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THE ROLE OF AGRICULTURE'S CONTRIBUTIONS IN THE THEORY OF ECONOMIC GROWTH IN OVER-POPULATED COUNTRIES*

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I

Agriculture's contributions to economic development have been broadly classified by Kuznets under three categories, namely, product, market and factor contributions. The last one comprises a labour contribution, when agriculture releases human labour to be absorbed by the growing non-agricultural sector; and a capital contribution when the resource transferred is capital, or funds for the financing of the non-farm sector, or savings.2

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* This paper has benefited from comments by Dr. William E. Hendrix on an earlier draft. However, the author alone is responsible for the views expressed here.
Of these, it is the labour contribution of agriculture which figures prominently in the two-sector growth models. In the Lewis’ model of growth, the capitalist sector (using reproducible capital) develops by drawing upon the subsistence (agricultural) sector’s vast stock of inexpensive labour. These workers, whose contribution to the total agricultural output was nil, begin to produce in the capitalist sector a surplus above their own consumption. This surplus, when reinvested in the capitalist sector, adds to the total output and absorbs more workers from the subsistence sector. And the process goes on till the “unlimited” supply of labour becomes limited. Thus, in the Lewis’ model, the core of economic development may be said to consist of the transfer of labour from the subsistence sector and its reallocation in the capitalist sector.

The Ranis-Fei model too focusses attention to the transfer of labour from the agricultural to the non-agricultural sector as central to economic development. Assuming initially a given institutional wage and redundant labour in agriculture, the model shows that an agricultural surplus begins to emerge in phase one of development as the redundant workers are reallocated to the non-agricultural sector. In phase two, the surplus begins to decline as the marginal physical productivity of workers remaining in agriculture becomes positive. With further allocation of workers to industry, the surplus falls even more rapidly in phase three and the real wages in both sectors begin to rise. This is the point when agriculture is commercialized and the economy is transformed into a modern industrial economy with a high proportion of its working force employed in the non-farm sector.

Thus, in these models of growth, the labour contribution of agriculture occupies the centre of the stage, while all other contributions are relegated to the background. It may be argued that the process of labour transfer depends on the absorption capacity or the rate of growth in the non-agricultural sector, and that this growth rate must be high enough at least to absorb the natural increases in the working force in its own sector plus a substantial part of the natural increases in the farm sector. In terms of the growth models, the surpluses generated in the non-farm sector are either not available initially for financing its development, or, not significant since the sector constitutes a small fragment of the total economy. Stated this way, the problem is one of raising the initial capital and the rate of growth in the non-farm sector. It is the purpose of this paper to place agriculture’s

4. Lewis’ formulation in terms of the ‘capitalistic’ and the ‘subsistence’ sectors does not deny the possibility that part of agriculture may use reproducible capital. In the rest of this paper, we shall use subsistence sector interchangeably with the farm or the agricultural sector and the capitalist sector with the non-farm or non-agricultural sector.
6. This formulation does not imply that the question of capital formation has been by-passed by the two-sector models. Lewis himself observes that “The central problem in the theory of economic development is to understand the process by which a community which was previously saving and investing 4 or 5 per cent of its national income or less, converts itself into an economy where voluntary savings is running at about 12 or 15 per cent of national income or more.” op. cit.
7. To single out capital as the only factor affecting growth of non-farm sector is to over-simplify the problem. Availability of capital, as Cairncross has argued, need not necessarily ensure the growth of the non-farm sector. See A. K. Cairncross: Factors in Economic Development, George Allen and Unwin, London, 1962.
capital and product contributions in a better perspective. To this end, we shall be concerned with, first, the magnitude of the growth rate in the non-farm sector, required for absorption and exhaustion of the redundant farm labour force. The importance of agriculture's capital and product contributions will be viewed against these considerations. Since the issues involved can be better appreciated if they are related to the historical experience of growth in a specific country, we shall make use of the data on sector proportions of the Indian economy for the last two decades. It will be argued that the creation of an "agricultural surplus," through increasing productivity and income in the farm sector, and its subsequent diversion to the other sector are essential for the growth of the non-farm sector itself. Finally, we shall conclude with a brief examination of the alternative means of diverting the surplus from agriculture, with illustrations from the experience of other countries.

II

For our analysis here, we define the non-agricultural sector as an aggregation of the secondary and the tertiary sectors of the economy, and also include in it certain activities usually included in the primary sector, such as forestry, fishing and mining, animal husbandry, orchards and plantations. Further, we define the size of a sector in terms of the working force employed in it, and the relative size of a sector in terms of the working force employed in it as a percentage of the total.

If there were no growth in the working force in agriculture, an expansion of the non-agricultural sector would mean transfer of labour from the former to the latter. If, however, the working force in agriculture is not stagnant, the rate of growth in the non-agricultural sector will have to be considerably higher for the process of labour transfer to be operative. One measure of the speed at which the non-farm sector is growing and also the speed at which transfer of labour from agriculture is taking place, is in such a case, the coefficient of differential growth, defined as the difference between the rates of increase in the total working force and the working force in the non-farm sector.8

Dovring's pioneering study of fifteen developed countries indicates: (i) that in most developed countries, absolute decline in agriculture did not take place until recently; and (ii) that the non-farm sector must grow at a rate more than twice that of the growth in the total working population in the early phases of development, if transfer of labour from agriculture is to lead to a decline in the total workers engaged in agriculture.9

Following Dovring's lead, we examine here the rate of growth in the non-farm sector in India during the decade of 1951-61, and determine the speed at which labour is being transferred from agriculture. It should be observed that the decade of 1951-61 witnessed a concerted attempt at rapid industrialization and at expanding the non-farm sector in India. The realized total investment in the

9. ibid.
non-agricultural sector was Rs. 4,935 crores over the decade. Investment of this magnitude may be expected to accelerate the transfer of labour from agriculture.

Table 1 presents the relevant data from census enumerations on the size of the two sectors in India in 1951 and in 1961. It will be observed that the total working force increased from 143.2 million in 1951 to 188.6 million in 1961—an increase of 45.4 million. The working force in the non-agricultural sector increased from 42.9 million to 57.5 million—an increase of 14.6 million—over the same period. But the increase in the agricultural sector was the highest, from 100.3 million to 131.1 million for the period, representing an increase of 30.8 million. The annual rates of increase in the total working force and in the working force in the agricultural and non-agricultural sectors work out at 3.17, 3.07 and 3.40 respectively.

**Table 1: Distribution of Working Force**

<table>
<thead>
<tr>
<th>Working force in 1951 (million)</th>
<th>Working force in 1961 (million)</th>
<th>Increase over 1951 (per cent per annum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>100.3</td>
<td>131.1</td>
</tr>
<tr>
<td>Non-agriculture</td>
<td>42.9</td>
<td>57.5</td>
</tr>
<tr>
<td>Total working force</td>
<td>143.2</td>
<td>188.6</td>
</tr>
</tbody>
</table>

*Source: Census of India, 1951 and 1961.*

The coefficient of differential growth turns out to be only 0.23 or about one-fifth of one per cent per annum. At this rate, the speed at which the non-farm sector absorbs labour from agriculture is clearly nominal and insignificant. In fact, it would take about fifteen years to reduce the relative size of the agricultural sector by one per cent from 70 to 69 per cent. Further, if the rates of growth in the non-farm sector and in the total working force are assumed to remain constant, there would be no decline in the working force in agriculture even in a hundred years, the working force in agriculture would continue to grow in absolute terms year after year.

Under the assumption of a constant rate of growth in the total working force, but varying rates of change in the working force in the non-farm sector, it is possible to work out the period when the working force in agriculture begins to decline. Such an exercise would illustrate the magnitude of the rate of change in the non-

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10. The realized total investment in the First and the Second Five-Year Plan was Rs. 6,560 crores, of which Rs. 1,625 crores were spent on agricultural programmes, co-operation, community development and panchayats, and major irrigation.


12. The smaller is the time span over which changes in sector size are considered, the greater is the risk of over-stating the non-farm sector's growth rate.
farm sector required to bring about a substantial transfer of labour from the farm sector. The year the agricultural labour force begins to decline and the distribution of the working force at the end of that year have been worked out in Table II, for three assumed rates of growth in the non-farm sector; the total working force is assumed to grow at 3.17 per cent per annum, and the initial values for the total agricultural and non-agricultural labour force are assumed to be 188.6 million, 131.1 million and 57.5 million respectively. These values are taken from column 2 of Table I.

**Table II—Consequences of Alternative Rates of Growth in the Non-Farm Sector**

<table>
<thead>
<tr>
<th>Annual (per cent) rate of change in non-farm sector</th>
<th>Coefficient of differential growth</th>
<th>Year labour force in agriculture begins to decline</th>
<th>Labour force at turning point (million)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
<tr>
<td>3.40</td>
<td>0.23</td>
<td></td>
<td>-----</td>
</tr>
<tr>
<td>5.00</td>
<td>1.83</td>
<td>43rd</td>
<td>699.5</td>
</tr>
<tr>
<td>6.80</td>
<td>3.63</td>
<td>14th</td>
<td>282.9</td>
</tr>
</tbody>
</table>

It will be observed in Table II\(^{13}\) that at the current rate of growth in the non-farm sector of the Indian economy (that is, 3.40 per cent per annum) the working force in agriculture does not begin to decline even in 50 years. The computations have not been carried beyond 50 years; but the indications are that the size of the agricultural sector continues to grow absolutely. If, however, the non-farm sector could grow at the rate of 5 per cent annually, the annual rate of growth in the total labour force remaining constant, the working force in agriculture would start declining in year 43. At 6.80 per cent rate of growth in non-farm sector, it takes 14 years before the labour transfer process becomes operative.\(^{14}\)

It seems appropriate to conclude that the growth of the Indian economy has been limited not by the problem of labour transfer (or labour contribution of agriculture) but by the inadequate growth of the non-farm sector. It could be argued that this inadequacy is due to the nature of planned investment in industries with high capital-labour ratios. Such an argument would be valid only up to a point; for, the major limiting factor in the growth of the non-farm sector is clearly the overall lack of capital. Although investment in low capital intensity industries would have had the effect of raising the size of the non-farm sector, it is not easy to determine if the consequent labour transfer would have been substantial. In general, it seems that the experience of countries which approximate

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13. The results presented in Table II have been obtained by iteration, using the formula

\[ \Delta P_A = \left( \frac{P_f}{P_A} \right) \Delta P_f - \left( \frac{P_f}{P_A} \right) \Delta P_N \]

where \( P_f, P_A, \) and \( P_N \) represent the total, agricultural and non-agricultural working force and delta refers to the annual rates of change in these variables. For the implications of the formula see, Bruce F. Johnston, "Agriculture and Economic Development : The Relevance of the Japanese Experience," *Food Research Institute Studies*, Vol. VI, No. 3, 1966.

14. The implications of the changes in the size of the two sectors have been set forth in my paper, "Occupational Distribution : Implications for Economic Development," mimeographed.
the two-sector models, such as Japan, has been no different from the Indian experience. Johnston and Mellor\textsuperscript{15} have pointed out that the Japanese development in the early phases was limited by the growth of the non-farm sector rather than by the problem of labour transfer.

It does not appear appropriate to attribute the inadequate growth of the non-farm sector to the unwillingness of the farm population to move out of agriculture. In India, as much as in Latin America, where the cities are being virtually swamped by the rural exodus, there is ample evidence to show that the farm people are willing to move out of the sector even when employment opportunities in the non-farm sector are meagre. Witness the increase in the residual ‘self-employed’ segments in the urban areas, which includes, as J. P. Lewis observes, “the urban in-migrant who, instead of doing absolutely nothing, joins Bombay’s army of underemployed bootblacks or Delhi’s throngs of self-appointed (and tippable) parking directors, or who becomes an extra, redundant salesman in the yard goods stall of the cousin, who according to custom, is going to have to provide him with bed and board anyway.”\textsuperscript{16}

It may be asked if the capital needed for financing a higher rate of growth could not be provided by the surpluses generated in the non-farm sector itself. The answer would depend on the size of the non-farm sector relative to the total economy, on the rate of profit, and also importantly on the size of the productive segment of the non-farm sector. To be sure, profits in the non-farm sector are reinvested to some extent, raising the sector’s growth rate as would be expected in terms of the two-sector models. But it should be pointed out that growth within the non-farm sector is extremely uneven: in general, the relatively unproductive segments, such as the services and the ‘self-employed’ segments grow faster than the productive segments, such as manufactures.\textsuperscript{17} Even in the productive segments, which constitute a fraction of the non-farm sector, slack may exist for a variety of reasons, reducing their ability to generate adequate surplus. These considerations underscore the fact that the reasonably productive segments of the non-farm sector cannot be expected to generate all the capital required to raise the sector’s growth rate.\textsuperscript{18}

If the problem is viewed from the relative size and the relative contribution of the two sectors to national income, the importance of agriculture’s capital contribution can be better appreciated. Typically, in the developing countries, agriculture constitutes 70 per cent or more of the total economy and more than 50 per cent of the national income originate in the agricultural sector. The sheer size of this sector and its relative share in the total income make it a potential source of investible capital. Historically, the growth of the developed economies has been heavily dependent upon the capital contribution of agriculture. In the following section, some aspects of this capital contribution will be briefly examined.

\textsuperscript{15} B. F. Johnston and J. W. Mellor, \textit{op. cit.}
\textsuperscript{17} Dowling has pointed out that if the non-farm sector has a large relatively unproductive segment, then the relevant differential growth rate would be the difference between the rates of growth in the total working force and in the small productive segment of the non-farm sector. Then the required growth rate for the non-farm sector would become extremely high.
\textsuperscript{18} We are leaving the role of foreign aid out of this discussion.
III

The concept of ‘agricultural surplus’ has been frequently used in the literature to emphasize the product contribution of agriculture in the process of the development of the non-farm sector. The workers reallocated to the non-farm sector need to be fed and clothed; the income elasticity of demand for food being high in a developing economy, the rising per capita income also creates an additional demand for food-stuff. The rise in the total demand for food in the process of development is, therefore, higher than the annual increase in the population alone in a non-developing economy. Alongside, there is also a rise in the demand for non-food farm products coming from the developing industries. Thus, the total demand for all farm products rises in the course of development. In a closed economy, it is easy to see the importance of agriculture's product contribution. But even in an open economy, for reasons of conserving foreign exchange, for example, this contribution is important.

The ‘agricultural surplus’ also represents potential capital, or loanable funds for the acquisition of capital, a part or all of which can be utilized for the initial investment in the non-agricultural sector. Assuming there is a farm product surplus in the first place, over and above the subsistence requirements of the agricultural sector, part of it becomes savings and is lent to the non-farm sector for productive investment; part of it can be taxed away for financing the growth of the non-agricultural sector.

The existence of an agricultural surplus and its diversion to the non-farm sector thus become crucial to economic development. As Nicholls has pointed out such an agricultural surplus did exist in England and in the European countries, at the time of their industrial development. Even in the U.S.S.R., economic development began with an initial agricultural surplus: it was able to provide its rapidly growing population with a modest amount of food per capita, and at the same time draw out of agriculture the finance needed for industrial development.

Nicholls has argued that an agricultural surplus does not exist in many countries and has emphasized that it needs to be created first before the non-farm sector can grow. This view may be contrasted with the results obtained from Ranis-Fei model of growth, in which an agricultural surplus automatically emerges as labour is reallocated from the agricultural to the industrial sector, and “we can picture each allocated worker as carrying his own subsistence bundle along with him.” This result seems to be due to certain assumptions in the model, particularly to the assumption that the wage rate in agriculture remains constant.

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19. This is seen clearly in Okhawa’s formulation: \( D' = P\gamma + e \) where \( D' \) and \( P\gamma \) refer to the rates of change in demand for food and in total population respectively, and \( e \) and \( g \) refer to the income elasticity of demand for food and change in per capita income.

20. It is often argued that agriculture’s product contribution should increase in order to ‘release’ labour from agriculture. Cf. “During the early stages of a nation’s growth, productivity in agriculture needs to increase fast enough to release large amounts of manpower to industry.” Agriculture and Economic Growth, U.S.D.A., Report No. 28, 1963, p. 1. Since substantial increase in farm working force is inevitable, this argument is not relevant to the labour surplus economy with a large agricultural sector.


22. Ranis and Fei, op. cit.
In Japan, the 'surplus' did not exist, but was created by a set of policies and measures. Prominent among these were the measures for increasing agricultural productivity with small capital investment (chiefly in the form of fertilizers), land-saving innovations and a network of agricultural research and extension services. And Johnston observes that "a significant part of the increment in national product that resulted from rising agricultural productivity was available for capital formation, partly as a result of agriculture's direct contribution via the land tax to financing government investment and in part through the private investment financed by the increased profits and savings of the landlords."

There are several reasons to doubt the existence of any appreciable surplus in agriculture of most developing countries. First, the current levels of production and income are so low that there is scope for little saving. This is not to deny that there is no saving potential, however; the farmers' propensity to spend on jewelry and ceremonies, and the unequal income distribution resulting from a concentration of land ownership do indicate that some saving potential, however small, does exist even at the current levels of income and consumption. In contrast to the Japanese experience, landlord saving in most countries has been used for conspicuous consumption, and in moneymaking in the agricultural sector rather than in productive investment in the non-farm sector. These potentials need to be tapped, wherever they exist. But in general, the saving thus secured may be too inadequate in comparison with the amount required. If this view is accepted, efforts to raise productivity, income and surplus in agriculture, as in Japan, will have a large pay-off.

IV

We have argued in this paper that in an economy with a large agricultural sector relative to the non-agricultural sector, the rate of growth in the non-farm sector must be high if the sector has to absorb sizable labour force from agriculture. To illustrate the point, we have considered alternative growth rates for the non-farm sector of the Indian economy; the labour transfer process does not become operative for many decades at the current rate of growth in the non-farm sector; for the process to become operative the non-farm sector must grow at a very high rate.

To put the proposition differently, the limiting factor in the growth of the non-farm sector does not seem to be the transfer of labour from agriculture, but the rate of investment. In the early phases of development, when agriculture constitutes by far the largest sector of the economy, it is agriculture's capital (and product) contribution rather than labour contribution which is crucial to rapid growth in the non-farm sector. The surplus needed for capital contribution may not exist, or if it exists, may be inadequate for this purpose. Then efforts need to be made to generate this surplus first, through raising productivity and income in the agricultural sector.

25. W.A. Lewis, op. cit.
26. We do not consider in this paper the problems involved in the diversion of capital from agriculture to industry. Kuznets has observed that "one of the crucial problems of modern economic growth is how to extract from the product of agriculture a surplus for the financing of capital formation necessary for industrial growth without at the same time blighting the growth of agriculture, under conditions where no easy quid pro quo for such surplus is available within the country." op. cit.