

# Constructing a 2016/17 Social Accounting Matrix (SAM) for Uganda

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## Abstract

A comprehensive analysis of the economic and social impacts of policy or economic changes on an economy requires an analytical framework which captures the complex inter-linkages between different agents in the economy. The social accounting matrix (SAM) is such a framework. A SAM is a comprehensive representation of the macro and meso economic accounts of a country, which captures transactions between all economic agents in the country via the factor and product markets. These agents include the different domestic industries, household groups, enterprises and governments. Thus, a SAM clearly shows the linkage between income distribution and economic structure in an economy. SAMs are also used as a direct input into a range of models, especially Computable General Equilibrium (CGE) models.

This paper and accompanying excel workbook describe the construction of a SAM for Uganda for the 2016/17 financial year. We discuss the structure of the SAM as the various sources of data. The data sources include the Supply Use Table for 2016/17, Government Financial Statistics (GFS), Ugandan National Household Survey, Balance of Payments and financial data. The development of the SAM is completed in 2 steps. First a Macro SAM is developed. This Macro SAM is then disaggregated further by disaggregating the activities and commodities accounts, labour income and expenditure, and the household accounts.

We do not present the Full SUT and SAM as part of this paper. To access the Full SUT, contact the Ugandan Bureau of Statistics (UBOS)<sup>1</sup>, and to access the Full SAM, contact the Ministry of Finance, Planning and Economic Development (MoFPED).<sup>2</sup>

Keywords: Social Accounting Matrix, Uganda, CGE modelling

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# Abbreviations

BoP	Balance of Payment
CG	Central Government
CIF	Cost, Insurance and Freight
FDI	Foreign Direct Investment
FOB	Free On Board
GEMPACK	General Equilibrium Modelling PACKage
GFS	Government Finance Statistics
GMI	Gross Mixed Income
GOS	Gross Operating Surplus
GOS/GMI	Gross Operating Surplus/Gross Mixed Income
GNI	Gross Domestic Income
IOTs	Input-output tables
ISIC	International System of Industrial Classification
LG	Local government
LFS	Labour Force Survey
MOF	Uganda Ministry of Finance
NPISH	Non-Profit Institutions Serving Households
RoW	The Rest of the World
SAM	Social Accounting Matrix
SUTs	Supply and Use tables
UBOS	Uganda Bureau of Statistics
UGX	Ugandan shilling
UNHS	Uganda National Household Survey
VAT	Value-added tax
UN	United Nations
WDI	World Development indicators
WB	The World Bank

# 1 Introduction

A comprehensive analysis of the economic and social impacts of policy or economic changes on an economy requires an analytical framework which captures the complex inter-linkages between different agents in the economy. The social accounting matrix (SAM) is such a framework. A SAM is a comprehensive representation of the macro and meso economic accounts of a country, which captures transactions between all economic agents in the country via the factor and product markets. These agents include the different domestic industries, household groups, enterprises and governments. Thus, a SAM clearly shows the linkage between income distribution and economic structure in an economy. SAMs are also used as a direct input into a range of models, especially Computable General Equilibrium (CGE) models.<sup>3</sup>

In 2015 the Ugandan Ministry of Finance, Planning and Economic Development developed a SAM for 2009/10. This SAM is the primary data input for the calibration of UgAGE - a CGE model for the Ugandan economy.<sup>4</sup> Since then, the structure of the economy has changed due to the introduction of new activities, expansion of existing activities, and phasing out of uneconomical activities. This warrants the development of a new Social Accounting Matrix (SAM) for the year 2016/17. This SAM is then used to update the UgAGE model and therefore enables the IMEM to operate on the most recent structure of the economy.

The development of SAM was facilitated by the availability of key data sources for 2016/17. These data sources include (i) the 2016/17 Supply and Use (SUT), developed by the Ugandan Bureau of Statistics (UBOS); (ii) household income and expenditure data sourced from the 2016/17 Ugandan National Household Survey (UNHS); (iii) the government finance statistics (GFS); (iv) the balance of payment (BoP), and (v) data on the activities of financial and insurance enterprises. Strengths and shortcomings of these data sources are discussed in Section 4.

*A note on terminology:* In this paper, the term ‘Macro SAM’ is used to denote the aggregated SAM, which contains only macro indicators. The disaggregated SAM, with all accounts as required and listed in Section 3.1, is often referred to in literature as a ‘Micro SAM’. However, the word ‘Micro’ may create an impression that the SAM is small. Hence, to avoid confusion, in this paper and in the SAM Workbook it is referred to as the “Full SAM”.

*Components of this paper:* This paper should be read in conjunction with an Excel file called “SAM1617-Workook.xlsx”. The Excel file contains all key data used as inputs into the SAM, as well as the final SAM matrix, and will be referred to in all of the discussions in the paper.

*The structure of this paper* is as follows. Section 2 describes previous SAMs developed by the Ugandan Bureau of Statistics (UBOS). Section 3 discusses the scope and structure of the 2016/17 SAM while Section 4 discusses data sources used to construct the 2016/17 SAM. Section 5 discusses methodological issues, such as the procedure to compile the SAM, how we reconcile inconsistent data from different sources, and the tools used to compile the SAM. Section 6 discusses in detail the construction of the Macro SAM, pointing out all data sources and how they are used in the Macro SAM. Section 7 discusses the disaggregation of the Macro SAM into the full SAM. The paper ends with a conclusion in Section 8.

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<sup>3</sup> For more detailed discussions about SAM structure and motivations behind their creation, see Round (2003a).

<sup>4</sup> This CGE model is part of an Integrated Macroeconomic Model (IMEM) developed for Uganda. The IMEM includes a macroeconomic model, a CGE model and a microsimulation model. These models are linked to each other in that the outputs of the macroeconomic model is used as inputs to the CGE model and outputs of the CGE model is used as inputs to the microsimulation model.

## 2 SAMs developed for Uganda

The compilation of national accounts in Uganda has evolved over years. The first Input-Output Tables (IOT) was developed in 1989 which was later updated in 1992. With significant changes in the structure of the economy over the ten years and the recommendations by the 1993 System of National Accounts (SNA) to use SUT for National Accounts compilation; the Uganda Bureau of Statistics (UBOS) developed its first official Supply and Use Table (SUT) in 2002. The 2002 SUT was composed of 241 activities and 142 commodities. Following demand from policy makers to advance to economy wide modelling; the corresponding first official Social Accounting Matrix (SAM) was developed. This 2002 SAM was constructed by the Uganda Bureau of Statistics (UBOS) with support from Economic Policy Research Centre (EPRC) and Institute of Social Studies (ISS)<sup>5</sup>. The 2002 SAM was made of 75 activities and 61 commodities (Alarcon et al., 2006). The main challenges experienced in developing this 2002 SAM were, minimal internal capacity among staff, huge inconsistencies in the original data which made the balancing procedure very challenging. The key data sources for this SAM were limited mainly sourced from the Uganda National Household Survey (UNHS) as well as the UBOS national accounts data.

A few years later, the 2009/10 SUT and SAM were developed largely to provide data for the Uganda Integrated Macroeconomic Model (IMEM) housed in the Ministry of Finance, Planning and Economic Development (MOFPED). The 2009/10 SUT was developed by UBOS and this was used by MOFPED (with technical support from Oxford Policy Management) to develop the corresponding 2009/10 SAM required by the county's Computable General Equilibrium Model (IMEM). The 2009/10 had 161 activities and 161 commodities. The corresponding 2009/10 SAM had 161 activities and 161 commodities. The key data sources for this SAM included the UNHS, UBOS national accounts data, Government Finance Statistics data, Balance of Payments data and other firm based datasets.

The emergence of new activities into the economy as well as the expansion of those existing, necessitated the development of a new SUT and SAM for the financial year 2016/17. The SUT was built by the Uganda Bureau of Statistics (UBOS) whereas the SAM was developed by the Ministry of Finance, Planning and Economic Development (MOFPED) in collaboration with the Centre for policy studies (COPS) at Victoria University, Australia. The key data sources for the 2016/17 SAM were broader compared to the previous SAMs. These data sources are discussed in Section 4 and include; Supply and Use (SUT), household income and expenditure data sourced from the 2016/17 Ugandan National Household Survey (UNHS), the government finance statistics (GFS), the balance of payment, financial sector data from the Bank of Uganda, financial statements of corporations and data on the activities of financial and insurance enterprises.

## 3 Structure of 2016/17 Uganda SAM

The 2016/17 SAM captures all transfers and real transactions regarding production, and the generation, distribution and use of income between sectors and institutions listed in Section 3.1 within the relevant year. That is, it is a more detailed version of the current accounts in the National Accounts and SUTs, and includes multiple household- and labour types. This level of disaggregation not only allows for the usual economic analysis that can be conducted with SUTs or IOTs but also income distribution analysis. This is a standard scope of a SAM which is similar to existing SAMs for Uganda (Powell 2014, Randriamamonjy and Thurlow 2017, Thurlow 2008) and most SAMs developed for other countries.

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<sup>5</sup> ISS was founded by Dutch Universities to assist on training especially to developing countries.

### 3.1 Structure

The 2016/17 Uganda SAM contains 435 accounts, namely:

- 186 production activity accounts, representing 186 industries that produce goods and services in the economy.
- 186 commodity accounts, representing goods and services produced by domestic industries and imports that are used in production, final consumption, and exports.
- 2 accounts for trade and transport margins.
- 5 accounts for direct and indirect taxes. The taxes are: excise taxes<sup>6</sup>, import duties, Value added tax, other taxes on production, and direct taxes.
- 17 factor accounts, consisting of 1 capital account and 16 labour accounts.<sup>7</sup> The labour accounts are distinguished by skill levels (unskilled, semi-skilled, skilled, and highly-skilled), rural/urban, and gender. The skill levels are based on the level of education, namely:
  - Unskilled = not completed primary
  - Semi-skilled = completed Primary school
  - Skilled = above Primary to completed secondary education
  - Highly Skilled = Graduate from Tertiary education
- 32 household accounts, distinguished by 4 regions (Central, Eastern, Northern, and Western), rural/urban, and expenditure quartiles, where quartile 1 is poorest and quartile 4 is richest.
- 2 enterprise accounts for financial and non-financial enterprises.
- An account each for NPISH, government, investment/saving, changes in inventory, and rest of the world.

The broad structure of the SAM is presented in Table 1. Not all cells in the SAM contains values. Cells that are zeros in the SAM are presented by the blank cells in the table. Cells with a non-zero value include a description of the content and their main data sources (in brackets). These data sources are discussed in Section 4. Due to space limit, in Table 1 some accounts are grouped together in the table. The full list of detailed accounts is included in the Appendix.

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<sup>6</sup> This tax is the net of the “Product taxes” and “Product subsidies” in the SUTs.

<sup>7</sup> In this report “Capital” account refers to the capital income (or capital value added) that is generated during the production process in the economy, not the capital stock.

**Table 1. The structure of 2016/17 Uganda SAM (with their main data sources in brackets)**

	186 Activities	186 Commodities + 2 margins	17 Factors	5 Tax types	32 Households & NPISH	2 Enterprises	Government	Investment + Stocks	Rest of the World	Total
186 Activities		Domestic supply (SUT)								Activity income
186 Commodities + 2 margins	Intermediate demand (SUT)	Transaction margins (SUT)			Household consumption (SUT & UNHS)		Government consumption (SUT)	Gross capital formation (SUT)	Exports (SUT)	Total demand
17 Factors	Value-added (SUT)								Factors income from RoW (BoP, FDI data)	Factor income
5 Tax types	Taxes on producers (SUT)	Taxes on products (SUT)			Household taxes (GFS, UNHS)	Corporate taxes (GFS)				Tax income
32 Households & NPISH			Factor payments to households (SUT, UNHS, GDP data)		Transfers between households & to NPISH (UNHS)	Enterprise transfers to households & NPISH (SUT, Financial activities data)	Government transfers to households & NPISH (GFS)		Foreign transfers to households & NPISH (BoP)	Household & NPISH income
2 Enterprises			Factor payments to enterprise:(SUT, UNHS, GDP data)				Government transfers to enterprises (GFS, Financial activities data)			Enterprise income
Government				Tax revenues paid to government (SUT, GFS)	Household transfers to government (GFS)	Enterprise transfers to government (GFS, Financial activities data)			Foreign transfers to government (GFS)	Government income
Savings + Stocks					Household savings (Residual)	Enterprise savings (Residual)	Government savings (Residual)		Current account balance (Residual)	Total savings
Rest of the World		Imports (SUT)	Factor payments to RoW (BoP, FDI data)			Enterprise payments to RoW (BoP, Financial activities data)	Government payments to RoW (GFS)			Current Account Debit
Total	Gross output	Total supply	Factor expenditures	Tax payments	Household & NPISH expenditures	Enterprise expenditures	Government expenditures	Total Investment	Current Account Credit	

## 4 Data sources

This section discusses the data sources used in the compilation of the 2016/17 Uganda SAM, as indicated in Table 1. They are included in the “SAM1617-Workbook.xlsx” file, which is a part of this paper. The workbook is self-contained, meaning that although some worksheets may link to each another, there are no links to information outside the workbook. The workbook contains 11 worksheets, and their contents are described below.

### 4.1 Macro and Full SAMs (sheets 1)

As will be discussed in Section 5.1, we compiled the SAM in two steps. In the first step we compiled the Macro SAM. In the second step, we disaggregate the Macro SAM into the dimension of the Full SAM. For example, we disaggregate aggregate labour account into 16 labour types and the aggregate household account into 32 household groups.

The first step is conducted in the “SAM1617-Workbook.xlsx” file, where the Macro SAM is created by formulas and linked to different sheets in this same workbook. The Macro SAM is presented in the sheet called “1.MacroSAM”. The compilation of the Macro SAM is discussed in Section 6, and the compilation of the Full SAMs is discussed in Section 7.<sup>8</sup>

### 4.2 Supply and Use tables (SUTs) (sheet 4)

The Full SUTs for the financial year 2016/17 is the main source of data in the compilation of the 2016/17 SAM. The Full SUTs includes information on 186 sectors.<sup>5</sup> However, to help with the compilation of the Macro SAM, we aggregated the Full SUTs into 7 sectors. The aggregated SUTs are presented in Sheet 4 of the Workbook, and re-produced in Table 2 below. See Appendix 1 for detail on the data sources used to compile the SUT.

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<sup>8</sup> We do not include the Full SUT and SAM in this paper. For the Full SAM, contact the Permanent Secretary, Ministry of Finance, Planning and Economic Development, Plot 2/12, Apollo Kaggwa Road, P. O. Box 8147 Kampala.

**Table 2. Aggregate 2016/17 SUTs (UGX mil)**

<b>A. Supply table</b>														
SUPPLY_S7	1 Agriculture	2 Mining	3 Manufacture	4 Utilities	5 TradeTrans	6 OthNonFinSv	7 FinanceSvc	8 Mar_Trade	9 Mar_Trans	10 NetProductTx	11 ImpDuty	12 VAT	13 Import	Total
1 Agriculture	29,852,818	0	0	0	0	0	0	3,640,851	180,812	9,659	62,770	165,429	1,878,973	35,791,312
2 Mining	0	2,374,182	0	0	0	0	0	383,919	10,948	0	4	0	75,125	2,844,179
3 Manufacture	0	0	30,230,762	0	0	0	0	9,271,340	632,110	2,330,314	995,657	2,563,210	16,512,742	62,536,135
4 Utilities	0	0	0	4,069,704	0	0	0	0	0	0	0	0	11,590	4,081,293
5 TradeTrans	0	0	0	0	20,795,962	0	0	-13,296,109	-823,870	0	0	151,190	1,516,986	8,344,159
6 OthNonFinSv	0	0	0	0	0	60,908,896	0	0	0	292,565	0	1,024,404	3,264,371	65,490,236
7 FinanceSvc	0	0	0	0	0	0	5,163,102	0	0	36,240	0	0	67,370	5,266,712
Total	29,852,818	2,374,182	30,230,762	4,069,704	20,795,962	60,908,896	5,163,102	0	-0	2,668,778	1,058,431	3,904,233	23,327,157	184,354,026
<b>B. Use table</b>														
USE_S7	1 Agriculture	2 Mining	3 Manufacture	4 Utilities	5 TradeTrans	6 OthNonFinSv	7 FinanceSvc	8 House	9 NPISH	10 Gov	11 Invest	12 Export	13 Stocks	Total
1 Agriculture	981,461	228,799	7,440,363	15,829	135,709	2,541,807	0	18,976,532	0	0	1,026,460	3,859,480	584,872	35,791,311
2 Mining	0	0	1,303,895	0	0	1,111,291	0	0	0	0	428,991	2	0	2,844,179
3 Manufacture	1,916,190	482,985	2,662,252	129,165	2,469,110	11,054,359	367,927	27,281,896	0	0	8,648,074	7,524,174	0	62,536,133
4 Utilities	57,080	11,032	375,215	20,260	59,446	368,750	91,206	2,937,134	0	0	0	161,170	0	4,081,293
5 TradeTrans	233,142	158,753	303,589	47,625	1,468,096	1,152,055	223,363	2,853,960	0	0	0	1,903,575	0	8,344,158
6 OthNonFinSv	127,295	274,304	1,117,230	101,485	2,479,470	6,612,343	1,224,935	22,379,758	2,254,920	8,475,053	14,688,493	5,754,952	0	65,490,237
7 FinanceSvc	18,246	18,581	144,455	33,322	692,829	2,160,372	384,219	582,400	0	908,308	0	323,980	0	5,266,712
8 COE	3,851,525	11,367	4,400,584	637,262	2,319,365	15,830,596	1,610,574	0	0	0	0	0	0	28,661,272
9 GOSGMI	22,666,166	1,182,757	12,404,292	3,067,364	11,108,901	19,966,214	1,247,461	0	0	0	0	0	0	71,643,156
10 VPTX	1,711	5,606	78,887	17,391	63,036	111,109	13,416	0	0	0	0	0	0	291,156
Total	29,852,817	2,374,182	30,230,761	4,069,704	20,795,962	60,908,895	5,163,102	75,011,680	2,254,920	9,383,361	24,792,018	19,527,333	584,872	284,949,607

Our discussion begins with the aggregate Supply Table (Part A, Table 2). The rows represent 7 commodities while the column headings are interpreted as follows: the first 7 columns refer to local Ugandan industries, columns 8 and 9 show the aggregate value of margins required to facilitate the flow of these commodities to users, columns 10 to 11 show taxes on products, and column 12 shows the value of imported commodities valued at c.i.f prices. In this Supply Table, goods and services produced in the domestic economy are measured at basic prices. Basic prices do not include trade and transport margins or indirect taxes on products. In the aggregate Supply Table, the production of domestically produced commodities (rows 1 to 7) by local industries (column 1 to 7) are valued at basic price and is presented in a 7\*7 matrix. For each product, summed over the industry columns determines domestic supply at basic prices. Imports at c.i.f prices are treated as equivalent to basic prices. Thus, adding imports at c.i.f prices to domestic supply yields total supply of each product at basic prices. The total supply of goods valued at purchasers' prices (column 14) is obtained by adding trade and transport margins, as well as taxes minus subsidies on products, to the total supply of goods at basic prices.

The Use Table (Part B, Table 2) is valued at purchasers price and shows the use of domestically and imported commodities (rows 1 -7) by; (i) industries as intermediate inputs (columns 1 – 7), (ii) household (column 8), (iii) NPISH (column 9), (iv) the government (column 10), (v) investors, (vi) exporters and (vii) stocks. The total demand of goods valued at purchasers' price (column 14) is obtained by adding the use of goods over all users. The Supply and Use Tables are balance when the aggregate supply of commodities and demand of commodities valued at purchasers' price are equal.

The Use Table further includes value added information by industry. The value added items are compensation of employees (COE) (row 8), gross operating surplus/mixed income (GOS) (row 9) and production tax (VPTX) (row 10). For each industry, the cost of production (in columns for industries) is calculated as the sum of intermediate commodity inputs and value added.

The two tables are closely linked together, and must satisfy two balancing conditions:

1. *Market clearing condition*: The supply of every product must be equal to the use of that product when measured in the same price; and
2. *Zero-pure economic profit condition*: The output value of an industry must be equal to its cost of production.

### **4.3 The Uganda National Household Survey (UNHS) 2016/17 (sheets 5-6)**

The second important data source for compiling the household and factor income accounts in the SAM, is the Uganda National Household Survey (UNHS). This survey is a representative sample of Uganda households. The sample includes over 15.6 thousand households with over 76.4 thousand individuals. The main objective of the survey is to collect high quality data on demographic and socioeconomic characteristics of households with the aim of monitoring Uganda's development performance of key indicators in various sectors. The survey comprises of four modules, namely:

- (i) The Socio-Economic,
- (ii) Labour Force,
- (iii) Community, and
- (iv) Market price modules.

Of the four modules, the first two (Socio-Economic and Labour Force) modules are relevant to this SAM.

*The Socio-Economic module* (sheet ‘5.UNHS’) provides, among other things, detailed data on household income and expenditure.<sup>9</sup> The income data records information based on income category, namely income from building and property, from agriculture, from non-agricultural enterprises, royalties, interest payment, dividend payment, treasury bill, pension, insurance, remittances and assistance from other households, other income, gambling, asset sale, salaries and wages, and transfers from government via social security benefits. The expenditure side records household consumption of 276 goods and services. In sheet ‘5.UNHS’ of the SAM Workbook, the data are aggregate to 87 commodities which are then mapped to the SUT’s commodities in SAM compilation.<sup>10</sup> There are also data on household non-consumption expenditure items, such as income tax, property rates, user fees and charges, local service tax, pension and social security payment, remittances, gifts and other transfers to other households. These data will be useful in compiling cells in the SAM related to specific expenditures,

Households are characterised by different geographical, demographical and educational characteristics, such as region of residents, gender, age, and education level. As discussed in Section 7, these data are used to disaggregate income and expenditure categories in the household account into 32 household types, distinguished by 4 regions (Central, Eastern, Northern and Western), urban/rural, and 4 expenditure quartiles. The quartiles are calculated at the national level, using the welfare measure reported in the UNHS, which, in turn, is based on household expenditure level (UBOS 2017).

*The Labour Force module* provides information, for currently employed persons on their main and other jobs/activities, hours of work for employed persons, and income from employment. The module allows for the calculations of employment incomes of 32 household types, distinguished by alone educational (skill) levels, gender, and four-digit ISIC industries. As discussed in Section 7, these data are used to disaggregate the labour income into 16 skill types, 186 SUT’s industries, and 32 household types. The skill types are distinguished by 4 skill levels (unskilled, semi-skilled, skilled, high-skilled), urban/rural, and gender. The data processed from the LFS is summarised in Sheet ‘6.LFS’ of the SAM Workbook. This sheet contains two matrices: (i) labour income by labour type and industry; and (ii) labour income by labour type and household types.

The UNHS is a valuable data source for the SAM. However, it does have limitations. As discussed in UBOS (2017, p.79), similar to many other household surveys, data on income is less reliable than data on expenditure. Indeed, analysis of UNHS shows that, if we use income and expenditure data on UNHS, the majority of households would have negative savings, even those in the richest quartile 4. Therefore, as discussed in Section 5.2, we used UNHS data only for the disaggregation of data that are available from the SUT’s, GFS, BoP or Financial activities data that were used to compile the Macro SAM, which provides a comprehensive snapshot of the economy, with consistent income, expenditure and savings for different institutional sectors.

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<sup>9</sup> The complete UNHS was processed in order to compile the tables in Sheet 5.

<sup>10</sup> The 2016/17 UNHS contains data for 276 commodities and 414 industries which are more disaggregated than the 2016/17 SUT, which has 186 commodities and 186 industries. However, there is no clean many-to-one mapping from UNHS sectors to the SUT sectors. Therefore, we aggregate the UNHS data into 87 commodities and 121 industries that are mappable to SUT sectors.

## 4.4 Additional data for household accounts (sheets 7 – 9)

### 4.4.1 Household shares in industry gross operating surplus (sheet 7)

Sheet 7 contains our estimates of household shares in industry gross operating surplus and data sources for the estimates. These shares were used to allocate the value of industry GOS going to households. This was required because many industries in Uganda, especially agriculture, retail and personal services, are dominated by informal household production. We have two sources of information for the estimation of the shares:

- (1) Household shares in GOS of 121 sectors in Uganda 2009/10 SAM (Source A, sheet 7)<sup>11</sup>; The shares in 2009/10 SAM seem plausible for agricultural sectors. However, they are implausibly high in some non-agricultural industries. For example, household shares are 100% for motor vehicle manufacturing, 96% for pharmaceutical products manufacturing, 89.9% for concrete production, 74.1% for iron and steel manufacturing. These are heavy industries, which we expect would have smaller shares by household-based production.
- (2) Formal/informal shares for 23 broad industries (Source B, sheet 7) from GDP production data (sheet ‘8.GDP Prod’). We used the shares of informal production as proxy for the shares of household-based production in these industries.

As 2009/10 SAM provides shares for more detailed industries, and the GDP data provides more reliable shares for the more aggregate industries, we have adopted the average between the two for the industries in 2016/17 SAM. The final shares are reported in Column E, Table 1, Sheet ‘7.HHshre in GOS’ of the Workbook. Columns F and G in the table contain the resulting values of GOS for households and enterprises.

### 4.4.2 Household saving rates (sheet 9)

As discussed in Section 4.3, households tend to under report their income relative to expenditure. As a result, UNHS shows that most households have negative saving rates (see Figure 1). We thought that was implausible, and hence we created saving rates for SAM’s 32 household types based on the relative average welfare per person as given in UNHS data.<sup>12</sup> The estimation is reported in Sheet ‘9.Sav rates calcs’ in the Workbook.

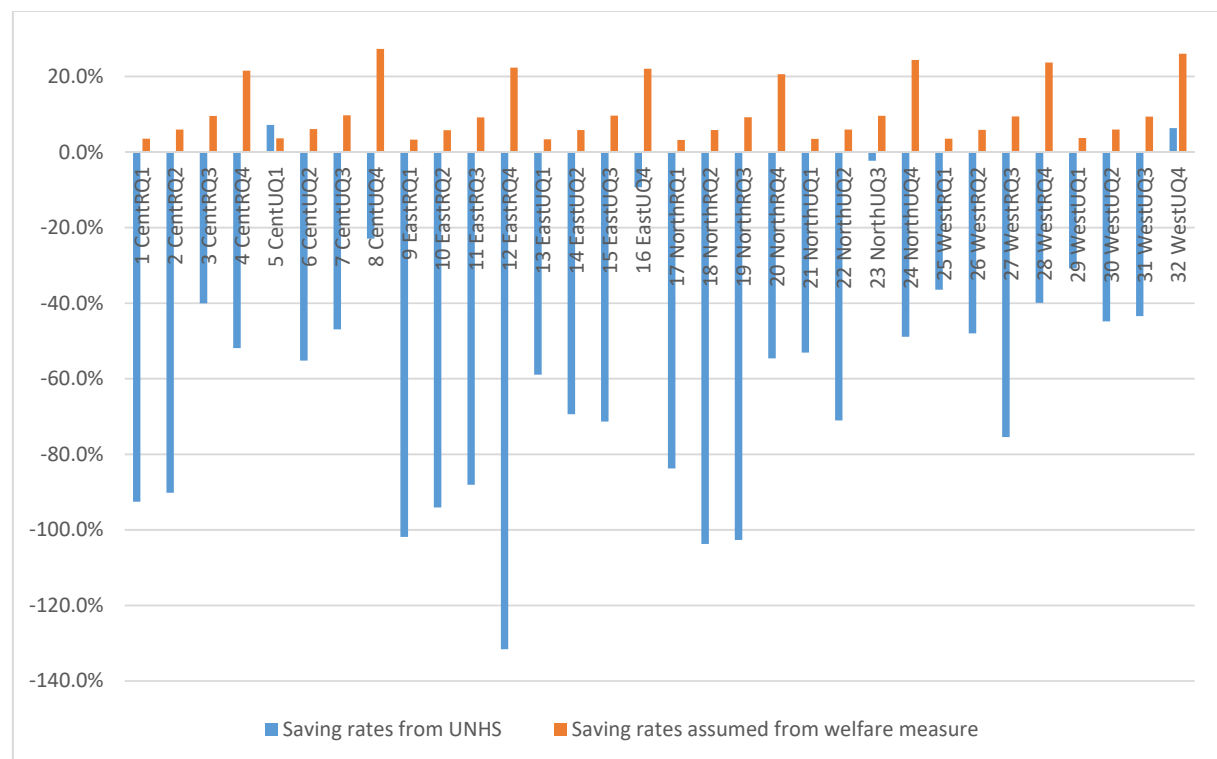
The procedure to estimate the saving rates is as follows. We first identified the household type with the lowest average welfare. That household type is Northern Rural Quartile 1. We then adopted an initial saving rate of 3% for that household type, and assume that the ratio of the saving rates of other households to that of Northern Rural Quartile 1 household is the same as the ratio of other households’ average welfare to the average welfare of Northern Rural Quartile 1. Finally, we used Excel’s Goal Seek function to change the initial saving rate of the Northern Rural Quartile 1 so that the weighted average saving rate for all households is the same as the 16.1% in the Macro SAM (cell O29, sheet ‘1.MacroSAM’). The resulting saving rates are reported in Figure 1.

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<sup>11</sup> The 2009/10 SAM has 161 sectors. However, there are no many-to-one mapping between the 186 sectors in 2016/17 SAM and the 161 sectors in 2009/10 SAM. Therefore, we aggregate both of them to a common 121 sectors.

<sup>12</sup> In analysing the 2016/17 UNHS, UBOS (2017) uses consumption expenditure per adult equivalent as a proxy for welfare. UBOS does not specify their equivalence scales, but it is likely that they use OECD equivalence scale, where: S = 1 for the first household member, S = 0.7 for each additional adult, and S = 0.5 for each child.

**Figure 1. Household saving rates from UNHS and in the final SAM**



## 4.5 Data for government accounts (sheet 10)

Sheet '10.GFS' contains government finance statistics (GFS) data from different sources with varying level of detail.

Table 3 in the sheet contains the summary of all GFS data into items that can be used directly in SAM. The final column in the table contains our notes on the correspondence between each GFS item and SAM's accounts. The data are valued at UGX million. This table was calculated from Table 2, which contain the same information as in Table 3, but in UGX billion. The data in Table 2 come from Table 1, which was compiled from the following data sources supplied to this project by Uganda Ministry of Finance, or downloaded from UBOS website:

- Source 1: sheet 'Bridge table', file "Annual Budgetary Central Government Finance Statistics 2017.18 (Financial Years).xls"
- Source 2: sheet 'GFSM2001', file "Annual Budgetary Central Government Finance Statistics 2017.18 (Financial Years).xls"
- Source 3: sheet 'GFSM2001', file "LG Website Format 16.17-Final-1.xlsx"
- Source 4: revenues and expenditures by Central and Local governments in 2018 Statistical Abstract (UBOS 2019, Tables 4.4B, 4.4H, 4.4J, 4.4K).

Data from these sources are presented in columns Y to AO of sheet '10.GFS'. They provide all required data for the government account in SAM. Note, however, that there are inconsistencies between the GFS data and data relating to taxes and government consumption in the SUTs. We will discuss this issue in some detail in Section 5.2.

## 4.6 Data for Rest of World (RoW) account (sheets 11 – 12)

Data for RoW account include the Balance of Payment (BoP) data and FDI data.

- e) *Balance of payment data* (sheet '11.BoP') come from File "Balance-of-Payments\_Analytical-BPM6.xls", which are reproduced in Table 1 in the sheet. This file contains data on Uganda transactions with rest of the world, namely imports and exports of goods and services; payment and receipts of primary income; payment and receipts of secondary income, such as transfers and grants. The data are in US\$ million. We converted the US\$ values to Uganda million shillings by using the average exchange rate for the year (3,528.2 UGX per 1 US\$), which is given in the Memorandum items part of the BoP. Table 2 in the sheet summarises the BoP into data items relevant for the SAM.
- f) *FDI data* (sheet '12.FDI') come from "Private-Sector-Investment-Survey-Report-2017.pdf" (Uganda Investment Authority 2018). This report contains time series data on FDI in Uganda, by economic sectors. This information is used to calculate the shares of non-financial and financial enterprises in FDI, which are used to allocate capital payments to and from RoW in the SAM between these enterprises.

## 4.7 Data on financial activities (sheet 13)

The SAM requires values of transfers between non-financial enterprises, financial enterprises, households, government, and the RoW. These data are included in sheet "13.FinActivities" in the Workbook. The transfers include receipts and payments of: (i) interest on loans and deposits; (ii) insurance claims and payouts; and (iii) pension contributions and payouts. These transfers are presented in Table 1 – 3 in the sheet. Table 4 provides the summary of all three types of transfers. The transfers were calculated from the following sources:

- a) *Interest on loans and deposits* (Table 1 in the worksheet) are taken from File "2. ISIC K - FinIns Activities.xlsx" that were provided to the CoPS team by the Uganda Ministry of Finance, Planning and Economic Development. Parts of the data relating to the financial year 2016/17 are included section Source A (column L) of this sheet.
  - *The allocation of interest on loans to institutional sectors* is reported in cells R17 – X48 of the worksheet. Household shares are based on the share of informal production of the 23 industrial sectors (discussed in Section 4.4). Government share are calculated from the public shares in outputs of the Public administration, education and health industries in the SUT. Loans to the Financial and insurance sector are allocated to the Financial enterprise account. The residual loans (after deducting loans to households, government and financial sectors) are allocated to the non-financial enterprise account.
  - *The allocation of interest on deposits* is obvious from the data, which are already distinguished by institutional sectors.
- b) *Insurance claims and payouts* (Table 2 in the worksheet) are taken from the 2017 annual report of the insurance industry (Insurance Regulatory Authority of Uganda, 2018), and are contained in section Source B in this sheet.
- c) *Pension contributions and payments* (Table 3 in the worksheet) are taken from the Retirement benefits sector Annual report 2017 (Uganda Retirement Benefits Regulatory Authority 2018), and are contained in section Source C in this sheet.

## 5 Methodology

### 5.1 The procedure

The Uganda 2016/17 SAM was compiled in two main steps. The first step consists of establishing a Macro SAM, using information from aggregate SUTs, government finance statistics, balance of payment, and financial activities. This Macro SAM is important for providing the control totals for the Full SAM which is created in step 2.

The second step is to compile the Full SAM. This consists of two sub-steps. The first sub-step is to create an initial, unbalanced Full SAM by disaggregating the macro SAM into more detailed accounts for activities, commodities, labour types and households, using data from SUTs and household shares in different income and expenditure categories defined in the UNHS. This initial SAM would be balanced in the second sub-step, using the RAS method, or proportional scaling method, which is widely used in the construction or update of Input-Output tables, Supply and Use tables, and SAMs.<sup>13</sup> This step is discussed in in Section 7.

### 5.2 Dealing with data inconsistency

The data sources discussed in Section 4 are not always consistent with each another. Table 3 reports some examples of the differences between the SUTs and GFS, between the SUTs and BoP, and between the GFS and BoP.

In the SUTs, government consumption is higher and indirect tax revenues are lower than those in the GFS (Panel A, Table 3). This explains the smaller government savings in the SAM (Table 4) compared with government operating surplus in the GFS (see our discussions in Section 6.16).

Panels B and C in Table 3 report the differences between the SUTs, BoP and GFS relating to the RoW account. Compared with values reported in BoP (sheet “11.BoP” in the Workbook), the SUTs report lower import values and higher export values, and the GFS reports higher net grants from RoW to government. This explains the lower RoW savings in the SAM (Table 4) compared with the current account balance reported in the BoP data (see our discussions in Section 6.16).

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<sup>13</sup> RAS is the procedure where a matrix is proportionately and iteratively scaled so as to meet certain row and col totals. For discussions on the theory of RAS and examples of how to conduct RAS, see Horridge, J.M. (2010) Four ways to RAS a matrix. Centre of Policy Studies, Monash University. Available at <https://www.copsmodels.com/archivep.htm>.

**Table 3. Examples of differences between data sources** (in UGX mil, unless otherwise indicated)

<i>(a) Differences between SUT and GFS</i>	SUT	GFS	Difference, SUT vs GFS	% Diff
Government consumption	9,383,361	8,624,421	758,940	8.8%
<b>Indirect taxes, of which</b>	<b>7,682,960</b>	<b>8,339,462</b>	-416,864	-5.0%
VAT	3,904,233	3,904,233	0	0.0%
Other product taxes	2,668,778	2,711,749	-42,971	-1.6%
Import duties	1,058,431	1,432,325	-373,894	-26.1%
Other taxes on production	291,156	291,156	0	0

<i>(b) Differences between SUTs and BoP</i>	SUT	BoP	Difference, SUT vs BoP	% Difference
Imports	23,327,157	23,761,649	-434,491	-1.8%
Exports	19,527,333	17,383,223	2,144,109	12.3%

<i>(c) Differences between GFS and RoW</i>	GFS	BoP	Difference, GFS vs BoP	% Difference
Government grant from RoW	1,033,993	648,377	301,366.14	46.5%
Government payment to RoW	451,695	271,985	179,709.66	66.1%

In compiling the SAM, we use data sources in the following order of priority: SUT, GFS, BoP, Financial activities data, and UNHS. Specifically:

1. We take the SUTs as given, and adjust other data items to conform to SUT values. For example, we use the SUT values for tax revenues, imports and exports on the relevant accounts in SAM, and override those in the GFS and BoP.
2. Next, the GFS values would take precedence over the corresponding values in the BoP. For example, we use the values of government transactions with RoW from the GFS, instead of those from the BoP.
3. When available, both GFS and BoP take precedence over the financial activities data on transfers between enterprises, government and Row.
4. The UNHS is used only to calculate the shares of household in different income and expenditure items. Absolute values in UNHS are not used because of the many reporting and recalling problems in surveys, as discussed in many documents, for example Round (2003b).

### 5.3 The tools

The SAM was compiled using a combination of Excel, Stata, and GEMPACK programs.

Excel was used in the initial step of establishing the Macro SAM, because the Macro SAM is small, containing only values for aggregate accounts. Excel can easily handle the formulas and linkages to put the key aggregate data sources into the Macro SAM.

However, Excel is not efficient for handling and processing complex and multi-dimensional matrices, such as the data from UNHS with information on many variables for over 76.4 thousand individuals in over 15.6 thousand households. It is also not efficient in doing complex and iterative procedures, such as the RAS for balancing the Full SAM. More importantly, changes to the data, assumptions, or the analysis, are difficult

to remember, apply and keep tracts of all the changes over the whole data manipulation process, and to be communicated to other people. Therefore, we used Stata to process household survey data, and GEMPACK programs to compile the Full SAM.

Both Stata (StataCorp 2015) and GEMPACK (Harrison and Pearson 1996, Horridge et al. 2018) allow transparent and automated process to manipulate data. In Stata, it is via a series of program scripts (called *do files*) that can be run and re-run easily. In GEMPACK, all data calculations, manipulations, checks and balancing are written in TABLO programs. Then the execution of the programs is automated with batch files. The use of programming software has a number of advantages, particularly if compared to the alternative of doing large numbers of sequential data manipulations using a spreadsheet program like Excel. First, it is transparent. Stata's Do files and GEMPACK's TABLO input files are text files written in an easy to master language. As such, they represent transparent documentation of the data manipulation processes that we have implemented at each stage of the database creation process. Second, automation enables easy modification of the data compilation process if and when new or better data become available, or when alternative assumptions/approaches are used.

## 6 The construction of the Macro SAM

This section discusses the compilation of the Macro SAM, which is the first and a crucial step in the creation of the full Uganda 2016/17 SAM. In the Macro SAM, data from different sources are pooled together in a coherent framework. The Macro SAM is then used to provide control totals to the disaggregation of some accounts into the Full SAM.

The Macro SAM was created within the SAM Workbook, and is reported in sheet '1.MacroSAM' of the Workbook. The reader can click on any of the non-zero cell of the Macro SAM and see the formula that calculates the value in the cell and the data that are used, via links to data from other sheets within the Workbook. The Macro SAM is reproduced below in Table 4.

As discussed in Section 4, the main source for SAM is the 2016/17 SUTs. The full SUTs is very large, with 186 industries and 186 commodities. For the Macro SAM, it is inconvenient and unnecessary to calculate the aggregate values for activities and commodities from this full SUTs. Therefore, we have created an aggregated SUTs (sheet '4.aggSUT' in the SAM Workbook) with 7 broad sectors. The discussion in this section, where relevant, will refer to that aggregated SUTs.

### 6.1 Activities Account (Row 1, Column 1, Table 4)

At the aggregate level, all cells in the Activities account are created from the 2016/17 SUTs.

*Cell (1,2) "Activities, Commodities"* reports the total value of domestic production at basic prices. This value is the sum of the MAKE block in the aggregate Supply table (cells C4:I10, sheet "4.aggSUT" of the SAM Workbook).

Column 1 (Table 4) reports different cost components of industry production.

*Cell (2,1) "Commodities, Activities"* reports the aggregate value of all commodities used as intermediate inputs into production by all activities, valued at purchasers' prices. It is calculated from the Use table (sum of the block C15:I21 in sheet '4.aggSUT' of the SAM Workbook).

*Cells (8,1) "Labour, Activities" and (9,1) "Capital, Activities"* report the aggregate value added by labour and capital, respectively. They are calculated from the Use table by summing over industries of the relevant vectors in cells C22:I23, sheet '4.aggSUT' of the SAM Workbook.

*Cell (10,1) “Production taxes, Activities”* report the aggregate value of other taxes on production collected from industries. Other taxes on production consist mainly of taxes payable by producers on the use of factors of production (e.g. land, buildings, capital and labour). Examples are business license fees, payroll taxes, stamp duties, etc. Unlike taxes on products, these taxes on production are not proportional to the value of goods and services produced (UN 1999, p.26). The value in this cell is calculated from the Use table (sum over industries for cells C24:I24 in sheet ‘4.aggSUT’ of the SAM Workbook).

## 6.2 Commodity Accounts (Row 2, Column 2, Table 4)

### 6.2.1 Column 2: Components of commodity at purchasers’ prices

Column 2 contains components of the aggregate value of composite (domestic and imported) commodities at purchasers’ prices, where purchasers’ price equals the basic price plus taxes and margins on commodities. All of these data are available from the 2016/17 SUTs.

The first component, *cell (1,2)*, reports the values of domestically produced commodities at basic prices, which have been discussed in Section 4.2.

*Cell (3,2) “Trade margins, Commodities”* reports the aggregate value of trade services used to facilitate the flows of commodities from producers/importers to users. The value in this cell is calculated as the sum of cells J4:J10, sheet “4.aggSUP” of the SAM Workbook.

*Cell (4,2) “Transport margins, Commodities”* report the aggregate value of transport services used to facilitate the flows of commodities from producers/importers to users. The value in this cell is calculated as the sum of cells K4:K10, sheet “4.aggSUP” of the SAM Workbook.

*Cell (5,2) “Excise tax, Commodities”* reports the value of non-VAT and non-import-duty taxes on 186 SUT commodities. (According to GFS data, these taxes include net excise taxes, export tax and taxes on specific services). The values in this cell is calculated as the sum of cells L4:L10 in sheet “4.aggSUP” of the SAM Workbook.

*Cell (6,2) “Import duty, Commodities”* reports the import duties on imports, the aggregate value of which is included in cell (19,2). The values in this cell is calculated as the sum of cells M4:M10 in sheet “4.aggSUP” of the SAM Workbook.

*Cell (7,2) “VAT, Commodities”* reports the aggregate net (revenue less refund) of value-added tax collected on 186 SUT commodities.<sup>14</sup> The values in this cell is calculated as the sum of cells N4:N10 in sheet “4.aggSUP” of the SAM Workbook.

*Cell (19,2) “RoW, Commodities”* reports the aggregate value of imports of goods and services from RoW, at CIF prices.<sup>15</sup> The values in this cell is calculated as the sum of cells O4:O10 in sheet “4.aggSUP” of the SAM Workbook.

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<sup>14</sup> In the SUTs this tax is called “Domestic VAT”. However, its value corresponds almost exactly to the total net VAT revenues reported in the GFS, hence we think it is VAT collected from both domestic and imported goods and services.

<sup>15</sup> CIF: Cost, Insurance and Freights.

**Table 4. The 2016/17 Macro SAM for Uganda (UGX millions)**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Activities	Commodities	Trade margin	Transport margin	Excise tax	Import duty	VAT	Labour	Capital	Production taxes	Direct taxes	Households	NPISH	Non-Financial Enterprises	Financial Enterprises	Government	Investment	Stock	Rest of the World	Total
1	Activities	153,395,426																		153,395,426
2	Commodities	52,799,838	0	0								75,011,680	2,254,920			9,383,361	24,792,018	584,872	19,527,333	184,354,023
3	Trade margin	0																		0
4	Transport margin	0																		0
5	Excise tax	2,668,778																		2,668,778
6	Import duty	1,058,431																		1,058,431
7	VAT	3,904,233																		3,904,233
8	Labour	28,661,272																	1,758	28,663,030
9	Capital	71,643,156																	77,518	71,720,673
10	Production taxes	291,156																		291,156
11	Direct taxes											2,184,368		2,037,779	85,830					4,307,978
12	Households							28,173,542	43,185,822			2,503,937		16,599,172	1,744,886	2,151,736			4,106,518	98,465,613
13	NPISH											1,126,625				358,594			1,072,944	2,558,163
14	Non-financial Enterprises								25,985,634						722,906	95,959				26,804,499
15	Financial Enterprises								1,082,335			1,361,990		709,722		561,169				3,715,216
16	Government				2,668,778	1,058,431	3,904,233			291,156	4,307,978	379,960		32,475	1,489				1,033,993	13,678,493
17	Savings											15,897,053	303,243	6,780,161	1,130,526	675,979			589,928	25,376,891
18	Stock																584,872			584,872
19	Rest of the World		23,327,157					489,488	1,466,882					645,190	29,579	451,695				26,409,991
20	Total out	153,395,423	184,354,026	0	0	2,668,778	1,058,431	3,904,233	28,663,030	71,720,674	291,156	4,307,978	98,465,613	2,558,163	26,804,499	3,715,216	13,678,493	25,376,891	584,872	26,409,991

### 6.2.2 Row 2: the use of commodities at purchasers' prices

Row 2 contains the aggregate values of the use of the composite commodities at purchasers' prices by different users. All of these data are available from the 2016/17 SUTs.

Cell (2,1) "*Commodities – Activities*" reports the aggregate value of commodities used as intermediate inputs into production. We have discussed this cell in Section 6.1.

Cell (2,3) "*Commodities, Trade margin*" and Cell (2,4) "*Commodities, Transport margin*" report the aggregate values of trade and transport margin services used as margins (cells J11 and K11, sheet "4.aggSUP" of the SAM Workbook). They are both zeros because in the Supply Table, the value of margin use by each margin commodities is reported with a negative sign, and is exactly offset by the use of that margin by non-margin commodities.<sup>16</sup>

In Table 4, the values in cells (2,3) and (2,4) are the same as that in cells (3,2) and (4,2) discussed in Section 6.2.1. However, in the Full SAM, the disaggregated cells corresponding to those cells will be different. The difference can be illustrated in the figures below. Figure 2 illustrates the calculation of the margin cells in the *Macro* SAM as the total margin usage for each margin commodities. These totals are zeros. Figure 3 illustrates the compilation of margin cells in a *more disaggregated* SAM. The cells (Transport margin, Commodities) are a matrix containing the values trade margin commodities used by each of the SUT commodities, taken from the Supply table. The cells (Transport margin, Commodities) are a matrix containing the total values transport margin commodities used by all SUT commodities, which are zeros.

Cell (2,12) "*Commodity, Households*" reports the aggregate value of final consumption of commodities at purchasers' prices by households. The value in this cell is calculated as the sum of cells J15:J21 in sheet "4.aggSUP" of the SAM Workbook.

Cell (2,13) "*Commodity, NPISH*" reports the aggregate value of final consumption of commodities at purchasers' prices by NPISH. The values in this cell is calculated as the sum of cells K15:K21 in sheet "4.aggSUP" of the SAM Workbook.

Cell (2,16) "*Commodities, Government*" reports the aggregate value of final consumption of commodities at purchasers' prices by the general government. The values in this cell is calculated as the sum of cells L15:L21 in sheet "4.aggSUP" of the SAM Workbook.

Cell (2,17) "*Commodities, Investment*" reports the aggregate value of commodities at purchasers' prices used for investment (i.e. Gross Fixed Capital Formation). The value in this cell is calculated as the sum of cells M15:M21 in sheet "4.aggSUP" of the SAM Workbook.

Cell (2, 18): "*Commodities, Stocks*" reports the aggregate value of commodities at purchasers' prices in stocks (i.e. changes in inventories). The value in this cell is calculated as the sum of cells O15:O21 in sheet "4.aggSUP" of the SAM Workbook.

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<sup>16</sup> According to UN (1999, p33), this is because in the Use table, the rows for trade and transport services show only the value of these services that are consumed directly by producers and final users. They do not include trade and transport margins which are instead included in the value of the goods at purchasers' prices shown in the rows for other commodities. That is, trade and transport margins are not included in the total use of market services in the Use table (cell P19, sheet "4.aggSUP" of the SAM Workbook). Consequently, in the supply table, trade and transport margins should be deducted from their total supply (row 8, sheet "4.aggSUP" of the SAM Workbook) in order to balance the supply and use of trade and transport services at purchasers' prices.

Cell (2,19) “Commodities, RoW” reports the aggregate value of exports at FOB prices.<sup>17</sup> The value in this cell is calculated as the sum of cells N15:N21 in sheet “4.aggSUP” of the SAM Workbook.

**Figure 2. Margins in Macro SAM**

Macro SAM			1	2	3	4	...
			Act	Com	Mar Trade	Mar Trans	
1	Activities			153,395			
2	Commodities	52,800			0	0	
3	Trade margin			0			
4	Transport margin			0			
...							

Supply table		Agri	...	Finance	Mar Trade	Mar Trans	...
Agriculture	29,853		0	3,641	181		
Mining	0		0	384	11		
Manufacturing	0		0	9,271	632		
Utilities	0		0	0	0		
Trade	0		0	-13,296	0		
Transports	0		0	0	-824		
Other non-fin. svc	0		0	0	0		
Financial svc	0		5,163	0	0		
Total	29,853		5,163	0	0		

**Figure 3. Margins in more disaggregated SAM**

Detailed SAM		Commodities								Margins		
		Agri	Mining	Manuf	Utilities	Trade	Trans	NFinSvc	FinSvc	Mar Trade	Mar Trans	...
Commodities	Agriculture											
	Mining											
	Manufacturing											
	Utilities											
	Trade									0		
	Transports										0	
	Other non-fin. Sv											
Margi	Trade margins	3,641	384	9,271	0	-13,296	0	0	0			
	Transport margins	181	11	632	0	0	-824	0	0			
...												

Supply table		Agri	...	Finance	Mar Trade	Mar Trans	...
Agriculture	29,853		0	3,641	181		
Mining	0		0	384	11		
Manufacturing	0		0	9,271	632		
Utilities	0		0	0	0		
Trade	0		0	-13,296	0		
Transports	0		0	0	-824		
Other non-fin. svc	0		0	0	0		
Financial svc	0		5,163	0	0		
Total	29,853		5,163	0	0		

<sup>17</sup> FOB stands for Free on Board. FOB price is the purchasers' price of exports at the port of exportation.

### 6.3 Trade and Transport margin Accounts (Rows 3,4 & Columns 3, 4, Table 4)

As trade and transport margins are used to facilitate the flow of commodities to different users, these accounts have been covered in our discussion of the Commodities account.

### 6.4 Taxes on products Accounts (Rows 5-7 & Columns 5-7, Table 4)

Cells (5,2), (6,2), (7,2), Table 4, contain data for excise taxes on product, import duty and VAT, respectively. They have been covered in our discussions of the Commodities account.

The columns of these accounts shows where revenues from these taxes are allocated to. They are allocated to the general governments (row 5, columns 5-7). The values of these cells are the same as the aggregate values of cells (5,2), (5,2) and (7,2) respectively. That is, they have the same aggregate value as given by the SUT. As discussed in Section 5.2, these values may differ from those given in the GFS.

### 6.5 Labour Account (Row 8, Column 8, Table 4)

Cell (8,1) “*Labour, Activities*” reports the aggregate labour income (value added) from production activities. This has been covered in our discussion of the Activity account.

Cell (8,19) “*Labour, RoW*” reports the value of payments by the RoW for Uganda’s labour working overseas. The value for this cell comes from the BoP (the credit entry for “Compensation of employees” in Table 11b, sheet “11.BoP” of the SAM Workbook).

Cell (19,8) “*RoW, Labour*” reports the value payments by Uganda’s industries to the RoW for foreign labour working in Uganda. The value for this cell comes from the BoP (the debit entry for “Compensation of employees” in Table 2, sheet “11.BoP” of the SAM Workbook).

Cell (12,8) “*Households, Labour*” reports income from labour that accrues to households. It is the sum of labour income from domestic industries and net labour payment from RoW. That is, cell (12,8) = cell (8,1) + [cell (8,19) – cell (19,8)].

### 6.6 Capital Account (Row 9, Column 9, Table 4)

Row 9 reports the income sources for capital. Column 9 reports the allocation of capital income to different institutional sectors, namely households, non-financial enterprises, financial enterprises, and RoW.

Cell (9,1) “*Capital, Activities*” reports the aggregate capital income (value added) from production activities, and has been covered in our discussion of the Activity account.

Cell (9,19) “*Capital, RoW*” reports the value of payments by RoW for Uganda’s investment overseas. The value for this cell is the sum of the *credit* entries for direct investment, portfolio investment, other investment by enterprises, and income from reserve assets in Table 2, sheet “11.BoP” of the SAM Workbook.<sup>18</sup>

Cell (19,9) “*RoW, Capital*” reports the value payments by Uganda’s industries to RoW for foreign direct investment (FDI) in Uganda. The value for this cell is the sum of the *debit* entries for direct

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<sup>18</sup> All of these entries belong to the Investment income category in BoP. Item “Other investment, Government” in BoP also belongs to this category, but we will record it in the Government account, because the GFS does report interest payments to the RoW.

investment, portfolio investment, other investment by enterprises, and income from reserve assets in Table 2, sheet “11.BoP” of the SAM Workbook.

Cell (12,9) “Households, Capital” report the aggregate value of capital income paid to households as a group. This value is the sum of capital income by household-based production in all industries. As discussed in Section 4.4, many sectors in Uganda, especially the agricultural, retail trade, and personal services sectors, are dominated by household production. For estimating the value of capital income from each industry going to all households, we multiplied industries’ capital income with household shares in the production of each industry (column C and E, sheet “7.HHshr in GOS” of the SAM Workbook). The calculation of these shares are discussed in Section 4.4. The sources for the shares are included in the same worksheet. The resulting values of industries’ capital income going to households are reported in column F in the same sheet. The total values of household capital income, summed over industries, is reported in cell (12,9), Table 4.

Cell (14,9) “Non-financial enterprises, Capital” and Cell (15,9) “Financial enterprises, Capital” report the incomes from capital that accrue to non-financial and financial enterprises respectively. For each of the enterprise types, capital income consists of 2 components: domestic capital income and net capital income from the RoW. They are calculated as follows:

- Domestic capital income for all enterprises is calculated as the difference between capital income generated by domestic activities and capital income accruing to households. Non-financial enterprises’ capital income is the sum of capital income going to all non-financial industries in column G, sheet “7.HHshr in GOS” of the SAM Workbook).
- Foreign capital income for all enterprises is the sum of the *net* entries for direct investment, portfolio investment, other investment by enterprises, and income from reserve assets in Table 2, sheet “11.BoP” of the SAM Workbook. This income is allocated to the two enterprise types as follows:
  - Direct and portfolio investment income is allocated to Non-financial and financial enterprises in proportion to their shares in FDI in Uganda.<sup>19</sup> The shares are calculated in sheet ‘13.FDI’ of the SAM Workbook. They are based on time series of FDI in Uganda over the period 2011-2016 published Uganda Investment Authority (2018).
  - Other investment by enterprises and investment income from reserve assets are allocated to Financial enterprises. This is because these incomes consist of interest payments on deposits, loans, trade credit, etc.

## 6.7 Production tax Account (row 10 and column 10, Table 4)

Cell (10,1) contains the value of ‘other taxes on production’ that is part of the value added generated by industries, and was covered in our discussions on Activity account.

The only recipient of production tax values is Government. Cell (16,10) “Government-Production tax” reports the aggregate value of production taxes received by government from all industries. This value is the same as that in cell (10,1), and can be calculated from the industry cost columns of the Use table.

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<sup>19</sup> In principle, the capital income from the RoW should be allocated to the two enterprise types based on their shares in Uganda investment overseas. However, we have only information on sectoral foreign investment in Uganda, not on sectoral investment by Ugandans overseas, and the value of Uganda’s investment overseas is very small. Therefore, we use the sectoral shares of FDI in Uganda for the net capital income from RoW.

## 6.8 Direct tax Account (row 11 and column 11, Table 4)

Row 11 reports direct tax collections from institutional sectors, namely households and enterprises. Column 11 reports the recipient of the direct tax revenues, which is the government.

Government Finance Statistics provide data on direct taxes, but it is not always clear who is paying these taxes. We have allocated these taxes to households, non-financial and financial enterprises, using available information and assumptions discussed below. The allocation is reported in Table 5.

**Table 5. Relevant information on direct taxes and their incidence in 2016/17 (UGX mil, unless otherwise indicated)**

	1. GFS value	2. Households	3. Enterprises	3a.Non- Financial enterprises	3b.Financial enterprises
<b>A. Direct taxes</b>					
A1. Income tax payable by individuals	2,133,480	2,133,480			
A2. Income tax payable by corporations	894,048		894,048	854,857	39,192
A3. Un-allocable tax	924,341	30,022	894,318	855,115	39,204
A4. Oil revenues	165,631		165,631	165,631	
A5. Tax on immovable property	190,478	20,866	169,612	162,177	7,435
<b>Total</b>	<b>4,307,978</b>	<b>2,184,368</b>	<b>2,123,610</b>	<b>2,037,779</b>	<b>85,830</b>
<b>B. Useful shares for enterprises</b>					
B1. Shares in enterprise GOS				95.62%	4.38%
B2. Shares in FDI	2,133,480	2,133,480		90.63%	9.37%

Source: GFS for 2016/17 and 2016/17 UNHS.

Note: (\*) Local service tax payments in UNHS; (\*\*) Property rate payments in UNHS.

In Table 5, Column 1 reports the value of the taxes from the GFS. Column 2 reports the value of direct tax payable by households, taken from UNHS. Column 3 reports the value of direct tax payable by all enterprises. Columns 3a and 3b allocate the value in Column 3 to Non-financial and Financial enterprises, using relevant shares in Panel B of the table.

In Table 5, item A1 (income tax payable by individuals) is clearly payable by households, and item A2 (Income tax payable by corporation) is clearly payable by enterprises. Item A4 (Oil revenue) is clearly payable by the Non-financial enterprises. However, it is not clear how to allocate items A3 (Un-allocable tax) and A5 (Tax on immovable property). We think they are paid by both enterprises and households. We do not have any information from the GFS on how these taxes are allocated between households and enterprises. However, in UNHS, households report their payment of 'local service tax' and 'property rate'. We use those values as the payment of direct taxes on Un-allocable tax and on immovable property respectively (see items A3 and A5 in Column 2, Table 5). As a result, direct tax payment by households (*Cell (11,12) "Direct tax, Households"*, Table 4) is calculated as the sum of direct tax payable by individuals recorded in GFS, and their payments for local service tax and property rates recorded in UNHS. That is, the sum of column 2, Panel A, Table 5.

The remainder of these taxes are payable by enterprises (Column 3, Table 5). They are then allocated to non-financial and financial enterprises based on their shares in their income from industry gross operating surplus (GOS). These shares are calculated from industry GOS in column G, Table 1, sheet "Table 4, and are reported in row B1, Table 5.

The total values of direct tax payments by non-financial and financial enterprises are the sums of their respective columns in Panel A, Table 5. They are included in cells (11,14) and (11,15) of Table 4, respectively.

The only recipient of direct tax revenue is the government. *Cell (16,11) “Government, Direct tax”*, Table 4, reports the aggregate value of government revenues from direct taxes. The value is the sum of all direct taxes paid by all institutional sectors, and is equal to the total GFS value of Items A1-A5, column 1, Table 5.

## 6.9 Household Account (row 12 and column 12, Table 4)

### 6.9.1 Household income sources (row 12, Table 4)

*Cell (12,8) “Labour, Households”* and *cell (12,9) “Capital, Households”* report aggregate value of household income from labour and capital value added, and have already been discussed earlier.

*Cell (12,12) “Households, Households”* reports the aggregate value of inter-household transfers. UNHS reports household income from remittances, as well as household expenditure on remittances, gifts, other transfers, and social functions. In principle, at the macro level, the total value of transfers received from inter-household transfers (hereafter ‘in-transfers’) must be the same as the value of transfers payments by households (hereafter ‘out-transfers’). However, the data in UNHS show that they are different. The aggregate value of household income from remittances (i.e. in-transfers) is 3,084,613 million (cell L36, sheet “5.UNHS” of the SAM Workbook), and the aggregate value of household expenditure on remittances, gifts, other transfers, and social functions (i.e. out-transfers) is 1,923,261 million (sum of cells DO36 and DP36, sheet “5.UNHS” of the SAM Workbook). There is no independent information to help us to determine which value to believe. Therefore, we have chosen the average value of the two.<sup>20</sup>

*Cells (12,14) “Households, Non-financial enterprises”* and *(12,15) “Households, Financial enterprises”* report the aggregate value of households income from non-financial and financial enterprises. For non-financial enterprises, this payment to households consists of dividends and royalty payments. UNHS shows that the royalty payment is very small in Uganda (only 0.001% of total capital income). Hence, for brevity, in this report we will refer to enterprise payments to household out of their capital income as “dividend payouts”. For financial enterprise, this payment consist of dividend payouts, interest payment on household deposits, and insurance and pensions payouts to households.

There are no data on dividend payouts for the non-financial or financial sectors in Uganda. Hence, we assumed that enterprises should retain sufficient earnings to cover their investment expenditures. That is, for each of the enterprise sectors,

$$\text{Retained earnings} = \text{Investment} = \text{Capital income} - \text{Income transfers to households}$$

<sup>20</sup> In principle, the in-transfers reported in the UNHS must include the transfers from RoW (there are no out-transfers from households to RoW). However, the total value of in-transfers reported in the UNHS is lower than that reported in the BoP (3,084.6 vs. 3,106.5 UGX bil), and hence we did not deduct the transfers from RoW from UNHS’ in-transfer data. Also, the average value of in-transfers and out-transfers in UNHS is much lower than the value of domestic inter-household transfers in SAM 2009/10 (2,503.9 vs. 4,130.9 UGX bil). As a result, we adopted the average value of in- and out-transfers in UNHS as the total of inter-household transfers in 2016/17.

We assume that investment by each type of enterprises is proportional to their shares in total capital income. The calculation of the dividend payouts is reported in Table 6.<sup>21</sup>

**Table 6. Calculation of dividend payouts, 2016/17 (UGX mil, unless otherwise indicated)**

	1.Households	2.Non-Financial enterprises	3.Financial enterprises	4.Total
1.Capital income (from Macro SAM, Table 4)	43,185,822	25,985,634	1,082,335	<b>70,253,792</b>
2. Institutional sector shares in capital income and gross capital formation (shares in total of row (1))	61.5%	37.0%	1.5%	<b>100%</b>
3. Required investment expenditure [=gross capital formation in SUTs * shares in (2)]	15,599,470	9,386,463	390,958	<b>25,376,891</b>
4. Dividend payouts [= (1) – (3)]		16,599,172	691,377	<b>17,290,549</b>
5.Implied dividend payout ratio [= (4)/(1)]		63.9%	63.9%	<b>63.9%</b>

Thus, the value of *Cell (12,14) “Households, Non-financial enterprises”* in Table 4 equals the value of dividend payouts by Non-financial enterprises (row 4, column 2, Table 6). The value of *Cell (12,15) “Households, Financial enterprises”* in Table 4 equals the value of dividend payouts by Financial enterprises (row 4, column 3, Table 6), plus interest payment on household deposits, and insurance and pensions payouts to households (cells D7, Table 4, sheet “13.FinActivities” of the SAM Workbook).

*Cell (12,16) “Households, Government”* reports aggregate value of transfers from the general government to households. This value is the sum of social benefits, other expenses (cells F41,42, sheet “10.GFS” of the SAM Workbook) and government payments of interests on government securities hold by households. The latter is calculated as the difference between total government interest payment on domestic debts (cell F33, sheet “10.GFS” of the SAM Workbook) and government interest payments to financial enterprises (cell F6, Table 4, sheet “13.FinActivities” of the SAM Workbook).

*Cell (12,19) “Households, RoW”* reports remittances from RoW to households. This value comes from the BoP (cell D16, Table 2, sheet “11.BoP” of the SAM Workbook).

### 6.9.2 Household expenditure items (column 12, Table 3)

*Cell (2,12) “Commodities, Households”* reports household consumption of goods and services, and was covered in our discussions on the Commodity Account (Section 6.2).

<sup>21</sup> Table 6 also reports the implied dividend payout ratio (DPR) of 63.9% that resulted from our assumption that retained earnings = investment. We think this DPR is plausible, because it lies between the average DPR of 77.8% for Uganda for the period 2010-2015, published in [https://plot.ly/create/?fid=michael.sigamani\\_sr:28#/,](https://plot.ly/create/?fid=michael.sigamani_sr:28#/) and the average DPR of 52% that we calculated from the financial reports of 11 big Uganda enterprises that are available from the internet. The enterprises include MTN Group Ltd. (Uganda operation), Bank of Africa, DFCU Financial, Airtel, Bank of Baroda (Uganda) Ltd., Barclay, Centenary bank, New Vision Printing and Publishing company Ltd., New Vision Printing and Publishing company Ltd., Orient bank, and Stanbic bank Uganda Ltd.

Cell (11,12) “*Direct tax, Households*”) reports direct tax payment by households, and was discussed in the previous section.

Cell (13,12) “*NPISH, Households*” reports the transfers from households to NPISH. We have no data on this value. Therefore, we use the same assumption adopted for SAM 2009/10 (Powell, 2014) that household would make up the difference between NPISH expenditures and NPISH incomes from non-household sources. These items are discussed in Section 6.10 on NPISH account.

Cell (15,12) “*Financial enterprises, Households*” reports household payments to financial enterprises. This consists of interest payments to financial enterprises on household loans, insurance premiums paid to insurance enterprises, and contributions to Supplementary voluntary pension schemes. The data for and the calculations of these payments are included in sheet “13.FinActivities” of the SAM Workbook.

Cell (16,12) “*Government, Households*” reports payments to Government by households. It is the sum of the values of government revenues from sales of goods and services, fines, penalties and forfeits, and miscellaneous and unidentified revenue (cells E26:E28, sheet “10.GFS” of the SAM Workbook).

Cell (17,12) “*Savings, Households*” reports the value of aggregate savings by households. By definition, savings is the difference between income and expenditure. All incomes and expenditures items discussed above results in a value for household savings that implies household saving rates of 16.1%. If we exclude inter-household transfers from the denominator in the calculation of household saving rates, the rate would be 16.6%. We think this rate seems plausible, because it lies between the gross domestic saving rate of 19.9% that can be calculated from the 2016/17 SUTs<sup>22</sup> and the 16.3% rate published by the World Development Indicators (World Bank 2019).

## 6.10 NPISH Account (row 13 and column 13, Table 4)

Row 13 of Table 4 reports NPISH incomes from government, RoW, and households.

Cells (13, 16) “*NPISH, government*” reports the transfers by government to NPISH. Similar to SAM2009/10, we assigned to NPISH the values of government transfers to tertiary institutions and district referral hospitals (cells F39:40, sheet “10.GFS” of the SAM Workbook).

Cells (13, 19) “*NPISH, RoW*” reports the transfers by RoW to NPISH. This value comes from the BoP (Table 2, sheet “11.BoP” of the SAM Workbook).

Cell (13,12) “*NPISH, Households*” reports the transfers by households to NPISH. As discussed earlier, household transfers to NPISH is assumed to be sufficient to make up for the difference between NPISH expenditure and NPISH income from non-household sources.

Column 13 reports NPISH’s expenditures.

Cell (2,13) “*Commodity, NPISH*” reports the value of commodities consumed by NPISH. It was already covered in our discussions of the Commodities Account.

Cell (17, 13) “*Savings, NPISH*” reports the value of savings by NPISH. We have no information on this amount, and hence we assume that NPISH would save sufficiently to make investment. And we have adopted a similar assumption as used for SAM 2009/10 (Powell, 2014) that the proportion of

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<sup>22</sup> See the calculations of saving rates by different economic agents in cells O29:V29, and the calculations gross domestic saving rates from SUT and from the Macro SAM in Table 4, sheet “1.MacroSAM” of the SAM Workbook.

NPISH investment in economy-wide investment is equal to the proportion of NPISH commodity consumption in economy-wide commodity consumption.

### **6.11 Non-Financial enterprise Account (row 14 and column 14, Table 4)**

Row 14 of Table 4 reports income sources for non-financial enterprises. Their income from capital value added (cell (13,9) was discussed in the section on Capital income account. They also receive income from financial enterprises and government.

*Cell (14,15) “Non-financial enterprises, Financial enterprises”* reports the value of payments from financial enterprises to non-financial enterprises. The payments consists of interest payments on non-financial enterprises’ deposits and insurance payouts (see Tables 1, 2 and 4, sheet “13.FinActivities” of the SAM Workbook).

*Cell (14,16) “Non-financial enterprises, Government”* reports the value of transfers from Government to non-financial enterprises. It consists of the subsidies reported in the GFS (cell E35, sheet “10.GFS” of the SAM Workbook).

Column 14 reports expenditures and saving by non-financial enterprises. Their direct tax payment and transfers to households have already been discussed in sections on Direct tax and Household accounts. They also pay to financial enterprises, government and the RoW.

*Cell (15,14) “Financial enterprises, Non-financial enterprises”* reports the value of payments by Non-financial enterprises to financial enterprises. They consist of interests on loans and insurance premiums payments (see Tables 1, 2 and 4, sheet “13.FinActivities” of the SAM Workbook).

*Cell (16,14) “Government, Non-financial enterprises”* reports the value of payments by non-financial enterprises to government. GFS data provide information on government revenues from dividends and rents from all enterprises (cells F24, F25, sheet “10.GFS” of the SAM Workbook). We allocate these values to non-financial and financial enterprises proportionately to their shares in total enterprise income from GOS (gross operating surplus).

*Cell (19,14) “RoW, Non-financial enterprises”* reports transfers from non-financial enterprises to RoW. The BoP for 2016/17 reports total value of secondary income debits by all institutional sectors to the RoW (cell AA61, sheet “11.BoP” of the SAM Workbook). However, there is no information on who is actually paying it, and what is the nature of the transfers. We assumed it is payable by enterprises, and we allocated the payment between non-financial and financial enterprises proportionately to their shares in total enterprise GOS income.

*Cell (17,14) “Savings, Non-financial enterprises”* reports savings by non-financial enterprises. This cell is calculated as the difference between total non-financial enterprises income and their total expenditure.

### **6.12 Financial enterprise Account (row 15 and column 15, Table 4)**

Row 15 of Table 4 reports income sources for financial enterprises. Their incomes from capital rentals, households and non-financial enterprises have already been discussed in Sections 6.6, 6.9.2, 6.10. Financial enterprises also receive payment from the government and the RoW.

*Cell (15,16) “Financial enterprises, Government”* reports financial enterprises’ income from the general government. This income consists of interests from loans to the government sectors in the economy (e.g. public education and health institutions, public administration and defence). The value

of this income is included in cell F6, Table 4, sheet “13.FinActivities” of the SAM Workbook, and is calculated from the data sources containing in the same sheet.

Column 15 reports expenditures and saving by financial enterprises. Their direct tax payments, transfers to households and non-financial enterprises have already been discussed in Sections 6.8, 6.9 and 6.11. They also make payments to the Government and the RoW as discussed below.

*Cell (16,15) “Government, Financial enterprises”* reports the payments by financial enterprises to the government. As discussed for *cell (16,14) “Government, Non-financial enterprises”* in Section 6.11, the GFS data provide information on government revenues from dividends and rents from all enterprises. We allocate these values to financial enterprises proportionately to their shares in total enterprise GOS income.

*Cell (19,15) “RoW, Financial enterprises”* reports transfers from financial enterprises to RoW. As discussed in the previous section for *Cell (19,14) “RoW, Non-financial enterprises”*, BoP data for 2016/17 reports total value of secondary income debits by all institutional sectors to RoW. We assumed it is payable by enterprises, and we allocated the payment between non-financial and financial enterprises proportionately to their shares in total enterprise GOS income.

*Cell (17,15) “Savings, Financial enterprises”*: reports savings by financial enterprises. This cell is calculated as the difference between total financial enterprises income and their total expenditure.

### **6.13 Government Account (row 16 and column 16, Table 4)**

Row 16 in Table 4 reports revenue sources of the general government. Their main source of revenues are direct and indirect taxes, which have been discussed in Sections 6.4, 6.7, and 6.8. The only remaining source of government income is grants from RoW (*Cell (16,19) “Government, RoW”* Table 4). These consist of foreign grants for budget support and project support, as well as grants from donors. The data come from the GFS, and are contained in cells E19, E20 and E22, sheet “10.GFS” of the SAM workbook.

Column 16 reports government expenditure and savings. Government final consumption of goods and services, and their transfers to households, NPISH and enterprises have been discussed in previous sections. The remaining expenditure item is government payments to the RoW (*Cell (19,16) “RoW, Government”* Table 4). These payments consist of interest payment on government foreign debts, and government transfers to international organisations. The data are reported in cells E34 & E37, sheet “10.GFS” of the SAM workbook.

*Cell (17,16) “Savings, Government”* reports government savings. It is calculated as the difference between government current revenues and government current expenditure discussed so far.

### **6.14 Stocks Account (row 18 and column 18, Table 4)**

This account contains two non-zero cells: *Cell (18,17) “Stock, Investment”* reports aggregate value of changes in inventory, which is part of gross capital formation (or gross investment). The value of this cell is the same as that in *Cell (2, 18): “Commodities, Stocks”* discussed in Section 6.2.2.

### **6.15 Rest of the World Account (row 19 and column 19, Table 4)**

Thus far we have discussed all domestic sectors’ income and expenditure items and the underlying linkages with other domestic sectors and RoW. Therefore, all income and expenditure items in RoW accounts have been covered.

RoW savings, [Cell (17,19) “Savings, RoW”], is calculated as the difference between RoW income and expenditure.

## 6.16 Investment and Savings account (row 17 and column 17, Table 4)

Column 17 in Table 4 reports investment, or gross capital formation, in the economy. Investment comprises gross fixed capital formation [cell (2,17), Table 4] and changes in inventories [cell (18,17), Table 4]. The value of cell (18, 17) is the same as that for cell (2,18), which, together with cell (2,17), was discussed in the previous section for Commodities account.

Row 17 report savings by different institutional sectors in the economy and RoW. All of these have been discussed in previous sections. As obvious from these discussions, savings is the balancing items for all the accounts, and hence the Macro SAM is balanced.

### Checks of savings

We have conducted some checks to see if the values of savings derived by the above methods are consistent with data from other sources.

Table 7, reports income and expenditure items from the GFS (Panel B) and from the current SAM (Panel A). Panel C in the table shows that Government savings in the SAM is 1,415,442 million less than that reported in the GFS. The difference is due entirely to the higher government expenditure on final consumption and lower indirect tax revenues reported in 2016/17 SUTs (and adopted for SAM) and those reported in the GFS.

**Table 7. Sources of differences in government savings in 2016/17 SAM and in GFS data** (UGS mil, unless otherwise indicated)

Account	A. SAM		B. GFS		C. Difference (SAM vs GFS)		% difference	
	Income	Expenditure	Income	Expenditure	Income	Expenditure	Income	Expenditure
Activities								
Commodities		9,383,361		8,624,421		758,940		8.8%
Trade margin								
Transport margin								
Net taxes on product	2,668,778		2,711,749		-42,971		-1.6%	
Import duty	1,058,431		1,432,325		-373,894		-26.1%	
VAT	3,904,233		3,904,233		0		0.0%	
Labour								
Capital								
Production taxes	291,156.13		291,156.12		0		0.0%	
Direct taxes	4,307,978		4,307,978					
Households	379,960	2,151,736	379,960	1,350,915		800,821		59.3%
NPISH		358,594		358,594				
Enterprises	33,964	657,128	33,964	657,128				
Government								
Rest of the World	1,033,993	451,695	1,033,993	451,695				
<b>Total income/expenditure</b>	<b>13,678,493</b>	<b>13,002,514</b>	<b>14,095,357</b>	<b>11,442,753</b>	<b>-416,864</b>	<b>1,559,761</b>	<b>-3.0%</b>	<b>13.6%</b>
<b>Savings</b>		<b>675,979</b>		<b>2,652,604</b>		<b>-1,976,625</b>		<b>-74.5%</b>

**Table 8. Sources of differences in RoW savings between 2016/17 SAM and BoP data, from RoW perspective (UGS mil, unless otherwise indicated)**

Account	A. SAM		B. BoP		C. Diff (SAM vs BoP)		% diff	
	Income	Expenditure	Income (Debit in BoP)	Expenditure (Credit in BoP)	Income	Expenditure	Income	Expenditure
Activities								
Commodities	23,327,157	19,527,333	23,761,649	17,383,223	-434,491	2,144,111	-1.8%	12.3%
Trade margin								
Transport margin								
Net taxes on product								
Import duty								
VAT								
Labour	489,488	1,758	489,488	1,758				
Capital	1,466,882	77,518	1,466,882	77,518				
Production tax								
Direct taxes								
Households		4,106,518		4,106,518				
NPISH		1,072,944		1,072,944				
Enterprises	674,769		674,769					
Government	451,695	1,033,993	271,985	648,377	179,710	385,616	66.1%	59.5%
Rest of the World								
<b>Total income/expenditure</b>	<b>26,409,991</b>	<b>25,820,063</b>	<b>26,664,773</b>	<b>23,290,337</b>	<b>-254,782</b>	<b>2,529,726</b>	<b>-1.0%</b>	<b>10.9%</b>
<b>Savings</b>		<b>589,928</b>		<b>3,374,436</b>		<b>-2,784,508</b>		<b>-82.5%</b>

Table 8 reports the sources of differences in RoW savings as calculated in 2016/17 SAM and that reported in 2016/17 BoP. Note that the SAM reports RoW's incomes and expenditures from RoW perspective, but the BoP reports Uganda's incomes and expenditures with RoW from Uganda perspective. Hence, in Panel B, Table 8, RoW's incomes are those recorded as 'Debit' in BoP data, and RoW's expenditures are those recorded as 'Credit' in BoP data.

Panel C of Table 8 shows that the differences in the RoW's savings between SAM and BoP are due entirely to the lower imports and higher exports by Uganda in the SUT's (and adopted for the SAM) that those reported in the BoP; and to the differences in grants payments and receipts between Uganda government and RoW reported in the GFS and BoP.

As for the total national savings, the Macro SAM shows that the relationship (Domestic saving + RoW saving = Total Investment) holds, as required by economic theory. Also, according to the SAM, the gross national saving rate, defined as the ratio of (Gross National Income (GNI) less final consumption) to GNI, is 18.7%, quite close to the value of 20.4% published in the World Development Indicators for Uganda in 2016/17 (World Bank 2019).

## 7 Compilation of the Full SAM

As reported in Section 3.1 and Table 1, the following accounts in the full SAM are more disaggregated than those reported in Table 4 for the Macro SAM, and hence will need to be disaggregated:

1. Activities and Commodities accounts should include data for 186 SUT's industries and commodities.

2. Labour income accounts should include labour income for 16 labour types (distinguished by skill levels, rural/urban, and gender), from 186 industries, and they should be allocated to 32 household types.
3. Household account must be disaggregated into those for 32 household types, distinguishes by 4 regions, rural/urban, and expenditure quartiles.
4. Cells in RoW accounts relating to labour and household accounts must be split into 16 labour types and 32 household types.

This section discusses these disaggregation's. For ease of discussion, we refer to the accounts and cells in the MacroSAM presented in Table 4 as proxy for the corresponding, more disaggregated, accounts and cells in the Full SAM. But keep in mind that the Full SAM would have the dimensions reported in Table 1.

## 7.1 Disaggregation of Activities and Commodities accounts

Except for cells (12,1) “Labour, Activities”, and (2,12) “Commodities, Households”, all disaggregated cells in the Activities and Commodities accounts take their values from the relevant blocks in the 2016/17 SUTs. For example, cell (1,2) “Activities, Commodities” reports a matrix which contain values for 186 domestic commodities produced by 186 activities, valued at basic prices, *i.e.* the prices before taxes and margins. The data come from the 2016/17 Supply table (cells C4:GF189, sheet “3.Full SUT” of the SAM Workbook). It is straightforward to identify data for other SAM cells from the SUTs.

## 7.2 Disaggregation of labour income and expenditure

The full SAM requires 4 matrices for labour income:

- (1) a matrix showing incomes for 16 skill types from 186 activities, which is the disaggregation of cell (“Labour, Activities”) in Table 4;
- (2) a vector of income for 16 skill types from RoW, which is the disaggregation of cell (“Labour, RoW”) in Table 4;
- (3) a matrix showing labour payments by 16 skill types to 32 household types, which is the disaggregation of cell (“Households, Labour”) in Table 4; and
- (4) a vector showing the payment of 16 skill types to RoW, which is the disaggregation of cell (“RoW, Labour”) in Table 4.

The data for disaggregation of labour income includes:

- i. The vector  $USE_{COE,i}$  containing Compensation of Employee (CoE) by 186 industries, which comes from the 2016/17 Use table (cells C381:GF381, “sheet “3.Full SUT” of the SAM Workbook); and
- ii. The matrix  $LFS_{h,i,s}$  containing wages and salaries for 32 household types  $h$ , 186 industries  $i$  and 16 skill type  $s$ . This matrix was calculated from the Labour Force Survey (LFS) module of the 2016/17 UNHS, and was used to compile the following shares:

a) Shares of skills in industry labour income ( $ISKSHR_{i,s}$ ):

$$ISKSHR_{i,s} = \frac{\sum_{h \in HOU} LFS_{h,i,s}}{\sum_{h \in HOU} \sum_{ss \in SKILL} LFS_{h,i,ss}}, \forall i \in IND, \forall s \in SKILL \quad (1)$$

b) Share of skills and households in aggregate labour income ( $HSKSHR_{h,s}$ ):

$$HSKSHR_{h,s} = \frac{\sum_{i \in IND} LFS_{h,i,s}}{\sum_{hh \in HOU} \sum_{i \in IND} \sum_{ss \in SKILL} LFS_{hh,i,ss}}; \forall h \in HOUS, \forall s \in SKILL \quad (2)$$

c) Average skill shares in aggregate labour income ( $SKSHR_s$ ):

$$SKSHR_s = \frac{\sum_{h \in HOU} \sum_{i \in IND} LFS_{h,i,s}}{\sum_{h \in HOU} \sum_{i \in IND} \sum_{ss \in SKILL} LFS_{h,i,ss}}, \forall s \in SKILL \quad (3)$$

Then the relevant cells in the Full SAM were calculated as follows:

1. Labour income by industry and skill:

$$Cells(Lab_s, Act_i) = USE_{COE,i} \times ISKSHR_{i,s} \quad (4)$$

2. Labour income from the RoW, by skill: <sup>23</sup>

$$Cells(Lab_s, RoW) = BoP_{COE,Credit} * SKSHR_s \quad (5)$$

3. Labour payments to household, by household and skill:

$$Cell(Hou_h, Lab_s) = \left[ \sum_{i \in IND} USE_{COE,i} + BoP_{COE,Net} \right] \times HSKSHR_{h,s} \quad (6)$$

4. Labour payments to the RoW, by skill:

$$Cells(RoW, Lab_s) = BoP_{COE,Debit} * SKSHR_s \quad (7)$$

where:  $BoP_{COE,Credit}$ ,  $BoP_{COE,Debit}$ ,  $BoP_{COE,Net}$  are credit, debit and net values of the COE entry in the Balance of Payment (Table 2, sheet 11.BoP of the SAM Workbook).

5. Finally, we used the RAS procedure to ensure that:

- i. For each industry, total labour income is the same as that in the SUTs;
- ii. The aggregate values of household labour income, as well as aggregate values of labour payment to and receipt from the RoW, are the same as those in the Macro SAM; and
- iii. Income and expenditure are the same for each of the labour types.

<sup>23</sup> Ideally, in creating vectors for labour income from and payment to RoW we should allocate their aggregate values to different skill types according to the skill profile of Uganda's workers working overseas and the skill profit of foreigners working in Uganda, respectively. However, we do not have this information, and hence, for both flows, we used the average skill shares in the wage data from the LFS.

## 7.3 Disaggregation of household accounts

Apart from the labour income, we need to disaggregate each of the remaining cells in household income and expenditure into those for 32 household types. The disaggregation is conducted in three steps as follows:

Step 1: Creating initial detailed household accounts by disaggregating the cells in the Macro SAM, using relevant shares by household type from the 2016/17 UNHS.

Step 2: Scaling initial detailed household accounts so that they are internally consistent and are consistent with those in SUTs, UNHS and other accounts.

Step 3: Final scaling of detailed household accounts to achieve plausible household saving rates.

The steps are discussed in some detail below.

### 7.3.1 Creation of initial household accounts

In this step, initial disaggregated household accounts are created by multiplying relevant cells in the Macro SAM or SUTs with household shares from UNHS for different variables.

Table 9 summarises the UNHS variables that were used for the disaggregation.

**Table 9. Disaggregation of household accounts**

<b>Household flows</b>	<b>UNHS variables used for shares in disaggregation</b>
<b>A. Household expenditure items</b>	
Household final consumption	Household consumption expenditure, supplemented by more detailed expenditure on health and education.
Household direct taxes payments	Household expenditure on income tax, property rates, and local service tax.
Household transfers to other households	Household expenditure on remittances, gifts, other transfers, and social functions.
Household transfers to NPISH	Household expenditure on remittances, gifts, other transfers, and social functions.
Household payments to financial enterprises	Household expenditures on interests on loans, pension and social security payments, and other non-consumption expenditures (e.g. interest on consumer debts, subscription, etc.)
Household payments to the government	Household expenditures on user fees and charges (e.g. passport, legal services), and on pension and social security payments.
Household payments to RoW	Household expenditure on remittances, gifts and other transfers.
<b>B. Household income items</b>	
Household labour income	Labour income from all jobs, by labour type and industry, from the LFS module of the UNHS.
Household capital income	Household actual and imputed rents from building/household property, income from agriculture activities and non-household enterprises.
Household income from other households	Household income from remittances and assistance from others.
Household income from non-financial enterprises	Household income from non-household enterprises, royalties and dividends.
Household income from financial enterprises	Household income from non-household enterprises, royalties and dividends, plus household incomes from interest, insurance and pensions.
Household income from Government	Household income from treasury bills, pension, family allowances and other social security benefits and other government transfers (refund on education, refund on medical expenditure)
Household income from the RoW	Household income from remittances and assistance from others.

The disaggregation procedure is illustrated with an example below of the disaggregation of household final consumption.

Table 10 and Table 11 report the values of household final consumption of 7 aggregate commodities in 2016/17 SUTs and 2016/17 UNHS, respectively. The final column in each table reports the share of commodities in total household consumption.

**Table 10. Household final consumption in 2016/17 SUTs, aggregated to 7 sectors (UGX mil)**

Commodity	Value	Share
1 Agriculture	18,976,532	25.3%
2 Mining	0	0.0%
3 Manufacturing	27,281,896	36.4%
4 Utilities	2,937,134	3.9%
5 Trade and transport services	2,853,960	3.8%
6 Other non-financial services	22,379,758	29.8%
7 Financial services	582,400	0.8%
Total	75,011,680	100.0%

**Table 11. Household final consumption in 2016/17 UNHS, aggregated to 7 sectors & 4 household types by expenditure quartile (UGX mil, unless otherwise indicated)**

Commodity	Household type					Commodity shares
	Q1	Q2	Q3	Q4	Total	
1 Agriculture	3,943,841	4,830,270	5,092,719	5,349,642	19,216,472	32.2%
2 Mining	0	0	0	0	0	0%
3 Manufacturing	1,608,041	2,650,251	3,843,668	8,065,479	16,167,440	27.1%
4 Utilities	202,110	310,999	421,904	788,885	1,723,898	2.9%
5 Trade and transport services	135,755	342,573	681,365	1,760,105	2,919,798	4.9%
6 Other non-financial services	1,030,656	2,016,531	3,597,074	11,373,432	18,017,694	30.2%
7 Financial services	90,862	199,666	395,877	923,697	1,610,101	2.7%
8 Total	7,011,264	10,350,290	14,032,607	28,261,240	59,655,402	100.0%

Using information from Table 11, we calculated household shares in the consumption of each of the commodities, as reported in Table 12.

**Table 12. Household shares in final consumption in 2016/17 UNHS, by commodity (%)**

Commodity	Household type				Total
	Q1	Q2	Q3	Q4	
1 Agriculture	20.5%	25.1%	26.5%	27.8%	100.0%
2 Mining	0	0	0	0	0%
3 Manufacturing	9.9%	16.4%	23.8%	49.9%	100.0%
4 Utilities	11.7%	18.0%	24.5%	45.8%	100.0%
5 Trade and transport services	4.6%	11.7%	23.3%	60.3%	100.0%
6 Other non-financial services	5.7%	11.2%	20.0%	63.1%	100.0%
7 Financial services	5.6%	12.4%	24.6%	57.4%	100.0%
8 Household shares	11.8%	17.4%	23.5%	47.4%	100.0%

We then multiplied the shares in Table 12 with the commodity values in

Table 10 to arrive at the initial matrix of household consumption (Table 13).

**Table 13. Initial household consumption matrix, based on SUT value and UNHS shares (UGX mil, unless otherwise indicated)**

Commodity	Household type				Total
	Q1	Q2	Q3	Q4	
1 Agriculture	3,894,598	4,769,958	5,029,131	5,282,845	18,976,532
2 Mining	0	0	0	0	0
3 Manufacturing	2,713,503	4,472,191	6,486,034	13,610,168	27,281,896
4 Utilities	344,350	529,872	718,829	1,344,082	2,937,134
5 Trade and transport services	132,694	334,849	666,001	1,720,416	2,853,960
6 Other non-financial services	1,280,177	2,504,731	4,467,922	14,126,928	22,379,758
7 Financial services	32,866	72,222	143,195	334,116	582,400
8 Total	8,398,188	12,683,824	17,511,112	36,418,556	75,011,680
Household shares	11.2%	16.9%	23.3%	48.6%	100.0%

Note that the value of each commodity in the last column of Table 13 is the same as that in

Table 10, but household shares in aggregate household consumption are now different from those in the UNHS (compare the last rows of Table 12 and Table 13). This is because the commodity shares in total household consumption in the SUTs are different from those in UNHS (compare the last columns of

Table 10 and Table 11). Similar problems can occur in the disaggregation of other income and expenditure items. This necessitates the additional steps discussed below.

### 7.3.2 Scaling of initial disaggregated cells in household accounts

In this step, scaling procedures were used to make sure that detailed household accounts are internally consistent with those in SUTs, UNHS and other accounts. As the example above shows, if the commodity/industry shares in the SUTs are different from those in UNHS, then the application of household shares in UNHS to the SUT commodities/industries may results in different share of each household in aggregate household income and expenditure item. A RAS procedure is applied to make sure that the SAM structure conforms to the structure in the SUTs and UNHS. Continuing with the example in the previous section, after RAS, the household consumption block in the final SAM will be as reported in Table 14. Note that commodity shares are now the same as those in the SUT, and household shares are the same as those in UNHS.

**Table 14. Household final consumption matrix after RAS (UGX mil, unless otherwise indicated)**

Commodity	Household type					Commodity shares
	Q1	Q2	Q3	Q4	Total	
1 Agriculture	3,793,421	4,724,051	4,999,202	5,459,859	18,976,532	25.3%
2 Mining	0	0	0	0	0	0%
3 Manufacturing	3,152,881	4,792,203	7,093,359	12,243,453	27,281,897	36.4%
4 Utilities	402,353	580,618	739,321	1,214,842	2,937,134	3.9%
5 Trade and transport services	145,142	355,151	687,537	1,666,130	2,853,959	3.8%
6 Other non-financial services	1,292,163	2,498,721	3,999,097	14,589,775	22,379,758	29.8%
7 Financial services	30,119	63,880	126,313	362,088	582,400	0.8%
8 Total	8,816,079	13,014,625	17,644,830	35,536,147	75,011,680	100.0%
Household shares	11.8%	17.4%	23.5%	47.4%	100.0%	

### 7.3.3 Inter-household transfer matrix

One challenge in the disaggregation of household account is the creation of the inter-household transfer matrix, which can be denoted as HHTRANS(h,k), where h is the recipient household and k is the source household. The UNHS provides data on total income from transfers for each household, but not the source of the transfers. Similarly, the UNHS provides data for total transfer expenditure by each household, but not the recipients of the transfers. That is, we know the column totals and the row totals of the HHTRANS matrix, but not the values in the cells of the matrix.

Due to lack of any additional information to populate the matrix, we allocate the total values of household transfers to individual household according to the shares from 2009/10 Uganda SAM. Figure 4 reports the final transfer matrix, which was aggregated to 16 household types for reporting purposes.

**Figure 4. Inter-household transfer matrix, aggregated to 16 household types (UGX bn)**

		Out-going transfers (giving households)																
		CentQ1	CentQ2	CentQ3	CentQ4	EastQ1	EastQ2	EastQ3	EastQ4	NortQ1	NortQ2	NortQ3	NortQ4	WestQ1	WestQ2	WestQ3	WestQ4	Total
In-coming transfers (Receiving households)	1 CentralQ1	4.8		19.6	58.2				0.6									83.1
	2 CentralQ2	1.1	47.0		40.8				1.2								1.7	91.8
	3 CentralQ3		3.7	172.1	10.6				0.9				7.5				1.3	196.1
	4 CentralQ4				429.2				0.9				6.9				0.1	437.0
	5 EasternQ1			3.2	152.0	31.0			1.7	0.5			5.8				2.8	196.9
	6 EasternQ2				232.2		29.4		3.4	1.8			6.1				1.8	274.8
	7 EasternQ3				61.9			140.5	37.3	4.7			2.0				1.5	247.9
	8 EasternQ4								35.8	29.0			7.2				0.1	72.1
	9 NorthernQ1				12.0				3.2	3.8						1.8	3.0	23.9
	10 NorthernQ2				4.6				1.3	0.2	79.8		71.2	2.8	2.9	0.4	1.1	164.3
	11 NorthernQ3				2.8							85.5	8.3		11.4	4.2	42.7	154.9
	12 NorthernQ4												128.5			2.3	6.1	136.9
	13 WesternQ1				10.2				1.3				20.0	1.9		0.9	4.9	39.2
	14 WesternQ2				3.7				1.6				20.4		10.4	1.8	22.2	60.1
	15 WesternQ3				1.8				0.1				19.0	1.5	3.7	54.8	63.2	144.1
	16 WesternQ4															0.3	180.6	180.9
Total		5.9	50.7	194.8	1.019.8	31.0	29.4	140.5	89.4	40.0	79.8	85.5	302.9	6.3	28.4	66.6	333.1	2.503.9

### 7.3.4 Final scaling of disaggregated household accounts

After the previous step we have obtained all scaled initial household income and expenditure matrices. Hence, savings for each household type can be calculated as the difference between the household's total income and total expenditure. However, as reported in Panel A,

Table 15, the implied saving rates by households (calculated as the ratio of household savings to household income) seem implausible for many households. There are some negative saving rates (highlighted in red) for households in high income groups (Eastern rural Q4 and Northern rural Q3). And the saving rates of some lower income groups are higher than that of the higher income groups. That necessitates a final scaling of all income and expenditure matrices to make sure that household saving rates are plausible.

In Section 4.4 we discussed how we estimated the saving rates for households based on their relative per capita welfare and household aggregate saving rates from the Macro SAM. The resulting saving rates are reported in Figure 1. We scaled all income and expenditure items in household accounts so as they satisfy the following conditions:

1. On the income side, the aggregate values of all income items, summed over households, must be the same as those in the Macro SAM. In addition, total labour incomes by labour type must be the same as those in the total rows of the Labour account.
2. On the expenditure side, the aggregate values of all expenditure items, summed over households, must be the same as those in the Macro SAM. In addition, total final household consumption, by commodity, must be the same as those in the Use table.
3. Household saving rates must be the same as those reported in Figure 1.

The final values of household income and expenditure are reported in Panel B,

Table 15

**Table 15. Household total expenditure, total income and implied saving rates before and after the final scaling (UGX mil, unless otherwise indicated)**

Household	A. Before final scaling			B. After final scaling		
	Income	Expenditure	Saving rate	Income	Expenditure	Saving rate
Central Rural Q1	1,156,411	959,494	17.0%	1,073,281	1,031,831	3.9%
Central Rural Q2	2,488,922	2,279,385	8.4%	2,450,704	2,298,238	6.2%
Central Rural Q3	5,055,455	3,540,536	30.0%	4,505,550	4,003,321	11.1%
Central Rural Q4	6,137,185	5,716,406	6.9%	6,627,016	5,285,055	20.2%
Central Urban Q1	364,191	246,838	32.2%	310,014	296,429	4.4%
Central Urban Q2	1,526,001	1,304,865	14.5%	1,455,192	1,359,887	6.5%
Central Urban Q3	3,641,542	3,288,122	9.7%	3,634,361	3,272,510	10.0%
Central Urban Q4	20,914,268	17,414,054	16.7%	22,171,646	16,406,987	26.0%
Eastern Rural Q1	4,241,828	3,468,065	18.2%	3,914,972	3,773,542	3.6%
Eastern Rural Q2	3,519,816	3,219,461	8.5%	3,465,817	3,256,468	6.0%
Eastern Rural Q3	2,462,298	2,307,814	6.3%	2,497,657	2,266,670	9.2%
Eastern Rural Q4	1,399,075	1,726,797	-23.4%	1,753,879	1,420,321	19.0%
Eastern Urban Q1	511,640	343,073	32.9%	433,618	415,765	4.1%
Eastern Urban Q2	645,166	512,906	20.5%	594,806	556,030	6.5%
Eastern Urban Q3	909,620	750,287	17.5%	871,067	781,250	10.3%
Eastern Urban Q4	1,961,983	1,232,168	37.2%	1,792,158	1,349,095	24.7%
Northern Rural Q1	2,916,595	2,301,022	21.1%	2,646,144	2,551,665	3.6%
Northern Rural Q2	2,445,946	2,312,762	5.4%	2,455,919	2,309,412	6.0%
Northern Rural Q3	2,208,690	2,302,526	-4.2%	2,362,363	2,152,577	8.9%
Northern Rural Q4	2,746,316	2,490,395	9.3%	2,914,051	2,341,139	19.7%
Northern Urban Q1	289,257	199,152	31.2%	247,666	237,163	4.2%
Northern Urban Q2	469,300	431,597	8.0%	462,778	434,148	6.2%
Northern Urban Q3	1,604,211	805,639	49.8%	1,261,700	1,090,655	13.6%
Northern Urban Q4	2,292,091	2,181,121	4.8%	2,550,308	1,989,121	22.0%
Western Rural Q1	2,094,003	1,350,478	35.5%	1,756,176	1,677,974	4.5%
Western Rural Q2	3,891,463	2,890,884	25.7%	3,499,763	3,259,843	6.9%
Western Rural Q3	4,846,512	4,589,252	5.3%	4,956,687	4,481,339	9.6%
Western Rural Q4	7,570,573	6,423,751	15.1%	7,926,117	6,082,071	23.3%
Western Urban Q1	286,894	207,383	27.7%	251,093	240,239	4.3%
Western Urban Q2	737,513	586,928	20.4%	681,118	635,904	6.6%
Western Urban Q3	1,491,974	1,317,731	11.7%	1,474,935	1,330,176	9.8%
Western Urban Q4	5,638,875	3,867,674	31.4%	5,467,054	3,981,816	27.2%
Total	98,465,608	82,568,560	16.1%	98,465,607	82,568,634	16.1%

This step completes the creation of the full Uganda 2016/17 SAM.

## 8 Conclusion

This paper reports the steps taken to develop the 2016/17 SAM for Uganda. This SAM provides an analytical framework which captures the complex inter-linkages between different agents in the economy. These agents include the different domestic industries, household groups, enterprises and

governments. This framework thus allows for a comprehensive analysis of the economic and social impacts of policy or economic changes on an economy.

We describe the structure of the Full SAM. In developing the SAM we rely on a range of data including the Full Supply Use Table for 2016/17, Government Financial Statistics (GFS), Ugandan National Household Survey, Balance of Payments and financial data. The data from these sources are often not consistent with each other. Thus, we have to decide which data to believe and which data to adjust.

The development of the SAM is completed in 2 steps. First a Macro SAM is developed. This Macro SAM is then disaggregated further by disaggregating the activities and commodities accounts, labour income and expenditure, and the household accounts. The final SAM contains information on 439 accounts.

To download the Full SUT contact the Uganda Bureau of Statistics and to access Full SAM, contact the Ministry of Finance, Planning & Economic Development.

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## Appendix 1. Data sources to compile the SUT

In this section we discuss the sources of data used to compile the 2016/17 Supply and Use Table (SUT).

### Productive sectors

The agricultural sector outputs is composed of data from different sources as follows; a) data for crops is largely based on the production data received from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) for FY 2016/17. (b) Livestock data used is based on the livestock model which uses the most recent National livestock census conducted by the Uganda Bureau of Statistics (UBOS) and the 2016/17 data from MAAIF. Under the industrial sector, data for mining was sourced from the Directorate of Geological Survey and Mines under Ministry of Energy and Mineral Development. The manufacturing sector was compiled using 2016/17 financial statements from companies as well as income statements from the Uganda Revenue Authority (URA). In addition, the energy sector was compiled using data from the Electricity Regulatory Authority (ERA) which was supplemented with data from financial statements of the main electricity companies like Uganda Electricity Generation Company Limited (UEGCL), Uganda Electricity Transmission Company Limited (UETCL), and Uganda Electricity Distribution Company Limited (UEDCL). Data for the sectors that make up tourism is based on numerous data sources. Some of these include; (1) Arrivals at the airport, (2) data from Ministry of Tourism on National parks and Game reserves (3) Financial statements of hotels (4) data compiled on income statements by the Uganda Revenue Authority (URA).

The communication sector was compiled using data attained from the Uganda Communication Commission (UCC) which was supplemented with data from income statements compiled by the Uganda Revenue Authority (URA). The financial and non-financial corporations are based on (1) data collected from the Bank of Uganda (BOU) in regard to the financial sector. (2) Data from Company Income statements data collected by Uganda Revenue Authority (URA) and (3) financial statements from corporations. These data sets were used to compile; sectors like Bank of Uganda, Other monetary intermediation, Financial Intermediation Services Indirectly Measured (FISIM) and other financial service activities. The Compulsory Social Security Activities sector is largely based on the financial statements provided by the National Social Security Fund (NSSF).

Water Supply; Sewerage and Waste Management Activities were compiled using financial statements for the National Water and Sewerage Corporation (NWSC). Water supply by the private sector is based the 2016/17 Uganda National Household Survey (UNHS). The education sector was compiled using data from government and private sector. Public education is based on the Government Finance Statistics (GFS) where allocations to each category of education is provided. Private education is based on income statements data from the Uganda Revenue Authority (URA) and Non-Profit Institutions Serving Households (NPISH). Finally, Services of Households as Employers of Domestic Personnel is based on the 2016/17 Uganda National Household Survey (UNHS).

### Intermediate consumption and Margins

Intermediate consumption data for the productive sectors, was compiled using a sector specific approach. Some sectors provide data to the Bureau of Statistics (UBOS) on a quarterly basis and this data includes allocations to intermediate consumption. Some of these sectors include, electricity, insurance, government bodies and others. Intermediate consumption for agricultural crops is based on a ratio generated from the quarterly mini-surveys conducted by the Bureau of statistics (UBOS).

The trade and transport margins were compiled using data collected by the Trade and Transport Margins Survey which was conducted in FY 2016/17 specifically for the development of the Supply and Use Tables (SUT).

*Disaggregated consumption of commodities*

Private consumption of commodities is based on the 2016/17 Uganda National Household Survey (UNHS) while Public consumption is based on government expenditure categorised by Classification of Functions of Government (COFOG).

*Gross Fixed Capital Formation*

The Gross Fixed Capital Formation (GFCF) is categorised into two; public and private. Public GFCF is based on the Government Finance Statistics (GFS), specifically the 2016/17 Acquisition of Nonfinancial Assets by Government. The private Gross Fixed Capital Formation is based on the construction model that uses data collected from sectors on key items like dwellings, structures and many more.

*Taxes and exchange rates*

The main taxes categorisation considered in the 2016/17 SAM are; direct taxes, sales tax, import duties. These tax-heads are all sourced from the 2016/17 revenue component of the Government Finance Statistics (GFS) published by the Ministry of Finance, Planning and Economic Development. The breakdown of taxes by commodity is based on categorisation by the Uganda Revenue Authority (URA). The exchange rates used are based on the annual average exchange rate data compiled by Bank of Uganda (BOU).

*Imports and exports*

The detailed data used to populate import and exports of goods was sourced from the customs office under the Uganda Revenue Authority. However, the exports and imports of services dataset was adopted from the Balance of Payments (MPM6) compiled by the Bank of Uganda.

## Appendix 2. Accounts in Uganda 2016/17 Social Accounting Matrix

Aggregate accounts in the Macro SAM	Detail accounts in the Full SAM
Activities	Sugarcane
Activities	Tobacco
Activities	Cotton
Activities	Flowers
Activities	Cocoa
Activities	Coffee (Arabica)
Activities	Coffee (Robusta)
Activities	Tea
Activities	Vanilla
Activities	Other Cash Crops
Activities	Wheat
Activities	Maize
Activities	Rice
Activities	Sorghum
Activities	Millet
Activities	Other Cereal Crops
Activities	Vegetables and Melons
Activities	Soya beans
Activities	Ground Nuts
Activities	SimSim (Sesame)
Activities	Sunflower
Activities	Other Oil Seeds
Activities	Irish Potatoes
Activities	Sweet Potatoes
Activities	Cassava
Activities	Other Root Crops and Tubers
Activities	Beans
Activities	Cow peas
Activities	Peas (Field)
Activities	Pigeon Peas
Activities	Other Legumes
Activities	Bananas
Activities	Other Fruit and Nuts
Activities	Cattle and Buffaloes
Activities	Cow's Milk
Activities	Camels, Horses, Asses, Mules, etc.
Activities	Goats
Activities	Sheep

Aggregate accounts in the Macro SAM	Detail accounts in the Full SAM
Activities	Swine/Pigs
Activities	Rabbits
Activities	Chickens
Activities	Eggs, Chicken
Activities	Other Poultry
Activities	Eggs, Other Poultry
Activities	Bee and Natural Honey
Activities	Other Animals and Products N.E.C
Activities	Agriculture support services
Activities	Timber and Poles
Activities	Firewood
Activities	Charcoal
Activities	Other Forestry products
Activities	Fishing
Activities	Aquaculture Products
Activities	Crude Petroleum
Activities	Natural Gas
Activities	Other Minerals mined
Activities	Quarrying product
Activities	Mining support service
Activities	Processed and preserved of meat
Activities	Processed and preserved of fish
Activities	Edible oils and fats
Activities	Dairy products
Activities	Grain mill and starch products
Activities	Bakery products
Activities	Manufactured sugar
Activities	Manufactured coffee
Activities	Manufactured tea
Activities	Other food products, n.e.c.
Activities	Prepared animal feeds
Activities	Beer
Activities	Soft drinks and bottled water
Activities	Other beverages
Activities	Tobacco Products
Activities	Textiles
Activities	Wearing Apparel
Activities	Leather and Related Products
Activities	Cork, Wood and Straw Products

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Activities	Paper and Paper Products
Activities	Printed and Recorded Media
Activities	Coke and Refined Petroleum Products
Activities	Paint, vanishes and similar products
Activities	Soap, detergents, etc. preparations
Activities	Other chemical products
Activities	Pharmaceuticals products
Activities	Rubber Products
Activities	Plastic Products
Activities	Bricks, tiles and other ceramic products
Activities	Cement, lime and plaster
Activities	Articles of concrete, cement and plaster
Activities	Other non-metallic products n.e.c.
Activities	Basic Metals products
Activities	Iron and steel products
Activities	Other metal products
Activities	Computer, Electronic and Optical Products
Activities	Electrical Equipment
Activities	Machinery and Equipment n.e.c.
Activities	Motor Vehicles, Trailers and Semi-Trailers
Activities	Other Transport Equipment
Activities	Furniture
Activities	Other Manufacturing
Activities	Repair and Installation of Machinery and Equipment
Activities	Electricity-Hydro
Activities	Electricity-Solar
Activities	Electricity-Thermal
Activities	Electricity-Other
Activities	Water Supply; Sewerage and Waste Management Activities
Activities	Construction of Buildings service
Activities	Civil Engineering service
Activities	Specialized Construction Services
Activities	Traditional Housing service
Activities	Sale and Repairs of Motor Vehicles and Motorcycles Service
Activities	Wholesale Trade
Activities	Retail Trade
Activities	Rail Transport
Activities	Passenger land transport
Activities	Freight transport by road

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Activities	Water Transport
Activities	Air Transport service
Activities	Warehousing and Support services for Transportation
Activities	Postal and Courier services
Activities	Accommodation
Activities	Food and Beverage Service
Activities	Publishing services
Activities	Audio-Visual Production and Distribution services
Activities	Broadcasting and Programming services
Activities	Telecommunications services
Activities	Computer Programming, Consultancy and Related services
Activities	Information Services
Activities	Bank of Uganda
Activities	Other monetary intermediation
Activities	FISIM
Activities	Other financial service activities
Activities	Insurance
Activities	Activities Auxiliary to Financial Service Activitie
Activities	Real Estate Activities with Own or leased Property
Activities	Real Estate Activities on fee or Contract basis
Activities	Legal and Accounting Services
Activities	Head Offices; Management Consultancies Services
Activities	Architecture and Engineering Services
Activities	Scientific Research and Development services
Activities	Advertising and Market Research services
Activities	Other Professional, Scientific and Technical Services
Activities	Veterinary Services
Activities	Rental and Leasing Services
Activities	Employment placement & Temporary Employment agencies Services
Activities	Travel Agency, Tour Operator and Reservation Services
Activities	Security and Investigation Services
Activities	Cleaning and Maintenance of Buildings and Landscape services
Activities	Office Administrative, Support and Other Business Support services
Activities	Public Administration and Defence
Activities	Compulsory Social Security Activities
Activities	Primary Education - Government
Activities	Primary Education - Households
Activities	Primary Education - External
Activities	Secondary , Technical and Vocational Education-Government

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Activities	Secondary , Technical and Vocational Education-Private
Activities	Secondary , Technical and Vocational Education-External and other
Activities	Higher and Adult Education-Government
Activities	Higher and Adult Education-Private
Activities	Higher and Adult Education-External and Other
Activities	Other Education n.e.c.-Government
Activities	Other Education n.e.c. Private
Activities	Other Education n.e.c.-external and other
Activities	Impatient Curative Care-public
Activities	Day Curative Health Care-public
Activities	Outpatient Curative Care -public
Activities	Ancillary services -public
Activities	Medical goods - public
Activities	Preventive Care - public
Activities	Other health services - public
Activities	Impatient Curative Care-private
Activities	Day Curative Health Care-private
Activities	Outpatient Curative Care -private
Activities	Ancillary services -private
Activities	Medical goods - private
Activities	Preventive Care - private
Activities	Other health services - private
Activities	Social Work Services
Activities	Creative, Arts and Entertainment Services
Activities	Libraries, Archives, Museums and Other Cultural Services
Activities	Gambling and Betting services
Activities	Sports Activities and Amusement and Recreation Services
Activities	Services of Business Membership Organizations and Trade Unions
Activities	Repair of Computers and Personal and Household Goods service
Activities	Other Personal Service
Activities	Services of Households as Employers of Domestic Personnel
Commodities	Sugarcane
Commodities	Tobacco
Commodities	Cotton
Commodities	Flowers
Commodities	Cocoa
Commodities	Coffee (Arabica)
Commodities	Coffee (Robusta)
Commodities	Tea

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Commodities	Vanilla
Commodities	Other Cash Crops
Commodities	Wheat
Commodities	Maize
Commodities	Rice
Commodities	Sorghum
Commodities	Millet
Commodities	Other Cereal Crops
Commodities	Vegetables and Melons
Commodities	Soya beans
Commodities	Ground Nuts
Commodities	SimSim (Sesame)
Commodities	Sunflower
Commodities	Other Oil Seeds
Commodities	Irish Potatoes
Commodities	Sweet Potatoes
Commodities	Cassava
Commodities	Other Root Crops and Tubers
Commodities	Beans
Commodities	Cow peas
Commodities	Peas (Field)
Commodities	Pigeon Peas
Commodities	Other Legumes
Commodities	Bananas
Commodities	Other Fruit and Nuts
Commodities	Cattle and Buffaloes
Commodities	Cow's Milk
Commodities	Camels, Horses, Asses, Mules, etc.
Commodities	Goats
Commodities	Sheep
Commodities	Swine/Pigs
Commodities	Rabbits
Commodities	Chickens
Commodities	Eggs, Chicken
Commodities	Other Poultry
Commodities	Eggs, Other Poultry
Commodities	Bee and Natural Honey
Commodities	Other Animals and Products N.E.C
Commodities	Agriculture support services

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Commodities	Timber and Poles
Commodities	Firewood
Commodities	Charcoal
Commodities	Other Forestry products
Commodities	Fishing
Commodities	Aquaculture Products
Commodities	Crude Petroleum
Commodities	Natural Gas
Commodities	Other Minerals mined
Commodities	Quarrying product
Commodities	Mining support service
Commodities	Processed and preserved of meat
Commodities	Processed and preserved of fish
Commodities	Edible oils and fats
Commodities	Dairy products
Commodities	Grain mill and starch products
Commodities	Bakery products
Commodities	Manufactured sugar
Commodities	Manufactured coffee
Commodities	Manufactured tea
Commodities	Other food products n.e.c.
Commodities	Prepared animal feeds
Commodities	Beer
Commodities	Soft drinks and bottled water
Commodities	Other beverages
Commodities	Tobacco Products
Commodities	Textiles
Commodities	Wearing Apparel
Commodities	Leather and Related Products
Commodities	Cork, Wood and Straw Products
Commodities	Paper and Paper Products
Commodities	Printed and Recorded Media
Commodities	Coke and Refined Petroleum Products
Commodities	Paint, vanishes and similar products
Commodities	Soap, detergents, etc. preparations
Commodities	Other chemical products
Commodities	Pharmaceutical products
Commodities	Rubber Products
Commodities	Plastic Products

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Commodities	Bricks, tiles and other ceramic products
Commodities	Cement, lime and plaster
Commodities	Articles of concrete, cement and plaster
Commodities	Other non-metallic products n.e.c.
Commodities	Basic Metals products
Commodities	Iron and steel products
Commodities	Other metal products
Commodities	Computer, Electronic and Optical Products
Commodities	Electrical Equipment
Commodities	Machinery and Equipment n.e.c.
Commodities	Motor Vehicles, Trailers and Semi-Trailers
Commodities	Other Transport Equipment
Commodities	Furniture
Commodities	Other Manufacturing
Commodities	Repair and Installation of Machinery and Equipment
Commodities	Electricity-Hydro
Commodities	Electricity-Solar
Commodities	Electricity-Thermal
Commodities	Electricity-Other
Commodities	Water Supply; Sewerage and Waste Management Activities
Commodities	Construction of Buildings service
Commodities	Civil Engineering service
Commodities	Specialized Construction Services
Commodities	Traditional Housing service
Commodities	Sale and Repairs of Motor Vehicles and Motorcycles Service
Commodities	Wholesale Trade
Commodities	Retail Trade
Commodities	Rail Transport
Commodities	Passenger land transport
Commodities	Freight transport by road
Commodities	Water Transport
Commodities	Air Transport service
Commodities	Warehousing and Support services for Transportation
Commodities	Postal and Courier services
Commodities	Accommodation
Commodities	Food and Beverage Service
Commodities	Publishing services
Commodities	Audio-Visual Production and Distribution services
Commodities	Broadcasting and Programming services

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Commodities	Telecommunications services
Commodities	Computer Programming, Consultancy and Related services
Commodities	Information Services
Commodities	Bank of Uganda
Commodities	Other monetary intermediation
Commodities	FISIM
Commodities	Other financial service activities
Commodities	Insurance
Commodities	Activities Auxiliary to Financial Service Activities
Commodities	Real Estate Activities with Own or leased Property
Commodities	Real Estate Activities on fee or Contract basis
Commodities	Legal and Accounting Services
Commodities	Head Offices; Management Consultancies Services
Commodities	Architecture and Engineering Services
Commodities	Scientific Research and Development services
Commodities	Advertising and Market Research services
Commodities	Other Professional, Scientific and Technical Services
Commodities	Veterinary Services
Commodities	Rental and Leasing Services
Commodities	Employment placement & Temporary Employment agencies Services
Commodities	Travel Agency, Tour Operator and Reservation Services
Commodities	Security and Investigation Services
Commodities	Cleaning and Maintenance of Buildings and Landscape services
Commodities	Office Administrative, Support and Other Business Support services
Commodities	Public Administration and Defence
Commodities	Compulsory Social Security Activities
Commodities	Primary Education - Government
Commodities	Primary Education - Households
Commodities	Primary Education - External
Commodities	Secondary , Technical and Vocational Education-Government
Commodities	Secondary , Technical and Vocational Education-Private
Commodities	Secondary , Technical and Vocational Education-External and other
Commodities	Higher and Adult Education-Government
Commodities	Higher and Adult Education-Private
Commodities	Higher and Adult Education-External and Other
Commodities	Other Education n.e.c.-Government
Commodities	Other Education n.e.c. Private
Commodities	Other Education n.e.c.-external and other
Commodities	Impatient Curative Care-public

<b>Aggregate accounts in the Macro SAM</b>	<b>Detail accounts in the Full SAM</b>
Commodities	Day Curative Health Care-public
Commodities	Outpatient Curative Care -public
Commodities	Ancillary services -public
Commodities	Medical goods - public
Commodities	Preventive Care - public
Commodities	Other health services - public
Commodities	Impatient Curative Care-private
Commodities	Day Curative Health Care-private
Commodities	Outpatient Curative Care -private
Commodities	Ancillary services -private
Commodities	Medical goods - private
Commodities	Preventive Care - private
Commodities	Other health services - private
Commodities	Social Work Services
Commodities	Creative, Arts and Entertainment Services
Commodities	Libraries, Archives, Museums and Other Cultural Services
Commodities	Gambling and Betting services
Commodities	Sports Activities and Amusement and Recreation Services
Commodities	services of Business Membership Organizations and Trade Unions
Commodities	Repair of Computers and Personal and Household Goods service
Commodities	Other Personal Service
Commodities	services of Households as Employers of Domestic Personnel
Trade margins	Trade margins
Transport margins	Transport margins
Net product taxes	Net product taxes
Import duty	Import duty
Value added tax	Value added tax
Labour	Unskilled Rural Male
Labour	Unskilled Rural Female
Labour	Unskilled Urban Male
Labour	Unskilled Urban Female
Labour	Semi-skilled Rural Male
Labour	Semi-skilled Rural Female
Labour	Semi-skilled Urban Male
Labour	Semi-skilled Urban Female
Labour	Skilled Rural Male
Labour	Skilled Rural Female
Labour	Skilled Urban Male
Labour	Skilled Urban Female

Aggregate accounts in the Macro SAM	Detail accounts in the Full SAM
Labour	High-skilled Rural Male
Labour	High-skilled Rural Female
Labour	High-skilled Urban Male
Labour	High-skilled Urban Female
Capital	Capital
Other taxes on production	Other taxes on production
Direct taxes	Direct taxes
Households	Central Rural Quartile 1
Households	Central Rural Quartile 2
Households	Central Rural Quartile 3
Households	Central Rural Quartile 4
Households	Central Urban Quartile 1
Households	Central Urban Quartile 2
Households	Central Urban Quartile 3
Households	Central Urban Quartile 4
Households	Eastern Rural Quartile 1
Households	Eastern Rural Quartile 2
Households	Eastern Rural Quartile 3
Households	Eastern Rural Quartile 4
Households	Eastern Urban Quartile 1
Households	Eastern Urban Quartile 2
Households	Eastern Urban Quartile 3
Households	Eastern Urban Quartile 4
Households	Northern Rural Quartile 1
Households	Northern Rural Quartile 2
Households	Northern Rural Quartile 3
Households	Northern Rural Quartile 4
Households	Northern Urban Quartile 1
Households	Northern Urban Quartile 2
Households	Northern Urban Quartile 3
Households	Northern Urban Quartile 4
Households	Western Rural Quartile 1
Households	Western Rural Quartile 2
Households	Western Rural Quartile 3
Households	Western Rural Quartile 4
Households	Western Urban Quartile 1
Households	Western Urban Quartile 2
Households	Western Urban Quartile 3
Households	Western Urban Quartile 4

Aggregate accounts in the Macro SAM	Detail accounts in the Full SAM
NPISH Non-financial Enterprises Financial Enterprises General Government Investment/Savings Changes in inventories Rest of World	NPISH Non-financial Enterprises Financial Enterprises General Government Investment/Savings Changes in inventories Rest of World