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A BALANCED GROWTH MODEL FOR INDIA IN A DUALISTIC SETTING

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Agriculture constitutes the foundation for a really sustained economic expansion because of its size and the importance of its role in India. However, both agriculture and industry should move forward in terms of a balanced growth and there should be an inter-sectoral flow of resources. The planners in India do not seem to have paid enough attention to this type of a growth model. The manufacturing sector has been well developed. But it does not meet fully the needs of the agricultural sector for its inputs. It seems an inter-industry balance is being established rather than a balance between industry and agriculture.1

Recognizing the value of unemployed and under-employed labour as a potential surplus and significant, resource economists have developed growth models for over-populated countries.2 Based on this literature a balanced growth model in a dualistic setting is suggested for India in this article. It is brought out that the isolated approach in the agricultural and industrial sectors has not been very successful. Two balanced growth models, one between agriculture and consumption goods manufacturing industries and the other between agriculture and social overheads and agricultural inputs industries, are analysed. It is suggested that a combination of these two approaches may be the most pragmatic but an inter-sectoral balanced growth between agriculture and social overheads and agricultural inputs manufacturing industries may be the most effective approach in the country at the present time.

The Model

Rural over-population is characterized by the zero marginal product of labour and the average product is near subsistence level. A part of the working force is removed without reducing the agricultural output. The resultant food surplus is mobilized to feed non-agricultural workers. This marketable agricultural surplus constitutes the savings fund or hidden rural savings3 which are mobilized for economic development.

Assumptions of the Model

1. That the inter-sectoral market relationship between agriculture and industry is established by a well organized market mechanism which ensures efficient allocation of resources.

2. That the social and economic bottlenecks are overcome and customs and traditions do not make labour immobile so that there is an opportunity cost for labour.

3. That those who remain on land work harder to maintain the level of production and even to push it up if the necessary economic incentives and agricultural inputs are provided.

4. That the economy is a closed one and the external forces for advance through trade expansion and foreign capital are sluggish or inoperative.

In Figure 4 I(a), M, M', M" are production contour lines of the agricultural sector. Ridge lines OV and OU mark off the region of factor substitutability.

If the amount of land is ot units the labour utilization ratio \( R = \frac{ts}{ot} \).

The population density (number of workers per unit of land) in the agricultural sector, called the endowment ratio \( S = \frac{te}{ot} \).

The labour force which is productive is ts and the surplus labour is se.

The fraction of the existing agricultural labour force which is productive is called the non-redundancy coefficient \( T = \frac{ts}{te} = \frac{ts}{ot} \frac{ot}{te} = \frac{R}{S} \).

\( T \) is thus directly proportional to the labour utilization ratio \( R \) and inversely proportional to the endowment ratio \( S \).

In Figure I(b), total agricultural population is OP, redundant labour force is QP and total agricultural output PM units. Curve \( TPPL \) shows the total physical productivity of labour with ot units of \( \kappa \) and \( TPPL \) increases at a decreasing rate when more and more labourers are added and at N the \( TPPL \) curve becomes horizontal. Average productivity \( APPL = \frac{MP}{OP} \) (slope of OM).

The institutionally determined real wage level is set near subsistence and is related to the average productivity of agricultural labour \( APPL \). This is called the constant institutional wage (CIW).

In Figure I(c), the marginal physical product of labour decreases and at G it coincides with the horizontal axis where marginal physical product of labour \( MPPL = 0 \). A portion of the redundant labour PQ, say, Py is allocated to the industrial sector. The remaining labour force in the agricultural sector produces an output of YZ units, while at constant institutional wage its total real income is represented by XY units. The difference XZ represents the agricultural surplus. This total agricultural surplus, TAS, emerges as a result of the allocation of the re-

4. The model and the diagram are based on Fei and Ranis: Development of the Labour Surplus Economy—Theory and Policy, op. cit.
dundant labour force Py out of the agricultural sector. The disappearance of the redundant labour force occurs at Q and at C the disguised unemployed agricultural labour force disappears and the commercialization of agriculture occurs. The agricultural real wage itself departs from the CIW level and begins to rise along the marginal product of labour. As a result industrial real wage also turns up at the commercialization point C.

The Industrial Sector and the Inter-sectoral Flow

Figure II(a) shows the industrial sector.

Q₀, Q₁, Q₂ are the production contour lines.

A₀, A₁, A₂ gives the expansion path.

In Figure II(b), P, P₀, P₁, P₂, S represents the labour supply curve for the industrial sector and the marginal physical productivity of labour MPPₜ are M₀, M₁, M₂. The competitive employment equilibrium positions in the labour market are indicated by the intersection of these curves with the industrial labour supply curve, i.e., points P₀, P₁, P₂. If initially real capital goods of volume K₀ exists in the industrial sector, equilibrium employment position is determined by curve M₀ indicated by point P₀, equilibrium wage is W₀ and profit π₀. Industrial profit π₀ constitutes the major source of investment funds originating in the industrial sector.

If the rural savings are siphoned off to the industrial sector then the total investment fund of the industrial sector is π₀ + S₀. Assuming that all profits are saved the capital stock in the next period will be K₁ = K₀ + S₀ + π₀. With this new capital K₁ a new MPPₜ curve M₁ is determined which determines a new equilibrium position P₁ causing an increase of the employment of labour by the amount L₀ L₁ which represents an additional transfer of labour from the agricultural sector to the industrial sector as a result of capital accumulation. Thus industrialization and output growth may be viewed as a continuous shifting of the MPPₜ curve to the right (M₀, M₁, M₂) through time.

Thus there is a continuous expansion of the industrial capital stock K₀, K₁, . . . . This in turn leads to a continuous increase in the demand for and employment of labour L₀, L₁, . . . . and a continuous expansion of industrial output Q₀, Q₁, . . . .

The Growth Path in the Indian Setting

In the light of this model the total savings fund I = Sᵢ + Sₐ where Sᵢ are the savings from the industrial sector and Sₐ the savings from the agricultural sector. The savings from the industrial sector would depend on the profits. If agricultural sector does not expand the inter-sectoral terms of trade would go against the manufacturing sector, profit would decrease and ultimately the Ricardian stationary state may be brought about.⁵

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⁵ H. Myint: The Economics of the Developing Countries, op. cit., p. 95.
Figure II
The crux of the problem is now to increase the savings from the agricultural sector ($S_a$).

$$S_a = \text{TAS} - A'_a - Q_a$$

where TAS is the total agricultural surplus, $A'_a$ is the farmer's consumption of agricultural goods.

$Q_a$ is the farmer's consumption of industrial goods. Now $S_a$ would increase if we are able to increase the total agricultural surplus TAS or maintain $A'_a$ and $Q_a$ at the old level as TAS increases. There are several ways of maintaining consumption at the old level like deficit financing, taxation of agriculture, compulsory procurement, etc., but we would not examine these issues here. Our objective here is how to increase the total agricultural surplus TAS.

TAS would increase if we could increase the productivity of our agriculture. An increase in productivity would shift the total physical productivity curve (TP$_P$) upward, shifting the marginal physical productivity MPP$_P$ curve also upward and TAS would increase (Figure 1(b)).

The question thus boils down to what sort of an industrial growth we want to feed back our agriculture. Here it is assumed that the base of an all-round industrial growth has already been laid in the country and the issue currently is what type of industries need further development in terms of a balanced growth with agriculture.

There could be two approaches to this question. In the first approach the interdependence on the demand side is stressed. To induce the farmers to produce a larger marketable surplus of food, economic incentives in the form of manufactured consumer goods are provided. Thus a balanced growth is struck between the agricultural sector and the consumer goods manufacturing sector. But in trying to offer economic incentives we acquiesce in the farmer's unwillingness to postpone present consumption and sacrifice for future economic growth. Our policy has then only a short period implication.

The second approach is that the interdependence on the supply side is emphasized. In this approach we rely on the supply of irrigation, transport, power, machinery, fertilizers, pesticides, improved seeds, etc., to expand agricultural output.

In this model a balanced growth relationship is built between agriculture and social overheads investments and agricultural input industries.

In the light of this theoretical discussion let us examine the investment policy of the Government of India in the Fourth Five-Year Plan. The new investment in organized industry and mining in the Fourth Plan is Rs. 6.193 crores. Out of this amount Rs. 3.543 crores is in the public sector and Rs. 2.550 in the private sector. The distribution of fixed investment outlay during 1966-71 is given in Table I.
## Table I—Investment Outlays in Industry and Mining in the Public and Private Sectors in the Fourth Plan

<table>
<thead>
<tr>
<th>Industry</th>
<th>Public Sector</th>
<th>Private Sector</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing industries</td>
<td>1,660</td>
<td>380</td>
<td>2,040</td>
</tr>
<tr>
<td>Machinery and Engineering industries</td>
<td>347</td>
<td>450</td>
<td>797</td>
</tr>
<tr>
<td>Fertilizers and pesticides</td>
<td>273</td>
<td>220</td>
<td>493</td>
</tr>
<tr>
<td>Intermediate goods</td>
<td>310</td>
<td>640</td>
<td>950</td>
</tr>
<tr>
<td>Consumer goods</td>
<td>82</td>
<td>640</td>
<td>722</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>240</td>
<td>220</td>
<td>260</td>
</tr>
<tr>
<td>Mining, minerals and related developments</td>
<td>831</td>
<td>100</td>
<td>931</td>
</tr>
<tr>
<td></td>
<td>3,543</td>
<td>2,650</td>
<td>6,193</td>
</tr>
</tbody>
</table>


Assuming the pattern of investment as an indication of the stress laid in different types of industries, it seems that sufficient economic incentives in the form of consumer goods industries have been provided. The allocations to fertilizers and pesticides seem to be much less. Indian agriculture is getting commercialized and market-oriented. There is a great shortage of fertilizers, transport, pesticides, improved implements, pumping sets, oil engines, pipes, etc. The production targets in these areas were under-estimated in the Third Plan and there were shortfalls in their achievement. The Fourth Plan investments in the industrial sector also do not seem to take care of the growing needs of agriculture in this respect.

An inter-sectoral flow of resources could be developed by the flow of agricultural inputs from the industrial sector and the flow of marketable surplus from the agricultural sector. The production and distribution of the inputs in the industrial sector and that of the marketable surplus in the agricultural sector would generate significant growth and employment.

To conclude, a balanced growth between agriculture, on the one hand, and social overheads and agricultural inputs manufacturing industries, on the other, is needed in the present situation in the country.