a few general qualitative comments may be useful.

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[22] Since such a two (or more) crop model is usually taken as the framework for most econometric studies of supply elasticities, we might mention some of the possible specification problems that can arise by neglecting the theoretical implications suggested by our model. If a good is not traded (for instance; root crops), we have seen how the utility and production decisions are interdependent. A farmer's production adjustment should depend then upon his own demand for goods as well as its random component. Furthermore, the elasticity of any one crop depends upon its share in total income because of the importance of the income effect. Finally, just as Nerlove has postulated a lagged model on the basis of price expectations, we suggest the use of a permanent income model for the demand adjustment. In fact, some of the empirical reaction coefficients found in the literature may be a reduced form of this type of expectation and permanent income model.

In thinking of this problem, it is useful to use Lancaster's approach in which the demand for goods "arises from the fact that goods are required to obtain characteristics and is a derived demand."[23] Each household has the problem of satisfying its basic food, clothing, housing, and entertainment needs. Various Z goods and M goods satisfy these needs in various ways. In a number of cases, however, manufactured goods can be expected to be superior to Z goods because the former possess all the attributes of the home produced goods plus additional ones. Manufactured cloth, for example, possesses most of the attributes of cloth produced at home by the rural family and also provides new variants of color, durability, style, etc.

For many developing countries in the early stages of industrialization, the food processing industry provides numerous examples of the effects that manufactured food goods can have on changing demand patterns in the rural area. Here the brewer or miller not only provides an increased demand for agricultural products as intermediate goods but, by offering in exchange a higher quality good, also reinforces the rural economy's positive supply response. People in the agrarian society are likely in these cases to be most anxious to relinquish Z goods and obtain these M goods with their supplemented attributes. Furthermore, consumer preferences for M over Z and imported processed F over home produced food are likely to increase as incomes increase since the additional attributes tend to be in the nature of luxuries while Z goods satisfy only more basic demands.

There are, however, qualifications. In some cases, the manufactured good may satisfy fewer attributes than the Z goods since, for example, the mass-produced item may sacrifice certain local artistic characteristics. Other Z activities have religious and cultural attributes which cannot be easily substituted

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[23] K. Lancaster, "A New Approach to Consumer Theory," Journal of Political Economy, Vol. LXXIV, April 1966.

for by the manufactured goods. If these are important, the supply curve may well become inelastic and perhaps even bend back. The degree of substitutability thus obviously depends upon cultural patterns and the level of income. Conversely, this implies that a breakdown of the traditional value system and the development of new taste patterns favoring Y will increase the elasticity of supply.

A policy implication of this analysis is the need to supply incentive goods to rural areas. The larger the set of Y goods available, the greater the possibility of substituting against Z goods. A manufacturing sector which produces a variety of high quality substitutes for Z goods is thus more likely to solve its food supply problem than one which produces inferior goods inappropriate for rural demands.

It is important in this context to stress the complexity and interrelationships of demand patterns. The symbol of the incentive good is the transistor radio. This is a very narrow view of the problem. Much more important may be, to give two examples, canned meat, which frees cattle for sources of energy rather than utilizing them as sources of meat, and corrugated roofing, which saves labour from housebuilding for more food growing. In general, the wider the variety of goods offered the greater the response possible. Part of the problem encountered in industrial programs is that they are made with little reference to the intricate demand patterns generated in rural areas trying to satisfy a variety of needs subject to a number of constraints.

An additional problem is encountered when certain urban goods are not available to the rural area. Some goods, for example, are produced in the city alone and cannot be traded; they are specific to the urban environment, "city lights" as it is sometimes put. The only way of obtaining them is to move from

the farm to the city. In some cases the government (or private entrepreneur) can provide some of the urban benefits to rural communities. Television stations in rural areas, recreation facilities, and telephone communicaton are but a few example of bringing the city to the country. The fact that the basket of goods is different for urban and rural sectors makes it very difficult to evaluate urban rural welfare and to compare the relationship between urban and rural real wages or, indeed, even to measure them.

We might note, finally, that elasticity of substitution between Z and M is likely to be particularly high in a landlord economy. The landlords, being richer, will have a stronger preference for imported goods and manufactured goods than for the inferior Z goods of rural life. Land reform which redistributes income may result in a decline in aggregate demand for M and an increased demand for Z. Other things being equal, this would result in a decrease in the amount of food marketed. In this case, there is a conflict between the needs of the manufacturing sector and the welfare of the rural sector. Furtado's description of the farmer's choice is instructive:

> ...Where previously his relationship to the landowner left him with no alternative but to turn over a substantial part of his produce, he could not choose to reduce the marketable part of his agricultural production, thereby producing more for his own use, or providing time to pursue crafts not related to agriculture, or to improve his home, etc. To protect himself from the manipulation of prices by middlemen, he was able to diversify production for his own use, thus becoming highly independent from the market. To the economy as a whole, the result has to be a relative decline of commercial activity and a regression in the pattern of the social division of labour. However, this will not prevent the living standard in rural areas from rising, owing to substantial modifications in the pattern of the income distribution. In fact, one may readily observe that, in certain rural areas of Latin America where marketed production is relatively small, the regions of old colonization in Paraguay being a good example, the standard of living of the population is relatively high.[24]

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[24] C. Furtado, "Development and Stagnation in Latin America: A Structuralist Approach," op. cit., p. 162.

On the other hand it could be argued that in the United States the demand for M goods was higher in the freeholder North than the plantation South. This was partly because average income was higher in the North, but perhaps also because of the more modern nature of Northern culture.[25]

V. INTERMEDIATE GOODS AND TECHNOLOGICAL CHANGE

Agricultural economists often stress the importance of technological change in agriculture in increasing the supply of food for a growing population and enhancing the generation of the so-called investable surplus. Our model indicates a dual relationship between technological change and the expansion of internal trade: A manufacturing or foreign sector providing incentive goods can encourage a positive supply response from agriculture, and the very process of agrarian specialization is likely to lead to technological change through learning by doing. In addition, the agrarian economy can also improve its productivity by obaining intermediate raw material and capital goods. Reduction of market barriers and expansion of trade not only provide an agrarian economy the possibility of reallocating its resources along its production possibilities curve but should also result in an outward shift of its production frontier.

We have observed, in many underdeveloped countries, the increased productivity that resulted as the economy reorganized production when a new foreign trade sector provided a vent for surplus. Similarly, we can observe increased productivity in rural areas as urbanization provides a market for food and the possibility for farmers to concentrate on a few crops most appropriate to their region and to their endowments of land and technology. All this is as Adam Smith predicted. But he also suggested two other gains from the extension of the

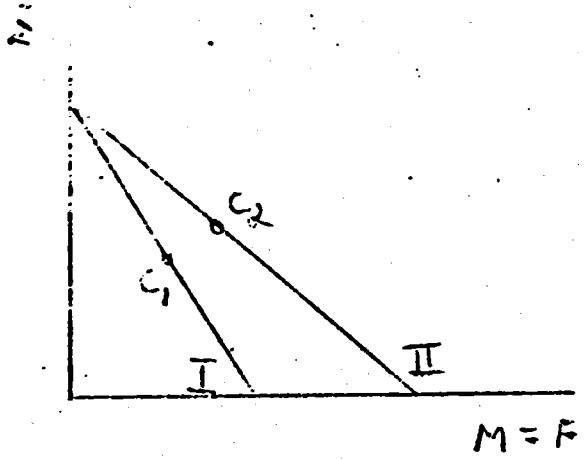
[25] We would like to thank Bill Parker for pointing this out to us.

market -- mechanization and technological improvement. These seemed to have happened far more rarely and more slowly in the underdeveloped world. Perhaps part of the reason is that today's developing countries do not have an indigenous manufacturing industry concnetrating on local needs.

In a sense, technological progress in agriculture is not autonomous, but depends upon the opportunity to trade. In many ways the rural sector buys its technological progress from the urban sector because it imports raw materisl and capital equipment as well as consumer goods. A necessary condition for the continued emergence of an agricultural surplus, then, is increased investment in those manufacturing industries catering to the specific needs of the agricultural sector. Foreign trade could conceivably fulfill this function but, most often, goods available from abroad are specialized to the needs of the developed countries and are not suitable to the local demands of the developing countries. The provision of incentive goods and intermediate goods, which is quite different from simple import-substitution, is another consideration to be taken into account in the optimum allocation of investment.

The simple model of this paper can be used to explore in a preliminary way some of the effects of technological change on the marketable surplus. Assume that units are chosen so that the price ratio between M and F goods is equal to one, and that all F goods are exported. Then Figure 2A illustrates both the production possibilities (assumed to be linear) between Z and F and the consumption possibilities between Z and M.

FIGURE 2A



Technological change results in a shift outward of the production and consumption possibilities curve. The change in Figure 2A is assumed to be biased towards the production of F goods since learning by doing is more likely to occur in the industry that expands as a result of trade than the one that contracts. The new consumption point C_2 is likely to imply greater exports of food and hence consumption of M than C_1 except in the unusual circumstance that Z is a highly superior good. In fact, the lower the income elasticity of demand for Z and the greater the substitution between Z and M, the more likely will technological change lead to an increase in supply of food.

A fall in the price of an imported intermediate good is like a technological change. Assume, for example, that the price of fertilizer is lowered. This will induce the farmer to use more fertilizer per unit of output than previously.[26]

[26]The total amount of food exchanged for fertilizer may rise or fall.

Even after paying for the fertilizer, the net amount of F remaining for exchange for manufactured consumer goods will increase. Thus, if in Figure 2B we assume that $\hat{F}$ represents not gross food production but net value added in food, then the shift from I to II describes the effect on consumption possibilities of the lowering of the price of an intermediate good. As before, unless Z is a superior good, exports of food in exchange for consumer goods must rise.[27]

An interesting example is presented when intermediate goods are used in the production of Z rather than F. Corrugated roofing, for example, is a raw material

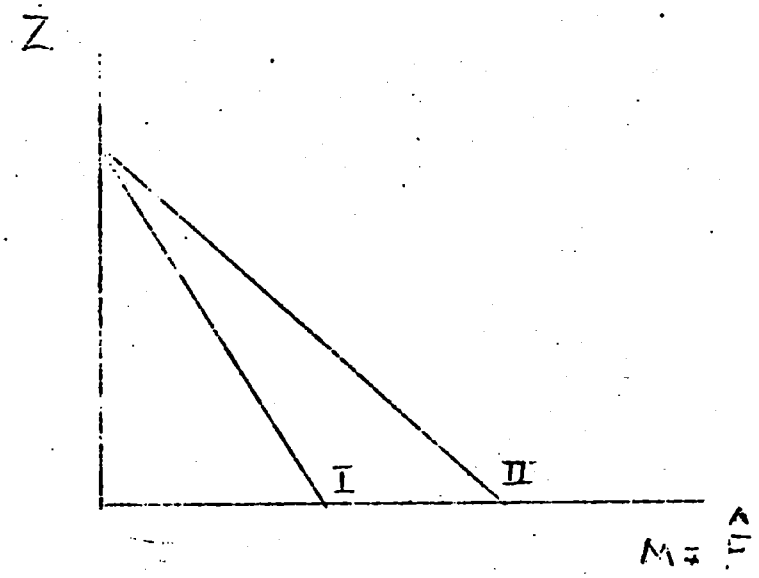
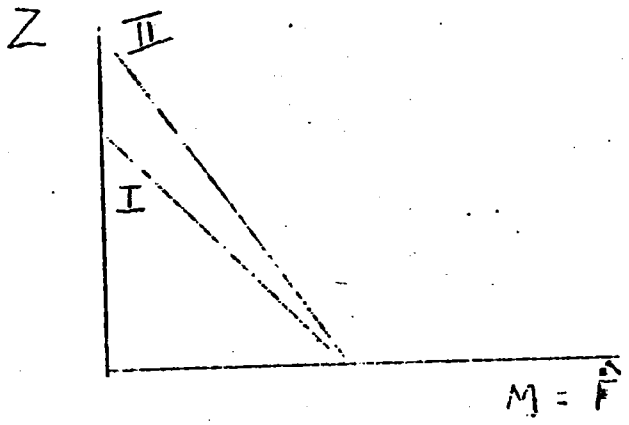


FIGURE 2B

[27] If urban demand for food is highly inelastic, this could lead to immiserizing growth.

for house construction and in many developing countries is one of the most important manufactured items consumed in the rural sector. Similarly, a number of implements and tools sold to the agrarian society have little direct impact on agricultural production but instead allow the farmer to produce Z goods with considerably less effort. The analysis of a fall in price of one of these kinds of intermediate goods destined for Z is more complex but, in general, it can be depicted as an outward shift of the production possibilities curve biased towards Z. This is pictured in Figure 2C where $\hat{F}$ represents net availability of F after purchase of the intermediate good.

Figure 2C



Two results follow from a fall in the price of an input into Z: a rise in income and a fall in the opportunity cost of Z. Unless Z is inferior both act to increase consumption of Z, and, hence, possibly to decrease the sale of F. Here is an example in which a fall in the price of an intermediate good may lead to a drying up of trade. However, if Z is inferior, as we have suggested above, this result is not likely to happen. The labour time saved through the use of corrugated roofing or improved tools will probably lead to increased effort on commercial crops rather than a return to autarky.

VI. FACTOR INTENSITIES AND SUPPLY OF LABOUR

The Z activities and F activities have different factor intensities; Z goods tend to be labour intensive, using little or no land, while F goods tend to be land intensive.[28] A change in product prices which leads to a change in production will also change factor scarcities and factor prices. The logic of the factor price equalization theorem, when applied in this context, suggests that increased food sales will lead to outward migration of labour from agriculture: a simultaneous release of food and labour may be the norm rather than the exception in certain types of agrarian economies.

The reasoning is as follows: when an agrarian economy, responding to trading opportunities, moves along its production possibilities curve to produce more F and less Z, the marginal product of labour falls while that of land rises. Because the economy concentrates on the relatively land intensive good (F) and cuts back on the labour intensive good (Z), land becomes more scarce and labour more plentiful. A rise in the product price ratio, P_F/P_Z, leads then to a fall in the factor price ratio w/r.[29] This in turn provides an incentive for labour to move.

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[28] One can also think of cases in which Z goods are land rather than labour intensive: landlords may own large estates the services of which are enjoyed in the form of private stocking and hunting of game; the government may provide public Z goods in the form of parks and other types of recreation areas.

[29] Though this basic proposition on the relationship between product prices and factor prices is well known in international trade theory, it may be useful to illustrate it briefly in the context of our model. Assume that the Z good uses only labour and no land, while F good production requires both factors of production. The economy is characterized by two production functions:

1. $Z = \frac{1}{a} L_Z$ where a is the labour required per unit of Z and is constant,

2. $F = F(L_F, \bar{T})$ where $\bar{T}$ equals the total amount of land and is fixed in supply and the application of labour to $\bar{T}$ is subject to diminishing returns.

If the total labour supply is constant ($L_F + L_Z = \bar{L}$), a decline in Z production means a rise in labour in food, hence a rise in $L_F/\bar{T}$, resulting in a decline in the marginal product of labor and a rise in the marginal product of land.

Another way of looking at this is in terms of the Rybczynski theorem of international trade. This theorem predicts that, if product prices remain constant, a decrease in labour will result in an increase in production of the land intensive good (in this case food). In the context of our model, suppose M and Z are perfect substitutes, i.e., $MRS_{ZM} = k$, a constant. Then, $MRS_{ZF} = k\frac{P_M}{P_F}$. If P_M/P_F is held constant and L decreases, then from the theorem F must increase. Thus, to some extent, labour migration from the agrarian sector will generate a surplus of food production at constant prices.

This oversimplified model should not be applied indiscriminately, but it correctly points to the important fact that a change in output changes the relative scarcity of factors of production. A switch from Z to M causes land to become scarce and labour more abundant. For example, a change from grain to cattle will make labour plentiful and land scarce since animal raising typically requires more land and fewer men per unit than does ordinary farming. The redundancy of labour that accompanied increased wool exports of England and the battle between cattle owners and homesteaders in the American West are perhaps examples of this in practice.

The substitution, of course, could operate in the opposite direction. Opening up of trade may create a market for the labour intensive good, leading, for example, to the emergence of an artisan class specializing in rural manufacturing.

Commercialization and increased specialization, through their effect on factor scarcity, can thus have wide repercussions on a rural economy. They can lead to an outward migration of people as the opportunity cost of family labour declines or, alternatively, to increased education and changing family roles since some Z goods are the province of women and children and a decline in their production releases these members for other activities.

Since a flourishing market for agricultural products can be labour saving, development policy may have to stress labour using non-agricultural activities in order to provide a rural demand for labour and thus alleviate urban unemployment.[30]

The rise in the price of land associated with the replacement of Z by F may create a new landlord class or strengthen the position of the old one. Ownership of land takes on a new importance due to its scarcity. A scramble to establish land rights, an increase in tithes, a commutation of labour requirements may all follow from trade biased away from the labour intensive good.[31] Those who own enough land may be able to cease working, move to the cities and become engaged in government or administrative work, or even enjoy an upperclass life of leisure. The changed distribution of income can lead to a switch in consumption towards luxuries and imports.

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[30]Why labour should migrate to the city when urban jobs are scarce can only be explained by a labour-migration theory that encompasses not only the probability of finding city employment but also the relative availability of an urban basket of goods quite different from its rural counterpart. Historically, people probably have been drawn to the city as much for the availability of peculiarly urban goods as for anything else. Because of this, we mentioned previously the interesting possibility of providing "city lights" within the rural environment. Yet there are obvious limits to this type of policy, and the real problem of urban unemployment (or underemployment in various Z' activities) does point to the differing roles the government may have to follow someplace else. If, for example, government policy is successful in the creation of internal trade by its expenditure on transport systems, marketing arrangements, agrarian credit facilities, then it should not simultaneously encourage and foster in the cities an industrialization program that is mainly labour saving. Realizing that expenditures on roads and distribution facilities because they reduce time spent in transport and marketing are like labour-saving innovations and that the net effect of increased agricultural specialization may be to release labour, which is likely to be attracted to an urban way of life, government policy should focus on the essential development problem of determining the appropriate industrial strategy to deal with a successful agrarian response.

[31]There is an interesting empirical example from the Philippines. With the commercial crop expansion in the early part of the twentieth century, there is a positive correlation between those regions specializing in increased exports and those having a high rate of increase in tenancy.

The increase wealth of landlords can also lead to more investment in a new manufacturing sector. A rise in the price of land may encourage the landlord to diversify his portfolio by selling some land and investing in government or industrial securities. The increase in demand for food may thus cause capital to flow out of agriculture into industry (as well as the reverse).

An equally important implication of the factor price equalization theorem is that good roads or other improvements in the transportation network are a partial substitute for inadequate farm size because trade in commodities is a substitute for factor mobility. The farmer with too little land can concentrate on labour intensive crops, if a market exists in which he can exchange his produce for land intensive goods. In fact some of the variation on productivity observed between large and small farms may reflect the different composition of output production techniques within an industry.[32]

Perhaps this explains why conflicts of interest arise over rural development. Cattle farming, for example, has low transport costs and is land intensive. Vegetable farming is labour intensive but requires good transport facilities to insure that the produce can reach the market quickly. Improvement of transportation systems in a cattle producing area may put the small farmer in a much stronger position by lowering the value of land and raising the wage rate. It would not be surprising if the rancher were not anxious for this development.

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[32] Suppose a perfect product market existed so that all farmers faced the same product prices but farmers could not move. Each farmer would adjust his production in accordance with his factor endowments. Given certain assumptions perfect factor price equalization would result. Suppose an econometric investigation was made that mis-specified the model and omitted Z goods entirely. It can be shown that the results would be biased as follows:

The large farms would appear to have higher food productivity than small farms both with respect to labour and land, but proportionately more so for labour.

If, instead, all variables were included, but output was treated as a composite commodity in which each individual crop was valued at its market price, an aggregation bias would result that could give the impression that labour productivity was higher on big farms but land productivity was lower.

VII. SUMMARY

We may summarize this paper as follows.

1. We have tried to clarify the concept of "leisure". Our feeling is that this concept as well as its associated concepts of "want satiation" and "involuntary idleness" are inappropriate and misleading descriptives of typical rural life. They are value-loaded phrases based more on a subjective judgement from an urban point of view rather than on factual knowledge. We suggest that in most instances the rural economy is not at the point where marginal productivity or marginal utility is zero but operates instead where the opportunity cost of agricultural production is positive and substantial.

2. We have tried to point out the dangers of viewing the agrarian economy in terms of a simple model. The inherent complexity of rural life - the variety of crops produced, the number and importance of non-agricultural activities, the many production processes differing in seasonal patterns and labour and land requirements - is an essential feature of critical importance to prediction and policy. Ignoring the mosaic pattern can lead to costly misspecification errors.

3. We have focused on the role of tastes and demand conditions in determining agricultural supply functions and pointed out how the range of alternatives offered to the rural economy affects their responsiveness. The adaptation of industrial production to rural needs is, we feel, at the heart of the development problem and it is important, if not essential, to study the desires and requirements of the rural sector. In a sense this reverses the dictum that agriculture is "basic" to industrial growth and suggests instead than an 'industrial revolution" may be a prerequisite to increased agricultural productivity because of the need to supply manufactured incentive goods, raw materials and capital goods to the rural economy.

4. We have also emphasized the importance of development strategies based on lowering trade barriers, improving specialization and exchange, and capturing the gains from trade. In this connection we have tried to show that more of a surplus or slack exists in rural areas than is implied by conventional models which ignore the variety of agrarian activities -- agricultural as well as non-agricultural. The possibility of expanding internal trade has frequently been ignored. Colonial governments, for example, reduced trade barriers between the colony and the mother country by laws and infrastructure facilitating the international movement of goods and capital. The overall effect, though ostensibly trade creating, may have been trade diverting since the government, at the same time, often increased internal barriers or failed to remove them. A fragmented political and economic structure was the result.

5. We have also suggested the inappropriateness of an industrialization policy that attempts to "squeeze" agriculture rather than to stimulate intersectoral trade. This strategy is based upon the assumption that the rural area has highly inelastic supply functions easily taxed. Our analysis suggests that supply responses may be highly elastic and a government strategy that removes barriers may be wiser. In fact, the attempt to squeeze agriculture may be a far more serious economic and political error than has so far been recognized because it both reaffirms and introduces distortions which prevent a society from reaching its maximum frontier.

6. We also have discussed the dual role between technological change and commercialization and have emphasized that the dynamic transformation of a developing economy (by the generation and exploitation of the surplus) can be accomplished via increased specialization, division of labour, and a global reduction of market imperfections. An essential input in this strategy is for the government to use policy instruments such as investment in communication and transport systems to

facilitate the flows of goods, capital and labour among all trading units.

Finally, we may note that increased specialization is not without its social costs, and the conflict between development and welfare comes to the forefront. Market systems, even when they improve overall allocation and division of labour, may well hurt the interests of some factors of production. If adequate redistribution mechanisms do not exist, the gains from trade will be spread unevenly, and certain parties, instead of sharing in the increased wealth, may even be immiserized. More important, increased speicalization disrups the organic social structure and causes great stress and strain. New divisions of labour and the interdependence they imply require new political and social relations among the members of society. A development program that ignores the historical lessons of the great transformations of the past is likely to continue its present course of a fractured and fragmented political and economic life.