The Labor Market and Social Accounting

A Framework of Data Presentation

Christiaan Grootaert
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The Living Standards Measurement Study

The Living Standards Measurement Study (LSMS) was established by the World Bank in 1980 to explore ways of improving the type and quality of household data collected by Third World statistical offices. Its goal is to foster increased use of household data as a basis for policy decision making. Specifically, the LSMS is working to develop new methods to monitor progress in raising levels of living, to identify the consequences for households of past and proposed government policies, and to improve communications between survey statisticians, analysts, and policy makers.

The LSMS Working Paper series was started to disseminate intermediate products from the LSMS. Publications in the series include critical surveys covering different aspects of the LSMS data collection program and reports on improved methodologies for using Living Standards Survey (LSS) data. Future publications will recommend specific survey, questionnaire and data processing designs, and demonstrate the breadth of policy analysis that can be carried out using LSS data.
The Labor Market and Social Accounting

A Framework of Data Presentation

Christiaan Grootaert

The World Bank
Washington, D.C., U.S.A.
THE LABOR MARKET AND SOCIAL ACCOUNTING: A FRAMEWORK OF DATA PRESENTATION

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I am greatly indebted to Graham Pyatt with whom I have had many interesting and stimulating discussions about social accounting matrices and related subjects. The idea for this paper was generated in the course of one such discussion. I am also thankful to Timothy King, William McGreevey, and Graham Pyatt for comments on an earlier draft of this paper.

This paper was presented at the Annual Meeting of the Population Association of America, San Diego, April 29 - May 1, 1982.
I. INTRODUCTION

The purpose of this paper is to present a framework of data presentation that links demographic and labor market information in an internally consistent way. The framework is set in the tradition of social accounting matrices (SAM). The latter describe the financial flows that take place within and between various institutions and sectors of the economy, each of which can be disaggregated according to local conditions and policy concerns.¹ In this paper we build up an accounting system that utilizes other data in addition to financial flows, notably information on numbers of households and individuals, the time individuals spend on productive and other activities, and labor force statistics. These have been identified as important omissions to the conventional SAM format (Round, 1981). Their inclusion into the framework enhances the relevance of the accounting system for the understanding of the labor market and for employment policy. Ultimately, the accounting system provides a complete mapping from activities in the economy to jobs and earnings, and to households receiving such earnings.

The accounting system as described in this paper has two convenient features. First, it links demographic and economic information via a number of well-known concepts such as the distribution of productive inputs and factor incomes. The latter are row or column summary vectors of the data matrices that are the component of the framework. Second, the accounting system has implicit in its design a large degree of flexibility with respect to classification so as to be adaptable to a wide variety of country settings.

¹/ For readers unfamiliar with SAMs, Benjamin King (1981) has written an excellent "Layman's guide to Social Accounting Matrices". A more complete introduction into the subject is provided by Fyatt and Thorbecke (1976).
Equally, within one country a variety of classifications can be used to study different problems. The relevance of the system for policy analysis is thereby substantially enhanced.

Section II of this paper describes the general accounting model and explains the links between the constituent matrices of the system. An illustration of the system is given using one particular classification scheme. Section III discusses the quantitative methods of analysis that follow from the format. In Section IV the flexibility of the system is demonstrated by discussing various alternative classification schemes. A final section offers a concluding comment.
II. THE GENERAL MODEL

Starting Point: A Demographic Statement of the Population

The first of the two building blocks of the accounting system is a matrix that crossclassifies individuals by personal characteristics and by the characteristics of the households to which they belong. Demographic characteristics of individuals are the first and perhaps most general classification that comes to mind. Persons can be grouped according to sex, age, race or ethnicity, marital status. Each of these criteria can be used separately or in combination. For the illustration that we shall use in this paper we intend to combine age and sex. Grouping age into three brackets, say, younger than 15, 15-59, 60 or older, we obtain a matrix with six rows.

There is quite a range of criteria to describe households and to group them. The purpose here is to use criteria that allow the construction of socioeconomic groups of households that have relevance with respect to economic and social policy issues. For some purposes characteristics of the household as a unit are appropriate, such as race or ethnicity, ownership of productive inputs, income level, household size and composition, dependency condition of the household (number of children and aged vs. the number of earners), etc. As an alternative, or jointly with household characteristics, some features of the household head or main income earner can be used to describe the household, viz. sex, educational attainment, occupation, industry, employment status, earnings, etc. Lastly, the location of the household can be incorporated (region or province, urban/rural, size of city) or changes in that location (i.e. migrant status). Clearly, a vast array of combinations is possible.
There is some overlap possible between the criteria that can be used to describe individuals and the features of the household or household head. A judicious choice must therefore be made, in the light of the problem under study. Some examples of classifications will be discussed towards the end of this paper. For the purposes of the illustration in this section we will select race and two aspects of location, viz. region and urban/rural.

Dividing a hypothetical country with two races into a northern and southern region yields eight household types, i.e. eight columns in the matrix. If the country's government is concerned with redressing racial and regional imbalances, these household types are politically relevant socioeconomic groups. Figure 1 shows the basic demographic breakdown of the population. Each cell $d_{ij}$ of the matrix indicates the number of individuals with demographic characteristic $i$ (sex/age group) belonging to socioeconomic household group $j$.

The row totals of the matrix show the distribution of the population over the demographic characteristics that were distinguished. The column totals provide a breakdown of the population over socioeconomic groups. The grand total of both row and column summary vectors is of course the total population of the country. It is to be noted that the data requirements for this matrix are fairly modest and available from most censuses.

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1/ Our illustrative criteria have fairly wide applicability, as indicated by the fact that one or more of them were used to categorize households in the social accounting matrices that were constructed for Iran (Pyatt et al, 1972), Sri Lanka (Pyatt and Round, 1977), Botswana (Greenfield, s.d.) and Malaysia (Chander et al, 1980).
<table>
<thead>
<tr>
<th>Types of Households (socioeconomic groups)</th>
<th>North</th>
<th>South</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>Race 1</td>
<td>Race 2</td>
</tr>
<tr>
<td>Rural</td>
<td>Race 1</td>
<td>Race 2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Types of Individuals</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥ 60</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distribution of population by socioeconomic groups

Total population
The Basic Economic Statement of the Population

The second building block of the accounting system describes the basic economic status of the individual members of the population. In addition to the grouping of persons into demographic categories, a categorization of activities is required. A first major dividing line could be as to whether or not an activity results in economic output, i.e. contributes to GDP according to the U.N. definition. The persons engaged in such activities (which we shall label here "productive activities") make up the economically active population.¹/ The remaining population can be broken down according to its status or reason for not being economically active, for example schooling, retirement, homemaking or other. Since the UN concept of productive activities only includes selected non-market activities (e.g. primary products produced for own consumption), people engaged in other non-market activities should be distinguished.

It is possible of course to deviate from the UN guidelines and either to include all non-market activities under productive activities or to separate them all out. Equally, the work of homemakers, for example, can be considered a productive activity.

A further breakdown of productive activities is necessary. Existing classification schemes such as the International Standard Industrial Classification may provide a general framework within which to make country specific adaptations. In general, it will be useful to bring out clearly distinctions between the modern and traditional (or formal/informal) sectors, however defined, and between private and public enterprises. For our illustration we shall combine these distinctions with the basic division agriculture/industry/services, to yield

¹/ This includes the military forces. In this paper we shall not distinguish this group.
the following six categories:

- traditional agriculture (smallholdings)
- modern agriculture (large farms)
- traditional industry
- traditional services
- modern industry and services (modern sector)
- government

They constitute six columns in the basic economic matrix of the population.

It is useful to distinguish individuals by the number of hours they work. The three basic categories are full-time employed, part-time employed, and unemployed.\(^1\) The distinction full-time/part-time employed can be made within each activity category, but to simplify our tabular illustration we shall only use one column for all part-time employed individuals. We further distinguish non-market activities (not included in productive activities), and four types of economically inactive status, viz. schooling, retirement, homemaking, and other. The resulting basic economic matrix \(E_{ik}\) is shown in Figure 2. The cells \(e_{ik}\) represent numbers of people with characteristic \(i\) (age/sex groups) who are fully employed in productive activity \(k\) (for \(k = 1, \ldots, 6\)), part-time employed \((k = 7)\), unemployed \((k = 8)\), engaged in non-market activities not covered elsewhere \((k = 9)\), or who are economically inactive.

\(^1\) There is an element of arbitrariness in the distinction between full-time and part-time employment. One needs to select a specific cut-off point, such as working 40 hours per week, or use as criterion whether the individual wants to work more. A combination of both criteria is also possible. Unemployment implies zero hours of work in productive activities and active search for work.
Figure 2: Economic Matrix $H_{ik}$ of the Population

<table>
<thead>
<tr>
<th>Productive Activities</th>
<th>Full-time Employment</th>
<th>Part-time Employment</th>
<th>Unemployment</th>
<th>Other Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small-holdings</td>
<td>Large Farms</td>
<td>Traditional Industry</td>
<td>Traditional Services</td>
</tr>
<tr>
<td>Male</td>
<td>&lt; 15</td>
<td></td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>Female</td>
<td>15-39</td>
<td></td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>≥ 40</td>
<td></td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>

Distribution of fully-employed population

Total part-time employment

Total unemployment

Population engaged in non-market activities

Distribution of economically inactive population

Total population
(k = 10, ..., 13). It is clear that a number of the cells will be empty (indicated by (o)) or are bound to have very few people in them (indicated by (n)).

The vector composed of column totals gives the distribution of people by economic status. Several elements of that vector are important totals in their own right, such as the total population on smallholdings (potential poverty target group), total unemployment, total school enrollment, etc. The grand total of all cells in the tables, as in the demographic matrix, is the total population. The demographic and economic matrices also have in common that the row sums constitute a vector that describes the demographic composition of the population. This vector provides therefore a link between the two matrices which indeed can be joined as illustrated in Figure 3.

The combined tables show which socioeconomic groups provide which people for which type of activity or economically inactive status. The breakdown of the population, in this illustration by age/sex groups, provides the link between a simple demographic statement of the population and a basic economic statement about people's activity status.

**Manpower Matrix**

The illustration presented so far relied on a breakdown of total population. A subset of the total population that is of particular relevance for economic policy analysis is the labor force. In Figure 2, the breakdown of the labor force is seen in the first eight columns, i.e. the people in productive activities and the unemployed. These columns constitute a manpower matrix. They correspond to the shaded area in Figure 3 which shows
Figure 3: Basic Demographic/Economic Accounting System

<table>
<thead>
<tr>
<th>Types of Households (Socioeconomic groups)</th>
<th>Productive Activities</th>
<th>Other Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution of population by demographic characteristics</td>
<td>Total Population</td>
<td>Distribution of economically active population (labor force)</td>
</tr>
<tr>
<td>Distribution of population by socioeconomic groups</td>
<td></td>
<td>Distribution of economically inactive population</td>
</tr>
</tbody>
</table>

1/ Including unemployment
the manpower matrix in the broader context of the demographic and activity status of the population.

A further refinement to the rows of the manpower matrix that is particularly useful is the addition of education information. Education is a major determinant of job accessibility. Further subdivision of each sex/age group by educational achievement would increase the homogeneity of each row vis-à-vis labor market opportunities, which is a useful feature from the point of view of analysis. It would provide a first look at the causality of the observed differences in economic status of the members of different socioeconomic groups.

The manpower matrix is a statement of labor demand for each type of worker. The demographic matrix joint to it shows which socioeconomic groups provide the supply of these types of workers. This set of matrices is useful for education policy, the study of discrimination and equality of opportunity across household types, and for understanding the functioning of the labor market in general.

To demonstrate the latter further, we would like to present a particular illustration of the manpower matrix that captures job seasonality. For that purpose, we wish to collapse the eight household types considered so far into four by eliminating the race dimension, i.e. we distinguish urban and rural households in each of the two regions of our hypothetical economy. To emphasize the distinction between all-year and seasonal work, we split the columns representing activity categories including unemployment into three. Two columns capture seasonal activity, the third all-year activity. To keep the example simple, we re-arrange the activities into farming, construction, other. Figure 4 shows the resulting table. The interpretation
Figure 4: Job Seasonality

<table>
<thead>
<tr>
<th>Types of Households (socioeconomic groups)</th>
<th>Productive Activities (full-time employment)</th>
<th>Part-time employment</th>
<th>Unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agriculture</td>
<td>Construction</td>
<td>Other</td>
</tr>
<tr>
<td></td>
<td>Dry season</td>
<td>Rainy season</td>
<td>All year</td>
</tr>
<tr>
<td>South</td>
<td>d_{11}</td>
<td></td>
<td>e_{11}</td>
</tr>
<tr>
<td>Rural</td>
<td>d_{14}</td>
<td></td>
<td>e_{14}</td>
</tr>
<tr>
<td>urban</td>
<td></td>
<td>e_{1}</td>
<td></td>
</tr>
<tr>
<td>north</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>south</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Family</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>d_{61}</td>
<td></td>
<td>e_{61}</td>
</tr>
<tr>
<td>15-59</td>
<td>d_{64}</td>
<td></td>
<td>e_{64}</td>
</tr>
<tr>
<td>5 and below</td>
<td></td>
<td>e_{6}</td>
<td></td>
</tr>
<tr>
<td>Total labor force</td>
<td>e_{1.1}</td>
<td></td>
<td>e_{1.1}</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
of selected cells is the following:

- $d_{11}$ - number of male workers, less than 15 years of age, provided by urban households in the north
- $d_{33}$ - total labor force provided by urban households in the south
- $e_{22}$ - total male adult labor force
- $e_{66}$ - total number of male adult workers who work full time in agriculture during the rainy season only
- $e_{66}$ - total work force who is full-time employed in construction all year round
- $p_{11}$ - dry season part-time employment among male workers less than 15 years of age
- $u_{22}$ - total rainy season unemployment

One might find that vector $[e_{11} \ldots e_{61}]$ (dry season agricultural work force) is virtually empty but that $[e_{14} \ldots e_{64}]$ (dry season construction) and $[u_{11} \ldots u_{61}]$ (dry season unemployment) contain sizeable numbers of people. The comparison of the last two vectors will identify the types of workers who manage to find a job in the agricultural off-season and those who do not. Equally, one can identify the categories of people who have year-round work and see how they differ from seasonal workers in a particular sector. If the demographic categories were expanded to include education one would throw further light on the causes for seasonal work (although age and sex can be expected to be major determinants). An interesting modification would be to use location of job (by season) as row category. Then, the left hand matrix of Figure 4 would show regional migration patterns. The right hand side would then link this up to available opportunities in various sectors.
From Head Count to Physical Quantities

The tables discussed so far involved only head counts. The entries in the cells were numbers of individuals. There are two alternative entries possible which complement the information in the head count tables and substantially enhance their usefulness for policy analysis. The first of those is number of hours devoted to a particular activity. This is most directly applied to the shaded area of Figure 3 which is the section of the table pertaining to the labor force.

The matrix that crosstabulates types of individuals with types of households now becomes a labor supply statement. It indicates the number of hours that each type of person is on the average available for work, by socioeconomic group. The matrix on activities can again be interpreted as a demand statement. It shows the number of hours each type of individual spends being engaged in productive activities and the number of hours that are lost due to unemployment.

Such information is useful for employment policy. It also allows assessment of output loss from unemployment (by multiplying the number of hours with the average productivity per hour) as well as estimation of the contribution to GDP in physical terms from different activities and by different socioeconomic groups.

If Figure 4, which adds the seasonality dimension to the labor force matrices, would be available as both a head count table and a table with number of hours, this set of tables would permit the analysis of the seasonal pattern of job availability. It would indicate which kinds of jobs open up during which season, and how many hours of work they provide and which types of individuals (age/sex/education) obtain all year round jobs vs. seasonal jobs. It would give information about hours of work during peak and slack seasons which is useful to estimate the opportunity cost of time.
The data base required to fill out Tables 3/4 with headcounts and hours worked is partly available as output from labor force surveys. The head count is standard output, although the seasonality aspect may not always be covered. It does require that the survey asks about multiple jobs. Equally, adequate information on hours worked may necessitate more detailed questioning than is presently done in a number of surveys. Often, information on hours is only asked to determine the correct classification as employed/unemployed according to the priority criterion. The actual amount of hours worked may not be available. The proposed Tables 3/4 show a potential payoff from doing so.

If in Table 3 the right-hand matrix (pertaining to people outside the labor force) is to be filled out with hours devoted to non-productive activities, more information is needed than what is commonly available from employment surveys. It would require some form of time use survey. A full fledged time budget study would not be needed, however, because home-making activities are not separated out, but data are needed on hours spent in schooling and work by children and young adults, hours devoted to housework by housewives, etc. In other words, this would call for inclusion in an employment survey of a limited number of questions about the use of time (in perhaps 4 to 5 major categories, depending on the amount of detail used in the breakdown of non-productive activities in Figure 3) to be asked of all individuals not in the labor force.

A Financial Statement: The Flow of Incomes

After headcounts and hours worked, a third type of entry is possible in the tables discussed so far, viz. earnings. Figure 5 is drawn using the same format as Figure 3 and shows the interpretation of the row and column totals when financial information has been entered. The shaded area again pertains to the labor force.
Figure 5: A Financial Statement: The Flow of Incomes

<table>
<thead>
<tr>
<th>Types of Households (socioeconomic groups)</th>
<th>Productive Activities</th>
<th>Unemployment</th>
<th>Other Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution of income from labor by types of individuals</td>
<td>Distribution of employment income over activities</td>
<td>Zero or unemployment compensation</td>
<td>Distribution of imputed income by type of activity</td>
</tr>
<tr>
<td>Distribution of income from labor by socioeconomic groups</td>
<td>Total household income from labor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The upper left-hand matrix shows the total earnings from labor for each type of individual across different socioeconomic groups. The earnings of people with similar characteristics can thus directly be compared by reading off a row and the differences according to region, race, etc. can be observed. The sum vectors of the matrix provide two interesting income distributions, one by socioeconomic groups, the other by type of individuals. If socioeconomic groups were defined by income level, then the familiar size distribution of household income (from labor) would obtain. The other distribution gives, in the illustration used here, essentially an age/sex profile of employment earnings. The submatrix pertaining to productive activities details the origins of income. The relative importance of each activity as a household income generator can directly be read from the column totals vector.

We now have a complete mapping from activities that generate income to types of individuals who receive such income, via the distribution of income from labor, to types of households that receive the income. In other words, the accounting system describes the flow of incomes in the economy and answers the question which activities generate income, which people receive it and to which socioeconomic group they belong.

The accounting system as presented here has an advantage over a direct mapping of income from activities to household groups, as is more conventionally done, because it makes explicit the two stages of the distributional process of incomes. In the first instance it illustrates the needs for factors (here, labor, by type) displayed by each activity and the resulting factor payment. This first step in the flow of incomes is summarized by the distribution of labor income over types of individuals, which is a subset of the factorial or functional distribution of income, a widely known and used concept. This also emphasizes that the provision of labor is an act of individuals, as is the initial receipt of incomes thereof.
The second stage of the process aggregates the incomes to the types of households who "own" the labor because the workers are members of these households. For this part of the process the household is the relevant unit because labor market participation decisions are usually made in its context and because the household is the recipient of other types of income. We shall return to this latter point later.

The people in the labor force will earn their income in the market in cash and in kind. In addition they may produce items for own consumption. A value needs to be imputed to the latter as well as to market income in kind. These imputed values can simply be added to the cash entries or could be kept separate by repeating Figure 5 for imputed entries in which case its row and column totals would provide a distribution of imputed income that could be contrasted with that of monetary income.

In the right-hand matrix of Figure 5, the value of the time of people outside the labor force can be imputed. This can be done on the basis of the market information in the productive-activities-by-individuals matrix of the table in order to ensure internal consistency.

The bottom row of Figure 5 displays total household income from labor and a distribution of it by socioeconomic groups and according to sources, i.e. types of activity. The centerpiece of the table is the distribution of income by types of individuals. One side of the table traces the origins of that income, the other side the destinations.

To satisfy completely the data demands of the financial statement matrix a full fledged income survey is necessary. Part of the information, however, viz. wages, can also be gathered with a labor force survey. Experience with this is satisfactory, wage data obtained through such surveys seem to be reliable and broadly consistent with national income figures. The main difficulty arises with
self-employment income. The general experience is that self-employment income can only accurately be obtained through a detailed balance sheet approach which is costly and time-consuming. Therefore, except in countries with considerable household survey capability, one might, initially at least, have to limit the entries in Figure 5 to wages and whatever other income was collected in labor force surveys.

Adding Other Factors of Production

The previous discussion considered only one factor of production, viz. labor, which was represented in the accounting system in three ways: headcounts of numbers of people, hours worked or engaged in non-productive activities, and earnings or imputed earnings. To complete the accounting framework the remaining factors of production, land and capital goods, need to be introduced. This is done in Figure 6. Since these factors are not only owned by households, but also by firms and by the government, columns for these institutions need to be added to the accounting scheme.\footnote{One could also add a column for factors of production with foreign ownership, including workers abroad.} A breakdown by firm size, formal/informal sector, etc. could be done, and equally, local and central governments could be distinguished. Where households are concerned, the view is taken that land and capital goods are owned by the household as a unit rather than by individual members. Therefore, only one row is used in the table which shows the distribution of land and capital goods over socioeconomic groups and the institutions. It is possible, of course, to distinguish different types of land and capital goods and to introduce a row for each type. The factor of production labor is seen as embodied in people
Figure 6: Distribution of Factors of Production

<table>
<thead>
<tr>
<th>Types of Households (socioeconomic groups)</th>
<th>(Sub-total)</th>
<th>Firms</th>
<th>Government</th>
<th>(Total)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Types of individuals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution of population by demographic characteristics</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total population</td>
<td></td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distribution of land by socioeconomic groups</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Land owned by households</td>
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<tr>
<td>Land owned by firms</td>
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<tr>
<td>Land owned by government</td>
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<tr>
<td>Total land</td>
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<tr>
<td>Distribution of capital goods by socioeconomic groups</td>
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<tr>
<td>Capital goods owned by households</td>
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<td>Capital goods owned by firms</td>
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<td>Capital goods owned by government</td>
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<td>Total capital goods</td>
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<tr>
<td>Distribution of capital goods over activities</td>
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</tbody>
</table>
and therefore solely owned by households (i.e. no serfdom!). It can be entered in this table either as a head count or in terms of hours. Land and capital are entered in physical units or in value terms.

The left-hand side of Figure 6 is a distribution of endowments or assets over household groups and institutions. It is, in other words, the economy's distribution of wealth. The right-hand side reflects the productive inputs needed in each type of activity, i.e. the uses of the economy's stock of wealth.

Instead of with physical entries, the cells of Figure 6 can be filled with financial data. For labor, we have already discussed this with respect to employment and other income information, including imputed figures. For land and capital goods, estimation of the returns is necessary. The resulting table is shown in Figure 7. The bottom rows represent the distribution of income from labor activities and of the returns to land and capital with the grand total being the distribution of total income from factors. The latter sums up to total value added, i.e. domestic product of the economy. On the right-hand side is the attribution of that product to activities. The presentation in Figure 7 pivots around factors of productions, thereby highlighting that they provide the link between the generation of value added and the receipt of income by the institutions in the economy.

For some categories, especially the self-employed and employers it will not be easy to separate out the returns to each of the three factors of production. In that case a special row can be used to describe the total return to the household enterprise.1/

1/ The social accounting matrix for Malaysia discussed in Chander et al (1980) does, however, attempt such a separation.
### Figure 7: Distribution of Factor Income

<table>
<thead>
<tr>
<th>Types of Individuals</th>
<th>(Subtotal)</th>
<th>Firms</th>
<th>Government</th>
<th>(Total)</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distribution of income from labor by socioeconomic groups</td>
<td>Total household income from labor</td>
<td>0</td>
<td>0</td>
<td>Total household income from labor</td>
<td>Distribution of income from labor by type of activity</td>
</tr>
<tr>
<td>Distribution of returns to land by socioeconomic groups</td>
<td>Total returns to land of households</td>
<td>Returns to land of firms</td>
<td>Returns to land of government</td>
<td>Total returns to land</td>
<td>Distribution of returns to land by type of activity</td>
</tr>
<tr>
<td>Distribution of returns to capital by socioeconomic groups</td>
<td>Total returns to capital of households</td>
<td>Returns to capital of firms</td>
<td>Returns to capital of government</td>
<td>Total returns to capital</td>
<td>Distribution of returns to capital by type of activity</td>
</tr>
<tr>
<td>Distribution of factor income by socioeconomic groups</td>
<td>Total factor income of households</td>
<td>Total factor income of firms</td>
<td>Total factor income of government</td>
<td>Total domestic income from factors</td>
<td>Distribution of factor income by type of activity</td>
</tr>
</tbody>
</table>
As a description of the origin and destination of income flows within the economy, Figure 7 fits in the framework of social accounting matrices (SAM). It is not a complete SAM because, among other things, it does not include links with the rest of the world, transfers within and across institutions are not modelled, the demand for commodities is not incorporated and no input-output table is included. No distinction is made between current and capital accounts, i.e. the savings/investment flows are not portrayed. Some of these could easily be appended to Figure 7. If activities were broken down by industry, an input-output table could be added at the upper right-hand side. If expenditure data by socioeconomic group are available, a matrix of commodity demands by type of household could be joined at the upper left-hand side of Figure 7. With added rows for savings and taxes, such a matrix would show the uses of household income by socioeconomic group.

Chander et al (1980) contains a full SAM for Malaysia. It is reproduced here as Figure 8. The shaded areas pertain to Figure 7 and show how it fits in the wider context of a SAM.

The shaded matrix shows the flows of income to institutions resulting from their factor contributions to the production process. Factors and households are broken down regionally. Labor is broken down according to location (urban/rural), and level of education. Households are further grouped according to location, race, and employment status. Land is not explicitly introduced, but housing is, and capital is split into two categories.

The shaded matrix of factors by institutions in Figure 8 corresponds to the left-hand section of Figure 7. The shaded vector of activities by factors in Figure 8 corresponds to the right-hand section of Figure 7. In the Malaysian SAM, however, activities are aggregated into one category, hence it is a vector
instead of a full matrix.\textsuperscript{1/}

The double shaded areas in Figure 8 indicate the more limited accounting system pertaining only to households and to one factor of production, viz. labor. For Peninsular Malaysia, households are disaggregated and a full matrix describes the flow of labor income. For East Malaysia, only a total figure of labor income of households is available ($M 659 \text{ mln})

Equally, the double shaded part of the activities-by-factors vector pertains to labor. For East Malaysia only one figure is entered, viz. total labor income from all activities ($M 659 \text{ mln}) which corresponds of course to the total labor income flowing to households. For Peninsular Malaysia, factors are disaggregated and the entries in the vector correspond to the column totals of the factors-by-households submatrix.

We have described in this section a simple accounting system to show how incomes generated in the labor market flow to different groups of households. We have indicated that such accounting system can be expanded by including other factors of production and other institutions. The resulting matrix (Figure 7) was shown to correspond and be logically consistent with submatrices of a social accounting matrix (Figure 8). In the next section we shall discuss further analytical uses of the accounting system.

\textsuperscript{1/} In the original SAM for Malaysia 30 activities were distinguished. The version in Chander et al. (1980) reproduced here is a more aggregated version.
III. ANALYZING INCOME FLOWS: THE RAS METHOD

The RAS or biproportional method is a technique used for adjusting and updating input-output matrices.\(^1\) It was initially devised to accommodate the situation when for a given base year a full input-output table is available, but for a second year only row and column totals are known. The technique consists of an iterative routine of successive pro-rating of the rows and columns of the original matrix to make it conform to the new row and column totals. Each newly generated matrix in the process is biproportional to the original matrix and if the sequence converges, a solution is eventually obtained.

The method can provide a basis for analysis of the flow-of-income accounting statement pictured in Figure 7. Let us consider the matrix that maps the wage income of types of individuals over productive activities and call it \(F_{ij}\). The cells \(f_{ij}\) contain the total wages of type of individual \(i\) earned in activity \(j\). These wage data can be seen as the product of average wages per hour with the number of hours worked:

\[
F_{ij} = W_{ij} H_{ij} \tag{1}
\]

where \(W_{ij}\) is the matrix containing the average wages and \(H_{ij}\) contains the information on hours worked.

The wage information in each cell of \(W_{ij}\) differs from the average wage in the economy because of row (type of worker) and column (type of activity) effects. Labelling these, respectively, \(R_i\) and \(S_j\), we can write

\[
F_{ij} = R_i H_{ij} S_j \tag{2}
\]

\(^1\) The name RAS comes from the notation \(a_{ij} = r_i a_{ij}^o s_j\) (where \(a_{ij}\) is an input-output coefficient) which is the basic equation of the method. Extensive discussions of the RAS technique can be found in Bacharach (1970) and Allen and Gossling (1975).
From (1) and (2) we obtain

\[ w_{ij} = r_i s_j \]  

(3)

Taking the logarithm of (3), we have for each cell \((i, j)\)

\[ \log w_{ij} = \log r_i + \log s_j \]  

(4)

i.e. average wages (in log form) are decomposed as a sum of row and column effects, in this case personal and activity attributes.

A similar procedure can be followed of course to decompose the wage data in the cells of the socioeconomic-group-by-workers submatrix of Figure 7 as the sum of personal and household attributes effects. Equally, the returns to the other factors of production, land and capital goods, are also subject to decomposition along the lines of equation (4).

The RAS estimation procedure consists of an exact fit on single observations. If an error term is added to equation (4), it becomes subject to econometric estimation. This is customarily done in, for example, the estimation of earnings functions whereby \( \log w \) is regressed on a series of categorical variables representing sex, age, education, work experience, etc., as well as industry, sector, occupation, employment status, etc. The estimated coefficients of these variables are intercept shifts showing the effects due to sex, age, education, etc., i.e. they are the row or column effects mentioned above. This type of covariance analysis is thus fundamentally the same as the RAS technique, except that the econometric procedure yields confidence intervals for the row and column effects and thus allows hypothesis testing. The important point is that equations estimated on the basis of expression (4) are logically consistent with the accounting framework discussed here in which the data can initially be presented.

Earnings functions estimated in this way can also be used to impute wages for people who perform tasks outside the market. The wage will be imputed on the basis of similarity in personal attributes as well as activity
or household attributes, which is theoretically sound if the rows of the accounting system were defined so that they are homogeneous with respect to labor market opportunities. Imputed wages will then be consistent with the market wage data entered elsewhere in the accounting system.
IV. ALTERNATIVE CLASSIFICATION SCHEMES

Throughout this paper we have illustrated the proposed accounting scheme using a classification of individuals based on demographic characteristics (age/sex), and a household grouping based on region, race and urban/rural location. This grouping is very general and has wide applicability. We emphasised in the introduction, however, that it was merely chosen as an illustration and that the accounting system by no means is tied to this particular classification. Indeed, flexibility and adaptability to country specific conditions and/or policy specific use are seen as one of its major plus points. It shares this advantage of course with the SAM methodology in general.

In this section we would like to give a few other examples of classifications that may be of use particularly in labor market analysis and for employment policy.

Labor Market Segmentation

There is of course no such thing as the labor market, rather a number of markets exist where various types of workers and firms operate. These markets are separated because of different skills, education, work experience, formal and informal training, migrant status, etc. of the workers, and/or because of age, sex, race discrimination. On the side of labor demand, firm size, modern vs. informal sector, public vs. private enterprise, degree of unionization, types of organization, etc., all can cause the delineation of specific labor markets and/or limit access to them. It is obvious then that in the accounting scheme any of the above elements are potential classifiers for individuals in order to reflect homogeneity with respect to degree of access to the various segments of the labor market. The pattern of segmentation can then be linked to the different types of activities (see Figure 3). If activities are classified by private/public, modern/traditional, a very useful table is obtained indicating from which segments the different types of firms, government, etc. draw their
workers. This would also explain in part the extent of unemployment in various segments. In the financial table (Figure 5), the earnings information in each cell and subsequent analysis of it will automatically pertain to economically meaningful market segments. Such analysis could, for example, indicate the differential benefit derived from an additional year of schooling/training/work experience over segments, by comparing the coefficients of the corresponding variables in the estimated equations.

Segmentation is thus introduced in the accounting scheme in two ways. First, an appropriate definition of types of workers (rows), based on non-substitutability of skills, experience etc. or based on discrimination by demographic attributes, reflects that each type of worker operates in a separate labor market segment. Second, splitting columns in the activities submatrix reflects the different needs for workers and/or discrimination on the part of firms.

Socioeconomic Groups

If the accounting system is to be politically relevant, the key in selecting classification criteria for households is to ensure that the resulting socioeconomic groups are meaningful in policy terms, i.e. that they are identifiable government target or potential target groups. Pyatt and Thorbecke (1976) list three main criteria: location, sociological factors (race, religion, language) and wealth. The SEGs in the illustrative classification of part I of this paper were based on two of these (location, race), which resulted in a widely used scheme as indicated. The classification criteria used for SEGs are not independent from those of individuals. For example, it would be virtually tautological to also use race and location for individuals since this would yield an almost diagonal matrix with little informational content. However, using location and race as individual classifiers is quite meaningful if occupation or employment status of the household head, perhaps combined with ownership of land and
other assets, is used to define a SEG.

What has to be kept in mind when deciding on the criteria is that the pivot of the accounting system is the distribution of either people, hours worked or earnings over types of individuals. It is that distribution which provides the link between socioeconomic groups and activities and may give indications about causality of observed patterns of employment and income flows across household groups.

Here are three examples of classifications that may be relevant for employment and labor market studies and policies.

(i) Households: race
    region
    urban/rural
    income or expenditure level

   Individuals: sex
    age
    skill or education
    employment status

This combination adds employment status to the individual criteria discussed earlier under labor market segmentation and refines the household criteria with income or expenditure level. It permits answering additional questions such as which socioeconomic groups provide most of the skilled employees, the unpaid family workers, etc. and which activities predominantly absorb such categories. It will show, for example, whether the self-employed come from high or low income households and whether this is different in urban vs. rural areas. As alternative to total level, expenditure patterns of households could be used to group them. This could be done on the basis of the percentage of total expenditures spent on a given set of commodities, say, food or housing, or by the labor/capital/import content of the overall consumption basket (Pyatt and Thorbecke, 1976; Ward, 1981). The former would link households directly to food or housing subsidy programs while in the latter scheme the forward link to factor demand is highlighted.
(ii) Households: occupation of the household head
type of tenancy (for farmers)
asset holding (land, cattle, house, major durables)

Individuals: race
region (or urban/rural)
education

This classification emphasizes the racial/regional breakdown of sharecropping, housing ownership, blue/white collar occupations etc. of the household head. It also allows linking the educational achievements of the household members to these characteristics of the head and to trace through the implications for the kinds of activities these individuals engage in. A variation of this scheme would be to use the characteristics of the main income earner instead of those of the household head. An interesting grouping of households based on assets has been used in the SAM constructed for Botswana. Urban households were classified by four types of housing (low, medium, high density housing, servants' quarters) and rural households were grouped by the number of cattle they owned (Greenfield, s.d.).

(iii) Households: sex of household head
dependency ratio (number of children and elderly over number of earners)

Individuals: see (i) or (ii)

The emphasis here is on these aspects of the demographic composition of the household which have a direct bearing on its ability to earn income. This can be linked to activities either via the sex/age/skill composition of the various socioeconomic groups or via the region/race/education breakdown.

Activities

As for socioeconomic groups, a multitude of classification schemes exists for activities. For most applications it will be necessary to have some distinction between agricultural, industrial and service activities, and to separate
out the public sector, as we did in the illustration in this paper. The distinction formal/informal was added to reflect varying technology and hence factor demand among activities. Related to this would be a breakdown by size of firm. Further refinements would be distinctions between domestic and foreign ownership of modern sector enterprises (see e.g. the SAM for Iran in Pyatt et al, 1972), the degree of monopoly power in the market and the existence of trade unions (Ward, 1981). It might, for example, be very interesting to find out how socioeconomic group specific are the income flows that are generated in union-dominated modern enterprises. Any of the above-mentioned criteria are bound to have implications for the labor/capital mix used in the production process. This will imply a varying demand for skill level in labor and thus for wage income flows to socioeconomic groups.

Within Category Flexibility

We stressed that social accounting, including the scheme presented here, is characterized by its flexibility of classifications. This extends also to the specific breakdown within each selected category. If the emphasis of the study changes, the socioeconomic grouping may have to be altered, but also the grouping within retained criteria can be modified. When assets are a criterion, land is clearly crucial in rural areas, but in urban areas it may be house ownership. Across countries, different cultures may use different assets as major store of value (land, cattle, etc.). If access to public services is used as a socioeconomic dimension, the type of services involved may differ by region or in urban vs. rural areas. The types of tenure/production arrangements that exist in agriculture may also be region specific. 1/

1/ The classifications used in the SAM for Swaziland (Pyatt and Round, 1977) provides an excellent example of the adaptability of the accounting scheme to unusual local conditions, in this case the unique organizational structure of land ownership and provision of factor services provided by the "Swazi Nation".
The selection of criteria as well as of the breakdown within each criterion is therefore a matter that requires the combination of detailed local knowledge of the country or area under study and insight into the purpose of the research or policy program for which the accounting scheme is to provide the empirical basis.
V. CONCLUDING COMMENT

This paper proposed an accounting framework to present selected demographic and economic information in a way that is relevant for the analysis of labor market issues. The framework is consistent with that of social accounting matrices. This has the immediate advantage that it can be directly linked to other information pertaining to the economy such as the structure of demand, the system of transfers, input-output relations, savings and investment flows, etc., all of which are incorporated in a SAM.

The data entries in the constituent matrices of the accounting system can be either headcounts, hours worked or engaged in non-productive activities, or income components. With physical entries the system links a demographic description of the population to an economic manpower matrix. Conclusions about supply and demand of labor can be derived. With financial entries, the flow of incomes from activities that generate value added to individual labor force participants and their respective socioeconomic groups can be traced. The pivot of the system is a vector representing the breakdown of the labor force by labor market relevant characteristics (such as variables causing segmentation or discrimination) or, in the financial system, the distribution of income from labor force participation. Summary vectors in the system show the distribution of the labor force or its income over socioeconomic groups and over activities.

By appropriate selection of grouping criteria for households, individuals and activities an instrument becomes available that is a highly relevant input into planning and policy making. The system exhibits large flexibility to accommodate a wide variety of country settings and policy concerns. It has been shown that earnings function analysis can be derived from and is consistent with the framework of data presentation. Imputed income information can also be derived in a way consistent with directly observed data.
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