INCOME DISTRIBUTION AND SOCIO-ECONOMIC MOBILITY:
AN APPROACH TO DISTRIBUTION PLANNING

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I. INTRODUCTION

The renewed perception of the maldistribution problem and the realization, from a social welfare point of view, of the arbitrary nature of traditional growth accounting in evaluating the success of economic policies and strategies has again focused the attention of many economists on the various approaches to income distribution theory. Going further one might say that, particularly in the developing countries, a real need is felt for "income distribution planning" encompassing both normative aspects involving choice of objectives and policy targets, and positive aspects involving the correct modelling of the distribution mechanism.

Income distribution has long been discussed and analyzed within two very different frameworks. One line of approach has its roots in classical economic theory:

"The produce of the earth -- all that is derived from its surface by the united application of labor, machinery, and capital, is divided among three classes of the community, namely, the proprietor of the land, the owner of the stock or capital necessary for its cultivation, and the labourers by whose industry it is cultivated."

David Ricardo
Principles of Political Economy

Building on Ricardo, but reflecting in his writings the declining importance of landowners in the developing capitalist economy, Marx proceeded to analyze income distribution as essentially determined by the class struggle between capital and labor. For marxist theory, the problem of maldistribution in the market economy is synonymous with the problem of 'exploitation' defined by Marx as appropriated labor-time.
The traditional economic theory of the functional distribution of income, though in opposition to Marxist theory in its analysis of the determining mechanisms of income distribution, also adopted the bi-polar 'capital versus labor' approach. More recently, the so-called Cambridge controversies in capital theory have again focused on the conflict between labor and capital. The conflict is not so much in terms of the factor shares but in terms of the inverse relation that characterizes, in economic equilibrium, the 'per unit' returns accruing to the factors (as expressed by the factor-price frontier). The distributional content of the modern capital theoretic models or growth models is essentially embodied in the monotonic inverse relation between the real wage and the rate-of-profit. Sraffa has shown how this modern approach can be connected to the Marxist theory of value and exploitation.¹ Those on at least one side of the controversy consider the distribution implications of capital theory as being of primary interest. For example, Bhaduri [1969] states:

"It must be emphasized that questions like the measurement of "capital" are, as such, not central to the controversy, but assume relevance in so far as they have a direct bearing on the theory of distribution." (page 532)

The second, and very different approach to problems of distribution concentrates on the "personal" or "size" distribution of income. This approach considers large "macro-divisions" of society into classes such as laborers and capitalists neither necessary nor particularly useful. The interesting unit here is the individual or the household. Whether that unit derives its income primarily from asset ownership or primarily by selling labor-time is not considered especially relevant. Concern for equality within the first framework results in attempts to increase the share of labor in national product. Within the
second framework, concern for greater equality results in attempts to reduce one or more measures of the income 'distance' separating households or individuals. Defining appropriate measures of inequality within the second framework is itself an interesting problem that has preoccupied theorists.  

The proponents of the two approaches have traditionally engaged in very little constructive debate or even communication. To those who regard the private ownership of capital as the overriding cause of mal-distribution, it is frivolous to analyze redistribution policies within the size distribution framework. A neoclassical welfare economist, on the other hand, can see no reason at all to consider functional shares. Though the number of economists exclusively using a pure classical or pure Marxist approach is not very large, the basic classical framework still provides the foundation for most economists' "view of the world," although it is likely to be blended with Keynesian and neo-classical elements.

In general, the proponents of the size distribution approach make the fundamental assumption that the economic system embodies the private ownership of capital and then proceed to analyze distribution problems within that economic and institutional environment. It is precisely this 'institutional' assumption that is considered to be the root of the problem by those theorists in the Marxian tradition. It is thus understandable that doubts about the sincerity of the proponents of the size distribution approach have frequently made any constructive debate impossible.

On the other hand, neo-classical economists have trouble understanding why, if some notion of human equality is the basis for distributitional concern, the problem should not be tackled directly by attempts
to reduce 'distance' between individuals. It is generally felt by neo-classicists that casting the problem into an aggregated conflict between capital and labor is not only very difficult when looked at from an aggregation criteria point of view but also embodies an unwarranted a priori assumption about what is important in the income distributing mechanism.

It seems to us to be very important to try to reconcile the two 'pure' approaches, for neither has a monopoly on truth. The capital-labor dichotomy in fact greatly oversimplifies the problem for it implicitly rules out, at the outset, the possibility of redistributing and spreading the capital assets. It also regards the labor force as essentially homogenous, disregarding the large income differentials within the general 'labor' category and hence ruling out any analysis of human capital formation and its distributional impact.

One problem with the pure size distribution approach is that it tends in practice to lack any handle on policy. Indeed, the modern normative work in this area, while aesthetically rather pleasing, seems to be situated somewhere between philosophy and pure mathematics. Clearly, part of the problem is that the size distribution approach is entirely divorced from sociology and political theory. It should be quite clear that redistribution in a modern economy is as much a socio-political process as a purely economic one and the gains and losses generated by a particular redistribution will affect certain interesting groups of people where those groups are defined in socio-economic terms. Thus, a given policy (say, an increase in the support price of specific agricultural products) can hardly be analyzed as having an effect on the bottom decile, or the second to the lowest income decile, but must be
analyzed as affecting certain socio-economic groups (in this case primarily the farmers producing the products and of course also the buyers of the products). Thus without an explicit analysis of gains and losses as they affect particular groups, it seems impossible to generate a policy oriented and practically applicable analysis of redistribution mechanisms.

Our purpose in this paper is to develop a framework especially relevant to less developed countries that can encompass the two traditional pure approaches to studying income distribution. Our starting point is the notion of a mobility matrix and the framework is explicitly dynamic.

We present the mathematics of the basic dynamic framework in the next section followed by a discussion of a proposed socio-economic grouping. We then discuss policy analysis and present an illustrative numerical example. Finally, we discuss the desirable economic modelling that would be required within our framework for a quantitative and more complete policy analysis and briefly survey some of the existing models.
II. DYNAMIC FRAMEWORK: DEFINITION AND DESCRIPTION

It is usually agreed that a more "equitable" distribution should involve a move to greater equality of incomes (i.e., less "distance" between individuals) as well as a move to greater equality of opportunity (i.e., the breaking down of class and other social barriers and the elimination of chronic intergenerational poverty). Most measures currently used to summarize income distributions are static measures in the sense that they tend to neglect mobility aspects of the distributional mechanisms. Replacing annual incomes by estimates of "permanent" income in a Lorenz curve framework would constitute a step in the right direction but would still fall short of a consideration of intergenerational mobility. The Lorenz curve framework also neglects the links that exist between the degree of mobility and the sociological decomposition of society.

The framework proposed here attempts to incorporate both dimensions of the equity concept, i.e., greater equality and greater mobility, and may be a start to providing a suitable foundation for interdisciplinary study of the distribution mechanism and the potentials of redistributive policies.6

Formally the proposed framework starts from the notion of a mobility matrix which has many similarities to that of a dynamic Markov process. However, we are far more limited in our assumptions than is usual with a Markov analysis and so those familiar with Markov analysis should be careful not to assume too much.

Define a Mobility matrix, \( M \), such that \( M_{ij} \) is the share of group \( i \) that will move to group \( j \) during the considered time period. This is similar to a Markov transition matrix, except that we do not specify
it to be stochastic in any sense. Assume that there are $n$ groups. Define the following:

- $M$: mobility matrix.
- $x$: column vector such that $x_i$ is the number of people in group $i$.
- $y$: column vector such that $y_i$ is the mean per capita income of people in group $i$.
- $r$: column vector of one plus growth rates of per capita group mean income.
- $s$: column vector such that $s_i$ is the share in aggregate income of group $i$.
- $\psi$: total income in the economy, a scalar.
- $t$: time subscript, $x_t$, $y_t$, etc.

The transpose is denoted by $u'$, $y'$, $m'$, etc.

A letter with a $^*$ denotes a vector transformed into a diagonal matrix.

The fundamental dynamic relationship is:

$$x_{t+1} = M x_t$$

(1)

If the total population remains unchanged, then $\Sigma_{i=1}^{n} x_{i,t+1} = \Sigma_{i=1}^{n} x_{i,t}$

This implies that the rows of $M$ must sum to one. If the groups (and the total population) have a natural rate of growth, one might redefine $M$:

$$M = M^{(1)} + M^{(2)}$$

Where $M^{(1)}$ is a diagonal matrix each of whose diagonal element $M_{ii}^{(1)}$ equals one plus the natural growth rate of group $i$. $M^{(2)}$ is the normalized mobility matrix each of whose rows sum to one.

If the rows of $M$ sum to one, then the dynamic process corresponds to a stationary Markov process. For purely descriptive purposes, one need
make no assumption about the behavior of \( \gamma \) over time and so need not worry about whether or not the process is stationary.\(^7\)

Total income in time \( t \) is given by:

\[ \psi_t = y_t' x_t \]  \hspace{1cm} (3)

\[ s_t = \frac{\hat{\gamma}}{\psi_t} x_t / \psi_t = \frac{\hat{\gamma}}{y_t} x_t / y_t' x_t \]  \hspace{1cm} (4)

where \( y_t' x_t \) is the column vector of group income.

Given the growth rate, \( r \), average per capita group income in time period \( t + 1 \) is given by:

\[ y_{t+1} = \hat{r} y_t \]  \hspace{1cm} (5)

Define \( \Delta S_t = S_{t+1} - S_t \), the change in group shares in total income. Using (5) and (1), \( \Delta S_t \) can be written as (note that \( y_{t+1} = \hat{y}_t \hat{r} \))

\[ \Delta S = \frac{\hat{y}_{t+1}' x_t}{y_t' \hat{m}_t' x_t} - \frac{\hat{y}_t' x_t}{y_t' x_t} \]  \hspace{1cm} (6)

Since every variable in equation (6) - (10) has a \( t \) subscript, the subscript is omitted.

**Decomposition of Changes in Group Income Shares.**

The changes in group shares can be decomposed into changes due to movements among groups (given by the \( \hat{m} \) matrix), changes due to the differential growth rates of per capita income (given by the \( \hat{r} \) vector), and interactions between the two.
First, assume that there is no growth of per capita income so that \( r = I \). Then, define the change in shares due only to inter-group movements, as

\[
\Delta \bar{S} = \frac{\hat{y'} \hat{X}}{\hat{y}' \hat{I} \hat{X}} - \frac{\hat{Y} \hat{X}}{y' \hat{X}}
\]  

(7)

Second, assume that there is no mobility, so that \( N = I \). (More generally, one can assume \( N^{(2)} = I \) and use \( N = N^{(1)} \), the diagonal matrix of one plus the natural group growth rates). In this case, define \( \Delta \bar{S}_t \) as the change in group shares due only to changes in mean incomes (and, if desired, natural growth rates of the group):

\[
\Delta \bar{S}_t = \frac{\hat{Y} \hat{X}}{y' \hat{X}} - \frac{\hat{Y} \hat{X}}{y' \hat{X}}
\]  

(8)

Define the interaction term, \( \Delta S^* \) residually as:

\[
\Delta S^* = \Delta S - \Delta \bar{S} - \bar{S}
\]  

(9)

and so get:

\[
\Delta S = \Delta \bar{S} + \Delta \bar{S} + \Delta S^*
\]  

(10)

The interaction term is due to the fact that \( \Delta \bar{S} \) will apply the \( \hat{r} \) matrix to people who will, because of mobility, not remain in the groups to which \( \hat{r} \) is applied. Note that if all growth rates in \( r \) are identical, it can be seen from (8) that \( \Delta \bar{S} = 0 \) and therefore \( \Delta S = \Delta \bar{S} \) as well as \( \Delta S^* = 0 \).

The decomposition given by (10) is a convenient accounting device and is not the only possible decomposition. One might, for example, define \( \Delta \bar{S} \) differently by multiplying \( r \) by some factor so that the growth in total income is the same as that calculated for \( \Delta \bar{S} \). This would make the denominators of the fractions in (7) and (8) the same, and so change \( \Delta S^* \). The resulting \( \Delta \bar{S} \) might be called an equivalent income change in shares due to income growth.
Relation to Household Distribution

The definition of the groups in $X$ has been left open. It is possible to define them as income classes, quantiles, or any other mutually exclusive complete grouping. We have chosen to define the groups as socio-economic classes. The implications of, and justifications for, this approach will be discussed in much more detail below. However, this choice gives rise to an interesting technical problem -- the derivation of the overall size distribution from the distribution by groups. The problem is that there will, in general, be a variation of incomes within groups and, further, that this variation will differ among groups.

In order to specify the overall size distribution, then, one must have information about the intra-group distributions. Define the intra-group frequency distribution as:

$$f^{(k)}(\eta) \quad k = 1, \ldots, \eta$$  \hspace{1cm} (11)

where $\eta$ represents intra-group income. Define the share of group $k$ in the total population as $W_k$:

$$W_{k,t} = \frac{X_{k,t}}{\Sigma_{i,t} X_{i,t}}$$ \hspace{1cm} (12)

Then the overall distribution of income is the weighted sum of the intra-group frequency functions. Define the sum distribution as $h(\eta)$:

$$h(\eta) = \sum_{k=1}^{\eta} W_k f^{(k)}(\eta)$$
The situation weights $w_k$ depend on $t$ since the group shares in the total population will change over time. The frequency functions $f^{(k)}$ also depend on time. Their means are $x_t$ and one might also wish to specify that other parameters, such as their variances, also change over time.

It is clear that, given knowledge of the intra-group distribution, it is computationally easy to derive the overall size distribution. The distribution $h(n)$ might well be analytically very messy, even if the individual distributions $f^{(k)}$ are tractable (say, all lognormal or Pareto). The main point, however, is that it is possible to define groups which are socially, politically, or economically interesting and still (easily) derive the overall size distribution. Thus, the neo-classical and the socio-economic approaches are not incompatible and can in fact be treated as mutually complementary.

III. THE MOBILITY MATRIX

One problem facing studies of income distribution and distribution planning, in common with many areas of economics, is the problem of aggregation. There can never be an absolutely satisfactory solution since aggregation always involves some arbitrary decisions. The problem arises in defining groups in the mobility matrix discussed above. As long as the problematic nature of aggregation is not forgotten or hidden in subsequent theorizing, one should not be too worried by it. For after all, an overriding concern for "correct" aggregation would effectively stop virtually all empirical studies in economics.

In thinking about a sensible and useful way to fill out the mobility matrix for developing countries, we were influenced by our perceptions of Turkey. Turkey is a developing country in the true sense of the word: in fact, it has been growing rapidly over the last two decades;
has established a small, not very healthy but still significant industrial base, is characterized by very strong rural-urban migration, and has a rather differentiated socio-economic structure. In some sense Turkey, Greece, Yugoslavia, Korea, Mexico, Brazil and some other countries all fall in the same general category of societies that are both developing and relatively differentiated. Other countries, such as Saudi Arabia or Libya are also growing, but under very special circumstances and within what one might call an undifferentiated social framework. Still other countries are, unfortunately, essentially static in both social and economic terms.

The socio-economic segregation scheme proposed below is probably most useful for dynamic developing economies. At this stage it should not however be regarded as anything more than a first modest attempt to apply empirically the theoretical framework developed above. One can hope to obtain some sense of (1) the kind of data problems that one is likely to face, (2) the kind of policy issues that can be usefully analyzed within the proposed framework, and (3) the kind of models that should be developed to implement distribution planning.

A Socio-Economic Classification

We define ten mutually exclusive but complete socio-economic groups. They are:

1. Large Capital Owners
2. Large Landowners
3. Small Capitalists
4. Professionals
5. White Collar Workers
6. Organized Urban Labor
7. Unorganized Urban Labor
8. Unemployed Urban Labor
9. Small Farmers
10. Landless Rural Labor

Clearly the dividing line between some of the groups is a matter of more or less arbitrary judgment. This is particularly so for the distinction between small and large capitalists as well as the distinction between small and large landowners. A sensible distinction should probably vary over time although, for comparative purposes, the same classification should be made across countries (for much the same reasons that the Standard Industrial Classification System has been adopted).

In most developing countries the three first groups will fall, in terms of the size distribution approach, roughly in the upper tail of the distribution. But each group has its own distinctive character. The large landowning group is essentially a traditional class, a group that is likely to be losing ground. The large capital owners, on the other hand, are likely to be a "modern" group and likely to be gaining ground both in purely economic terms and in socio-political strength. The same can be said for the professional class although, depending on the country, this group may either have very strong links to large capital or may in fact be antagonistic to it.

The third group, small capitalists and traders, is important particularly because of the debate between those who are optimistic and those who are pessimistic about the distributional nature of the market mechanism. The optimists will argue that it is through this group that a "breakthrough" into the top decile is possible for the able and thrifty man. The pessimists on the other hand will argue that the "laws of the market" will work for the big enterprise against the small one and that
the progressive expansion of large national and multi-national capital will tend to wipe out the class of small capitalists and proprietors. Big fish eat little fish, and that's capitalism.

White-collar workers and urban organized labor are likely to have similar group mean incomes. However, at least in a country such as Turkey, there is much to be said for distinguishing the two groups since the largest subsection of white-collar workers will be civil servants. They are a group whose income is directly determined by government spending decisions. The organized urban workers, on the other hand, deal with (and conflict with) industrial capital. The character of this latter group will depend on the general social and political environment, especially as it has furthered or discouraged strong industrial labor unions.

Besides organized urban labor, most developing countries will have a large traditional urban sector with unorganized labor working in small firms. The degree to which unorganized urban labor differs from organized urban labor in its level of skill is an interesting but open question. Entry into the advanced, often capital-intensive modern urban sector may be closely related to skill or may be a matter of a much more arbitrary rationing of jobs.

Finally we come to the last three categories. Together they constitute the bottom tail of the distribution and it is here that poverty in an extreme and often chronic form will be the rule. It is here also that the contrast to the developed countries is strongest. In a developed country, these last three groups are unlikely to exceed ten percent of the population except in a deep depression, while in most developing countries they will exceed a third of the population. In an advanced economy, this group benefits from a more or less comprehensive social security and welfare
system. Such welfare systems do not exist in developing countries, and cannot reasonably be established in the short run because the resources and organization required for them are simply not available to the state.

It is clear that the filling of the cells of a ten by ten mobility matrix obtained from the above groupings is a difficult empirical problem. Data traditionally used by economists such as Census Data, Tax Return Data or Data from consumer expenditure surveys are not sufficient. Studies done by sociologists on social mobility may in fact contain more useful information than traditional economic data. 11

The best, and in the long-run probably unavoidable method of data gathering for distribution planning is to do surveys that continue over a considerable time with the same sample. 12 One might even label individual respondents in the census and keep track of them in succeeding censuses. Unfortunately, as far as we know, there are as yet no such longitudinal surveys in any less developed countries.

However, all is not lost. There are certainly data on the structure of the population over time. \((x_t, x_{t+1}, \ldots)\). From various sources, one might well be able to estimate the rows of \(X\). There will certainly be a number of zeros which can be specified a priori and there should be scattered evidence at least on the relative sizes of the other entries. One can then, by some iterative procedure, impose the row and column constraints:

\[
\sum_j m_{ij} = 1
\]

\[
\sum_i m_{ij} x_{it} = x_{i, t+1}
\]

Such a procedure is analogous to the RAS method of updating an input-output table and should be a feasible approach, at least for some less developed countries. 13
Given the absence of careful data studies, it is clear that the results obtained from a mobility matrix framework should be considered with great care. We do not have available even the beginnings of an empirical study and the example below is purely illustrative, based on qualitative judgments and some insights gained from sociological studies. Below we present a qualitative mobility matrix, by filling in those entries we believe to be significantly different from zero in a developing country such as Turkey. This qualitative matrix is useful for analysis and classification of different policies.

We expect the matrix to be strongly diagonal in structure. About 60% of the cells (63 out of 100) are empty. We think of an entry as empty if $N_{ij}$ and $N_{k_i}$ are smaller than one percent. In other words, the entry $X_{ij}$ must be negligible both in terms of the group of origin and the group of destination.

The matrix refers to households and to a decade. Thus $M_{9,3} = 0$ means that the number of individuals classified as belonging to underemployed urban labor households in say 1970, less than one percent will be classified as belonging to a professional household in 1980. Furthermore, those who will have moved will constitute less than 1 percent of the professional group. On the other hand, $M_{9,4}$ positive means that either more than one percent of the people classified as belonging to small farm households in 1970 will by 1930 have become small capitalists or that more than one percent of small capitalists will have a 1970 small farm origin.

A careful look at the structure of the mobility matrix above shows that one is essentially considering four "kinds" of upward mobility.
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<td>1.</td>
<td>Large Capitalists</td>
<td>M_{1,1}</td>
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<td>2.</td>
<td>Large Landowners</td>
<td>M_{2,1}</td>
<td>M_{2,2}</td>
<td></td>
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<td></td>
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<td>3.</td>
<td>Small Capitalists</td>
<td>M_{3,1}</td>
<td></td>
<td>M_{3,3}</td>
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<td></td>
<td></td>
<td></td>
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<td>4.</td>
<td>Professionals</td>
<td>M_{4,1}</td>
<td></td>
<td>M_{4,3}</td>
<td></td>
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<td>5.</td>
<td>White Collar</td>
<td></td>
<td>M_{5,3}</td>
<td>M_{5,4}</td>
<td>M_{5,5}</td>
<td>M_{5,6}</td>
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<td>6.</td>
<td>Organized Urban</td>
<td></td>
<td>M_{6,3}</td>
<td>M_{6,4}</td>
<td>M_{6,5}</td>
<td>M_{6,6}</td>
<td>M_{6,7}</td>
<td></td>
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<td>7.</td>
<td>Unorganized Urban</td>
<td></td>
<td>M_{7,3}</td>
<td>M_{7,5}</td>
<td>M_{7,6}</td>
<td>M_{7,7}</td>
<td>M_{7,8}</td>
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<td>8.</td>
<td>Underemployed</td>
<td></td>
<td></td>
<td></td>
<td>M_{8,6}</td>
<td>M_{8,7}</td>
<td>M_{8,8}</td>
<td>M_{8,9}</td>
<td>M_{8,10}</td>
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<td>9.</td>
<td>Small Farmers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M_{9,7}</td>
<td>M_{9,8}</td>
<td>M_{9,9}</td>
<td>M_{9,10}</td>
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<td>10.</td>
<td>Landless Rural</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td>M_{10,7}, M_{10,8}</td>
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The first kind is that generated by rural urban migration. \((M_{10}, 7, M_{9}, 7, M_{10}, 8, M_{9}, 8)\). The second kind involves movement upward within the urban labor market \((M_{9}, 6, M_{9}, 6, M_{8}, 7)\). These two kinds of movement have recently attracted the greatest share of attention and formal modelling effort.\(^{14}\)

The third kind of mobility is that potentially generated by the education system, involving movement from a working class background into skilled and skilled occupational categories and movements from white collar or small capitalist to professional status \((M_{5}, 4, M_{3}, 4, M_{6}, 4, M_{7}, 5, M_{6}, 5)\).

The fourth kind of mobility involves acquisition of capital by non-capital owning households \((M_{9}, 3, M_{7}, 3, M_{6}, 3, M_{5}, 3)\) or break-ins into the large capital owning class \((M_{4}, 1, M_{3}, 1, M_{2}, 1)\).

Emphasis on the poverty problem has led to the relative neglect of the last two kinds of mobility. We feel that they are important and that the perception of such immobility by members of the society strongly affects behavior. Educational upgrading and the generation of mobility through the educational system has of course been often discussed, but it has not really been formally integrated into an income distribution planning exercise.

The redistribution of assets has also attracted increased attention. It is clear that those influenced by the Marxian approach have always believed it to be the central solution. The traditional socialist answer is at least partial socialization of the means of production and not much is believed to be achievable without this measure. Clearly the problem is an important one and it is important both to consider establishing social ownership of the means of production as a reasonable alternative and also to study the impact of socialization on the workings of the market mechanism.
For example, it may here be interesting to note that Turkey has decided to emphasize this fourth kind of mobility within an essentially free-market private-ownership framework. The government is adopting an integrated set of policies, with credit policy as the most important component, designed to encourage both redistribution of assets towards, and investment by, lower-income groups. When one realizes how, in many less developed countries, government credit and trade policies have contributed to the formation of an extremely skewed asset distribution (with some vague aim of creating a capitalist class) the new Turkish policies should represent an extremely interesting experiment.\textsuperscript{15}

**Mobility and Policy Analysis**

The framework developed here should provide a useful starting point for a discussion of policies designed to change the distribution of income over time. Given the division of the population into socio-economic groups, it seems natural to classify policies into three categories: (1) policies which affect "mobility," i.e., those that directly affect the magnitudes that appear in the cells of the mobility matrix; (2) policies that affect group mean incomes; and (3) policies that affect the distribution of income within the groups.

In the following discussion we shall ignore the third possibility by treating the distribution within each group as given.\textsuperscript{16} This simplifies the analysis, is probably a rather realistic assumption, and reflects the fact that the within group distributions are probably the least susceptible targets of income distribution policy.

We thus consider redistribution policies which fall into two categories: (1) those that affect the mean incomes of the socio-economic groups; and (2) those that affect the mobility matrix. For example, policies
such as setting minimum wages; establishing or expanding social security systems; subsidizing key prices such as those for food, low-income housing and medical care; and policies involving straight government transfers would all be classified into the first category as policies that affect group mean incomes (or the growth rates of group mean incomes). Often the whole problem of distribution planning is seen as one of affecting mean income growth rates. But government policies and planning with respect to education, migration, the structure of markets and the allocation of credit are examples of policies that may have a direct effect on the mobility matrix and so, in this different way, change the distribution of income.

This two-way classification should of course not be taken to imply that any given policy will only affect either mobility or group income. Many policies may have composite and sometimes even conflicting effects. An example is minimum wage policy designed to increase the share of labor in the value-added of the modern sector. Such a policy may, because of resulting restriction of employment, discourage mobility out of the poorest unskilled groups and instead tend to perpetuate chronic unemployment and underemployment.

In general, policy conflicts between improving mobility and generating a more equitable (according to some normative standard) structure of group mean incomes involve questions of the appropriate time-horizon. Some development strategies involve generating an economic structure that will use the relatively unskilled labor force. For example, a country might decide to invest very heavily in a tourist industry which demands relatively unskilled service and construction workers. Such a policy may well discourage efforts to upgrade the labor force since there will be less demand for, and, at least in the short-run, less resources for such an effort. This strategy may lead to significantly higher mean incomes for poor groups but also
by a State act. Others have also gone along with the basic idea that municipal valuation should not suffer because of rent control acts. What is surprising is that few have recommended abolition or amendment of the rent control acts themselves. The exceptions are J. Madhab and K. Sreeram referred to above and the Taxation Enquiry Commission of 1953-54 [G.O.I., 1954]. Their position is well stated:

"...the controlled rents must be assumed to be reasonable rent; and we are unable to agree that municipalities should in effect be permitted to ignore the very fact that a particular limit has been set by statute to the rent which the landlord may levy and make the assumption that he may 'reasonably' obtain a rent which exceeds that maximum. Nor are we able to agree with the other suggestion viz., that the landlord should be permitted to pass on to the tenant the increase in the tax which would result from the previous proposal. The real issue raised by the suggestion is in regard to the level at which rent happens to be controlled, and the proposal is in effect that, that level should be raised to the extent the tax may be raised on the basis of a 'reasonable' assessment higher than the controlled rent. This raises the larger question as to the levels at which rents should be controlled from time to time. What is clear is that the Municipality cannot through revision of assessments, be allowed in effect to decide that question and in individual cases alter the level prescribed by government." [G.O.I., 1954, Vol. 3, p.7].

This, in essence, has also been the view of the courts in various judgments concerning the problem.

I am convinced that it is rent control acts which should be abolished or amended to release property taxes from the binding constraints of controlled rents. It is not at all clear that rent controls actually benefit low income tenants nor that they redistribute income. Abhijit Datta [1973] claims that they do not. There are relevant questions to do with issues of both horizontal and vertical equity. Firstly, it is not always the case that tenants are poorer than landlords. Secondly, if we are really interested in subsidising the poor, why pick
decreased mobility when compared to a sectorally more balanced investment pattern. The long-run result may be a more unequal distribution. As with most conflicts involving time in economics, the resolutions must involve the choice of an appropriate discount rate. Here the results are not just more or less aggregate income, but also different income distributions over time. Questions of equity must be evaluated with questions of output.

Finally, we would like to stress that a socio-economic division of society allows a much more focused analysis of policy alternatives than, say, a division into quantiles. Rather than setting target growth rates for each decile as in the Ahluwalia-Chenery approach, it seems more appropriate to talk of target growth rates for various socio-economic groups. In analyzing mobility, these groups again seem more relevant than deciles.

Below we describe, with a purely illustrative example, the kind of results that can be obtained using our proposed framework. For simplicity we aggregate the ten socio-economic groups into three groups: group 1 includes groups 1, 2, 3, 4, and 5 above; group 2 includes groups 6 and 7; and group 3 includes groups 8, 9, and 10. The example can be thought of as roughly applying to a developing country with a per capita income of about $300 that embarks on a decade of rapid growth.
IV. A NUMERICAL EXAMPLE

Consider a stable population of 100 divided into three socio-economic groups. Initially 15% of the population is located in group 1 (the top group), 35% is located in group 2 (the middle group), and 50% is located in group 3 (the bottom group). These percentages are not empirical estimates for any one country but they roughly correspond to the proportions prevailing in countries such as Turkey, Brazil, and Mexico—countries with a dynamically expanding industrial sector but a still large and relatively backward rural sector and substantial unemployment problems.

Total income is $30,000 i.e., $300 per capita. The initial mean incomes for each group are $1000, $300 and $90 respectively. In vector notation we have:

\[
X_0 = \begin{bmatrix}
15 \\
15 \\
50
\end{bmatrix}, \quad Y_0 = \begin{bmatrix}
1000 \\
300 \\
20
\end{bmatrix}, \quad S_0 = \begin{bmatrix}
0.500 \\
0.350 \\
0.150
\end{bmatrix}
\]

We shall consider four alternative strategies each consisting of combining a vector of mean income growth rates with a mobility matrix that will restructure the population. Restricting ourselves to two possible growth vectors and two mobility matrices, there are four alternative strategies. The two growth vectors we shall consider are the following:

\[r_A = \begin{bmatrix}
5.0 \\
3.5 \\
2.5
\end{bmatrix} \quad \text{Unequalizing Growth (\%)} \quad r_B = \begin{bmatrix}
4.0 \\
4.5 \\
5.0
\end{bmatrix} \quad \text{Equalizing Growth (\%)}
\]

In the first case, \(r_A\), growth is unequalizing in the sense that the top group grows twice as fast as the bottom group and the middle group's growth rate lies in between. The second alternative is equalizing with the
two bottom groups growing at a slightly higher rate than the top group.
The difference is more substantial than it first appears. It should be
remembered that group 3 consists of small farmers, landless rural laborers
and urban unemployed. A 5.0% growth rate for the mean income of this group
would seem to represent an absolute maximum for what is at all feasible.
Only very massive efforts can actually be expected to achieve the growth
vector \( r_B \). This does not of course mean that it is impossible to diminish
the size (or relative size) of the bottom group, only that the major effect
is through changes in mobility rather than changes in mean incomes.

Consider two alternative mobility matrices:

\[
M_A = \begin{bmatrix}
1.00 & 0.00 & 0.00 \\
0.10 & 0.85 & 0.05 \\
0.00 & 0.10 & 0.90 \\
\end{bmatrix} \quad \text{Low Mobility}
\]

\[
M_B = \begin{bmatrix}
1.00 & 0.00 & 0.00 \\
0.18 & 0.82 & 0.02 \\
0.05 & 0.20 & 0.75 \\
\end{bmatrix} \quad \text{High Mobility}
\]

The unit of time is a decade. Consider the Low Mobility matrix.

In a rapidly growing economy, mobility is essentially upward although there
may be some small movement back to underemployed or even rural status for
those in the urban labor force. 10% of the middle group will enter the top
group over one decade and 10% of the bottom group will enter the middle
group. When interpreting these numbers it is perhaps best to assume the
population to be classified by the status of the household head. Thus
the son of an organized worker who was in school in the base period but
who has become a professional ten years later will fill the \( M_{2,1} \) entry of
the mobility matrix.
The second matrix represents substantially higher mobility. As opposed to 10%, 25% of the members of the bottom group will move upward over the decade, with the result that the bottom group's share in population will fall from 50.0% to 38.2% in ten years. Clearly such a shift can only be achieved with strong rural-urban migration and urban employment growth, since the urban unemployed are themselves part of group 3.

Combining the two growth vectors with the two mobility matrices there are four possible strategies:

Strategy I: Low Mobility, Unequalizing growth \((M^A, r^A)\)
Strategy II: Low Mobility, Equalizing growth \((M^A, r^B)\)
Strategy III: High Mobility, Unequalizing growth \((M^B, r^A)\)
Strategy IV: High Mobility, Equalizing growth \((M^B, r^B)\)

Tables 2 to 5 summarize the distributional impact of the various strategies.

Table 2 presents the changing structure of the population, the shares of the three groups in total income and the mean incomes of each group after a decade of growth. The rapid increase in the relative size of the top group is due to the fact that this group includes small capitalists and white collar workers, two categories that tend to increase substantially as development proceeds. The movement is essentially one from the unorganized urban sector into the capitalist category and an increase in the number of white collar workers. The movement into the second group reflects successful rural-urban migration, i.e., urban employment growth.

The new structure resulting from the assumed mobility in conjunction with the alternative growth rates applied to the mean incomes generates a new breakdown of national income by socio-economic groups. Table 3 decomposes the change in income shares into the components due to mobility and differential growth. Note that since the size of the groups change, these shares do not have much significance from the point of view of income
TABLE 2

GROUP SHARES AND INCOMES

STRATEGY:

<table>
<thead>
<tr>
<th>GROUP</th>
<th>BASE</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent Shares</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Population</td>
<td>1</td>
<td>15.0</td>
<td>18.5</td>
<td>18.5</td>
<td>23.8</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>35.0</td>
<td>34.8</td>
<td>34.8</td>
<td>38.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>50.0</td>
<td>46.7</td>
<td>46.7</td>
<td>38.2</td>
</tr>
<tr>
<td>Present Shares</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>In Total Income</td>
<td>1</td>
<td>50.0</td>
<td>16.0</td>
<td>54.3</td>
<td>54.3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>35.0</td>
<td>29.3</td>
<td>32.1</td>
<td>27.1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>15.0</td>
<td>10.7</td>
<td>13.6</td>
<td>7.5</td>
</tr>
<tr>
<td>Mean Incomes Of Groups</td>
<td>1</td>
<td>1000.</td>
<td>1628.</td>
<td>1480.</td>
<td>1628.</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>300.</td>
<td>423.</td>
<td>466.</td>
<td>423.</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>90.</td>
<td>115.</td>
<td>147.</td>
<td>115.</td>
</tr>
<tr>
<td>Growth Rate of Total Income (%)</td>
<td></td>
<td>5.3</td>
<td>5.3</td>
<td>7.0</td>
<td>6.9</td>
</tr>
</tbody>
</table>
TABLE 3

DECOMPOSITION OF CHANGES IN GROUP Income Shares (%) FROM BASE PERIOD DUE TO MOBILITY AND INCOME GROWTH

<table>
<thead>
<tr>
<th>Group</th>
<th>Total Change</th>
<th>Change Due To:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mobility</td>
<td>Growth</td>
<td>Residual</td>
</tr>
<tr>
<td>Strategy I</td>
<td>1</td>
<td>10.0</td>
<td>5.8</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-5.7</td>
<td>-3.5</td>
<td>-2.1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-4.3</td>
<td>-2.3</td>
<td>-2.2</td>
</tr>
<tr>
<td>Strategy II</td>
<td>1</td>
<td>4.3</td>
<td>5.8</td>
<td>-1.6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-2.9</td>
<td>-3.5</td>
<td>-0.6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-1.4</td>
<td>-2.3</td>
<td>1.0</td>
</tr>
<tr>
<td>Strategy III</td>
<td>1</td>
<td>15.4</td>
<td>11.6</td>
<td>4.3</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-7.9</td>
<td>-5.5</td>
<td>-2.1</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-7.5</td>
<td>-6.1</td>
<td>-2.2</td>
</tr>
<tr>
<td>Strategy IV</td>
<td>1</td>
<td>10.2</td>
<td>11.6</td>
<td>-1.6</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-4.8</td>
<td>-5.5</td>
<td>-0.6</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-5.4</td>
<td>-6.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>
TABLE 6

OVERALL SIZE DISTRIBUTION
OF INCOME BY DECILES (%).

<table>
<thead>
<tr>
<th>Decile</th>
<th>Base</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.9</td>
<td>0.7</td>
<td>0.9</td>
<td>0.7</td>
<td>0.8</td>
</tr>
<tr>
<td>2</td>
<td>1.7</td>
<td>1.3</td>
<td>1.7</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>3</td>
<td>2.4</td>
<td>2.0</td>
<td>2.5</td>
<td>2.0</td>
<td>2.5</td>
</tr>
<tr>
<td>4</td>
<td>3.3</td>
<td>2.8</td>
<td>3.4</td>
<td>3.0</td>
<td>3.6</td>
</tr>
<tr>
<td>5</td>
<td>4.6</td>
<td>4.0</td>
<td>4.7</td>
<td>4.3</td>
<td>5.0</td>
</tr>
<tr>
<td>6</td>
<td>6.3</td>
<td>5.7</td>
<td>6.4</td>
<td>6.0</td>
<td>6.7</td>
</tr>
<tr>
<td>7</td>
<td>8.5</td>
<td>7.9</td>
<td>8.7</td>
<td>8.2</td>
<td>8.9</td>
</tr>
<tr>
<td>8</td>
<td>11.9</td>
<td>11.5</td>
<td>12.0</td>
<td>12.0</td>
<td>12.4</td>
</tr>
<tr>
<td>9</td>
<td>18.3</td>
<td>19.0</td>
<td>18.6</td>
<td>19.7</td>
<td>19.0</td>
</tr>
<tr>
<td>10</td>
<td>42.0</td>
<td>45.0</td>
<td>41.0</td>
<td>42.9</td>
<td>39.5</td>
</tr>
</tbody>
</table>

Gini Coefficient: 0.56  0.59  0.55  0.59  0.55
## Table 5

**Composition of Groups by Quintiles of the Overall Income Distribution**

<table>
<thead>
<tr>
<th>Quintile</th>
<th>Base</th>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GROUP 1</strong> (TOP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor 1</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>0.0</td>
<td>0.4</td>
<td>0.3</td>
<td>0.9</td>
</tr>
<tr>
<td>3</td>
<td>2.1</td>
<td>1.8</td>
<td>3.5</td>
<td>3.5</td>
<td>5.9</td>
</tr>
<tr>
<td>4</td>
<td>13.7</td>
<td>15.0</td>
<td>18.3</td>
<td>22.5</td>
<td>24.1</td>
</tr>
<tr>
<td>Rich 5</td>
<td>84.0</td>
<td>83.1</td>
<td>77.9</td>
<td>73.7</td>
<td>69.1</td>
</tr>
<tr>
<td><strong>GROUP 2</strong> (MIDDLE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor 1</td>
<td>0.5</td>
<td>0.4</td>
<td>0.7</td>
<td>0.8</td>
<td>1.5</td>
</tr>
<tr>
<td>2</td>
<td>6.9</td>
<td>7.4</td>
<td>9.8</td>
<td>15.6</td>
<td>17.4</td>
</tr>
<tr>
<td>3</td>
<td>28.9</td>
<td>34.1</td>
<td>32.7</td>
<td>40.4</td>
<td>37.2</td>
</tr>
<tr>
<td>4</td>
<td>43.5</td>
<td>45.1</td>
<td>41.4</td>
<td>36.8</td>
<td>34.8</td>
</tr>
<tr>
<td>Rich 5</td>
<td>20.2</td>
<td>13.0</td>
<td>15.4</td>
<td>6.4</td>
<td>9.1</td>
</tr>
<tr>
<td><strong>GROUP 3</strong> (BOTTOM)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor 1</td>
<td>39.7</td>
<td>42.6</td>
<td>42.2</td>
<td>51.5</td>
<td>50.9</td>
</tr>
<tr>
<td>2</td>
<td>35.1</td>
<td>37.2</td>
<td>35.3</td>
<td>36.7</td>
<td>24.5</td>
</tr>
<tr>
<td>3</td>
<td>19.1</td>
<td>16.7</td>
<td>17.2</td>
<td>10.0</td>
<td>11.6</td>
</tr>
<tr>
<td>4</td>
<td>5.5</td>
<td>3.3</td>
<td>4.8</td>
<td>1.7</td>
<td>2.3</td>
</tr>
<tr>
<td>Rich 5</td>
<td>0.6</td>
<td>0.2</td>
<td>0.5</td>
<td>0.1</td>
<td>0.2</td>
</tr>
</tbody>
</table>
distribution defined in the traditional Lorenz curve framework. However, group shares may be important in themselves, not least as indicators of economic, social and political power. Note that group 3 is a shrinking group in terms of both size and income share with the somewhat paradoxical result that low-end poverty programs may become politically more difficult as development proceeds given the diminishing importance of group 3.

Table 4 depicts distribution by deciles and thus links the analysis to the size distribution approach. The translation is made by aggregating three different two-parameter lognormal distributions assumed for the socio-economic groups. On the basis of some empirical evidence, the following log variances were assumed for the three groups: .45, .32, and .50 respectively. The within group Gini coefficients are functions only of the log variance and so are the same for all the experiments. They are .36, .31, and .38 for groups one, two, and three respectively.

What is rather striking about the results reported in Table 4 is the difficulty in affecting the share of the bottom 20% or even 40%. Rather dramatic experiments have relatively little effect on the overall size distribution. Of course, there is no a priori reason that mobility should have any effect on the static size distribution -- for example, a symmetric mobility matrix would leave the size distribution unchanged. However, as Table 3 indicates, in these experiments mobility affected group income shares more than differential growth rates in group mean incomes. It is sobering that substantial changes both in group mean incomes and population shares affect the overall size distribution only very slowly.

Table 5 gives the group composition of quintiles of the overall distribution. For example, in the base year, 84% of the members of group one were in the richest quintile of the overall distribution while none of
them were in the poorest quintile. In general, the experiments had a more
dramatic effect on the composition of quintiles than they did on the over-
all size distribution. This result would seem to be of great importance
to political scientists and sociologists since it implies important changes
in the structure of society. For example, in strategy IV the share of
the top quintile in total income falls by only 1.8% (Table 4). However,
the share of the upper class (group 1) in the richest quintile falls by
almost 15% (Table 5), a rather dramatic structural change even though
group 1 has increased its share in the total population.

V. NOTES ON MODELS FOR DISTRIBUTION PLANNING

The small example above gives one a feeling for the flexibility
and use of the general framework presented as an approach to distribution
planning. It should be clear, however, that neither the growth rates for
group mean incomes, nor the changes in the elements of the mobility matrix
are themselves policy tools or control variables. An actual ideal model
for distribution planning within the framework proposed above would have
to specify the economic or social mechanisms that link certain control
variables to the group-income growth rates and the elements of the mobility
matrix.

Most planning models have great difficulties linking their
endogenous variables to truly government controlled variables. In most
of the traditional multi-sector models that have been used for development
planning, it is not at all clear how the computed plan will be implemented
in an economy that essentially relies on market mechanisms and does not
use compulsory production targets. It would therefore probably be un-
realistic and unjustified to ask of the nascent distribution planning
models explicit mathematical links between the distributional variables
(the group-income growth rates and the elements of the M matrix) and narrowly defined policy-tool variables. Still, as rapidly as possible, formal modelling must increase its policy content if it is to evolve into something more than a purely theoretical exercise.

Before discussing the kind of modelling that would seem required to implement the approach developed in this paper as a planning tool rather than just as a descriptive framework, it is useful to survey briefly some of the formal models that do contain some explicit analysis of income distribution. The survey is certainly not exhaustive, but merely gives examples of the range of existing models.

It is perhaps best to classify the models in terms of their definition of income recipient groups. At one extreme are functional, capital-theoretic models, and neo-Marxian models. The influence of the Marxian tradition is clearly evident in the writings of the Cambridge school, especially J. Robinson, N. Kaldor and L. Pasinetti, as well as the writings of M. Kalecki. Both Kalecki and Kaldor-Robinson explicitly attempt to integrate a Marxian approach with (Keynesian) macro-economic theory. From the point of view of distributional planning we feel that they suffer from too drastic aggregation. Distribution cannot be usefully summarized simply by the relative shares of capital and labor. Since these models do not create the possibility of generating and evaluating distribution by finer groupings (or households) they do not provide the foundations for careful distribution planning, even though they may provide useful insights into the workings of the macro-economic system.

Moving away from the "Marxian" two factor models, one next encounters a range of models which attempt to implement general equilibrium models empirically and computationally. The first model incorporating price quantity interaction linking the demand and production structures
was developed by Johansen [1960]. Johansen has continued his work and there have been a number of explicitly non-linear Johansen-type models that generate factor incomes as a by-product. 20

More recently, Johansen-type models have been extended to include distribution explicitly. Adelman and Robinson [1974] have developed a model which generates the personal and household distributions by the technique discussed above. Their model thus integrates the functional and household distribution approaches.

Metcalf [1972] integrates a statistical model of the size distribution by households into a Keynesian macro model for the United States. This model effectively crosses the demarcation line between the functional or socio-economic group approach and the pure size distribution approach. While Metcalf does consider subdivisions of households, they are defined by demographic characteristics and are not very interesting socio-economic categorizations. 21

Binder [1973] has developed an even more explicitly neo-classical model of the size distribution in which the production structure is exogenous and mobility (except for inherited capital) is not a problem. Fair [1971] has developed a optimizing model in the same spirit. One might also include in this group the human capital and education models and the work done by Tinbergen. 22

Perhaps the purest size distribution models are the purely statistical models such as Champernowne [1953]. These models have little or no economic justification and cannot really be used to examine how economic changes and policies might affect distribution.
A range of models that do not fit very well into the mobility versus size distribution categorization but which are nevertheless interesting for analyzing movements within the lower part of the distribution are the Harris-Todaro migration models. These models concentrate on a functional distribution, but only within part of the wage earning group. They are really concerned with the "employment problem" rather than with any more general questions of income distribution.

None of the above models explicitly includes an analysis of the factors affecting mobility. With the exception of the migration models, they also tend to be short or medium run models in that they concentrate on changes in group mean incomes rather than changes in intergroup mobility. Again except for the migration models, none of them consider any interactions between changes in group mean incomes and changes in mobility.

In the short-run, it is reasonable to assume that changes in socio-economic stratification are small and one can therefore ignore the influence of the mobility matrix on income distribution when one is building a short-run model. The essential aim of a short-run model should be the careful analysis of market interactions (in both factor and product markets) that determine factor remuneration and the analysis of the various transfer mechanisms that determine the final distribution. However, income distribution is inherently a long-run problem, at least if major changes are considered and if these changes are to take place in a reasonably smooth way. A long-run or medium-run model should combine analysis of income formation by various functional and socio-economic groups with analysis of movement between the groups. Even in a short-run model, it is clearly useful to distinguish functional and socio-economic groups since they (rather than deciles) define the target groups affected by actual policies.
It seems to us that, provided a major modelling effort is considered worthwhile, the mean-income formation process should be analyzed with general equilibrium models of the Johansen-type. The art here is in generating useful and policy relevant aggregations, and in modelling the market mechanism not as it should ideally work but as it actually works, with the necessary disequilibrium adjustment mechanisms.

Regarding the second problem area -- the modelling of the links between policy measures and changes in mobility -- it is clear that a great deal of work is required before these links can be established with any degree of confidence. From our discussion of the 10 x 10 mobility matrix above, one can classify mobility into four categories: (1) Rural-Urban Migration, (2) Movements within the Urban-Labor Market, (3) Movement through the Educational System, (4) Private Capital Formation and Redistribution of Assets. This four-way classification suggests that long and medium-run distribution planning models should include: (1) Migration equations of the Harris-Todaro type, (2) Equations referring to the urban labor market and barriers to entry into employment in the capital-intensive modern sectors, (3) a sub-model of the education system, and (4) a sub-model of savings and investment by groups that should be closely integrated with a good description of the financial market and government credit policy. It may well be that it is a major modelling effort in this last area that will have the highest pay-off in terms of impact on policy.
VI. CONCLUSION

In spite of the surge in interest for distribution problems in the last three or five years, great progress, either theoretical or on the policy front, cannot be said to have taken place. Probably the most important single obstacle to rapid progress is the lack of an adequate data base. However, orderly data generation requires an adequate and widely acceptable theoretical framework, something which is currently lacking.

We suggest that the classification of people by socio-economic groups rather than income classes, and the notion of mobility, should provide a fruitful framework within which to structure formal model building and data gathering. In terms of policy analysis, socio-economic groups rather than income classes would seem to be the politically more relevant was to group the population, and so this framework might well provide a starting point for interdisciplinary work. Furthermore, current empirical work (not only our example but other ongoing work) indicates that the size distribution is insensitive to fairly dramatic economic changes, while the distribution by socio-economic groups is not. The economists who concentrates only on the size distribution will ignore important and interesting interactions between the structure of the distribution and economic variables.
1. See Sraffa [1960].
2. See Sen [1971].
3. For a Keynesian synthesis, see Furtado [1964].
4. For some recent work, see Ahluwalia and Chenery [1973].
5. The notion of a mobility matrix and measures based on it, is discussed in Szal and Robinson [1974].
6. Sociologists, particularly those interested in social stratification, have been interested in dynamic models and the mathematical tools of Markov processes. See Pullman [1970]. Economists studying income distribution have also used this approach. See Bronfenbrenner [1971].
7. Some descriptive measures of M are discussed in Szal and Robinson [1974]. They define the groups in terms of income classes, not socio-economic groups.
8. The fact that the groups are mutually exclusive is limiting. No one can be in more than one socio-economic class. Relaxing this assumption would greatly complicate the analysis, but might well be fruitful.
9. This is the approach taken by Adelman and Robinson in their model of the short run determinants of the income distribution. For a description of the model, see Adelman and Robinson [1973]. For a related approach to mapping from the functional to the household distribution, see Thorbecke and Sengupta [1972].
10. Note that aggregation has always been a nagging problem in input-output analysis.
11. For a survey, see Pullman [1970].
12. Such a survey has been conducted in the U.S. by the Survey Research Center. For an analysis of the results, see Morgan et. al. [1974].
13. See, for example, Bacharach [1971].
14. See, for example, Harris and Todaro [1970].
15. For a discussion of the Turkish approach, see Dervis [1974].
16. In the example below, we assume that the within group distributions can be specified by a two parameter lognormal distribution.
17. We have used a computer program developed as part of the Adelman-Robinson Korean model. The quantiles of the overall distribution are determined by guessing a quantile, adding the distributions, and refining the guess iteratively.
18. The Gini coefficient for the overall distribution is estimated from the deciles using a method of polynomial interpolation.
19. For a survey of the capital theory controversy, see Harcourt [1972].
21. Thorbecke and Sengupta [1972] use a macroeconomic model to generate the functional distribution which they then map into the household distribution.
22. See Mincer [1970] and Tinbergen [1959].
23. See Harris and Todaro [1970].
BIBLIOGRAPHY


