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SOME ANALYTICAL PROBLEMS IN DEVELOPMENT THEORY

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Lecture 2

Some Analytical Problems in Development Theory

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There have been few attempts at formal models of early economic growth. At the same time there has been a great deal of institutional and policy discussion, in which implicit models can sometimes be discerned. In this discussion certain concepts appear with great regularity: the notion of a surplus of labor time which can be mobilized for "modern" economic activities; a presumed behavior of population which leads to a "low-level equilibrium trap"; the need for a "big push" to break out of this trap; indivisibilities and externalities which produce a necessary lumpiness of investment and a divergence between social and private returns; debate over "balanced"versus"unbalanced"growth of production; discussion of the optimal savings rate for a national economy; and possible ways of adjusting to the initially very skewed factor endowment of most LDC's.

Such concepts are the building blocks out of which larger growth models are constructed. So it is necessary to look carefully at them, to see precisely what assumptions are being made in each area, and to check these assumptions against our limited knowledge of the economies in question.

1. Population, Labor Supply, and Labor Efficiency

A poor country has by definition little capital. It has natural resources which may vary from meagre to (potentially) abundant. But its basic resource is its people; and so assumptions about population growth, labor supply, and personal efficiency are central to any growth model.

Population has had a checkered career in economics. It occupied a central position in the classical period, was later relegated to special treatment by demographers, but has recently tended to reappear at least in the development literature. The view that "population is not our business" has tended to be replaced by at least a questioning attitude that perhaps after all it may be our business.

A familiar model in the recent literature is that of the "low-level equilibrium trap." This assumes a functional relation between the rate of population increase and the level of per capita income, operating through the death rate. A rise in per capita income lowers the death rate because fewer people die of disease and malnutrition and because greater resources can be devoted to public health, medical services, and hospital care. It may then easily happen that a modest rise in per capita income is swamped by a more than proportionate rise in the rate of population increase, which drives per capita income down toward its initial level.

This mechanism is unrealistic for today's LDC's, and does not reveal the true nature of their population problem. The recent dramatic decline in death rates in many countries was not related to or dependent on the behavior of per capita income. It results from rather inexpensive transfers of medical technology from the developed countries. The necessary medical personnel and physical supplies can largely be borrowed through the World Health Organization and national technical assistance programs. Such local expenses incurred require only a modest reallocation of government resources. The Ceylon malaria eradication program, in which modest expenditures reduced the death rate from to within years is the most famous illustration. But similar programs of greater or lesser scope are going on in most of the LDC's. One should expect, therefore, that in most LDC's the death rate will shortly have fallen to the 10-15 range characteristic of the richer countries. Assuming that the birth-rate is much more sluggish in the short run, and will remain near the physiological maximum of 40-45, it seems likely that most LDC's will soon be experiencing -- if they are not already experiencing-- population increases of the order of 3 percent per year. This is happening in countries with per capita incomes of $ 50 and with per capita incomes of $ 500, and is best regarded as an exogenous change impinging on the economy.

The initial impact of such a change is clearly unfavorable, since it provides more "mouths" without in the first instance providing more "hands." The ratio of dependent children to active labor force members rises; so that if output per worker remains constant, output per capita is bound to fall. This is a transitional effect, lasting only until the high rate of natural increase has endured long enough to produce a balanced age-structure in the population. In population matters, however, the "short run" is a matter of 30 or 40 years, which is quite long in terms of the "takeoff" aspirations of the LDC's.

After a balanced age-structure has been attained, does it matter whether the rate of natural increase is 3 percent, or 2 percent, or 1 percent ? Modern growth theory implies a negative answer. In steady-state growth, the rate of increase in output will adapt itself to the rate of increase in the labor force. Technical progress apart, output per capita will remain constant at any given level of population growth. We have seen also that Kuznets' investigations for the developed countries over the past century show no relation between the rate of population growth and the rate of increase in per capita output. The median rate of population growth in these countries, however, was not much above 1 percent, and exceeded 2 per cent only in a few of the new world countries with ample land reserves.

In today's LDC's, too, the natural resource situation is obviously very important. There are still a considerable number of lightly populated countries with open frontiers of settlement, in which one can visualize a process of extensive expansion lasting for decades to come. Under these conditions a high rate of population growth need not depress per capita income, but will mean simply that the country will be "filled up" sooner than otherwise. In a fully settled country, however, there seems a strong presumption that a higher rate of population growth--say,3 percent instead of 2 percent-- will mean a lower rate of increase in per capita output. (Hirschman's argument that population pressure constitutes a "challenge" which may induce government to work harder at raising output appears somewhat strained). Many countries, I think, will find it very hard to raise

output at more than 3 percent per year, and so are probably doomed for the time being to stagnate at their present level. Even a well-governed country which is able to raise output at 5 percent a year, and thus raise living standards perceptibly, could have done still better of population growth could have been contained.

Will the present high birth rates in the LDC's eventually fall of their own accord? Possibly so. A familiar argument, advanced by Lewis among others, is that families aim to produce a "target number" of surviving children. Suppose this target number is four, and that half of all children die before reaching maturity. Then eight births will be necessary to achieve the desired result. But if medical improvement reduces infant mortality from 50 percent to 20 percent, a family will need only five births to achieve the desired result. As this becomes realized throughout the population, the birth rate will follow the death rate downward with a lag. This optimistic view implies, however, that families have the motivation, the knowledge, and the physical facilities for family planning-- in short, an effective government program.

It is true also that a country which manages to outrace population growth for a few decades will find its birth rate falling because of increased education, urbanization, and rising standards of living. A new low birth rate-low death rate equilibrium will eventually be attained. But this is a slow process. In the developed countries it took 50 to 100 years. There is no need for today's LDC's to follow this gradualist approach, and the economic case for family planning programs is very strong indeed. The marginal yield on additional expenditures in this direction is in most countries much higher than that of expenditure on physical capital.

Population growth, then, is typically more rapid than would be desirable. This implies that aggregate labor supply is no problem for development, and indeed I doubt that one could find an LDC in which labor shortage --in terms of sheer numbers-- has constituted a growth bottleneck. A rising proportion of the labor force engaged in "modern" economic activity (factory industry, construction, public utilities, education) is a reasonable

test of successful development. Few LDC's are presently meeting this test. Population tends to pile up on the land and in low-productivity trade and service activities in the towns, while the proportion of the labor force in modern industry shrinks. How to absorb the available supplies of labor, rather than how to obtain labor, is the key development problem.

Labor supply does constitute a growth problem, however, in two other senses. First, if the economy is expanding at all rapidly, the pattern of demand will be shifting toward higher-level occupations: teachers, doctors, scientists and engineers, sub-professional technicians, administrators. The low initial ouput of such skills, and the long training period which inhibits any rapid increase in output, readily can become a bottleneck. This is essentially a problem of educational strategy, which will be discussed further in Chapter 8.

Second, while factory operatives and other manual workers are readily available, their productivity is initially quite low. This is partly a matter of physical energy, associated with endemic diseases and malnutrition, which corrects itself gradually over the course of time. But to an even greater extent it is a function of poor supervision, poor personnel policies, and poor production management. It seems generally to be true that (apparently) "cheap" labor leads to wasteful use of labor, and to a wide gap between output per worker in the LDC's and in comparable branches of industry in the developed countries. The bright side of this low efficiency level is that there is much room for future improvement, not so much through substitution of capital as simply through better management; and efficiency does rise over time, particularly where there is the stimulus of a rising wage level. The squeezing out of excess labor, and the steady decline of the labor-output ratio, is doubtless desirable per se; but it does intensify the problem of providing adequate employment opportunities for a rapidly growing labor force.

2. Labor Surplus and Labor Transfer

It makes a substantial difference whether a growth model which assumes that all available factors of production are presently in use, or whether one assumes an unused supply of one or more factors requiring only to be drawn into production. "Developed country" growth models, as we have seen, are typically full-employment models. In the LDC's, however, it is quite plausible to assume some "slack" in factor utilization when the growth process begins. We have noted that some countries have unutilized land. Even without technical progress, industrialization, etc., this could permit a modest extensive expansion in which a growing population is supported at its established level of living.

The experience of some oil-rich or mineral-rich countries suggests the possibility of capital surplus, i.e. revenues available to government in excess of what can be used effectively for productive investment or current government services. Since there is always the possibility of saving, one might question whether this is a true surplus. The development-oriented oil sheikh might accumulate dollar balances which could eventually be used as the absorptive capacity of the economy increases. But since improving the behavior of oil sheikhs is not a very interesting subject for economists, this sort of case has been little discussed.

By far the favorite type of factor surplus in the development literature has been surplus labor. Lewis, Fei and Ranis, and others have assumed that densely-populated LDC's, found mainly but not exclusively in Asia, typically have excess labor in the "traditional sector" of the economy. While the traditional sector includes a variety of activities, agriculture is much the largest component. A distinction is sometimes drawn between labor whose marginal product is zero (the Fei-Ranis "redundant labor") and labor whose marginal product is positive but smaller than the worker's consumption ("disguised unemployment"). Where marginal product is zero, it can be argued that the social opportunity cost of labor is also zero. Here, then, we have a costless resource which can be transferred to productive

employment in the "modern sector" with a consequent rise in national output.

In the most familiar growth models, the existence of such a surplus is simply assumed. It is not demonstrated. Similarly, those who deny the existence of surplus labor often reason from general principles and provide no direct evidence. T.W.Schultz, for example, reasons from a model of what he considers "normal" behavior in traditional peasant communities and, except for the rather dubious "Indian flu epidemic" illustration, provides no direct evidence for his contention.

The question at issue is one of fact, and cannot be resolved by deductive argument. But it is a much trickier question than appears at first glance which helps to account for the diversity of opinion about it. Let us try to sort out its various complications.

First, seasonal and chronic labor surplus must be clearly distinguished. Crop production, though not livestock production, is a markedly seasonal activity, with sharp peaks of labor demand at planning and harvest. How far labor slack in off-peak periods can be mobilized for non-agricultural use, and how far peak demands can be met by emergency use of family labor plus recruits from the cities, are important problems of social engineering. But they are not our problem here. The question at issue is whether a labor surplus exists even at seasonal peaks of demand. Only such a chronic surplus could be transferred permanently to other activities without loss of output.

Next we must distinguish between laborers and man-hours of labor. The agricultural work day is quite flexible--indeed, this is an important method of adjustment to seasonal fluctuations in demand. It is often argued that, as population density per acre of farm land increases, the available work becomes more and more finely subdivided among family members. Each puts in fewer work hours per week and per year. If, the, one adopts some standard of a "normal" or proper work day, and if one observes the work schedule of each family member over a complete seasonal cycle (as has actually been done by the Indian Sample Survey), one can derive a measure of "underemployment" in the sense of divergence between

actual and "standard" work hours. The argument that labor can be withdrawn from agriculture without loss of output can be interpreted to mean that, if one or more family members is withdrawn, the remainder will automatically work longer hours, or can be persuaded to work longer hours, so that total input will not decrease.

Third, one must specify the kind of agricultural organization being discussed. Is it peasant proprietorship, in which all output belongs to the farm family ? Is it a tenancy arrangement and, if so, does the landlord receive a fixed rent in kind or a fixed proportion of output ? Is it a system of wage labor hired by the landowner ? Use of the term "agricultural wage" or"subsistence wage" often makes it sound as though wage labor is under consideration; and one can of course set up a model using only hired labor. This would not be very useful, however, because in most countries much the greater part of the labor applied to agriculture is applied by family members who own or rent their land. Moreover, the large plantation operators who do hire labor in some countries can scarcely be charged with irrationally employing workers whose marginal product is below their wage. The argument that employers may be compelled by social pressure to employ redundant labor may have some force in large-scale industry and government; but I would judge that its application in agriculture is very limited.

We are concerned, then, essentially with peasant agriculture as with tenancy systems which closely resemble it.[1] We measure labor input in terms of man-hour we awaid another possible complication by assuming that output per man-hour is independent of the worker's consumption level. Unless one does this, it is quite possible to get "bootstrap-lifting models" under which, by getting rid of part of the available labor and dividing what they used to consume among the remainder, a fall in man-hours leads to a rise in total output.[2] While such models are ingenious, they probably have little descriptive value except at near-starvation levels.

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[1] That is, systems under which the cultivation receives a fixed proportion of output. As compared with outright ownership, such a system dilutes the producer's output incentive and particularly his investment incentive. The direction of response to changes in family size, technical productivity, and other parameters, however, will be essentially the same under either system.

[2] cf. Wonnacott, Leibenstein

We are still not out of the woods. The labor-surplus hypothesis embraces several propositions which, while they look similar or even identical, stand in fact on rather different grounds. One or more of them may be true without the remainder being necessarily true. We shall consider seriatim the following statements:

(1) that the last man-hours applied in agriculture yield zero marginal product;

(2) that individuals can be withdrawn from agriculture with no reduction of agricultural output;

(3) that removal of this surplus labor generates also a food surplus, which can be transferred to feed the former agricultural workers in their new employment; and

(4) that, so long as this process continues, the labor supply curve to the "modern sector" is horizontal at a constant real wage--there are "unlimited supplies of labor."

(1) It is certainly conceivable that a family might apply man-hours of labor up to the point of zero marginal product. For this to be rational, however, one would have to assume either that, at the zero-product point the marginal utility of leisure to the worker is also zero--he is "satiated with leisure"; or that even by working up to this point, the family is barely able to achieve a subsistence level of living. If the last bit of food must be produced to avoid starvation, the valuation of leisure is irrelevant. On any other assumptions, the fact that leisure normally has some value would lead workers to stop short of the zero marginal product point.

It is conceivable also that, when the zero marginal product point has been reached, each family member is still working less than a "normal" work day. There are potential labor hours which remain unutilized. This seems to be the situation visualized in most versions of the surplus labor argument.

Empirical tests of this possibility are not easy. If one could find a situation in which the agricultural labor force was shrinking, one could then, by observing the behavior of output, draw inferences about labor's marginal productivity. In actuality, however, the farm labor force is everywhere rising, and continues to rise until quite a late stage of development. One can investigate the use of time by farm family members; and it often turns out that even adult male workers are not fully employed at seasonal peaks.[1] But this does not per se tell us anything about marginal productivity. A second approach is to fit an aggregate production function for a crop in a particular country and observe the characteristics of the labor coefficient. Studies of this sort usually show a positive (and significant) labor coefficient, which costs doubt on the zero marginal productivity hypothesis.

Still another approach is through micro-economic data from farm management studies, which permit cross-sectional analysis of inputs and outputs.[2] Recent studies in India and Pakistan indicate that the larger forms use less labor and material inputs per acre, and consequently have lower output per acre. A possible interpretation is that the larger farmers do not need to cultivate so intensively to obtain the conventionally acceptable standard of living. Regressions of total input per acre against output per acre show diminishing returns, but far from zero returns even on the smallest and most intensively cultivated farms. It is interesting also that farms of every

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[1] The Indian Sample Survey has conducted such investigations from time to time. In Egypt, Donald Mead found that in some regions male workers averaged only days of employment even during peak months.

[2] See Morton Paglin, "'surplus' agricultural labor and development" American Economic Review, Sept., 1965; Nurul Islam, "Concept and measurement of employment and underemployment in development economics," International Labour Review, March 1965; and John W. Mellor, "The use and productivity of farm family labor in early stages of development," Journal of Farm Economics, August 1963.

size use significant amounts of hired labor, which suggests that the marginal productivity can scarcely be zero. All told, the available evidence supports a finding that the marginal productivity of farm labor in these countries, while quite low for obvious reasons, is still appreciably above zero.

(2) The second question on our list is whether farm workers can be withdrawn from agriculture with no loss of output. Note first that this is an "academic" question in the sense that net withdrawal of farm labor is virtually unheard of in the early stages of development. Rural-urban migration is typically below, often much below, the rate of natural increase in the rural areas. (This is not inconsistent with the observation that city populations in some countries are growing rapidly. Starting from a situation in which 80 percent of the population and 20 percent urban, a rural outflow of 1 percent a year will mean a 4 percent rate of inflow to urban areas). The important dynamic question is how a larger or smaller rate of increase in the farm labor force will affect the rate of increase in farm output.

If we stay with comparative statics, however, and if we make the conventional assumption that techniques remain unchanged, it seems very likely that with-drawal of labor would be accompanied by a fall in output. This is clearly true if the marginal productivity of farm labor is above zero. But more interesting, it will typically be true even if cultivation has already been extended to the zero-marginal-output point. The reason is that leisure usually has some positive value. The workers remaining in agriculture will strike a new income-leisure equilibrium in which, while they are working longer hours than before, hours will not be lengthened sufficiently to achieve the same total man-hour input (and hence the same output) as before. Output can remain constant only on the assumption that farm workers are already satiated with leisure, or on the rather odd assumption that the marginal utility of

food increases as more food is consumed.[1]

If the conclusion that output must fall seems a bit unreal, this is doubtless because the assumptions used are very restrictive. Techniques are not in fact independent of the available labor supply. Shrinkage of the labor force would probably produce a reconsideration of techniques which would raise man-hour output. Moreover, the concept of a shrinking farm labor force is itself unreal for the reasons suggested earlier.

(3) While total output will probably fall as labor is withdrawn, both marginal and average output per man-hour should rise, since the agricultural sector is moving to the left up of the Productivity curves. The next question is whether this generates a food surplus which is available as a "subsistence fund" for workers in the non-agricultural sector.

The precise outcome depends on the assumed tenure system. Under a system of hired labor, assuming no change in the hourly wage for the time being, the landowner's average profit per man-hour of labor (the gap between the wage line and the average productivity curve) is immediately increased. His total profit is reduced, however, by the fall in labor input and in total output. He will presumably try to move back to his initial equilibrium by hiring more man-hours of labor. But, depending on the supply situation, this may cause wages to rise. And even if more man-hours are available at a constant wage, the best he can do is restore total profit to its original level. There seems no possibility of generating a new "surplus" by this route.

Under peasant proprietorship, the increase in average output per man-hour accrues initially to the peasant; and, under any of the standard tenancy arrangements, part of the increase will accrue to him. How will he

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[1] For a demonstration, using ordinary indifference curves and labor-output transformation curves, see R. Albert Berry and Ronald Soligo, "Rural-urban migration, agricultural output, and the supply price of labor in a labor surplus economy."

respond to this increase in income? Partly by consuming more food, since at very low nutritional levels the income elasticity of demand for food is much higher than in the richer countries. Probably also he will work longer hours, though this depends on the shape of his indifference map. In any event, he reaches a new income-leisure balance in which--as before-- the total amount of food available to him is consumed. Between the increase in his consumption and the reduction in total output, the hypothetical "surplus" is completely eroded. Nor does any surplus accrue to the landlord, since he receives either a fixed amount of produce or (under share-cropping arrangements) a fixed share of the reduced total output.

There will be an increase in agricultural marketing, however, if the peasants consume manufactured goods from the urban sector. Their income elasticity of demand for these goods will probably be even higher than for foodstuffs. So the new equilibrium will involve some increase in per capita food consumption and some increase in per capita consumption of manufactured goods, earned by marketing part of the increase in per capita agricultural output. The percentage increase in food marketings, however, will clearly be smaller than the percentage reduction in the agricultural labor force, and will by itself not provide an adequate "subsistence fund" for the transferred labor.

(4) As regards the supply of labor to the modern sector of the economy, we have the paradoxical situation that, while the conventional reasoning in support of a horizontal supply curve appears to be wrong, the horizontal supply curve nevertheless exists for these reasons.

If the urban (unskilled) wage level were tied to the average income in agriculture by a margin just sufficient to cover transfer costs and higher urban living costs (as in the Lewis and Fei-Ranis models), and if average agricultural income rises as labor is transferred, then the urban

labor supply curve should slope upward. This is intuitively plausible, and Berry and Soligo have given a rigorous demonstration covering all but the 'odd' cases of leisure satiation, etc. What has confused the issue is that urban employers are typically able to find all the labor they need at the going wage rate. The reasons for this, however, are different from those set forth in the labor-surplus models.

First, the real urban wage rate usually exceeds real incomes in agriculture by a margin considerably greater than would be needed to induce rural-urban migration. Instead of 20 or 30 percent, the gap may be 100 or 150 percent. (Why then doesn't everyone rush off to the city? Perhaps partly because prospective availability of jobs in the city is an important consideration. A high wage at which not to work does not have much attractive power.) Moreover, the urban wage level keeps getting pushed up from time to time, despite the presence of ample labor supplies. The institutional reasons for this are by now rather well-known: the role of government as a pace-setter in wages; the pressure on large enterprises (especially foreign enterprises) to pay wages which, while they appear very low by developed-country standards, are above the local supply-price of labor; and the demonstration effect by which these wage standards are transmitted, though doubtless with reduced force, to smaller enterprises throughout the economy.

The second consideration is that agriculture is not the only or even the main source of labor supply for urban industries. The natural increase of the urban population provides a substantial source; and the young city-bred people, whose average educational level is considerably higher than that of the rural population, are considered superior recruits for industry and government. The trade and service sectors in the towns also provide a reservoir of underemployed labor only too eager to trans-

fer to industry as vacancies arise. These sources are to be sure reinforced by a steady inflow from the countryside, stimulated partly by the wide wage gap, partly by greater opportunities for education and vertical mobility in the cities, partly by the "bright lights" attraction of city life.

The urban wage level, however, is not strongly influenced by supply considerations. It has a semi-autonomous life of its own. And the conclusion that employers can find all the untrained labor they need at the existing wage is not dependent on the usual assumptions about labor surplus and labor productivity in agriculture.

3. Balanced and Unbalanced Growth

One finds frequent references in the literature to a supposed difference between proponents of "balanced" and "unbalanced" growth. But it is not easy to discover what the argument is really about. At times it seems to be an argument over trade strategy, at other times it arises in connection with a self-contained economy. At times it seems to be a policy argument about "how to develop," at other times a difference of opinion about how development has occurred in the past. The terms "balanced" and "unbalanced" are often not clearly defined, and are used in a variety of conflicting and confusing ways.

What sense can one give to the concept of "unbalanced growth"? The clearest interpretation is that the commodity pattern of output expansion may differ substantially from the pattern of consumption increases because of the possibility of international trade. At the prescriptive level, this leads into controversies about the feasibility of export-led growth for

today's LDC's. We prefer to leave this controversy for more thorough examination in Chapter 7, and to concentrate for the moment on a purely internal expansion.

A second possibility is that capacity expansion, while it must be balanced over any extended period of time, may well be unbalanced over periods of a few years. Hirschman argues that, because many investment projects are large and expensive while a country's annual investment fund is limited, it may be impossible to undertake a full array of complementary projects within a single year. Investment planning is not an exercise in instantaneous allocation. It involves rather than devising of efficient time-sequences, deciding what to do this year and next year, and what to postpone until later. In particular, there is a strategic choice between building infrastructure capacity ahead of demand and allowing infrastructure to lag until pressure of demand forces investment decisions in this area. He favors the latter course on the ground that the most basic shortage in the less developed countries is a shortage of decision-making capacity. If transport and power capacity are lagging visibly behind demand, one can be reasonably sure that additional capacity will be built. But if one builds ahead of demand one cannot be sure that the idle capacity will call forth investment in manufacturing, agriculture, and other "directly productive activities". He visualizes, then, a development sequence in which "directly productive" investment forces the pace, then infrastructure catches up, then productive investment forges ahead once more. This he labels--and defends--as "unbalanced growth".

There are difficulties in the Hirschman argument--notably the fact that most investment decisions in the "directly productive" sector are private decisions which cannot be planned in the same sense as public decisions

about infrastructure investment. Only part of the annual investment fund is channelled through government. But leaving such difficulties aside, one may still ask whether the pattern of growth he visualizes can reasonably be termed "unbalanced". Continuous balance is obviously unfeasible, if for no other reason than the long construction period of major capital projects. But balance can also be interpreted as reasonable complementarity of investments over periods of, say, ten years or longer.

In a growing economy, some outputs will be increasing considerably faster than others. This is inherent in differing income elasticities of consumer demand. It is inherent in differing rates of technical progress and cost-reduction. (And, in the open economy which we here exclude, it is inherent in the gradual replacement of imported items by home production as domestic demand rises above the "threshold level" necessary to employ efficient-sized production units.) But differential growth rates stemming from such sources are surely not "unbalanced." On the contrary, they are inherent in any viable growth process.

It is of course true that unanticipated discoveries and innovations may cause output spurts in particular sectors of the economy. The record of Schumpeterian innovations in the older industrial countries is well-known. The telephone, electric power generation, and the internal combustion engine created entirely new industries which quickly bulked large in the economy. In the less developed countries, such innovations are more likely to be based on natural resource discoveries. The discovery of substantial coal deposits in Zambia after Rhodesian supplies were cut off, the oil strikes off the coast of Eastern Nigeria, The discovery--

or at least the harnessing--of the abundant fish life off the coast of Peru, are cases in point. This kind of imbalance can, with some violence, be worked into growth models by positing a secular upward shift in the marginal-efficiency-of-capital schedule. With some violence, because a smooth time trend is most convenient for model-building, whereas the essence of actual innovations is their irregularity.

Tracked to its roots, the concept of "unbalanced growth" does not seem to contain anything new. Is there then some novelty in the doctrine of "balanced growth" as expounded by Nurkse, Rosenstein-Rodan, and others?

As Myint points out,[1] the balanced growth doctrine has passed through several phases. Paul Rosenstein-Rodan's original paper on industrialization of Southeastern Europe focussed on a balanced expansion of consumer goods industries in the region. A substantial economic infrastructure was already present in these countries; and it was assumed that capital goods needed for the new industries could be imported in exchange for agriculture exports.

The less developed countries, however, have considerably less infrastructure in place. Early postwar discussions oriented toward these countries accordingly emphasized the external economies of infrastructure investment, and the need for a balanced expansion of consumer goods industries plus infrastructure. Finally, in Rosenstein-Rodan's paper on "the big push," the doctrine reaches its most ambitious form. It now contemplates a simultaneous, balanced, mutually reinforcing expansion of consumer goods industries plus capital goods industries plus infrastructure.

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[1] Hla Myint, The Economics of the Developing Countries, Ch.

What can one say about this view, and particularly about the ambitious or "big push" version? Note first that this is obviously a "big country model," which could conceivably be relevant only to a handful of the largest LDC's. Next, it appears that the balance visualized is only within the "modern sector of the economy. Agriculture tends to be treated as incidental, which bypasses a crucial aspect of early economic growth. Further, is it not just utopian to say that, if one could somehow construct a new modern economy on top of the old one, the new industries would be mutually reinforcing ? One can in fact not do this over any brief period. While new industries may be complementary on the demand side, they are competitors for factors of production. There are limited supplies of capital, trained labor, business management, and public administrative capacity. The time required to make factor supplies more elastic ensures that the development process will be long-drawn out. Since the rise of per capita incomes and the growth of the domestic market is necessarily gradual, new industries will reach the threshold of viability at different time, depending on the minimum efficient scale of plant. One will in fact get a Hirschman-esque preferable sequence of expansion rather than a simultaneous flowering of every kind of new industry at once.

In any event, the "big push" doctrine is a policy prescription, not an effort at historical explanation. If one is interested in how growth has actually occurred, it seems obvious that growth must be balanced in the modest sense that (a) the production pattern gradually becomes more diversified, while at the same time factor productivity in most sectors is rising; (b) all the necessary inputs to production are available from somewhere; and (c) all output finds a market (on our present assumptions, a domestic market).

The most basic balance is of course that between agriculture and industry. Consider a simple two-sector economy, in which the available labor is fully employed in producing either corn or cloth. Production involves no capital, so this complication need not be considered .

Consumption consits entirely of corn and cloth, and we know the income elasticity of demand for each. Then for any rate of increase in per capita output of cloth there is a necessary rate of increase[1] in per capita output of corn, required to maintain stability in the terms of trade between the two. It is intuitively obvious, and can be shown by the formula in footnote, that this required rate of increase is higher the greater the income elasticity of demand for corn, the higher the rate of increase in cloth output, and the greater the share of cloth output in national income. Stability in the corn-cloth terms of trade is necessary in order to avoid the Ricardian impasse: rising "cloth wages " in the industrial sector, a fall in profits, and a fall in savings and investment.

There may be a problem of balance on the production side as well as on the consumption side, depending on the assumed behavior of productivity in the two sectors. Suppose there is not change in labor force participation rates. So that a certain increase in consumption per capita corresponds to the same percentage increase in output per worker. We can use the two interchangeably. Then clearly, if corn output per worker rises at the rate x, and cloth output per worker at the rate y, the system is in balance with no need for movement of labor between the two sectors . But if y is high, it may well be impossible to raise output per worker at an equivalent rate. In this event -assuming full employment in both sectors to begin with-labor must be transferred from agriculture to industry; and this in turn means that output per worker in agriculture must rise at a rate higher than x. Production balance in this case involves continuing labor transfer at a prescribed rate, and wage differentials or other inducements sufficient to maintain this rate of transfer.

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1 This rate can readily be derived algebraically. Let y be the rate of increase in per capita output of cloth, x the required rate of increase in per capita output of corn. Let a be the corn share and b the cloth share of annual output, and the income elasticity of demand for corn. Then the rate of increase in per capita income is $\frac{a.x+b.y}{a+b}$ and the rate of increase in per capita demand for corn is $\propto \frac{ax+by}{a+b}$. Since demand must be matched by output, we have $x = \propto \frac{ax+by}{a+b}$, which reduces to $x = \frac{\propto by}{a(1- \quad) + b}$.

If we included capital as a factor of production, then we could set up assumptions under which each sector would be self-financing, or other conditons which would require inter-sectoral transfers of capital at a prescribed rate. A comprehensive concept of balance, then, must include rates of labor and capital transfer, of productivity increase, and of increase in consumption of the two products, the whole system being internally consistent.

These ideas about balanced growth can obviously be extended to a more complex economy with a variety of food and non-food products. The main difference is that in the multi-product case there is no need to insist on stability of relative prices within the industrial sector or within the agricultural sector. It is well known that differential rates of productivity increase are reflected, not only in differentials in factor absorption and factor transfers, but also in differential rates of reduction in unit production costs and in relative prices. The expanding pattern of consumption is guided by price elasticities as well as by income elasticities.

This picture of gradual, incremental, balanced growth seems to be a reasonable facsimile of actual growth processes-particularly under conditions of internal financing where massive infusions of foreign capital are ruled out. Two elements of discontinuity must nevertheless be admitted. The first, already referred to, is innovation leading to entirely new products. There are not a response to existing wants, but come out of the blue and help to mold the pattern of wants in new directions. Second, certain kinds of production require larege, indivisible investments which it is socially efficient to undertake before the time at which they can be fully utilized. This leads us to another set of ideas which has bulked large in the literature of economic development.

4. Indivisibilities, Externalities, and Increasing Returns

In reasoning about static resource allocation, it is often convenient to assume competitive, constant-cost conditions over the full range

of the economy. Plants are of optimum scale, are operated at capacity, and addition of more optimum-sized plants does not disturb the level of costs. A smooth expansion of the economy (abstracting from technical change) will not alter relative costs and prices.

There is a well-grounded suspicion that, for "young" and poor economies, this picture is quite inaccurate. While the spectre of diminishing returns may haunt the agricultural sector, the "modern" sector is apt to show overall increasing returns. This is certainly no new idea. It was advanced as a plausible hypothesis by Mill, and asserted as a strong probability by Marshall. So it will be useful first to sort out the possible reasons for increasing returns and then to consider the relevance of this phenomenon for growth theory.

(1) One important reason is the learning time necessary to achieve full proficiency in new activities. The activities in the modern sector of a LDC are copies of the corresponding activities in older industrial countries. The plants are often built by foreign engineers and may look physically identical with those in Britian or Germany. But this does not mean that equivalent production results can immediately by obtained. The local management and workers are in the first instance really trainees; and only gradually, through "learning by doing," do they approach the productivity levels of the older countries. Nor is this just a matter of six or twelve months. It is more commonly a matter of ten to twenty years, and failure or success on this front thus becomes an important determinant of early economic growth.

An interesting implication is that the new industries are in the first instance considerably overstaffed. Labor inputs per unit of output are much higher than they will need to be when the learning process has been completed. This means that, as learning progresses and man-hour output rises, labor tends to be extended from existing industries. Employment in the modern sector can be maintained only by some positive rate of new investment, and a still higher rate of investment is required to increase employment.

(2) A second consideration is that the unavoidable scale of plant, or the minimum efficient scale of plant, is often large relative to the size of the economy. In a country with a national output of no more than a few billions, this is much more important than in the industrial countries. Dams, railways, trunk highways, and the like present obvious indivisibilities. They must be built in a piece; but once built, average and marginal costs fall steadily as they are more and more fully utilized. From another standpoint, the average capital-output ratio falls steadily as more and more is produced from a fixed plant.

In the heavier branches of manufacturing, too, the market may be so small that it can accommodate no more than one efficient-sized plant.[1] If this plant is built, as it doubtless should be, somewhat ahead of immediate demand, it will also show decreasing average costs as the market grows. All this amounts to saying that cost reduction due to ordinary economies of scale is likely to be especially important in early economic growth.

(3) Next we must note the likelihood of Marshallian" external-internal" economies, i.e., the possibility that growth in the output of an industry may lower the cost curves of its constituent firms. Why might this be ? One possibility is that the industry buys inputs from some other industry- say, a railroad-which experiences decreasing costs as its output rises. This is a bootstrap-lifting explanation in the sense that it depends on finding some other industry in the economy which is subject to ordinary economies of scale. But even apart from this, growth of an industry's output may enable its member firms to specialize on a narrower range of products or processes, thereby increasing proficiency and reducing costs. This line of reasoning goes back at least as far as Adam Smith. Again, an

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1 We say "effieient size" rather than "optimum scale" because the evidence suggests that, for many branches of manufacturing, the long-run average cost curve dips down sharply at first, but is then saucer-shaped over quite a wide range. It is not very important, then, to hit the precise bottom of the curve. It is important to reach the point at which the curve flattens out, i.e., to achieve minimum efficient scale.

industry concentrated in a certain locality may gradually build up an experienced and specialized labor force, whose proficiency redounds to the benefit of all.

(4) More broadly, there are many possibilities of external economies cutting across industry lines. External economies of production arise whenever actions of one producer affect the costs of another producer. As Scitovsky has shown, such economies may be either technological (operating directly) or pecuniary (operating through the market mechanism). On the technological side, a mining company which pums water out of its mine may lower the water level and the pumping costs of neighboring mines. Similarly, a Pakistani farmer who installs a pump as part of a land desalinization project contributes something to his neighbor's land as well as to his own. [1]

Doubtless more common in practice are pecuniary external economies. Industry A supplies an input to industry B. Suppose now that, as industry A expands, its average cost and product price fall for one or other of the reasons already noted. This reduction in cost to industry B will encourage expansion of that industry, which means that it will buy still more from industry A, whose costs will continue to fall, and so on in an interacting cycle. Equilibrium will not be reached until both industries have expanded to the zero-profit point.

This is in fact, as Scitovsky has shown, a very wide-ranging case. Expansion of A and a decline in the price of A's product may also raise profits in (1) an industry which produces a factor used in A, (2) an industry whose product in complementary to that of A, (3) an industry whose product is a substitute for a factor used in A, or (4) an industry whose product is consumed by persons whose incomes are raised by expansion of A. Since this last category will include almost every industry in the economy, the consequences of expanison in any one industry are obviously far-reaching and complex.

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1 There are of course corresponding possibilities of external diseconomies such as the oil company which pumps competitively out of a common pool.

This interrelatedness of the economy has obvious implications for investment planning and for growth theory. On the planning side, it strengthens the case for some coordination of individual industry investment plans looking toward the overall economic situation as it will be at some point in the future. The socially profitable level of investment will typically be higher than it would be if extenal effects were ignored. To put the same point differently; excess capacity built today will be utilized earlier than might appear from direct effects only, and it will thus pay to build capacity further ahead of the (apparent) point of full utilization. This is a particularly important consideration for infrastructure investment.

From the standpoint of growth analysis, the implication is that in a growing economy one can expect a residual increase in output which is not attributable either to increased factor inputs or to technical progress in the strict sense. It is attributable rather to the cumulative effect of learning time, scale economies, and externalities. This residual appears to be of substantial size even in "mature" economies;[1] and one might expect it to be relatively larger in the early decades of economic growth.

Related to this, one may hypothesize a characteristic behavior of ICOR. Proper investment planning will suggest laying down a substantial economic infrastructure at an early stage of development, and, since the ICOR is unusually high in transport, power, irrigation, and the like, the economy-wide ICOR will also be rather high. As infrastructure tapers off, and emphasis shifts to investment in agriculture, industry, and services, ICOR will tend to fall and will pull the average capital-output ratio down with it. For the LDC's this must remain a hypothesis which in

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1 Cite Griliches articles.

the nature of the case be tested only by some decades of experience. For the older industrial countries, there is considerable experience that this actually happend. [1]

5. The Optimal Rate of Saving

It is a commonplace that the less developed countries save "too little". But how much more should they save ? What is a reasonable target for the average savings rate at some future date? And how rapidly should this target be approached. These are problems in normative economics, which we have promised generally to eschew in this book. They bulk so large in the literature, however, that we must take some account of them.

Let us first clear away two possible objections: that it is not proper for government to influence the national savings rate, and that it is not feasible for government to have much influence in a predominantly private economy.

Neo-liberals sometimes argue that the national savings rate should be determined solely by individual time preference, expressed through market choices. For government to interfere with voluntary savings decisions is as reprehensible as any other interference with consumer choice. This view has been carried to the point of arguing that even corporate saving is an illegitimate encroachment on individual choice. Corporate profits belong to the stockholders and should be fully distributed to them, leaving them the choice of how much to reinvest in this company or in others, and forcing all companies to compete for funds through new security issues. [2]

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1 Check this against Kuznets and other basic sources.

2 Hayek paper at Carnegie Tech symposium.

Even those who are in general well disposed toward consumer guidance of the economy will find it difficult to go this far. Some government capital formation is essential, and its level and financing are necessarily matters of collective decision-making. Corporate managers are not necessarily worse judges of stockholders' long-run interests than are the stockholders themselves. Most saving--in some countries much the greater part--is institutional saving rather than household saving. There is little indication that citizens are seriously dissatisfied with this situation, or that they would favor the massive institutional changes necessary to reverse it.

At a different level, one may question the efficacy of the market in registering individual time preferences. Even before Keynes it was clear that, in a monetary economy, individuals may well end up saving more or less than they initially intended to save. Aggregate demand influences the personal incomes from which savings may come; and government actions which alter aggregate demand will in fact alter the national savings level. Moreover, in most LDC's financial institutions are poorly developed and financial markets are highly imperfect. Individuals may well save less than they would do if there were more secure and remunerative outlets for saving.

Next one must consider that the saving decision involves a choice between present and future, sometimes a quite distant future. Only the present generation, however, is represented at the bargaining table. So it is plausible to argue that a government which is in part the warden of future generations may reasonably interfere with this generation's choices. The fact that this argument can be abused by an authoritarian regime to impose what appear to be excessively high savings rates is no reason for rejecting it altogether.

Finally, individuals acting collectively through the political mechanism may well reach a decision different from the sum of individual decisions taken in isolation. Sen[1] and others have shown that one man may be willing to sacrifice more for later generations if he has assurance that others will make equivalent sacrifices. Is such a collective decision, implemented through government, necessarily less valid than the sum of isolated decisions? I think not.

But even if one concludes that the national savings rate is a legitimate object of public policy, what can government actually do about it? In a mixed economy, government cannot <u>determine</u> the marginal or average savings rate, but there is no doubt it can <u>influence</u> it substantially. Increased tax collections channeled to either public or private capital formation will raise the savings rate unless, as seems quite unlikely, private saving is discouraged to a corresponding extent. Government can influence private saving by obvious devices, such as tax treatment of personal and corporate income, and also in more subtle ways. For example, if government succeeds in stimulating investment in sectors where profit takes large share of value added, and if profit recipients save more heavily than wage and salary earners, the national savings rate will rise. The choice of a savings rate and the choice of an investment allocation, while they can be treated as formally separate, are in fact interrelated.

What kind of choice problem is involved in decisions about the desirable savings rate? Formally, the problem is one of maximizing <u>utility</u> over <u>time</u> subject to

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1. A. K. Sen, "On optimising the rate of saving," <u>Economic Journal</u>, Sept. 1961, pp. 479-96.

constraints.. "Time" enters, however, only in the sense that units of capital formation and of output carry different dates, so that the model must specify capital-output relations and collective time preference. In all other respects the usual models are quite static. The citizens' marginal utility functions and rates of time discount, once specified, remain unchanged over time. So does the production function for the one output of the system. These and other assumptions, which are needed to make the models soluble, at the same time make them highly unrealistic and mainly of intellectual rather than practical interest.

Maximization may be attempted for a certain period of time, or over all future time; and there has been considerable debate over the merit of these two approaches. In favor of a finite time period, it can be argued that actual development plans are always formulated in these terms. Over an infinite period, too, production functions and utility functions become infinitely uncertain. While one can hold them constant by assumption, this assumption becomes less and less plausible as the time period is extended. The discounted sum of all future output may also, if the growth rate of output exceeds the discount rate, become infinitely large, so that the maximization procedure breaks down.

Those who favor an infinite time period tend to base their case on logical necessity. A plan for a finite period must necessarily say something about the capital stock remaining at the end of the period. But decision on this implies a decision about desirable output rates beyond the end of the plan period. Thus infinity comes in through the back door.

If one chooses a finite period, as we shall do here, the problem subdivides into two main approaches: one can maximize the terminal capital stock, subject to constraints on the behavior of consumption within the plan period; or one can maximize the consumption flow over the plan period subject to a constraint on terminal capital stock.

Work along the first line was initiated by the distinguished mathematician John von Neumann and has been extended mainly by other mathematicians. The von Neumann case was a no-consumption case in which all output is devoted to increasing future output. The problem is to define an equilibrium growth rate (in the sense of Chapter 3) which is the highest that can be derived from the initial capital stock. This will clearly also maximize the capitalstock at any cut-off date in the future.

More realistically, one can regard the wage-rate as pegged at a constant level (implying an unlimited supply of labor), and consumption as equal to the total wage bill. All output in excess of the wage bill goes to profit. Maximum growth will then be attained if all profit is saved. The optimal saving rate equals the capital share of national income, a result which has more recently been dubbed the "Golden Rule" of capital accumulation. It can be shown also that under these conditions the growth rate of output will equal the marginal productivity of capital (which under competitive equals the rate of return on capital).

The alternative approach is to maximize "utility" or "welfare" within the plan period, subject to a constraint on the capital stock remaining at the end of the period. The present generation could maximize its welfare by letting capital run down toward the end of the period; but this might well be considered a dirty trick on later generations. Specifying a terminal capital stock is away of recognizing that the world will not end after 25 years, or whatever the planning period may be. One might provide, for example, that the terminal stock must be sufficient to sustain at least the same growth rate beyond the plan period as prevailed over the plan period; and there are many other possibilities.

It is usual also to specify that per capita consumption must not fall below its initial level at any point. Without this, one might maximize plan-period output by cutting consumption sharply at the outset, to finance capital formation which would swell the output flow in later years. But since this would obviously be very difficult in practice, it is scarcely an interesting case.

In order to solve this kind of maximization problem, one would need to know the nature of individuals' utility functions. One must consider, for example, that utility is not necessarily derived only from personal consumption. Citizens may derive satisfaction also from community consumption of education and other goods, from a high growth rate of output and employment opportunities, from an increase in national self-respect and power. One would need next to know how rapidly the marginal utility of consumption falls as the consumption level rises. This will affect the real cost of saving ten years from now as compared with saving today, and hence the proper time distribution of saving within the plan period. By analogy with the argument for progressive taxation, it seems reasonable that later, higher-income, generations should be required to save more heavily than earlier and poorer generations.1 Finally--unless individual time preference is to be set aside as myopic and irrelevant--one would need to know consumers' subjective rate of discounting the future.

These things cannot be known with any precision in practice, though some experimentation might be possible. Sen has suggested that one might get some expression of time preference, not in terms of rate-of-return concepts, but in terms of the easier-to-understand reciprocal of this, the "period of recoupment." One can imagine a referendum in which people were asked whether they would give up a unit of current consumption which should be fully recovered over the next ten years, and from then on every ten years into the future. "High-saving" parties and "low-saving" parties might conceivably view with each other for popular favor. (Indeed, in the socialist countries, so-called "hard liners" and "soft liners" differ on precisely this point, though the differences are worked out through intra-party-rivalry.) In the end, political leaders must make some more-or-less arbitrary judgment on the matter, and must answer to the only definitive test of popular favor--that of survival.

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1. This point is well argued in A. Rahman, "Finite-horizon planning and optimizing the rate of savings" (Center Discussion Paper No. 10, September 1966).

This raises obvious difficulties for the reckoning of employment and output. If everyone with a nominal occupation is counted as employed in a census, then employment is considerably overstated. It an arbitrary and exaggerated value is attached to the output of such people, national output may also be considerably overstated. If underemployed "tertiary" workers are increasing as a proportion of the labor force, as they seem to be in some countries, then time trends may be seriously distorted. If the presumed value of these workers' output is held constant in the national income calculations, while in fact output per worker is falling because of increased over-crowding and work-sharing, then GNP appears to be rising faster than it actually is. This may help to account for the high "statistical" growth rates in some countries where little actual growth seems to be occuring.

This wage-distortion unemployment clearly reduces per capita output at each point of time, relative to what it would be with better pricing and allocation of labor. Moreover, under-pricing of capital, which implied capital rationing with strong overtones of favoritism and influence, must mean a less-than-optimal allocation of capital, with a further reduction of national output If saving and investment are taken as a fixed proportion of output, the growth rate of the economy is also reduced.

One can probably put the matter even more strongly than this. The modern sector of the economy is presumably the spearhead of growth. But the output of the modern sector is reduced by the fact of "too little" labor being combined with the available capital. Moreover, over-pricing of labor means that the profit share of this smaller output is likewise reduced. (Under-pricing of capital works in the opposite direction, but would not be sufficient to outweigh higher wage costs except in very capital-intensive industries.) This reduces both the incentive to investment and the funds available for investment from business saving. Where other conditions are favorable and vigorous growth is well underway, thiscircumstance alone will scarecely besufficient to check the process. But that it always acts as a drag on the rate of growth is scarcely to be doubted.

2. Rigidity of Factor Proportions. All this is on the usual neoclassical assumption of smoothly sloped isoquants and continuous factor substitution. But is this a reasonable assumption for manufacturing and other "modern" industries? May there not often be a single production technique which is the only one known or is at any rate much superior to any other, so that the isoquant reduces to a single point?.

This is of course a question of fact, and one which has been insufficiantly studied. The most reliable approach is probably through engineering estimates from machinery builders and constructinn firms. These would show whether there is in fact more than one technique which engineers are prepared to consider seriously; and where there are several techniques, one could obtain physical inputs per unit of output and calculate the relative profitability of each at various sets of hypothetical factor prices. Alternatively, one can try to fit production functions for particular branches of industry--on a time-series basis in a single country or, more venturesomely, on a cross-section basis across national lines a la Arrow-Chenery-Minhas-Solow. The necessary

assumptions are highly restrictive, and the results to this point can be taken as no more than vaguely suggestive. For what they are worth, they usually suggest marked flexibility of factor proportions, with elasticities of substitution lying generally in the range of 0.75 to 1.25.

The situation obviously differs as between branches of industry. Industries which require large indivisible units of capital (hydroelectric power generation, petroleum refining) differ greatly from industries in which machines are smaller and more variable in construction (clothing, leather-working, textiles.) Very broadly, this is a division between "heavy" manufacturing and "light" manufacturing. To the extent that light industry is predominant in most countries in the earlydecades of development, the assumption of flexible factor proportions becomes more plausible.

One must distinguish also between the central production operations--the "assembly line" or its equivalent--and everything else that goes on in a factory. In addition to the central operations, materials and components have to be unloaded, unpacked, stored, moved to the machines as needed; finished products must similarly be moved, stored, packaged, and shipped; and the plant itself must be cleaned, protected, repaired, painted, and so on. These supporting operations are typically more flexible than the central production operations in their factor requirements. This helps to explain the considerable differences in labor-capital proportions among the advanced industrial countries, even in heavy industries which on the surface may look quite inflexible.

When all this has been said, it remains true that factory industry generally offers less scope for factor substitutions than does agriculture, handicrafts, construction, services, and other sectors. The implications of this fact will be considered in a moment.

3. What Should be Done? When we turn to the normative question of what policies should be followed to adjust to the imbalance in factor proportions, the first problem is to specify objectives. It is necessary also to choose between partial equilibrium and general equilibrium or economy-wide analysis. If one is choosing among alternative techniques for an industry, as in A. K.Sen's Appendix III. one assumes that varying amounts of capital and labor can be made available at a price. For the economy as a whole, however, the pool of capital is fixed, and the problem is how thinly this capital should be spread over the labor force. It is with thelatter problem that we are concerned here.

Next, one must decide what one is trying to maximize. It is intuitively plausible, and has been demonstrated convincingly of Fei and Fanis, that the technology which will maximize output will normally not be that which would maximize employment. In welfare terms, it would seem difficult to make a case against output as the maximal. Part of output can in principle be spread over the unemployed through redistributive fiscal policies, so maximizing output will tend also to maximize per capita consumption. To be sure, this may be difficult or even impossible in practice. Where this is so, and where there remains great inequality between the employed and the unemployed (or underemployed),

maximizing output might not maximize welfare. Moreover, one can argue that reducing unemployment has political and other benefits which should be included in the social welfare function, and that on this account techniques should be adjusted in a more labor-using direction.

A third objective which has sometimes been suggested is that of maximizing total profit in the modern sector, the so-called "reinvestible surplus." This might make some sense if one assumes that the national savings rate cannot be raised effectively through fiscal policy, and that heavy reliance must be placed on business saving. One would have to assume also that profits actually will be reinvested, which may or may not be true in a particular case. Even so, maximizing profit will usually not mean using the most capital-intensive technique available, i.e., that which maximizes profit per worker. As Ranis and others have shown, adding more labor will reduce profit per worker but may well increase total profit, so that some intermediate technique will usually contribute most to the profit pool.

Suppose factor proportions are flexible in some degree, and that one wishes to maximize output. How does one go about it? The conventional answer would be to establish "correct" factor prices and permit private managers (and for that matter public managers) to choose the least-cost technology at those prices. But what are the "correct" prices? One could try to apply linear programming techniques, though these are probably less useful for economy-wide problems than for single-firm problems. Or one could proceed, as Mahbub ul Haq suggests, by a process of tâtonnement. Move the market price some distance in the right direction, see what happens, then if necessary move it again. Concretely, he suggests that if unemployment is 20 percent, the wage level might be cut 20 percent as a beginning. If unemployment still remains, cut it some more; and so on.

Whether such "shadow prices," even if determined, could be made effective in producers' decisions opens up another range of problems. If government is a large lender, and if it also has effective control of the banking system, it should be able to raise the interest rate in organized markets quite sharply; and it should of course charge itself this same rate in public enterprises. To lower the effective wage rate, however, would require a tax-and-subsidy system (subsidies to employers per unit of labor, recaptured from taxes on wage income, or profit income, or both). This would be difficult technically and no doubt quite unpopular politically, and has not to my knowledge been seriously attempted in any country.

One must consider also that short-run output maximization as deduced from a two-factor production surface is a great simplification of the actual policy problem. In addition to capital goods and untrained labor, there is skilled and supervisory labor to be considered. The cost and availability of these kinds of labor will affect the choice of technology. Hirschman's observation that machines require less management than men is very pertinent.

Most of the capital goods required for a capital-intensive technology may have to be imported. If the price of foreign exchange is pegged below the equilibrium level, with consequent exchange rationing, foreign capital goods

are made to look cheaper than they are. A higher "shadow" exchange rate would tilt the balance toward greater use of simpler, home-produced capital goods.

Where larger and smaller production units coexist in the same industry, possibly aided by a split-level or "Japanese" wage structure, additional considerations come into play. The larger units may be corporation-controlled, with a higher reinvestment quotient (plus higher tax payments), and concentrated in a few urban areas. The small units may be scattered around the countryside, with largely family management, possibly a lower reinvestment ratio and a greater resistance to tax collections. So tax considerations, savings considerations, and location-of-industry considerations enter to complicate the picture.

Still further complications enter if time is taken into account. One of the major products of modern industry is a trained labor force. Different levels of technology have different training potential. It may seem advantageous in the short-run to use rather primitive methods as a way of absorbing surplus labor. But this may freeze the economy into a mold from which it is difficult to escape at a later stage when more capital-intensive methods would be appropriate.

Because of these complexities, and because of the difficulty of making "shadow prices" effective in practice, government can scarcely avoid taking a direct hand in resource allocation and factor combinations, using fiscal and lending devices as well as pricing techniques for this purpose. To a large extent this involves policy as between major sectors of the economy rather than policy within a single industry. If you are going to have a steel mill, there is only a certain amount that can be done to shift factor proportions. But you can choose whether to have a steel mill, or an electronics plant, or more cotton-ginning capacity, or an irrigation system.

Agriculture is a very labor-using activity, and an activity in which for a long time capital can be applied informs which are complementary rather than competitive with labor (what Sen terms "landesque" or land-saving capital.) Road-building, dam-building, irrigation development, local community facilities, and other public works projects also are (or can be) very labor-using. So is house-building (in tropical countries) and most other types of construction, which form a large share of investment in the early decades of development. Large-scale factory industry using power-driven machinery, on the other hand, is just not very labor-using. In a labor surplus-economy, than, the indicated policy--even in terms of output maximization--would seem to involve heavy emphasis on the labor-intensive sectors, some restraint on speed of manufacturing development, and restraint also in speeding the replacement of small, semi-handicraft enterprises by larger factories. In the older countries there was a great deal of reasonably efficient manufacturing before powe-equipped factories had been heard of. It may well be efficient for newer economies to traverse this same sequency, though hopefully faster than their predecessors.