

file

ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station
New Haven, Connecticut

CENTER DISCUSSION PAPER

No. 89

INCOME AND WEALTH DISTRIBUTION IN THE DEVELOPMENT PROCESS
AND THEIR RELATIONSHIP TO OUTPUT GROWTH

R. Albert Berry

July 1970

Note: Center Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publications to Discussion Papers should be cleared with the author to protect the tentative character of these papers.

INCOME AND WEALTH DISTRIBUTION IN THE DEVELOPMENT PROCESS

AND SOME RELATIONSHIPS TO OUTPUT GROWTH

A limited amount of work has been done by economists on the economic determinants of distribution of income and the way distribution may be expected to change over the course of time. Some of the studies which have looked at changing distribution patterns in a given country over time and some of those which have surveyed a number of countries at a given point of time have suggested that distribution bears a quadratic relationship to the stage of development, typically growing more uneven as the development process gets underway, and then more even again as the country approaches maturity.¹ Kuznets related this sequence largely to structural change in a developing economy, in particular the increasing share of the non-agricultural sector which is normally characterized by higher average incomes than is agriculture, and, less equal ones.² As its share in total output grows over a certain range, distribution will widen, both because its internal distribution is unequal and because its average is substantially higher than that of the agricultural sector. Later, as it increasingly dominates the economy, the effect of the difference in its average income over that of agriculture in leading to overall slowness will decrease, and its own internal distribution may also become less unequal. (Different authors have stressed a number of other factors

¹See, for example, Simon Kuznets, "Economic Growth and Income Inequality" American Economic Review, No. 45, March 1955.

²Kuznets, "Quantitative Aspects of the Economic Growth of Nations: Distribution of Income by Size", Economic Development and Cultural Change, Vol. XI, No. 2, Part II, January 1963. In almost all of the 10 countries for which Kuznets presents data in this study, this relation was borne out. Exceptions were the U.S. in 1950-3 (The relation has been the usual one earlier, apparently) and Italy (though a marginal exception).

whose change over the development process is likely to affect distribution,¹ but the empirical work done to date has been too scanty for any of these to pass into the category of accepted theory.) Enough (though not overwhelming) empirical evidence has been adduced by now-consistent with the increase-decrease pattern of inequality over time² to call for further work on the possible sources of it.

In view of the unhappy prospect which such a worsening of distribution presents to modern day L.D.C.'s, the ultimate question is to what extent, if at all, such a worsening is inevitable. Kuznets basic explanation suggests that it is.³

¹See, for example, L.B. Kravis, "International Comparison of Income Size Distribution," Review of Economic Statistics, November 1960, 42, pp.408-16; R.J. Lampman, "Recent Changes in Income Inequality Reconsidered", American Economic Review, June 1954, 44, pp. 251-68; H.T. Oshima, "International Comparison of Size Distribution of Family Money Income with Special Reference to Asia," Review of Economic Statistics, November 1962, 44, pp. 439-45.

Among the possibly important factors considered are increases in education, the transition from small scale to large scale enterprise, increasing geographic and other mobility of factor, increasing political participation of previously marginal groups.

²For a discussion of some of the literature see Richard Weisskoff, "Income Distribution and Economic Growth in Puerto Rico, Argentina and Mexico", mimeographed, 1969.

³One could argue, of course, that to the extent that the widening and narrowing results from the difference in average agricultural and non-agricultural incomes, there is a spacious component in the change, if the difference in monetary (or total measured) incomes between the sectors is greater than the difference in real incomes.

In this paper we present a simple theoretical framework giving an alternative (though not entirely unrelated)

interpretation of the observed sequence referred to above.

Also, basing the analysis on the same explanations of how the growth process of average income per capita occurs, we analyze the extent to which a conflict between output maximization and improvement of the distribution of income is likely to occur.

Before proceeding further, it is useful to detail what we would define as a "conflict" between the two variables, output and distribution.¹ The first point to be clarified involves the difference between "pre-tax and transfer" income and "post-tax and transfer" income. Relatively even after distribution of income can clearly be obtained either by having a relatively even before tax distribution or effecting distribution through the government budget. One question of interest, therefore, is the extent to which equalization of income through the tax and expenditure policy of the government conflicts or does not conflict with maximization of total output. Here the relevant concepts are transfer costs, incentive costs, and so on--a series of phenomena frequently discussed (though less often qualified) in economics.

In this study, the sense in which we ask whether there is a conflict between output and distribution is primarily in terms of the effects on output and pre-tax and transfer distribution of the use of those factors of production normally disposed of by the government itself or under the control of the government and the effects of the other types of interventions available to it. Examples of this would be the distribution of education

¹It is not necessary for our purposes here to specify particular measures of distribution as the relevant ones for this discussion. Some variable involving a set of positive weights on the share of lower deciles and negative ones on the share of upper deciles would be appropriate.

effected by the government; the distribution of credit, the regulations the government sets up affecting the income earning power of people in different positions along the income profile--for example, regulations affecting large and small firms; and so on.¹ A situation in which we would say that the two variables were in conflict would be one in which that allocation of factors and use of controls by the government which maximized total output (for example distribution of credit precisely to those lines of investment where its pay-off to total output would be greatest) would tend to imply a more unequal income distribution than would some other forms of government intervention (including the possibility of no intervention at all); we would say that the two are not in conflict if the most productive (in terms of total output) directions of government investment, activity and regulation tended to favor people currently at the lower end of the income distribution.²

Discussions of the possibility of conflict between production maximization and distribution improvement presuppose in part that fiscal redistribution through tax and transfer, i.e., through the government budget

¹One is thinking of either (a) direct participation in the development of new technologies or of public infrastructure, or (b) the way in which the government regulates and stimulates the development of new technologies and the investment of the private sector, or (c) the way the government affects market structures. Any government policy fits into one or another of these categories or some combination of them. The concepts fit the case of a growing economy; the question is how policies affect the movements of and shape of the output-distribution possibilities curve. In terms of a stationary economy with a fixed bundle of resources, one would be thinking of the relationships between government policies and the position on (or off) the (stationary) possibilities curve.

²Really the question is the extent of the conflict, it is implausible to assume that that particular set of government policies which gives the maximum equality will also give maximum output; nor is there any general presumption that the relation should be a monotonic one.

is relatively expensive; in other words it is not possible simply to maximize production, forgetting about the distribution of income implicit in the particular way in which production is generated, and then redistribute income as seems appropriate after the fact of the production process. The relation between the two variables can be expressed in a "possibilities curve", ^{where} quantity of distribution is somehow measured on one axis and output growth on another; if the two are in conflict the "possibilities curve" will have a negative slope. Since we may assume that a community indifference curve between the two would also have a negative slope, a tangency would, as in a regular indifference curve-production possibilities curves diagram, indicate the social optimum.¹

The distribution of income in which one is ultimately interested is that among persons, after all intra family transfers of income (in the form of provision of goods and services, and any other form) primarily from income earners to non-income earners, have been taken into account. This means that the family distribution of income, along with a knowledge of this transfer process and the composition of families would be more or less ideal. Distribution of personal income before such transfers is not fully satisfactory, as its relation to the distribution just described is usually imperfectly known and may change over time. But the family income

1

The effectiveness of the administrative system would determine the cost of redistribution through the budget. The relevant output or income variable here would be total output or income minus these administrative costs of redistribution if we assumed budgetary transfer.

distribution by itself is also imperfect if the family composition and nature of intra family transfers are unknown--also usually the case. We abstract here from these problems, for the most part since it appears likely that the general patterns of change in all three distributions, (personal without consideration of intra family transfer, family without consideration of composition of family, and personal after consideration of intra family transfers) would be rather similar.

Broad Definition of the Variables Determining Income Distribution Over Time

Before tax distribution of income depends on the distribution of the control of factors of production, on their prices, and on the way in which the factor and product markets work. Thus the way in which income distribution changes over time will depend basically on three things:

- (a) Changes in the distribution of ownership of factors over time--the factors being labor, human capital,¹ and physical capital (both reproducible and non-reproducible) and possibly such other factors as intangible capital.^{2,3}

¹The way in which factors are defined is always arbitrary, and the most fruitful way depends on the issue being analysed. The three factor breakdown used here is by now a popular one, although for some purposes it pays to look at all income from human effort as payment to human capital. If there is a laboring class which received little or no investment in its future productivity, especially investment paid for by itself, the three factor breakdown becomes useful. Describing how we may expect distributions to change over time is simpler when we accept the assumption, probably valid over considerable periods in the past, that a person's human capital was largely produced by himself or his family--i.e., it did not involve too much in the way of intra family transfers, either through the government budget or directly.

Although this categorization of factors is arbitrary, we emphasize that it does not alter any result, only the ease of exposition is affected.

- (b) The way in which the production function changes over time, i.e., the nature of technological change, which may change the relationship between the marginal productivity of one factor and that of another, and
- (c) the way in which any market imperfections which exist change over time--this may change the remunerations of factors in a different way from the way their marginal productivities are changing.¹

²(Footnote from previous page)

The fact that some factors are owned by the government but no change is made for their service introduces a complication. (If a change is made then the government simply enters the factor market like any family and we must ask how it uses these earnings.) It means that complementary factors rise in market price and substitution factors fall; thus the current and future remunerations of factors traded in the market place will be changed as a result of government investments, and so will the wealth of the owners of said factors. And when the production function is defined in physical units, it is also, of course, affected by such investments.

Since government investment is an important area of policy, it would be best separated out as a category by itself in an empirical study; at this stage we are interested in a rather broad interpretation of the change in output and distribution over time, so far as conceptual simplicity we implicitly treat its effects under (a) and (b).

³The development process involves changes in the composition of consumption (as average incomes change) and hence changes in the relative importance of different industries and, if factors tend to be at all industry specific in their use, changes in relative factor prices. (For an interesting presentation of some of the interactions between changing demand composition and changing profit rates see Stephan Hymer and Stephen Resnick, "Capital and Wealth in the Development Process", Economic Growth Center, Discussion Paper No. 63, 1969). This implies that one source of changes in wealth distribution is this change in distribution of (especially human) capital as the relative prices of factors change over time. If future market earnings could be perfectly foreseen and were always appropriately discounted, a skill not yet usable would imply current wealth equal to the value of those future
(Continued on Page 7a)

Footnotes continued

earnings discounted at the market rate of interest. But because of imperfections in the capital market, one cannot view the issue so simply. The ability to make this latent wealth liquid lowers its value by an amount depending on the individual's need for liquidity. Thus wealth distribution will normally be affected over time by these changes.

Footnote from page 7.

¹ Rather than thinking of monopoly power leading to a higher rate of return to capital one can think of monopoly profits as accruing to the condition of having monopoly power and more or less think of this power as an asset or factor. And it may be noted here that the distribution of such power may well change considerable over time. Schumpeter described how the process of technological change leads to a position of monopoly for the innovator, and the position is then eroded occurs with the course of time. Whether the erosion occurs with any rapidity may be open to question, but certainly the creation of new monopoly positions is a permanent feature of growth. It may well be that the distribution of this "asset" of monopoly position changes income distribution more over time than does the distribution of physical capital, for example.

Market imperfections are also responsible for the fact that capital held by different groups of people tends to earn different rates of return; the returns different groups achieve are clearly important determinants of changing income and wealth distribution over time.

A slight modification of this sort of analysis would allow one to tell another interesting story, how the wealth distribution changes over time. Since the wealth distribution at a point of time is largely a result of past income distributions and savings functions,¹ it will in general change a good deal more gradually than the income distribution does.

Much of the story with respect to the distribution of income at a point of time is told by distribution of physical and human capital² (the latter defined as corresponding to the difference between the value of a mans effort and the value of "pure" labor, the latter being arbitrarily defined, as indicated earlier, to correspond to the service of a person in whom no or very little expenditure aimed at improving his productivity has been made). Correspondingly, changes in distribution of wealth (of these two kinds) over time are clearly very important in determining changes in income distribution over time. In an extreme case where capital were the only source of income then the way in which the distribution of capital would change over time would depend on the relationship between income levels and reinvestment rates. If savings (or reinvestment) rates out of income were the same for people at all income levels then the distribution of capital would remain the same and the distribution of income would thus also be constant provided that there were not systematic differences between the

¹The other factors in determining wealth distribution over time are changes in relative factor prices and in the distribution of monopoly power (where, as in the previous footnote, we think of this as a separate asset or source of income), and the rates of return to the wealth held by different individuals and groups.

²With a definition of "pure" labor like that in footnote 1 Page 5, the labor share would probably be in the neighborhood of 20 or 30 percent or less for most countries over most of the development process.

rate of return to capital invested by people and their wealth levels.¹

But if those savings rates differ, for example being higher for people with higher ^{per} capita income, then the distribution of capital would become more unequal over time, with the inequality growing faster the more the savings rates differ and the higher was the rate of return on capital. And if the rate of return is a positive function of the wealth of the investor (a likely situation), a further tendency toward increasing concentration will be present.^{2.5}

The fact that there is labor income makes the tendency for increasing concentration over time look less strong since it appears reasonable to expect the price of labor to rise relative to the price of capital over time. Note, however, that if savings rates were equal for everyone, and neither pure labor income nor the rate of return to capital varied over time, then income distribution would remain constant over time even though the distribution of capital gradually becomes more even and the share of total income coming from capital increases continuously for each person.^{2.5} A rising relative price of labor would not assure improvement, of course, since it would have to outweigh the two already mentioned negative influences found, in most real world situations (differential savings rates³ and differential rates of return to capital).⁴ And a rising relative price of pure labor is not a "sure thing" since it is conceivable that pure labor

is

¹In a perfect capital market there would be no such differences, except those due to differing levels of monopoly positions.

²Proof:

Let Y_0 be the income of individual X in year 0. It is equal to $L + c C_0$

Where

L is pure labor income (equal for everyone)

c is the (constant) rate of return to capital

C_0 is his capital stock at the initial point of time.

2 Footnote from previous page continued.

His rate of growth of income $\Delta Y/Y_0$ depends on ΔY which equals $c (\Delta C)$
 $\Delta C = s (L + c C_0)$, where s is the savings rate. $c \Delta C = cs (L + c C_0)$
Thus $\frac{\Delta Y}{Y_0} = \frac{cs (L + c C_0)}{L + c C_0} = cs$ which is independent of the share of
original income coming from labor and capital.

2.5 Footnote from previous page

For an excellent discussion of this and related questions, see James E. Meade, Efficiency, Equality and the Ownership of Capital, (Dondon, George Allen and Unwin. 1964).

3 Footnote from previous page

In fact, empirical studies in various countries suggest that the savings rate out of labor income is very low or even zero, and almost all savings out of capital income. See, for example Irving Kravis and I. Fried, "Entrepreneurial Income, Saving, and Investment," American Economic Review, Vol. 47, June 1957; Simon Kuznets, The Shares of Upper Income Groups in Income and Savings, New York, 1953.

4 Footnote from previous page

Although empirical evidence appears limited on this, Meade, (Op. Cit., p. 27) presents data for the U.K. which implies that the rate of return to the 42% of total personal wealth held by the top 1% of the population in 1959 has a rate of return about twice that of the remaining 53% of the wealth held by everyone else.

is a substitute for human capital in such a way that if human capital rises faster than physical capital, its (pure labor's) price will fall.¹

To summarize, it appears that in the absence of technological change, and redistribution through the budget, changes in income distribution over time would be determined primarily by:

- (a) A falling rate of return to capital and increasing wage rate of labor, which would tend to equalize incomes over time;
- (b) A higher average savings rate for higher income people, which would tend to make incomes less equal over time;
- (c) A higher rate of return to capital for higher income people, having the same effect as (b).

The net effect of these factors, would thus be theoretically unpredictable;

sufficient knowledge of the relevant parameters would make it predictable for a given case. Such a classification abstracts from certain complexities related to differences in the consumption baskets of rich and poor which may lead to changes in the distribution of real income being different from changes in the distribution of money income; these factors are considered below. It also abstracts from demographic change over time, which may be important if family size varies significantly with income level, as it frequently has.²

¹But this possibility, while it may exist, does not seem to have been important in affecting distribution measures like the Gini coefficient i.e., in generating large groups of people with incomes far down in the distribution. It may well, however, be responsible for the sorry fate of smaller groups of very unskilled people in some advanced countries.

²This factor has been discussed by, among others, Meade, Op. Cit.; Herman Daly, "A Marxian-Malthusian View of Poverty", Economic Growth Center Discussion Paper, No. 1970

As mentioned earlier, this very simple framework is probably a better description of how the distribution of physical capital changes over time than for human capital.

In the latter case, it seems probable that a smaller proportion of new investment is paid for out of private pockets, and therefore that the distribution of newly generated investment in human capital depends to a greater extent on government policy. A free education system would generally tend to be positively redistributive of human capital and vice versa.

The second broad factor which determines changes in income distribution over time--the nature of technological change--also presumably obeys certain regularities which may make it possible, especially for countries at certain stages in the development process, to predict how it will influence distribution. Marx, one of the earliest economists to write on this issue, concluded that there was a tendency for the capitalist system to generate and apply labor saving technological change at such a rate as to assure that the equilibrium wage (and it is probably fair to interpret him as referring to the equilibrium payment to pure labor) would be at or below subsistence. This maintenance of a reserve army has not occurred in the U.S., or other developed countries; although the sorting out of payments to pure labor and payments to investment in human capital is difficult, it appears that even the former has risen considerably over time; and if it has not risen, the Marxian result on the distribution of income has been avoided by a general increase in the stock of human capital. A really serious question arises in this vein in the underdeveloped countries which tend to borrow technologies not developed as a reaction to their own relative factor abundances; and it seems possible that, with this influence working, something very close to what Marx referred to may

be happening, and may continue to happen in many of the underdeveloped countries unless specific and strong policy measures are taken to counter-act it. It is reasonable to hypothesize for these countries that much of the ^{tech-}nological change which is introduced worsens income distribution. In other circumstances this might not be the case.

Any economy has many market imperfections, and although in general a neo-classical model with no imperfections remains a useful vehicle of analysis it is at the same time necessary in the analysis of certain problems to focus attention on these imperfections. Given that the development process tends to bring about certain market integration, enlargement of markets, improvements in communications and transportation, and so on, it seems reasonable to posit that the degree of imperfections and distortions which exist in a system diminish as development proceeds. And if overall development leads to a trend towards more even distribution of income and socio-political power; this is likely to coincide with a decrease in personalism--thus a decreasing tendency to favor people because they are friends, or to employ them even though they cannot do the job as well as someone else. But there are also factors working in the other direction. The development process involves an increasing role being played by the industrial sector, which may tend to be more characterized by market imperfections in both product and factor markets than the agricultural sector.¹ On the other hand the service

¹This would be an accurate description for some developed countries, where many producers produce each agricultural item and only a few each industrial one. Restrictive organizations raise the monopoly element in agriculture but perhaps still leave it below what in industry in most countries. But the suggestion in the text is probably put most in doubt by the fact that there may be many market imperfections in underdeveloped country agricultural marketing due to transportation and communication problems.

sector is probably relatively less monopolized (although this depends on the case) and it also increases relative to the primary sector as the development process proceeds. As mentioned earlier, technological change continuously creates monopoly positions, so it is not safe to assume that the average level of monopoly will decrease because market expansion cuts into the monopoly power of previously existing monopolies. The effects of all these phenomena on distribution obviously need to be analyzed in much more detail before a general theory which would predict their implications for income distribution changes over time could be firmed up.

In the present study, we select four of the possible sets of assumptions or models one could use in analyzing probable income distribution change over time in terms of the above general framework i.e. where change results from (a) change in the distribution of wealth; (b) the nature of technological change and (c) changes in market imperfections. Our goal is not so much to predict in each model which way distribution is likely to change as development proceeds, since this depends on values of parameters which way would be to be based on empirical research not yet done, but rather to compare these models among themselves, essentially asking, other things being equal, what is the relative path of distribution over time in the various models? We make first the traditional or classical division (probably relatively meaningful at certain stages of the development process and in certain regions of the world) between a capitalist group and a laboring group, analyzing the expected change in this functional distribution over time as it depends on the extent of capital accumulation, the nature of technological change, and certain specific imperfections. This approach is more realistic than might appear at first sight, if one recognizes that in many underdeveloped countries the distribution of human capital is very related to the distribution

of physical capital--the people who tend not to have one tend also not to have the other. Obviously people do not fall simply into these two categories--there is a continuum--but this complexity will not be considered here, in order to keep the analysis manageable. A second division of income--between capital income of large scale capitalists on the one hand and labor and capital income of everyone else seems more appropriate for some countries, which have fairly widespread division of capital in small amounts; in early stages of development this is especially characteristic of the agricultural sector.

We use various assumptions about the nature of technological change, and we concentrate on a particular type of market imperfection, that characteristic of the so called "labor surplus" economies--i.e., an inequality between the marginal productivity of labor and the wage rate in at least some part of the economy (usually referred to as the "traditional" sector). We also use an alternative definition of a labor surplus situation, being one in which the wage rate is below a reasonable level (however defined) with the result that a person cannot subsist on labor income and must either be subsidized (e.g. by the rest of his family) or have some capital so that his total income from both labor and capital is at or above the subsistence level.¹

Income Distribution Over Time and Output--Distribution Conflict
in a Neo-Classical Economy

We take as our first case, in view of its relative ease of analysis a neo-classical economy with pure competition and no market imperfections of any sort, thus abstracting from the moment from the third source of possible

¹The imputed wage within a family economic unit in the traditional labor surplus case is also, of course, below the subsistence level, but it is assumed that a below subsistence wage will not actually be observed in the labor market.

income distribution changes to which we referred above. Although we shall conclude that the likelihood of output-distribution conflict is greater in the case of labor surplus situation, this model provides a useful reference point with respect to that question also.

The changes which lead to an increase in production per capita (which we take as the relevant variable rather than total production) are increases in the capital/labor ratio, and technological change. Under the current set of assumptions, distribution changes over time depend on relative savings rates of different income groups, and the impact of the capital accumulation and the technological change on the relative prices of labor and capital. In order to analyse fully the income redistributive impact of an increase in output one must consider not only the impact of the change in output on the distribution of income among factors of production but also the effect on consumers or users of the goods. These two groups are the same, of course, but it pays to analyse separately the implications for each individual as producer and as consumer.

When the source of increasing output is capital formation, the implications for redistribution of monetary income¹ between the factor capital and the factor labor depend clearly on the elasticity of substitution of the aggregate production function. With a Cobb-Douglas production function there will be no change in the share of income going to each factor though per unit remunerations will change and the effect will be toward greater equality of

¹We use the term "monetary income" here not to exclude income in specie but to distinguish it from real income, which may change over time with monetary income constant if prices change.

distribution. A smaller elasticity of substitution would mean a rising share of income going to labor, and vice versa. The redistribution occurring due to the fact that a given percent change in monetary income may not imply the same percent change in purchasing power for the recipients of labor income and the recipients of capital income depends on differences in the typical market baskets consumed by earners of capital income and by earners of labor income. As capital accumulates, relative prices will fall for those products relatively intensive in capital and will rise for those relatively intensive in labor, so whichever income-earning group has the relatively higher proportion of its bundle of goods produced in relatively capital intensive ways will have an increase in real income greater than its increase in money income (assuming that the overall price level stays constant).

If the source of increasing output is technological change, then neutral technological change implies that there will be no redistribution of monetary income impact as long as the production function is homogeneous of any degree. And under these circumstances, labor saving technological change (see definitions below) would lead to an increase in the labor share if elasticity of substitution tended to be high, and a decrease in it if it tended to be low; the conclusions for capital saving technological change would be the opposite. The picture is more complicated if the production function is not homogeneous.

To determine the income redistribution impact of a technological change one has to define labor saving and capital saving technological changes with some precision. There are two basic ways in which simple forms of technological change can be defined; one involves a type of change which leaves the isoquants the same as before, but increases the output corresponding to each one.

This means that at a given unchanged factor endowment, the technological change will leave the marginal productivity ratio of factors the same, and thus their shares in total income also stay the same. A twist in the shape of the isoquant at the point corresponding to the economy's factor endowment such as to imply a lower price for capital relative to labor can be called capital saving technological change; if factor prices had stayed at their original level, individual entrepreneurs would have increased their use of labor and decreased their use of capital. In this case capital saving technological change would definitely decrease the total share of income going to capital; and labor's share would fall with a labor saving change.

Another possible definition of neutral technological change is one in which it is assumed that each point in each isoquant shifts inward by the same percent. This is the same as saying that each quantity of output now requires X percent less of each of the factors previously required to produce it, regardless of the factor proportions originally used to produce it. When the production function is not homogeneous, this sort of neutral change can affect the marginal rate of substitution between the two factors at the factor proportions corresponding to the economy; if for a given proportion of capital and labor, the ratio of the marginal productivity of capital to that of labor rises for isoquants corresponding to higher output levels then there will be an increase in the ratio of the marginal productivity of capital to that of labor with an effect the same as previously resulted from labor-saving technological change. In terms of this definition of labor saving and capital saving technological change, the change would have to be capital saving in order to leave the shares of the two factors constant.

Conversely if for a given proportion of capital and labor, the ratio of marginal productivity of capital to that of labor falls for isoquants corresponding to higher output levels, the change would have to be labor saving to leave factor shares constant.

These last paragraphs have referred to shares in monetary terms. The implications of the nature of technological change through the way it affects the purchasing power of a given amount of money to each of the two groups depends in this case on whether that change is more rapid in the goods typically consumed by the earners of labor income or those consumed by the earners of capital income.

In empirical terms, it is not clear whether capital accumulation and technological change as they typically occur tend to increase the real purchasing power of a given amount of money for the labor earners or the capital earners. Capital earners tend to consume modern products - electrical products, automobiles, and so on - a number of which are relatively capital intensive, but at the same time they tend to be heavy consumers of personal services which at least are physical capital non-intensive. Technological change tends to be concentrated in physical products rather than in services, so there is no simple a priori answer as to which group will be favored.

Whenever either the capital accumulation process or the technological change process leads to a change in relative prices, a full general equilibrium analysis would have to be used to analyze the indirect effects of these tendencies towards price changes by looking at the factor proportions and consumption proportions of all goods related in production or in consumption with those whose relative prices had the original tendency to change.

Three Labor Surplus Cases

One of the most striking characteristics of many underdeveloped countries is that they do not fully fit the neo-classical model which forms the framework of the above analysis. And one of the most important ways in which they do not fit it is in the existence of some form of surplus labor, a situation which leads to the marginal productivity of labor being different in different sectors of the economy, in particular between sectors which in general use a profit maximizing criterion in the decision as to how many workers to employ, and other sectors where people are self employed or organized in family units, do not have enough complimentary factors to give them very high marginal products, but do not lose their employment as a result. The traditional picture of this situation may be portrayed as in Figure 2. There is a modern sector which equates marginal productivity and salary, and a traditional sector in which are employed all the workers who do not gain access to the modern sector. In an economy with a great deal of excess labor the marginal productivity of that factor may be zero or negative. In Figure 2 we assume that the wage level in the modern sector is given by S_s , the amount of labor in that sector is OL_0 and that the amount of labor in the rest of the economy is L_0^1 . This model we will refer to as the first labor surplus model or LSM#1.

The implications of this labor surplus situation for static inefficiency (in terms of failing to achieve maximum potential output) and for distribution of income depend in part of the production relationships in the economy and in part on the details on the behavioral pattern of people in the so-called traditional sector. Labor surplus theory has usually assumed, either implicitly or explicitly, that there is some relationship between the salary at which people

are willing to work in the modern sector and the income they derive in the traditional sector. One specific hypothesis is that the subsistence wage level applicable for the modern sector is equal to the average income in the traditional sector. With this assumption, the static loss of production in the economy represented by Figure 2 would be the area AL_2L_0 . Loss clearly depends on the elasticity of the marginal productivity of labor curve in the modern sector. If this curve is very elastic beneath the level of the subsistence wage and there is a lot of redundant labor, the static inefficiency loss can be quite great. If there is, given equal salaries, either a preference to work in the modern sector or not to work there, a preference which is in some sense artificial and perhaps due to poor information, then the loss will be respectively greater or less than that suggested in Figure 2.

Two institutional situations have been most commonly mentioned in explaining how some individuals can earn an income above their marginal productivity in the traditional sector. If the economic unit is the family, consisting of several workers, as is fairly typical in the agricultural sector especially, and as long as average income is high enough for all to survive, it is reasonable to assume that no one will be turned out because less hands are really necessary. This situation we will refer to as the family institution case. Alternatively it has been proposed that in more or less feudal agricultures, the owner may feel a responsibility to support more workers than would maximize his profits - this we refer to as the "noblesse oblige" case. We turn below to the question of how income distribution change over time is likely to vary between these two subcases of LSM#1, the neo-classical model and the other labor surplus situation

to be considered. But first we outline briefly the statics of the latter which we will refer to as labor surplus model two (LSM#2). It differs from the first one in that we assume labor is paid its marginal product in all sectors, even though this payment is below the culturally or physically defined subsistence minimum. Thus the institutional situation implies that people will work in the modern sector at wages less than the average productivity of labor in the traditional sector. This assumption corresponds essentially to a situation where the family is the economic entity which maximizes income, rather than the individual as in the case above. If this sector were, as is frequently assumed, made up of family economic entities with a number of people in each family (for example the father and a group of sons) then it is clear that in order to maximize family income the optimal behavior would not be to send a son to work in the modern sector only if the wage rate there were equal to or above the average income per person in the family in the traditional sector, but rather to send him there at any salary above the marginal productivity in the traditional sector; if that marginal productivity is 0, the son should theoretically go to work in the modern sector if he can get a positive wage at all. While this theoretical extreme is impossible for a variety of institutional and other reasons, possibility of a wage below subsistence cannot be neglected, especially in societies where family relationships are closely maintained even after a person moves from a rural to an urban area, or goes to work on a different farm or artisan entity from the one his father runs. Since the latter two moves do not even necessarily involve geographic separation, their feasibility can the less be denied a priori.

~~There is a possibility of a wage below subsistence cannot be neglected, especially in societies where family relationships are closely maintained even after a person moves from a rural to an urban area, or goes to work on a different farm or artisan entity from the one his father runs. Since the latter two moves do not even necessarily involve geographic separation, their feasibility can the less be denied a priori.~~

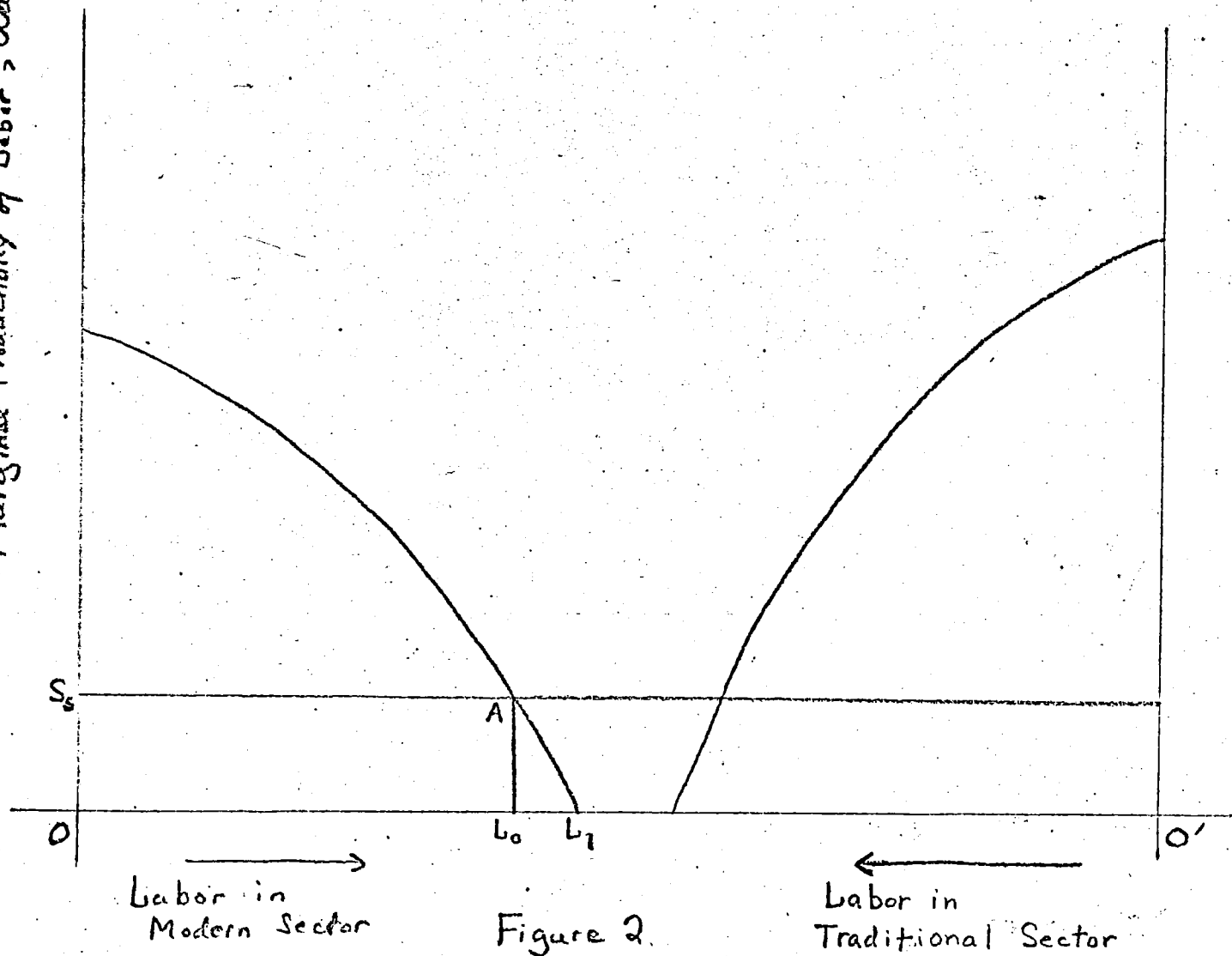
If this latter assumption were actually to hold, the existence of surplus labor¹ would not necessarily imply any static inefficiency although this extreme case would be unlikely since the wage rate would have to fall to zero if the marginal productivity were zero in the traditional sector. At any rate, to the extent that some people accept wages below the average income of the economic entity to which they belong, some of the static inefficiency loss is cut out.

Relative Income Distribution Paths in the Three Models

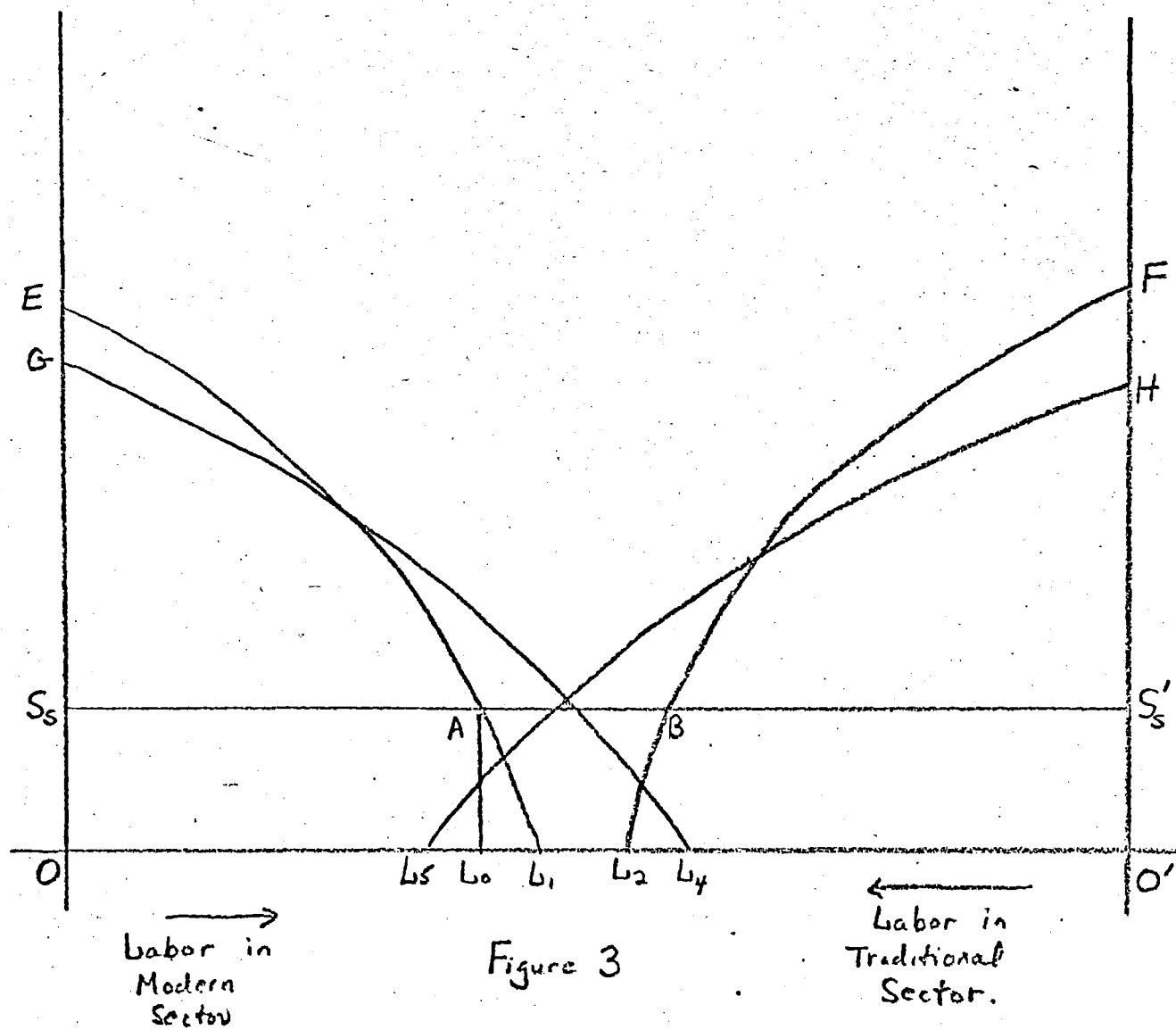
The way in which the distribution of income between capital and labor changes in the course of economic development is of interest when it may be reasonably assumed that individual families tend to have income from only one of the two factors. This is a reasonable assumption in the modern sector where the capitalists and the workers are usually rather clearly defined groups. But it is not necessarily the case in the traditional sector, where we are frequently talking about small scale farmers who, although they do not operate very much land, do at least own it, or small scale artisans with similar characteristics. In these cases each of these economic units has some labor income and some capital income; one might impute the latter evenly among all the members of the unit. In a neo-classical model, and especially when development has proceeded to a point where agriculture and small scale industry are relatively unimportant, the breakdown of income between capital and labor may be meaningful, in that people tend to have most of their income from only one of the factors. But it could not correspond to a distribution by two groups of families either in LSM#2

¹Where we define a labor surplus economy as one in which the marginal product of labor was below the subsistence level, however defined.

Marginal Product of Labor : Wages



Marginal Productivity of Labor: Wages



nor in the LSM#1 family institution case. It might, depending on how we define labor income, be meaningful where the institution by which people whose marginal productivity was below their income were subsidized was through "noblesse oblige" landlords instead of their own family.

Although the labor-capital income breakdown has interest only in some of the cases we wish to compare, we take a look at it as a first step toward a more satisfactory division, i.e. we consider the relative trajectories of the share of income going to labor in these cases basically as a reference point for subsequent considerations. For the "noblesse oblige" case, we assume that the capital income in the traditional sector (defined as total income minus the number of workers times the subsistence wage) corresponds to a specific group none of whom leave that sector until the economy has left the labor surplus situation. We trace out relative distribution paths for the 4 cases in question, even though, as noted above, in only two could this distribution directly refer to family groups.

Figure 3 ^{incorporates} the relevant assumptions made about the economies used in the comparison. We assume that each of the four economies "starts" with a given average income per capita and we then consider for which ones the labor share is likely to be higher at the start, and what the relative trends are likely to be thereafter, both of the absolute labor income and of labor's share of the total pie. In Figure 4b we plot the amount of income derived from labor in the four cases as a function of average income per capita; thus when the curve for one economy is higher than that for another, its labor share is higher. Labor share itself is plotted in Figure 4a.

The two marginal productivity curves of Figure 3 (EL_1 for the modern sector and FL_2 for the traditional sector) define for us in the case of LSM#1, a total amount of income by which we arbitrarily define the "starting point" or basic level for all four cases; that level is equal to $OEAL_0$ plus $O'FL_2$. The amount of labor income in the noblesse oblige case would be S_sAL_0 (from the modern sector) plus $AS_s'O'L_0$ (from the traditional sector)¹, indicated in Figure 4b as OZ . The amount of labor income in LSM#1 family institution case - would be only S_sAL_0 if we stick strictly to the logic that no labor income is imputed unless the marginal productivity of labor is positive. Thus the curve (Figure 4 representing labor income for this case starts (at O_T) below that of the noblesse oblige case but the same marginal productivity curves would apply in each case. Given model LSM#2, and assuming the same average income per capita at the starting point, at least one or both of the marginal productivity curves for the two sectors must differ from those assumed for LSM#1. This is so because the loss of potential production AL_1L_0 which occurs in LSM#1 does not occur in this case. There is, of course, no pair of curves which have a "correct" relation to those used for LSM#1. But trying to make the cases as parallel as possible, we may

¹In this case, of course, not all of the ~~income~~ going to workers in the traditional sector is generated by their marginal productivity, but for present purposes we define the subsidy received by workers as labor income since it results (albeit through an unusual route) from the individual's status as a laborer. (In the case of LSM#1, with the family-sharing institution, it seems more convenient to define the difference between income and marginal productivity of the surplus-laborers as income resulting either from their status as co-owners of capital, or as members of a family. Admittedly the latter case may be very close in nature to the noblesse oblige situation, though it seems likely that the landowner in the latter situation will feel responsible for providing subsistence only when the workers are on his land and in the former case the family would probably interpret its responsibility as going farther).

Relative Paths of Labor Income and Labor Share : Four Models

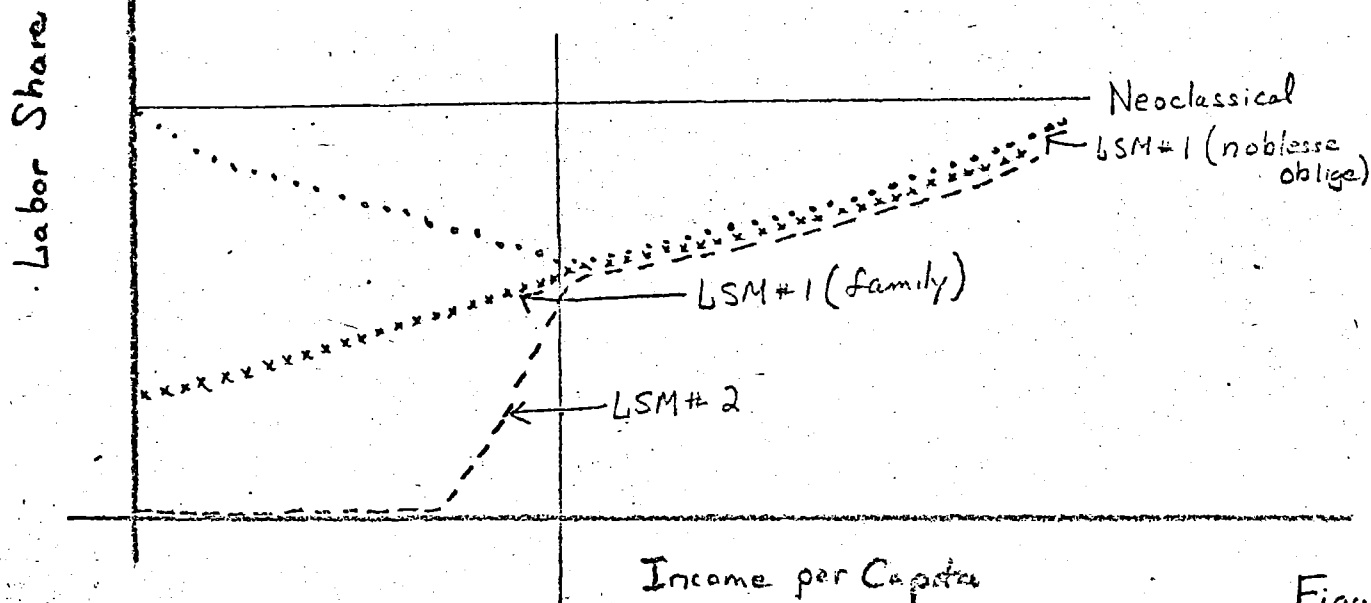


Figure 4a

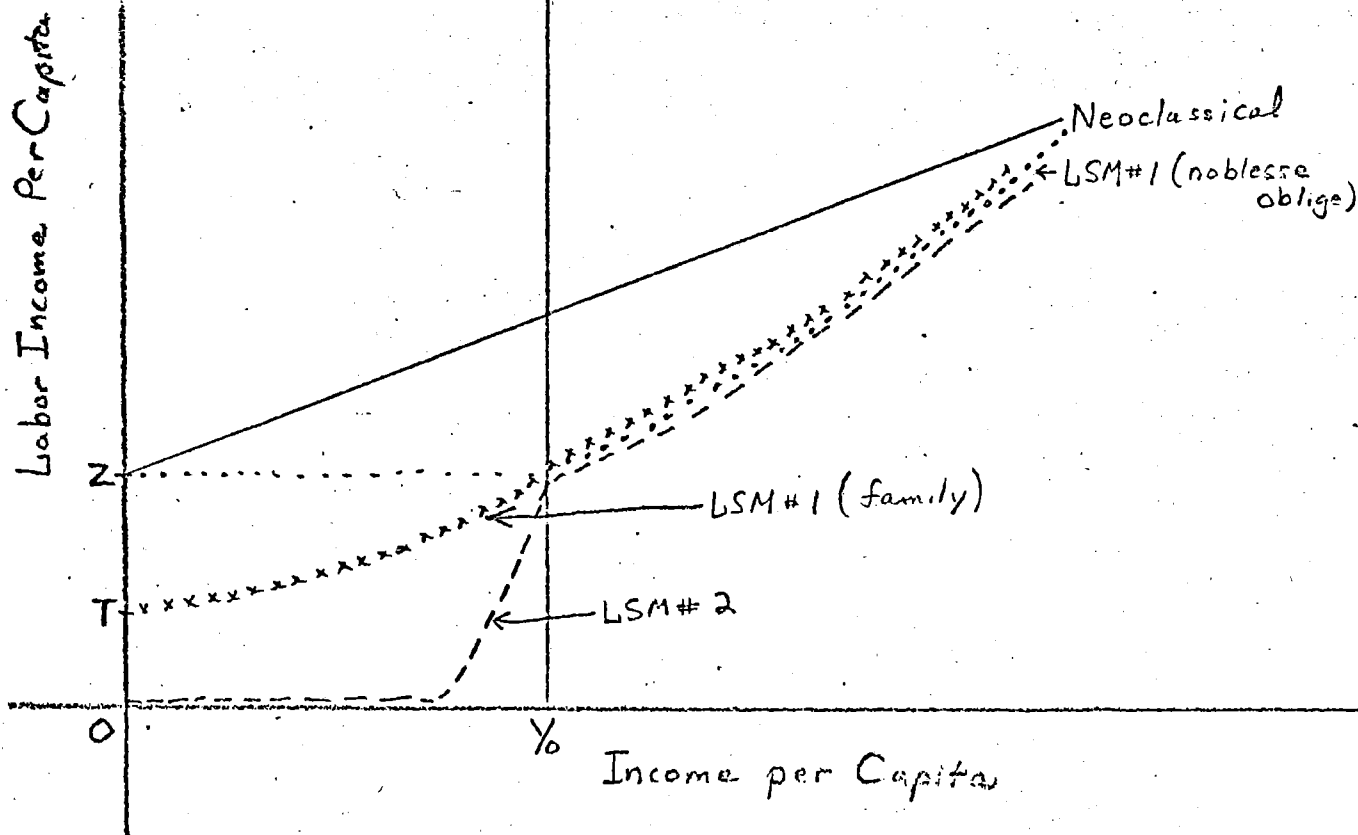


Figure 4.b

reasonable to assume that one or both of the curves is, over the full range of L , a little below those for LSM#1. Reasonable differences in the relative positions of the curves in the two cases will not alter the results much. Assuming surplus labor at the starting point (in the sense that with all the labor used its marginal productivity is zero in both sectors) then the initial labor share is equal to zero as indicated in Figure 4.

The marginal productivity curves for a neo-classical model with the same total average income as the above ones and with an equilibrium wage level which is at least as high as S_g must again be somewhat different. It seems reasonable, for the sort of analysis under way here to try to alter the curves for two sectors as little as possible given the restrictions. Thus we have drawn the curves GL_4 and HL_5 , which cut precisely at the level S_g ; any other neo-classical model with the same total income would start with a higher labor share; this one is therefore an extreme case in this respect; it starts out with the same labor share as does the noblesse oblige case of LSM#1. We are implicitly assuming that that model is neo-classical not because any basic institutions are different but because marginal productivity of labor is higher given the same total output as in the other cases, thus implying that neither the intra- and inter-family subsidies of the LSM#1 cases nor the widespread ownership of capital of LSM#2 exist to keep everyone alive.

Just as in the definition of "parallel" representatives of the four types of economies considered, with each generating the same total amount of income there is some arbitrariness, the same is true as we define the growth process (shifts in the marginal productivity of labor curves) for these four economies.

A fairly meaningful way to define parallelism in this sense might be the following. First, assume a basic expansion process in the growing sector (in the labor surplus cases the "modern" sector) of the neo-classical model¹ corresponding to the assumption that technological change is neutral and that the production function is Cobb-Douglas, so that factor proportions do not affect the labor share.² Thus the labor share in this model remains constant as average income per capita goes up. Then we arbitrarily define parallelism of the growth process across the various models as meaning that the marginal product of labor curves of the modern sectors of all the economies move out by the same

¹We follow here the convention of labor surplus economics in assuming that all capital formation and technological change occur in the modern sector (which is usually interpreted as consisting of a larger share of the industrial sector than some others, such as the agricultural sector. Comparing the labor surplus cases with the neo-classical one creates an awkwardness here, since the latter has no traditional sector in the sense of the term applied in labor surplus economies. For expositional simplicity, nevertheless, we have assumed two sectors in the neo-classical economy as represented in Figure 3, and we will assume that growth occurs in only one of them. This does not, given the other assumptions we are making, alter any results.

²Note that if the only cause of the expansion of the production possibilities in the growing sector is (Hicks) neutral technological change, then the marginal product of labor curve in this sector shifts vertically by the per cent of the technological change. If the sole cause is capital formation, then the move tends to be more horizontal. The curve does not shift on the vertical axis at all if the change is such that the marginal productivity of capital with only one laborer is 0. It shifts only for quantities of labor high enough so that the marginal productivity of capital is positive.

relative rates for any two rays passing through the origin.¹ (After discussing the results implied by these assumptions, we try to explain why they are reasonable ones).

We discuss now the relative over time patterns of distribution, having defined a situation where the labor share in the neo-classical economy is constant. In the noblesse oblige case absolute labor income would not rise at all until total income² had gone up enough so that the marginal productivity of labor curve of the modern sector had shifted enough to cut the other marginal productivity curve at the subsistence wage level i.e. until the surplus labor was exhausted, ^{the} labor share would, of course, be falling, during this stage as indicated in Figure 4. After this (commercialization) point is reached, average wages would start to rise and would tend to rise faster than in the neo-classical case, with labor share therefore rising. The absolute income in this model going to labor could (depending on the details of the curves and the way they moved) eventually rise above that in the neo-classical model with the same, (by definition), being true of the labor share. For LSM#1, family institution, labor ceases to be redundant; labor's share falls at least up to the point where labor income in the modern sector rises during this period, both because the number of workers is rising and because the wage rises as AP_L in ^{the} traditional sector rises; its

¹Thus if we take any new MP_L curve for the neo-classical economy, corresponding to a new level of income, the ratio of the outward movement along ray A to that of along ray B will be the same as that between two MP_L curves corresponding to these same two income levels in the labor surplus case. Note that the relative percent shift may be different in the two cases; with a given percent technological change income may grow faster in one model than another, but our interest is in the labor share at a given per capita income; we are not here interested in the efficiency properties.

²We do not consider here the implications of the fact that there may be a change in the relative prices of goods typically produced in the modern sector and those typically produced in the traditional sector. The implications would tend to be similar for all the models under consideration.

share in the modern sector may either rise or fall; while labor is redundant in the traditional sector, there is no income from it. Labor share of total output is likely to rise due to the increasing share of the modern sector plays in the total economy. After labor ceases to be redundant its returns in the traditional sector begin to rise, perhaps rapidly; labor share it then still more likely to rise; it is equal or greater in this case than in the noblesse oblige one when the labor surplus point is reached.¹ Beyond this point the two cases may be expected to present similar trajectories;--as long as we conclude that total labor ~~share~~ will at some level of income be equal for these two labor surplus situations and for the neo-classical situation it must rise over certain ranges in the latter.²

¹There is a complexity here which we brush over rather lightly. We have not assumed, as is sometimes done, that the initial subsistence wage in the traditional sector will continue to govern the modern sector wage until all the labor surplus is exhausted, since it does not seem plausible to assume the supply price to the modern sector is related to APL in the traditional sector at the start but not thereafter. If this assumption is made, note that the labor shares become equal in the family institution and the noblesse oblige cases of LSM#1 at the commercialization point (i.e. when the gap between income and marginal productivity disappears). At the same time it seems unrealistic to assume permanently that the modern sector wage will equal APL rather than MPL in the traditional sector. This makes sense as long as income is perfectly evenly distributed within the family; and this seems most likely as long as the family is close to subsistence and virtually all is consumed. As average income rises, it seems more likely that income of sons, brothers, etc. will fall below average income, especially if the owner elects to save, retaining all the savings in his own name. Further, if the original equality wage (modern = AP_L (traditional)) was due in part to the fact that a migrant from the traditional sector to the modern sector was not able to either retain his capital in the traditional sector (and hence the income from it) or effectively translate it into modern sector capital, then this problem would seem likely to diminish as development proceeds and average incomes rise, communications improve and capital markets improve.

²A labor share, as noted earlier, is less meaningful here than in the other cases since the people who consume more than their marginal productivity do not receive this income in their function as workers; the meaningful distribution of income in this case - that between capitalists (possibly just in the modern sector or possibly in both sectors) and laborers in the modern sector, along with economic family enterprises in the traditional sector, will be discussed below when we consider directly this particular distribution.

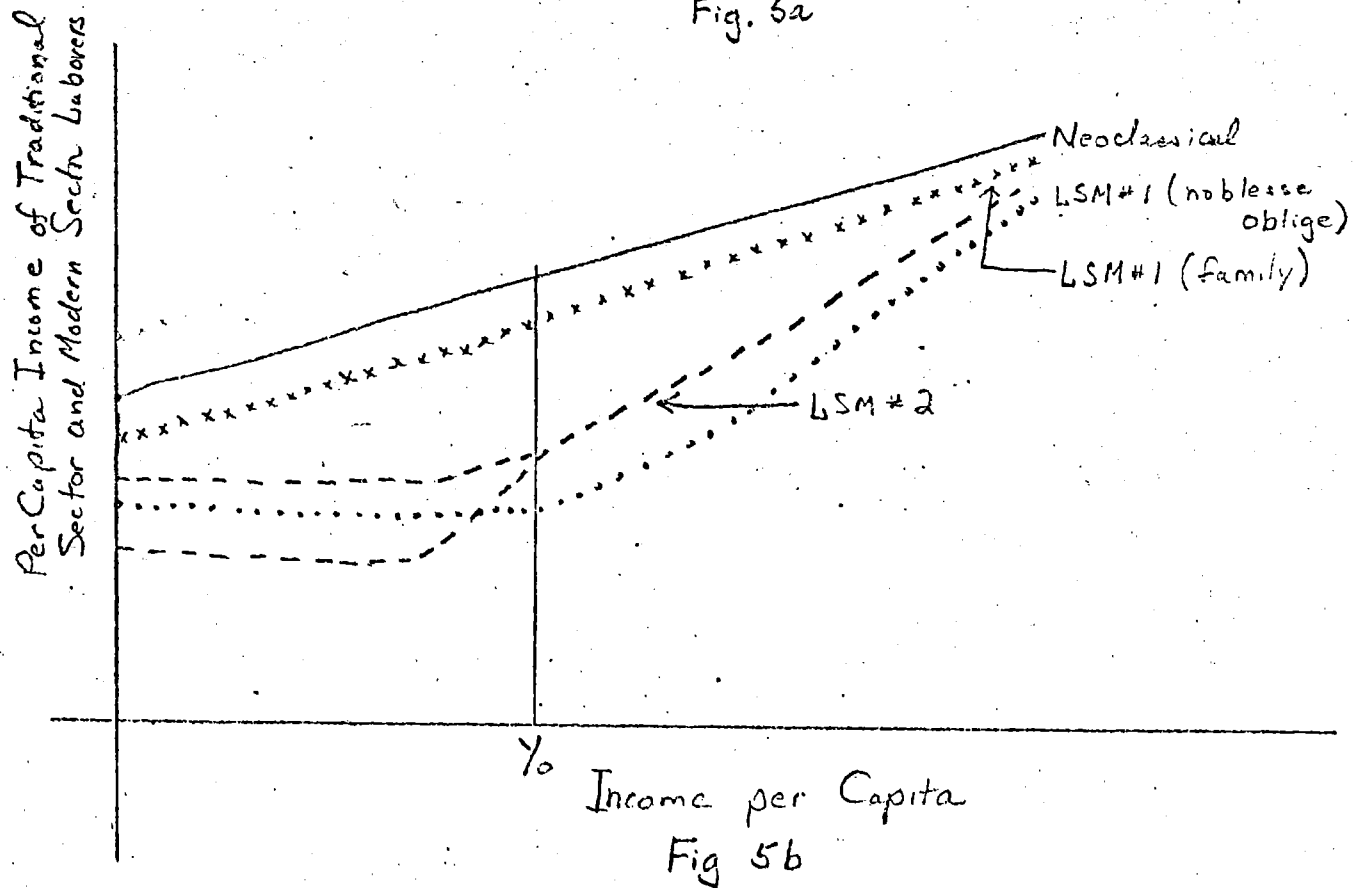
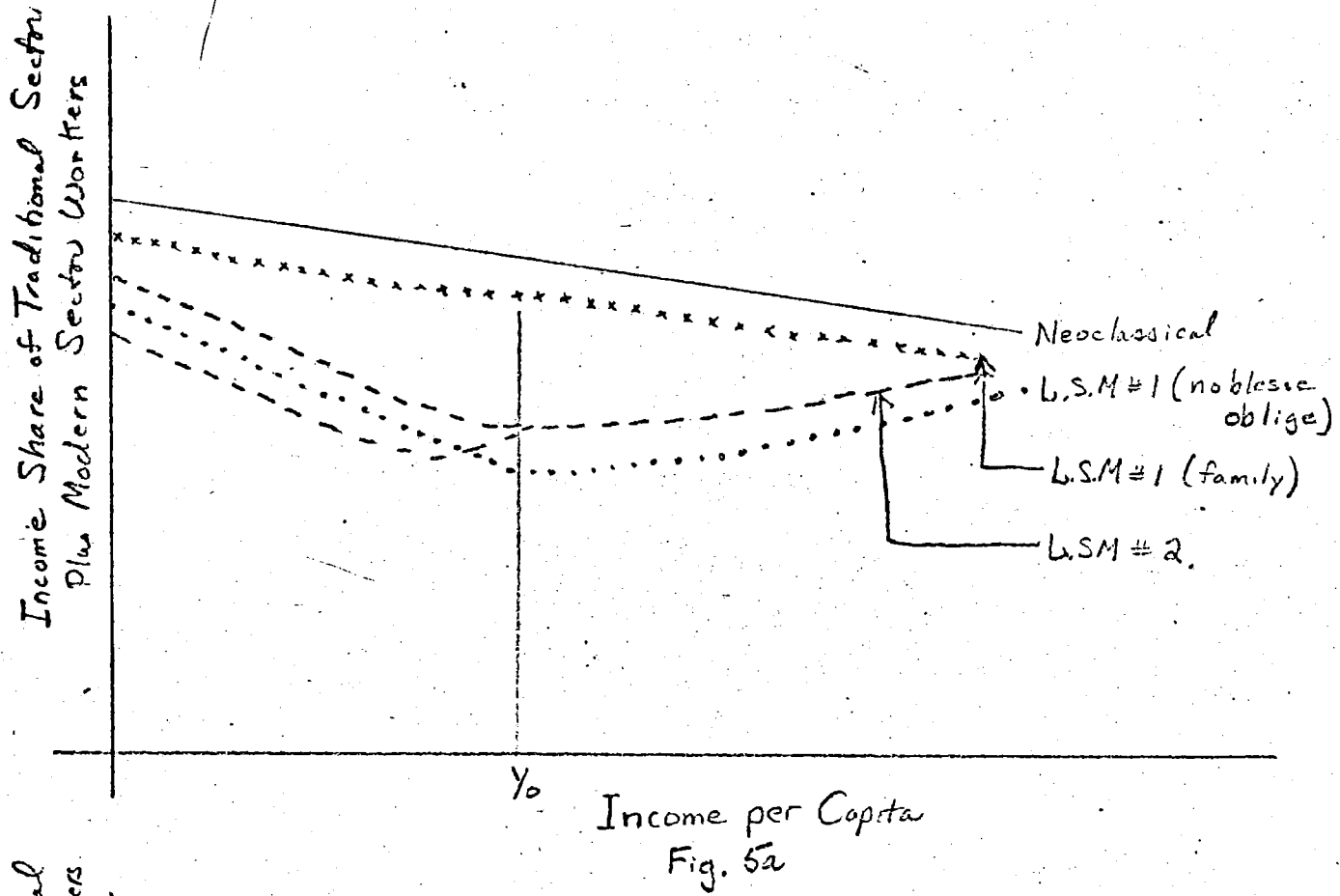
For the LSM#2 case the distribution is completely unequal (i.e. there is no labor income) until the marginal product of labor becomes positive; this would occur at an income level lower than that at which wages in LSM#1 started to rise above the subsistence level, (a level indicated as Y_0 in Figure 4). Since the marginal productivity curves are little different between the two cases, it will then rise rapidly and be almost as high as that in LSM#1 when that economy leaves the labor surplus situation; from then on the movements of the two curves would be almost identical since the two marginal productivity curves are almost identical.

Trends in the Distribution Between "Big Capitalists" and Others

In three of the four cases discussed above the share of labor was either of somewhat dubious definition (LSM#1 - noblesse oblige case) or could not possibly correspond to an income breakdown among groups of people since the wage rate could be below the subsistence level (LSM#1, family case, and LSM#2). In the "family" version of LSM#1 we assume that the institutional situation which enables labor whose marginal productivity is low to get a living income is precisely that there are economic entities, either individuals or families which have both labor and capital income, even though not in the modern sector. So although knowing the time pattern of labor share and capital share is of interest, it is not as revealing as a direct analysis of the probable path of the incomes of groups which more or less correspond to rich and poor; a reasonable approximation to this division would seem to be "modern sector capitalists" and "others", or perhaps all "large scale capitalists" and "others".^{1,2}

¹Clearly the division is an oversimplified one which implies the non-existence of middle groups; but it suffices to allow a first step in the analysis.

²If we assume in effect that there are no "noblesse oblige" capitalists in the traditional sector, then the income of the others would include, in that case, all of the capital income from the traditional sector; and one would describe this as being between the capitalists in the modern sector and all laborers (who will also have capital income from the traditional sector).



If we assume, as we will below, that even in the neo-classical model the blocks of capital in the slow growing sector are small, the various models are as parallel as possible. But as we see, it is also interesting to make comparisons after assuming that all capital (i.e. in both sectors) in the neo-classical economy is owned by large capitalists.

Assuming, as we did in the above discussion, that the marginal productivity curves corresponding to the neo-classical model indicated a higher elasticity of ~~output to labor~~ in both sectors under consideration than was the case for the labor surplus models, and further assuming that the share of income generated in each of the two sectors is the same for each model at the starting point, then modern sector capitalist income must be less in the neo-classical model than in LSM#1, since more labor is employed at the same wage; therefore total traditional sector income plus labor income from the modern sector is higher in the neo-classical model than in the LSM#1. And it is lowest of all in the LSM#2 situation. (See Figure 5)

We now assume the source of output growth in the modern sectors of the three systems is as before. We find that the share of income going to the lower income group falls over time in the neo-classical case since labor's share remains constant but that of traditional sector capital falls. Per capita income of the group will rise, however. While the noblesse oblige model is in the labor surplus situation, the real income of the relevant group which in this case consists either entirely of labor income, or at least included less capital income than in the other cases, remains constant.

Their share thus falls faster than in the neo-classical case. But when the economy leaves the labor surplus situation, the wage rises faster than in the neo-classical model so the share also rises relative to that in the neo-classical case and probably, at least over a certain range, in absolute terms as well.¹

In the LSM#1 family institution case, the real income of the group in question begins to rise immediately. It was higher to start with than in

¹Once again it is necessary to remember that in the neo-classical model there is no difference between the decision rules of firms in the two sectors; the difference is really between big firms which we assume to be in the growing sector and small firms in the other sector.

the noblesse oblige case since it included all of the capital income from the traditional sector though lower than in the neo-classical case as long as we assume that output in the modern sector started at the same level in the two cases. This latter follows from the fact that the income of modern sector capitalists is less in the neo-classical model. (Note that if the appropriate comparison is between all income not going to the modern sector capitalists in this labor surplus model (family unit) and labor income in the neo-classical model, then the income distribution can be better in the labor surplus model, in fact it could be better for all per capita income levels.¹) The income of this group may rise either more rapidly or more slowly than in the neo-classical case.² In any case it will be rising throughout as total income from the traditional sector stays constant over an initial period of while labor income from the modern sector rises

¹It is worth noting here that such a conclusion as this one must be interpreted with care. There is not the same sort of reasons in the neo-classical economy for the same group of capitalists not to receive the capital income from both sectors. In that case, of course, their income would be greater in the neo-classical than in the labor surplus case.

²The determinants of which will grow faster can be seen in Figure 6. In the neo-classical model the wage rises as the two marginal productivity of labor curves cut at higher and higher levels. For the labor surplus case under discussion, (assuming that the supply price of labor to the modern sector equals average productivity in the traditional sector) one can draw a rectangular hyperbolae as present in Figure 6 to indicate the way in which the modern sector salary will rise as the marginal productivity of labor curve in the modern sector moves to the right. During the stage of redundant labor (to the left of L_2) the curve is a rectangular hyperbola with focus on O^1 ; when the amount of labor left in the sector is less than L_2 it is flatter than such a hyperbola. Extensive labor surplus at the starting point will indicate that the rectangular hyperbolae describing the wage rate for the labor surplus model will tend to be flat, indicating a slow increase in that variable.

But a neo-classical model with no surplus labor and the same average income will be definition have relatively elastic marginal productivity of labor curves and therefore a similar tendency for wages to grow slowly with shifts of the MPL curve for the modern sector. And of course if one used the traditional assumption of a constant real wage as long as there is surplus labor, wages would not rise at all as the start in the labor surplus case.

through higher wages and more people employed; then as traditional sector output falls, labor income rises fast enough to more than offset this. This model gives the group of people in question a higher income throughout, under the assumptions we are making, than the noblesse oblige case, both because in the latter no capital income went in the group, and also because the labor income is higher in the former case. (With any given marginal productivity of labor curve in the modern sector the wage rate in that sector will be higher in the family entity case than in the noblesse oblige case, since it is determined ^(according to our earlier assumptions) where it intersects the marginal product of labor ^{curve} in the traditional sector curve but with the rectangular hyperbolae the line LM drawn in Figure 6¹).

For the LSM#2 case the income from labor and traditional sector capital will remain constant at the amount of income earned by traditional sector capital (i.e. total output of the traditional sector) until the marginal productivity of labor rises above ^{zero} (presumably before LSM#1 leaves its labor surplus situation) and the labor income from the modern sector will thereafter rise quickly. The share of the relevant group thus starts lower than in LSM#1 (family unit); whether it will be below the curve for LSM#1 (noblesse oblige) depends on the relative size of the modern and traditional sectors and on the earnings going to capitalists from agriculture in the noblesse oblige case. ~~There are also~~ ...

In any case at the income Y_0 , at which the noblesse oblige model leaves the labor surplus situation and wages begin to rise above their subsistence

¹We mentioned earlier that as wages rise farther and farther, the assumption that the comparison a person working in the traditional sector will make is between his total income there and his labor income in the modern sector will become less and less realistic, as he will become presumably better and better adapted to extract capital income from the modern sector if he wants to. This complexity will tend to lower the position of the hyperbolae as we move to the right, and thus lower the increase in wage necessary to attract people in the modern sector.

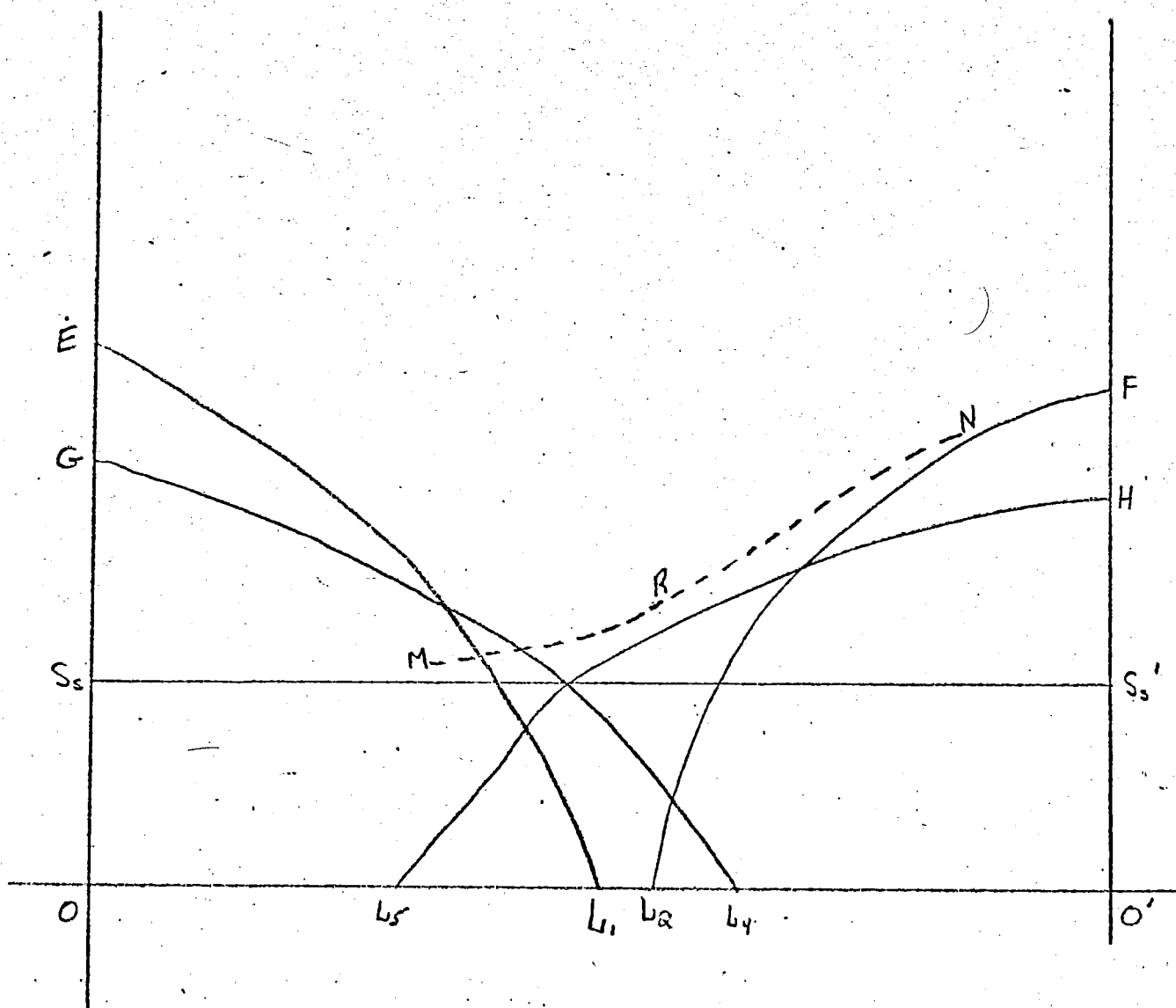


Figure 6

level, the LSM#2 model does definitely have a higher income for this group, the difference being roughly the income at that point accruing to traditional sector capital. But at this point the income is not as high in LSM#2 as in LSM#1 (family unit) since the wage rate is lower. And the income of this group will never catch that of LSM#1 (family unit) for this reason. The difference, however, will tend to become smaller and smaller. The same is true with the noblesse oblige case, the difference will become smaller and smaller as the amount of income accorded to capital in the traditional sector becomes smaller and smaller. Thus all three will eventually approach each other.

An Interpretation of the Empirical Evidence of Historical Paths of Distribution in Now Developed Countries

It goes without saying that one can hypothesize many mechanisms which would account for a worsening followed by a bettering of income distribution over a country's development process. The above discussion indicated that in general labor surplus models are more likely to produce such a result than neo-classical models. In the labor surplus model where the labor share would reasonably correspond to a specific group of people (the poor) i.e. the noblesse oblige case, we saw that labor share fell and then rose relative to that in a parallel neo-classical economy. (Figure 4a) And where we implicitly took modern sector capital income as the income of the rich then two of the three labor surplus models considered bore this same relation to the neo-classical one (See Figure 5a). Since impressionistic evidence from the economic histories of many now developed countries suggests that something like this surplus situation prevailed at times, it appears possible that the sequences described above may have played a role in the alleged behavior of distribution.

Varying the Assumptions on the Nature of Technological Change and the Elasticity of Substitution

In tracing out our "benchmark" distribution path for the neo-classical economy above we assumed neutral technological change and a Cobb-Douglas production function, thus implying constant factor shares, a result not important for our purposes there since we were concerned only with the relative distribution paths of the various models.

In fact logic suggests that as labor becomes relatively more scarce (so that the wage rate rises and the rate of return to capital falls) technological change will become more labor saving over time. And, though it is difficult to guess at how the income share of pure labor has changed over time in the now developed countries, it is widely guessed (with some support from a few empirical analyses of the sources of growth) that this share has tended to fall over time.¹ Given the likelihood that this pure labor share has fallen in the developed countries, the fact that this has not led to a worsening distribution of income may well have been due to increasing equality of investment in human capital and greater importance of human as opposed to physical capital over time. A cursory look at the now developing countries suggests that labor saving technological change is introduced at earlier stages of their development process than it was for the now developed ones, due to the ease, profitability (sometimes) and prestige borrowing from the now developed countries, to whose factor proportions it corresponds more naturally. If this is true, we may expect a more negative trend in distribution over time in these countries than that observed in the now developed ones. If this factor must be added to the negative distributional tendency of growth in a country still in a labor surplus condition (already

¹See, for example, Denison.

discussed), the future may be very bleak indeed. We turn first simply to the technical question of how the results above are altered in the various models, ~~if~~ the technological change is labor saving rather than neutral. Trying to maintain parallelism of assumptions among the various cases, and without going into more detailed analysis, it appears that the general effect in all the models is about the same; labor share is lower than it would otherwise have been, as is the share of labor and traditional sector capital. The stage of development for the labor surplus models where labor share (or the share of labor and traditional capital) was rising (assuming constant labor share in the neo-classical model) may therefore not be present in this case; if the technology is sufficiently labor saving the labor surplus characteristic of the economies may never be overcome.

Labor Saving Technology and Likely Future Distribution in Less Developed Countries

The fact that the historical path of distribution of the now developed countries has, at least in the later stages, indicated improvement would, if background conditions of the currently underdeveloped countries appeared to correspond well to the previous situations of the former set, lead one to conclude that the negative effects of labor saving technological change would be more than offset by factors working in the opposite direction. If the negative impact of labor saving change ^{in today's LDC's,} were greater [^] this would be less likely; and this negative impact is almost certainly greater. The countries which develop new technologies develop them as a response to relative factor prices; during the development of many of these countries it appears that relative market prices of factors corresponded more or less to relative social opportunity costs. Thus the nature of the technological change may have been more or less optimal in terms of maximizing

total output. Labor share would have been greater had it been less labor saving, but in any case fairly wide access to investment in human capital eventually permitted the income distribution improvement already mentioned.

The situation differs substantially in the underdeveloped countries. First of all their modern sectors borrow much technology and develop little; thus the technology they use at a given per capita income level is less labor intensive than it had been in the now developed country. This alone would imply a worse distribution of income. And as long as technology continues to be borrowed, there is no automatic corrective device to make the technological change more capital saving in response to this worsening.

Possible Output Costs of Improved Distribution

The above discussion is anything but reassuring as to the future changes in distribution which L.D.C.'s will undergo. If the stage of worsening distribution observed earlier in the now developed countries was due to their having some sort of labor surplus, this problem surely characterizes at least some of today L.D.C.'s like India, etc. much more than it even did the typical now developed country. And if that worsening was due to something else (i.e. if the now developed countries were in fact always more or less neo-classical) then a new negative factor will have to be faced in today's L.D.C.'s. Further, the ^{very rapid} borrowing of technology is unquestionably a new negative factor.

In view of this, one would expect that if the same nature and extent of government intervention in the market were to be exercised in today's LDC's as was at the comparable stages of the now developed countries, and the political power of the poor were also the same, distribution would be worse at each income level for the former group. This prospect, plus the tremendous maldistribution already observable in almost all LDC's raises the question of whether some interventions designed to improve distribution or prevent it from

worsening would have high costs in terms of the rate of output growth.

Promisingly, it appears that they would not, and might indeed speed growth.

The classical definition of a labor surplus situation (corresponding to our LSM#1 above) implies a static inefficiency of output (too few laborers in the modern sector). Any intervention which would correct this disequilibrium (e.g. subsidies to firms to hire more labor, laws forcing them to hire more labor, etc.) would raise laborer's share, or that of labor and traditional capital. It would, of course, raise total output. Possibly the savings rate would be lowered so that the long run effect could be negative, but an agile government policy should be able to avoid this.

As long as labor surplus exists the market price of labor is above its social cost. This factor pushes firms toward acceptance of capital intensive technologies, which in turn lower labor's share. An intervention designed to prevent such adoptions in order to prevent the lowering of labor share could, up to a point, raise the growth rate of output as well. Consider Figure 7. The relative market prices of capital and labor are indicated by the slope of PP' and their relative social costs by that of SS' . Firms will use technology B when they should use A. Now if a new technology C becomes available, its adoption will increase private profits of the industry but lower national income (the social cost of production being higher at C than at A). An intervention to prevent its adoption would thus avoid a decrease in output as well as a worsening of distribution.

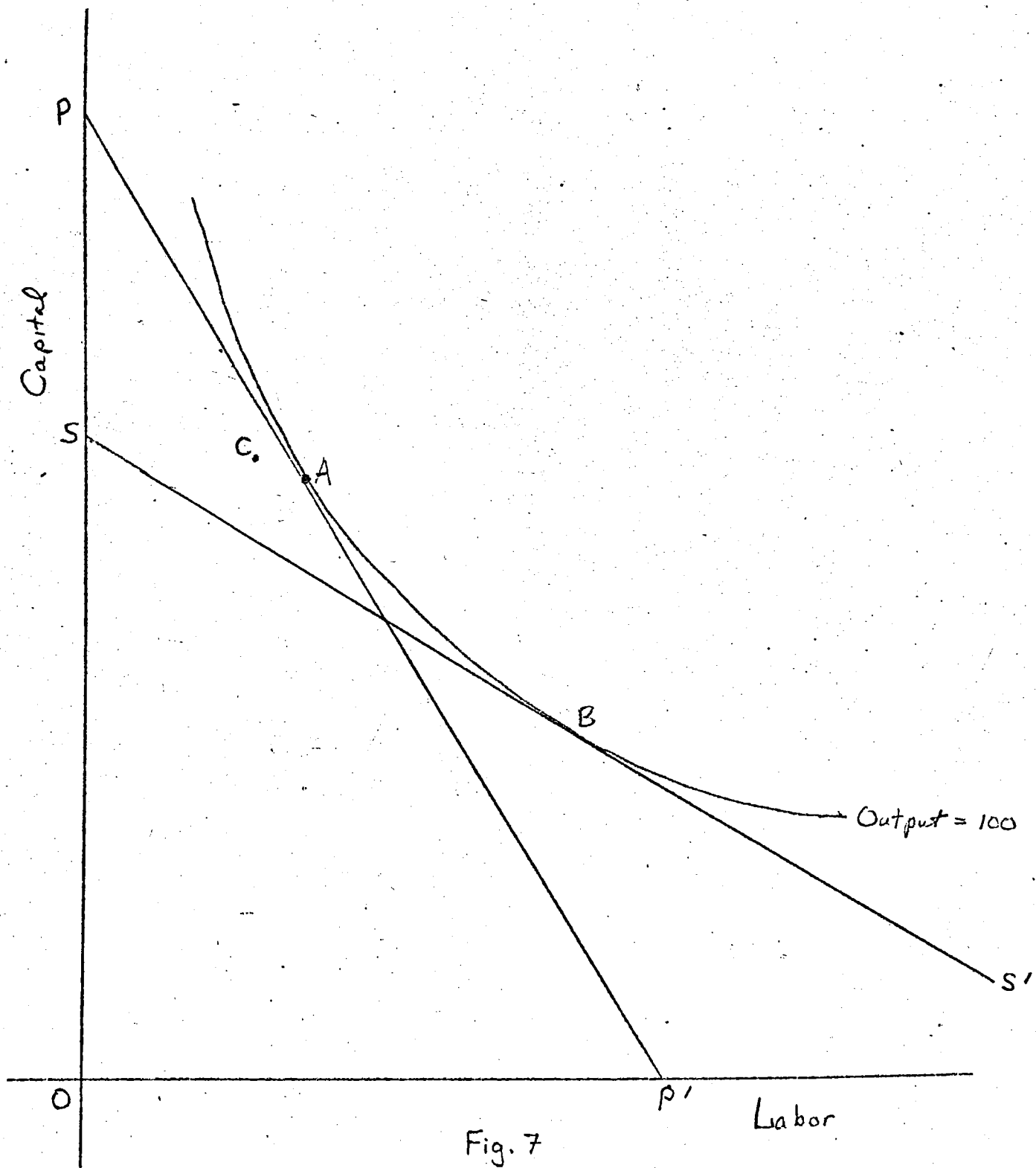


Fig. 7