Rural-urban fringe

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PATTERNS OF URBANIZATION AND DEVELOPMENT IN SMALLHOLDER HOUSEHOLD AGRICULTURE

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I. INTRODUCTION

It is well understood today that urban population growth and urbanization are the direct consequence of the rapid growth in population and of net rural-to-urban migration. Historically, this type of internal migration has been considered a response to structural imbalances between spatial distributions of labor demand and labor supply arising from industrialization. Thus viewed, internal migration acts as an equilibrating process which tends to correct the structural imbalances.

This basic idea has come to be questioned for understanding urbanization in contemporary developing countries. For one thing, in many instances urbanization seems to be occurring independently of economic development. For another, the process of internal migration seems to be aggravating, rather than correcting, the structural imbalances. The so-called "overurbanization" argument describes the existing conditions of many cities in developing countries correctly because "the growth of population has probably run ahead of industrialization, and the development of administrative and other service occupations which are characteristically concentrated in cities" (Hoselitz, 1957). However, an alternative model that takes this argument into account and is as rich in analytical content as the historical model has not yet been developed.

A distinction can be made between projected urban growth, which deals with the increase in size of urban population, and urbanization, which measures changes in the ratio of the urban population to total population. Using these concepts, one may think of two ways in which population reallocation can occur. Obviously, one is by way of internal migration, where people move from rural areas to large cities, enhancing the population growth of the already established cities. A second route is by annexation and/or incorporation of small rural towns into cities, thereby increasing the urban population and its ratio to the total. In the second case, it is not so much the movement of people that leads to urbanization as the urbanization of rural towns and districts. In reality both can occur at the same time. Analytically, however, the

distinction seems fundamental. The first case implies a pattern of urbanization centered on established cities. The second implies, in contrast, a dispersed, rurally-oriented pattern of population and occupational reallocation in the development process.

It is basically correct to characterize usual forms of internal migration as an equilibrating process. If the process creates "overurbanization," it is worth considering the types of "structural imbalances" that give rise to such developments. Without minimizing the importance of the unprecedented population pressures exerted on many developing countries, in this paper it is argued that the "structural imbalances" can be created, just as different technologies can be adopted or rejected, by policy measures, directly or indirectly, explicitly or implicitly. Internal migration under these circumstances can indeed enhance disequilibrium. One basic reason for the types of imbalances characterizing many developing countries is the dualistic pattern of agricultural development (and implied capital-using technological change) that is being promoted, e.g., as in Mexico and in Colombia, or, conversely, the broad-based pattern of agricultural development (and implied labor-using technological change), experienced in Japan and Taiwan, that is being neglected.

This paper attempts to relate the patterns of agricultural development and those of urbanization. Paying special attention to the small-holder, peasant household subsector of agriculture, it argues that the nature of technological change in agriculture interacts with the intersectoral and spatial allocation of population. Drawing on the experience of Japan, I argue that a dispersed and rurally-oriented settlement pattern can confer important advantages during the course of a nation's structural transformation.

II. THE SOURCES AND RATES OF PRODUCTIVITY GROWTH IN AGRICULTURE

It has now become quite common to consider productivity gains in agriculture in terms of an identity,

$$\frac{O}{L} = \left(\frac{A}{L}\right)\left(\frac{O}{A}\right)$$

where O stands for output, A cultivated acreage, and L labor. The productivity of labor in agriculture is the product of land area per worker (A/L) and output per acre (O/A). Thus, growth in the productivity of labor can be decomposed into growth in land area per worker and output per land area. Alternatively, the identity indicates that productivity growth in agriculture can be derived either from an increase in land area per worker or from an increase in output per acre. On the one hand, increases in land area per worker can be achieved through technological innovations that allow a worker to cultivate a greater amount of land: the mechanical-engineering innovations. On the other hand, increases in output per acre are achieved by better seeds, more water control, fertilizer use, multiple cropping and better cropping mix: the biological-chemical innovations.

In Japan, three distinctive periods can be discerned in the growth of agricultural productivity since the Meiji modern growth began. A rather rapid progress before World War I is contrasted to the relative stagnation after the 1920s until World War II. The productivity of labor in agriculture, however, has risen impressively once again since the 1950s, once the disastrous influences of World War II were absorbed. According to one study, during the earlier period the growth in output per hectare accounted for approximately 70 percent of the growth in total output and for over two-thirds of the growth in output per worker (Binswanger and Ruttan, 1978, p. 53).

Given Japan's limited endowment of land, a decline in the price of fertilizer relative to the price of land can be expected to increase fertilizer use per hectare.

A strong negative relationship can be hypothesized (in fact, has been empirically confirmed) between the price of fertilizer relative to the price of land and fertilizer per hectare. Alternatively, the use of land per worker increases as the price of land relative to the price of labor declines. As an increase of acreage per worker would be made possible by increased use of machinery, a decline in the price of machinery relative to the price of labor should also lead to an increase in the use of land per worker. A strong negative relationship is hypothesized (and empirically confirmed in Japan and in the U.S. among others) between land area per worker and the price of machinery relative to the price of labor.

Because the output per unit of labor (labor productivity) is given by the product of acreage per unit of labor and yields per unit of land, one can decompose an increase in labor productivity into changes in labor input per hectare and those in yields per hectare. The national average output per unit of labor is taken to be the weighted average of labor productivity for each farm type. The productivity change is then the change in the weighted national value of labor productivity between two dates. If we consider each variable and each grouping of variables as a factor with a measurable independent effect, we can compute values indicating the relative importance of the factors in question (Kaneda, 1967, 1980).[1]

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[1]For example, to analyze the effect of the transfer of landownership from owners to tenants reflected in the change in the tenurial weights, separately from the effects of changes in labor input per hectare and yields per hectare, I calculated an index with changes in the period values of the variables, generating a family of eight indices. The independent effect of a factor then was taken as the mean difference between the indices where it appeared in a period 2 (post-reform) value and where it appeared in a period 1 (pre-reform) value. Similarly, the independent effect of a group of factors was obtained by linear combination of indices, accounting for the combined effects of these factors.

For analysis of the periods after 1951, when the land reform program was already completed and virtually all Japanese farmers were owner-cultivators, the size of farm operations became far more important than tenurial types. The weights derived from the share of output of farms in different sizes replaced the tenurial weights of the

According to the accompany table, labor productivity increased by some 65 percent during the period between 1939-41 and 1946-48. Of this, the contribution of the gains in land productivity was the most important factor. Fully three quarters of the change in the productivity of labor are accounted for by the growth in land yields. Next comes the contribution made by labor savings. The computation shows that the shift in the share of output between owner-cultivators and tenants as the consequence of the land reform (as indicated by the relative importance of the "weight" factor in Table 1) was responsible for an almost insignificant part of the increase in the national average productivity of labor.

Between 1952 and 1961 the productivity of labor in agriculture rose by some 40 percent. In terms of measured independent effects, the contribution of the gains in land productivity was still the most important factor, although mechanization (along with other methods of substituting capital for labor, such as the use of insecticides and herbicides) accounted for more than 40 percent of the gains. Taken together, these factors accounted for more than 95 percent of the gains in the productivity of labor during the 1950s. It is significant to note that the proportion of the gains attributable to the improvement in land productivity showed a relative decline, between the forties and the fifties, while the share contributed by the advance in mechanization and other methods of substituting capital for labor increased impressively (from 18 percent to 42 percent) between the two decades.

The decade of the sixties and the early seventies witnessed dramatic developments in Japanese agriculture. The growing shortage of farm labor in the sixties, when

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immediate post-war period. The stipulation, of course, is that for the period of rapid growth of the economy of Japan and of the tightening labor conditions in agriculture, it is desirable to measure the importance of the economies of scale at least indirectly. The relative importance of the factors was calculated using the identical method as above (with the size weights instead of the tenurial weights). The results for the decade of the 1950s and for the period between 1965 and 1975 as well as those for the period straddling across the land reform are quite interesting and instructive for the purpose at hand.

TABLE 1

Gains in the Productivity of Labor Attributable to Factor Components, Japanese Agriculture, Selected Years

	1939-41 to 1946-48	1952-54 to 1959-61	1965 to 1975
V (weights)	2.6	4.4	8.6
L (labor inputs per tan)	17.9	42.2	56.7
Y (output per tan)	75.8	43.3	27.4
VL	-2.6	6.7	0.4
VY	4.0	-5.6	2.0
LY	3.3	10.0	4.5
VLY	-1.1	-1.1	0.4
TOTAL	100.0	100.0	100.0

Notes: 1) The weights for 1939-41 to 1946-48 are the shares in the total number of farms of owner-cultivators and tenant-farmers. Those for later periods are the shares of farms classified according to five size groups.

2) A tan is about one-tenth of a hectare.

Source: Kaneda, 1967, p. 1449, and Kaneda, 1980, pp. 474 and 479.

approximately half a million annually flowed out of the agricultural labor force, prompted mechanization of an increasing number of agricultural operations. The use of machines in harvesting, and even in transplanting, has spread to all parts of Japan, particularly to rice farms.[2] The process of mechanizing most field operations were the prima facie evidence of the shift of emphasis from the centuries of land-productivity-oriented growth to labor-productivity-oriented growth in Japanese agriculture.

During the period between 1965 and 1975 the national average productivity of labor in agriculture increased by some 57 percent. It is evident that in this period the contribution of the gains in labor saving innovations alone was more than half of the overall gain. Yield-enhancing innovations were still important, although in comparison with the earlier decades, their relative importance was clearly on the wane. The computation showed further that the interscale shift in the share of output was responsible for a significant part of the gains in the national productivity of labor in agriculture.

The substantial growth in agricultural labor productivity during the period of rapid economic growth was consistent with the speed and the pattern of urbanization in postwar Japan. In comparison with the experiences of many countries during that period, Japan has escaped almost all of the most serious problems that have accompanied rapid urbanization elsewhere. Of course, the problems of the quality of urban life in terms of housing, environmental pollution and the general lack of space have indeed plagued most Japanese cities. However, violent crimes, drug abuse, group antagonisms,

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[2]Mechanization in Japanese agriculture was largely limited to ancillary (post-harvest) operations and irrigation systems until about the middle of the 1950s. Handheld tractors (called "cultivators") and sprayers were the first to be introduced into field operations. They spread widely in the late 1950s and early 1960s. Since about the mid-1960s, however, riding tractors, transplanting machines, and harvesters came to be widely adopted by Japanese farmers.

etc., have not been serious. The homogenous population, language, customs, etc., must all have contributed to this situation. So has the rapid growth of the economy, especially in the industrial sectors, which has generated enough employment opportunities for absorbing labor. Indeed, there has been virtually no large pool of unemployed in the cities. It is being recognized also that the high quality of Japanese education outside the cities has contributed to this rather enviable pattern (Mills and Ohta, 1976). However, more often than not the role played by the agricultural sector in the process of urbanization seems to have escaped the literature on Japanese urbanization.

It appears important, therefore, to analyze the ways in which types of technological innovations in agriculture contributed to retaining labor when it was not needed elsewhere and releasing labor when it was needed. Also pertinent to the issues for analysis is the way in which agricultural growth was shared by the bulk of the nation's farmers and, as a consequence, was able to contribute to developments in rural based activities dispersed geographically (although in the general sphere of economic activities of the large metropolitan centers). It is significant that the rapid urbanization in the 1960s resulted from the growth of the urban population due to the annexation of rural areas in the 1950s (Mills and Ohta, 1976). It is incorrect, therefore, to attribute Japanese urbanization solely to internal migration of people from rural areas to large cities, as is customarily done in specification of migration equations.

III. UNIMODAL OR DUALISTIC PATTERNS OF AGRICULTURAL DEVELOPMENT

One of the most important strategic questions in agricultural development concerns the alternatives of "the progressive modernization of the entire agricultural sector" and "the crash modernization strategy that concentrates resources in a highly commercialized subsector." Johnston and Kilby refer to the first alternative, illustrated

by the patterns of agricultural development in Japan and Taiwan, as a "unimodal strategy" and to the second alternative, as found in Mexico and Colombia, as a "bimodal strategy" (Johnston and Kilby, 1975).

Colosio has characterized the dualistic nature of Mexican agriculture by hypothesizing the existence of two subsectors of agriculture represented by two production functions of different functional forms (Colosio, 1979). In his framework, commercial agriculture is composed of all irrigated farms having relatively capital-intensive techniques, with relatively large rates of total factor productivity growth, larger yields per hectare, and most of its output commercialized. The other subsector is characterized as rain-fed agriculture, with low capital intensity, relatively low technical progress, and most of its output destined for subsistence consumption. The first subsector is represented by a CES production function, homogenous of degree 1, with capital, labor, and land in the argument. Partial elasticities of substitution between any pair of factors are assumed to be equal (and presumably less than one). The subsistence subsector is represented by a Cobb-Douglas production function, because according to Colosio, variations in factor shares have not been substantial.

There are several substantive issues which Colosio's formulation points out for the purpose of examining the duality in the agricultural sector.[3] In the discussion below, however, it is to be understood that the model of dualistic agriculture is not strictly "Mexican." Instead of a strictly subsistence subsector, the existence of a small-farm subsector, which is composed mainly of family household farms, largely self-employed, and paracommercial is assumed. The two subsectors are, therefore, a large, commercial subsector and a small, household-farm subsector.

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[3]Some of these issues are formally examined in the context of a computable general equilibrium model elsewhere (Kaneda, 1981).

In the first place, one of the outstanding differences in the two subsectors is their respective input structure. Purchased machinery would be important in the commercialized subsector while it would be virtually absent in the small-farm subsector. Needless to say, modern farm equipment and power machines are so expensive that it is advantageous to develop larger farms in order to make full use of the assets and hold down unit costs. Introduction of large machines, therefore, necessitates large management units.[4]

Furthermore, once investments are made on fixed assets, the short-run cost function becomes "lower" than its long-run counterpart. Since fixed costs are costs foregone in the short run, they do not affect the short-run supply of output. In the short run, so far as the commercialized subsector is concerned, the price of the product can fall to the levels that cover only variable costs and not fixed costs. Such a situation would be disastrous to the other subsector, whose total costs are largely variable. Thus, the difference in input structures produces an important difference in the capacity to withstand adverse developments for the two subsectors.

Secondly, inputs in agriculture can also be divisible. In contrast to the large machines, inputs such as seeds, fertilizers, and agricultural chemicals are divisible, and because of this, can be made neutral to the scale of operation of farms. If the conditions for their use are feasible (availability of credit, easy access to water, extension services, etc.), small farms can adopt these inputs with only minor adjustments. The implied strategic question is to choose between alternative ways of either involving the great bulk of small farmers or concentrating on the commercial subsector in directing innovation activities and allocating investments.

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[4]Of course, it is possible to design tractor hire-service arrangements that can be used for many small management units. The basic technological and economic superiority of large management units under these circumstances, however, is undisputable.

In the third place, it is important to consider the substitution and the complementary relationships between these types of inputs and the farm resources of labor and land. It is often observed that biological-chemical inputs increase the use of labor on farms by making it possible to grow more crops, more lucratively, per hectare of cultivated area. In contrast, tractors and combines are more often than not alleged to be labor-displacing. Thus, elasticities of substitution between any pair of inputs, primary and/or intermediate, become rather important parameters to be considered explicitly.[5]

Fourthly, it is a matter worth remembering that over a long period of development the small-farm subsector of agriculture must contain the majority of the nation's farmers. From the point of view of rural development objectives (with a specific target population of the rural poor), this subsector is overwhelmingly more important than the commercial subsector, although the latter contributes the larger amount of marketable agricultural commodities. It is apparent, however, given the socio-institutional structure as well as the demographic conditions of most rural areas, that the growth rate of output in the small-farm subsector (rather than the wage bill of the commercial sector) determines by and large the rate of increase of incomes of most of the rural population.

Fifthly, it is worth considering the economic relations between the two subsectors in agriculture and other sectors outside agriculture. On the one hand, there is the interdependence of sectors through direct intermediate (goods) deliveries. Obvious examples are cash crops to be processed, such as cotton, coffee, and sugar on the

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[5]If there are only two goods, as in the customary primary factors, they must be substitutes. For further treatment of this subject see Kaneda, 1981.

agricultural output side, and machines, implements, fertilizers, and pesticides on the industrial output side. On the other hand, each of the sectors can be a source of effective demand for the final products of another. The dualistic structure of agriculture is likely to be characterized by the direct intermediate delivery relationships exclusively between the commercialized subsector and the urban (capital-intensive) manufacturing sector while the small-farm subsector is left "dammed up" without comparable intersectoral relationships. Alternatives ought to be analyzed for the growth of intersectoral relationships between the small-farm subsector and the manufacturing activities in both urban and rural areas. It is likely that there exists a positive intersectoral relationship derived from the types of technological change fostered in agriculture. Small equipment and implements are more likely to be produced for local markets than larger ones. In Japan's experience a broad-based agricultural development pattern contributed to the creation of dispersed rural markets for developing indigenous industries. The complementary relationships between agriculture and rural industries, as they are affected by technological change, must therefore be considered explicitly.

Finally, given the demographic conditions in many less developed countries, promoting the capacity of agriculture to retain its labor force when alternative employment opportunities are not opening up, may well be as important as developing employment opportunities in urban, industrial, and service sectors. It is unlikely that the highly capital-intensive subsector will accomplish this task, as its marginal capital-labor ratio would be disproportionately high. The small-farm subsector, however, would be able to achieve this objective only if it could increase the productivity of labor within its subsector at a substantial and sustained rate. It seems reasonable to suppose that the overriding concern of new entrants into the labor force (rural youths in particular) is not so much the comparative rural-urban levels of earnings at the time of entry as the age-earnings profiles in alternative sources of employment. This is

clear in an economy characterized by "life-time employment practices." The concern, however, is more or less universal. A slower growth of labor productivity in the subsector that contains rural youths must increase their annual outflow. This outflow can be expected to increase still more if situations do not improve. The usual consequence of this is, of course, the augmented population pressures on urban centers and the creation of serious urban problems.

IV. INTERSECTORAL FLOWS OF LABOR IN THE SMALL-FARM SUBSECTOR OF AGRICULTURE

It is, of course, necessary to clearly distinguish between the stock and the flow concepts of labor input.[6] If attractive opportunities draw a part of the current agricultural labor to town and cities, and if some form of compulsory leaves are imposed on a part of the existing agricultural population, be it formal schooling, labor conscription, or military obligations, the potential stock of agricultural labor force will have to decline. On the other hand, the flow requirement for labor changes according to production and marketing organization, technology, and capital inputs which are in turn influenced by the scope and depth of the capital market and the products favored (Kaneda, 1979).

This distinction between the stock and the flow concepts acquires added significance, when one considers the fundamental characteristics of the small-farm subsector of agriculture. When making their decisions on labor input, small-farm proprietors take into account several relevant considerations. Given the anticipated amount of labor input required for a certain agricultural enterprise, they may (1) decide to put

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[6]Reasonable accounts of agricultural labor input must reflect: (1) the rate of participation by individuals in the economic labor force of the community, (2) the age, sex, and skill structure of the labor force in order to explicitly account for the differences (say, overtime) in the composition of the labor force, and (3) the apportionment of labor inputs between strictly defined agricultural activities and non-agricultural activities.

their own working hours to the enterprise, (2) choose to have available family members do a portion of the work, (3) have hired workers take over a part of the work, and/or (4) make use of the labor pool arrangement of the community, whereby labor is exchanged among farm families according to the individual needs of the proprietors.

The third case above inevitably entails payment of wages, whereas the others do not. The significance of this difference arises from the fact that a cost is sunk before the returns are realized, representing a prior commitment on uncertain monetary yields. In itself this cost appears to be no different from any other commitment of funds for the purchase of current inputs. Problems of uncertainty aside, the proprietor's decision variable is the family income -- the sum of earnings by the farm's own resources including family members' labor. Then, the flow of family labor input will depend crucially on their net earnings relative to the wages payable to hired workers in agriculture and nonagriculture. The expected increases in the proportion of nonagricultural activities of a "representative" farm household and the expected changes in farm labor input by different family members reflect these economic forces at work in both agricultural and nonagricultural sectors.[7]

Taken together, these considerations mean that labor in the small-farm subsector of agriculture can flow intersectorally in a variety of ways. Given a stock of labor in a farm household, for example, family production of nonfarm goods may be carried out on a part-time basis by all the family members, by only some of the family members on a full-time basis, or by any other combination. Similarly, if rural nonfarm employment is available, all the family may work for wages part-time, only some of

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[7] It would be common in the small-farm subsector of agriculture to have a variety of enterprises to be carried out by an individual farm, where production processes as well as marketing are intimately bound up with the growing characteristics of the crops and animals. As a consequence, depending on the season or the stage of growth of crops and animals, peak and slack seasons appear and different tasks are required of labor.

them full-time, or only one full-time. In these cases either a stock of labor, a flow of labor, or both would have undergone intersectoral movements, even though none of the family members changed the original place of residence.

In the situations of this type, however, it is not clear whether changes in the farm household's stock of labor would change labor input in flow terms of the household's various economic activities. It is quite possible that the effect of withdrawal of self-employed and unpaid family workers could be counteracted by an increase in the average output of the remaining self-employed and unpaid family workers. In this respect, A. K. Sen has made an important distinction between the marginal productivity of a worker and the marginal productivity of a manhour in agriculture. He has shown that the former would be zero, even though the latter would be substantially above zero (Sen, 1966 and Zarembka, 1972, ch. 1).

Of course, substituting for the services of family members who are no longer in residence in the household cannot go on forever. Nor is it possible to keep increasing outputs of both farm and nonfarm activities, under a given stock of labor, without continuous capital deepening and technological change. Thus, there must be limits to the maximum "tautness" that the subsector's stock of labor can tolerate in "taking up the slack," as it were. More realistically speaking, there is a trade-off relationship between self-employed and unpaid family workers on the one hand and, say, wage-salary employment on the other.

Fundamentally at issue here is the question of comparative efficiency of the stock of labor in household activities and wage-salary employment outside the household. When a young woman leaves a farm to work in town, the effect of her disappearance on the farm household's output could be made good by an increase in the output of the remaining family workers. Alternatively, this can be achieved by a small increase

in wage employment in the farm household. That is to say, in this case the marginal productivity of this young woman's labor hour was positive in the household but below that in the wage-salary employment sector.

One way of dealing with this situation is to use a parameter linking the stock of labor in the farm household subsector and that in the wage-salary employment sectors outside. For example, if the value of this parameter is assumed to be one-third, then one unit of labor input in wage-salary employment is assumed equivalent to three units of labor performed by self-employed and unpaid family workers. In terms of the wage rate, the assumption is that the wage rate in the wage-salary employment sector is three times that in the farm household subsector.[8]

Another way is to assume that the small-farm household subsector of agriculture is a residual employment sector. Employment levels in the economy are based on the principle that labor in the wage-salary employment sectors is determined first, on the marginal productivity criterion, and that the rest of the available stock of labor is absorbed in the small-farm subsector of agriculture. In this case the level of employment in the small-farm agricultural subsector is variable and, therefore, the "institutional wage" which often is defined as the average product in the subsector, is also variable.

V. SUBJECTIVE EQUILIBRIUM OF THE FARM HOUSEHOLD

The question of whether a small family farm could survive in competition with a large agricultural business has attracted the attention of students of agriculture since

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[8]Strictly speaking, one ought not to assume a constant parameter value between the stock of labor in the wage-salary sectors, measured in efficiency units, and that in the self-employment sector. An assumption of constancy in the parameter value means that the wage differentials are constant. In fact, actual intersectoral wage behavior reveals that the wage differentials are flexible, widening in times of downswing and narrowing when aggregate demand conditions strengthen (Taira, 1970, ch. 3). Thus, it is clear that the relationship between paid labor and self-employed labor must be determined endogenously, allowing the parametric value to vary depending on the demand and supply conditions for labor in the paid sectors of the economy.

the last century. There are two broad views among those who are hopeful of the small farm's prospects. The first focuses on the nature of agricultural production processes, which are principally organic, and observes that the scale advantage of large farms utilizing machines is not as great as the advantage in industrial (principally mechanical) production. According to this view, the technical superiority of large agricultural businesses was not overwhelming as long as mechanical power depended on steam and electric power. It was quite another matter, however, when the combustion engine was developed and the use of tractors grew.

A second view focused on the small household farm as representing an organization form of a nature peculiar to agriculture. A peasant farm is run mainly (or entirely) by the work of the peasant family, in contrast to large commercial farms, which are run by hired labor. The peasant family is assumed to maximize household utility. This idea can be traced to Russian agricultural economists of about the turn of the century, for example, S. Bulgakov and A. V. Chayanov, and has since been elaborated and extended by a number of Japanese agricultural economists represented by Chihiro Nakajima (1969). The marginalist representation of the original idea can be summarized by the use of two curves, one of which represents increasing marginal disutility of labor at a successive increase in the family labor input, and the other a falling subjective valuation of a gradually larger income from labor (which enables family consumption). The peasant farm household's subjective equilibrium is reached at the intersection of the curves, where the balance of labor-consumption is struck.

The work force resources of the peasant farm are determined not only by the number and the composition of the peasant family; with regard to age, sex, and other attributes, but also by its consumption requirements. Thus, the extent of utilization of the family work force in production is determined as much by the needs of consumers (including nonworkers) as by the available labor resources in the family. In a more

recent representation by Nakajima it is posited that the peasant farm produces to the point at which the marginal valuation of family labor equals marginal product of labor. This marginal product of labor would be less than that on the commercial farm, which is set equal to the wage rate, if off-farm job opportunities for peasant families are limited.

Fundamental in deriving this result is the notion that it is impossible to vary the manpower resources of the peasant farm arbitrarily in combining the factors of production. The availability of other production factors, land, capital, and intermediate inputs, must then be flexible enough to create "technically optimal proportions" for the utilization of the family manpower capacity. For this to be the case the peasant family must be able to alter not only the extent of land utilization, but also the use of its equipment and other inputs. There must be an unencumbered access to the free land and capital markets. If, on the other hand, there is a binding constraint on the variability of these non-labor inputs, say, if the land area is severely limited, then "technically optimal proportions" cannot be achieved and output (income) cannot reach the desired level. The peasant family has to seek employment outside the family farm to establish labor-consumption (subjective) equilibrium.

In discussing the ultimate triumph of the small over the large farming unit in Japan, T. C. Smith focuses on the "unique ability of the family labor force to combine farming with other occupations: to supplement farm income with earnings from by-employment" (Smith, 1959, p. 129). As trade and industry developed providing new employment in rural areas, it became possible to reduce underutilization of labor on family-size holdings. In contrast, despite the expansion of off-farm job opportunities, underemployment of hired labor in larger farms (particularly of those hired on longer

term contracts) became more serious.[9] As the peasant family succeeded in reducing the extent of idleness, its per capita earnings (from both farm and non-farm activities) became greater than those of hired labor in large farms. According to T. C. Smith, labor in large farms could not be employed fully enough to be paid competitively, once off-farm jobs became available to members of peasant families.

Whether one emphasizes the importance of by-employment possibilities or not, or whether one emphasizes the limited availability of land or not, it is clear that the subjective equilibrium analysis is intimately bound up with the dualistic theory of agriculture. Dualism in this context is the coexistence of "commercial" large farms and small-scale, peasant farms. We shall illustrate this dualism by means of two diagrams (Figure 1).

For the sake of simplicity of illustration, we assume here that agricultural output is a homogeneous product whose production requires only two factors, land and labor. We further assume that a typical peasant farm has the option of cultivating its own land and leased-in land, or of engaging in wage labor on other farms or non-farm activities. A commercial farm is assumed to have the option of cultivating land with the use of its own and/or hired labor or of leasing out land to small, peasant farms. The essential elements in illustration are (i) that the peasant farm's owned land is far too small for the family's work force capacity and (ii) that the amount of leased-in land as well as off-farm wage employment opportunities are limited.

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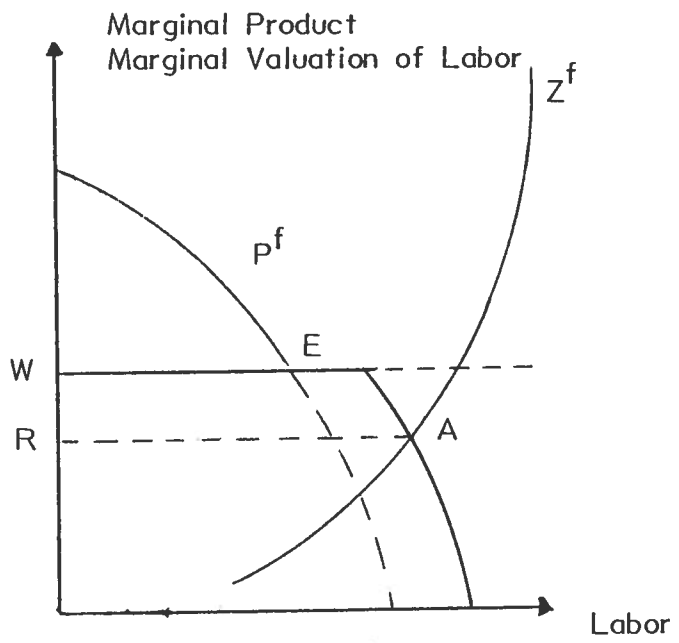
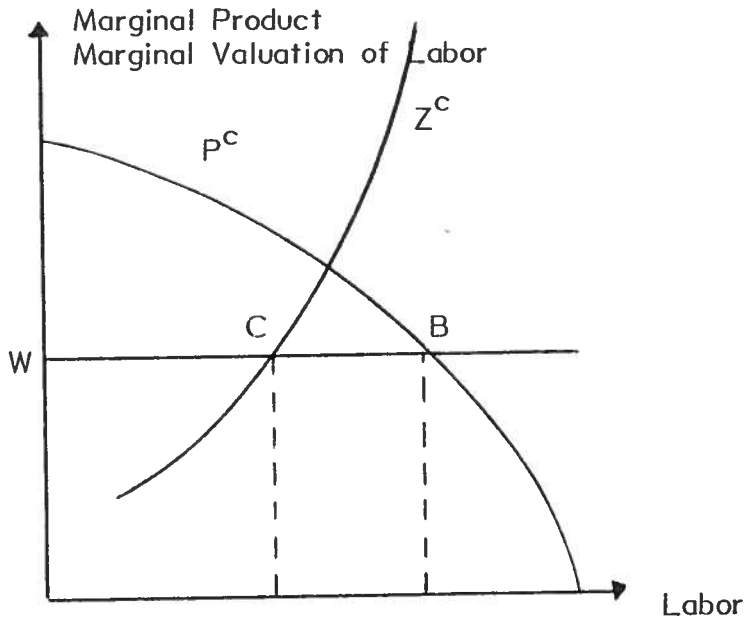
[9] Georgescu-Roegen (1971, p. 252) has observed that:

> Nature, as a silent partner of man, not only dictates to man when he should start an agricultural process, but also forbids him stopping the process until it is completed. In industry we can interrupt and start again almost any process when we please, but not so in agriculture.

As a consequence, underutilization of labor and capital (and "overpopulation" and "overcapitalization" of agriculture) is the predicament of farming as an economic activity. Furthermore, according to Georgescu-Roegen, to do away with this type of nature-enforced agricultural idleness is a well-nigh impossible problem.



(a) Peasant Family Farm



(b) Commercial Farm

FIGURE 1

Subjective Equilibrium of Peasant Farm

For a utility-maximizing peasant farm the point of subjective equilibrium is given at point A on Figure 1(a), where the marginal valuation of labor (Z^f) equals the marginal product of labor (P^f). The point of intersection is below the wage rage (W). Of the total labor utilized by the peasant farm, AR, the segment E is labor devoted to activities off the peasant's own farm. The assumption here is that the off-farm employment opportunities are limited strictly to the amount of E. The gap results, therefore, between the marginal valuation of labor and the wage rate.

For a commercial farm the maximization of utility implies that the marginal valuation of own labor (Z^c) equals the wage rate (W). Profit maximization requires that the marginal product of labor (P^c) also equals the wage rate. Thus, the equilibrium is at point B on Figure 1(b). The segment CW is the commercial farm's own labor, and the segment BC is hired labor.

Given that the land area available to the peasant farm is limited, and off-farm employment opportunities are also initially limited, there exists a dualism in the labor market of agriculture. Since the subjective marginal valuation of labor by the peasant farm is below the wage rate, additional labor is supplied by the family if employment opportunities arise either in other farms or in non-farm activities. In this perspective, then, it is quite natural for peasant families to exploit off-farm job opportunities and combine farming and non-farming activities without causing a decline in total farm output.

The income of the peasant family will increase (as will its per capita earnings), as employment opportunities are expanded, until its marginal valuation of labor equals the wage rate. When the slack in the family's work force utilization disappears, so does the dualism of agricultural labor.

If the shadow price of time for the peasant family (that represents the ratio of the marginal utilities of time and income) falls short of the (real) wage rate, it

indicates that the marginal (value) productivity of the peasant's family labor falls below the current wage available by working for someone else. This situation may be deemed to reflect that the decision to seek employment from another, in village society, is not strictly economic, as it entails at the same time social and personal relationships. Thus, in order to avoid the stigma attached to working for another, the small peasant's family may choose to depress the "internal" margin of labor productivity below the "external" (Marglin, 1976, p. 13). It is likely, however, as Marglin points out, that the stigma attached to working for one's neighbor does not carry over to working for a non-farm enterprise removed from one's village. Thus, it is more likely for non-farm enterprises to draw agricultural "slack" labor of the present family at less of a cost to society than the wage rate indicates. From another perspective, the peasant farm is a unit in the self-employment sector, acting as the residual employer. All work force capacity which does not have non-farm employment is absorbed by the peasant farm sector and is to be "engaged" therein.

VI. INTERNAL MIGRATION IN PEASANT AGRICULTURE

The historical experiences of advanced economies indicate that the degree of urbanization is highly correlated with the level of development. The development process has, therefore, come to be identified simply with shifting the center of gravity of a population and its economic activities from primarily agrarian to urban, industrial-service oriented areas. In simplified development models, internal migration would be treated as sectoral labor transfer, and it is usually assumed to respond to intersectoral (or interlocational) wage differentials.

Given that the secularly rising relative importance of the non-agricultural sector would be the source of increasing employment opportunities, the direction in which labor moves is self-evident. Simply put, internal migration occurs when a stock of

labor moves from agriculture to urban sectors. The growth of non-agricultural employment opportunities, however, would be high or low depending on (1) the rate of expansion of labor-intensive sectors, (2) the share of labor employed in these sectors, and (3) the responsiveness of employment growth in the faster growing sectors. Thus, intersectoral transfer of labor is affected by the interplay of agricultural and non-agricultural factors.

Intersectoral flows of resources need not be the same as interregional flows of resources. In fact, a rural-to-urban flow is only one of the manifestations possible for intersectoral flows in the process of economic development and structural change. It is the contention of this paper that intersectoral flows inevitable in the process of development can take various forms and that locationsl changes are but one, albeit most visible, of their dimensions. To put it another way, urbanization as a result of movement of population to large cities, is not a sufficient or necessary condition for economic development.

Again, one may find the experience of Japan in the Meiji era instructive. Throughout the early period of industrialization, and most of the years prior to World War II, Japan increased her industrial output without reducing the number of households engaged in agriculture. In particular, it was not large city-located industries that were mainly responsible for the pre-1914 growth; it was "the expansion of Japan's basic economy -- agriculture and small-scale industry built on traditional foundations -- which accounted for most of the growth of national productivity and income during this period" (Lockwood, 1954, p. 25). Lockwood estimates that half of Japan's 5.5 million farm families had some non-agricultural employment in the 1930s and that for about one-fourth of these farm families the income from non-agricultural activities exceeded that derived from farming (Lockwood, 1954, p. 491).

The agriculture of Japan maintained the sectoral labor force of some 5.5 million farm households since the Meiji period to World War II. In the meantime the sectoral composition of labor force changed drastically, from a high of about 83 percent in the primary sector in 1880 to 44 percent in 1940 (and to less than 12 percent in 1975). Underlying this structural transformation of the economy, and the absorption of rural labor into urban sectors in particular, were the intergenerational transfers of labor from rural to urban sectors based largely on the Japanese family structure in the countryside. According to Japanese demographers and sociologists, the pattern of primogeniture in land inheritance reinforced by the civil code enacted in the late nineteenth century was important (Fukutake, 1967). After one of the sons became heir to the farm, the siblings migrated out of agriculture. Generations of farmers' children, therefore, entered into nonfarm activities in town and cities and still larger metropolitan areas.[10]

The experience of Japan indicates a case to be made for deconcentration of industries to the rural area and for promotion of nonfarm activities in country and rural towns, allowing both agricultural and industrial growth to proceed without causing excessive spatial imbalances in population distribution. By means of small-scale rural activities it was possible for the nonfarm activities not only to utilize labor on the farm in slack seasons, but also to marshall and utilize on-farm resources such as family savings and local raw materials that would otherwise have remained idle.

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[10] Important indeed were the spread of public education and its impact on internal migration. Education of siblings in farm families was at once an investment in human capital and a form of division of family assets for those who were not inheriting land. Thus, in the prewar years the sectoral composition of labor force changed due largely to the majority of new entrants in the labor force choosing non-agricultural sectors and occupations. In the mid-1950s and thereafter, however, the rapid growth in the demand for labor in urban sectors has absorbed not only new labor force entrants but also many presumed heirs to farms as well as those already engaged in agriculture. Therefore, in the postwar period of rapid growth intergenerational transfer of labor was complemented by intragenerational transfers of labor.

Eventually many local industrial towns in Japan became urban, as the structural transformation of the economy occurred. Because of this, and because of migration and natural increases, the percentage of the urban population rose. It is to be emphasized, however, that this form of urbanization was as much a consequence of economic development and structural change. The experience of Japan serves in focusing attention on the interrelationships and interactions between this form of urbanization and the patterns of agricultural development.

In E. A. J. Johnson's "central place" approach, the critical factor in the process of urbanization is a community's marketing performance. The size of the market defined in terms of average incomes and the number of inhabitants covered depends on the length of market radius. So does the effectiveness of competition and the range of consumer's choice. A community must, therefore, be integrated into a larger market system, in graduated hierarchies comprising towns, small cities, and medium-size cities (Johnson, 1970). Spatial design of this type, for a given community, makes possible satisfactory market performance that stimulates and impels the community's producers to raise productivity. The question is how to make this approach operational in the context of rural development or regional development.

VII. CONCLUDING REMARKS

In the context of the issues addressed in this paper, the following are some relevant considerations.

(1) In more densely populated parts of the world where the small-farm subsector of agriculture is of overwhelming importance, shorter radii can cover more people. If, by emphasizing divisible (biological-chemical) technologies, satisfactory productivity growth is achieved and is shared by the people more broadly, the economic size of this smaller area can then match that of a larger area with extensive land use.

(2) It is reasonable to presume that, if a migrant is proceeding from a location in an area surrounded by densely distributed opportunities, he/she would have a shorter migrating distance on the average than if he/she were to migrate from a location in an area where opportunities are more sparsely distributed. The secondary impacts arising from the income-expenditure linkages of the broadly based pattern of agricultural growth (emphasizing interactions with local non-farm enterprises) would contribute in distributing non-farm employment opportunities locally.

(3) As the process of economic development proceeds on the lines discussed above, and as the economy undergoes structural transformation, these towns, small cities, and medium-sized cities that are production, trade, and service centers would themselves become larger. Small cities may be incorporated into larger cities. Rural towns may do the same, eventually. And the percentage of population in urban residence rises due to this form of urbanization as well as to increases in the population of the established metropolitan areas. In the meantime, the country and the region would have had a dispersed pattern of urbanization without suffering from excessive imbalance in population distribution.

(4) It is true that the populations of some small cities decline, usually because of an imbalance between in-and out-migration. It is also true that large metropolitan centers, which attract waves of migrants over many years, later lose many residents to their places of origin. Factors responsible for the so-called "U-turn" phenomena and for ebbs and flows of place-to-place migration of this and other types are not well understood. It seems, however, that although they are important, the place-to-place migration patterns of this type are "second generation problems" in human settlement patterns. It also appears that the population dynamics involved in these phenomena are largely independent of the changes in which agriculture plays a dominant role, and

that they are to be distinguished from rural-to-urban migration in the "representative developing country."

It has been argued in this paper that the nature of technological change interacts not only with the share of income accruing to the majority of farmers but with the intersectoral and spatial reallocation of population. Of particular interest has been the effect of agricultural technological change on the magnitude of internal migration and patterns of settlement. It is important to pay attention to such a policy as leads to a dispersed, rurally-oriented pattern of population reallocation as contrasted to a pattern of urbanization centered on established large cities. The paper has argued that there are important advantages in a dispersed pattern of industrialization and in avoiding excessive concentration of the growth of industrial output and employment in a few established large cities.

FOOTNOTES

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