

## IX. PROJECTING INCOME USING A SOCIAL ACCOUNTING MATRIX

### A. Introduction

This chapter discusses a method that can be used to project the amount of disposable income (see box 1)\* received by the various institutions that make up the economy, namely, households, businesses and the government. The method can also be used to obtain various indicators of disposable household income, examples of which are levels and rates of change of per capita and per household disposable household incomes. Projections of disposable incomes of the various institutions and their various indicators can be prepared for the entire country or for its urban and rural areas. These projections can be used as indicators of the standard of living or as inputs into projections of household consumption and household savings (see chaps X and XI).

This method is based on the social accounting matrix (SAM), described in annex I, which is an accounting device for presenting income and product flows in an economy (Pyatt and Thorbecke, 1976). Using accounting relationships underlying this matrix, the method can be used to project levels of disposable income received by various types of institutions, given the levels of value added by industry and several other inputs.<sup>2/</sup> The projection involves transforming value added by sector into incomes of factors of production (see box 2) (e.g., wages, profits, rent) and further transforming those factor incomes into incomes of institutions, namely, into disposable incomes of households, corporations, government.

Since SAM is merely a descriptive device and the relationships underlying it are accounting relationships, it is necessary for this method to use among its inputs assumptions on a variety of proportions and ratios which are used in the transformations referred to above. Those assumptions may postulate that the proportions and ratios remain fixed or undergo specified changes over time.

This method of making income projections has several advantages over using econometric models. The SAM-based method does not require time series data and does not depend on complicated estimation techniques. The SAM-based method is also relatively easy to apply from a computational standpoint.<sup>2/</sup> Furthermore, owing to the double-entry accounting nature of SAM, all projections based on it will be consistent with other sets of economic projections and with the national accounts in general.

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\* Terms defined in glossary boxes are underlined where they appear for the first time.

Box 1

Glossary

Disposable income

The income of a particular type of institution, such as households, corporations or government, after taxes or transfers, whichever is appropriate, which is available for consumption or savings.

Household consumption

The value of "final" goods and services consumed by households over a specified time period.

Household savings

The portion of household disposable income that is not spent on consumption over a specified time period.

Social accounting matrix

The tabular presentation of the income and product flows in an economy during a specified time period. It consists of a set of accounts, such as those for factors of production (labour and capital) or institutions (households, corporations and government) along with the economy's input-output table.

Value added

For a firm or farm, the difference between its total revenue and the cost of raw materials, services and components used in production, over a specified time period. For the economy as a whole or any of its industries, the aggregate of value added of different firms or farms of which the economy or industry is composed.

While the SAM-based method has certain advantages over econometric models, it also has some disadvantages. First, it may employ fairly rigid assumptions inasmuch as the relationships between the various income flows are generally kept fixed at the base-year levels throughout the projection. Although such relationships may change relatively little in the short run, they are likely to change over longer periods of time. The parameters in an econometric model may reflect such changes if they are estimated with data covering several periods. Thus, SAM, which is based on observations at one point in time, may not be well-suited to project incomes over the long run.

Box 2

Glossary

(Items indicated by an asterisk come from the glossary of Module One and should not be modified)

Econometric models

Mathematical models expressing economic theories in terms of empirically estimated coefficients of model relationships. The model coefficients are obtained by applying statistical estimation methods to suitable data. The models may be used to forecast future values of selected model variables.

Electronic spreadsheet program

A type of microcomputer software used in making spreadsheet type calculations electronically.

Factor incomes

The income accruing to a particular factor of production in return for services rendered by that factor. Examples of factor incomes are capital income and labour income.

Factors of production

Resources or inputs required to produce a good or service. Basic categories of factors of production are land, labour, and capital.

National accounts

A system of accounts that provide for a systematic and integrated recording of transaction flows in an economy. It brings into a coherent system data ranging in degree of aggregation from consolidated accounts of the country to detailed input-output and flow-of-funds tables. They include production and goods and services accounts, along with outlay and capital finance accounts for institutions such as households and government.

Profits

Income accruing to capital in return for services rendered by it. It can be computed as the difference between the market value of output and the market value of inputs which were employed to produce that output.

Rent

Income accruing to a durable good, such as land or buildings, in return for services rendered by the good.

Wages

Income accruing to labour in return for services rendered by it.

Since the SAM method has no behavioural content, it cannot be used to forecast changes in the functional distribution of income (see box 3), which might result from rapid inflation or changes in factor prices. Similarly, it cannot be employed to forecast shifts in the institutional distribution of income which may be the consequences of changes in the distribution of ownership of assets, such as capital. However, in making income projections with the SAM-based method, one can take into account anticipated effects of selected government policies on institutional incomes. This can be done by assuming shifts in the values of selected proportions and/or ratios over the projection period which would be in accordance with expectations on the likely outcomes of such policies. Alternatively, the values of the proportions and ratios may remain fixed over the projection period, as in the examples presented later in the chapter.

## B. The technique

### 1. Overview

This overview lists inputs required by the method and indicates the types of results it can generate. It also outlines the computational steps involved in making an income projection with this method.

#### (a) Inputs

To project incomes with this method the following inputs are required:

- (i) Projected levels of value added by industry;
- (ii) Projected population size;
- (iii) Projected number of households;
- (iv) Assumed values for various proportions and ratios (see below);
- (v) Assumed values for different types of transfers (see below).

The proportions and ratios for which values need to be assumed include:

- (i) Proportions of value added going to wages by industry;
- (ii) Ratios of net indirect taxes (indirect taxes less subsidies) to value added by industry;
- (iii) Proportion of profits received by households;
- (iv) Proportion of gross income of corporations (gross business income) paid to households as dividends (see box 4);
- (v) Proportion of gross income of households paid as household income taxes;
- (vi) Proportion of gross income of corporations paid as corporate income taxes.

Box 3

Glossary

(Items indicated by an asterisk come from the glossary  
of Module One and should not be modified)

Factor prices

The prices of factors of production, which normally reflect their scarcity value (or competitive market prices) unless distorted by institutional arrangements.

Functional distribution of income

The distribution of income to factors of production without regard to ownership of those factors.

Indirect taxes

Taxes levied on goods and services purchased by consumers and exported by producers, for which the taxpayer's liability varies in proportion to the quantity of particular goods purchased or sold. Examples of indirect taxes are customs duties (tariffs), excise duties, sales taxes and export duties.

Inflation

A process of above normal general price increase as reflected in, for example, the consumer and wholesale price indices. More generally, the phenomenon of rising prices.

Institutional distribution of income

The distribution of income to different types of institutions, such as households, corporations and government, which is influenced, among other things, by the ownership of the factors of production by the institutions.

Subsidies

A special type of transfer payment to a corporation to prevent it from experiencing losses or to prevent an increase in its price.

Box 4

Glossary

Corporate income taxes

Taxes levied on the profits of companies.

Dividends

Payments to shareholders of a company, usually in the form of cash or shares.

Government transfers to corporations

Payments made by the Government to corporations, which do not entail exchange of goods and services.

Government transfers to households

Payments made by the Government to households, which do not form part of exchange of goods and services. Examples of such payments are social security benefits or student grants.

Household income taxes

Taxes levied on the income accruing to members of households.

Net foreign transfers to households

The difference between the amounts of income that households received from and pay to the various institutions abroad. The receipts and payments may be in connection with the remuneration of the factors of production and/or transactions involving no exchange of goods and services.

Values for the following types of transfers should to be specified:

- (i) Government transfers to households;
- (ii) Government transfers to corporations;
- (iii) Net foreign transfers to households.

For a national projection, the inputs should refer to the entire country. For an urban-rural projection, some of them should refer to urban and rural areas, while the others may be for the country as a whole. The inputs are listed in box 5.

Since this method is described as a procedure for making quinquennial projections, projections of value added, population size and the number of

households and all other inputs would be for dates five years apart, starting with the initial year of projection. Given the appropriate annual inputs, however, the method could, of course, also be used to make annualized projections of income.

Box 5

Inputs for making income projections using  
the social accounting matrix

1. Value added by industry (national or urban and rural).
2. Population size (national or urban and rural).
3. Number of households (national or urban and rural).
4. Assumptions on various proportions and ratios (national or urban and rural):
  - (a) Proportions of value added going to wages by industry;
  - (b) Ratios of net indirect taxes (indirect taxes less subsidies) to value added by industry;
  - (c) Proportions of profits received by households;
  - (d) Proportions of gross income of corporations paid to households as dividends;
  - (e) Proportions of gross income of households paid as household income taxes;
  - (f) Proportions of gross income of corporations paid as corporate income taxes.
5. Assumptions on value of transfers (national or urban and rural):
  - (a) Government transfers to households;
  - (b) Government transfers to corporations;
  - (c) Net foreign transfers to households.

(b) Outputs

In making a national projection, the method can be used to generate the following outputs relating to disposable incomes:

- (i) Different types of incomes: factor incomes, gross incomes and disposable incomes;
- (ii) Various disposable income aggregates, such as total disposable income and disposable incomes of institutions;

- (iii) Indicators of the distribution of disposable incomes, such as the proportions of total disposable income received by various institutions;
- (iv) Rates of change in total disposable income and disposable incomes of institutions;
- (v) Levels and rates of change in per capita and per household disposable household incomes.

If the method is used to prepare an urban-rural projection, the results would include all those listed under (i) through (v) for urban and rural areas, as well as for the entire country. In addition, they would include indicators of the urban-rural distribution of disposable household incomes and indicators of the urban-rural differentials of those incomes.

The types of outputs that the technique can generate as part of the projection are shown in box 6.

(c) Computational steps

The disposable incomes of institutions are obtained as an outcome of successive transformations of different types of income. Initially, levels of value added by industry are converted into incomes of factors of production, such as wages and profits, classified by industry. Then, these factor incomes by industry are transformed into factor incomes received by institutions. Factor incomes of institutions are further converted into gross incomes of institutions which are, in turn, transformed into disposable incomes of institutions. Those disposable incomes are then used to derive various income aggregates, indicators of income distribution and rates of change in disposable incomes. In addition, projected total disposable household income is also used to derive levels and rates of change in the disposable household income per capita and per household.

2. National level

This section initially describes a technique for projecting the levels of disposable incomes of the various institutions at the national level. It then describes the steps needed to derive other results. The procedure, which is summarized in box 7, is based on the structure of the social accounting matrices presented in table 1 of section C and discussed in annex I. Some of the steps of that procedure are also presented in figure I. If a different structure of SAM is used, procedures will, of course, differ accordingly.

(a) Incomes of factors of production

The first step in making an income projection using relationships embodied in SAM is to derive the functional distribution of income by industry (i.e., wages and profits) from the projected levels of value added by industry. ✓



(i) Wages

Wage income by industry for the end of any given projection interval (t to t+5) can be obtained as follows:

Box 6

Types of outputs obtained by projecting incomes  
using the social accounting matrix

1. Different types of incomes (national or urban, rural and national)  
Factor incomes  
Gross incomes  
Disposable incomes
2. Disposable income aggregates (national or urban, rural and national)  
Total disposable income and disposable incomes of institutions  
Growth in total disposable income and disposable incomes of institutions
3. Indicators of the distribution of the total disposable income by institutions (national or urban, rural and national)  
Proportions of total disposable income received by the various institutions
4. Indicators of the urban-rural distribution of disposable household income (national only; if urban and rural incomes are being projected)  
Proportions of disposable household income in different locations
5. Rates of growth of disposable incomes (national or urban, rural and national)  
Rates of growth of total disposable income and disposable incomes of institutions
6. Indicators of per capita and per household disposable household incomes (national or urban, rural and national)  
Levels and rates of growth of per capita and per household disposable household income
7. Indicators of urban-rural differentials in disposable household incomes (national only; if urban and rural incomes are being projected)  
Percentage differences between levels of urban and rural per capita and per household disposable household income

Box 7

Computational steps needed to project incomes  
at the national level

The steps used to project disposable incomes at the national level at the end of the five-year projection interval are:

1. Estimate the amount of wages generated in each industry by multiplying the projected levels of value added (at factor prices) by the corresponding proportions of value added going to labour as wages. In addition, sum the wage bills by industry to obtain the total wage bill.
2. Calculate profits in each industry as the difference between the value added and the wage bill for the industry. Add up profits across industries to arrive at total profits.
3. Derive the amount of profits received by households by multiplying total profits by the proportion of total profits received by households.
4. Add the total wage bill and profits received by households to obtain the factor income of households.
5. Derive the factor income of corporations as the difference between total profits and the amount of profits received by households.
6. Calculate the gross income of corporations as the sum of their factor income and government transfers to corporations.
7. Obtain dividends received by households by multiplying the gross income of corporations by the proportion of that income paid to households as dividends. Then calculate the gross income of households as the sum of the factor income, government transfers, dividends and net foreign transfers received by households.
8. Compute household and corporate income taxes as products of gross incomes of household and corporations and respective proportions of those incomes paid as household and corporate income taxes. Compute net indirect taxes by multiplying the levels of value added by industry by the ratios of net indirect taxes to value added, followed by summing up the products. Then derive the gross income of government as the sum of household and corporate income taxes, and net indirect taxes.
9. Calculate the disposable income of households as the difference between the gross income of households and household income taxes. Derive the disposable income of corporations as the difference between gross income of corporations and corporate income taxes. Compute the disposable income of government as the difference between gross income of government and government transfers to households and corporations.

(continued)

Box 7 (continued)

10. Calculate various other disposable incomes aggregates, such as the total disposable income.
11. Derive indicators of the distribution of the total disposable incomes among institutions.
12. Compute rates of growth of disposable incomes.
13. Calculate indicators of the level and growth of per capita and per household disposable income of households.

$$WAGE(i,t+5) = PRVAWG(i,t+5) \cdot VA(i,t+5); \quad (1)$$

$$i = 1, \dots, I,$$

where:

- $i = 1, \dots, I$  are industries of the country's economy,  
 $I$  is the number of industries,  
 $t$  is the year of the projection period,  
 $WAGE(i,t+5)$  is the wage bill in industry  $i$   
 $PRVAWG(i,t+5)$  is the proportion of value added going to wages in industry  $i$ , and  
 $VA(i,t+5)$  is the value added at factor prices in industry  $i$ .

The wage bill for the entire economy can be obtained by aggregating industry-specific wage bills. For the end of the projection interval ( $t$  to  $t+5$ ), the total wage bill is:

$$WAGE(t+5) = \sum_{i=1}^I WAGE(i,t+5), \quad (2)$$

where:

- $WAGE(t+5)$  is the total wages.

(ii) Profits

If labour and capital are the only two factors of production, as assumed in this discussion, profits for each industry can be projected as the difference between value added and wages. At the end of a given projection interval, profits by industry are:

$$\begin{aligned} \text{PROF}(i, t+5) &= \text{VA}(i, t+5) - \text{WAGE}(i, t+5); & (3) \\ i &= 1, \dots, I, \end{aligned}$$

where:

$\text{PROF}(i, t+5)$  is the amount of profits in industry  $i$ .

Given the projected profits in each industry, the total profits for the entire economy can be obtained by aggregating industry-specific profits across industries. For the end of the projection interval ( $t$  to  $t+5$ ), the total profits are obtained as:

$$\text{PROF}(t+5) = \sum_{i=1}^I \text{PROF}(i, t+5), \quad (4)$$

where:

$\text{PROF}(t+5)$  is the total profits.

(b) Factor incomes of institutions

Once incomes of factors of production have been calculated, it is possible to project factor incomes received by the various institutions -- households and corporations. 4

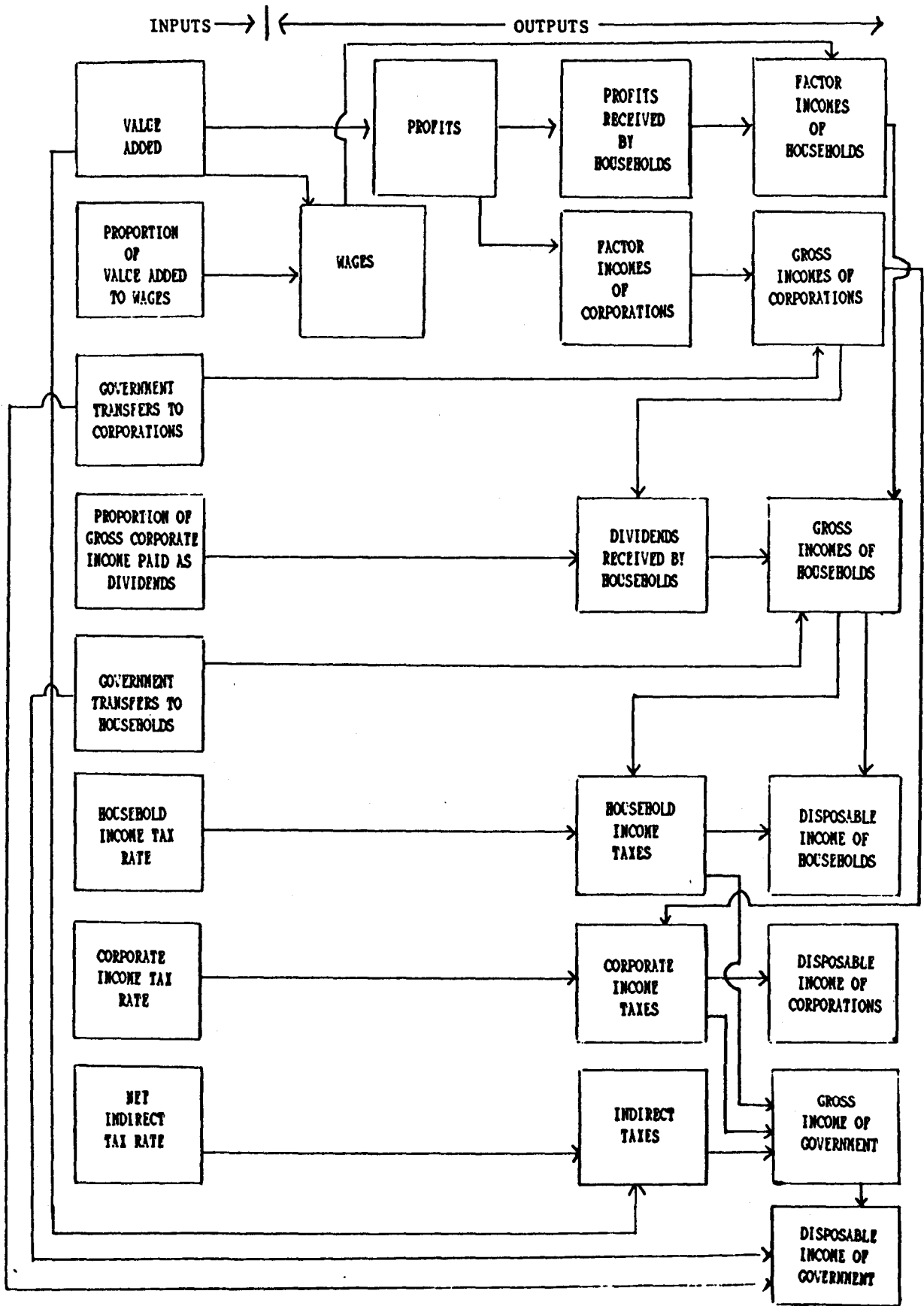
(i) Factor income of households

The factor income received by households includes total wages and that part of total profits that accrues to households.

The part of total profits that accrues to households can be found as the product of the proportion of profits going to households and total profits:

$$\text{PROFH}(t+5) = \text{PRPROFH}(t+5) \cdot \text{PROF}(t+5), \quad (5)$$

Figure I. Steps to project incomes at the national level



where:

PROFH(t+5) is the amount of profits accruing to households, and  
PRPROFH(t+5) is the proportion of profits received by households.

Therefore, the factor income of households at the end of the projection interval is calculated as follows:

$$FIH(t+5) = WAGE(t+5) + PROFH(t+5), \quad (6)$$

where:

FIH(t+5) is the factor income of households.

(ii) Factor income of corporations

The factor income received by corporations equals that part of the total profits that does not go to households. Thus, the factor income of corporations at the end of a projection interval is:

$$FIC(t+5) = PROF(t+5) - PROFH(t+5), \quad (7)$$

where:

FIC(t+5) is the factor income of corporations.

(c) Gross incomes of institutions

The gross incomes of all three types of institutions -- households, corporations and government -- can be derived from factor incomes received by households and corporations. The gross income of corporations must be projected first since it provides the basis for projecting dividends paid to households.

(i) Gross income of corporations

The gross income of corporations can be obtained as the sum of the factor income of corporations and the government transfers to corporations. For the end of the projection interval (t to t+5), the gross income of corporations is thus:

$$GCI(t+5) = FIC(t+5) + GTC(t+5), \quad (8)$$

where:

GCI(t+5) is the gross corporate income, and

GTC(t+5) is the government transfers to corporations.

(ii) Gross income of households

The gross income of households is obtained as the sum of several income components, including dividends paid to households by corporations, which must be derived before computing the gross income of households.

Dividends paid to households can be obtained as a proportion of gross income of corporations. Therefore, for the end of the projection interval (t to t+5) dividends are:

$$\text{DIVH}(t+5) = \text{PRCIH}(t+5) \cdot \text{GCI}(t+5), \quad (9)$$

where:

$\text{DIVH}(t+5)$  is the dividends paid to households, and

$\text{PRCIH}(t+5)$  is the proportion of gross income of corporations paid to households as dividends.

The gross household income can be obtained as the sum of the factor income received by households, dividends, government transfers to households and net foreign transfers to households:

$$\text{GHI}(t+5) = \text{FIH}(t+5) + \text{DIVH}(t+5) + \text{GTH}(t+5) + \text{NFTH}(t+5), \quad (10)$$

where:

$\text{GHI}(t+5)$  is the gross household income,

$\text{GTH}(t+5)$  is the government transfers to households, and

$\text{NFTH}(t+5)$  is the net foreign transfers to households.

(iii) Gross income of government

The gross income of government equals the sum of various taxes levied by the Government. This includes household income taxes, corporate income taxes and net indirect taxes. To compute the gross income of government, it is initially necessary to project the size of these various taxes aggregates.

a. Household income taxes

Household income taxes can be computed as the product of the gross household income and the proportion of that income paid as taxes:

$$\text{HIT}(t+5) = \text{PRHIT}(t+5) \cdot \text{GHI}(t+5), \quad (11)$$

where:

$\text{HIT}(t+5)$  is the household income taxes, and

$\text{PRHIT}(t+5)$  is the proportion of gross household income paid as household income taxes.

b. Corporate income taxes

Corporate income taxes can be computed as the product of the gross corporate income and the proportion of that income paid as taxes:

$$CIT(t+5) = PRCIT(t+5) \cdot GCI(t+5), \quad (12)$$

where:

$CIT(t+5)$  is the corporate income taxes, and

$PRCIT(t+5)$  is the proportion of gross corporate income paid as corporate income taxes.

c. Net indirect taxes

Net indirect taxes (indirect taxes less subsidies) in each industry can be obtained as a product of value added of the industry and the ratio of net indirect taxes to value added. For the end of the projection interval (t to t+5) net indirect taxes by industry can therefore be obtained as:

$$NIT(i, t+5) = RITVA(i, t+5) \cdot VA(i, t+5); \quad (13)$$

$$i = 1, \dots, I,$$

where:

$NIT(i, t+5)$  is the net amount of indirect taxes (indirect taxes less subsidies) in industry i, and

$RITVA(i, t+5)$  is the ratio of net indirect taxes to value added in industry i.

Total net indirect taxes are obtained by summing up the net indirect taxes across industries. Thus, for the end of the projection interval (t to t+5) the total net indirect taxes are:

$$NIT(t+5) = \sum_{i=1}^I NIT(i, t+5), \quad (14)$$

where:

$NIT(t+5)$  is the total net indirect taxes.

The gross income of government can be obtained as the sum of revenues received by the government in the form of different taxes:

$$GGI(t+5) = HIT(t+5) + CIT(t+5) + NIT(t+5), \quad (15)$$

where:

$GGI(t+5)$  is the gross government income.

(d) Disposable incomes of institutions

After deriving the gross incomes of institutions, it is possible to obtain the disposable incomes of institutions, namely, households, corporations and government.



(i) Disposable household income

The disposable household income can be calculated as the gross income of households less household income taxes. For the end of the projection interval (t to t+5), the disposable household income is:

$$DHI(t+5) = GHI(t+5) - HIT(t+5), \quad (16)$$

where:

DHI(t+5) is the disposable household income.

(ii) Disposable corporate income

Disposable corporate income (i.e., gross business savings) can be obtained for the end of the projection interval as the gross income of corporations less dividends and corporate income taxes at that date:

$$DCI(t+5) = GCI(t+5) - [ DIVH(t+5) + CIT(t+5) ], \quad (17)$$

where:

DCI(t+5) is the disposable corporate income.

(iii) Disposable government income

The disposable government income can be found as the gross income of government less government transfers to households and corporations. For the end of the projection interval this income is:

$$DGI(t+5) = GGI(t+5) - [ GTH(t+5) + GTC(t+5) ], \quad (18)$$

where:

DGI(t+5) is the disposable government income.

(e) Other results

Once disposable incomes of the various institutions are derived for the end of a given projection interval, several useful indicators can be calculated. These indicators include disposable income aggregates and indicators of the distribution and rates of change of disposable incomes. They also include indicators of the levels and rates of change of per capita and per household disposable incomes of households.

(i) Aggregates of disposable income

A key aggregate that can be calculated from the projected disposable incomes of institutions, which are part of disposable income aggregates is the total disposable income. Increases in the total disposable income over the intervening five-year projection intervals can also be calculated, as well as increases in disposable incomes of institutions over those intervals.

a. Total disposable income

Total disposable income can be obtained by summing up the disposable incomes of households, corporations and government. For the end of a projection interval the total disposable income is:

$$TDI(t+5) = DHI(t+5) + DCI(t+5) + DGI(t+5), \quad (19)$$

where:

$TDI(t+5)$  is the total disposable income.

b. Growth in total disposable income

The growth in total disposable income over the projection interval (t to t+5) equals the difference between the total disposable income at the end of the interval and the total disposable income at its beginning:

$$TDIG = TDI(t+5) - TDI(t), \quad (20)$$

where:

$TDIG$  is the growth in the total disposable income during the interval.

c. Growth in disposable incomes of institutions

The increases in the disposable incomes of households, corporations and government over the projection interval are obtained as follows:

The growth of disposable household income is calculated as:

$$DHIG = DHI(t+5) - DHI(t), \quad (21)$$

The growth of disposable corporate income is obtained as:

$$DCIG = DCI(t+5) - DCI(t), \quad (22)$$

The growth of disposable government income is computed as:

$$DGIG = DGI(t+5) - DGI(t), \quad (23)$$

where:

$DHIG$  is the growth of disposable household income during the interval,

$DCIG$  is the growth of disposable corporate income during the interval, and

DGIG is the growth of disposable government income during the interval.

(ii) Indicators of the distribution of total disposable income

After calculating the total disposable income, it is possible to derive the proportion of this income received by each type of institution.

Proportions by institutions

The distribution of total disposable income among the various institutions can be obtained as follows:

The proportion of the total disposable income received by households is calculated as:

$$\text{PRDHI}(t+5) = \text{DHI}(t+5) / \text{TDI}(t+5), \quad (24)$$

The proportion of the total disposable income received by corporations is obtained as:

$$\text{PRDCI}(t+5) = \text{DCI}(t+5) / \text{TDI}(t+5), \quad (25)$$

The proportion of the total disposable income received by government is calculated as:

$$\text{PRDGI}(t+5) = \text{DGI}(t+5) / \text{TDI}(t+5), \quad (26)$$

where:

- |            |  |
|------------|--|
| PRDHI(t+5) | is the proportion of total disposable income received by households,       |
| PRDCI(t+5) | is the proportion of total disposable income received by corporations, and |
| PRDGI(t+5) | is the proportion of total disposable income received by government.       |

(iii) Rates of growth of disposable incomes

It is also possible to compute average annual growth rates of total disposable income and disposable incomes of households, corporations and government.

a. The rate of growth of total disposable income

The average annual rate of growth of the total disposable income can be computed from the total disposable income at the beginning and at the end of the projection interval.

i. Geometric growth rates

If it is assumed that growth occurs over discrete intervals, then the percentage growth rate can be obtained using the geometric growth rate formula:

$$\text{GGRTDI} = [ ( \text{TDI}(t+5)/\text{TDI}(t) )^{1/5} - 1 ] \cdot 100, \quad (27)$$

where:

GGRTDI is the average annual geometric growth rate of the total disposable income for the interval.

ii. Exponential growth rates

Alternatively, if growth is assumed to be continuous, the percentage growth rate of total disposable income can be calculated using the exponential growth rate formula:

$$\text{EGRTDI} = [ (\ln ( \text{TDI}(t+5)/\text{TDI}(t) )) / 5 ] \cdot 100 \quad (28)$$

where:

EGRTDI is the average annual exponential growth rate of the total disposable income for the interval, and

ln is the natural logarithm.

b. Rates of growth of disposable incomes of institutions

Average annual rates of growth of disposable incomes of institutions can be derived from the levels of those incomes at the beginning and the end of the interval.

i. Geometric growth rates

Assuming discrete growth, the geometric growth rate of the disposable household income is calculated as:

$$\text{GGRDHI} = [ ( \text{DHI}(t+5)/\text{DHI}(t) )^{1/5} - 1 ] \cdot 100, \quad (29)$$

The geometric growth rate of the disposable corporate income is calculated as:

$$\text{GGRDCI} = [ ( \text{DCI}(t+5)/\text{DCI}(t) )^{1/5} - 1 ] \cdot 100, \quad (30)$$

The geometric growth rate of the disposable government income is calculated as:

$$\text{GGRDGI} = [ ( \text{DGI}(t+5)/\text{DGI}(t) )^{1/5} - 1 ] \cdot 100, \quad (31)$$

where:

- GGRDHI is the average annual geometric growth rate of the disposable household income for the interval,
- GGRDCI is the average annual geometric growth rate of the disposable corporate income for the interval, and
- GGRDGI is the average annual geometric growth rate of the disposable government income for the interval.

ii. Exponential growth rates

If the projections were based on the assumption of continuous growth, then the exponential growth rate of the disposable household income is calculated as:

$$\text{EGRDHI} = [ ( \ln ( \text{DHI}(t+5)/\text{DHI}(t) ) ) / 5 ] \cdot 100, \quad (32)$$

The exponential growth rate of the disposable corporate income is calculated as:

$$\text{EGRDCI} = [ ( \ln ( \text{DCI}(t+5)/\text{DCI}(t) ) ) / 5 ] \cdot 100, \quad (33)$$

The exponential growth rate of the disposable government income is calculated as:

$$\text{EGRDGI} = [ ( \ln ( \text{DGI}(t+5)/\text{DGI}(t) ) ) / 5 ] \cdot 100, \quad (34)$$

where:

- EGRDHI is the average annual exponential growth rate of the disposable household income for the interval,
- EGRDCI is the average annual exponential growth rate of the disposable corporate income for the interval, and
- EGRDGI is the average annual exponential growth rate of the disposable government income for the interval.

(iv) Levels of per capita and per household disposable incomes of households

In addition to the above indicators, one may also compute levels and rates of change of the per capita and per household disposable household incomes.

Per capita disposable household income can be obtained by dividing the disposable household income by the population size. Thus, for the end of a given projection interval (t to t+5), per capita disposable household income is:

$$\text{PCDHI}(t+5) = \text{DHI}(t+5) / \text{POP}(t+5), \quad (35)$$

where:

PCDHI(t+5) is the per capita disposable household income, and  
POP(t+5) is the population size.

Per household disposable household income, which will be often referred to as average disposable household income can be obtained by dividing the disposable household income by the total number of households. Thus, for the end of a given projection interval, average disposable household income is:

$$ADHI(t+5) = DHI(t+5) / NH(t+5), \quad (36)$$

where:

ADHI(t+5) is the average (per household) disposable household income, and  
NH(t+5) is the total number of households.

(v) Rates of change of per capita and per household disposable incomes of households

Once the levels of per capita and per household disposable household incomes are computed, their average rates of change over time can be derived either as geometric or as exponential rates.

a. Geometric growth rates

If it is assumed that growth occurs in discrete time intervals, percentage rates of growth of per capita and per household disposable household incomes can be obtained as follows:

The geometric growth rate of per capita disposable household income is calculated as:

$$GGRPCDHI = [ ( PCDHI(t+5)/PCDHI(t) )^{1/5} - 1 ] \cdot 100, \quad (37)$$

where:

GGRPCDHI is the average annual geometric growth rate of the per capita disposable household income for the interval.

The geometric growth rate of per household disposable income is calculated as:

$$GGRADHI = [ ( ADHI(t+5)/ADHI(t) )^{1/5} - 1 ] \cdot 100, \quad (38)$$

where:

GGRADHI is the average annual geometric growth rate of the average (per household) disposable household income for the interval.

b. Exponential growth rates

If the projections assume continuous growth, the percentage rates of growth of per capita and per household disposable household incomes would be calculated as follows:

The exponential growth rate of per capita disposable household income is calculated as:

$$\text{EGRPCDHI} = [ ( \ln ( \text{PCDHI}(t+5)/\text{PCDHI}(t) ) ) / 5 ] \cdot 100, \quad (39)$$

where:

EGRPCDHI is the average annual exponential growth rate of per capita disposable household income for the interval.

The exponential growth rate of per household disposable income is calculated as:

$$\text{EGRADHI} = [ ( \ln ( \text{ADHI}(t+5)/\text{ADHI}(t) ) ) / 5 ] \cdot 100, \quad (40)$$

where:

EGRADHI is the average annual exponential growth rate of average (per household) disposable household income for the interval.

3. Urban-rural level

A major policy objective in many countries is to reduce income differences between urban and rural areas. To project urban and rural incomes along with those differences it is necessary to apply this method at the urban-rural level. This section describes a procedure for projecting urban and rural disposable incomes that is similar to that employed in making a national projection. Like its national counterpart, the procedure can be used to project levels of incomes of different types, and to calculate other results, such as levels and growth rates of per capita and per household disposable incomes of households.

(a) Different categories of incomes

The procedure for making urban-rural income projections derives incomes of factors of production (wages and profits) using steps that are urban-rural equivalents of the steps described in equations (1) through (4). Factor incomes and gross incomes of institutions are derived with urban-rural counterparts of the steps explained, respectively, by equations (5) through (7) and by equations (8) through (15). Lastly, disposable incomes of households, corporations and

government are projected employing urban-rural equivalents of the steps described in equations (16) through (18).

(b) Other results

The indicators discussed in connection with the national projection can also be computed as part of an urban-rural projection. Those indicators are, however, calculated for urban and rural areas separately, as well as for the entire country, using steps analogous to those indicated by equations (19) through (40). In addition, indicators of the distribution of disposable household income by location -- proportions of disposable household income urban and rural -- can be calculated. Moreover, indicators of the urban-rural differentials of per capita and per household disposable incomes of households can be calculated.

(i) Proportions of disposable household income that are urban and rural

The proportion of disposable household income that is urban ( $k=1$ ) at the end of the projection interval can be obtained by dividing the disposable household income in urban areas by the disposable household income for the entire country:

$$\text{PRDHIURB}(t+5) = \text{DHI}(1,t+5) / \text{DHI}(t+5), \quad (41)$$

where:

$k = 1, 2$  are urban and rural locations,

$\text{PRDHIURB}(t+5)$  is the proportion of disposable household income that is urban,

$\text{DHI}(k,t+5)$  is the disposable household income in location  $k$ .

The proportion of disposable household income that is rural ( $k=2$ ) can be found as a complement of the proportion urban:

$$\text{PRDHIRUR}(t+5) = 1 - \text{PRDHIURB}(t+5), \quad (42)$$

where:

$\text{PRDHIRUR}(t+5)$  is the proportion of disposable household income that is rural.

(ii) Urban-rural differentials in per capita and per household disposable household incomes

Given the levels of per capita and per household disposable household incomes in urban ( $k=1$ ) and rural ( $k=2$ ) areas, it is possible to calculate differences between urban and rural incomes as a per cent of rural incomes. In particular, for the end of a given projection interval ( $t$  to  $t+5$ ), the percentage difference between urban and rural per capita disposable household incomes is:



$$\text{DPCDHI}(t+5) = [ ( \text{PCDHI}(1,t+5) - \text{PCDHI}(2,t+5) ) / \text{PCDHI}(2,t+5) ] \cdot 100, \quad (43)$$

where:

$\text{DPCDHI}(t+5)$  is the difference between urban and rural per capita disposable household incomes expressed as per cent of the rural per capita disposable household income, and

$\text{PCDHI}(k,t+5)$  is the per capita disposable household income in location k.

For the end of a given projection interval, the percentage urban-rural difference of per household disposable income is:

$$\text{DADHI}(t+5) = [ ( \text{ADHI}(1,t+5) - \text{ADHI}(2,t+5) ) / \text{ADHI}(2,t+5) ] \cdot 100, \quad (44)$$

where:

$\text{DADHI}(t+5)$  is the difference between urban and rural average (per household) disposable household incomes expressed as per cent of the rural average (per household) disposable household income, and

$\text{ADHI}(k,t+5)$  is the average (per household) disposable household income in location k.

This completes the description of the technique for making income projections using the social accounting matrix.

### C. The inputs

This section lists the inputs that are employed to project incomes using the social accounting matrix. It then describes the way those inputs can be prepared.

#### 1. Types of inputs required

The following categories of inputs are needed to project incomes using a social accounting matrix:

- (a) Projected levels of value added by industry;
- (b) Projected population size;
- (c) Projected number of households;
- (d) Assumed values of various proportions and ratios;
- (e) Assumed values of various types of transfers.

Items (d) and (e) above require further amplification.

Various proportions and ratios used by the method are as follows:

- (a) Proportions of value added going to wages by industry;
- (b) Ratios of net indirect taxes (indirect taxes less subsidies) to value added by industry;
- (c) Proportion of profits received by households;
- (d) Proportion of gross corporate income paid to households as dividends;
- (e) Proportion of gross household income paid as household income taxes;
- (f) Proportion of gross corporate income paid as corporate income taxes.

Three types of transfers for which values also need to be assumed are as follows:

- (a) Government transfers to households;
- (b) Government transfers to corporations;
- (c) Net foreign transfers to households.

These categories of inputs should be prepared for the entire country or for urban and rural areas, depending on the type of projection to be made.

## 2. Preparation of the inputs

Where suitable projections of value added, population and the number of households are already not available, the preparation of the requisite inputs may begin by making those projections.

### (a) Projections of value added, population size and the number of households

Projections of value added, which are often prepared in the course of drafting a development plan, can be derived using a procedure based on an input-output table. Such a procedure was outlined in box 17 of Module Two. Projections of the population size can be prepared by means of the cohort component method and those of the number of households can be made by the headship rate method. These techniques were respectively described in chapters II and III of Module One.

Projected value added must be calculated at factor prices rather than at market prices (see box 8). The difference between the two is equal to net indirect taxes (indirect taxes less subsidies), which are excluded from value added at factor prices. If the available projection of value added is calculated at market prices, this projection will have to be adjusted using information on net indirect tax, which is provided in SAM to obtain a projection of value added at factor prices.

### (b) Assumptions on the various proportions and ratios

To prepare assumptions on the initial and future values of the various proportions and ratios, observations on those proportions and ratios for a recent date or a few such dates are needed.

Box 8

Glossary

(Items indicated by an asterisk come from the glossary  
of Module One and should not be modified)

Capital income

Income in the form of profits, dividends and interest, accruing to physical capital and financial claims in return for services rendered by those forms of capital.

Labour income

Income, primarily in the form of wages and salaries, accruing to labour in return for services rendered by it.

Market prices

The amounts of money or money equivalents needed to be given up in order to obtain goods and services through exchange.

(i) Observations on proportions and ratios

Observations on the relevant proportions and ratios can be derived from a recent SAM. If an appropriate SAM is not available, it can be derived using the types of data that are briefly discussed in annex I.

a. Procedures to derive observations on proportions and ratios

The steps that must be taken to obtain observations on proportions and ratios needed in preparing income projections at the national or urban-rural level described in this section. Annex II shows how those steps can be used to obtain observations on the proportions and ratios employing illustrative SAMs shown in tables 1 and 2.

i. National level

The following discussion of the steps that can be used to derive observations on the relevant proportions and ratios needed to make a national projection are based on the structure of a SAM such as that shown in table 1.

Value added. To calculate proportions of value added going to wages for each industry, it is initially necessary to derive the level of value added at factor cost for every industry. Where the factors of production include only labour and capital, the value added at factor cost for each industry in a given year to which

Table 1. An illustrative social accounting matrix

(Thousands of LCUs)<sup>a/</sup>

## Expenditures

	1a	1b	2a	2b	2c	2d	3	4a	4b	4c	4d	4e	4f	4g	4h	5	6 Totals
1a. Income to labour (wages)								19 142	1 021	22 176	1 845	9 070	15 766	18 353	66 043		153 417
1b. Income to capital (profits)								113 836	896	18 416	3 903	19 265	20 367	11 262	23 969		211 914
2a. Household current account	153 417	151 326		23 773	6 625												335 141
R 2b. Corporate current account		60 588			7 853												68 441
e 2c. Government current account			31 336	13 881		13 313											58 530
c 2d. Indirect taxes								-965	18	10 849	3	13	947	710	1 737		13 313
e 3. Combined capital account			33 481	30 788	-11 952											20 983	73 300
i 4a. Agriculture			93 820				2 671	1 635		34 680		479		7	752	15 699	149 744
p 4b. Mining			35					81	395	13 496	23	1 292			170	1 867	17 360
t 4c. Manufacturing			51 652				3 519	7 363	740	36 643	726	12 963	5 174	10 806	16 214	52 884	198 685
s 4d. Utilities			2 309					264	52	1 726	910	346	405	777	1 695	258	8 742
4e. Construction			12 496				34 798		13	464		1 674		135	410	78	50 070
4f. Trade			19 708				3 973	2 272	151	9 036	186	2 525	1 789	2 225	2 281	12 415	56 563
4g. Transport			18 208					1 080	311	3 326	108	832	6 080	8 401	3 927	16 717	58 990
4h. Services			31 836		56 002			1 669	136	4 860	539	1 609	5 149	4 100	14 709	12 862	133 471
5. Rest of the world account			40 260				28 338	3 366	13 625	43 012	498		886	2 215	1 563		133 762
6. Totals	153 417	211 914	335 141	68 441	58 530	13 313	73 300	149 743	17 360	198 685	8 742	50 070	56 563	58 990	133 471	133 763	

a/ Local currency units.

Table 2. An illustrative social accounting matrix involving some urban-rural disaggregation

(Thousands of LCUs) a/

		Expenditures														6						
		1a		1b		2a		2b	2c	2d	3	4a	4b	4c	4d	4e	4f	4g	4h	5	Totals	
		Urban	Rural	Urban	Rural	Urban	Rural															
1a.	Income to labour (wages)											1 210	681	19 374	1 600	7 834	13 831	15 403	40 642			100 576
												17 932	340	2 802	245	1 237	1 935	2 949	25 401			52 841
1b.	Income to capital (profits)											6 856	611	16 076	3 362	2 158	13 814	9 469	14 749			67 096
												106 979	285	2 340	541	17 107	6 553	1 793	9 220			144 818
2a.	Household current account	100 576		37 660				23 148	6 189													167 574
			52 841		113 665			625	436													167 567
2b.	Corporations current account			29 435	31 153				7 853													68 441
R 2c.	Government current account					26 221	5 116	13 881		13 313												58 530
e 2d.	Indirect taxes											-965	18	10 849	3	13	947	710	1 737			13 313
c 3.	Combined capital account					29 998	3 485	30 787	-11 952												20983	73 300
i 4a.	Agriculture					7 303	86 517			2 671	1 635		34 680		479		7	752	15 699			149 743
p 4b.	Mining					35				81	395	13 496	23	1 292				170	1 867			17 360
t 4c.	Manufacturing					31 705	19 947			3 519	7 363	740	36 643	726	12 963	5 174	10 806	16 214	52 884			198 685
s 4d.	Utilities					2 309					264	52	1 726	910	346	405	777	1 695	258			8 742
	4e. Construction					616	11 880			34 798		13	464		1 674		135	410	78			50 070
	4f. Trade					14 795	4 913			3 973	2 272	151	9 036	186	2 525	1 789	2 225	2 281	12 415			56 563
	4g. Transportation					1 758	16 450				1 080	311	3 326	108	832	6 080	8 401	3 927	16 717			58 990
	4h. Services					18 614	13 222		56 002		1 669	136	4 860	539	1 610	5 149	4 100	14 709	12 862			133 471
	5. Rest of the world account					34 221	6 038			28 338	3 366	13 625	43 012	498		886	2 215	1 563				133 762
6.	Totals	100 576	52 841	67 096	144 818	167 574	167 567	68 441	58 530	13 313	73 300	149 743	17 360	198 685	8 742	50 070	56 563	58 990	133 471	133 762		

a/ Local currency units.

SAM refers can be obtained as the sum of labour income (wages) and capital income (profits) in that year:

$$VA(i,t') = WAGE(i,t') + PROF(i,t'); \quad (45)$$

$$i = 1, \dots, I,$$

where:

$t'$  is the given calendar year. <sup>6</sup>

Proportions of value added going to wages. Given the levels of value added at factor cost, the proportion of value added going to wages in each industry can be obtained as the amount of wages paid by the industry divided by the industry's value added:

$$PRVAWG(i,t') = WAGE(i,t') / VA(i,t'); \quad (46)$$

$$i = 1, \dots, I.$$

Ratios of net indirect taxes to value added. For each industry the ratios of value added going to net indirect taxes can be obtained by dividing net indirect taxes (indirect taxes less subsidies) by the value added:

$$RITVA(i,t') = NIT(i,t') / VA(i,t'); \quad (47)$$

$$i = 1, \dots, I.$$

Proportion of profits received by households. The proportion of profits going to households can be calculated as the amount of profits accruing to households, divided by the total profits:

$$PRPROFH(t') = PROFH(t') / PROF(t'). \quad (48)$$

Proportion of gross corporate income paid to households as dividends. The proportion of gross income of corporations going to households as dividends can be obtained as the amount of income received by households as dividends, divided by the amount of gross income of corporations:

$$PRCIH(t') = DIVH(t') / GCI(t'). \quad (49)$$

Proportion of gross household income paid as household income taxes. The proportion of gross income of households reserved by the government as household income taxes can be calculated as the ratio of household income taxes to gross household income:

$$PRHIT(t') = HIT(t') / GHI(t'). \quad (50)$$

Proportion of gross corporate income paid as corporate income taxes. The proportion of gross income of corporations that is paid to government as corporate income taxes can be calculated as the corporate income taxes divided by gross income of corporations:

$$\text{PRCIT}(t') = \text{CIT}(t') / \text{GCI}(t'). \quad (51)$$

ii. Urban-rural level

The description of steps that would be used to derive observations on proportions and ratios needed to make an income projection at the urban-rural level will assume that the structure of the SAM is such as that shown in table 2.

Value added. To derive observations on proportions of value added going to wages by industry in both urban and rural areas, it is initially necessary to derive levels of value added at factor cost generated in the two areas by industry using an urban-rural equivalent of equation (45):

$$\text{VA}(i,k,t') = \text{WAGE}(i,k,t') + \text{PROF}(i,k,t'); \quad (52)$$

$$i = 1, \dots, I;$$

$$k = 1, 2.$$

Proportions of value added going to wages. Proportions of value added going to wages can be calculated from total wages by industry in urban and rural areas and the levels of value added in the two locations, employing an urban-rural counterpart of equation (46):

$$\text{PRVAWG}(i,k,t') = \text{WAGE}(i,k,t') / \text{VA}(i,k,t'); \quad (53)$$

$$i = 1, \dots, I;$$

$$k = 1, 2.$$

Ratios of net indirect taxes to value added. If it is assumed that ratios of net indirect taxes to value added by industry do not vary between urban and rural locations, those ratios can be derived by dividing net indirect taxes for each industry by the sum of industry's value added levels generated in urban and rural locations:

$$\text{RITVA}(i,k,t') = \text{NIT}(i,k,t') / \sum_{k'=1}^2 \text{VA}(i,k',t'); \quad (54)$$

$$i = 1, \dots, I;$$

$$k = 1, 2.$$

Proportions of profits received by households. The proportions of profits going to households in urban and rural areas can be calculated using an urban-rural equivalent of equation (48):

$$\text{PRPROFH}(k,t') = \text{PROFH}(k,t') / \text{PROF}(k,t'); \quad (55)$$

$$k = 1,2.$$

Proportions of gross corporate income paid to households as dividends. The proportions of gross corporate income received by households in urban or rural areas as dividends can be calculated as dividends received by households in those areas divided by the total gross corporate income:

$$\text{PRCIH}(k,t') = \text{DIVH}(k,t') / \text{GCI}(t'); \quad (56)$$

$$k = 1,2.$$

Proportions of gross household income paid as household income taxes. The proportions of gross household income paid as household income taxes in urban and rural areas can be calculated using an urban-rural equivalent of equation (50):

$$\text{PRHIT}(k,t') = \text{HIT}(k,t') / \text{GHI}(k,t'); \quad (57)$$

$$k = 1,2.$$

Proportions of gross corporate income paid as corporate income taxes. If it is assumed that proportions of gross corporate income paid as corporate income taxes do not vary between urban and rural areas, those proportions can be obtained by dividing corporate income taxes by gross corporate income, both of which are for the entire country:

$$\text{PRCIT}(k,t') = \text{CIT}(t') / \text{GCI}(t'); \quad (58)$$

$$k = 1,2.$$

b. Illustrating the derivation of observations on proportions and ratios

The calculation of the relevant proportions and ratios is illustrated in annex II, first for the country as a whole and then for urban and rural areas, using SAMs shown in tables 1 and 2, respectively.

(ii) Assumptions on future values of proportions and ratios

The observations of the relevant proportions and ratios, which can be derived from a given SAM, would always refer to a date that precedes the initial year of the projection. They would provide the basis for selecting the assumed future values of the proportions and ratios to be included among projection inputs.



For the initial year of projection, the assumed values can be selected by approximating trends in the values of the proportions and ratios over the time period between the year to which SAM refers and the initial year. Information needed to approximate those trends may not be readily available, particularly where SAM refers to a date close to the initial year. In such a situation, specifying the initial year values of the proportions and ratios may entail personal estimates of the changes in their values. If there is no strong reason to do otherwise, one may assume that the values of the proportions and ratios remained fixed prior to the initial year and use the observations on the proportions and ratios derived from SAM as estimates of the initial year values.

Assumptions on future values of the relevant proportions and ratios should be based on the considerations regarding possible future shifts in those proportions and ratios, which may arise in the absence of government interventions or as a result of government policy. Thus, proportions of value added going to wages, for example, may be assumed to remain constant at the level observed in SAM if net effects of various forces influencing those proportions can be expected to cancel out. Alternatively, they may be allowed to change over time to reflect possible changes such as a wage freeze (see box 9).

The proportion of profits received by households can be anticipated, for example, to increase over the projection period if the share of the country's capital stock which is owned by households operating it as unincorporated businesses is expected to grow over time. Similarly, the proportion of gross corporate income going to households as dividends may be assumed to increase if the household ownership of corporate securities is expected to expand over the projection period.

Assumptions regarding the future ratios of net indirect taxes to value added and the future proportions of the gross incomes of households and corporations paid as household and corporate income taxes can be formulated by taking into account the future fiscal policy of the government. Since tax rates are used as instruments of fiscal policy, these proportions can be treated as policy instruments in the income projection exercise.

Box 9

Glossary

Fiscal policy

Government taxation and expenditure policy designed to regulate the aggregate level of economic activity.

Gross domestic product

The total monetary value of all final goods and services produced in an economy over a given period of time, typically one year, calculated at market or factor prices.

Wage freeze

The fixing of wages at their existing level for a specified or indefinite period.

(c) Assumptions on transfers

To prepare assumptions on future values of transfers -- government transfers to households and corporations and net foreign transfers to households from abroad - observations on those variables for a recent date or a few such dates are needed. The observations may be derived from a recent SAM.

Assumptions on transfers can be formulated by selecting values for those transfers for the relevant future years that would take into account the observations on them for a recent year or years. Formulating assumptions in this way would, however, require that projected values of certain other variables be taken into account. This would ensure that the transfers are given realistic values which do not lead to absurd projection results. For example, this procedure should ensure that government transfers to households and corporations would not add up to an excessive proportion of the projected gross government income, out of which they are paid.

To avoid unrealistic assumptions on future values of transfers, they can be selected using a two-stage procedure, which initially entails making assumptions on future ratios of transfers to, say, gross domestic product (GDP), and then multiplying those ratios by the projected GDP. This procedure requires that recent observations on the relevant ratios be obtained, that assumptions on the ratios be formulated using those observations and that the projected GDP be multiplied by the assumed ratios.

(i) Observations on the relevant ratios

Ratios of the transfers to GDP can be derived from a recent SAM.

a. Procedures to derive observations on ratios

Procedures to derive the relevant ratios are described in this section, first for the country as a whole and, then, for urban and rural areas. They are illustrated in part in annex III using the social accounting matrix presented in table 1.

i. National level

The discussion of the steps to derive ratios of the various transfers to GDP for the country as a whole assumes a structure of SAM such as that shown in table 1.

Gross domestic product. To derive observations on the ratios, one should initially calculate gross domestic product at factor cost, which can be obtained by aggregating levels of value added at factor cost across the various industries:

$$\text{GDP}(t') = \sum_{i=1}^I \text{VA}(i,t'), \quad (59)$$

where:

GDP(t') is the gross domestic product at factor prices.

Ratio of government transfers to households to GDP. Given the gross domestic product, the ratio of government transfers to households to GDP can be obtained as government transfers to households, divided by GDP:

$$RGTH(t') = GTH(t') / GDP(t'), \quad (60)$$

where:

RGTH(t') is the ratio of government transfers to households to the gross domestic product.

Ratio of government transfers to corporations to GDP. The ratio of government transfers to corporations to GDP can be calculated as government transfers to corporations, divided by GDP:

$$RGTC(t') = GTC(t') / GDP(t'), \quad (61)$$

where:

RGTC(t') is the ratio of government transfers to corporations to the gross domestic product.

Ratio of net foreign transfers to households to GDP. The ratio of net foreign transfers to households to GDP can be derived as net foreign transfers to households, divided by GDP:

$$RNFTH(t') = NFTH(t') / GDP(t'), \quad (62)$$

where:

RNFTH(t') is the ratio of net foreign transfers to households to the gross domestic product, and

NFTH(t') is net foreign transfers to households.

ii. Urban-rural level

The ratios of transfers to GDP for urban and rural areas can be calculated by steps analogous to those used for calculating the ratios at the national level. This discussion will assume that the structure of a SAM involved is that shown in table 2. Gross domestic product. The levels of gross domestic product at factor prices for urban and rural areas can be obtained using the urban-rural equivalent of equation (59):

$$GDP(k,t') = \sum_{i=1}^I VA(i,k,t'); \quad (63)$$

$$k = 1,2.$$

Ratios of government transfers to households to GDP. Ratios of government transfers to households to GDP are calculated for urban and rural areas using an urban-rural equivalent of equation (60):

$$RGTH(k,t') = GTH(k,t') / GDP(k,t'); \quad (64)$$

$$k = 1,2.$$

Ratios of government transfers to corporations to GDP. If it is assumed that ratios of government transfers to GDP do not vary across locations, they can be obtained using the following modification of the step indicated in equation (61):

$$RGTC(k,t') = GTC(t') / \left[ \sum_{k=1}^2 GDP(k',t') \right]; \quad (65)$$

$$k'=1$$

$$k = 1,2.$$

Ratios of net foreign transfers to households to GDP. Ratios of net foreign transfers to households to GDP are calculated for urban and rural areas using an urban-rural equivalent of equation (62):

$$RNFTH(k,t') = NFTH(k,t') / GDP(k,t'); \quad (66)$$

$$k = 1,2.$$

b. Illustrative derivation of observations on ratios

The steps introduced above to derive the relevant ratios using an appropriate SAM are illustrated for the entire country and for the urban and rural areas separately in annex III.

(ii) Assumptions on future values of ratios

Once the relevant ratios are obtained from a given SAM, they can be used to prepare assumptions about the values of those ratios for the projection period. Thus, values of the ratios of government transfers to households and corporations to GDP can be chosen by taking into account expected future government policies regarding those transfers. Values of the ratio of net foreign transfers to households to GDP can be chosen on the basis of expectations regarding future trends in foreign transfers to and from households.

(iii) Derive future values of transfers

Given assumptions on future values of the relevant ratios, future values of the corresponding transfers can be calculated as described below.

a. Procedure to derive future values of transfers

The description of the procedure is first concerned with the national level.

i. National level

To derive future values of transfers at the national level, assumptions regarding future ratios of those variables to GDP should be used in connection with projected GDP values.

Gross domestic product. To project transfers for the end of any projection interval (t to t+5), it is necessary to first project gross domestic product at factor prices for that date by summing the projected value added levels by industry:

$$\text{GDP}(t+5) = \sum_{i=1}^I \text{VA}(i,t+5); \quad (67)$$

where:

$\text{GDP}(t+5)$  is the gross domestic product at factor prices.

Government transfers to households. To derive government transfers to households for the end of the projection interval, the projected gross domestic product for that date should be multiplied by the assumed value of the ratio of government transfers to households to GDP:

$$\text{GTH}(t+5) = \text{GDP}(t+5) \cdot \text{RGTH}(t+5). \quad (68)$$

Government transfers to corporations. To compute government transfers to corporations for the end of the projection interval, the projected gross domestic product should be multiplied by the assumed ratio of government transfers to households to GDP:

$$\text{GTC}(t+5) = \text{GDP}(t+5) \cdot \text{RGTC}(t+5). \quad (69)$$

Net foreign transfers to households. Net foreign transfers to households for the end of the interval can be obtained as a product of the projected gross domestic product and the assumed ratio of net foreign transfers to households to GDP:

$$\text{NFTH}(t+5) = \text{GDP}(t+5) \cdot \text{RNFTH}(t+5). \quad (70)$$

ii. Urban-rural level

The derivation of the assumed future values of transfers for urban and rural areas is identical to that for the country as a whole, except that the calculations are performed for each location. Thus, gross domestic product for urban and rural areas for the end of the given projection interval is obtained using an urban-rural equivalent of equation (67) with the projected levels of value added by industry for the two areas for that date. Government transfers to households and corporations and net foreign transfers to households for the two areas are obtained using urban-rural counterparts of equations (68) through (70) and assumed values of the relevant ratios along with the projected values of the gross domestic product for the two locations.

b. Illustrative derivation of future values of transfers

The derivation of future values of transfers at the national level are illustrated in annex III. An analogous derivation for the urban-rural level is not illustrated owing to its similarity to that for the national level.

D. Illustrative examples of projections

The examples presented in this section use the inputs described in the preceding section to illustrate the preparation of national and urban-rural projections of incomes using the method based on the social accounting matrix. The examples show how calculations are made for the projection interval 0-5. Results for a 20-year projection period also provided.

1. National projection

This example is based on the inputs, including projected levels of value added by industry, projected population size and projected numbers of households, which are shown in table 3. The inputs also include assumptions on the relevant proportions and ratios and assumptions on transfers, which are presented, respectively, in table 4 and 5.

These inputs are for dates five years apart, starting with the initial year of projection (denoted as year 0). They are based on the assumption that the proportions and ratios would remain unchanged over the projection period, at the levels derived from the SAM shown in table 1 (see annex II for the derivation). They are also based on the assumption that the ratios of the transfers to the gross domestic product will remain unchanged at the levels observed in that SAM (annex III).

(a) Incomes of factors of production

The initial step in projecting disposable incomes involves the projection of wages and profits.

(i) Wages

For any specific year of the projection period, the wage bill for any industry can be calculated as a product of the value added and the proportion of value added going on wages. The calculations for the end of the projection interval 0-5 (year 5) are illustrated in table 6, where wages in year 5 for each industry (column 4) are obtained by multiplying value added in that year (column 2) by the assumed proportion of value added going to wages in that year (column 3).

For example, wages in agriculture at the end of the interval 0-5, 24,656, are obtained as:

$$24,656 = (171,341) (0.1439). \quad (1)$$

Table 3. Inputs for projecting incomes at the national level; projected value added by industry, population size and number of households

Variable	Year				
	0	5	10	15	20
Value added (thousands of LCUs) a/					
Agriculture	147 800	171 341	198 631	230 268	266 943
Mining	2 100	2 810	3 761	5 033	6 735
Manufacturing	45 100	66 267	97 368	143 065	210 209
Utilities	6 400	9 404	13 817	20 302	29 830
Construction	31 500	38 325	46 628	56 730	69 020
Trade	40 100	56 242	78 883	110 637	155 174
Transportation	32 900	41 990	53 591	68 397	87 293
Services	100 000	146 933	215 892	317 217	466 096
Population size (thousands)					
	10 000.0	11 210.4	126 19.0	14 159.4	15 675.6
Number of households (thousands)					
	1 470.7	1 638.7	1 854.7	2 138.4	2 486.2

a/ Local currency units.

where 171,341 is the value added in agriculture and 0.1439 is the proportion of value added going to wages in agriculture at that date.

The wage bill for the entire economy can be obtained as the sum of the industry-specific wage bills. The total wage bill at the end of the interval 0-5, 236,005, is the total of industry-specific wage bills, which are shown in column 4 of table 6.

(ii) Profits

Profits for each industry can be projected as a difference between value added and the wage bill, as illustrated for the end of the interval 0-5 in table 7. Thus, profits in the various industries (column 4) are obtained as the differences between the value added levels (column 2) and the wage bills (column 3) in those industries.

For example, profits in agriculture at this date, 146.685, are calculated as:

$$146,685 = 171,341 - 24.656, \quad (3)$$

where 171,341 and 24,656 are, respectively, value added and the wage bill in agriculture in year 5.

Given the projected profits in each industry, the total profit for the entire economy can be obtained as the sum of the industry-specific profit levels.

Thus, the total profits at the end of the interval 0-5, 297,306, are obtained by adding up the profit levels by industry projected for that date and shown in column 4 of table 7.

(b) Factor incomes of institutions

After projecting incomes of factors of production, one can further project factor incomes received by institutions, such as households and corporations.

(i) Factor income of households

The factor income of households consists of total wages and a part of total profits.

The amount of profits going to households can be calculated as the product of the proportion of profits paid to households and the total profits. For the end of the projection interval 0-5, this amount of profits, 212,306, is obtained as follows:

$$212,306 = (0.7141) (297,306), \quad (5)$$

where 0.7141 is the proportion of profits paid to households in year 5 (table 4), while 297,306 is the total profits in that year (table 7).



Table 4. Inputs for projecting incomes at the national level;  
assumptions on the various proportions and ratios

Variable	Year				
	0	5	10	15	20
<b>Proportions of value added going to wages</b>					
Agriculture	0.1439	0.1439	0.1439	0.1439	0.1439
Mining	0.5326	0.5326	0.5326	0.5326	0.5326
Manufacturing	0.5463	0.5463	0.5463	0.5463	0.5463
Utilities	0.3210	0.3210	0.3210	0.3210	0.3210
Construction	0.3201	0.3201	0.3201	0.3201	0.3201
Trade	0.4363	0.4363	0.4363	0.4363	0.4363
Transportation	0.6197	0.6197	0.6197	0.6197	0.6197
Services	0.7337	0.7337	0.7337	0.7337	0.7337
<b>Ratios of net indirect taxes to value added</b>					
Agriculture	-0.0073	-0.0073	-0.0073	-0.0073	-0.0073
Mining	0.0094	0.0094	0.0094	0.0094	0.0094
Manufacturing	0.2673	0.2673	0.2673	0.2673	0.2673
Utilities	0.0005	0.0005	0.0005	0.0005	0.0005
Construction	0.0005	0.0005	0.0005	0.0005	0.0005
Trade	0.0262	0.0262	0.0262	0.0262	0.0262
Transportation	0.0240	0.0240	0.0240	0.0240	0.0240
Services	0.0193	0.0193	0.0193	0.0193	0.0193
<b>Proportions of profits received by households</b>					
	0.7141	0.7141	0.7141	0.7141	0.7141
<b>Proportions of gross corporate income paid to households as dividends</b>					
	0.3474	0.3474	0.3474	0.3474	0.3474
<b>Proportions of gross household income paid as household income taxes</b>					
	0.0935	0.0935	0.0935	0.0935	0.0935
<b>Proportions of gross corporate income paid as corporate income taxes</b>					
	0.2028	0.2028	0.2028	0.2028	0.2028

Table 5. Inputs for projecting incomes at the national level: assumptions relating to transfers

(Thousands of LCUs) a/

Variable	Year				
	0	5	10	15	20
Government transfers to households	7 347	9 653	12 825	17 225	23 373
Government transfers to corporations	8 727	11 466	15 234	20 460	27 763
Net foreign transfer to households	0	0	0	0	0

a/ Local currency units.

Table 6. Projecting wages at the national level in year 5

Industry	Value added <u>a/</u> (thousands of LCUs) <u>d/</u>	Proportion of value added going to wages <u>b/</u>	Wages <u>c/</u> (thousands of LCUs) <u>d/</u>
(1)	(2)	(3)	(4)
Agriculture	171 341	0.1439	24 656
Mining	2 810	0.5326	1 497
Manufacturing	66 267	0.5463	36 201
Utilities	9 404	0.3210	3 019
Construction	38 325	0.3201	12 268
Trade	56 242	0.4363	24 539
Transportation	41 990	0.6197	26 021
Services	146 933	0.7337	107 805
Total			236 005

a/ From table 3.

b/ From table 4.

c/ (Col. 2) . (col. 3).

d/ Local currency units.

Table 7. Projecting profits at the national level in year 5

(Thousands of LCUs) a/

Industry	Value added <u>b/</u>	Wages <u>c/</u>	Profits <u>d/</u>
(1)	(2)	(3)	(4)
Agriculture	171 341	24 656	146 685
Mining	2 810	1 497	1 314
Manufacturing	66 267	36 201	30 065
Utilities	9 404	3 019	6 385
Construction	38 325	12 268	26 057
Trade	56 242	24 539	31 704
Transportation	41 990	26 021	15 969
Services	146 933	107 805	39 128
Total	533 311	236 005	297 306

a/ Local currency units.

b/ From table 3.

c/ From table 6, col. 4.

d/ (Col. 2) - (col. 3).

Therefore, the size of household factor income at the end of the interval 0-5, 448,311 (shown in table 8), can be obtained as follows:

$$448,311 = 236,005 + 212,306, \quad (6)$$

where 236,005 is total wages and 212,306 is profits paid to households in year 5.

(ii) Factor income of corporations

The factor income of corporations equals that part of total profits that does not go to households. Therefore, the amount of that income at the end of the interval 0-5, 85,000, which is also shown in table 8, can be calculated by subtracting profits paid to households from total profits at that date:

$$85,000 = 297,306 - 212,306 \quad (7)$$

where 297,306 and 212,306 are total profits and profits paid to households in year 5.

(c) Gross incomes of institutions

After projecting household and corporate factor incomes, it is possible to project the gross incomes of the various institutions -- households, corporations and government.

(i) Gross income of corporations

The gross corporate income is equal to the sum of the factor income of corporations and government transfers to corporations. Therefore, gross corporate income at the end of the interval 0-5, 96,466, which is shown in table 8, can be derived as follows:

$$96,466 = 85,000 + 11,466, \quad (8)$$

where 85,000 is the factor income of corporations (table 8) and 11,466 is the amount of government transfers to corporations in year 5 (table 5).

(ii) Gross household income

Gross household income consists, among other things, of dividends paid to households, which must be derived before gross household income is computed.

Dividends. Dividends paid to households can be obtained as a proportion of gross corporate income. Therefore, dividends at the end of the interval 0-5, 33,512, are calculated as:

$$33,512 = (0.3474) (96,466), \quad (9)$$

where 0.3474 is the proportion of gross corporate income going to households as dividends (table 4) and 96,466 is the gross corporate income in year 5 (table 8).

Table 8. Projected factor incomes, gross incomes and disposable incomes of institutions

(Thousands of LCUs) a/

Type of income	Year				
	0	5	10	15	20
Factor incomes of:					
Households	338 575	448 311	600 098	811 671	1 108 605
Corporations	67 325	85 000	108 472	139 977	182 696
Gross incomes of:					
Households	372 342	491 476	655 899	884 631	1 205 091
Corporations	76 052	96 466	123 706	160 437	210 459
Government	65 022	87 346	118 576	162 558	224 866
Disposable incomes of:					
Households	337 528	445 523	594 572	801 918	1 092 415
Corporations	34 208	43 390	55 643	72 165	94 665
Government	48 949	66 227	90 516	124 873	173 731

a/ Local currency units.

Gross household income. Given the amount of dividends, gross household income can be obtained as the sum of household factor income, dividends, government transfers to households and net foreign transfers to households. Thus, the gross household income at the end of the interval 0-5, 491,476, which is shown in table 8, is calculated as follows:

$$491,476 = 448,311 + 33,512 + 9,653 + 0, \quad (10)$$

where 448,311 is household factor income (table 8), 33,512 is dividends, 9,653 is government transfers to households (table 5) and 0 is net foreign transfers to households (table 5), all in year 5.

(iii) Gross income of government

To calculate gross government income, it is initially necessary to project the different sources of government revenue -- household income taxes, corporate income taxes and net indirect taxes.

a. Household income taxes

Household income taxes can be obtained as the product of the gross household income and the proportion of that income paid as household income taxes. Thus, the amount of household income taxes at the end of the interval 0-5, 45,953, is obtained as follows:

$$45,953 = (491,476) (0.0935), \quad (11)$$

where 491,476 is the gross household income (table 8) and 0.0935 is the proportion of gross household income paid as household income taxes in year 5 (table 4).

b. Corporate income taxes

Corporate income taxes are derived as the product of the gross corporate income and the proportion of that income paid as corporate income taxes. Therefore, the amount of corporate income taxes at the end of the interval 0-5, 19,563, is obtained as follows:

$$19,563 = (96,466) (0.2028), \quad (12)$$

where 96,466 is the gross income of corporations (table 8) and 0.2028 is the proportion of gross corporate income paid as corporate income taxes in year 5 (table 4).

c. Net indirect taxes

Net indirect taxes (indirect taxes less subsidies) for any industry can be calculated as the product of value added and the ratio of net indirect taxes to value added for that industry. The calculations of net indirect taxes for the end of the projection interval 0-5 are illustrated in table 9, where net indirect taxes in year 5 for each industry (column 4) are obtained by multiplying the

Table 9. Projecting net indirect taxes at the national level in year 5

Industry	Value added <u>a/</u> (thousands of LCUs) <u>d/</u>	Ratio of net indirect taxes to value added <u>b/</u>	Net indirect taxes <u>c/</u> (thousands of LCUs) <u>d/</u>
(1)	(2)	(3)	(4)
Agriculture	171 341	-0.0073	-1 251
Mining	2 810	0.0094	26
Manufacturing	66 267	0.2673	17 713
Utilities	9 404	0.0005	5
Construction	38 325	0.0005	19
Trade	56 242	0.0262	1 474
Transportation	41 990	0.0240	1 007
Services	146 933	0.0193	2 835
<b>Total</b>	<b>533 311</b>		<b>21 829</b>

- a/ From table 3.
- b/ From table 4.
- c/ (Col. 2) . (col. 3).
- d/ Local currency units.



value added in that year (column 2) by the assumed ratio of net indirect taxes to value added in that year (column 3).

For example, net indirect taxes in agriculture at the end of the interval 0-5, -1,251, are obtained as:

$$-1,251 = (171,341) (-0.0073), \quad (13)$$

where 171.341 is the value added in agriculture (column 2) and -0.0073 is the ratio of net indirect taxes to value added in agriculture (column 3) at that date.

The total net indirect taxes can be obtained as the sum of the industry-specific net indirect taxes. Thus, the net indirect taxes for the entire economy at the end of the interval 0-5 are 21,830, which are shown as the total of column 4 in table 9.

Given the projected levels of household and corporate income taxes and that of the total net indirect taxes, the gross income of government is obtained as sum of these various taxes. Thus, for the end of the interval 0-5, the gross income of government, 87,346, which is shown in table 8, is obtained as:

$$87,346 = 45,953 + 19,563 + 21,830, \quad (15)$$

where 45,953, 19,563 and 21,830 are household income taxes, corporate income taxes and total net indirect taxes, respectively, in year 5.

(d) Disposable incomes of institutions

Given the projected gross incomes of institutions, it is possible to project the disposable incomes of institutions.

(i) Disposable household income

The disposable household income equals the gross household income less household income taxes. Thus, the disposable household income at the end of the interval 0-5, 445,523, is calculated as follows:

$$445,523 = 491,476 - 45,953, \quad (16)$$

where 491,476 is the gross income of households (table 8) and 45,953 is household income taxes in year 5.

(ii) Disposable corporate income

Disposable corporate income (gross business savings) equals the gross corporate income less dividends and corporate income taxes. The disposable corporate income at the end of the interval 0-5, 43,390, is therefore:

$$43,390 = 96,466 - (33,512 + 19,563), \quad (17)$$

where 96,466 is the gross corporate income (table 8), 33,512 is dividends and 19,563 is corporate income taxes, all in year 5.

(iii) Disposable government income

Government disposable income equals the difference between the gross income of government and government transfers to households and corporations. The government disposable income at the end of the interval 0-5, 66,227, is therefore obtained as:

$$66,227 = 87,346 - (9,653 + 11,466), \quad (18)$$

where 87,346 is the gross government income (table 8) and 9,653 and 11,466 are respectively government transfers to households and corporations in year 5 (table 5).

(e) Other results

After projecting the disposable incomes of the various institutions for the end of the given projection interval, a number of useful indicators can be derived. Those indicators include various income aggregates, indications of the distribution of income and rates of growth of disposable incomes.

(i) Aggregates of disposable income

In addition to disposable incomes of institution, aggregates of disposable income that may be obtained by this method include, the total disposable income, the change in this income and changes in disposable incomes of institutions.

a. Total disposable income

The total disposable income is equal to the sum of the disposable incomes of the various institutions. Therefore, for the end of the interval 0-5, the total disposable income, 555,140, is calculated as follows:

$$555,140 = 445,523 + 43,390 + 66,227, \quad (19)$$

where 445,523, 43,390 and 66,227 are, respectively, the disposable incomes of households, corporations and government in year 5 (table 8).

The total disposable income in year 5 is shown in table 10 in the column corresponding to that year, together with the disposable incomes of the three institutions. Also presented in this table are the projected disposable income levels for other years of the projection period, as well as other results obtained in the course of projecting incomes.

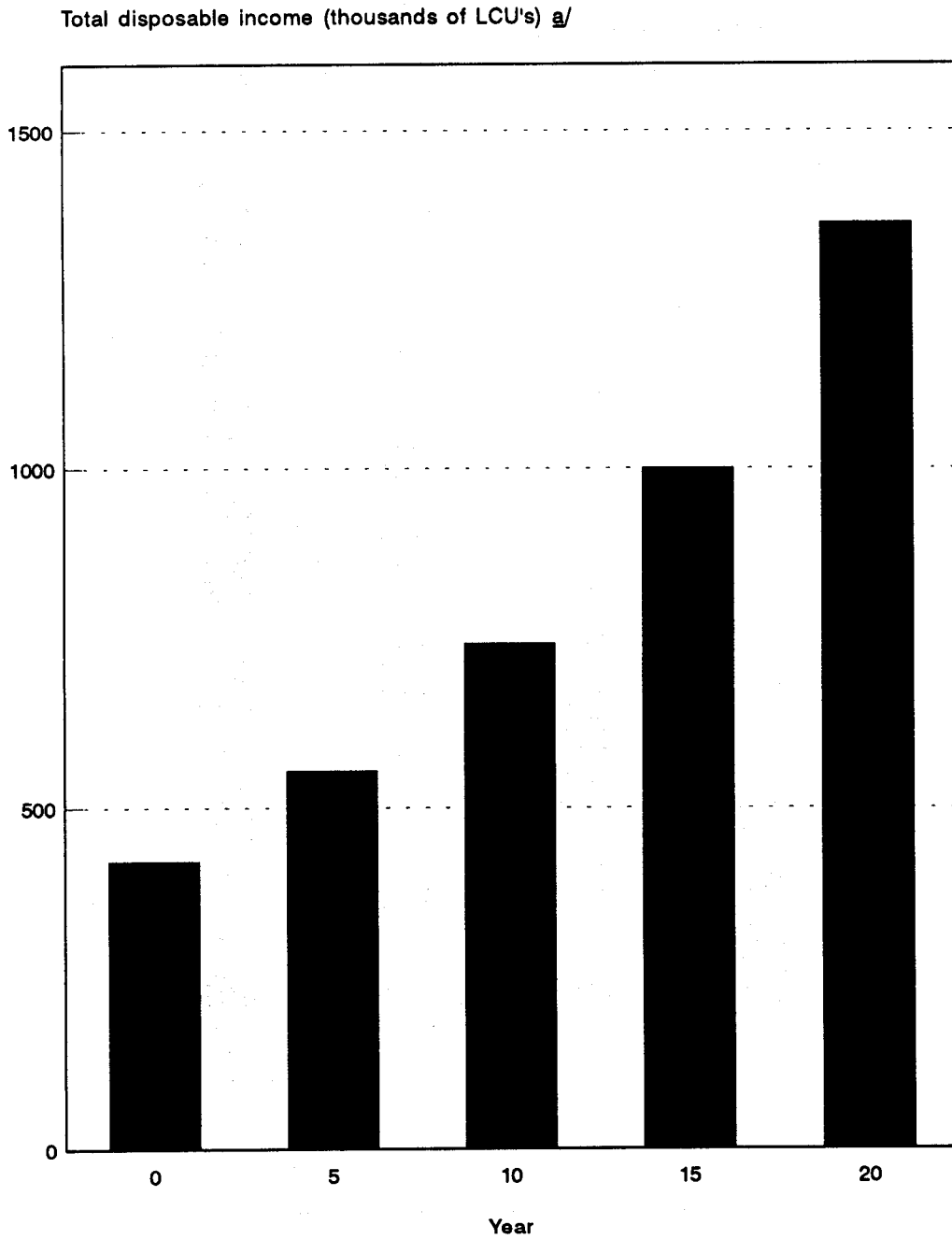
Figure II shows how the projected total disposable income increases over this period. Similarly, figure III indicates the increase in the disposable incomes of institutions over the same period.

Table 10. Disposable incomes: aggregates, indicators of the distribution and rates of growth

Indicators	Year				
	0	5	10	15	20
<b>Disposable income aggregates (thousands of LCUs) a/</b>					
<b>Levels of income</b>					
Total	420 685	555 140	740 731	998 956	1 360 810
Household	337 528	445 523	594 572	801 918	1 092 415
Corporate	34 208	43 390	55 643	72 165	94 665
Government	48 949	66 227	90 516	124 873	173 731
<b>Growth in incomes</b>					
Total		134 455	185 591	258 225	361 854
Household		107 995	149 049	207 346	290 497
Corporate		9 182	12 253	16 522	22 500
Government		17 278	24 289	34 357	48 858
<b>Indicators of the distribution of total disposable income by institutions</b>					
<b>Proportions by institutions</b>					
Total	1.00	1.00	1.00	1.00	1.00
Households	0.80	0.80	0.80	0.80	0.80
Corporations	0.08	0.08	0.08	0.07	0.07
Government	0.12	0.12	0.12	0.13	0.13
<b>Rates of growth of disposable incomes (percentage)</b>					
Total		5.70	5.94	6.16	6.38
Households		5.71	5.94	6.17	6.38
Corporations		4.87	5.10	5.34	5.58
Government		6.23	6.45	6.65	6.83

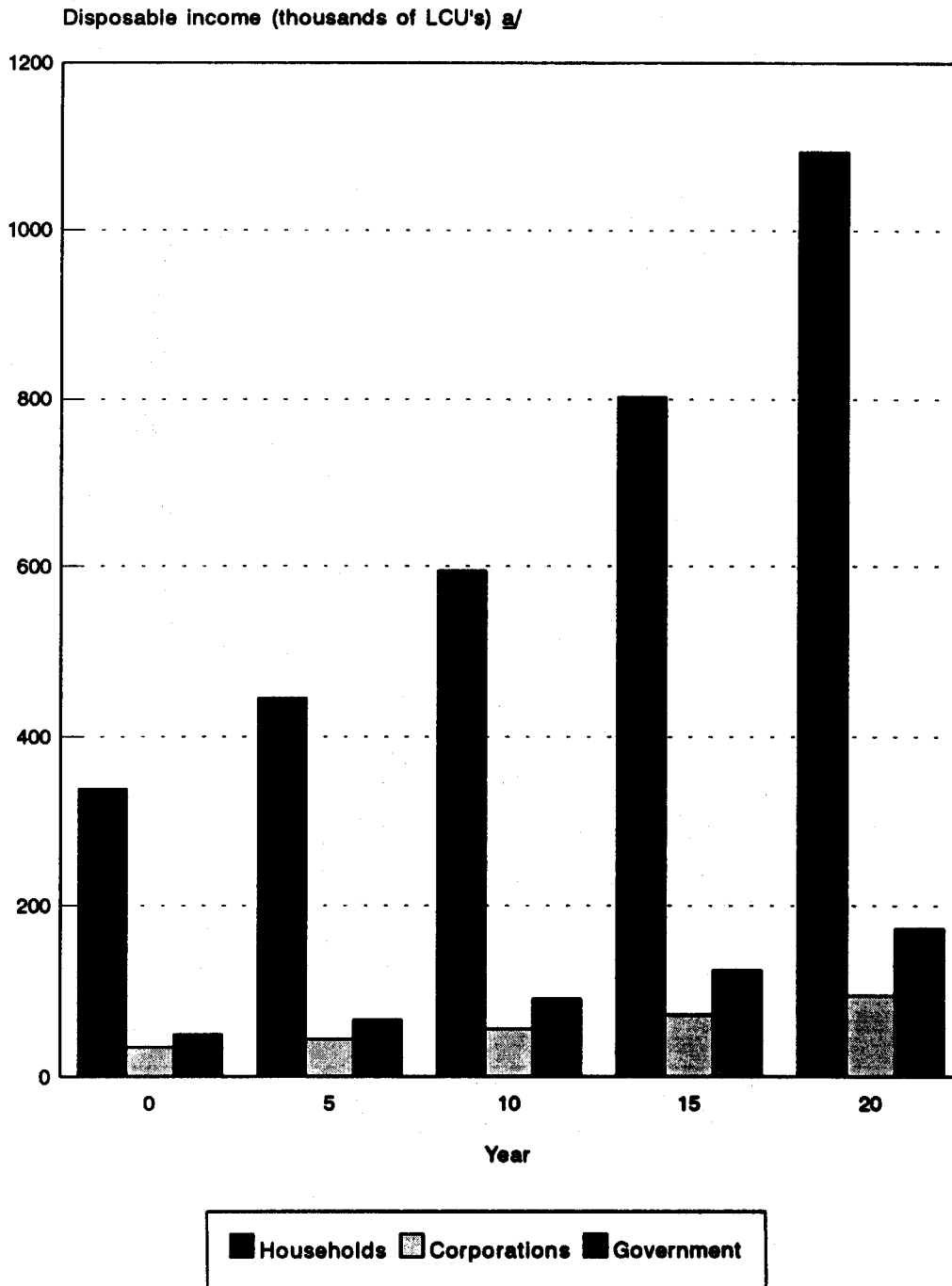
a/ Local currency units.

Figure II. Total disposable income



a/ Local currency units.

Figure III. Disposable incomes of households, corporations and government



<sup>a/</sup> Local currency units.

b. Growth in total disposable income

The increase in the total disposable income over a given projection interval equals the difference between the levels of total disposable income at the end and at the beginning of the interval. Therefore, the growth in the total disposable income over the interval 0-5, 134,455, is obtained as follows:

$$134,455 = 555,140 - 420,685, \quad (20)$$

where 420,685 and 555,140 are the levels of total disposable income in years 0 and 5, respectively.

c. Growth of disposable incomes of institutions

The increases in the disposable incomes of institutions over the interval 0-5 are obtained as follows:

The growth of disposable household income, 107,995, is calculated as:

$$107,995 = 445,523 - 337,528, \quad (21)$$

where 337,528 and 445,523 are the levels of disposable household income in years 0 and 5. The growth of disposable corporate income, 9,182, is calculated as:

$$9,182 = 43,390 - 34,208, \quad (22)$$

where 34,208 and 43,390 are the levels of disposable corporate income in years 0 and 5.

The growth of disposable government income, 17,278, is calculated as:

$$17,278 = 66,227 - 48,949, \quad (23)$$

where 48,949 and 66,227 are levels of disposable government income in years 0 and 5.

The projected increases in the disposable incomes of institutions are presented in table 10.

(ii) Indicators of the distribution of total disposable income

After projecting the disposable incomes for the end of the given projection interval, the proportion of the total disposable income going to each institution can be derived.

Proportions by institutions

Proportions of the total disposable income received by the various institutions at the end of the interval 0-5 are calculated as follows:

The proportion of the total disposable income received by households, 0.80, is obtained as:

$$0.80 = 445,523 / 555,140, \quad (24)$$

where 445,523 and 555,140 are the disposable household income and the total disposable income in year 5, respectively.

The proportion of the total disposable income received by corporations, 0.08, is obtained as:

$$0.08 = 43,390 / 555,140, \quad (25)$$

where 43,390 is the disposable corporate income in year 5.

The proportion of the total disposable income received by the government, 0.12, is obtained as:

$$0.12 = 66,227 / 555.140, \quad (25)$$

where 66,227 is the government disposable income in year 5.

The proportions of the total disposable income received by the various institutions over the 20-year projection period are shown in table 10. The proportions of the total disposable income received by the various institutions in the initial and the terminal year of the projection period (years 0 and 20, respectively) are shown in figure IV.

(iii) Rates of growth of disposable incomes

Given the projected levels of disposable incomes at dates five years apart, it is also possible to compute rates of growth of total disposable income and the disposable incomes of institutions.

a. The rate of growth of the total disposable income

The rate of growth of the total disposable income can be geometric or exponential, depending on whether one assumes that the growth occurs over discrete time intervals or continuously.

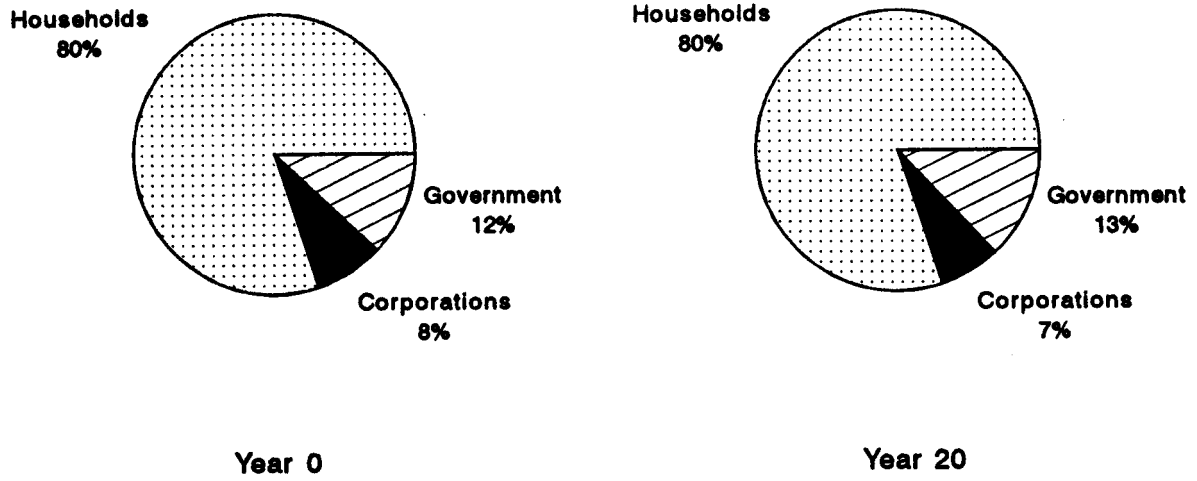
i. Geometric growth rate

If it is assumed that disposable income changes in discrete intervals, the average annual geometric rate of growth of the total disposable income for the interval 0-5, 5.70 per cent (table 10), is obtained as follows:

$$5.70 = [(555,140/420,685)^{1/5} - 1] \cdot 100, \quad (27)$$

where 420,685 and 555,140 are the levels of total disposable income in years 0 and 5.

Figure IV. Proportions of the total disposable incomes received by various institutions in the initial and the terminal year





Rates of growth of the total disposable income over the 20-year projection period, which were computed using the geometric growth rate formula, are shown in table 10 and presented in figure V.

ii. Exponential growth rate

If one assumes that the total disposable income changes continuously, the average annual exponential rate of growth of this income for the interval 0-5, 5.55 per cent, is obtained as follows:

$$5.55 = [ ( \ln ( 555,140/420,685 ) ) / 5 ] \cdot 100. \quad (28)$$

b. Rates of growth of disposable incomes of institutions

Rates of growth of disposable incomes of the various institutions can be also geometric or exponential.

i. Geometric growth rates

Assuming discrete growth, the geometric rates of increase of the disposable incomes of institutions for the interval 0-5 are calculated as follows:

The annual rate of growth of disposable household income, 5.71 per cent, is obtained as follows:

$$5.71 = [ ( 445,523/337,528 )^{1/5} - 1 ] \cdot 100, \quad (29)$$

where 337,528 and 445,523 are the levels of disposable household income in years 0 and 5, respectively;

The annual rate of growth of disposable corporate income, 4.87 per cent, is obtained as:

$$4.87 = [ ( 43,390/34,208 )^{1/5} - 1 ] \cdot 100, \quad (30)$$

where 34,208 and 43,390 are the levels of disposable corporate income in years 0 and 5, respectively;

The annual rate of growth of disposable government income, 6.23 per cent, is obtained as follows:

$$6.23 = [ ( 66,227/48,949 )^{1/5} - 1 ] \cdot 100, \quad (31)$$

where 48,949 and 66,227 are the levels of disposable government income in years 0 and 5, respectively.

Figure VI shows changes in the rates of growth of disposable incomes of households, corporations and government over the 20-year projection period.

Figure V. Rate of growth of total disposable income

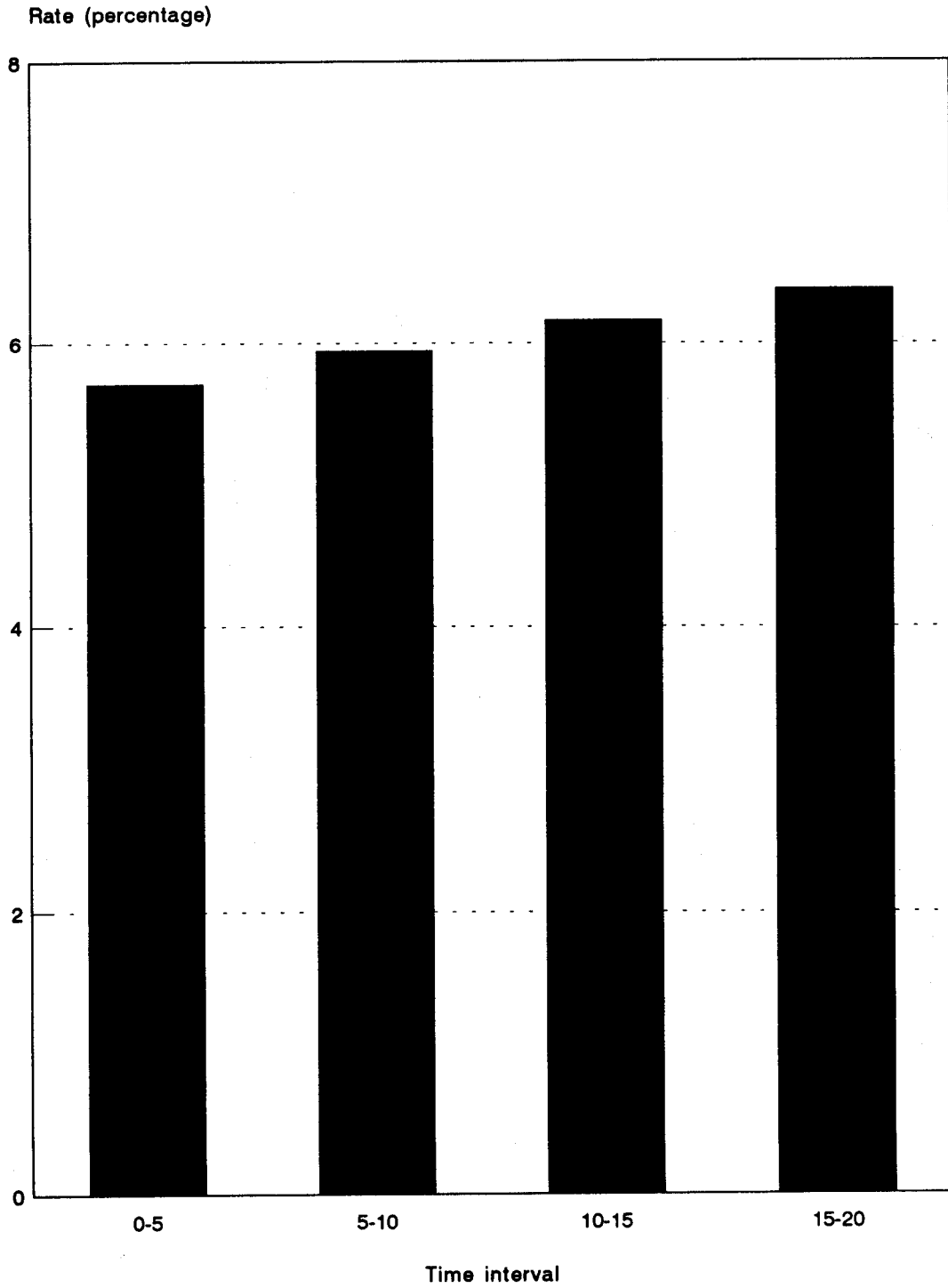
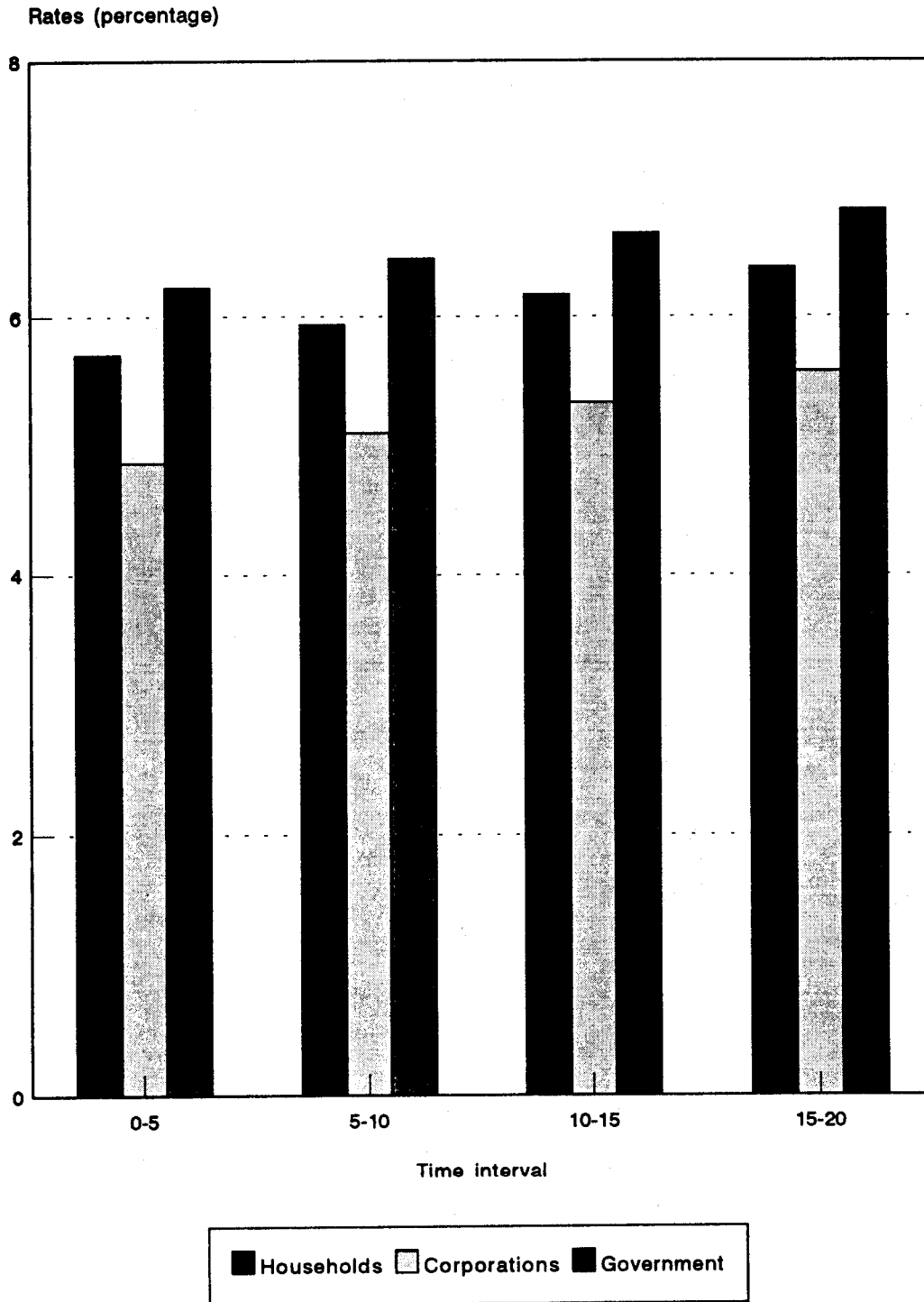


Figure VI. Rates of growth of disposable incomes of institutions



ii. Exponential growth rates

If continuous growth is assumed, rates of growth of disposable incomes of institutions would be calculated using the exponential growth rate formula. The calculations would be analogous to that indicated by equation (28) for the total disposable income.

(iv) Levels of per capita and per household disposable incomes of households

It is also possible to derive levels and rates of change of the disposable household income expressed in per capita and per household terms.

Per capita disposable income of households can be obtained by dividing the disposable household income by the population size. Thus, for the end of the projection interval 0-5, per capita disposable household income, 39.7, which is shown in the column corresponding to year 5 in table 11, can be derived as follows:

$$39.7 = 445,523 / 11,210.4, \quad (35)$$

where 445,523 is the level of disposable household income (table 10) and 11,210.4 is the population size in year 5 (table 3).<sup>2</sup>

Figure VII shows the change in per capita disposable household income over the 20-year projection period.

Average disposable household income at the end of the projection interval 0-5, 271.9, which is also shown in table 11, is calculated as follows:

$$271.9 = 445,523 / 1,638.7, \quad (36)$$

where 1,638.7 is the number of households in year 5 (table 3).

The change in average disposable household income over the projection period is indicated in figure VII.

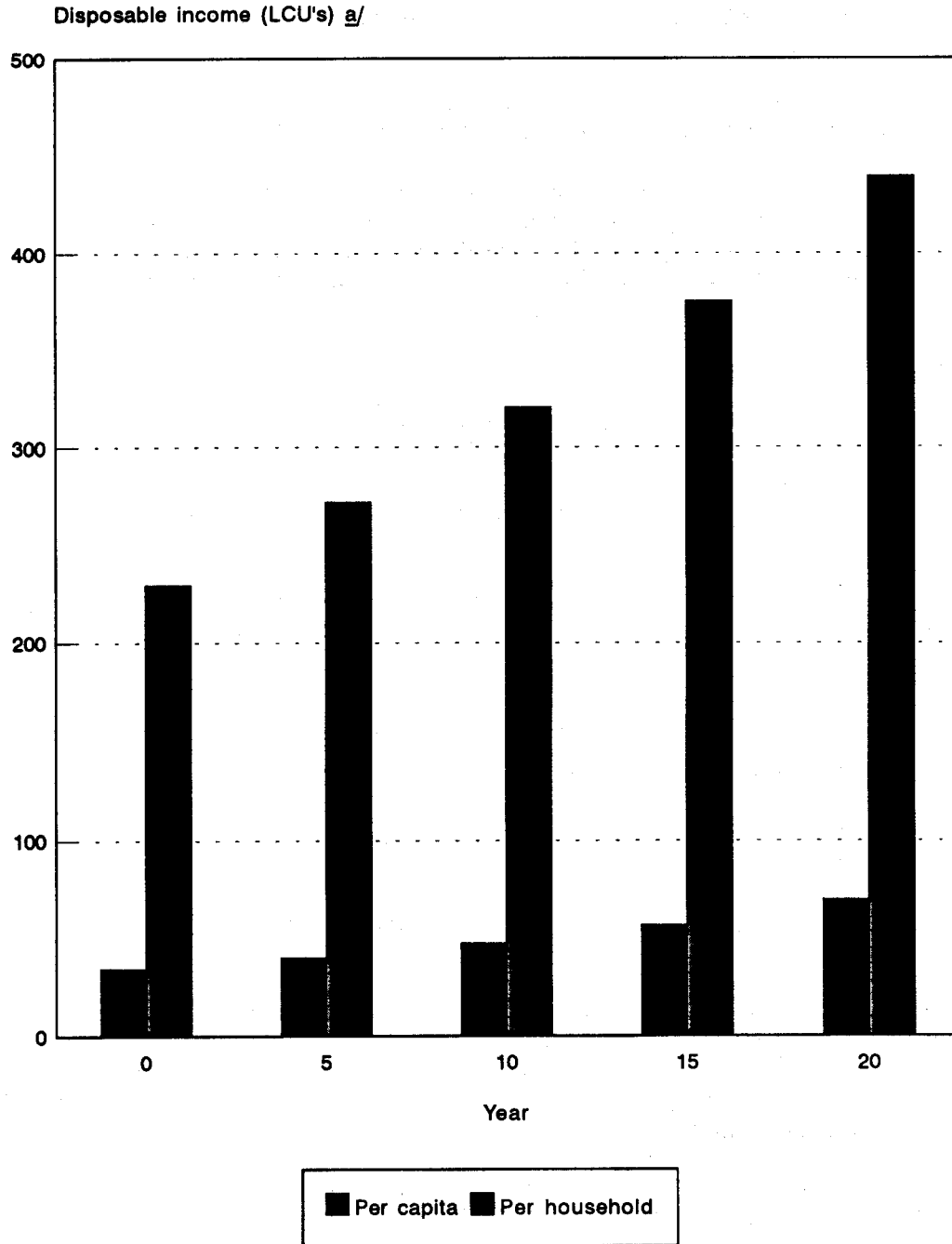
(v) Rates of change of per capita and per household disposable incomes of households

Given the levels of per capita and per household disposable incomes, it is further possible to derive the annual rates of change in those income levels. Those rates can be geometric or exponential.

a. Geometric growth rates

If one assumes that growth occurs over discrete time intervals, the annual rates of growth of per capita and per household disposable incomes of households for the interval 0-5 can be obtained using the geometric growth rate formula as follows:

Figure VII. Levels of per capita and per household disposable household income



a/ Local currency units.

Table 11. Levels and rates of growth of per capita and per household disposable incomes of households

	Year				
	0	5	10	15	20
Levels (LCUs) <u>a/</u>					
Per capita	33.8	39.7	47.1	56.6	69.7
Per household	229.5	271.9	320.6	375.0	439.4
Rates of growth (percentage)					
Per capita		3.32	3.46	3.75	4.24
Per household		3.45	3.35	3.19	3.22

a/ Local currency units.

The annual rate of growth of per capita disposable income of households, 3.32 per cent (table 11), is calculated as:

$$3.32 = [(39.7/33.8)^{1/5} - 1] \cdot 100, \quad (37)$$

where 33.8 and 39.7 are the levels of per capita disposable household income in years 0 and 5, respectively.

The annual rate of growth of average disposable household income, 3.45 per cent (table 11), is calculated as:

$$3.45 = [(271.9/229.5)^{1/5} - 1] \cdot 100, \quad (38)$$

where 229.5 and 271.9 are the levels of average disposable household income in years 0 and 5, respectively.

Figure VIII shows changes in the rates of growth of per capita and per household disposable incomes over the 20-year projection interval.

#### b. Exponential growth rates

If it is assumed that growth occurs continuously, the exponential rates of growth of per capita and per household disposable incomes of households can be obtained in a way that is analogous to that indicated by equations (39) and (40).

### 2. Urban-rural projection

This example shows how this method can be used to project disposable incomes for urban and rural areas. It emphasizes those calculations that are unique to urban and rural projections. The example uses the same types of inputs as those used to make the national projection. The inputs for the urban areas are shown in tables 12 through 14, while those for the rural areas are presented in tables 15 through 17.

#### (a) Different categories of incomes

The various categories of incomes -- factor incomes, gross incomes and disposable incomes -- for urban and rural areas can be projected using calculations that are identical to those carried out as part of the national projection, except that they are made for each location.

Thus, the inputs for the urban areas yield projected levels of different types of incomes over a 20-year period for urban areas, which are shown in table 18. The inputs for the rural areas yield projected levels of the various types of incomes over this period for rural areas, which are indicated in table 19. Aggregating those projected levels of income across urban and rural areas gives projections of different categories of incomes for the entire country, which is shown in table 20.

Figure VIII. Rates of growth of per capita and per household disposable household income

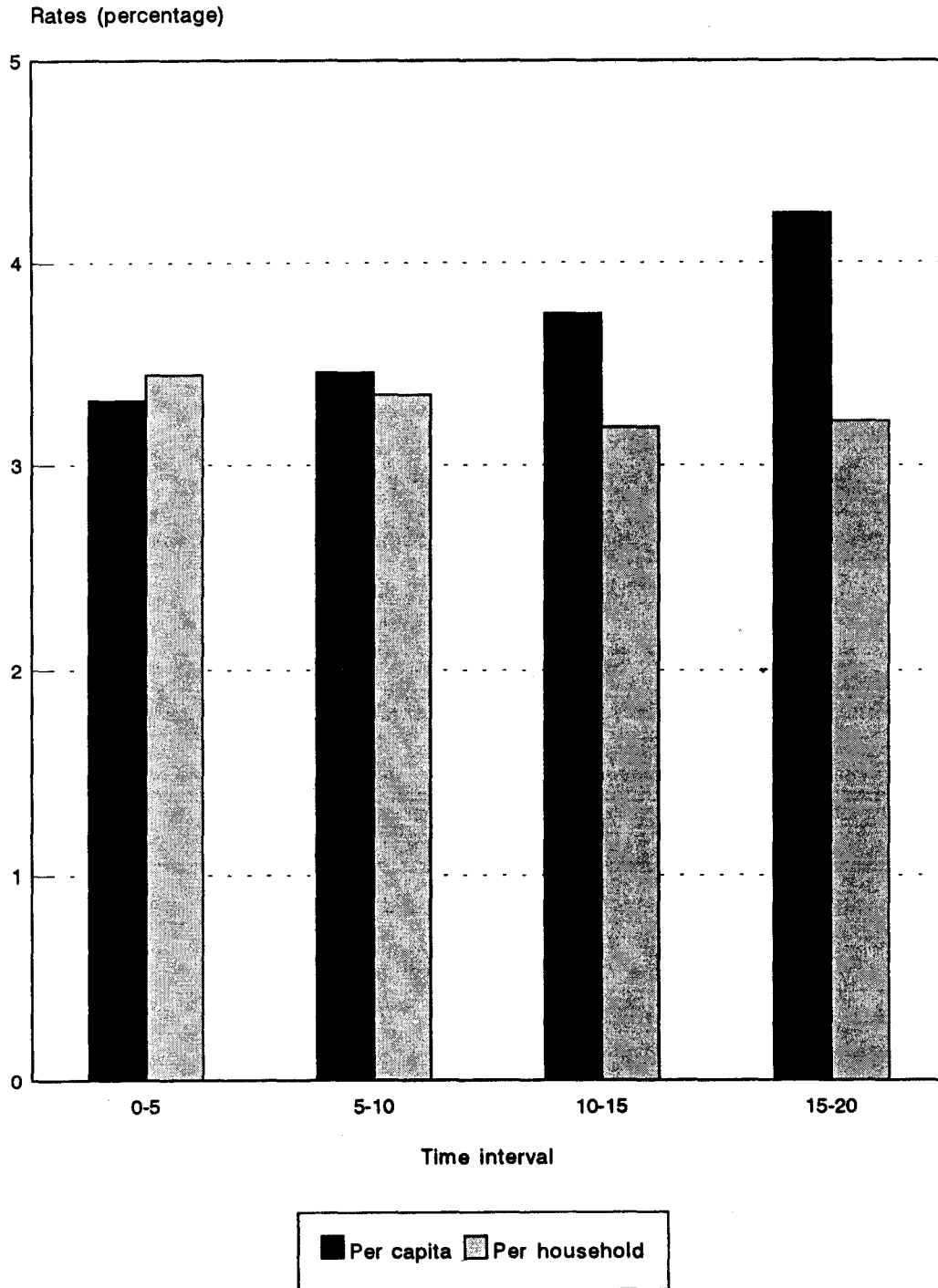




Table 12. Inputs for projecting incomes at the urban level;  
projected value added by industry, population  
size and number of households

Variable	Year				
	0	5	10	15	20
Value added (thousands of LCUs) a/					
Agriculture	9 000	10 433	12 095	14 022	16 255
Mining	1 400	1 874	2 507	3 355	4 490
Manufacturing	39 400	57 892	85 062	124 983	183 642
Utilities	5 500	8 081	11 874	17 447	25 635
Construction	11 100	13 505	16 431	19 990	24 321
Trade	30 700	43 058	60 392	84 702	118 799
Transportation	27 600	35 225	44 957	57 378	73 231
Services	61 500	90 364	132 774	195 088	286 649
Population size (thousands)					
	2 983.4	4 067.0	5 334.3	6 697.3	8 140.9
Number of households (thousands)					
	481.5	671.3	885.6	1 148.0	1 464.6

a/ Local currency units.

Table 13. Inputs for projecting incomes at the urban level; assumptions on the various proportions and ratios

Variable	Year				
	0	5	10	15	20
<b>Proportions of value added going to wages</b>					
Agriculture	0.1500	0.1500	0.1500	0.1500	0.1500
Mining	0.5272	0.5272	0.5272	0.5272	0.5272
Manufacturing	0.5465	0.5465	0.5465	0.5465	0.5465
Utilities	0.3225	0.3225	0.3225	0.3225	0.3225
Construction	0.7840	0.7840	0.7840	0.7840	0.7840
Trade	0.5003	0.5003	0.5003	0.5003	0.5003
Transportation	0.6193	0.6193	0.6193	0.6193	0.6193
Services	0.7337	0.7337	0.7337	0.7337	0.7337
<b>Ratios of net indirect taxes to value added</b>					
Agriculture	-0.0073	-0.0073	-0.0073	-0.0073	-0.0073
Mining	0.0094	0.0094	0.0094	0.0094	0.0094
Manufacturing	0.2673	0.2673	0.2673	0.2673	0.2673
Utilities	0.0005	0.0005	0.0005	0.0005	0.0005
Construction	0.0005	0.0005	0.0005	0.0005	0.0005
Trade	0.0262	0.0262	0.0262	0.0262	0.0262
Transportation	0.0240	0.0240	0.0240	0.0240	0.0240
Services	0.0193	0.0193	0.0193	0.0193	0.0193
<b>Proportions of profits received by households</b>					
	0.5613	0.5613	0.5613	0.5613	0.5613
<b>Proportions of gross corporate income paid to households as dividends</b>					
	0.3382	0.3382	0.3382	0.3382	0.3382
<b>Proportions of gross household income paid as household income taxes</b>					
	0.1565	0.1565	0.1565	0.1565	0.1565
<b>Proportions of gross corporate income paid as corporate income taxes</b>					
	0.2028	0.2028	0.2028	0.2028	0.2028

Table 14. Inputs for projecting incomes at the urban level;  
assumptions relating to transfers

(Thousands of LCUs) a/

Variable	Year				
	0	5	10	15	20
Government transfers to households	6 871	9 610	13 509	19 076	27 049
Government transfers to corporations	4 003	5 599	7 871	11 115	15 760
Net foreign transfers to households	0	0	0	0	0

a/ Local currency units.

Table 15. Inputs for projecting incomes at the rural level; projected value added by industry, population size and number of households

Variable	Year				
	0	5	10	15	20
Value added (thousands of LCUs) a/					
Agriculture	138 800	160 907	186 536	216 246	250 688
Mining	700	937	1 254	1 678	2 244
Manufacturing	5 700	8 375	12 306	18 081	26 567
Utilities	900	1 322	1 943	2 855	4 194
Construction	20 400	24 820	30 197	36 739	44 698
Trade	9 400	13 184	18 491	25 935	36 375
Transportation	5 300	6 764	8 633	11 018	14 062
Services	38 500	56 569	83 119	122 129	179 446
Population size (thousands)					
	7 016.6	7 130.6	7 258.0	7 433.5	7 503.1
Number of households (thousands)					
	989.3	968.1	970.1	991.2	1 022.2

a/ Local currency units.

Table 16. Inputs for projecting incomes at the rural level;  
assumptions on the various proportions and ratios

Variable	Year				
	0	5	10	15	20
<b>Proportions of value added going to wages</b>					
Agriculture	0.1436	0.1436	0.1436	0.1436	0.1436
Mining	0.5439	0.5439	0.5439	0.5439	0.5439
Manufacturing	0.5449	0.5449	0.5449	0.5449	0.5449
Utilities	0.3116	0.3116	0.3116	0.3116	0.3116
Construction	0.0674	0.0674	0.0674	0.0674	0.0674
Trade	0.2280	0.2280	0.2280	0.2280	0.2280
Transportation	0.6219	0.6219	0.6219	0.6219	0.6219
Services	0.7337	0.7337	0.7337	0.7337	0.7337
<b>Ratios of net indirect taxes to value added</b>					
Agriculture	-0.0073	-0.0073	-0.0073	-0.0073	-0.0073
Mining	0.0094	0.0094	0.0094	0.0094	0.0094
Manufacturing	0.2693	0.2693	0.2693	0.2693	0.2693
Utilities	0.0005	0.0005	0.0005	0.0005	0.0005
Construction	0.0005	0.0005	0.0005	0.0005	0.0005
Trade	0.0262	0.0262	0.0262	0.0262	0.0262
Transportation	0.0240	0.0240	0.0240	0.0240	0.0240
Services	0.0193	0.0193	0.0193	0.0193	0.0193
<b>Proportions of profits received by households</b>					
	0.7849	0.7849	0.7849	0.7849	0.7849
<b>Proportions of gross corporate income paid to households as dividends</b>					
	0.0091	0.0091	0.0091	0.0091	0.0091
<b>Proportions of gross household income paid as household income taxes</b>					
	0.0305	0.0305	0.0305	0.0305	0.0305
<b>Proportions of gross corporate income paid as corporate income taxes</b>					
	0.2028	0.2028	0.2028	0.2028	0.2028

Table 17. Inputs for projecting incomes at the rural level;  
assumptions relating to transfers

(Thousands of LCUs) a/

Variable	Year				
	0	5	10	15	20
Government transfers to households	483	600	753	956	1 228
Government transfers to corporations	4 724	5 867	7 363	9 346	12 002
Net foreign transfers to households	0	0	0	0	0

a/ Local currency units.

Table 18. Projected factor incomes, gross incomes and disposable incomes of institutions in urban areas

(Thousands of LCUs) a/

Type of income	Year				
	0	5	10	15	20
<b>Factor incomes of:</b>					
Households	153 504	215 075	302 793	428 154	607 809
Corporations	32 696	45 357	63 298	88 813	125 214
<b>Gross incomes of:</b>					
Households	172 787	241 918	340 372	481 026	682 535
Corporations	36 699	50 957	71 169	99 927	140 974
Government	47 625	67 338	95 611	136 263	194 845
<b>Disposable incomes of:</b>					
Households	145 745	204 058	287 104	405 745	575 718
Corporations	16 845	23 389	32 667	45 866	64 707
Government	36 751	52 129	74 232	106 072	152 036

a/ Local currency units.

Table 19. Projected factor incomes, gross incomes and disposable incomes of institutions in rural areas

(Thousands of LCUs) a/

Type of income	Year				
	0	5	10	15	20
<b>Factor incomes of:</b>					
Households	185 082	231 171	291 909	372 920	482 227
Corporations	34 618	41 707	50 569	61 760	76 051
<b>Gross incomes of:</b>					
Households	185 923	232 205	293 190	374 523	484 257
Corporations	39 342	47 574	57 932	71 106	88 054
Government	15 293	19 416	24 942	32 434	42 698
<b>Disposable incomes of:</b>					
Households	180 253	225 122	284 248	363 100	469 487
Corporations	31 005	37 493	45 656	56 039	69 396
Government	10 086	12 949	16 826	22 133	29 467

a/ Local currency units.



Table 20. Projected factor incomes, gross incomes and disposable incomes of institutions for the entire country

(Thousands of LCUs) a/

Type of income	Year				
	0	5	10	15	20
<b>Factor incomes of:</b>					
Households	338 586	446 246	594 703	801 074	1 090 036
Corporations	67 314	87 065	113 867	150 573	201 265
<b>Gross incomes of:</b>					
Households	358 710	474 123	633 562	855 549	1 166 792
Corporations	76 041	98 531	129 101	171 034	229 028
Government	62 918	86 754	120 554	168 698	237 543
<b>Disposable incomes of:</b>					
Households	325 998	429 180	571 351	768 846	1 045 205
Corporations	47 850	60 882	78 323	101 906	134 103
Government	46 837	65 078	91 057	128 205	181 503

a/ Local currency units.

(b) Other results

The projected incomes for urban and rural areas and the entire country can be further used to derive various indicators of disposable incomes at the urban-rural and the national level. Most of the indicators correspond to those that are calculated as part of the national projection, the derivation of which has been illustrated in the preceding example. Those indicators include the aggregates, indicators of the distribution by institutions and rates of growth of disposable incomes. They also include levels and growth rates of per capita and per household disposable incomes of households. Additional indicators which are computed only as part of an urban-rural projection include indicators of the locational distribution of disposable household income--proportions urban and rural, as well as those of urban-rural differentials of disposable household incomes.

The indicators that were obtained for urban and rural areas and the entire country, which correspond to indicators calculated in the national projection, are shown in tables 21 through 26.

Changes in the levels of the total disposable income for urban and rural areas and for the entire country for the 20-year projection period are shown in figure IX.

(i) Proportions of disposable household income that are urban and rural

The proportion of disposable household income that is urban is calculated as a ratio of the disposable household income for the urban areas to the disposable household income for the entire country. At the end of the projection interval 0-5, the proportion of disposable household income that is urban, 0.48, for the end of the interval 0-5, is obtained as:

$$0.48 = 204,058/429,180, \quad (41)$$

where 204,058 and 429,180 are the levels of disposable household income for the urban areas and the entire country in year 5, respectively.

The proportion of disposable household income that is rural equals the complement of the proportion urban. Thus, the proportion rural at the end of the projection interval 0-5, 0.52, is:

$$0.52 = 1 - 0.48, \quad (42)$$

where 0.48 is the proportion urban.

Changes in the proportions of disposable household income that are urban and rural over the projection period are shown in figure X.

Table 21. Disposable incomes: aggregates, indicators of the distribution and rates of growth in urban areas

Indicators	Year				
	0	5	10	15	20
Disposable income aggregates (thousands of LCUs) a/					
Levels of income					
Total	199 341	279 576	394 002	557 684	792 461
Household	145 745	204 058	287 104	405 745	575 718
Corporate	16 845	23 389	32 667	45 867	64 707
Government	36 751	52 129	74 232	106 072	152 036
Growth in incomes					
Total		80 235	114 426	163 682	234 777
Household		58 313	83 046	118 642	169 973
Corporate		6 544	9 278	13 200	18 840
Government		15 378	22 103	31 841	45 964
Indicators of the distribution of total disposable income by institutions					
Proportions by institutions					
Total	1.00	1.00	1.00	1.00	1.00
Households	0.73	0.73	0.73	0.73	0.73
Corporations	0.08	0.08	0.08	0.08	0.08
Government	0.18	0.19	0.19	0.19	0.19
Rates of growth of disposable incomes (percentage)					
Total		7.00	7.10	7.20	7.28
Households		6.96	7.07	7.16	7.25
Corporations		6.78	6.91	7.02	7.13
Government		7.24	7.33	7.40	7.47

a/ Local currency units.

Table 22. Levels and rates of growth of per capita and per household disposable incomes of households in urban areas

	Year				
	0	5	10	15	20
Levels (LCUs) a/					
Per capita	48.9	50.2	53.8	60.6	70.7
Per household	302.7	304.0	324.2	353.4	393.1
Rates of growth (percentage)					
Per capita		0.54	1.41	2.39	3.14
Per household		0.08	1.30	1.74	2.15

a/ Local currency units.

Table 23. Disposable incomes: aggregates, indicators of the distribution and rates of growth in rural areas

Indicators	Year				
	0	5	10	15	20
Disposable income aggregates (thousands of LCUs) a/					
Levels of income					
Total	221 344	275 564	346 729	441 272	568 350
Household	180 253	225 122	284 248	363 100	469 487
Corporate	31 005	37 493	45 656	56 039	69 396
Government	10 086	12 949	16 826	22 133	29 467
Growth in incomes					
Total		54 220	71 165	94 542	127 078
Household		44 870	59 125	78 853	106 387
Corporate		6 488	8 163	10 383	13 357
Government		2 862	3 877	5 307	7 334
Indicators of the distribution of total disposable income by institutions					
Proportions by institutions					
Total	1.00	1.00	1.00	1.00	1.00
Households	0.81	0.82	0.82	0.82	0.83
Corporations	0.14	0.14	0.13	0.13	0.12
Government	0.05	0.05	0.05	0.05	0.05
Rates of growth of disposable incomes (percentage)					
Total		4.48	4.70	4.94	5.19
Households		4.55	4.77	5.02	5.27
Corporations		3.87	4.02	4.18	4.37
Government		5.12	5.38	5.64	5.89

a/ Local currency units.

Table 24. Levels and rates of growth of per capita and per household disposable incomes of households in rural areas

	Year				
	0	5	10	15	20
Levels (LCUs) a/					
Per capita	25.6	31.6	39.2	48.8	62.6
Per household	182.2	232.5	293.0	366.3	459.3
Rates of growth (percentage)					
Per capita		4.21	4.40	4.52	5.08
Per household		5.00	4.73	4.57	4.63

a/ Local currency units.

Table 25. Disposable incomes: aggregates, indicators of distributions and rates of growth for the entire country

Indicators	Year				
	0	5	10	15	20
Disposable income aggregates (thousands of LCUs) a/					
Levels of income					
Total	420 685	555 140	740 731	998 956	1 360 811
Household	325 998	429 180	571 351	768 846	1 045 205
Corporate	47 850	60 882	78 323	101 906	134 103
Government	46 837	65 078	91 057	128 205	181 503
Growth in incomes					
Total		134 455	185 591	258 225	361 854
Household		103 182	142 171	197 495	276 359
Corporate		13 032	17 441	23 583	32 197
Government		18 241	25 980	37 148	53 297
Indicators of the distribution of total disposable income by institutions					
Proportions by institutions					
Total	1.00	1.00	1.00	1.00	1.00
Households	0.77	0.77	0.77	0.77	0.77
Corporations	0.11	0.11	0.11	0.10	0.10
Government	0.11	0.12	0.12	0.13	0.13
Indicators of the urban-rural distribution of disposable household income					
Proportions of disposable household income					
Urban	0.45	0.48	0.50	0.53	1.55
Rural	0.55	0.52	0.50	0.47	0.45
Rates of growth of disposable incomes (percentage)					
Total		5.70	5.94	6.16	6.38
Households		5.65	5.89	6.12	6.33
Corporations		4.94	5.17	5.41	5.64
Government		6.80	6.95	7.08	7.20

a/ Local currency units.

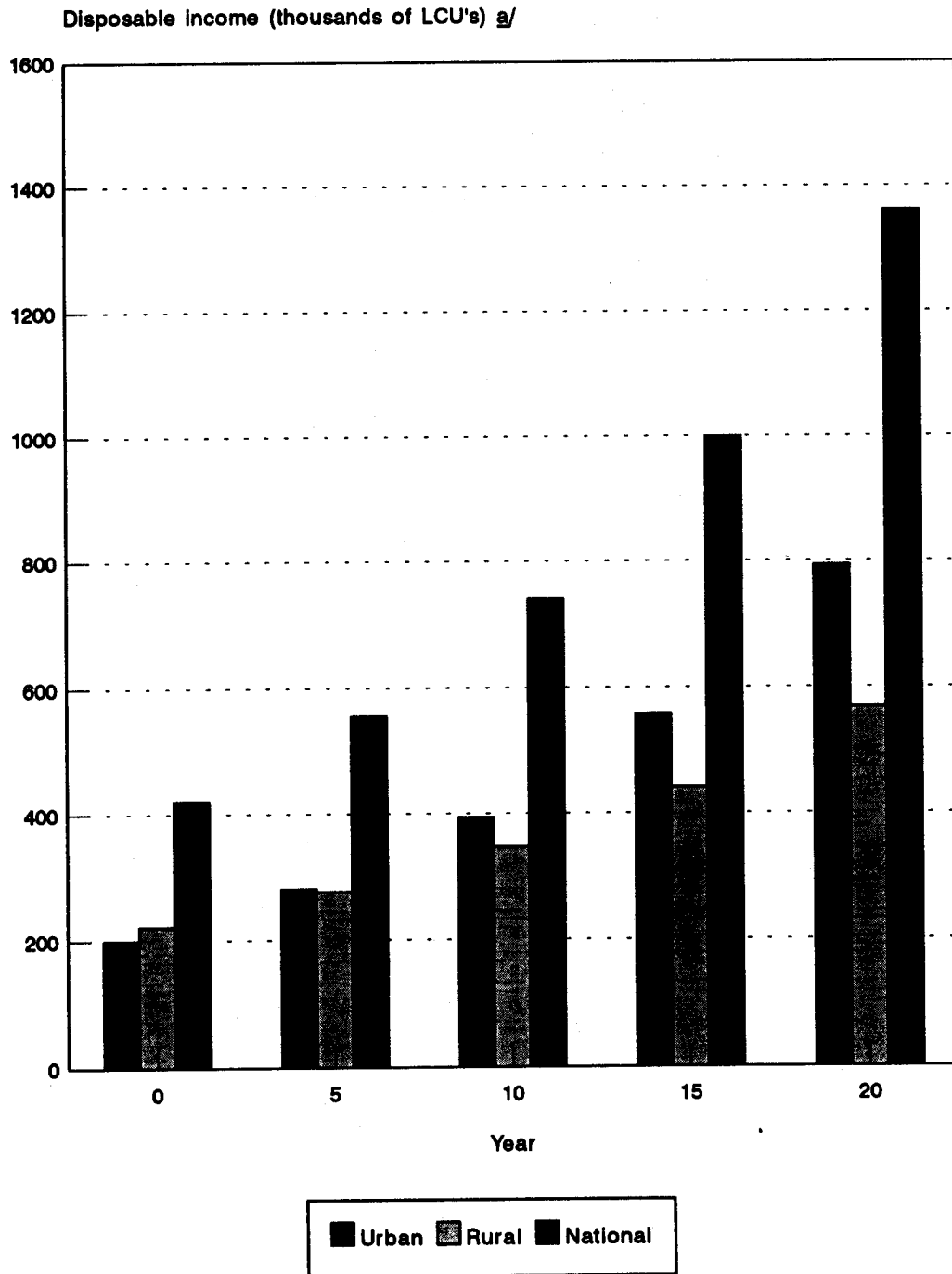
Table 26. Levels and rates of growth of per capita and per household disposable incomes of households for the entire country

	Year				
	0	5	10	15	20
Levels (LCUs) a/					
Per capita	32.6	38.3	45.4	54.4	66.8
Per household	221.6	261.8	307.9	359.4	420.3
Rates of growth (percentage)					
Per capita		3.29	3.43	3.70	4.19
Per household		3.39	3.30	3.14	3.18

a/ Local currency units.

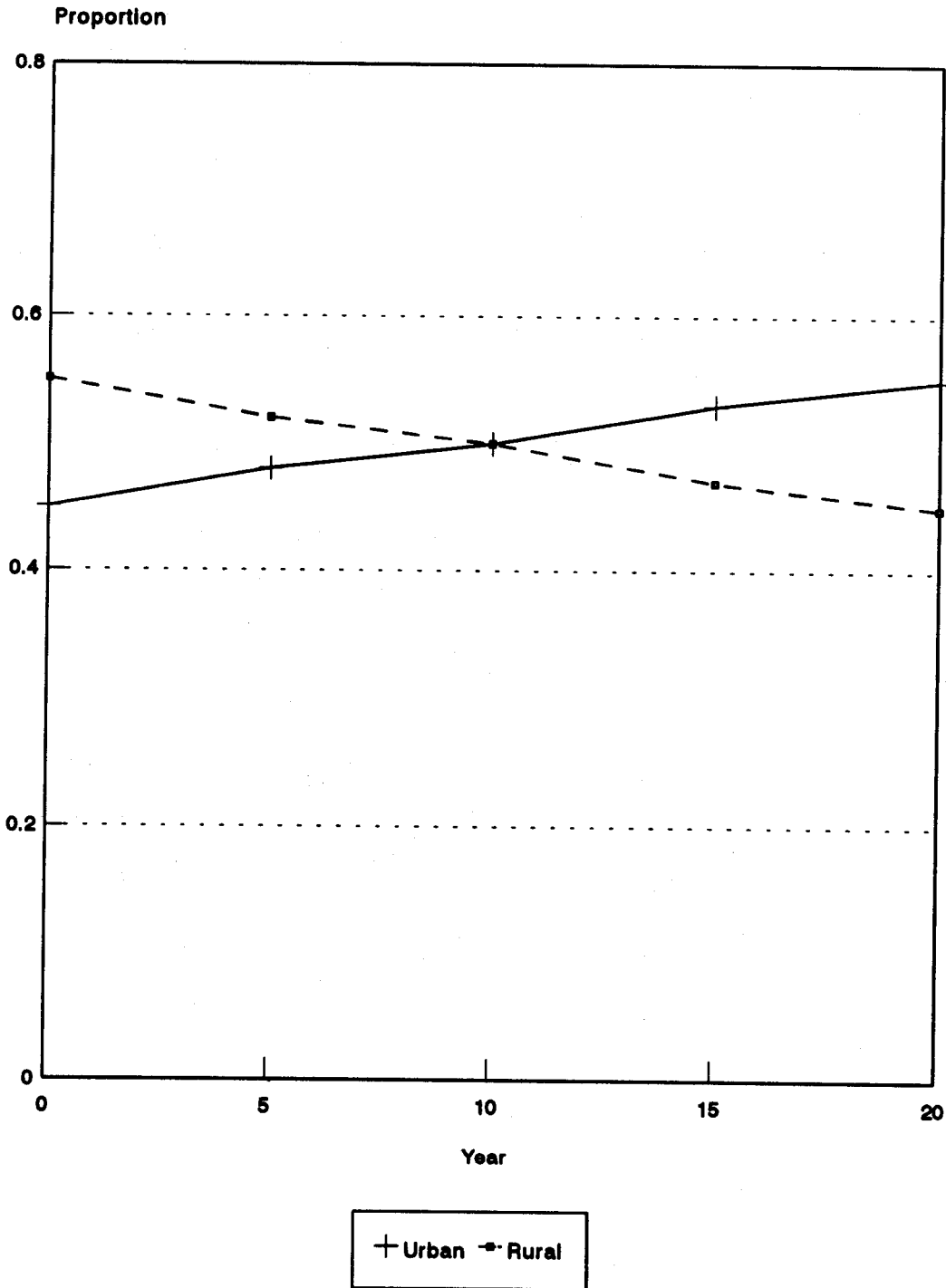


Figure IX. Total disposable income: urban, rural and national



a/ Local currency units.

Figure X. Proportions of disposable household income that are urban and rural



(ii) Urban-rural income differentials in per capita and per household disposable incomes of households

Given the levels of per capita and per household disposable incomes of households, it is also possible to derive urban-rural differentials in per capita and per household disposable incomes of households.

Thus, the urban-rural difference in per capita disposable household incomes expressed as a per cent of rural per capita disposable household income for the end of the projection interval 0-5, 58.9 per cent, which is shown in column 2 of table 27, can be obtained as follows:

$$58.9 = [(50.2 - 31.6) / 31.6] \cdot 100, \quad (43)$$

where 50.2 and 31.6 are, respectively, the levels of per capita disposable incomes of households in urban and rural areas in year 5 (shown in tables 22 and 24).

The urban-rural differential of per household disposable income for the end of the projection interval 0-5, 30.7 per cent, which is shown in column 3 of table 27, is obtained as follows:

$$30.7 = [(304.0 - 232.5) / 232.5] \cdot 100, \quad (44)$$

where 304.0 and 232.5 are, respectively, the levels of per household disposable income in urban and rural areas in year 5 (tables 22 and 24).

E. Summary

This chapter has described a method that uses selected relationships of the social accounting matrix to project disposable incomes for the entire country or for its urban and rural areas separately. In addition, the chapter described the types of inputs required by the method and the way they can be prepared using, among other things, a recent social accounting matrix. Lastly, two examples of projections -- national and urban-rural -- have been presented and discussed. A complete listing of the outputs that can be generated by the method is presented in box 10.

Table 27. Proportionate urban-rural differentials in per capita and per household disposable incomes of households

Year	Differences between levels of urban and rural disposable household incomes expressed as percentage of levels of rural disposable household incomes <sup>a/</sup>	
	Per capita	Per household
(1)	(2)	(3)
0	90.2	66.1
5	58.9	30.7
10	37.4	10.6
15	24.0	-3.5
20	13.0	-14.4

<sup>a/</sup> Calculations illustrated in text.

Box 10

Outputs of a method for projecting incomes  
using a social accounting matrix

1. Disposable income aggregates (national or urban, rural and national)

Levels of income:

Total

Household  
Corporate  
Government

Growth in incomes:

Total

Household  
Corporate  
Government

2. Indicators of the distribution of the total disposable income by institutions  
(national or urban, rural and national)

Proportions by institutions:

Households  
Corporations  
Government

3. Indicators of the urban-rural distribution of disposable household income  
(national only; if urban and rural incomes are being projected)

Proportions of disposable household income:

Urban  
Rural

(continued)

Box 10 (continued)

4. Rates of growth of disposable incomes (national or urban, rural and national)

Total:

Household  
Corporate  
Government

5. Indicators of per capita and per household disposable household incomes (national or urban, rural and national)

Levels:

Per capita  
Per household

Rates of growth:

Per capita  
Per household

6. Indicators of urban-rural differentials of disposable household incomes (national only; if urban and rural incomes are being projected)

Percentage differences between levels of urban and rural disposable household income:

Per capita  
Per household

F. Notation and equations

1. Indices, variables and special symbols

(a) List of indices

$i = 1, \dots, I$  are industries of the country's economy  
 $k = 1, 2$  are urban and rural locations  
 $t$  is the year of the projection period  
 $t'$  is the given calendar year

(b) List of variables

ADHI(k, t+5) is the average (per household) disposable household income in location k  
ADHI(t+5) is the average (per household) disposable household income  
CIT(t+5) is the corporate income taxes  
DADHI(t+5) is the difference between urban and rural average (per household) disposable household incomes expressed as per cent of the rural average (per household) disposable household income  
DCI(t+5) is the disposable corporate income  
DCIG is the growth of disposable corporate income during the interval  
DGI(t+5) is the disposable government income  
DGIG is the growth of disposable government income during the interval  
DHI(k, t+5) is the disposable household income in location k  
DHI(t+5) is the disposable household income  
DHIG is the growth of disposable household income during the interval  
DIVH(t+5) is the dividends paid to households

DPCDHI(t+5)	is the difference between urban and rural per capita disposable household incomes expressed as per cent of the rural per capita disposable household income
EGRADHI	is the average annual exponential growth rate of average (per household) disposable household income for the interval
EGRDCI	is the average annual exponential growth rate of the disposable corporate income for the interval
EGRDGI	is the average annual exponential growth rate of the disposable government income for the interval
EGRDHI	is the average annual exponential growth rate of the disposable household income for the interval
EGRPCDHI	is the average annual exponential growth rate of per capita disposable household income for the interval
EGRTDI	is the average annual exponential growth rate of the total disposable income for the interval
FIC(t+5)	is the factor income of corporations
FIH(t+5)	is the factor income of households
GCI(t+5)	is the gross corporate income
GDP(t')	is the gross domestic product at factor prices
GDP(t+5)	is the gross domestic product at factor prices
GGRDCI	is the average annual geometric growth rate of the disposable corporate income for the interval
GGRDGI	is the average annual geometric growth rate of the disposable government income for the interval
GGRDHI	is the average annual geometric growth rate of the disposable household income for the interval
GGI(t+5)	is the gross government income
GGRPCDHI	is the average annual geometric growth rate of the per capita disposable household income for the interval



GGRADHI	is the average annual geometric growth rate of the average (per household) disposable household income for the interval
GGRTDI	is the average annual geometric growth rate of the total disposable income for the interval
GHI(t+5)	is the gross household income
GTC(t+5)	is the government transfers to corporations
GTH(t+5)	is the government transfers to households
HIT(t+5)	is the household income taxes
NFTH(t')	is the net foreign transfers to households
NFTH(t+5)	is the net foreign transfers to households
NH(t+5)	is the total number of households
NIT(i,t+5)	is the net amount of indirect taxes (indirect taxes less subsidies) in industry i
NIT(t+5)	is the total net indirect taxes
PCDHI(k,t+5)	is the per capita disposable household income in location k
PCDHI(t+5)	is the per capita disposable household income
POP(t+5)	is the population size
PRCIH(t+5)	is the proportion of gross income of corporations paid to households as dividends
PRCIT(t+5)	is the proportion of gross corporate income paid as corporate income taxes
PRDCI(t+5)	is the proportion of total disposable income received by corporations
PRDGI(t+5)	is the proportion of total disposable income received by government
PRDHI(t+5)	is the proportion of total disposable income received by households
PRDHIURB(t+5)	is the proportion of disposable household income that is urban

PRDHIRUR(t+5)	is the proportion of disposable household income that is rural
PRHIT(t+5)	is the proportion of gross household income paid as household income taxes
PROF(i,t+5)	is the amount of profits in industry i
PROF(t+5)	is the total profits
PROFH(t+5)	is the amount of profits accruing to households
PRPROFH(t+5)	is the proportion of profits received by households
PRVAWG(i,t+5)	is the proportion of value added going to wages in industry i
RGTC(t')	is the ratio of government transfers to corporations to the gross domestic product in year t'
RGTH(t')	is the ratio of government transfers to households to the gross domestic product in year t'
RITVA(i,t+5)	is the ratio of net indirect taxes to value added in industry i
RNFTH(t')	is the ratio of net foreign transfers to households to the gross domestic product in year t'
TDI(t+5)	is the total disposable income
TDIG	is the growth in the total disposable income during the interval
VA(i,t+5)	is the value added at factor prices in industry i
WAGE(i,t+5)	is the wage bill of industry i
WAGE(t+5)	is the total wages

(c) List of special symbols

I	is the number of industries
ln	is the natural logarithm

2. Equations

A. The technique

1. National level

(a) Incomes of factors of production

(i) Wages

$$WAGE(i, t+5) = PRVAWG(i, t+5) \cdot VA(i, t+5); \quad (1)$$

$$i = 1, \dots, I$$

$$WAGE(t+5) = \sum_{i=1}^I WAGE(i, t+5) \quad (2)$$

(ii) Profits

$$PROF(i, t+5) = VA(i, t+5) - WAGE(i, t+5); \quad (3)$$

$$i = 1, \dots, I$$

$$PROF(t+5) = \sum_{i=1}^I PROF(i, t+5) \quad (4)$$

(b) Factor incomes of institutions

(i) Factor income of households

$$PROFH(t+5) = PRPROFH(t+5) \cdot PROF(t+5) \quad (5)$$

$$FIH(t+5) = WAGE(t+5) + PROFH(t+5) \quad (6)$$

(ii) Factor income of corporations

$$FIC(t+5) = PROF(t+5) - PROFH(t+5) \quad (7)$$

(c) Gross incomes of institutions

(i) Gross income of corporations

$$GCI(t+5) = FIC(t+5) + GTC(t+5) \quad (8)$$

(ii) Gross income of households

$$DIVH(t+5) = PRCIH(t+5) \cdot GCI(t+5) \quad (9)$$

$$GHI(t+5) = FIH(t+5) + DIVH(t+5) + GTH(t+5) + NFTH(t+5) \quad (10)$$

(iii) Gross income of government

a. Household income taxes

$$HIT(t+5) = PRHIT(t+5) \cdot GHI(t+5) \quad (11)$$

b. Corporate income taxes

$$CIT(t+5) = PRCIT(t+5) \cdot GCI(t+5) \quad (12)$$

c. Net indirect taxes

$$NIT(i, t+5) = RITVA(i, t+5) \cdot VA(i, t+5); \quad (13)$$

$$i = 1, \dots, I$$

$$NIT(t+5) = \sum_{i=1}^I NIT(i, t+5) \quad (14)$$

$$GGI(t+5) = HIT(t+5) + CIT(t+5) + NIT(t+5) \quad (15)$$

(d) Disposable incomes of institutions

(i) Disposable household income

$$DHI(t+5) = GHI(t+5) - HIT(t+5) \quad (16)$$

(ii) Disposable corporate income

$$DCI(t+5) = GCI(t+5) - [DIVH(t+5) + CIT(t+5)] \quad (17)$$

(iii) Disposable government income

$$DGI(t+5) = GGI(t+5) - [GTH(t+5) + GTC(t+5)] \quad (18)$$

(e) Other results

(i) Aggregates of disposable income

a. Total disposable income

$$TDI(t+5) = DHI(t+5) + DCI(t+5) + DGI(t+5) \quad (19)$$

b. Growth in total disposable income

$$TDIG = TDI(t+5) - TDI(t) \quad (20)$$

c. Growth in disposable incomes of institutions

$$DHIG = DHI(t+5) - DHI(t) \quad (21)$$

$$DCIG = DCI(t+5) - DCI(t) \quad (22)$$

$$DGIG = DGI(t+5) - DGI(t) \quad (23)$$

(ii) Indicators of the distribution of total disposable income

a. Proportions by institutions

$$PRDHI(t+5) = DIH(t+5) / TDI(t+5) \quad (24)$$

$$PRDCI(t+5) = DCI(t+5) / TDI(t+5) \quad (25)$$

$$\text{PRDGI}(t+5) = \text{DGI}(t+5) / \text{TDI}(t+5) \quad (26)$$

(iii) Rates of growth of disposable incomes

a. The rate of growth of total disposable income

i. Geometric growth rate

$$\text{GGRTDI} = [(\text{TDI}(t+5)/\text{TDI}(t))^{1/5} - 1] \cdot 100 \quad (27)$$

ii. Exponential growth rate

$$\text{EGRTDI} = [(\ln (\text{TDI}(t+5)/\text{TDI}(t))) / 5] \cdot 100 \quad (28)$$

b. Rates of growth of disposable incomes of institutions

i. Geometric growth rate

$$\text{GGRDHI} = [(\text{DHI}(t+5)/\text{DHI}(t))^{1/5} - 1] \cdot 100 \quad (29)$$

$$\text{GGRDCI} = [(\text{DCI}(t+5)/\text{DCI}(t))^{1/5} - 1] \cdot 100 \quad (30)$$

$$\text{GGRDGI} = [(\text{DGI}(t+5)/\text{DGI}(t))^{1/5} - 1] \cdot 100 \quad (31)$$

ii. Exponential growth rates

$$\text{EGRDHI} = [(\ln (\text{DHI}(t+5)/\text{DHI}(t))) / 5] \cdot 100 \quad (32)$$

$$\text{EGRDCI} = [(\ln (\text{DCI}(t+5)/\text{DCI}(t))) / 5] \cdot 100 \quad (33)$$

$$\text{EGRDGI} = [(\ln (\text{DGI}(t+5)/\text{DGI}(t))) / 5] \cdot 100 \quad (34)$$

(iv) Levels of per capita and per household disposable incomes of households

$$\text{PCDHI}(t+5) = \text{DHI}(t+5) / \text{POP}(t+5) \quad (35)$$

$$\text{ADHI}(t+5) = \text{DHI}(t+5) / \text{NH}(t+5) \quad (36)$$

(v) Rates of change of per capita and per household disposable incomes of households

a. Geometric growth rates

$$\text{GGRPCDHI} = [(\text{PCDHI}(t+5)/\text{PCDHI}(t))^{1/5} - 1] \cdot 100 \quad (37)$$

$$\text{GGRADHI} = [(\text{ADHI}(t+5)/\text{ADHI}(t))^{1/5} - 1] \cdot 100 \quad (38)$$

b. Exponential growth rates

$$\text{EGRPCDHI} = [(\ln (\text{PCDHI}(t+5)/\text{PCDHI}(t))) / 5] \cdot 100 \quad (39)$$

$$\text{EGRADHI} = [(\ln (\text{ADHI}(t+5)/\text{ADHI}(t))) / 5] \cdot 100 \quad (40)$$

2. Urban-rural level

(a) Different categories of incomes

(b) Other results

(i) Proportions of disposable household income that are urban and rural

$$\text{PRDHIURB}(t+5) = \text{DHI}(1,t+5) / \text{DHI}(1,t+5) \quad (41)$$

$$\text{PRDHIRUR}(t+5) = 1 - \text{PRDHIURB}(t+5) \quad (42)$$

(ii) Urban-rural differentials in per capita and per household disposable incomes

$$\text{DPCDHI}(t+5) = [(\text{PCDHI}(1,t+5) - \text{PCDHI}(2,t+5)) / \text{PCDHI}(2,t+5)] \cdot 100 \quad (43)$$

$$\text{DADHI}(t+5) = [(\text{ADHI}(1,t+5) - \text{ADHI}(2,t+5)) / \text{ADHI}(2,t+5)] \cdot 100 \quad (44)$$

B. The inputs

1. Types of inputs required
2. Preparation of the inputs

(a) Projections of value added, population and the number of households

(b) Assumptions on the various proportions and ratios

(i) Observations on proportions and ratios

a. Procedures to derive observations on proportions and ratios

i. National level

Value added

$$VA(i,t') = WAGE(i,t') + PROF(i,t') \quad (45)$$

$$i = 1, \dots, I$$

Proportions of value added going to wages

$$PRVAWG(i,t') = WAGE(i,t') / VA(i,t') \quad (46)$$

$$i = 1, \dots, I$$

Ratios of net indirect taxes to value added

$$RITVA(i,t') = NIT(i,t') / VA(i,t') \quad (47)$$

$$i = 1, \dots, I$$

Proportion of profits received by households

$$PRPROFH(t') = PROFH(t') / PROF(t') \quad (48)$$

Proportion of gross corporate income paid to households as dividends

$$PRCIH(t') = DIVH(t') / GCI(t') \quad (49)$$



Proportion of gross household income paid as household income taxes

$$PRHIT(t') = HIT(t') / GHI(t') \quad (50)$$

Proportion of gross corporate income paid as corporate income taxes

$$PRCIT(t') = CIT(t') / GIC(t') \quad (51)$$

ii. Urban-rural level

Value added

$$VA(i,k,t') = WAGE(i,k,t') + PROF(i,k,t') \quad (52)$$

$$i = 1, \dots, I;$$

$$k = 1, 2$$

Proportions of value added going to wages

$$PRVAWG(i,k,t') = WAGE(i,k,t') / VA(i,k,t') \quad (53)$$

$$i = 1, \dots, I;$$

$$k = 1, 2$$

Ratios of net indirect taxes to value added

$$RITVA(i,k,t') = NIT(i,k,t') / \sum_{k'=1}^2 VA(i,k',t') \quad (54)$$

$$i = 1, \dots, I;$$

$$k = 1, 2$$

Proportions of profits received by households

$$PRPROFH(k,t') = PROFH(k,t') / PROF(k,t') \quad (55)$$

$$k = 1, 2$$

Proportions of gross corporate income paid to households as dividends

$$\text{PRCIH}(k, t') = \text{DIVH}(k, t') / \text{GCI}(t') \quad (56)$$

$$k = 1, 2$$

Proportions of gross household income paid as household income taxes

$$\text{PRHIT}(k, t') = \text{HIT}(k, t') / \text{GHI}(k, t') \quad (57)$$

$$k = 1, 2$$

Proportions of gross corporate income paid as corporate income taxes

$$\text{PRCIT}(k, t') = \text{CIT}(t') / \text{GCI}(t') \quad (58)$$

$$k = 1, 2$$

b. Illustrating the derivation of observations on proportions and ratios

(ii) Assumptions on future values of proportions and ratios

(c) Assumptions on transfers

(i) Observations on the relevant ratios

a. Procedure to derive observations on ratios

i. National level

Gross domestic product

$$\text{GDP}(t') = \sum_{i=1}^I \text{VA}(i, t') \quad (59)$$

Ratio of government transfers to households to GDP

$$RGTH(t') = GTH(t') / GDP(t') \quad (60)$$

Ratio of government transfers to corporations to GDP

$$RGTC(t') = GTC(t') / GDP(t') \quad (61)$$

Ratio of net foreign transfers to households to GDP

$$RNFTH(t') = NFTH(t') / GDP(t') \quad (62)$$

ii. Urban-rural level

Gross domestic product

$$GDP(k,t') = \sum_{i=1}^I VA(i,k,t') \quad (63)$$

$$k = 1,2$$

Ratios of government transfers to households to GDP

$$RGTH(k,t') = GTH(k,t') / GDP(k,t') \quad (64)$$

$$k = 1,2$$

Ratios of government transfers to corporations to GDP

$$RGTC(k,t') = GTC(t') / \left[ \sum_{k'=1}^2 GDP(k',t) \right] \quad (65)$$

$$k = 1,2$$

Ratios of net foreign transfers to households to GDP

$$\begin{aligned} \text{RNFTH}(k, t') &= \text{NFTH}(k, t') / \text{GDP}(k, t') & (66) \\ k &= 1, 2 \end{aligned}$$

b. Illustrative derivation of observations on ratios

(ii) Assumptions on future values of ratios

(iii) Deriving future values of transfers

Procedure to derive future values of transfers

i. National level

Gross domestic product

$$\text{GDP}(t+5) = \sum_{i=1}^I \text{VA}(i, t+5) \quad (67)$$

Government transfers to households

$$\text{GTH}(t+5) = \text{GDP}(t+5) \cdot \text{RGTH}(t+5) \quad (68)$$

Government transfers to corporations

$$\text{GTC}(t+5) = \text{GDP}(t+5) \cdot \text{RGTC}(t+5) \quad (69)$$

Net foreign transfers to households

$$\text{NFTH}(t+5) = \text{GDP}(t+5) \cdot \text{RNFTH}(t+5) \quad (70)$$

ii. Urban-rural level

Notes

1/ Throughout this chapter, "value added" refers to value added in constant factor prices. Various types of incomes, such as incomes of factors of production and incomes of institutions, are also in constant prices.

2/ It can be easily applied using an electronic spreadsheet program.

3/ Since only two factors of production are assumed in this discussion -- labour and capital -- profits going to households include rent and interest income received by households, plus the income of unincorporated business owned by households.

4/ The social accounting matrix of table 1 assumes that there are no public enterprises owned and operated by the government. Hence, the government sector is not among the institutions that are recipients of factor income and, in particular, income from capital.

5/ Indicators of the distribution of disposable corporate income and disposable government income by location are not included among the other results of the method, since they would not be of much interest to the planner.

6/ The definitions of the various variables referring to the given calendar year,  $t'$ , which are used in this discussion are not given here. The definitions of those variables for the year  $t+5$  -- the end of the projection interval ( $t$  to  $t+5$ ) -- were presented in section B. Those definitions are included in section F of this chapter.

7/ Since the disposable household income and the population size are respectively expressed in thousands of local currency units and thousands of persons, per capita disposable household income is expressed in local currency units.

Annex I

SOCIAL ACCOUNTING MATRIX

A. Introduction

The social accounting matrix provides a picture of the income and product flows in an economy during a particular period, usually a year (Pyatt and Thorbecke, 1976). In this sense, it is similar to the input-output table (see box 11). However, SAM goes further than an input-output table; in addition to presenting the product flows, it shows the intervening relationships between the vector of final demand (which is generally taken as given in an input-output table) and factor incomes received owing to the production. SAM provides a more complete view, therefore, of the circular flows of income and products within an economy.

SAM is fundamentally a table consisting of an equal number of rows and columns, where each row and its corresponding column refer to a particular accounting category. These accounting categories can be grouped into factors of production (e.g., labour, capital), institutions (e.g., households, corporations, government), industries (e.g., agriculture, manufacturing), capital accounts (savings and investment) and the foreign sector (or "rest of the world"). Each row of SAM contains the receipts of a given unit, while each column contains the corresponding outlays or expenditures. Thus, SAM is, in fact, a type of double-entry accounting document.

This annex first discusses two representative social accounting matrices, which are shown in tables 1 and 2 of chapter IX. Then, the annex briefly considers the types of data that may be used to construct such matrices.

B. Description of two social accounting matrices

Table 1 in chapter IX presents a social accounting matrix of a hypothetical economy. That SAM consists of five basic types of rows and columns corresponding to five basic types of accounts. These are, respectively, accounts of factors of production, accounts of institutions, the capital account, accounts of industries and the foreign sector account. In the table, factors of production are restricted to labour and capital, while institutions consist of households, corporations and government. The industries are agriculture, mining, manufacturing, utilities, construction, trade, transport and services. In addition to the rows and columns corresponding to these accounting categories, there is a sixth row containing the column totals and a sixth column containing the row totals. It follows from the double-entry accounting principles underlying SAM that there is always an exact correspondence between each element of the row totals and the corresponding element of the column totals.

In table 1, rows 1a and 1b, and columns 1a and 1b refer to the two factors of production -- labour and capital. In particular, rows 1a and 1b show that the factors of production receive all of their payments from the various industries (columns 4a to 4h). Moreover, they show how much factor income is generated in

Box 11

Glossary

Final goods and services

Goods and services that are consumed to satisfy wants rather than used as inputs into further stages of production.

Input-output table

A table indicating in matrix form the linkages existing among industries in an economy. Each row of the input-output matrix indicates the way in which the output of the industry is used to satisfy final demand or as inputs to other industries. Each column of the matrix shows the origins of the inputs used by the given industry, including those of factors of production (e.g. labour).

Intermediate goods and services

Goods and services used as inputs into further stages of production, an example of which is leather in shoe manufacturing.

Net foreign investment

Total income from abroad less (minus) the sum of all exports of goods and services.

the economy, how much of that income is generated by each industry and how much of that income is received by each factor of production. Rows 1a and 1b show respectively that the labour income accrues entirely to households in the form of wages and salaries and that the capital income accrues to both households and domestic corporations in the form of profits.

Rows 2a to 2c indicate where the receipts of the various institutions come from. First, row 2a shows that the receipts of households come in the form of wages and profits received from industries for supplying services of factors of production -- labour and capital -- to those industries (columns 1a and 1b). In addition, the receipts of households come from corporations and the government in the form of dividends and government transfers to households, respectively (columns 2b and 2c). Secondly, row 2b shows that the receipts of corporations are in the form of profits received from industries for supplying the services of capital (column 1b) and payments from government in the form of transfers to corporations (column 2c). Lastly, in rows 2c, government revenues are shown to consist of taxes levied on household income (column 2a) and corporate income (column 2b). In addition, government revenues come from net indirect taxes (column 2d).

The outlays of institutions are presented in columns 2a through 2c. Thus, outlays of households (shown in column 2a) consist of payments of household income taxes to government (row 2c), household savings (row 3), purchases of goods and services from industries (rows 4a to 4h) and purchases of final goods and services from the rest of the world, or final imports (row 5). Corporate outlays (column 2b) include the payments of dividends to households (row 2a) and corporate income taxes to government (row 2c), plus corporate savings (row 3). Lastly, government outlays (column 2c) include transfers to households and corporations (rows 2a and 2b), government savings (row 3) and the purchases of goods and services (row 4h).

Row 3 contains the balancing items on the capital account, including net domestic savings -- household, corporate and government savings (columns 2a to 2c) -- and net foreign investment (column 5). Column 3 presents the disposition of these savings, as purchases of capital goods and inventory from the various industries (rows 4a through 4h) and the rest of the world (row 5).

Rows 4a to 4h show that the receipts of the industries consist of purchases by institutions of final goods and services (columns 2a to 2c), purchases of intermediate goods and services by the industries themselves (columns 4a to 4h) and sales to the rest of the world, or exports (column 5). The industries spend their receipts (columns 4a to 4h) on payments to the factors of production (rows 1a and 1b), on net indirect taxes paid to government (row 2d), on payments for intermediate goods and services received from the industries themselves (rows 4a through 4h) and on purchases of intermediate goods and services from the rest of the world, or intermediate imports (row 5).

Row 5 and column 5 describe the hypothetical economy's transactions with the rest of the world. Row 5 shows that the foreign sector derives its receipts from the sale of both final goods and services to institutions (columns 2a to 2c), the sales of investment goods (column 3) and the sale of intermediate goods and services to the domestic industries (columns 4a through 4h). The rest of the world's outlays (column 5) include purchases of domestic goods and services (rows 4a through 4h) and a balancing item (row 3), which is called net foreign investment.

A SAM such as that presented in table 1 can be easily disaggregated to provide more detail if the necessary data are available. For example, households can be further classified according to location (e.g., urban or rural), principal source of income (e.g., agricultural, non-agricultural) and/or income level (e.g., high, medium and low). Table 2 in chapter IX, for example, illustrates how the SAM in table 1 can be disaggregated to show how income and product flows, including those between urban and rural locations can be depicted by SAM. The degree of detail (i.e., the number of rows and columns) in any given SAM will depend on the purpose for which it has been constructed as well as on the availability of data.

### C. Types of data required to derive social accounting matrix

When SAM is not available, it must be constructed from appropriate data with the necessary detail for the types of projections desired. For example, if SAM



is to be used, among other things, to project disposable incomes of urban and rural households, it must show the various selected flows by location. As suggested in the description of the method, to project incomes using SAM, only part of the matrix is used in the projection. The full SAM is necessary only to ensure that the income flows on which the projections are based are in fact internally consistent.

The amount of data required to construct SAM would depend on the degree of disaggregation desired. An extremely simple SAM, which would not be disaggregated by production industry, can be derived from the national accounts data available in most countries. However, for this purpose, the national accounts must include the "national disposable income and outlay" account, as well as the "domestic product and expenditure" account. Other sources of data used in the construction of a relatively simple SAM would include the balance of payments and financial data, which are most often available from central banks.

If more disaggregated SAMs are to be constructed (such as those presented in tables 1 and 2), it will be necessary to have access to an input-output table which provides information on inter-industrial product flows within the production sector, information on factor payments by industry and a industrial breakdown of final demand. In addition, household survey data are necessary to identify sources of income for different categories of households, as well as to show how such income is disbursed (i.e., consumption expenditures, personal savings, income taxes).

Annex II

ILLUSTRATIVE DERIVATION OF VARIOUS PROPORTIONS AND RATIOS

This annex illustrate the applications of the steps to calculate observations on the various proportions and ratios used in preparing income projections, which were described in section C of chapter IX. The use of those steps is first illustrated at the national level and then at the urban-rural level.

A. National level

The calculation of the proportions and ratios at the national level is illustrated using the SAM shown in table 1 of chapter IX.

1. Value added

To calculate the proportions of value added going to wages by industry, it is initially necessary to obtain value added at factor prices for each industry. As illustrated in table 28, value added for each industry (column 4) is obtained as the sum of labour income (column 2) and capital income (column 3) for the industry.

For example, value added in agriculture, 132,978, is obtained as follows:

$$132,978 = 19,142 + 113,836, \quad (45)$$

where 19,142 and 113,836 are, respectively, labour income (wages) and capital income (profits) in agriculture.

2. Proportions of value added going to wages by industry

Given the levels of value added by industry, the proportions of value added going to wages for the various industries can be obtained as shown in table 29. The proportion in each industry (column 4) is obtained by dividing the labour income (column 2) by the level of value added (column 3).

For example, the proportion of value added going to wages in agriculture, 0.1439, is obtained as follows:

$$0.1439 = 19,142 / 132,978, \quad (46)$$

where 19,142 is the labour income in agriculture and 132,978 is the value added in this industry.

Table 28. Calculating value added by industry for the entire country

(Thousands of LCUs a/)

Industry	Labour income b/	Capital income c/	Value added d/
(1)	(2)	(3)	(4)
Agriculture	19 142	113 836	132 978
Mining	1 021	896	1 917
Manufacturing	22 176	18 416	40 592
Utilities	1 845	3 903	5 748
Construction	9 070	19 265	28 335
Trade	15 766	20 367	36 133
Transportation	18 353	11 262	29 615
Services	66 043	23 969	90 012

a/ Local currency units.

b/ From table 1, row 1a, from column 4a to column 4h.

c/ From table 1, row 1b, from column 4a to column 4h.

d/ (Col. 2) + (col. 3).

Table 29. Calculating proportions of value added going to wages by industry for the entire country

Industry	Labour income <u>a/</u>  (thousands of LCUs) <u>d/</u>	Value added <u>b/</u>  (thousands of LCUs) <u>d/</u>	Proportion of value added going to wages <u>c/</u>
(1)	(2)	(3)	(4)
Agriculture	19 142	132 978	0.1439
Mining	1 021	1 917	0.5326
Manufacturing	22 176	40 592	0.5463
Utilities	1 845	5 748	0.3210
Construction	9 070	28 335	0.3210
Trade	15 766	36 133	0.4363
Transportation	18 353	29 615	0.6197
Services	66 043	90 012	0.7337

- a/ From table 28, column 2.  
b/ From table 28, column 4.  
c/ (Col. 2)/(col. 3).  
d/ Local currency units.

3. Ratios of net indirect taxes to value added by industry

Ratios of net indirect taxes (indirect taxes less subsidies) to value added by industry can be obtained as indicated in table 30. For each industry, this ratio (column 4) is calculated as the ratio of the amount of net indirect taxes (column 2), divided by value added (column 3).

For example, the ratio of net indirect taxes to value added in agriculture, -0.0073, is calculated as follows:

$$-0.0073 = -965 / 132,978, \quad (47)$$

where -965 is the amount of net indirect taxes levied on agriculture, which is the amount of indirect taxes levied on this industry less subsidies received by the industry.

4. Proportion of profits received by households

To obtain the observation of the proportion of profits going to households, 0.7141, it is necessary to divide the amount of profits received by households by total profits:

$$0.7141 = 151,326 / 211,914, \quad (48)$$

where 151,326 is the amount of profits accruing to households (row 2a and column 1b in table 1) and 211,914 is total profits (row 1b and column 6).

5. Proportion of gross corporate income paid to household as dividends

The proportion of gross corporate income going to households in the form of dividends, 0.3474, is obtained as the gross corporate income received by households as dividends, divided by the gross corporate income:

$$0.3474 = 23,773 / 68,441, \quad (49)$$

where 23,773 is the gross corporate income going to households as dividends (row 2a and column 2b in table 1) and 68,441 is gross corporate income (row 2b and column 6).

6. Proportion of gross household income paid as household income taxes

The proportion of gross household income paid as household income taxes, 0.0935, can be computed as household income taxes, divided by gross household income:

$$0.0935 = 31,336 / 335,141, \quad (50)$$

Table 30. Calculating ratios of net indirect taxes to value added by industry for the entire country

Industry	Net indirect taxes <u>a/</u> (thousands of LCUs) <u>a/</u>	Value added <u>b/</u> (thousands of LCUs) <u>a/</u>	Ratio of net indirect taxes to value added <u>c/</u>
(1)	(2)	(3)	(4)
Agriculture	-965	132 978	-0.0073
Mining	18	1 917	0.0094
Manufacturing	10 849	40 592	0.2673
Utilities	3	5 748	0.0005
Construction	13	28 335	0.0005
Trade	947	36 133	0.0262
Transportation	710	29 615	0.0240
Services	1,737	90 012	0.0193

a/ From table 1, row 2d from column 4a to column 4h.

b/ From table 28, col. 4.

c/ (Col. 2)/(Col. 3).

d/ Local currency units.

where 31,336 is household income taxes (row 2c and column 2a in table 1) and 335,141 is gross household income (row 2a and column 6).

7. Proportion of gross corporate income paid as corporate income taxes

The proportion of gross corporate income paid as corporate income taxes, 0.2028, can be obtained as corporate income taxes, divided by gross corporate income:

$$0.2028 = 13,881 / 68,441, \quad (51)$$

where 13,881 is corporate income taxes (row 2c and column 2b in table 1) and 68,441 is gross corporate income (row 2b and column 6).

B. Urban-rural level

In explaining how the various proportions and ratios required to make an urban-rural projection are obtained, the SAM shown in table 2 is used.

1. Value added

Table 31 illustrates the derivation of value added levels by industry for urban and rural areas. For either location, value added at factor cost for each industry (column 5) is derived by adding up the labour income (column 3) and the capital income (column 4) for that industry.

2. Proportions of value added going to wages by industry

Proportions of value added going to wages for the two locations are obtained as shown in table 32. The proportion for each industry in the given location (column 5) is computed by dividing the labour income (column 3) by the level of value added (column 4) for that industry and location.

3. Ratios of net indirect taxes to value added by industry

Ratios of net indirect taxes to value added by industry for the entire country are obtained as indicated in table 33. Initially, value added levels by industry for the entire country (column 4) are obtained by adding the levels of value added by industry originating in urban and rural areas (columns 2 and 3). Then, ratios of net indirect taxes to value added (column 6) are calculated by dividing the amounts of net indirect taxes (column 5) by the levels of value added (column 4). The proportions for urban and rural areas are assumed to be the same as the proportions for the entire country.

Table 31. Calculating value added by industry for urban and rural areas

(Thousands of LCUs) a/

Location	Industry	Labour income b/	Capital income c/	Value added d/
(1)	(2)	(3)	(4)	(5)
Urban	Agriculture	1 210	6 856	8 066
	Mining	681	611	1 292
	Manufacturing	19 374	16 076	35 450
	Utilities	1 600	3 362	4 962
	Construction	7 834	2 158	9 992
	Trade	13 831	13 814	27 645
	Transportation	15 403	9 469	24 872
	Services	40 642	14 749	55 391
	Total	100 575	67 095	167 670
Rural	Agriculture	17 932	106 979	124 911
	Mining	340	285	625
	Manufacturing	2 802	2 340	5 142
	Utilities	245	541	786
	Construction	1 237	17 107	18 344
	Trade	1 935	6 553	8 488
	Transportation	2 949	1 793	4 742
	Services	25 401	9 220	34 621
	Total	52 841	144 818	197 659

a/ From table 2, row 1a, from column 4a to column 4h.

b/ From table 2, row 1b, from column 4a to column 4h.

c/ (Col. 3) + (col. 4).

d/ Local currency units.



Table 32. Calculating proportions of value added going to wages by industry for urban and rural areas

Location	Industry	Labour income <u>a/</u> (thousands of LCUs) <u>d/</u>	Value added <u>b/</u> (thousands of LCUs) <u>d/</u>	Proportion of value added going to wages <u>c/</u>
(1)	(2)	(3)	(4)	(5)
Urban	Agriculture	1 210	8 066	0.1500
	Mining	681	1 292	0.5271
	Manufacturing	19 374	35 450	0.5465
	Utilities	1 600	4 962	0.3225
	Construction	7 834	9 992	0.7840
	Trade	13 831	27 645	0.5003
	Transportation	15 403	24 872	0.6193
	Services	40 642	55 391	0.7337
	Total	100 575	167 670	4.183423
Rural	Agriculture	17 932	124 911	0.1436
	Mining	340	625	0.5440
	Manufacturing	2 802	5 142	0.5449
	Utilities	245	786	0.3117
	Construction	1 237	18 344	0.0674
	Trade	1 935	8 488	0.2280
	Transportation	2 949	4 742	0.6219
	Services	25 401	34 621	0.7337
	Total	52 841	197 659	3.195166

a/ From table 31, col. 3.

b/ From table 31, col. 5.

c/ (Col. 3)/(Col. 4).

d/ Local currency units.

Table 33. Calculating ratios of net indirect taxes to value added by industry for the entire country

Industry	Value added			Net indirect taxes <u>b/</u>	Ratio of net indirect taxes to value added <u>c/</u>
	(thousands of LCUs) <u>a/</u>				
	Urban <u>d/</u>	Rural <u>d/</u>	National <u>e/</u>	(thousands of LCUs) <u>a/</u>	
(1)	(2)	(3)	(4)	(5)	(6)
Agriculture	8 066	124 911	132 977	-965	-0.0073
Mining	1 292	625	1 917	18	0.0094
Manufacturing	35 450	5 142	40 592	10 849	0.2673
Utilities	4 962	786	5 748	3	0.0005
Construction	9 992	18 344	28 336	13	0.0005
Trade	27 645	8 488	36 133	947	0.0262
Transportation	24 872	4 742	29 614	710	0.0240
Services	55 391	34 621	90 012	1 737	0.0193
Total	167 670	197 659	365 329	13 312	

a/ From table 2, row 2d, from column 4a to column 4h.

b/ (Col. 5)/(col. 4).

c/ From table 31, col. 5.

d/ (Col. 2) + (cCol. 3).

e/ Local currency units.

4. Proportions of profits received by households

To derive the proportion of profits going to households in the urban areas, 0.5613, the amount of profits received by urban households (capital income accruing to those households) is divided by the urban profits (capital income in urban areas):

$$0.5613 = 37,660 / 67,096, \quad (55)$$

where 37,660 is the amount of profits accruing to urban households (row 2a (urban) and column 1b (urban) in table 2) and 67,096 is the total urban profits (row 1b (urban) and column 6 in the same table).

The proportion of profits received by rural households, 0.7849, is calculated in an analogous way:

$$0.7849 = 113,665/144,818, \quad (55)$$

where 113,665 is the amount of profits accruing to rural households (row 2a (rural) and column 1b (rural) in table 2) and 144,818 is the total rural profits (row 1b/rural and column 6).

5. Proportions of gross corporate income paid to households as dividends

The proportion of gross corporate income going to urban households as dividends, 0.3382, can be obtained by dividing the gross corporate income going to urban households as dividends by the gross corporate income:

$$0.3382 = 23,148 / 68,441, \quad (56)$$

where 23,148 is the gross corporate income going to urban households as dividends (row 2a (urban) and column 2b) and 68,441 is the gross corporate income (row 2b and column 6).

The proportion of gross corporate income going to rural households as dividends, 0.0091, can be calculated as the gross corporate income going to rural households as dividends, divided by the gross corporate income:

$$0.0091 = 625 / 68,441, \quad (56)$$

where 625 is the gross corporate income going to rural households as dividends (row 2a (rural) and column 2b).

6. Proportions of gross household income paid as household income taxes

The proportion of gross income of urban households paid as household income taxes, 0.1565, can be computed by dividing the household income taxes for the urban areas by the gross income of urban households:

$$0.1565 = 26,221 / 167,574, \quad (57)$$

where 26,221 is the household income taxes in urban areas (row 2c and column 2a (urban)) and 167,574 is the gross income of urban households (row 2a (urban) and column 6).

The proportion of gross income of rural households paid as household income taxes, 0.0305, can be computed in an analogous way:

$$0.0305 = 5,116 / 167,567, \quad (57)$$

where 5,116 is the household income taxes in rural areas (row 2c and column 2a (rural)) and 167,567 is the gross income of rural households (row 2a (rural) and column 6).

7. Proportions of gross corporate income paid as corporate income taxes

The proportion of gross corporate income paid as corporate income taxes, for the entire country 0.2028, can be computed by dividing the corporate income taxes by the gross income of corporations:

$$0.2028 = 13,881 / 68,441, \quad (58)$$

where 13,881 is the corporate income taxes (row 2c and column 2b) and 68,441 is the gross income of corporations (row 2b and column 6). This proportion is then assumed to be the same in both urban and rural areas.

Annex III

ILLUSTRATIVE DERIVATION OF THE RATIOS OF VARIOUS TRANSFERS TO  
GROSS DOMESTIC PRODUCT AND OF FUTURE VALUES OF THOSE TRANSFERS

This annex illustrates the derivation of observations on the ratios of various transfers to GDP using the steps discussed in section C of chapter IX, first for the entire country and then for urban and rural areas. Further, the annex illustrates how the assumed future values of those ratios can be used along with the projected GDP to obtain the future values of the transfers using the steps that were also discussed in section C. Illustrative calculations of the future values of transfers are discussed only for the entire country. Such calculations for urban and rural areas are not presented owing to the similarities of the procedures applying to the national and urban-rural level.

A. Deriving observations on ratios

The illustrative derivation of the ratios are initially that for the entire country.

1. National level

To show how the various ratios of transfer to GDP at the national level can be calculated, the SAM shown in table 1 is used along with table 28.

(a) Gross domestic product

To obtain the observations on ratios, gross domestic product at factor cost must first be derived. The gross domestic product, 365,331, can be obtained as the sum of the value added levels by industry, which are shown in column 4 of table 28.

(b) Ratio of government transfers to households to GDP

The ratio of government transfers to households to GDP, 0.0181, is obtained as:

$$0.0181 = 6,625 / 365,331, \quad (60)$$

where 6,625 is the amount of government transfers to households (row 2a and column 2c in table 1).

(c) Ratio of government transfers to corporations to GDP

The ratio of government transfers to corporations to GDP, 0.0215, is obtained as:

$$0.0215 = 7,853 / 365,331, \quad (61)$$

where 7.853 is the amount of government transfers to corporations (row 2b and column 2c).

(d) Ratio of net foreign transfers to households to GDP

The ratio of net foreign transfers to households to GDP, 0, is obtained as follows:

$$0 = 0 / 365,331, \quad (62)$$

where 0 on the right-hand side is the net foreign transfers to households (row 2a and column 5).

2. Urban-rural level

The various ratios that can be calculated for urban and rural areas can be calculated in an analogous way. To illustrate those calculations, the SAM shown in table 2 is used together with table 31.

(a) Gross domestic product

Gross domestic product in urban areas, 167,670, can be obtained by adding up the levels of value added by industry generated in the urban areas, which are shown in column 5 of table 31.

Gross domestic product in rural areas, 197,659, can be obtained in an analogous way.

(b) Ratios of government transfers to households to GDP

The ratio of government transfers to urban households to urban GDP, 0.0369, is obtained as:

$$0.0369 = 6,189 / 167,670, \quad (64)$$

where 6,189 is the amount of government transfers to urban households (row 2a (urban) and column 2c in table 2).

The ratio of government transfer to rural households to rural GDP, 0.0022 can be obtained in an analogous way:

$$0.0022 = 436 / 197,659 \quad (64)$$

where 436 is the amount of government transfers to rural households (row 2a (rural) and column 2c).

(c) Ratio of government transfers to corporations to GDP

The ratio of government transfers to corporations to GDP, for the entire country, 0.0215 is obtained as:

$$0.0215 = 7,853 / (167,670 + 197,659), \quad (65)$$

where 7,853 is the amount of government transfers to corporations (row 2b and column 2c in table 2), while the sum of 167,670 and 197,659 stands for the economy's GDP. Then this ratio is imputed to urban and rural areas.

(d) Ratio of net foreign transfers to households to GDP

The ratio of net foreign transfers to urban households to the urban GDP, 0, is obtained as:

$$0 = 0 / 167,670, \quad (66)$$

where 0 on the right-hand side is the net foreign transfers to urban households (row 2a (urban) and column 5).

The ratio of net foreign transfers to rural households to the rural GDP is obtained in an analogous fashion.

B. Derivation of future values of transfers

This illustration only concern the national level, since the derivation of the future values of transfers for urban and rural areas is essentially the same as that for the entire country. The illustration refers to the end of the projection interval 0-5, for which specific levels of value added by industry and specific values of the relevant ratios are assumed.

(a) Gross domestic product

To illustrate the derivation of the level of gross domestic product for the end of the interval 0-5, the following value added levels are assumed for that date:

<u>Industry</u>	<u>Value added</u> <u>(Thousand of local currency units)</u>
Agriculture	171 341
Mining	2 810
Manufacturing	66 267
Utilities	9 404
Construction	38 325
Trade	56 242
Transport	41 990
Services	146 933

Given these value added levels, the gross domestic product in year 5 is 533,312.

(b) Government transfers to households

The amount of government transfers to households at the end of the interval 0-5, 9,653, is calculated as follows:

$$9,653 = (533,312) (0.0181), \quad (68)$$

where 0.0181 is the assumed ratio of government transfers to households to GDP for the end of the interval.

(c) Government transfers to corporations

The amount of government transfers to corporations at the end of the interval 0-5, 11,466, is calculated as follows:

$$11,466 = (533,312) \cdot (0.0215), \quad (69)$$

where 0.0215 is the assumed ratio of government transfers to corporations to GDP for the end of the interval.

(d) Net foreign transfers to households

Net foreign transfers to households at the end of the interval 0-5, 0, are as follows:

$$0 = (533,312) \cdot (0), \quad (70)$$

where 0 on the right-hand side is the assumed ratio of government transfers to corporations to GDP for the end of the interval.

This concludes the illustrative derivations of observations of the ratios of various transfers to GDP and future values of those transfers.



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