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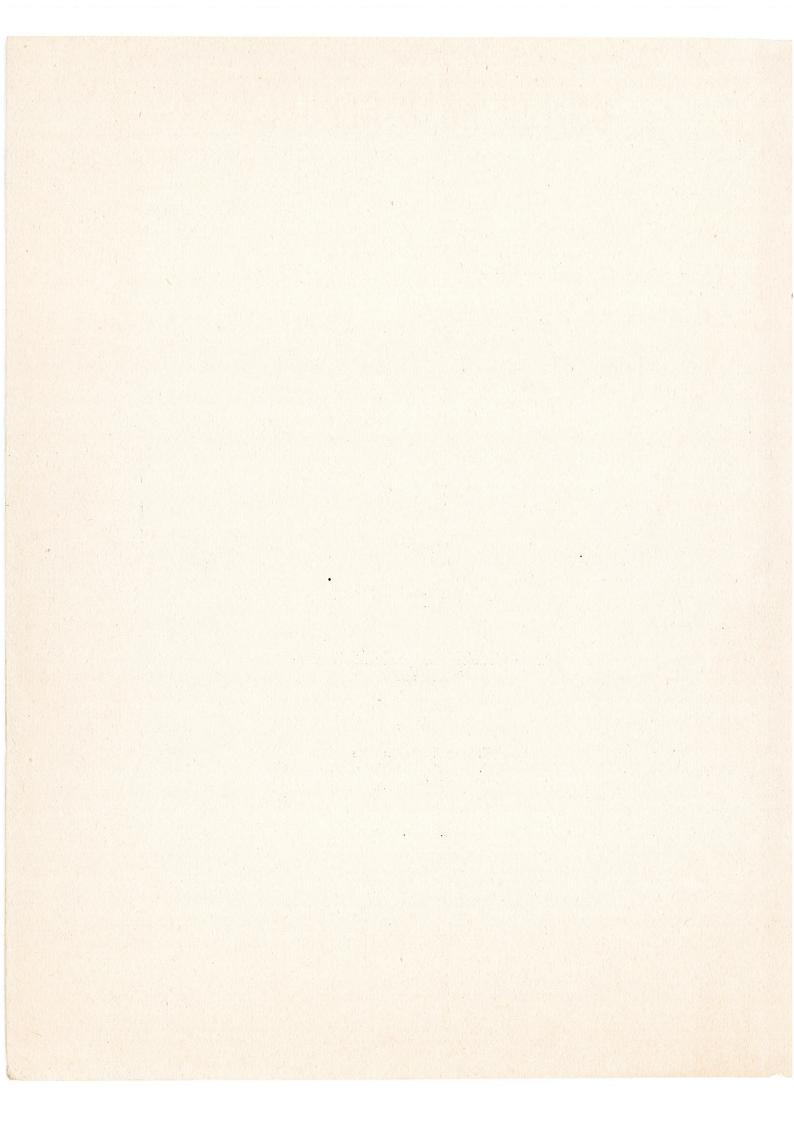
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SOME ANALYTICAL PROBLEMS IN DEVELOP-
MENT THEORY

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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 dis-
cussed 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 underlined_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 every-
where 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 coeffic-
ient, which casts doubt on the zero marginal productivity hypothesis.

Still another approach is through micro-economic data from farm manage-
ment 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."