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**POVERTY-FOCUSED SOCIAL ACCOUNTING MATRICES  
FOR TANZANIA**

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## **Abstract**

The development of effective and sustainable economic policies for Tanzania requires access to appropriate databases. One such database is a social accounting matrix (SAM) that details the structure of the entire economy, taking into account the patterns of production and demand, and various institutional relationships. Prior to this study the most recent SAM for mainland Tanzania was for 1992 and was based on past household budget and labor force surveys. Following the release of newer versions of these two surveys as well as a new input-output table for 1992, it is desirable to construct a new SAM for the country. Furthermore, given that Tanzania is committed to reducing national poverty, it is necessary that this new SAM is able to address questions related to poverty and inequality.

This paper outlines the process of developing SAMs for mainland Tanzania. Although this process was formally a collaborative project undertaken by the International Food Policy Research Institute (IFPRI) and the Tanzanian National Bureau of Statistics (NBS), the final project team also contained representatives from the Bank of Tanzania, the Tanzanian Revenue Authority, the University of Dar es Salaam, and the Economic and Social Research Foundation (ESRF). The collaboration combined IFPRI's technical experience with the collaborators' knowledge of the country and available statistical data. The SAMs were constructed during a series of workshops held in Tanzania aimed at capacity building, information sharing, and first-hand data validation. Furthermore, the process was made sufficiently flexible to allow the NBS to easily update the SAM to subsequent years. The updating process is also detailed in this paper. Although only the 2000 SAM is described, the process is identical for the other Tanzanian SAMs published by IFPRI for 1998 onwards.

## **Acknowledgements**

The work presented in this paper forms part of a collaborative project with the Tanzanian National Bureau of Statistics (NBS) that aims at the development of social accounting matrices for economic policy analysis in Tanzania. The Royal Danish and Dutch Embassies jointly funded the project, with the latter funding the International Food Policy Research Institute's (IFPRI) component.

Part of the process of constructing the SAM took place over three two-week workshops held in Tanzania, with representatives from the NBS, the Bank of Tanzania, the Tanzanian Revenue Authority, the University of Dar es Salaam, and the Economic and Social Research Foundation (ESRF). While this paper documents IFPRI's involvement in the project, the results are product of the efforts of the many people who are involved in the project and have participated in the workshops.

## Contents

1. Introduction and Background .....	1
2. The Structure of a Social Accounting Matrix .....	2
Activities and Commodities.....	3
Trade and Marketing Margins .....	3
Government Income and Payments .....	4
Domestic Non-government Institutions.....	4
Home and Final Household Consumption.....	5
3. Constructing the Prior .....	5
4. The Balancing Process .....	17
The Cross-entropy Balancing Method .....	17
Setting the Constraints on the Prior .....	20
5. Describing the Final Social Accounting Matrix .....	22
Micro SAM Accounts.....	22
The Structure of Production and Trade.....	28
Household Income and Expenditure.....	36
Government, Savings, Investment and the Rest of the World.....	39
6. Summary .....	40
References.....	40
Appendix 1: The SAM Construction Process.....	42
Appendix 2: Final 2000 Micro SAM for Tanzania (Tsh Bil.) .....	46

## 1. Introduction and Background

This paper outlines the process of constructing social accounting matrices (SAMs) for mainland Tanzania.<sup>1</sup> A SAM is a consistent data framework that captures not only the information contained in the national income and product accounts and the input-output table, but also takes into consideration the monetary flows between institutions within the economy. The SAM is an ex-post accounting framework since, within its square matrix, total receipts must equal total payments for each account contained within the SAM.

As an attempt to reflect the specific structure of the Tanzanian economy, the SAM's accounts are disaggregated across various activities, commodities, production factors, and households. However the task of constructing a SAM is complicated by this need for greater disaggregation. Since the required information is not contained within a single data source, information from various sources has to be compiled and then made consistent with one another. This process is itself valuable since it reveals inconsistencies between a country's various statistical sources, and by doing so, highlights areas where data reliability is weakest.

Beyond its role as a consistency-check, the objective of a SAM is to provide a multi-sector, economy-wide database that facilitates policy-analysis. The work presented in this paper forms part of a collaborative project between the International Food Policy Research Institute (IFPRI) and the Tanzanian National Bureau of Statistics (NBS) aimed at developing poverty-focused SAMs for Tanzania. Although the SAMs outlined in this paper do not make use of information contained in earlier SAMs, it does represent the culmination of a project that also involved the updating of the 1992 SAM originally developed by Wobst (1998).

The most recent available data was used during the compilation of the SAM. This information included the results of the 2000/01 Household Budget Survey (HBS) (NBS, 2002a) and the 2000/01 Labor Force Survey (LFS) (NBS, 2002c). With the exception of the intermediate demand structure, which is taken from the 1992 input-output table (NBS, 1999), the 2000 SAM detailed in this paper is based solely on data for the year 2000. However, the project also

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<sup>1</sup> Mainland Tanzania is distinct from Zanzibar. Hereafter 'Tanzania' is used to describe only mainland Tanzania

developed a framework that would allow for the easy updating of SAMs to alternative years. In such cases it was necessary to combine information from different years, albeit using the same method of compilation. Within the joint NBS/IFPRI project a series of SAMs for four consecutive years from 1998 to 2001 were constructed.<sup>2</sup>

Section 2 briefly reviews the structure of a social accounting matrix. The process of constructing a SAM begins with the compilation of a *prior SAM* that represents the first attempt to place the available data into a SAM framework. Given the diversity of data sources, this information is almost always inconsistent and results in inequalities between receipts and payments in the SAM accounts. Section 3 details the various data sources used and the assumptions made during the construction of the prior SAM for Tanzania.

Once the prior SAM has been compiled the reliability of the various data sources is assessed based on the inequalities between row and column accounts. This is done before attempting to balance the SAM so that the additional information on relative data reliability can be included as weighted constraints in the cross-entropy estimation of the *final SAM*. The cross-entropy balancing approach is presented in Section 4 together with a description of the constraints imposed on the estimation procedure. Finally Section 5 provides a description of the Tanzanian economy as it is reflected in the final SAM.

## **2. The Structure of a Social Accounting Matrix<sup>3</sup>**

A Social Accounting Matrix (SAM) is a comprehensive, economy-wide data framework, typically representing the economy of a country.<sup>4</sup> More technically, a SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row – the incomes of an account appear along its row, its expenditures along its column. The underlying principle of double-entry accounting requires

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<sup>2</sup> The SAMs for 1998, 1999, 2000, and 2001 are available at [www.ifpri.org](http://www.ifpri.org). A step-by-step guide to updating the Tanzanian SAM is also provided in the appendix.

<sup>3</sup> This discussion on SAMs is drawn from Lofgren *et al* (2002).

<sup>4</sup> For general discussions of SAMs see Pyatt and Round (1985), and Reinert and Roland-Holst (1997); for perspectives on SAM-based modeling see Pyatt (1988), and Robinson and Roland-Holst (1988).

that, for each account in the SAM, total revenue (row total) equals total expenditure (column total).

Table 2.1 shows an aggregated SAM (with verbal explanations in place of numbers). With one exception, it contains all the features of the final SAMs presented in this paper. The exception is that, in the final SAMs, taxes are paid to tax accounts, disaggregated by tax type, each of which forwards its revenues to the core government account. The tax types are divided into direct taxes (on domestic non-government institutions and factors), sales taxes, import taxes, export taxes, and producer/activity taxes.

### *Activities and Commodities*

The SAM distinguishes between ‘activities’ (the entities that carry out production) and ‘commodities’ (representing markets for goods and non-factor services). SAM flows are valued at producers’ prices in the activity accounts and at market prices (including indirect commodity taxes and transactions costs) in the commodity accounts. The commodities are activity outputs, either exported or sold domestically, and imports. This activity-commodity separation is preferred since it permits activities to produce multiple commodities (for example, a dairy activity may produce the commodities cheese and milk) while any commodity may be produced by multiple activities (for example, activities for small-scale and large-scale maize production may both produce the same maize commodity). In the activity columns, payments are made to commodities (intermediate demand), factors of production (value-added comprising of operating surplus and compensation of employees), as well as producer tax accounts. In the commodity columns, payments are made to domestic activities, the rest of the world, and various tax accounts (for domestic and import taxes). This treatment provides the data needed to model imports as perfect or imperfect substitutes vis-à-vis domestic production.

### *Trade and Marketing Margins*

Domestic and international trade flows in the SAM are explicitly associated with transactions (trade and transportation) costs, also referred to as marketing margins. For each commodity, the



SAM accounts for the costs associated with domestic, import, and export marketing. For domestic marketing of domestic output, the marketing margin represents the cost of moving the commodity from the producer to the domestic consumer. For imports, it represents the cost of moving the commodity from the border to the domestic market, while for exports it shows the cost of moving the commodity from the producer to the border.

### *Government Income and Payments*

The government is disaggregated into a core government account and different tax collection accounts, one for each tax type. This disaggregation is necessary since otherwise the economic interpretation of some payments is often ambiguous. In the SAM, direct payments between the government and other domestic institutions are reserved for transfers. Finally, payments from the government to factors (for the labor services provided by government employees) are restructured in the SAM. The preferred approach is to reallocate such payments to a commodity for government services (public administration) that pays a government service activity, which in turn, pays the labor account

### *Domestic Non-government Institutions*

The domestic non-government institutions consist of households and enterprises. The enterprises earn factor incomes (a reflection of ownership of capital and/or land) and may also receive transfers from other institutions. Their incomes are used for corporate taxes, enterprise savings, and transfers to other institutions. As opposed to households, enterprises do not demand commodities. Assuming that the relevant data are available, it is preferable to have one or more accounts for enterprises when these have tax obligations and a savings behavior that are independent of the household sector. It is possible to disaggregate the enterprise sector in a manner that captures differences across enterprises in terms of tax rates, savings rates, and the shares of retained earnings that are received by different household types. For example, in some settings it may be appropriate to disaggregate enterprises into non-agricultural (with earnings from non-agricultural capital), small-scale agricultural enterprises (with earnings from land and

capital of small farmers), and large-scale agricultural enterprises (with earnings from land and capital of large farmers).<sup>5</sup>

### *Home and Final Household Consumption*

The SAM distinguishes between home (own) consumption of activities and marketed consumption of commodities by households. Home consumption, which in the SAM appears as payments from household accounts to activity accounts, is valued at producer prices, i.e., without marketing margins and the sales taxes that may be levied on marketed commodities. Final household consumption of marketed commodities appears as payments from household accounts to commodity accounts, valued at consumer prices that include marketing margins and commodity taxes.

## **3. Constructing the Prior**

The initial task of building a SAM involves compiling data from various sources into a SAM framework. This information comes from national accounts, household budget and labor force surveys, foreign trade statistics, government budgets, balance of payments, and various other government publications. In other words, this information is drawn from a number of sources that may use (i) different disaggregations of sectors, production factors, and socio-economic household groups, (ii) different years and/or base-year prices, and (iii) different data collection and compilation techniques. Consequently, the initial or *prior* SAM will inevitably include imbalances between row and column account totals. The development of a disaggregated microeconomic (Micro) SAM first requires the construction of an underlying macroeconomic (Macro) SAM that contains all economic control totals. The construction of a Macro SAM is centered around the national accounts and typically replicates the major national accounts values.

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<sup>5</sup> Due to data limitations enterprises are not disaggregated further in the Tanzanian SAMs. Instead, capital earnings from the agricultural sector are distributed directly from the agricultural capital account to households, while capital earnings from the non-agricultural sector are channeled through the enterprise account. Hence, the enterprise account in the Tanzania SAM represents non-agricultural enterprises only.

Table 2.1: Basic SAM Structure

	Activities	Commodities	Factors	Households	Enterprises	Government	Investment	Rest of the World	Total
Activities		marketed outputs		home-consumed outputs					Activity income (Gross Output)
Commodities	intermediate inputs	transactions costs		private consumption		government consumption	investment	exports	Demand
Factors	value-added							factor income from RoW	factor income
Households			factor income to households	inter-household transfers	surplus to households	transfers to households		transfers to households from RoW	household income
Enterprises			factor income to enterprises			transfers to enterprises		transfers to enterprises from RoW	enterprise income
Government	producer taxes, value-added tax	sales taxes, tariffs, export taxes	factor income to government, factor taxes	transfers to government, direct household taxes	surplus to government, direct enterprise taxes			transfers to government from RoW	government income
Savings				household savings	enterprise savings	government savings		foreign savings	savings
Rest of the World (RoW)		imports	factor income to RoW		surplus to RoW	government transfers to RoW			foreign exchange outflow
Total	activity expenditures	supply	factor expenditures	household expenditures	enterprise expenditures	government expenditures	investment	foreign exchange inflow	

Account by account, this section first outlines the construction of the prior Macro SAM and explains how each Macro SAM entry is disaggregated to arrive at the prior Micro SAM. It should be noted that the prior Macro SAM is already balanced since it is drawn from consistent national accounting data. However the prior Micro SAM is not balanced as it uses information from many data sources that are inevitably inconsistent.<sup>6</sup>

Table 3.1 shows the Macro SAM constructed for Tanzania for the year 2000.<sup>7</sup> Each of the entries in the SAM is discussed in detail below. The notation for the SAM entries is row then column, and the values are in billions of current (2000) Tanzanian Shillings.

i. (Factors, Activities)... 6,698

This is the value of gross domestic product (GDP) at factor cost and is taken directly from national accounts (NBS, 2002d). In constructing the Micro SAM this single value is disaggregated across 43 activities and 12 factor categories.<sup>8</sup>

The initial process of disaggregation entailed deriving a level of value-added attributable to the home production factor. This was calculated by summing the total value of each household's home consumption for each activity (home consumption is discussed in detail later in this section).

The remaining value-added was then disaggregated across activities using information from both national accounts and the 1992 input-output (IO) table. The 14-sector disaggregation of GDP at factor cost from the national accounts is insufficient to provide values for the 43 activities included in the final Micro SAM. Therefore, whenever further disaggregation was necessary the IO table's disaggregation of that particular sector was used.

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<sup>6</sup> The same data sources and methods that were used in the construction of the 2000 SAM were also used for the 1998, 1999, and 2001 SAMs. While these additional SAMs are not discussed in the text, they are available at [www.ifpri.org](http://www.ifpri.org). Since much of the survey data is for the year 2000, these additional SAMs are updates of the 2000 SAM (with new information being used wherever possible).

<sup>7</sup> The Macro SAM in this table is not the prior but the final Macro SAM. However the differences between the two SAMs at this aggregate level is at the most very small since the information in the prior Macro SAM is largely maintained during the balancing process. The reason for displaying the final Macro SAM is that the reader will find it more convenient if the cited Macro and Micro SAMs are consistent.

<sup>8</sup> The disaggregated activity, commodity, factor, and household categories are defined in Section 5, which outlines the final balanced Micro SAM.

Table 3.1: Prior Macro SAM for Tanzania for 2000 (TSh Bil.)

	Activities	Commodities	Factors	Households	Enterprises	Government	Taxes	Investment	Rest of World	Total
Activities		10,744		1,684						12,428
Commodities	5,690	303		4,382		483		1,267	1,065	13,190
Factors	6,698									6,698
Households			4,627		1,860	62			210	6,759
Enterprises			1,997							1,997
Government					1		745			746
Taxes	40	466	18	85	136					745
Savings				608		201			457	1,267
Rest of World		1,676	56							1,733
Total	12,428	13,190	6,698	6,759	1,997	746	745	1,267	1,733	

Note: The Macro SAM is balanced in the prior since it is largely constructed from consistent national accounting data. The Macro SAM presented is the final Macro SAM that may have changed slightly during the balancing process. However, these changes are at the most very small.

The distribution of sectoral value-added across capital and labor for the non-agricultural sectors was taken from the 1992 IO table. According to the IO table, the share of capital in value-added in the agricultural sectors is above 90 percent. Given that this is an overestimation, extensive discussion was undertaken between project collaborators, country representatives, and agricultural data-specialists. Finally, non-subsistence value-added in the agricultural sectors was shared equally between capital and labor.<sup>9</sup> Capital was then further disaggregated into land (30 percent) and capital (70 percent) value-added. These calculations produced a distribution of total GDP at factor cost across sectors, and across broadly defined labor, capital, and land factors.

The labor value-added by sector was further disaggregated across labor categories using information from the 2000/01 Labor Force Survey (LFS). An imputed wage had to be calculated for agricultural labor since respondents in the LFS were not asked to state an income if they were engaged in work on their own farms. Total labor value-added by sector was imputed by taking the average wage earned by *hired* labor in agriculture (taken from the LFS) and then multiplying this value through by the total number of people who reported working in each agricultural sector.

ii. (Commodities, Activities)... 5,690

The share of intermediate inputs to value-added was taken from the 1992 IO table. In the current Macro SAM the ratio of intermediates to value-added is 0.84. Each sectors' demand for each intermediate commodity was determined using the sectoral information in the IO table.

iii. (Taxes, Activities)... 40

The total value of activity taxes was taken from the Tanzanian Revenue Authority (2002). This figure represents payments by activities to the government for such items as business licenses, departure charges, motor vehicle taxes, road toll, stamp duty, and other non-tax revenue. The

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<sup>9</sup> One possible suggestion that might explain this high-capital intensity is that subsistence or home production is sometimes treated in the system of national accounts as gross operating surplus.

relative distribution of activity taxes was taken from the IO table's estimates of other indirect taxes and subsidies.

iv. (Activity, Households)... 1,684

The payment from households to activities represents households' consumption of own production. This production is measured at producer (or farm-gate) prices. The value of total household consumption was taken from national accounts. For both the Macro and Micro SAMs this was distributed across own and final consumption using information from the 2000/2001 HBS. Respondents in the HBS were asked to keep a journal of incomes and expenditures over a period of 30 days. Regarding consumption, households were asked to state whether the commodities that were consumed were purchased, or whether they were produced or gathered by the household. In the SAM the latter was treated as own household consumption of agricultural commodities as well as processed food and beverages. According to the HBS, own consumption constitutes 27.7 percent of total household consumption. This is largely consistent with the estimates from the NBS, which, in 2000, attributed 31.8 percent of total consumption to own household production (BOT, 2001).

Since the HBS did not take into account the value of owner-occupied dwellings, the initial step in disaggregating own consumption across activities involved removing the share of non-monetary GDP attributable to owner-occupied dwellings. This share was derived from national accounts and amounted to 27.9 percent of non-monetary GDP. The remaining own consumption was distributed across activities using consumption shares taken from the HBS measure of own consumption.<sup>10</sup>

v. (Activities, Commodities)... 10,744

Total marketed output is the difference between gross output (12,388) and the value of own household consumption (1,648). Gross output is the sum of intermediate demand, GDP at factor

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<sup>10</sup> There is some discussion on the consumption patterns of households in the final section of this paper. The complete list of household own and final consumption shares, as well as the SPSS code used to generate these shares, can be obtained from the authors.

cost, and activity taxes. While the SAM distinguishes between activities and commodities, and thus would facilitate interactions between single/multiple activities and single/multiple commodities, the IO table does not allow for this distinction. Therefore the disaggregation of this cell in the Micro SAM results in single entries along the main diagonal of the activity-commodity sub-matrix (or a one-to-one mapping between activities and commodities).

vi. (Commodities, Commodities)... 303

The payment by commodities to commodities is a condensed version of the treatment of trade margins in the final Micro SAM. In the Micro SAM there are separate margin accounts for the trade costs incurred through the marketing of each commodity. This value of transaction costs is further disaggregated to distinguish between the costs incurred by imports, exports, and domestically produced and sold goods.

Unlike most other entries in the Macro SAM, this entry was first calculated on a disaggregated level, and then aggregated to arrive at a final Macro SAM value. Trade costs per unit of marketed output were calculated using the survey data on trade margins by broad economic sector produced during the compilation of the 1992 IO table. These margins are shown in Table 3.2.

Table 3.2: Trade Margins from the IO Table by Broad Commodity Categories (1992)

<b>Commodity Category</b>	<b>Final and Intermediate Demand (1992 TSh Mil.)</b>	<b>Trade Margin (1992 TSh Mil.)</b>	<b>Trade Margin to Total Demand (Percentage)</b>
Agricultural Crops	286,245	84,779	42.1
Livestock and other animals	79,509	15,027	23.3
Hunting	2,529	106	4.4
Forestry	33,890	7,055	26.3
Manufacturing	824,109	104,073	14.5
Total	1,226,282	211,040	20.8

Source: 1992 IO Table

The variation in trade margins within these broad sectors was determined by using the variation found in the differences between 1998 consumer and producer prices exclusive of sales taxes.



The reason for only using the variation in relative producer/consumer prices is that more confidence is placed on the detailed survey work of the IO table than on the estimates of relative prices (which are typically more difficult to measure).

vii. (Taxes, Commodities)... 466

While the Macro SAM in Table 3.1 shows only a single row and column for taxes, this accounts actually consists of a number of distinct tax accounts. These include specific accounts for activity, income, sales, factor, import, and export taxes. The commodity tax entry can therefore be disaggregated to include indirect taxes (366) and import tariffs (100). There are also export taxes in the 2000 SAM, but their combined value is only 6.9 million Tanzanian Shillings.

Import tariff and export tax rates by commodity category were derived from trade information from the Customs and Excise Department at the Tanzanian Revenue Authority (TRA, 2002).<sup>11</sup> It should be noted that the implied aggregate import tariff rate of 6 percent is based on tariff collections and therefore, due to collection inefficiencies and exemptions, this might not coincide with the tariff book rate.

Indirect taxes on commodity sales were taken from the Tanzanian Revenue Authority (TRA, 2002). This value was disaggregated across commodities using excise and value-added tax rates found in the trade data described above. It is assumed that the sales taxes imposed on imported commodities also apply to domestically produced goods sold domestically.

viii. (Rest of World, Commodities)... 1,676

Data on merchandise imports was obtained from the Customs and Excise Department at the Tanzanian Revenue Authority (TRA, 2002). Data on imports of services were obtained from the Bank of Tanzania (BOT, 2001). Since the merchandised data was measured inclusive of cost, insurance and freight (CIF), it was necessary to reduce the value of transportation and insurance

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<sup>11</sup> As is typical of trade data, the information on imports, exports, and taxes was converted from the harmonized system (HS) of product classification into the 43 commodity categories used in the SAM. Although this mapping between HS and SAM categories is not presented in this document, it is available from the authors.

services imported into the country in order to avoid double counting the importing of these services. The Bank of Tanzania assumes there is a 13 percent difference between imports measured at CIF and free-on-board (FOB) prices. Therefore, this portion of the value of merchandised imports was subtracted from the value of transport and insurance imports according to the weighted shares of these services' imports.

ix. (Commodities, Households)... 4,382

As already noted in the discussion of own household consumption, the disaggregation of total household consumption from the national accounts used information from the HBS. According to this survey, final household demand constitutes 72.3 percent of total household consumption spending. Final consumption was distributed across commodities using household consumption shares calculated from the HBS raw data.

x. (Commodities, Government)... 483

The value of government consumption spending is taken from national accounts. All of government spending is for the purchase of the government services commodity. In this way the government is treated as both a sector producing government services, and a demander of these services.

xi. (Commodities, Investment)... 1,267

The aggregate value of investment spending is taken from national accounts. It is distributed across commodities according to the 1992 IO table's investment shares.

xii. (Commodities, Rest of World)... 1,065

The aggregate value of exports to the rest of the world is taken from national accounts (NBS, 2002). This is then disaggregated across commodities using the detailed commodity information from the Customs and Excise Department (TRA, 2002).

xiii. (Households, Factors)... 4,627

This value is the sum of all land, labor, and agricultural capital value-added generated during production, less any factor taxes and factor payments abroad. The distribution of labor income across households is determined using household labor-income shares as reported in the HBS. Agricultural capital and land returns are distributed according to households' stated land ownership in the HBS.<sup>12</sup>

xiv. (Enterprises, Factors)... 1,997

The sum of all non-agricultural capital value-added (or gross operating surplus) is paid to enterprises. It is therefore assumed that all non-agricultural capital is subject to direct taxation by the government.

xv. (Taxes, Factors)... 18

Factor taxes are taken from the Tanzanian Revenue Authority (TRA, 2002) and include pay-roll levies. Based on discussions with the TRA, this tax is distributed across high-educated male and female workers assuming the same tax rate on each factor's income.

xvi. (Rest of World, Factors)... 56

Factor remittances abroad are taken from the national accounts. Based on discussions with the NBS and the Bank of Tanzania, these remittances are made by agricultural (20 percent) and non-agricultural (80 percent) capital.

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<sup>12</sup> An alternative distribution of agricultural capital income could have been derived from households' ownership of cattle, sheep and other relevant assets. Land ownership is preferred since (i) it is difficult to compile a weighted index of asset ownership when the assets are measured in incomparable units (e.g., cattle and tractors); and (ii) the distribution of livestock assets closely matches that of land ownership (this is especially true for cattle).

xvii. (Households, Enterprises)... 1,860

Enterprise payments to households are treated as the sum of enterprise income less direct taxes and dividend payments to the government. These payments are distributed across households according dividend earnings reported by households in the HBS.

xviii. (Government, Enterprises)... 1

Dividend payments from enterprises to the government are taken from national accounts (NBS, 2002).

xix. (Taxes, Enterprises)... 136

Enterprise direct taxes are taken from the Income Tax Department at the Tanzanian Revenue Authority (TRA, 2002). Among other things, this includes such items as taxes on limited companies and parastatals, training levies, excess-profit taxes, and estate duties.

xx. (Households, Government)... 62

Government transfers to households are taken from national accounts (NBS, 2002). The distribution of this value across households is determined by households' reported income from government in the HBS.

xxi. (Households, Rest of World)... 201

Aggregate household income from the rest of the world is treated as a residual between households' income and expenditure. By assumption, this is evenly distributed across higher income rural and urban households.

xxii. (Taxes, Households)... 85

The value of direct taxes on households is taken from the Income Tax Department at the Tanzanian Revenue Authority (TRA, 2002), and represents total P.A.Y.E. taxes. This value is distributed across households according to their relative income tax payments as reported in the HBS.

xxiii. (Savings, Households)... 608

Taking total domestic savings and removing government savings from this value determines total household savings. Both of these values are reported in national accounts (NBS, 2002). Savings across households is distributed according to households' relative savings as reported in the HBS.

xxiv. (Government, Taxes)... 745

Each of the tax accounts mentioned above pay their total tax revenue to the government.

xxv. (Savings, Government)... 201

Government savings is taken from national accounts (NBS, 2002).

xxvi. (Savings, Rest of World)... 457

Foreign savings or borrowing is treated as a residual in the SAM in order to balance total savings with total investment spending.

#### 4. The Balancing Process

Although the Macro SAM is already balanced in the prior, the data used to disaggregate the SAM is from a number of possibly inconsistent sources. This results in a number of imbalances between row and column accounts in the prior Micro SAM, which must be removed in order to arrive at a final balanced SAM for Tanzania. A cross-entropy approach to SAM estimation is used for the balancing process leading from the unbalanced prior to the balanced final SAM. Since data availability and data consistency are limited, the cross-entropy approach is an appropriate tool for estimating a balanced and consistent database starting from an unbalanced database that contains all available information.

##### *The Cross-entropy Balancing Method*<sup>13</sup>

A SAM can be defined as a matrix T of monetary flows  $T_{i,j}$  representing payments by account  $j$  to account  $i$ . Following the convention of double-entry bookkeeping, total receipts and total expenditures of a particular agent  $i$  have to be equal (i.e., respective row and column sums are balanced). This is shown below.

$$y_i = \sum_j T_{i,j} = \sum_j T_{j,i}$$

Dividing every cell entry of the flow matrix T by its respective column total generates a matrix A of column coefficients:

$$A_{i,j} = \frac{T_{i,j}}{y_j} \quad \text{with} \quad \sum_i A_{i,j} = 1 \quad \forall j$$

In matrix notation it follows that:

$$y = A \cdot y$$

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<sup>13</sup> For a detailed discussion see Robinson *et al* (2001).

Balancing a SAM is an underdetermined estimation problem using information from various sources and for various years. The cross-entropy approach allows the incorporation of errors in variables, inequality constraints, and prior knowledge about any part of the SAM (as opposed to just row and column sums as in the RAS balancing method).<sup>14</sup> These features of the cross-entropy estimation technique allow considerable flexibility in incorporating specific information and implementing limits to which the estimation results are restricted. The general cross-entropy approach is described by the following optimization problem.<sup>15</sup>

$$\min \sum_i \sum_j A_{i,j}^* \cdot \ln \left( \frac{A_{i,j}^*}{\bar{A}_{i,j}} \right)$$

$$s.t.: \sum_j A_{i,j}^* y_j^* = y_i^* \quad \text{and} \quad \sum_j A_{i,j}^* = I \quad \forall i$$

In this equation  $\bar{A}$  is a coefficient matrix representing any prior SAM. Despite being inconsistent and imbalanced, this prior SAM represents the starting point of the balancing process aimed at determining a new and balanced coefficient matrix  $A^*$ .<sup>16</sup> The described problem is set up to minimize the entropy difference between the two coefficient matrices. This becomes clearer if the optimization problem is rearranged as follows:

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<sup>14</sup> Following information theory developed by Shannon (1948) and further developed by Theil (1967) the expectation of separate information values can be described as the expected information of data points:

$$-I(p : q) = - \sum_{i=1}^n \frac{p_i \ln p_i}{q_i}$$

where  $q$  and  $p$  are prior and posterior probabilities regarding a set of events  $E_i$  and  $-I(p:q)$  is the Kullback-Leiber (1951) measure of the ‘cross-entropy’ distance between the two probability distributions. The cross-entropy approach minimizes the cross-entropy distance between the probability distributions that are consistent with the information in the data and the prior.

<sup>15</sup> As formulated by Golan, Judge, and Robinson (1994) to update an input-output table  $\bar{A}$  by solving for a new coefficient matrix  $A$ , which minimizes the entropy difference between the underlying prior  $\bar{A}$  and the new matrix  $A$ .

<sup>16</sup> This means that the prior  $\bar{A}$  does *not* need to satisfy the model  $y = \bar{A} \cdot y$ , but the sum of its column coefficients adds up to one, i.e.  $\sum_i \bar{A}_{i,j} = I \quad \forall j$ .

$$\min \sum_i \sum_j A_{i,j}^* \cdot ( \ln A_{i,j}^* - \ln \bar{A}_{i,j} )$$

Additional equality and inequality constraints can be formulated as linear ‘adding-up’ constraints on various elements of the SAM. For an aggregator matrix  $G$ , which has ones for those Micro SAM entries that correspond to a certain Macro SAM aggregate and zeros otherwise, the formulation for  $k$  such aggregation constraints is given by

$$\sum_i \sum_j G_{i,j}^{(k)} \cdot T_{i,j} = \gamma^{(k)}$$

where  $\gamma^{(k)}$  is the value of the aggregate and the  $T_{ij}$  's are the Micro SAM flows.

Measurement errors in variables can be incorporated into the system through

$$y = \bar{x} + e$$

where  $y$  is a vector of row sums and  $\bar{x}$  the initially known vector of column sums measured with error. The error  $e$  is defined as a weighted average of known constants

$$e_i = \sum_w W_{i,w} \cdot \bar{v}_{i,w}$$

where  $w$  is a set of weights  $W$ ,  $v$  are constants, and weights are subject to

$$\sum_w W_{i,w} = 1 \text{ with } 0 \leq W_{i,w} \leq 1$$

For the purposes of the Tanzanian Micro SAM, a symmetric distribution around zero given lower and upper bounds is generally chosen using five weights.<sup>17</sup> Consequently, the optimization

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<sup>17</sup> Note that if the error distribution is symmetrically centered on zero and all weights are equal – as are their initial prior values – then the respective error equals zero.



problem of minimizing the entropy difference now contains a term for the weights  $W$ , as shown below.

$$\min \left( \sum_i \sum_j A_{i,j}^* \cdot (\ln A_{i,j}^* - \ln \bar{A}_{i,j}) + \sum_i \sum_w W_{i,w} \cdot \ln W_{i,w} \right)$$

Solving the above optimization problem in conjunction with the constraints imposed on the system derives a balanced SAM that is as close to the prior SAM as possible while still satisfying the constraints. By varying the value of the standard errors on the constraints it is possible to adjust the confidence placed on various areas within the prior. For instance, it is possible to lower the standard errors on the macro control constraints so as to ensure a closer match of the Micro SAM's aggregates to those found in national accounts. The remainder of this section outlines the constraints used for the Tanzanian SAMs.

#### *Setting the Constraints on the Prior*

Based on discussions with the National Bureau of Statistics, various constraints were imposed on the model according to the perceived reliability of the data. Given the discrepancies between commodity demand and supply, it was decided that the levels of sectoral gross output, total market supply, and total demand are known only with considerable error.<sup>18</sup> As such a high standard error was placed on the column and row totals implying that gross output, supply and demand are able to readily shift between sectors. Furthermore, the error distribution on gross output was assumed to be uniform. However, GDP at factor cost is fixed in aggregate so that it matches the national accounts value.

Other macroeconomic aggregates (taken from the Macro SAM) that were maintained in the final Micro SAM include:

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<sup>18</sup> These inconsistencies between demand and supply are likely to be due to the need to reevaluate GDP, since the last rebasing of GDP took place in 1992. GDP is currently being rebased to the year 2001 and this will undoubtedly reduce the imbalances in the commodity accounts.

- Imports and exports
- Household own and final consumption
- Government consumption
- Investment demand
- Household and enterprise direct taxes
- Import tariffs and indirect commodity taxes

The HBS contains recent and detailed information on household expenditures. As a result, household consumption shares across activities and commodities were held fixed with error in order to maintain households' consumption patterns in the final SAM.<sup>19</sup>

Finally, the ratio between certain cells was held fixed with error. This allowed, for example, the fixing of import tariff rates for individual commodities. In this case a particular commodity's share of total imports was allowed to vary but the tariff rate imposed on the imported commodity was maintained. Other areas where fixed shares with errors were imposed include:

- Import, export, and domestic transactions cost margins
- Household and enterprise private savings rates

All of these constraints are imposed based on considerations of data reliability. For example, data that is current is given preference over outdated information. Information that is difficult to measure is treated with less certainty than other sources. As a result, information that is seen as more reliable includes:

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<sup>19</sup> Although it is possible to simply fix certain shares within the SAM it is often preferable to allow some flexibility between the prior and final SAM shares. This would reflect the fact that all data is likely to be measured with some error and it also prevents over-constraining the estimation procedure. As mentioned earlier in this section, confidence in a particular data source, in this instance the HBS' household consumption shares, is reflected in the size of the standard error placed around the prior estimate. In the case of household consumption shares, a relatively small standard error was chosen so as to maintain the shares in the final SAM.

- National accounts macro-aggregates
- Import and export shares by commodity
- Import tariff rates on commodities
- Private savings rates

Other information that were given more flexibility to vary around their expected values include:

- Investment shares by commodities
- Production and supply shares by sector and commodity
- Household consumption shares by activity and commodity<sup>20</sup>
- Import, export, and domestic transactions cost margins

Significant uncertainty is placed on intermediate commodity demands given that they are (i) difficult to measure, (ii) were last measured in 1992, and (iii) are likely to be subject to considerable variation over time.

## **5. Describing the Final Social Accounting Matrix**

Based on the data sources detailed in Section 3 and the constraints outlined in Section 4, a final SAM for Tanzanian was estimated using the cross-entropy method. The strength of the cross-entropy balancing procedure lies in the information it is given regarding the reliability of the various data sources. This section presents the structure of the final SAM in order to confirm that it accurately represents the Tanzanian economy in 2000.

### *Micro SAM Accounts*

The Micro SAM is a more detailed representation of the flows shown in the Macro SAM. In total there are 43 productive activities producing 43 commodities.<sup>21</sup> Although the SAM distinguishes

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<sup>20</sup> These shares were largely maintained during the estimation procedure regardless of the size of the standard error placed on their initial estimates.

between producers and commodities, the IO table does not account for differences between supply and use. Consequently, there is a direct mapping between activities and commodities. A description of these disaggregated accounts is presented in Table 5.1.

Table 5.1: Micro SAM Account Descriptions

<b>Group</b>	<b>Account</b>	<b>Description</b>
Agricultural Sectors (Activities)	AMAIZE	Growing of maize
	APADDY	Growing of paddy
	ASORGH	Growing of sorghum or millets
	AWHEAT	Growing of wheat
	ABEANS	Growing of beans
	ACASSA	Growing of cassava
	ACEREA	Growing of other cereals
	AOILSE	Growing of oil seeds
	AROOT	Growing of other roots and tubes
	ACOTTO	Growing of cotton
	ACOFFE	Growing of coffee
	ATOBAC	Growing of tobacco
	ATEAGR	Growing of tea
	ACASHE	Growing of cashew nuts
	ASISAL	Growing of sisal fiber
	ASUGAR	Growing of sugar
	AOFRVE	Growing of fruits and vegetables
	AOCROP	Growing of other crops
	ALIVES	Operation of poultry and livestock
	AFISHI	Fishing and fish farms
AHUFOR	Hunting and forestry	
Non-agricultural Sectors (Activities)	AMININ	Mining and quarrying
	AMEATD	Processing of meat and dairy products
	AGRAIN	Grain milling
	APFOOD	Processed food
	ABEVER	Beverages and tobacco products
	ACLOTH	Textile and leather products
	AWOODP	Wood paper printing
	ACHEMI	Manufacture of basic and industrial chemicals
	AFERTI	Manufacture of fertilizers and pesticides
	APETRO	Petroleum refineries
	ARUPLA	Rubber, plastic, and other manufacturing
	AGLASS	Glass and cement
	AMETAL	Iron, steel, and metal products
	AEQUIP	Manufacture all equipment

<sup>21</sup> It would be possible to construct a SAM with the 79 sectors contained in IO table. However, based on discussions during the workshops, it was decided that this level of disaggregation is unnecessary, and that the IO table should be aggregated into 43 sectors.

Table 5.1 continued: Micro SAM Account Descriptions

<b>Group</b>	<b>Account</b>	<b>Description</b>
Non-agricultural Sectors (Activities)	AUTILI	Utilities
	ACONST	Construction
	ATRADE	Wholesale and retail trade
	AHOTEL	Hotels and restaurants
	ATRANS	Transport and communication
	AESTAT	Real estate
	AADMIN	Public administration, health, and education
	APRIVS	Business and other services
Agricultural Commodities	CMAIZE	Maize
	CPADDY	Paddy
	CSORGH	Sorghum or millets
	CWHEAT	Wheat
	CBEANS	Beans
	CCASSA	Cassava
	CCEREA	Other cereals
	COILSE	Oil seeds
	CROOTS	Other roots and tubes
	CCOTTO	Cotton
	CCOFFE	Coffee
	CTOBAC	Tobacco
	CTEAGR	Tea
	CCASHE	Cashew nuts
	CSISAL	Sisal fiber
	CSUGAR	Sugar
	COFRVE	Fruits and vegetables
	COCROP	Other crops
	CLIVES	Poultry and livestock
	CFISHI	Fish
CHUFOR	Hunting and forestry	
Non-agricultural Commodities	CMININ	Mining and quarrying
	CMEATD	Meat and dairy products
	CGRAIN	Grain milling
	CPFOOD	Processed food
	CBEVER	Beverages and tobacco products
	CCLOTH	Textile and leather products
	CWOODP	Wood paper printing
	CCHEMI	Manufacture of basic and industrial chemicals
	CFERTI	Manufacture of fertilizers and pesticides
	CPETRO	Petroleum refineries
	CRUPLA	Rubber plastic and other manufacturing
	CGLASS	Glass and cement
	CMETAL	Iron steel and metal products
	CEQUIP	Manufacture all equipment
	CUTILI	Utilities
	CCONST	Construction
	CTRADE	Wholesale and retail trade
	CHOTEL	Hotels and restaurants
CTRANS	Transport and communication	

Table 5.1 continued: Micro SAM Account Descriptions

<b>Group</b>	<b>Account</b>	<b>Description</b>
Non-agricultural Commodities	CESTAT	Real estate
	CADMIN	Public administration health and education
	CPRIVS	Business and other service activities
Marketing Margins	CTDTP-E	Export transactions costs
	CTDTP-D	Domestic sales transactions costs
	CTDTP-M	Import transactions costs
Factors	FSUB	Subsistence Factor
	LCHILD	Child labor (age 10 to 14)
	LNONF	Female labor (no formal education)
	LNFPF	Female labor (not finished primary school)
	LNFSF	Female labor (not finished secondary school)
	LSECF	Female labor (secondary or higher education)
	LNONM	Male labor (no formal education)
	LNFPM	Male labor (not finished primary school)
	LNFSM	Male labor (not finished secondary school)
	LSECM	Male labor (secondary or higher education)
	CAPAG	Agricultural capital
	CAPNAG	Non-agricultural capital
	LAND	Agricultural land
Households	HRBFPL	Rural (below food poverty line)
	HRFBPL	Rural (between food and basic needs poverty lines)
	HRNOED	Rural (non-poor – head with no education)
	HRNFPS	Rural (non-poor – head not finished primary school)
	HRNFSS	Rural (non-poor – head not finished secondary school)
	HRSECP	Rural (non-poor – head finished secondary school)
	HUBFPL	Urban (below food poverty line)
	HUFBPL	Urban (between food and basic needs poverty lines)
	HUNOED	Urban (non-poor – head with no education)
	HUNFPS	Urban (non-poor – head not finished primary school)
	HUNFSS	Urban (non-poor – head not finished secondary school)
	HUSECP	Urban (non-poor – head finished secondary school)
	Taxes	DIRTAX
IMPTAX		Import tariffs
EXPTAX		Export taxes
ACTTAX		Value added or activity taxes
INDTAX		Indirect or sales taxes
FACTAX		Factor taxes
Other	GOV	Government
Institutional	ROW	Rest of world
Accounts	S-I	Savings and investment

Of the 43 production sectors in the SAM, 21 are in agriculture. The remaining sectors are split between mining (1), manufacturing (13), the rest of the secondary sector (2), and the tertiary sector (6). The same disaggregation applies for commodities. In addition, there are three

marketing margin commodity accounts for export, import, and domestic sales transaction costs discussed above.

Considerable attention was paid to disaggregating factors. The first factor is the composite subsistence land, labor and capital factor used in the production of own household consumption. Since it is not possible to determine the shares of each of the factor types in this factor category, they are combined into a single factor called *subsistence factor*. Assuming that subsistence production uses the same technology as non-subsistence production, the share of subsistence labor value-added in total subsistence value-added is 36.2 percent.

Labor was disaggregated largely according to gender and education as reported in the LFS. The exception to this was the *child labor* category, which includes all working children between the ages of ten and 14.<sup>22</sup> Adult workers were divided into male and female labor categories, and then disaggregated further according to their highest level of education attained. The educational categories chosen included: (i) no formal education (including adult education); (ii) not finished primary school; (iii) not finished secondary school; and (iv) completed secondary school or higher education. Table 5.2 shows the distribution of the labor force across the various labor categories in 2000/01.<sup>23</sup>

Children are an important source of labor in Tanzania. Non-subsistence child labor accounts for 8.6 percent of the total workforce. However, as will be seen in Table 5.5, they only contribute 0.3 percent to GDP at factor cost or total value-added. Female and male adults appear to be as likely to work with 51.7 and 48.3 of the adult non-subsistence labor comprising women and men respectively. Within both male and female adult labor the largest category are workers who have not yet finished secondary school. Male workers hold a larger number of the higher educated jobs, and women hold a proportionally larger share of uneducated positions.

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<sup>22</sup> A detailed description of the LFS codes used and the SPSS syntax are available from the authors.

<sup>23</sup> The total workforce shown in the table is lower than the official estimate of 16.9 million people. This is because a number of respondents in the LFS declared that they were working but did not specify their job. It is impossible to determine whether these respondents incorrectly answered positively to being employed, or whether there was an omission regarding their job description. As such these people have been dropped from estimates of the labor force.

Table 5.2: Labor Force by Labor Category (2000/01)

<b>Age and Gender Category</b>	<b>Education Category</b>	<b>Number of Workers</b>	<b>Share of Total Workers</b>
Subsistence labor		5,937,131	36.2
Child labor (ages 10 to 14)		1,403,358	8.6
Female	No formal education	1,527,131	9.3
	Not finished primary school	672,474	4.1
	Not finished secondary school	2,344,897	14.3
	Secondary or higher education	143,315	0.9
	<i>Total adult female</i>	4,687,817	28.6
Male	No formal education	788,193	4.8
	Not finished primary school	928,912	5.7
	Not finished secondary school	2,407,857	14.7
	Secondary or higher education	249,685	1.5
	<i>Total adult male</i>	4,374,646	26.7
All labor categories		16,402,952	100.0

Source: Authors' calculations using the Labor Force Survey 2000/01 (NBS, 2002)

Capital is separated into agricultural and non-agricultural capital depending on the sector in which it is employed, and land is only used in agricultural production.

Households are initially separated into rural and urban. The remaining disaggregation is based on the income level of the household and on the education of the head of the household. In terms of adult-equivalent income levels, the poorest households are those below the food poverty line, followed by households who fall between the food and basic needs poverty lines. The remaining households that do not fall into either of these categories (approximately 60 percent of the population) are divided according to the highest educational attainment of the head of the household. These include: (i) no formal education (including adult education); (ii) not finished primary school; (iii) not finished secondary school; and (iv) completed secondary school or higher education.

This disaggregation of households uses the poverty lines developed for the official report on the HBS (NBS, 2002b). The motivation behind using rural/urban and education in further disaggregating households is derived from the finding of the HBS report that these are the two factors which account the most for the incidence of household poverty. According to the same report, there is no greater likelihood of a household falling into poverty if the head of that household is female given that other socio-economic conditions are equal. As such, households



were not disaggregated according to the gender of the head of the household. The distribution of household population across the household categories is shown in Table 5.3.

Of the total Tanzanian population of 31.3 million people, 80.3 percent live in rural areas. The largest concentration of the population is in those rural households whose household head has not finished secondary school. A similar concentration is also found in the urban areas. The concentration of the population in these household categories coincides with the concentration of adult labor into categories with the same attained education level. The remaining household populations are relatively evenly distributed within the urban and rural classifications. Given this relatively even distribution of the population and the identification of the two poverty lines, this household disaggregation appears to be appropriate for poverty analysis.

Table 5.3: Household Population by Household Category (2000/01)

<b>Rural/ Urban</b>	<b>Education Category</b>	<b>Number of People</b>	<b>Share of Total Population</b>
Rural	Below food poverty line	5,080,859	16.2
	Between food and basic needs poverty lines	4,605,455	14.7
	Non-poor – head with no education	3,512,349	11.2
	Non-poor – head not finished primary school	3,499,736	11.2
	Non-poor – head not finished secondary school	7,842,113	24.9
	Non-poor – head finished secondary school	661,535	2.1
	<i>Total rural</i>	<i>25,202,047</i>	<i>80.3</i>
Urban	Below food poverty line	674,816	2.2
	Between food and basic needs poverty lines	712,486	2.3
	Non-poor – head with no education	422,993	1.4
	Non-poor – head not finished primary school	689,084	2.2
	Non-poor – head not finished secondary school	2,462,953	7.9
	Non-poor – head finished secondary school	1,146,635	3.7
	<i>Total Urban</i>	<i>6,108,967</i>	<i>19.7</i>
<b>All households (total population)</b>		<b>31,311,014</b>	<b>100.0</b>

Source: Authors' calculations using the Household Budget Survey 2000/01 (NBS, 2002)

### *The Structure of Production and Trade*

Tanzania is largely an agricultural economy with 46.3 percent of total GDP at factor cost being generated within the agricultural sectors. Table 5.4 shows the distribution of production and trade across the sectors included in the SAM. Column one shows the importance of each sector in generating total value-added in the economy. The single largest agricultural sector in Tanzania

is maize production accounting for almost one tenth of total value-added. Other large sectors within crop agriculture include fruits and vegetables (6.6 percent), and paddy (3.7 percent). The animal-related and forestry sectors together contribute 11 percent towards total value-added and are therefore an important component of both agricultural and national production. Beyond agricultural production, the agro-related sectors account for 5.7 percent of value-added. Combined agricultural and agro-related production dominates GDP at factor cost.

None of the remaining individual manufacturing sectors account for more than around one percent of total value-added, with total manufacturing value-added equal to only 11.9 percent of GDP at factor cost. The service and remaining secondary sectors are an important source of value-added and together amount to 40.4 percent. Within these sectors it is wholesale and retail trade that contributes the most (10.5 percent) followed by health, education and public services (6.4 percent).

Turning to international trade, column two shows that over a quarter of total import expenditures are for the purchase of equipment. Other important imported commodities in order of magnitude are transport and communication services (20 percent), and petroleum products (12.14 percent). With the exception of sugar, which accounts for 2.5 percent of total imports, there are virtually no agricultural imports. The most important source of export earnings is transport and communication services (40.9 percent), which includes tourism. Two other sectors with high shares of total exports include coffee (7.9 percent) and cashew nuts (7.8 percent). Columns three and four show import to domestic demand and export to domestic output ratios. The former shows that around 90 percent of petroleum products used within Tanzania are imported from abroad. Similarly for exports, the food crops have very low export intensities, while the traditional crops have very high proportions of output sold abroad (with the exception of sugar production). Finally, the non-traditional crops have higher export intensities than the food crops but these are still substantially lower than the traditional crop categories.

Table 5.4: The Structure of Production and Foreign Trade in Tanzania (2000)

Activity/Commodity	Share of Total Value (%)			Import-demand Ratio	Export-output Ratio
	Value-added	Imports	Exports		
Maize	9.89	0.82	0.09	3.75	0.24
Paddy	3.73	1.09	0.22	6.64	0.73
Sorghum/millet	1.32	0.00	0.01	0.01	0.10
Wheat	0.23	0.96	0.00	43.72	0.19
Beans	2.35	0.00	0.09	0.02	0.64
Cassava	2.01	0.00	0.00	0.00	0.00
Other cereals	0.34	0.00	0.01	0.04	0.39
Oil seeds	1.50	0.01	0.37	0.28	4.27
Other roots/tubes	1.62	0.00	0.00	0.00	0.00
Cotton	0.63	0.00	3.46	0.01	38.41
Coffee	0.76	0.00	7.91	85.09	100.00
Tobacco	0.54	0.01	4.01	0.50	57.27
Tea	0.27	0.01	2.20	1.56	62.16
Cashew nuts	1.04	0.00	7.80	83.59	100.00
Sisal fiber	0.09	0.00	0.00	0.00	0.00
Sugar	1.60	2.53	1.06	28.57	7.50
Fruits/vegetables	6.60	0.40	2.29	2.34	7.03
Other crops	0.80	0.01	0.38	0.37	10.80
Poultry/livestock	3.29	0.14	0.54	1.31	2.49
Fish	4.04	0.01	5.43	0.06	19.09
Hunting/forestry	3.65	0.03	0.46	0.34	3.16
Mining/quarrying	1.41	0.67	1.66	12.28	15.36
Meat/dairy	2.28	0.20	0.05	1.75	0.24
Grain milling	0.66	0.78	0.56	2.43	1.02
Processed food	1.92	3.70	0.58	16.57	1.68
Beverages/tobacco	0.86	0.83	0.10	9.90	0.67
Textile/leather	2.93	3.83	1.41	18.22	4.04
Wood/paper/printing	0.95	3.41	0.47	33.09	3.70
Chemicals	0.21	5.61	0.27	64.48	4.77
Fertilizers/pesticides	0.04	0.62	0.01	51.32	0.50
Petroleum refineries	0.18	12.14	0.01	89.44	0.40
Rubber/plastics	0.23	3.06	0.11	54.84	2.32
Glass/cement	0.39	0.32	0.56	7.97	7.44
Iron/steel/metal	0.56	6.29	0.09	49.18	0.78
All equipment	0.68	28.00	0.65	82.79	6.17
Utilities	1.78	0.00	0.00	0.00	0.00
Construction	4.75	0.09	0.00	0.21	0.00
Wholesale/retail trade	10.51	0.00	0.00	0.00	0.00
Hotels/restaurants	2.60	0.00	0.00	0.00	0.00
Transport/comm.	5.70	19.96	40.86	69.14	74.46
Real estate	5.82	0.00	0.00	0.00	0.00
Health/education/Govern.	6.38	0.88	4.61	1.05	3.42
Business/services nec.	2.87	3.62	11.68	22.17	36.88
All sectors	100.00	100.00	100.00	15.44	9.57

Source: Authors' calculations from the 2000 SAM for Tanzania

Based on these results, the structure of the Tanzanian economy is typical of a sub-Saharan country. There is a high dependence on agricultural production, with exports being dominated by traditional, and to lesser extent non-traditional, crops. The exporting of food crops that does take place is likely to be trade with other countries in the region. The manufacturing base is relatively small and is largely concentrated in the production of agro-related products. Finally, retail trade and public services drive production in the service sector.

Table 5.5 shows percentage usage of each factor in each sector's production. Conversely, Table 5.6 shows each factor's usage across all sectors. As can be seen from these two tables, the subsistence factor, which represents home consumption, is largely used in the production of food and non-traditional crops. As would be expected, there is some degree of home processing of agricultural products into food and related products. The subsistence factor is also used in the production of real estate services, which represents the value of owner-occupied dwellings. The concentration of subsistence factor usage in food and non-traditional crops is even clearer in Table 5.6, where it can be seen that most of this factor is used in maize, and fruit and vegetable production.

By construction, land is only used in the agricultural sectors. However, within agriculture land is somewhat concentrated in the animal-related and forestry sectors. Exceptions to this include maize, paddy, and fruits and vegetables.

As noted above, child labor is an important labor category in Tanzania. Almost 70 percent of all child labor is used within the poultry and livestock, fruits and vegetables, and cotton sectors.

Comparing male and female labor intensities reveals some division of labor in agricultural and agro-related production. Table 5.5 shows that more female labor is used in the production of food crops, while more male labor is used in the traditional crop and animal-related sectors. Outside of agriculture the labor division is more pronounced. Very little female labor is used in manufacturing and services, with the exception of the hotel and catering, and textile sectors, which use higher skilled female labor. Manufacturing and service production is dominated by male labor.

Table 5.5: Factor Employment within Sectors in Tanzania (2000)

Activity	Subsist Factor	Land	Child Labor	Female Labor by Education Level			
				None	NFP	NFS	Sec+
Maize	67.8	4.6	0.2	1.8	1.2	8.1	0.0
Paddy	23.0	11.2	0.2	1.9	2.1	18.8	0.1
Sorghum/millet	66.3	5.0	0.4	3.9	0.6	5.2	0.0
Wheat	5.4	14.2	0.0	0.0	0.0	0.0	0.0
Beans	30.3	10.3	0.0	3.8	2.5	20.4	0.1
Cassava	81.0	2.8	0.1	1.1	0.6	3.4	0.0
Other cereals	12.2	13.1	0.5	5.5	2.3	19.4	0.1
Oil seeds	27.0	10.9	0.6	3.4	1.6	17.1	0.0
Other roots/tubes	53.1	7.0	0.8	1.6	1.3	12.0	0.0
Cotton	0.0	14.9	5.2	1.1	3.1	12.2	0.0
Coffee	8.4	13.7	0.0	2.1	1.2	15.4	0.0
Tobacco	0.0	14.9	0.0	2.8	2.3	14.9	0.2
Tea	1.6	14.8	0.0	0.0	0.0	0.0	0.0
Cashew nuts	0.0	14.9	1.0	3.1	0.7	10.5	0.0
Sisal fiber	0.0	15.0	0.0	5.4	0.0	0.0	0.0
Sugar	1.5	14.5	0.0	0.0	27.4	0.0	0.0
Fruits/vegetables	40.2	8.6	0.7	1.2	1.0	16.5	0.3
Other crops	44.3	8.3	1.1	1.0	0.0	12.0	0.1
Poultry/livestock	18.4	12.0	3.9	2.4	1.0	17.8	0.8
Fish	6.0	14.0	0.0	2.0	0.0	3.4	0.0
Hunting/forestry	60.2	5.8	0.0	0.0	0.0	11.0	0.0
Mining/quarrying	0.0	0.0	0.1	0.1	0.0	0.0	0.1
Meat/dairy	87.1	0.0	0.0	0.0	0.0	0.1	0.2
Grain milling	0.0	0.0	0.3	0.5	3.5	25.5	0.0
Processed food	16.3	0.0	0.0	0.2	0.1	0.7	4.0
Beverages/tobacco	13.1	0.0	0.0	0.0	0.0	0.1	0.4
Textile/leather	0.0	0.0	0.2	0.8	0.8	14.4	4.8
Wood/paper/printing	0.0	0.0	0.0	0.0	0.0	0.3	0.6
Chemicals	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fertilizers/pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum refineries	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber/plastics	0.0	0.0	0.0	0.0	0.0	4.1	2.2
Glass/cement	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Iron/steel/metal	0.0	0.0	0.0	0.0	0.0	0.0	0.5
All equipment	0.0	0.0	0.0	0.0	0.0	0.5	0.2
Utilities	0.0	0.0	0.0	0.0	0.0	0.5	0.4
Construction	0.0	0.0	0.2	0.1	0.0	0.3	0.7
Wholesale/retail trade	0.0	0.0	0.0	0.1	0.2	1.3	0.4
Hotels/restaurants	0.0	0.0	0.0	1.2	1.7	8.9	0.8
Transport/comm.	0.0	0.0	0.0	0.0	0.0	0.6	1.1
Real estate	76.1	0.0	0.0	0.0	0.0	0.0	0.7
Public services	0.0	0.0	0.0	0.1	0.4	8.8	23.4
Business/services nec.	0.0	0.0	0.1	0.1	0.5	3.8	3.3
All sectors	25.1	4.1	0.3	0.9	1.1	7.0	2.1

Source: Tanzanian SAM 2000. *NFP* means 'not finished primary school'; *NFS* means 'not finished secondary school'; and *Sec+* means 'finished secondary or tertiary school'.

Table 5.5 continued: Factor Employment within Sectors in Tanzania (2000)

Activity	Male Labor by Education Level				Capital		All Factors
	None	NFP	NFS	Sec+	Agri	Non-agri	
Maize	0.8	2.2	2.5	0.2	10.6	0.0	100.0
Paddy	1.1	6.3	8.4	0.8	26.2	0.0	100.0
Sorghum/millet	1.8	2.0	2.9	0.1	11.7	0.0	100.0
Wheat	0.0	0.0	47.4	0.0	33.0	0.0	100.0
Beans	1.0	4.0	3.3	0.2	24.0	0.0	100.0
Cassava	0.6	2.0	1.6	0.2	6.6	0.0	100.0
Other cereals	2.7	6.3	6.9	0.4	30.7	0.0	100.0
Oil seeds	2.3	6.7	5.0	0.2	25.4	0.0	100.0
Other roots/tubes	0.0	4.3	3.6	0.2	16.3	0.0	100.0
Cotton	3.0	11.4	14.0	0.2	34.8	0.0	100.0
Coffee	2.3	8.9	15.4	0.6	31.9	0.0	100.0
Tobacco	3.4	10.4	14.0	2.2	34.8	0.0	100.0
Tea	0.0	49.2	0.0	0.0	34.4	0.0	100.0
Cashew nuts	5.5	12.3	17.2	0.0	34.9	0.0	100.0
Sisal fiber	13.7	11.0	16.7	3.2	35.0	0.0	100.0
Sugar	0.0	22.8	0.0	0.0	33.8	0.0	100.0
Fruits/vegetables	1.7	3.8	5.2	0.4	20.2	0.0	100.0
Other crops	3.6	7.0	2.9	0.2	19.4	0.0	100.0
Poultry/livestock	3.5	5.5	5.9	0.7	28.0	0.0	100.0
Fish	6.9	15.6	19.5	0.0	32.6	0.0	100.0
Hunting/forestry	1.1	0.0	7.4	0.8	13.6	0.0	100.0
Mining/quarrying	0.0	0.1	1.3	0.1	0.0	98.3	100.0
Meat/dairy	0.0	0.2	0.5	0.0	0.0	11.9	100.0
Grain milling	1.7	2.3	34.8	7.7	0.0	23.7	100.0
Processed food	0.3	0.5	4.8	3.2	0.0	69.9	100.0
Beverages/tobacco	0.0	0.0	1.1	15.9	0.0	69.3	100.0
Textile/leather	0.4	4.0	21.4	5.3	0.0	48.0	100.0
Wood/paper/printing	1.4	1.0	15.9	4.0	0.0	76.8	100.0
Chemicals	0.0	0.0	81.4	0.0	0.0	18.6	100.0
Fertilizers/pesticides	0.0	0.0	70.6	0.0	0.0	29.4	100.0
Petroleum refineries	0.0	0.0	24.5	3.0	0.0	72.5	100.0
Rubber/plastics	0.0	0.3	11.1	4.0	0.0	78.3	100.0
Glass/cement	0.2	0.4	18.5	3.6	0.0	77.2	100.0
Iron/steel/metal	1.2	3.0	10.4	8.2	0.0	76.8	100.0
All equipment	0.0	2.2	2.7	3.5	0.0	90.9	100.0
Utilities	1.1	0.8	7.9	9.7	0.0	79.8	100.0
Construction	1.3	7.3	45.9	11.4	0.0	32.8	100.0
Wholesale/retail trade	0.2	0.5	2.8	2.2	0.0	92.4	100.0
Hotels/restaurants	0.1	0.3	6.9	3.3	0.0	76.8	100.0
Transport/comm.	0.1	0.3	4.1	6.1	0.0	87.7	100.0
Real estate	0.0	0.0	0.8	5.5	0.0	16.8	100.0
Public services.	0.1	1.3	14.2	47.5	0.0	4.3	100.0
Business/services nec.	0.4	2.4	12.5	8.5	0.0	68.5	100.0
All sectors	1.1	3.5	9.0	5.7	9.6	30.5	100.0

Source: Tanzanian SAM 2000. *NFP* means 'not finished primary school'; *NFS* means 'not finished secondary school'; *Sec+* means 'finished secondary or tertiary school; and *Agri* means 'Agriculture';

Table 5.6: Factor Employment across Sectors in Tanzania (2000)

Activity	Subsist Factor	Land	Child Labor	Female Labor by Education Level			
				None	NFP	NFS	Sec+
Maize	26.7	10.9	5.3	19.7	11.2	11.4	0.1
Paddy	3.4	10.2	2.1	7.5	7.4	10.0	0.2
Sorghum/millet	3.5	1.6	1.6	5.6	0.7	1.0	0.0
Wheat	0.1	0.8	0.0	0.0	0.0	0.0	0.0
Beans	2.8	5.9	0.0	9.8	5.4	6.8	0.1
Cassava	6.5	1.4	0.9	2.4	1.1	1.0	0.0
Other cereals	0.2	1.1	0.5	2.0	0.7	0.9	0.0
Oil seeds	1.6	4.0	2.8	5.4	2.2	3.6	0.0
Other roots/tubes	3.4	2.7	4.1	2.8	2.0	2.7	0.0
Cotton	0.0	2.3	10.8	0.7	1.8	1.1	0.0
Coffee	0.3	2.5	0.0	1.8	0.9	1.7	0.0
Tobacco	0.0	2.0	0.0	1.6	1.2	1.1	0.1
Tea	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Cashew nuts	0.0	3.8	3.4	3.5	0.6	1.5	0.0
Sisal fiber	0.0	0.3	0.0	0.5	0.0	0.0	0.0
Sugar	0.1	5.6	0.0	0.0	40.9	0.0	0.0
Fruits/vegetables	10.6	13.8	16.1	8.8	6.2	15.5	1.0
Other crops	1.4	1.6	2.8	0.9	0.0	1.4	0.0
Poultry/livestock	2.4	9.6	42.4	8.6	3.0	8.3	1.3
Fish	1.0	13.7	0.0	8.8	0.0	1.9	0.0
Hunting/forestry	8.8	5.2	0.0	0.0	0.0	5.7	0.0
Mining/quarrying	0.0	0.0	0.4	0.1	0.0	0.0	0.1
Meat/dairy	7.9	0.0	0.0	0.0	0.0	0.0	0.2
Grain milling	0.0	0.0	0.7	0.4	2.2	2.4	0.0
Processed food	1.2	0.0	0.0	0.5	0.2	0.2	3.7
Beverages/tobacco	0.4	0.0	0.0	0.0	0.0	0.0	0.2
Textile/leather	0.0	0.0	1.6	2.6	2.1	6.0	6.7
Wood/paper/printing	0.0	0.0	0.1	0.0	0.0	0.0	0.3
Chemicals	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fertilizers/pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Petroleum refineries	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rubber/plastics	0.0	0.0	0.0	0.0	0.0	0.1	0.2
Glass/cement	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iron/steel/metal	0.0	0.0	0.0	0.0	0.0	0.0	0.1
All equipment	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Utilities	0.0	0.0	0.0	0.0	0.0	0.1	0.3
Construction	0.0	0.0	3.0	0.3	0.0	0.2	1.5
Wholesale/retail trade	0.0	0.0	0.5	1.3	2.3	1.9	1.9
Hotels/restaurants	0.0	0.0	0.2	3.3	4.2	3.3	1.0
Transport/comm.	0.0	0.0	0.0	0.0	0.0	0.5	3.0
Real estate	17.7	0.0	0.0	0.0	0.0	0.0	2.1
Public services	0.0	0.0	0.0	0.7	2.3	7.9	71.1
Business/services nec.	0.0	0.0	0.9	0.4	1.2	1.6	4.6
All sectors	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Tanzanian SAM 2000. *NFP* means 'not finished primary school'; *NFS* means 'not finished secondary school'; and *Sec+* means 'finished secondary or tertiary school'.

Table 5.6 continued: Factor Employment across Sectors in Tanzania (2000)

Activity	Male Labor by Education Level				Capital		All Factors
	None	NFP	NFS	Sec+	Agri	Non-agri	
Maize	7.2	6.2	2.7	0.3	10.9	0.0	9.9
Paddy	3.9	6.7	3.5	0.5	10.2	0.0	3.7
Sorghum/millet	2.2	0.8	0.4	0.0	1.6	0.0	1.3
Wheat	0.0	0.0	1.2	0.0	0.8	0.0	0.2
Beans	2.1	2.7	0.9	0.1	5.9	0.0	2.4
Cassava	1.1	1.1	0.4	0.1	1.4	0.0	2.0
Other cereals	0.8	0.6	0.3	0.0	1.1	0.0	0.3
Oil seeds	3.1	2.8	0.8	0.0	3.9	0.0	1.5
Other roots/tubes	0.0	2.0	0.7	0.0	2.7	0.0	1.6
Cotton	1.7	2.0	1.0	0.0	2.3	0.0	0.6
Coffee	1.6	1.9	1.3	0.1	2.5	0.0	0.8
Tobacco	1.6	1.6	0.8	0.2	2.0	0.0	0.5
Tea	0.0	3.7	0.0	0.0	1.0	0.0	0.3
Cashew nuts	5.2	3.6	2.0	0.0	3.8	0.0	1.0
Sisal fiber	1.2	0.3	0.2	0.1	0.3	0.0	0.1
Sugar	0.0	10.3	0.0	0.0	5.6	0.0	1.6
Fruits/vegetables	10.3	7.0	3.8	0.5	13.8	0.0	6.6
Other crops	2.6	1.6	0.3	0.0	1.6	0.0	0.8
Poultry/livestock	10.6	5.1	2.1	0.4	9.6	0.0	3.3
Fish	25.1	17.9	8.8	0.0	13.7	0.0	4.0
Hunting/forestry	3.7	0.0	3.0	0.5	5.2	0.0	3.6
Mining/quarrying	0.0	0.0	0.2	0.0	0.0	4.5	1.4
Meat/dairy	0.0	0.1	0.1	0.0	0.0	0.9	2.3
Grain milling	1.0	0.4	2.6	0.9	0.0	0.5	0.7
Processed food	0.6	0.3	1.0	1.1	0.0	4.4	1.9
Beverages/tobacco	0.0	0.0	0.1	2.4	0.0	1.9	0.9
Textile/leather	1.0	3.3	7.0	2.7	0.0	4.6	2.9
Wood/paper/printing	1.2	0.3	1.7	0.7	0.0	2.4	1.0
Chemicals	0.0	0.0	1.9	0.0	0.0	0.1	0.2
Fertilizers/pesticides	0.0	0.0	0.3	0.0	0.0	0.0	0.0
Petroleum refineries	0.0	0.0	0.5	0.1	0.0	0.4	0.2
Rubber/plastics	0.0	0.0	0.3	0.2	0.0	0.6	0.2
Glass/cement	0.1	0.0	0.8	0.2	0.0	1.0	0.4
Iron/steel/metal	0.6	0.5	0.6	0.8	0.0	1.4	0.6
All equipment	0.0	0.4	0.2	0.4	0.0	2.0	0.7
Utilities	1.7	0.4	1.6	3.0	0.0	4.7	1.8
Construction	5.8	9.8	24.3	9.6	0.0	5.1	4.7
Wholesale/retail trade	1.6	1.4	3.3	4.0	0.0	31.8	10.5
Hotels/restaurants	0.1	0.2	2.0	1.5	0.0	6.6	2.6
Transport/comm.	0.5	0.5	2.6	6.1	0.0	16.4	5.7
Real estate	0.0	0.0	0.5	5.6	0.0	3.2	5.8
Public services.	0.8	2.4	10.1	53.4	0.0	0.9	6.4
Business/services nec.	1.0	1.9	4.0	4.3	0.0	6.5	2.9
All sectors	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Tanzanian SAM 2000. *NFP* means 'not finished primary school'; *NFS* means 'not finished secondary school'; *Sec+* means 'finished secondary or tertiary school; and *Agri* means 'Agriculture'.



Consulting Table 5.6 shows that 40.9 percent of female labor that has not finished primary school is employed in the sugar sector. This large share highlights the important distinction that is made in the SAM between subsistence and non-subsistence factors. In this case there are similarly educated women working elsewhere in the economy but they are largely employed in subsistence production, and as such are not distinguished in this SAM. Consequently, all categories (except for the first one) should be interpreted as non-subsistence factors, with the subsistence factor containing an amalgamation of the various labor and non-labor factors.

Agricultural capital is used most intensively in the traditional crop sectors, where estate production is more prevalent. However, the importance of capital in agricultural production is substantially lower than in non-agricultural production. As expected, the most capital-intensive sector is the mining sector, followed by manufacturing. However, the largest concentration of total non-agricultural capital is not within these sectors. With the exception of real estate, and public and private services, the services sector is also highly capital intensive and contains most of the country's non-agricultural capital resources.

### *Household Income and Expenditure*

Starting with household income, Table 5.7 shows how the income earned by each income source is distributed across households. For the sake of convenience those households that lie above the basic needs poverty lines have been aggregated. However in the final SAM in the appendix these households are further divided into categories based on the education of the head of the household. Table 5.8 shows the distribution of household income across each of the income sources. In interpreting these tables it is important to keep in mind each household's share of the total population as shown in Table 5.3 above.

Table 5.7: Distribution of Income Sources across Households (2000)

Income Source	Rural			Urban			All
	BFL	BFBL	AFBL	BFL	BFBL	AFBL	
Subsistence factor	8.9	13.1	67.8	0.3	0.4	9.5	100.0
Child labor	5.3	5.4	52.4	0.5	4.9	31.5	100.0
Female (None)	12.0	11.6	57.4	2.6	2.4	14.0	100.0
Female (NFP)	7.0	7.4	56.2	1.6	2.5	25.3	100.0
Female (NFS)	2.1	3.4	49.0	1.2	2.2	42.1	100.0
Female (Sec+)	0.0	0.7	18.3	0.6	1.8	78.6	100.0
Male (None)	13.5	21.3	52.0	1.5	1.2	10.5	100.0
Male (NFP)	8.8	9.2	54.4	1.8	2.4	23.4	100.0
Male (NFS)	2.9	4.2	54.1	1.0	1.6	36.2	100.0
Male (Sec+)	0.6	0.9	31.4	0.3	0.9	65.9	100.0
Agricultural capital	12.4	15.5	65.1	0.9	0.5	5.6	100.0
Land	12.2	15.3	64.9	1.0	0.6	6.0	100.0
Non-agricultural capital	0.6	1.6	48.3	2.4	6.2	40.9	100.0
Government	6.9	7.0	64.8	1.0	0.8	19.5	100.0
Rest of world	0.0	0.0	45.7	0.0	0.0	54.3	100.0
Total household income	5.2	7.3	54.9	1.2	2.4	29.0	100.0

Source: Tanzanian SAM 2000. *NFP* means ‘not finished primary school’; *NFS* means ‘not finished secondary school’; *Sec+* means ‘finished secondary or tertiary school’; *BFL* means ‘below food poverty line’; *BFBL* means ‘between food and basic needs poverty line’; and *ABL* means above basic needs poverty line.

Table 5.8: Household Income by Income Source (2000)

Income Source	Rural			Urban			All
	BFL	BFBL	AFBL	BFL	BFBL	AFBL	
Subsistence factor	42.9	44.7	31.1	5.7	5.7	8.2	24.8
Child labor	0.3	0.2	0.3	0.1	0.1	0.4	0.3
Female (None)	2.1	1.5	1.2	2	2	1.1	0.9
Female (NFP)	1.4	1.1	1.2	1.5	1.5	1.8	1.1
Female (NFS)	2.8	3.2	4.0	6.9	6.9	7.5	7.0
Female (Sec+)	0.0	0.2	1.5	1.1	1.1	4.8	2.0
Male (None)	2.9	3.2	1.4	1.3	1.3	1.2	1.1
Male (NFP)	5.9	4.4	4.2	5.3	5.3	6.0	3.5
Male (NFS)	4.9	5.2	5.2	7.4	7.4	6.2	8.9
Male (Sec+)	0.7	0.7	7.9	1.5	1.5	10.8	5.4
Agricultural capital	22.3	19.9	11.0	7.3	7.3	2.0	9.4
Land	9.6	8.6	4.7	3.5	3.5	1.0	4.1
Non-agricultural capital	3.0	6.2	21.6	55.6	55.6	42.7	27.5
Government	1.2	0.9	1.1	0.8	0.8	0.7	0.9
Rest of world	0.0	0.0	3.5	0	0	5.8	3.1
Total household income	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Tanzanian SAM 2000. *NFP* means ‘not finished primary school’; *NFS* means ‘not finished secondary school’; *Sec+* means ‘finished secondary or tertiary school’; *BFL* means ‘below food poverty line’; *BFBL* means ‘between food and basic needs poverty line’; and *ABL* means above basic needs poverty line.

As expected, subsistence factor income is almost entirely earned by rural households, with the poorer rural households being most dependent on this income source. Most of total land and agricultural capital income is earned by higher income households, with rural households earning more than urban households. Given their lower access to subsistence factor income, poorer urban households are more dependent on agricultural capital and land income. However these households do receive a greater share of the indirect returns to non-agricultural capital (i.e., enterprise income), and are also most dependent on this income source. Rural households receive more of and are more dependent on transfer payments from government. Finally, a greater share of higher educated labor income accrues to urban households, despite their lower share of the population.

Table 5.9 shows how total household consumption spending is distributed across broad commodity categories. On average 64.7 percent of all households consumption spending is on agricultural and food products.<sup>24</sup> Higher-income rural households spend more on food than similarly classified urban households. Amongst poorer households, those below the food poverty line spend less of their income on food consumption than those households between the two poverty lines. Only high-income urban households spend a substantial amount on services.

Table 5.9: Household Consumption Spending by Broad Commodity Category (2000)

Commodity category	Rural			Urban			All
	BFL	BFBL	AFBL	BFL	BFBL	AFBL	
Agriculture and food	66.9	68.2	65.2	67.7	72.0	61.4	64.7
Other manufactured goods	15.1	13.0	16.4	22.5	16.0	19.1	16.9
Utilities	0.5	0.5	0.8	1.3	1.0	1.4	0.9
Real estate	13.5	14.5	11.2	2.7	3.3	1.7	8.6
Other services	4.0	3.8	6.4	5.8	7.7	16.4	8.9
All commodities	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Tanzanian SAM 2000. *BFL* means 'below food poverty line'; *BFBL* means 'between food and basic needs poverty line'; and *ABL* means above basic needs poverty line.

<sup>24</sup> Food products include meat and dairy products, grain milling, food, and beverages.

## *Government, Savings, Investment and the Rest of the World*

Government income is generated through its tax receipts. The most important of these are indirect and direct taxes, which contributes 49.1 and 29.5 percent to total government revenue. Import taxes are another important revenue source. Government expenditure is dominated by consumption spending, although the government did manage to save 27 percent of its income in 2000.

Table 5.10: Government Income and Expenditure (2000)

<b>Income</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>	<b>Expenditure</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>
Enterprise dividends	1	0.2	Consumption spending	483	64.7
Direct taxes	220	29.5	Transfers to households	62	8.3
Import taxes	100	13.3	Savings	201	27.0
Export taxes	0.0	0.0			
Value-added taxes	40	5.4			
Indirect taxes	367	49.1			
Factor taxes	18	2.4			
<b>Total</b>	<b>746</b>	<b>100.0</b>	<b>Total</b>	<b>746</b>	<b>100.0</b>

Source: Authors' calculations from the 2000 SAM.

Total savings in Tanzania is heavily dependent on the inflow of foreign savings. Total savings received from abroad amount to over 36 percent of total savings available for investment. Remaining savings come from households (48 percent), and the government (15.9 percent). All savings is directed towards gross fixed capital formation, which represents both public and private investment in the economy.

Table 5.11: Savings and Investment (2000)

<b>Savings</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>	<b>Investment</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>
Households	608	48.0	Fixed capital formation	1,267	100.0
Government	201	15.9			
Foreign	457	36.1			
<b>Total</b>	<b>1,267</b>	<b>100.0</b>	<b>Total</b>	<b>1,267</b>	<b>100.0</b>

Source: Authors' calculations from the 2000 SAM.

The final account in the SAM is the current account. As can be seen from Table 5.12, the value of imports far exceeds the value of exports. This large trade deficit is made possible by the

inflow of foreign capital into the country. While some of this inflow is foreign borrowing, much of it is in the form of foreign aid (grants). As such, while the deficit is a substantial share of total receipts, it should in part be interpreted as a dependence on foreign goodwill. In the case of Tanzania the inflow of foreign aid has been extensive.

Table 5.12: Tanzanian Current Account (2000)

<b>Receipts</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>	<b>Payments</b>	<b>Value (Tsh Bil)</b>	<b>Share</b>
Exports	1,065	61.5	Imports	1,676	96.7
Household remittances	210	12.1	Factor remittances	56	3.3
Deficit	457	26.4			
<b>Total</b>	<b>1,733</b>	<b>100.0</b>	<b>Total</b>	<b>1,733</b>	<b>100.0</b>

Source: Authors' calculations from the 2000 SAM.

## 6. Summary

The objective of this research has been to not only compile a SAM for Tanzania using the recently released household budget and labor force surveys, but also to construct a framework that can be used to update the SAM as new data becomes available. While only the Tanzanian SAM for the year 2000 has been discussed in detail, the same process of construction applies to the SAMs for 1998, 1999, and 2001. Furthermore, the process of compiling and balancing the SAM is described in the appendix, and the appropriate GAMS code used during this process is available from the International Food Policy Research Institute.

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### **Appendix 1: The SAM Construction Process**

This appendix outlines the process of compiling the database and constructing the final SAM. This is done in three stages:

1. New data from the government publications are collected for the relevant year and entered into the Excel data file.
2. The prior SAM is constructed using information from the data file. This prior SAM is then scrutinized for any obvious inconsistencies between the various data sources.
3. The SAM is balanced using cross-entropy and a final SAM is produced. This final SAM is then scrutinized for any substantial differences between the prior and final SAMs.

Since this process is clearly defined, it has largely been automated. While the example below has been developed for Tanzania, with some adjustments this process could be adapted to fit most countries.

#### *Compiling the Database*

The file containing the data for the SAM is ‘*MasterDataFile.xls*’. As described on the first worksheet, this file contains three types of data: (i) data that needs to be collected annually; (ii) data that is only available from periodic surveys; and (iii) data that is compiled using information from the first two types of data. Each of these required data is discussed in turn.

i. Annual Data (Orange sheets)

Since this information is available annually, it needs to be updated for each new SAM. The relevant worksheets that require such information include:

- ‘*GDP (Nat Acc)*’ – National Accounts (NBS)
- ‘*Taxes (Inl. Rev)*’ – Income Tax Dept. (TRA)
- ‘*Trade (C&E)*’ – Customs and Excise (TRA)
- ‘*GDP (BoT)*’ – National Accounts (BOT)

ii. Periodic Data (Green sheets)

Since this information is drawn from a variety of periodic surveys and publications, it is only necessary to enter new data when new surveys and publications become available.<sup>25</sup> The relevant worksheets that require such information include:

- ‘*Lab Inc (LFS)*’ – Labor Force Survey (NBS)
- ‘*HHD Inc-Exp (HBS)*’ – Household Budget Survey (NBS)
- ‘*HHD Cons (HBS)*’ – Household Budget Survey (NBS)
- ‘*IO Table (NBS)*’ – Input-output Table (NBS)
- ‘*Margins (IO)*’ – Input-output Table (NBS)

iii. Automatic Data (Purple sheets)

This information is compiled using information from the annual and survey data. For example the Macro SAM combines information from national accounts, the household budget survey, the tax tables, and the input-output table. The various tables included in this

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<sup>25</sup> The SPSS syntax used in the compilation of these tables is available from the authors. This includes a detailed outline of the commodity classification used in the HBS, and the classification of households and labor in the HBS and LFS.



section are read into the General Algebraic Modeling System (GAMS) and are used during the construction of the prior SAM.<sup>26</sup> The relevant worksheets that contain such information include:

- ‘*MacroSAM*’
- ‘*Value Added*’
- ‘*Trade*’
- ‘*Taxes*’
- ‘*Sav-Inv*’

### *Constructing the Prior SAM*

Two GAMS files are needed to construct the prior SAM. The first file (‘*LoadData.gms*’) loads the necessary data from the data file constructed in stage one. The second file (‘*Prior.gms*’) uses this data to compile the prior Micro SAM. This is then exported to the SAM file (‘*MasterSAMFile.xls*’) where the prior Macro SAM and prior Micro Coefficient SAM are constructed.<sup>27</sup> The sheets in the SAM file containing information on the prior include:

- ‘*PriorMicro*’ – Direct output from GAMS
- ‘*PriorMacro*’ – Compiled from the prior Micro SAM
- ‘*PriorCoeff*’ – Compiled from the prior Micro SAM

At this stage the prior Macro SAM should be checked for differences in the row and column account totals. If differences exist then there is likely to be some error in the entry of the data in the data file. The prior Micro SAM should also be checked for any substantial differences between demand and supply in the commodity accounts, and between income and expenditure in the household accounts. If such differences exist then inconsistencies exist between the various data sources. The prior data should only be adjusted if there exists new information on how to

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<sup>26</sup> For details on GAMS see Brooke *et al* (1998).

<sup>27</sup> The SAM file must be closed when the prior is constructed in GAMS.

correct for these differences. In the absence of additional and confirmed information, it is preferable to allow the balancing procedure to adjust for these differences.

### *Balancing the SAM*

The final stage of constructing the SAM involves balancing the prior SAM using cross-entropy estimation techniques (as described in Section 4). The SAM is balanced by running the cross-entropy code in GAMS (*Balance.gms*). This code has been tested on SAMs for 1998 to 2001 and has found solutions for each of those years without requiring any adjustment to the code.<sup>28</sup> It therefore can be expected that in the case of Tanzania the SAM construction and updating process for subsequent years will be easily achieved as well.

The prior SAM is loaded from the SAM file (*MasterSAMFile.xls*, Sheet *PriorMicro*), and after balancing is exported back to the same file (*MasterSAMFile.xls*, Sheet *FinalMicro*).<sup>29</sup>

The sheets containing information on the final Macro and Micro SAMs include:

- *FinalMicro* – Direct output from GAMS
- *FinalMacro* – Compiled from the final Micro SAM
- *FinalCoeff* – Compiled from the final Micro SAM
- *FinalDiff* – Absolute difference between cells in the prior and final SAMs.
- *FinalPerc* – Percentage difference between cells in the prior and final SAMs.

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<sup>28</sup> It is possible to place more stringent constraints on the cross-entropy model and find final SAMs that are closer to the prior, however the improvements are typically small.

<sup>29</sup> The SAM file must be closed since the prior SAM is read into GAMS and then the final SAM is exported back into the SAM file.

## Appendix 2: Final 2000 Micro SAM for Tanzania (Tsh Bil.)

	AMAIZE	APADDY	ASORGH	AWHEAT	ABEANS	ACASSA	ACEREA	AOILSE	ARROOTS	ACOTTO	ACOFFE	ATOBAC	ATEAGR	ACASHE	ASISAL	ASUGAR	AOFRVE	AOCROP
AMAIZE																		
APADDY																		
ASORGH																		
AWHEAT																		
ABEANS																		
ACASSA																		
ACEREA																		
AOILSE																		
ARROOTS																		
ACOTTO																		
ACOFFE																		
ATOBAC																		
ATEAGR																		
ACASHE																		
ASISAL																		
ASUGAR																		
AOFRVE																		
AOCROP																		
ALIVES																		
AFISHI																		
AHUFOR																		
AMININ																		
AMEATD																		
AGRAIN																		
APFOOD																		
ABEVER																		
ACLOTH																		
AWOODP																		
ACHEMI																		
AFERTI																		
APETRO																		
ARUPLA																		
AGLASS																		
AMETAL																		
AEQUIP																		
AUTILI																		
ACONST																		
ATRADE																		
AHOTEL																		
ATRANS																		
AESTAT																		
AADMIN																		
APRIVS																		
CMAIZE	42																	
CPADDY		82																
CSORGH			2															
CWHEAT				1														
CBEANS					24													
CCASSA						3												
CCEREA							3											
COILSE								7										
CROOTS									6									
CCOTTO										2								
CCOFFE											4							
CTOBAC												8						
CTEAGR													2					
CCASHE														1				
CSISAL															3			
CSUGAR																27		
COFRVE																	10	
COCROP																		1
CLIVES											7						2	0
CFISHI																		
CHUFOR																		
CMININ																		

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	AMAIZE	APADDY	ASORGH	AWHEAT	ABEANS	ACASSA	ACEREA	AOILSE	ARROOTS	ACOTTO	ACOFFE	ATOBAC	ATEAGR	ACASHE	ASISAL	ASUGAR	AOFRVE	AOCROP
CMEATD																		
CGRAIN																		
CPFOOD																		
CBEVER																		
CCLOTH	1	3	7	2	1	0	0	0	0	5		1		1	0		0	
CWOODP	1	1	0	0	0	0	0	0	0	0		0	0	0			0	0
CCHEMI		0	0	0						1	0	0	0	0				0
CFERTI			0	1	0	0	1	0	0	7	2	3	4	3		0		0
CPETRO		0		1			2				3	2	1		1	0	1	
CRUPLA					0							0	0					
CGLASS																		
CMETAL	2	6	5	0	0	0	0	0	0	3	3	1	0	0		0	2	3
CEQUIP	0	0		0			0	0	0	0	0				1			
CUTILI	0	0	0	0	0	0	0	0	0	0	1	0	3	0	3	1	0	0
CCONST	1	0	0	0			0	0		0	0	0	0	0				
CTRADE	36	9	5	1	3	0	2	2	1	18	6	6	4	1	1	3	7	1
CHOTEL																		
CTRANS	9	8	4	1	1	0	0	1	0	5	2	7	1	1	0	4	2	0
CESTAT	1	0	0	0	0		0	0		0	0	0	0	0	0	0	0	0
CADMIN																		
CPRIVS	0	0	0	0	0		0	0		0			0			0	0	0
CTDTP-E																		
CTDTP-D																		
CTDTP-M																		
FSUB	449	57	59	1	48	109	3	27	57		4		0			2	178	24
LCHILD	1	0	0			0	0	1	1	2				1			3	1
LNONF	12	5	3		6	1	1	3	2	0	1	1		2	0		5	1
LNFPF	8	5	1		4	1	1	2	1	1	1	1		0		29	4	
LNFSF	54	47	5		32	5	4	17	13	5	8	5		7			73	6
LSECF	0	0			0	0	0					0					1	0
LNQNM	5	3	2		2	1	1	2		1	1	1		4	1		8	2
LNFBM	15	16	2		6	3	1	7	5	5	5	4	9	9	1	24	17	4
LNFSM	16	21	3	7	5	2	2	5	4	6	8	5		12	1		23	2
LSECM	1	2	0		0	0	0	0	0	0	0	1			0		2	0
CAPAG	70	65	10	5	38	9	7	25	18	15	16	13	6	24	2	36	89	10
CAPNAG																		
LAND	30	28	4	2	16	4	3	11	8	6	7	5	3	10	1	15	38	4
ENTR																		
HRBFPL																		
HRFBPL																		
HRNOED																		
HRNFPS																		
HRNFSS																		
HRSECP																		
HUBFPL																		
HUFBPL																		
HUNOED																		
HUNFPS																		
HUNFSS																		
HUSECP																		
GOV																		
DIRTAX																		
IMPTAX																		
EXPTAX																		
VATAX	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0
INDTAX																		
FACTAX																		
ROW																		
S-I																		
TOTAL	756	360	112	24	187	138	30	111	116	85	78	66	34	78	15	144	468	59

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	ALIVES	AFISHI	AHUFOR	AMININ	AMEATD	AGRAIN	APFOOD	ABEVER	ACLOTH	AWOODP	ACHEMI	AFERTI	APETRO	ARUPLA	AGLASS	AMETAL	AEQUIP	AUTILI
AMAIZE																		
APADDY																		
ASORGH																		
AWHEAT																		
ABEANS																		
ACASSA																		
ACEREA																		
AOILSE																		
AROOTS																		
ACOTTO																		
ACOFFE																		
ATOBAC																		
ATEAGR																		
ACASHE																		
ASISAL																		
ASUGAR																		
AOFRVE																		
AOCROP																		
ALIVES																		
AFISHI																		
AHUFOR																		
AMININ																		
AMEATD																		
AGRAIN																		
APFOOD																		
ABEVER																		
ACLOTH																		
AWOODP																		
ACHEMI																		
AFERTI																		
APETRO																		
ARUPLA																		
AGLASS																		
AMETAL																		
AEQUIP																		
AUTILI																		
ACONST																		
ATRADE																		
AHOTEL																		
ATRANS																		
AESTAT																		
AADMIN																		
APRIVS																		
CMAIZE	21					176	4	7										
CPADDY						224												
CSORGH	2					37		0										
CWHEAT						33	2	1										
CBEANS				0														
CCASSA						4												
CCEREA	2					16	1	3										
COILSE							17											
CROOTS							0											
CCOTTO									57					0				
CCOFFE							2											
CTOBAC								25										
CTEAGR							0											
CCASHE							0	0										
CSISAL									13									
CSUGAR							163	1										
COFRVE							2	6						0				
COCROP			0				0											
CLIVES	1				104		1		1									
CFISHI		0					0							0				
CHUFOR	1	5	6	0	0	1	0	2	0	19				1				
CMININ		1		2	1		1	0			5	6	7	6	7	2		

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	ALIVES	AFISHI	AHUFOR	AMININ	AMEATD	AGRAIN	APFOOD	ABEVER	ACLOTH	AWOODP	ACHEMI	AFERTI	APETRO	ARUPLA	AGLASS	AMETAL	AEQUIP	AUTILI
CMEATD					0		0											
CGRAIN				0			9	11										
CPFOOD	2						1	6										
CBEVER							4	6										
CCLOTH	0	5		0		0	0	1	17	0				0	0	1		0
CWOODP	0			0	0	1	3	1	2	23	1	0	0	0	3	1	0	3
CCHEMI	0		0	1	0			0	0	1	25	1	1	0	1	0	0	0
CFERTI			0															
CPETRO		3	0	0	0		1	1	2	0	1	0	1	0	8	0	0	14
CRUPLA			0	0	0	0	1	1	0	0	0	0	0	15	0	2	3	0
CGLASS				0			0	1			0			0	3		6	0
CMETAL	1	1	0	0			0	0	0	0	1			1		49	18	0
CEQUIP		4		1	5												26	5
CUTILI	1	0	0	4	0	6	4	3	27	8	2	0	0	5	18	8	1	11
CCONST	1		0	1	0	20	3	2	8	2	1		0	1	2	3	1	4
CTRADE	7	8	4	2	22	5	11	10	22	8	3	0	1	2	5	10	5	13
CHOTEL			0															2
CTRANS	4	0	4	2	0	1	5	5	5	2	2	0	1	1	2	2	2	10
CESTAT	0	0	0	1	0	0	3	1	2	1	0	0	0	0	0	1	0	6
CADMIN	0		0															1
CPRIVS			4	2	1	1	3	1	5	2	1	0	0	1	1	1	1	3
CTDTP-E																		
CTDTP-D																		
CTDTP-M																		
FSUB	41	16	147		133		21	8										
LCHILD	9			0		0			0	0								
LNONF	5	5		0		0	0		2	0					0			
LNFPF	2			0		2	0		2						0			
LNFSF	39	9	27	0	0	11	1	0	28	0				1	0		0	1
LSECF	2			0	0		5	0	9	0				0		0	0	0
LNONM	8	19	3		0	1	0		1	1					0	0		1
LNFBM	12	42		0	0	1	1	0	8	1				0	0	1	1	1
LNFSM	13	53	18	1	1	15	6	1	42	10	11	2	3	2	5	4	1	9
LSECM	2		2	0	0	3	4	9	10	3			0	1	1	3	2	11
CAPAG	62	88	33															
CAPNAG				93	18	11	90	40	94	49	3	1	9	12	20	29	42	95
LAND	26	38	14															
ENTR																		
HRBFPL																		
HRFBPL																		
HRNOED																		
HRNFPS																		
HRNFSS																		
HRSECP																		
HUBFPL																		
HUFBPL																		
HUNOED																		
HUNFPS																		
HUNFSS																		
HUSECP																		
GOV																		
DIRTAX																		
IMPTAX																		
EXP TAX																		
VATA X	0	1	1	0	1	3	1	1	2	1	1	0	0	0	0	1	0	1
INDTAX																		
FACTAX																		
ROW																		
S-I																		
TOTAL	262	299	265	110	287	572	369	153	359	131	58	10	25	48	78	118	109	193

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	ACONST	ATRADE	AHOTEL	ATRANS	AESTAT	AADMIN	APRIVS	CMAIZE	CPADDY	CSORGH	CWHEAT	CBEANS	CCASSA	CCEREA	COILSE	CROOTS	CCOTTO	CCOFFE
AMAIZE								365										
APADDY									299									
ASORGH										55								
AWHEAT											22							
ABEANS												138						
ACASSA													42					
ACEREA														27				
AOILSE															83			
AROOTS																60		
ACOTTO																	85	
ACOFFE																		75
ATOBAC																		
ATEAGR																		
ACASHE																		
ASISAL																		
ASUGAR																		
AOFRVE																		
AOCROP																		
ALIVES																		
AFISHI																		
AHUFOR																		
AMININ																		
AMEATD																		
AGRAIN																		
APFOOD																		
ABEVER																		
ACLOTH																		
AWOODP																		
ACHEMI																		
AFERTI																		
APETRO																		
ARUPLA																		
AGLASS																		
AMETAL																		
AEQUIP																		
AUTILI																		
ACONST																		
ATRADE																		
AHOTEL																		
ATRANS																		
AESTAT																		
AADMIN																		
APRIVS																		
CMAIZE						0												
CPADDY			1			1												
CSORGH																		
CWHEAT						0												
CBEANS			6			6												
CCASSA																		
CCEREA						2												
COILSE			0			1												
CROOTS			6			0												
CCOTTO																		
CCOFFE			0															
CTOBAC																		
CTEAGR																		
CCASHE			0															
CSISAL																		
CSUGAR																		
COFRVE			12			0												
COCROP			10			1												
CLIVES			20			4												
CFISHI			10															
CHUFOR	2		0			0	0											
CMININ	58		0		22	0												

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	ACONST	ATRADE	AHOTEL	ATRANS	AESTAT	AADMIN	APRIVS	CMAIZE	CPADDY	CSORGH	CWHEAT	CBEANS	CCASSA	CCEREA	COILSE	CROOTS	CCOTTO	CCOFFE
CMEATD			1															
CGRAIN			3															
CPFOOD			5															
CBEVER			21			3	2											
CCLOTH			0			0	0											
CWOODP	38	3	2	5	5	30	15											
CCHEMI							0											
CFERTI																		
CPETRO	1	0	1	2		0	8											
CRUPLA	0	0	1	3	0	0	1											
CGLASS	74		1			1	0											
CMETAL	56		6	2		0	0											
CEQUIP	17	2	13	19	3	10	5											
CUTILI	2	4	10	3	1	2	6											
CCONST	55	6	4	6	96	18	3											
CTRADE	22	11	31	18	11	24	18											
CHOTEL	8	12	9	39	17	54	15											
CTRANS	21	77	13	35	10	35	21											
CESTAT	7	23	26	24	1126	16	20											
CADMIN	5	15	3	16	47	782	4											
CPRIVS	5	38	8	28	36	15	23											
CTDTP-E								0	0	0	0	0	0	0	0		4	10
CTDTP-D								23	18	4	1	8	4	2	9	4	5	
CTDTP-M								1	1	0	1	0	0	0	0	0	0	0
FSUB					297													
LCHILD	1	0	0				0											
LNONF	0	1	2			0	0											
LNFPF		2	3			2	1											
LNFSF	1	9	16	2	0	37	7											
LSECF	2	3	1	4	3	100	6											
LNONM	4	1	0	0		1	1											
LNFBM	23	3	1	1	0	6	5											
LNFSM	146	20	12	16	3	60	24											
LSECM	36	15	6	23	21	203	16											
CAPAG																		
CAPNAG	104	650	134	335	65	18	132											
LAND																		
ENTR																		
HRBFPL																		
HRFBPL																		
HRNOED																		
HRNFPS																		
HRNFSS																		
HRSECP																		
HUBFPL																		
HUFBPL																		
HUNOED																		
HUNFPS																		
HUNFSS																		
HUSECP																		
GOV																		
DIRTAX																		
IMPTAX								1	3		1	0	0	0	0	0	0	0
EXPTAX															0		0	0
VATAX	4	3	4	4	2	3	3											
INDTAX								1		0	1	1	3	1	0	4	2	8
FACTAX																		
ROW								14	18	0	16	0	0	0	0	0	0	0
S-I																		
TOTAL	693	900	403	584	1767	1437	337	403	340	59	43	147	49	29	92	68	97	92



**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	CTOBAC	CTEAGR	CCASHE	CSISAL	CSUGAR	COFRVE	COCROP	CLIVES	CFISHI	CHUFOR	CMININ	CMEATD	CGRAIN	CPFOOD	CBEVER	C CLOTH	CWOODP	CCHEMI
AMAIZE																		
APADDY																		
ASORGH																		
AWHEAT																		
ABEANS																		
ACASSA																		
ACEREA																		
AOILSE																		
ARROOTS																		
ACOTTO																		
ACOFFE																		
ATOBAC	66																	
ATEAGR		33																
ACASHE			78															
ASISAL				15														
ASUGAR					142													
AOFRVE						308												
AOCROP							35											
ALIVES								219										
AFISHI									289									
AHUFOR										148								
AMININ											110							
AMEATD												214						
AGRAIN													572					
APFOOD														359				
ABEVER															146			
ACLOTH																359		
AWOODP																	131	
ACHEMI																		58
AFERTI																		
APETRO																		
ARUPLA																		
AGLASS																		
AMETAL																		
AEQUIP																		
AUTILI																		
ACONST																		
ATRADE																		
AHOTEL																		
ATRANS																		
AESTAT																		
AADMIN																		
APRIVS																		
CMAIZE																		
CPADDY																		
CSORGH																		
CWHEAT																		
CBEANS																		
CCASSA																		
CCEREA																		
COILSE																		
CROOTS																		
CCOTTO																		
CCOFFE																		
CTOBAC																		
CTEAGR																		
CCASHE																		
CSISAL																		
CSUGAR																		
COFRVE																		
COCROP																		
CLIVES																		
CFISHI																		
CHUFOR																		
CMININ																		

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	CTOBAC	CTEAGR	CCASHE	CSISAL	CSUGAR	COFRVE	COCROP	CLIVES	CFISHI	CHUFOR	CMININ	CMEATD	CGRAIN	CPFOOD	CBEVER	CCLOTH	CWOODP	CCHEMI
CMEATD																		
CGRAIN																		
CPFOOD																		
CBEVER																		
CCLOTH																		
CWOODP																		
CCHEMI																		
CFERTI																		
CPETRO																		
CRUPLA																		
CGLASS																		
CMETAL																		
CEQUIP																		
CUTILI																		
CCONST																		
CTRADE																		
CHOTEL																		
CTRANS																		
CESTAT																		
CADMIN																		
CPRIVS																		
CTDTP-E	5	3	5		1	3	0	0	3	0	1	0	0	0	0	1	0	0
CTDTP-D	3	1		1	8	31	2	10	10	7	4	5	17	10	15	12	3	1
CTDTP-M	0	0	0		2	1	0	0	0	0	1	0	0	2	1	2	1	2
FSUB																		
LCHILD																		
LNONF																		
LNFPF																		
LNFSF																		
LSECF																		
LNONM																		
LNFBM																		
LNFSM																		
LSECM																		
CAPAG																		
CAPNAG																		
LAND																		
ENTR																		
HRBFPL																		
HRFBPL																		
HRNOED																		
HRNFPS																		
HRNFSS																		
HRSECP																		
HUBFPL																		
HUFBPL																		
HUNOED																		
HUNFPS																		
HUNFSS																		
HUSECP																		
GOV																		
DIRTAX																		
IMPTAX	0	0	0		11	0	0	0	0	0	2	1	1	8	2	13	5	6
EXPTAX	0	0	0				0									0		
VATAX																		
INDTAX	1	9	1		5	1	6	9	8	8	7	39	4	43	29	88	8	32
FACTAX																		
ROW	0	0	0		42	7	0	2	0	0	11	3	13	62	14	64	57	94
S-1																		
TOTAL	75	46	84	16	211	350	43	241	310	163	135	262	607	485	208	539	206	194

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	CFERTI	CPETRO	CRUPLA	CGLASS	CMETAL	CEQUIP	CUTILI	CCONST	CTRADE	CHOTEL	CTRANS	CESTAT	CADMIN	CPRIVS	CTDTP-E	CTDTP-D	CTDTP-M	FSUB
AMAIZE																		
APADDY																		
ASORGH																		
AWHEAT																		
ABEANS																		
ACASSA																		
ACEREA																		
AOILSE																		
AROOTS																		
ACOTTO																		
ACOFFE																		
ATOBAC																		
ATEAGR																		
ACASHE																		
ASISAL																		
ASUGAR																		
AOFRVE																		
AOCROP																		
ALIVES																		
AFISHI																		
AHUFOR																		
AMININ																		
AMEATD																		
AGRAIN																		
APFOOD																		
ABEVER																		
ACLOTH																		
AWOODP																		
ACHEMI																		
AFERTI	10																	
APETRO		25																
ARUPLA			48															
AGLASS				78														
AMETAL					118													
AEQUIP						109												
AUTILI							193											
ACONST								693										
ATRADE									900									
AHOTEL										403								
ATRANS											584							
AESTAT												1275						
AADMIN													1437					
APRIVS														337				
CMAIZE																		
CPADDY																		
CSORGH																		
CWHEAT																		
CBEANS																		
CCASSA																		
CCEREA																		
COILSE																		
CROOTS																		
CCOTTO																		
CCOFFE																		
CTOBAC																		
CTEAGR																		
CCASHE																		
CSISAL																		
CSUGAR																		
COFRVE																		
COCROP																		
CLIVES																		
CFISHI																		
CHUFOR																		
CMININ																		

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	CFERTI	CPETRO	CRUPLA	CGLASS	CMETAL	CEQUIP	CUTILI	CCONST	CTRADE	CHOTEL	CTRANS	CESTAT	CADMIN	CPRIVS	CTDTP-E	CTDTP-D	CTDTP-M	FSUB
CMEATD																		
CGRAIN																		
CPFOOD																		
CBEVER																		
CCLOTH																		
CWOODP																		
CCHEMI																		
CFERTI																		
CPETRO																		
CRUPLA																		
CGLASS																		
CMETAL																		
CEQUIP																		
CUTILI																		
CCONST																		
CTRADE															36	227	40	
CHOTEL																		
CTRANS																		
CESTAT																		
CADMIN																		
CPRIVS																		
CTDTP-E	0	0	0	0	0	0												
CTDTP-D	0	1	1	2	3	2												
CTDTP-M	0	8	1	0	2	11												
FSUB																		
LCHILD																		
LNONF																		
LNFPF																		
LNFSF																		
LSECF																		
LNONM																		
LNFBM																		
LNFSM																		
LSECM																		
CAPAG																		
CAPNAG																		
LAND																		
ENTR																		
HRBFPL																		150
HRFBPL																		220
HRNOED																		352
HRNFPS																		321
HRNFSS																		441
HRSECP																		26
HUBFPL																		5
HUFBPL																		7
HUNOED																		11
HUNFPS																		18
HUNFSS																		68
HUSECP																		61
GOV																		
DIRTAX																		
IMPTAX	0	4	6	1	8	25												
EXPTAX					0													
VATAX																		
INDTAX	0	6	11	22	10	1												
FACTAX																		
ROW	10	204	51	5	105	469		1			335		15	61				
S-I																		
TOTAL	21	248	119	108	247	618	193	695	900	403	919	1275	1452	398	36	227	40	1679

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	LCHILD	LNONF	LNPF	LNFSF	LSECF	LNONM	LNPFM	LNFSM	LSECM	CAPAG	CAPNAG	LAND	ENTR	HRBFPL	HRFBPL	HRNOED	HRNFPS	HRNFSS
AMAIZE														27	57	58	63	144
APADDY														5	6	11	13	20
ASORGH														10	10	13	10	13
AWHEAT														0	0	0	0	1
ABEANS														4	6	8	9	17
ACASSA														10	14	18	14	33
ACEREA														2	1	0	0	1
AOILSE														1	4	6	5	11
AROOTS														8	7	8	10	19
ACOTTO																		
ACOFFE														0	0	0	3	0
ATOBAC																		
ATEAGR														0	0	0	0	0
ACASHE																		
ASISAL																		
ASUGAR														0	0	0	1	1
AOFRVE														16	21	26	26	57
AOCROP														2	4	5	4	8
ALIVES														4	7	8	7	13
AFISHI														1	1	1	4	2
AHUFOR														11	16	20	19	41
AMININ																		
AMEATD														9	12	15	14	19
AGRAIN																		
APFOOD														1	1	2	2	2
ABEVER														0	0	1	2	2
ACLOTH																		
AWOODP																		
ACHEMI																		
AFERTI																		
APETRO																		
ARUPLA																		
AGLASS																		
AMETAL																		
AEQUIP																		
AUTILI																		
ACONST																		
ATRADE																		
AHOTEL																		
ATRANS																		
AESTAT														26	35	50	58	149
AADMIN																		
APRIVS																		
CMAIZE														12	11	17	15	46
CPADDY														1	1	4	3	12
CSORGH														2	1	4	2	6
CWHEAT														0	0	0	0	0
CBEANS														6	8	9	12	33
CCASSA														3	3	4	5	17
CCEREA														0	0	0	0	1
COILSE														2	3	6	6	18
CROOTS														2	3	5	5	16
CCOTTO																		
CCOFFE														0	0	0	0	1
CTOBAC																		
CTEAGR														1	1	2	2	6
CCASHE																		
CSISAL																		
CSUGAR														1	1	1	1	3
COFRVE														9	15	19	24	81
COCROP														2	2	5	3	7
CLIVES														5	6	12	10	32
CFISHI														16	19	23	28	71
CHUFOR														2	3	6	10	25
CMININ																		

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	LCHILD	LNONF	LNFPF	LNFSF	LSECF	LNONM	LNFPM	LNFSM	LSECM	CAPAG	CAPNAG	LAND	ENTR	HRBFPL	HRFBPL	HRNOED	HRNFPS	HRNFSS
CMEATD														8	14	20	27	64
CGRAIN														32	38	54	56	157
CPFOOD														15	24	39	46	125
CBEVER														4	7	12	16	53
CCLOTH														27	34	56	57	136
CWOODP														1	1	3	4	9
CCHEMI														11	12	16	17	39
CFERTI																		
CPETRO														6	8	11	35	40
CRUPLA														3	4	5	5	18
CGLASS														1	0	1	2	3
CMETAL														3	4	5	8	18
CEQUIP														2	1	3	9	14
CUTILI														2	3	6	6	14
CCONST																		
CTRADE																		
CHOTEL														6	9	16	25	66
CTRANS														3	4	3	8	25
CESTAT														2	0	0	1	2
CADMIN														2	2	2	5	11
CPRIVS														3	4	3	5	16
CTDTP-E																		
CTDTP-D																		
CTDTP-M																		
FSUB																		
LCHILD																		
LNONF																		
LNFPF																		
LNFSF																		
LSECF																		
LNONM																		
LNFPM																		
LNFSM																		
LSECM																		
CAPAG																		
CAPNAG																		
LAND																		
ENTR											1997							
HRBFPL	1	7	5	10		10	21	17	2	78		34	10					
HRFBPL	1	7	5	16	1	16	22	25	3	98		42	30					
HRNOED	5	28	2	12	0	37	2	7	0	116		49	41					
HRNFPS	2	4	31	11	1	1	125	36	0	121		51	29					
HRNFSS	3	4	6	200	3	0	2	281	1	167		75	680					
HRSECP	0	0	1	8	22		0	1	113	8		4	149					
HUBFPL	0	2	1	6	1	1	4	6	1	6		3	45					
HUFBPL	1	1	2	10	2	1	6	9	3	3		2	116					
HUNOED	1	6	1	8	0	7	0	2	0	3		2	103					
HUNFPS	1	1	14	10	0	0	55	5	1	6		3	107					
HUNFSS	2	1	3	152	6	0	0	208	3	17		8	504					
HUSECP	3	1	1	28	101	0	0	2	236	11		4	45					
GOV													1					
DIRTAX													136	2	7	8	3	16
IMPTAX																		
EXPTAX																		
VATAX																		
INDTAX																		
FACTAX					3				15									
ROW										11	46							
S-I													16	37	41	32	169	
TOTAL	20	62	72	472	140	74	236	601	380	643	2043	276	1997	351	491	677	756	1920

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	HRSECP	HUBFPL	HUFBPL	HUNOED	HUNFPS	HUNFSS	HUSECP	GOV	DIRTAX	IMPTAX	EXPTAX	VATAX	INDTAX	FACTAX	ROW	S-I	TOTAL
AMAIZE	12	2	3	5	5	12	2										756
APADDY	1	0	1	1	1	2	0										360
ASORGH	0	0	0	0	0	0	0										112
AWHEAT	0	0	0	0	0	0	0										24
ABEANS	2	0	0	0	0	1	0										187
ACASSA	2	0	1	0	1	1	0										138
ACEREA	0	0	0	0	0	0	0										30
AOILSE	1	0	0	0	0	0	0										111
AROOT	2	0	1	0	0	1	0										116
ACOTTO																	85
ACOFFE	0		0	0	0	0	0										78
ATOBAC																	66
ATEAGR	0	0	0	0	0	0	0										34
ACASHE																	78
ASISAL																	15
ASUGAR	0	0	0	0	0	0	0										144
AOFRVE	7	1	1	1	1	2	1										468
AOCROP	0	0	0	0	0	0	0										59
ALIVES	2	0	0	0	0	0	0										262
AFISHI	0	0	0	0	0	0	0										299
AHUFOR	3	1	1	2	1	2	0										265
AMININ																	110
AMEATD	3	0	0	0	0	1	1										287
AGRAIN																	572
APFOOD	0	0	0	0	0	0	0										369
ABEVER	0	0	0	0	0	0	0										153
ACLOTH																	359
AWOODP																	131
ACHEMI																	58
AFERTI																	10
APETRO																	25
ARUPLA																	48
AGLASS																	78
AMETAL																	118
AEQUIP																	109
AUTILI																	193
ACONST																	693
ATRADE																	900
AHOTEL																	403
ATRANS																	584
AESTAT	23	6	12	11	16	69	37										1767
AADMIN																	1437
APRIVS																	337
CMAIZE	4	4	4	4	4	25	6								1		403
CPADDY	0	0	0	0	1	5	1								2		340
CSORGH	0	0	0	0	0	1	0								0		59
CWHEAT	0	0	0	0	0	4	0								0		43
CBEANS	5	2	4	4	5	17	7								1		147
CCASSA	1	1	1	1	2	4	1								0		49
CCEREA	0	0	0	0	0	0	0								0		29
COILSE	2	1	2	3	3	11	4								4		92
CROOTS	2	1	2	2	3	11	4										68
CCOTTO															37		97
CCOFFE	0	0	0	0	0	0	0								84		92
CTOBAC															43		75
CTEAGR	2	0	1	1	1	4	2								23		46
CCASHE															83		84
CSISAL																	16
CSUGAR	0	0	0	0	0	0	0								11		211
COFRVE	12	5	12	9	17	63	29								24		350
COCROP	1	0	1	1	1	3	1								4		43
CLIVES	6	1	1	2	2	11	8								6		241
CFISHI	11	5	7	7	11	31	14								58		310
CHUFOR	7	3	6	6	8	33	12								5		163
CMININ															18		135

**Appendix 2 continued: Final 2000 Micro SAM for Tanzania (Tsh Bil.)**

	HRSECP	HUBFPL	HUFBPL	HUNOED	HUNFPS	HUNFSS	HUSECP	GOV	DIRTAX	IMPTAX	EXPTAX	VATAX	INDTAX	FACTAX	ROW	S-I	TOTAL
CMEATD	22	3	9	7	11	47	28								1		262
CGRAIN	28	9	22	18	26	95	43								6		607
CPFOOD	29	8	17	16	21	82	42								6		485
CBEVER	10	1	3	3	6	33	21								1		208
CCLOTH	18	6	9	7	16	64	42								15	4	539
CWOODP	2	0	1	1	1	6	4								5	27	206
CCHEMI	9	3	4	4	6	23	15								3		194
CFERTI															0		21
CPETRO	26	2	4	4	7	31	20								0		248
CRUPLA	3	1	3	1	2	10	5								1	28	119
CGLASS	0	0	0	0	0	3	3								6	1	108
CMETAL	3	1	1	1	2	7	5								1	29	247
CEQUIP	1	3	1	0	1	4	4								7	454	618
CUTILI	2	1	1	1	3	10	8										193
CCONST																456	695
CTRADE																219	900
CHOTEL	10	2	4	8	9	65	25										403
CTRANS	9	2	3	3	7	36	28								435	48	919
CESTAT	0	0	1	0	1	3	2										1275
CADMIN	2	0	1	0	2	8	14	483							49		1452
CPRIVS	7	1	2	6	3	14	27								124		398
CTDTP-E																	36
CTDTP-D																	227
CTDTP-M																	40
FSUB																	1679
LCHILD																	20
LNONF																	62
LNFPF																	72
LNFSF																	472
LSECF																	140
LNONM																	74
LNFBM																	236
LNFSM																	601
LSECM																	380
CAPAG																	643
CAPNAG																	2043
LAND																	276
ENTR																	1997
HRBFPL								4									351
HRFBPL								4									491
HRNOED								10							15		677
HRNFPS								10							13		756
HRNFSS								17							40		1920
HRSECP								3							28		361
HUBFPL								1									81
HUFBPL								1									165
HUNOED								2							8		156
HUNFPS								2							8		229
HUNFSS								6							37		1014
HUSECP								3							62		558
GOV									220	100	0	40	367	18			746
DIRTAX	2	0	1	1	3	19	22										220
IMPTAX																	100
EXPTAX																	0
VATAX																	40
INDTAX																	367
FACTAX																	18
ROW																	1733
S-I	64	2	13	11	16	137	71	201							457		1267
TOTAL	361	81	165	156	229	1014	558	746	220	100	0	40	367	18	1733	1267	