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ECONOMIC DEVELOPMENT WITH SURPLUS LABOR: SOME COMPLICATIONS

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Economic Development With Surplus Labor: Some Complications

Lloyd G. Reynolds

Over the past twenty years economists have devoted much attention to the problem of how a poor country can initiate a sustained increase in per capita output. But we do not yet have any substantial body of theory about early economic growth. For reasons which should be fairly obvious, but which cannot be detailed here, most of recent growth theory -- neo-Keynesian, neo-classical, or what not -- has little relevance to early growth in the less developed countries.

There is the beginning of a theoretical tradition, however, as regards one kind of LDC: a densely-populated country with surplus labor, in which most people are engaged in agriculture and other "traditional" activities, but in which there is also an expanding "modern" sector. The reasons for the appearance and expansion of the modern sector are not explained in the model. Growth is underway "before the curtain rises." Development of this line of theory is due mainly to the late Ragnar Nurks, Sir Arthur Lewis, Gustav Ranis and John C. H. Fei. Their work provides the point of departure for the present essay; and it will be presumed that the reader is generally familiar with it.

The purpose of this paper is to suggest that the rather simple assumptions of these earlier models can usefully be elaborated in several directions, and to make a start on exploring the consequences of a more complex model. The object is to come somewhat closer to reality, but without introducing so many complications that the model becomes entirely unmanageable.

Like earlier writers in this tradition, we are considering a certain kind of LDC rather than LDC's in general. The economy considered here has the following characteristics:-

1. It is a closed economy. This is a major limitation, which greatly restricts the applicability of the analysis.

2. It is a fully-settled country, with no frontier of unused arable land.
3. There is a surplus of labor time, in a sense defined more precisely below.
4. There is a high rate of population growth -- say, of the order of 3 per cent per year. We suppose that this rate of growth has continued long enough to produce a steady state in which the labor force is also increasing at 3 per cent per year.
5. The economy is at an early stage of development. Employment in modern activities is a small proportion of total employment.
6. Agriculture is conducted by peasant farmers, who may be either owners or tenants. All farm work is performed by household members and there is no hired labor.
7. There is a clear separation of people and income between country and city. People who move to the city settle there permanently. This is meant to exclude the African migratory labor situation, in which it becomes difficult to separate "rural" from "urban" incomes.

Within this context, we suggest six lines of variation from earlier models. These relate to the sectoring of the economy, the concept of surplus labor, the behavior of rural and urban earnings, the behavior of employment in modern activities, the impact of rapid population growth, and the concept of a "turning point" in economic development.

Sectoring the Economy

An adequate descriptive model seems to require at least four sectors rather than the customary two. Of these, two are "traditional:" the rural sector and the urban trade-service sector. The two others -- industry and government -- are "modern" sectors.

The reason for this classification is that these four sectors operate on different production functions and may be expected to show a characteristically different behavior of productivity and employment over time. Employment, as will appear

later on, is our central concern; and we subscribe fully to Fei and Ranis' view that successful development is best defined in employment (or employment and output) terms rather than in terms of output only.

Families in the rural sector will be regarded as engaged solely in agricultural production. (Actually, in a traditional rural society not only food but clothing, housing, furniture and personal services are largely home-produced. The way in which labor time is re-allocated over time among agricultural production for the market, food production for own use, other types of household production, and leisure presents interesting analytical problems. But these complications will be ignored here).

We have specified that agriculture is organized into peasant farms, in which the peasant either owns the land and its product, or rents the land and pays a percentage of output to the landlord. The operation of a tenancy system differs from that of an owner-operated system as regards production incentives, sources of and obstacles to innovation, distribution of income, and saving and investment practices. But there is a basic similarity, and either system differs substantially from a system of landlords employing wage labor.

The urban trade-service sector includes the multitude of people whom one sees thronging the city streets, sidewalks, and back alleys in the less developed countries: the petty traders, street vendors, coolies and porters, small artisans, messengers, barbers and shoe-shine boys, personal servants. This is a large sector. In the early decades of development, it employs (or under-employs) many more people than the industrial sector. It is a relatively open sector in the sense that, with little skill and little initial capital, a newcomer can crowd his way into employment. It is thus a natural entry point to the urban economy for migrants from the countryside. Openness leads to over-manning of these occupations and a low average output per worker. There is typically a wide gap in productivity and earnings between workers in this sector and those in the industrial sector. When the industrial sector needs additional labor, it

can draw also on the natural increase of the urban population.

The industrial sector includes manufacturing establishments employing wage labor and using a certain amount of mechanical equipment. One need not insist that these establishments be large, for in the early stages of development many of them are not large. The median number of employees runs in the dozens rather than the hundreds. Nor need one insist that they be located in towns and cities. Most of them will be; but agricultural processing, production of certain consumer staples, and production of small components for larger products may be widely distributed around the countryside.

The industrial sector also includes such (relatively) high-productivity activities as commercial and industrial construction; transport, power and communications; export-import and other wholesale trade; and banking and finance. One should not regard these industries as "supporting" manufacturing, any more than manufacturing supports them. Together with manufacturing, they form an independent complex of "modern" economic activity, whose output rises faster than total national output as development proceeds.

The government sector comprises government as producer of public goods: education, health services, defense, road building and repair, urban services, and general administration. (Public corporations producing power, transport, and other marketed products are probably best included in the industrial sector). The government sector is initially small, but like the industrial sector its growth rate tends to exceed that of national output.

The Meaning of Surplus Labor

We are considering a fully-settled country with no unused land; and we assume with Lewis and others that the economy has a surplus of labor. But what is meant by this ambiguous and much-debated concept?

Much of the discussion has turned on the question whether there are workers, particularly agricultural workers, whose marginal productivity is zero. Properly speaking, labor should be defined in terms of man-hours rather than people. The question then becomes: do the last man-hours applied in agriculture, and perhaps also in the urban trade-service sector, yield zero output?

Both logic and empirical evidence suggest a negative answer. It is conceivable that a farm family might apply man-hours up to the point of zero marginal product. For this to be rational, however, one would have to assume either that at this 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 survive.[1] If the last ounce of food must be produced to avoid starvation, the valuation of leisure is irrelevant. Without one or other of these assumptions, the fact that leisure normally has some value would lead workers to stop short of the zero marginal product point.

Empirical tests of the zero-marginal-product hypothesis are not easy. One cannot observe what happens when workers are "withdrawn from agriculture," for the farm labor force is normally increasing because of rapid population growth. One can investigate the use of time by farm family members; and it may turn out that adult male workers are not fully employed (on some reasonable definition of a normal work week) even at seasonal peaks. But this tells us nothing directly about marginal productivity. One can fit production functions for particular crops and observe the characteristics of the labor coefficient. Studies of this sort usually show a positive (and significant) labor coefficient.

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[1] See on this point R. A. Berry and R. Soligo, "Rural-urban migration, agricultural output, and the supply price of labor in a labor surplus economy." (Economic Growth Center Discussion Paper No. 9, 1966).

Another approach is through micro data from farm management studies, which permit cross-section analysis of production relations. Recent studies in India and Pakistan indicate that the larger farms use less labor and material inputs per acre, and also have lower output per acre.[1]

A possible interpretation is that large farmers do not need to cultivate so intensively to obtain the conventionally accepted standard of living. Regressions of total inputs 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 size use a certain amount of hired labor, which suggests that its marginal productivity can scarcely be zero.

But even if the marginal product of labor is above zero, one can still assert that there is labor surplus, or perhaps better, "labor slack" in the economy. This for three reasons. First, there is often open unemployment in the cities, due to migration from the countryside in excess of employment opportunities. Second, many people work less than any reasonable conception of full time, and could readily be persuaded to offer additional man-hours <u>at the prevailing wage</u>. (This implies that the industrial wage level is above the supply price of labor. Given a surplus of available man-hours, why does the wage level not fall? In the rural sector, more man-hours would be applied if they could be made to yield as much as the marginal man-hour is presently yielding. Third, there is disguised unemployment in the conventional sense. Man-hour output in the rural and urban trade-service sectors is well below that in industry and government, so that national product can be raised by labor transference.

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[1] See, for example, A. Mathur, "The anatomy of disguised unemployment," <u>Oxford Economic Papers</u>, July 1964, D. Mazumdar, "Size of farm and productivity: a problem of Indian agriculture," <u>Economica</u>, May 1965, M. Paglin, "Surplus agricultural labor and development: facts and theories," <u>American Economic Review</u>, September 1965.

This impression of labor slack is confirmed by the fact that industrial employers in the LDC's rarely complain of inability to find labor. There may be complaints about lack of training, low motivation, and other aspects of labor quality, but there is no deficiency of numbers.

The Behavior of Earnings

The Lewis and Fei-Ranis models are austerity models. Real wages remain constant in both agriculture and industry, while increases in productivity are channeled into capital formation. The question is whether this behavior is likely in the circumstances of most LDC's.

Look first at agriculture. In a growing economy, per capita output is rising by definition. (Unless the increment is entirely saved, which seems unlikely, per capita consumption is rising). Given a high income elasticity of demand for food, per capita demand for food will be rising. Then either per capita food output must rise, or there will be a rise of food prices relative to industrial prices, leading in either case to a rise in real farm income. Under peasant agriculture either all of the increased income or (in the case of tenancy) a substantial part of it will accrue to the peasant. While he may save some of the increment, he will normally consume part of it. Government may recapture part of the increased income through taxation, but a 100 per cent marginal rate of taxation is scarcely feasible. Increased output requires that the household supply increased labor inputs, learn new techniques, and assume new risks. It seems unlikely that they would be willing to do this for zero return.

We conclude that growth models in which rural earnings per capita remain constant as output per capita rises are not very plausible. Instead, income and consumption per capita will move upward over time.

The urban trade-service sector can be regarded as linked to the rural sector by migration. There is some equilibrium relation of earnings in the two sectors which

will maintain labor market balance in the sense, say, that the level of urban unemployment remains constant. Whether in equilibrium one should expect real earnings in the (traditional) urban sector to be above or below those in the rural sector is hard to say. This depends basically on assumptions about migration.

At any rate, once equilibrium has been established, changes in the earnings level in traditional urban activities should thenceforth parallel those in agriculture. If real incomes in agriculture rise over time, one would expect a parallel movement in urban earnings.

As regards wages in industry and government, observation suggests two hypotheses: first, rates of pay for unskilled and semi-skilled labor are much above the level of earnings in traditional activities. Second, there is probably a tendency for this earnings gap to widen in the early decades of development.

Lewis and others have speculated that a moderate wage premium, of the order of 30 per cent or so, might be necessary to induce workers to migrate to towns and accept industrial employment. But in fact the wages of unskilled and semi-skilled industrial workers are often two to three times as high as traditional earnings.[1] In the case of clerical and managerial people, high relative earnings can be attributed to supply bottle-necks in the educational system. But what explains high earnings for low-skilled workers who are in excess supply?

One can rely to some extent on the "economy of high wages" line of argument. There are well-known reasons why a high-wage policy may not involve a proportionate increase unit labor costs. One can also rely somewhat on the argument that employers

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[1] For references to the evidence and some comments on causation, see my paper "Relative earnings and manpower allocation in developing economics," (Center Discussion Paper No.)

are competing, not for labor in general, but for the limited pool of workers with industrial experience, whose supply price is higher than that of the completely untrained.

When this has been said, the main reasons for "unduly high" wages are probably social and political. Modern industry is highly productive. If employers paid only the supply price of labor, profit margins would be so wide as to seem exorbitant. Foreign-owned corporations, in particular, are apt to be considered fair game for wage pressure, and may feel that they can buy political favor by a generous wage policy. Government is expected to be a "good employer" and even to function as a wage leader for the economy. Minimum wage legislation is frequently used to set a floor under wages in the modern sectors.

Under these conditions it seems likely that the earnings differential between the modern and traditional sectors will widen during the early decades of development. Value added per worker in the modern sector is likely to rise quite rapidly over time. This does not per se provide any reason for wage increases, since wages are already above the supply price of labor. But if wage rates were actually held stable, profit margins would widen continuously and this is unacceptable in the political climate of most LDC's. There will be a strong tendency, therefore, for productivity gains to be shared with labor through a rising real wage level.

The Behavior of Industrial Employment

Industrial employment has been regarded as the hero of the development drama. If only it increases fast enough, the labor surplus will eventually be absorbed and the economy will grow thereafter along convential lines. But performance has been disappointing. Country after country has found that industrial employment rises much less rapidly than industrial output.[1]

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[1] See the evidence on this point in Werner Baer and Michael Herve, "Employment and industrialization in developing countries," Quarterly Journal of Economics, February 1966, pp. 88-107.

There are doubtless many reasons for this, but two considerations require special emphasis. First, new industries in less developed countries usually start off at a low level of productivity relative to that of the same industries in older industrial countries. Workers are untrained, managers and supervisors are often inexperienced, new equipment has to be broken in, unexpected difficulties appear in supplies of materials, spare parts and repair services. But managers and workers can and do learn from experience. Productivity rises gradually, which necessarily means that employment rises less rapidly than output.

The second consideration is the wage behavior just noted. If the real wage level is rising rapidly, employers will respond in the normal fashion by capital-labor substitution and other measures. The sight of employers striving energetically to save labor in the midst of a general labor surplus is common in the less developed countries.

For these reasons one cannot assume that increases in industrial employment will be proportionate to increases in the capital stock. New investment will create new jobs. But against this one must set a continued shrinkage of employment on old investment.

Wage pressure tends also to restrict employment in the government sector. Two-thirds or more of current government budgets in the LDC's is payment for labor services. If one assumes that the amount which government can budget for labor services is independent of the wage level, the elasticity of demand for labor in the public sector is -1. In a growing economy, public employment is unlikely actually to fall; but its rate of increase will be much reduced relative to what might happen with more moderate wage policies.

Population Growth, Unemployment and Migration

The kind of model under consideration here should probably be termed a "high population growth" model rather than a "labor surplus model." If the problem were

merely to absorb an initial labor surplus of, say, 15 or 20 per cent of the labor force, the task might not appear too difficult. The real difficulty is that the surplus is being continuously replenished by rapid population growth.

Most of this population increase accrues in the countryside, which means that the farm labor force tends to increase rapidly. The question what would happen to agricultural output if there were a net withdrawal of labor from agriculture is thus of only academic interest. The practical question is whether labor-using innovations can be introduced into agriculture fast enough to absorb the growing labor force without depressing marginal productivity. Unless this can be done, the amount of unused labor time in agriculture will rise. Under-employment in the urban trade-service sector, and open unemployment in the cities, also seem likely to increase.

The distribution of under-employment between country and city depends on the behavior of migration; and this presents interesting problems for research and policy. Wage differentials are certainly one stimulus to migration. But what is the relevant differential in this case? Is it the difference between average earnings in agriculture and average earnings in low-productivity trade and service occupations in town? These occupations employ most of the low-skilled urban population, and are easiest for a new migrant to enter.

Is it, on the other hand, the difference between agricultural earnings and the wage level in the industrial and government sectors? This differential will usually be large; but it must be corrected for the difficulty of finding employment in these sectors. The higher the urban unemployment level, relative to the rate at which new "modern" jobs are being created, the lower the probability[1] of new migrants finding

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[1] Calculation of this probability requires assumptions about the working of the urban labor market. One might assume, for example, that new migrants take their place at the end of a queue, and are hired only after the existing unemployed have been absorbed. Alternatively, it might be assumed that a new migrant has the same chance of employment this month as do the existing unemployed, i.e., that selection of new employees is random as regards date of migration.

jobs within a given period of time. The lower the probability of employment, the smaller the inducement to migration.

Accumulation of unemployed labor in the cities, which has caused increasing concern in many LDC's may thus be a self-limiting phenomenon. At some level of unemployment, the employment prospects of new migrants may become so bleak that the rate of net migration will fall to the rate of net increase in industrial jobs. Unemployment will then have reached an equilibrium level.

Normatively, there is an interesting question whether, if people are to be unemployed and under-employed, it is better for them to be so in the city or the country. This is not entirely within the control of government; but there are things which government can do to influence the outcome.

The Concept of a Turning-Point

A central question in any development model is this: at what point can one say that successful development is assured? At what point is the economy on a sustained growth path?

In the Fei-Ranis model, there are two distinct turning points. The first, or "shortage point," is that at which redundant labor has been eliminated from the agricultural sector. The second, or "commercialization" point, is that at which disguised unemployment in the traditional sector has also been eliminated. At this point, labor becomes a scarce factor for which agriculture and industry must compete. The marginal productivity of labor and with this the earnings of labor, are equalized in the two sectors; and the supply curve of labor to each sector slopes upward.

This second point represents a very late stage in economic growth. Accelerated growth of the Japanese economy is usually dated from 1868; and this is regarded as one of the most successful historical cases of economic development. Not until the 1960's, however, was surplus labor substantially eliminated and then only by a combination of

phenomenally rapid industrial expansion and an equally seccessful birth-reduction program. Strictly, there is still disguised unemployment in the sense of substantial inter-sectoral differences in productivity and earnings. In most of the other industrial countries, too, the average productivity (and presumably also the marginal productivity) of labor in agriculture is well below the average for the economy. The flow of labor out of agriculture, which has been going on for generations, has not been rapid enough to close the productivity gap.

The significant indicator of success in early development is the point at which unemployment (unutilized man-hours as a percentage of available man-hours) begins to decline. The economy is then, in Fei-Ranis terms, moving in the "right" direction. This is a very modest conception of a turning-point, but this does not mean that it is easily reached. A high population growth economy, even one with a vigorous development program, may readily move away from this point rather than toward it in the early decades of development. Further, it seems unlikely that the turning-point can ever be reached simply by absorption of labor in manufacturing and other industrial activities.

An Arithmetical Illustration

These surmises are supported by some illustrative calculations, to which we now turn. This is not a model. It is simply a piece of Ricardian arthmetic, in which we set certain values for a hypothetical economy in Year 1, assume certain rates of change in output and employment, and ask what will happen in Year 2. This is merely a sketch of the output-employment "corner" of a potential model.

Table 1, which shows the initial state of the economy, requires little explanation. Employment and unemployment are defined in terms of man-hours rather than people, which would admittedly present difficulties for statistical testing. All unemployment has been assigned arbitrarily to the two traditional sectors, but this is of no real consequence. The sector productivity levels are of the right order of magnitude for

an economy at an early stage of development. In the government sector, of course, the high productivity of labor says only that government wages and salaries are relatively high, since government output is conventionally valued at what it costs. High value added per worker in the industrial sector is associated with a relatively high capital-labor ratio and may be associated also with market structures which permit monopolistic pricing.

We assume that labor force is growing at 3 per cent per year. We assume also that national product is growing 5 per cent a year, permitting a growth of 2 per cent in per capita income. A possible distribution of this output increase by sectors is shown the first column of Table 2. Industrial output has been set to grow fastest, and the relatively low growth rate of agriculture is in accord both with experience and with evidence on income elasticities of demand.

What do these growth rates imply for employment and unemployment? This depends on how the increases in output are achieved and specifically on how far they require increased labor. In the second column of Table 2 (Case A), we have assumed that employment increases proportionately with output in all sectors except the industrial sector, where such behavior is not plausible for reasons indicated above. In this event, total employment would from the beginning rise faster than labor force. The unemployment rate would fall from 20 per cent in Year 1 to about 19.6 per cent in Year 2, and would continue to decline thereafter.[1] Note, however, that urban unemployment declines mainly because of the large assumed labor absorption in the traditional urban sector. Expansion of the small government and industry sectors would by itself be quite incapable of accommodating the growing labor force.

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[1] Urban and rural under-employment will decline at differing rates, but we may assume such discrepancies are equilibrated by changes in the rate of rural-urban migration.

Table 1

Employment and Output in Year 1

Sector	Labor Force	Employment	Unemployment	Output	Relative Productivity
Rural	70	55	15	40	72.7
Urban Traditional	20	15	5	15	100
Industry	5	5	0	15	300
Government	5	5	0	10	200
Economy	100	80	20	80	100

Table 2

Alternative Employment Assumptions

Sector	Output Growth Rate (Percent)	Employment Growth Rate--Case A (Percent)	Employment Growth Rate--Case B (Percent)
Rural	4	4	2
Urban Traditional	5	5	5
Industry	7-2/3	4	4
Government	5	5	2
Economy	5	4.25	2.69

It is unfortunately quite easy, by moderate changes in these assumptions, to come out with a deteriorating employment situation. Suppose, for example, that the output increases are accompanied by the employment increases in the last column of Table 2 (Case B) in agriculture, we now assume that the output increase is achieved partly by technical changes (such as improved seed, pesticides, fertilizer) which do not require a proportionate increase of labor inputs. In government, we assume that employment increases are restricted by a rising relative wage level. Under the assumptions of Case B, employment in Year 2 will rise by only about 2.7 per cent, compared with the three per cent increase in labor force. Unemployment will increase year by year.

Suppose the economy does start off in the "wrong" direction, as in Case B. Is there anything in the picture which might cause it to change course after a time, and reach a turning-point beyond which unemployment will decline? The weight of the industrial sector in the economy is increasing gradually. On the assumption that the profit share of value added in industry is large and that a substantial proportion of profit is reinvested, this should gradually raise the capital formation rate and hence the rate of increase in GNP. Remember, however, that the incomes of landowners -- another group of potential savers -- are declining relatively because of the relative shrinkage of the agricultural sector. So one cannot assert as a general rule that the savings rate will rise over time -- this will depend on the assumptions made about income distribution, and about how property income in industry and agriculture is divided between consumption, tax payments and saving.

To be sure of reaching a turning-point, therefore, one would need to introduce exogenous changes of one or more of the following types:-

(1) An acceleration in the rate of GNP increase resulting, say, from an acceleration of technical progress, or from a skilfully administered program of foreign aid.

(2) Labor-using innovations which raise the ratio of employment growth rates to output growth rates. It is perhaps most plausible to look for these in the rural sector: in crop-production itself; in auxiliary activities, such as construction of irrigation systems or feeder roads by labor-intensive methods; or in development of rural-based small industries on the Japanese model. Education is also a very labor-using activity. Capital inputs are relatively small and the activity absorbs students' time as well as teachers' time.

(3) A decline in fertility rates. This could not plausibly be regarded as endigenous. Indeed, there is considerable evidence that the initial effect of rising per capita income is to <u>increase</u> fertility, and also to increase infants' survival rates. One would have to assume that this tendency is overborne by some force acting from the outside -- say, a large and successful family planning program.

The less is done in any one of these directions, the more weight is thrown on the others. This is true in model construction and also in the formulation of development strategy.

It seems likely that an interesting and useful model could be constructed along the lines suggested above. Because of the four-sector assumption and other complications, such a model might not permit of general algebraic solution. One could still, however, engage in computerized Ricardian arthmetic, i.e., simulation runs to explore the consequences of varying the key parameters of the system. Such experiments might contribute materially to our understanding of employment behavior in high population growth economies.