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**A 2004 Social Accounting Matrix for  
Israel**

**Khalid Siddig, Dorothee Flaig, Jonas Luckmann,  
Harald Grethe**

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# A 2004 Social Accounting Matrix for Israel

Documentation of an Economy-Wide Database with a Focus on Agriculture,  
the Labour Market, and Income Distribution

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## Abstract

This document describes the Israeli Social Accounting Matrix (SAM) for the year 2004, developed by the Agricultural and Food Policy Group at the University of Hohenheim. The SAM is a part of a larger research project which aims to analyse several economic, trade, and labour policies in the context of economic integration of agriculture between Israel and the West Bank. Data are obtained from various sources in Israel. Sources include the Israeli Central Bureau of Statistics (ICBS), the Central Bank of Israel (CBI), and the Israeli Tax Authority (ITA). Data from sources outside of Israel are used to fill-in some gaps in the domestic reports. External sources include the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD), and the World Bank. The SAM provides data on 47 sectors with activities separated from commodities, 36 labour force types, 10 household groups, as well as 17 tax accounts in addition to 37 accounts reserved for taxes on production factors. A top-down approach is pursued by first building a balanced macro SAM which is consistent with 2004 national account data. Subsequently, the macro SAM is disaggregated into a micro SAM which is balanced in several steps.

Keywords: SAM, IO Table, CGE, Database, Israel.

JEL classification: C6, C8, D1, D3, D5, D6, E2, E6, F1, F2, H2

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## Acronyms

BS	Business Survey
CBI	Central Bank of Israel
CGE	Computable General Equilibrium
CPC	Central Product Classification
ENT	Enterprises
GAMS	General Algebraic Modelling System
GEMPACK	General Equilibrium Modelling Package
GOV	Government
GTAP	Global Trade Analysis Project
HES	Household Expenditure Survey
HH	Household
ICBS	Israeli Central Bureau of Statistics
IMJ	Israeli Ministry of Justice
IOT	Input-Output Table
ISIC	International Standard Industrial Classification
ITA	Israeli Tax Authority
LFS	Labour Force Survey
NA	National Accounts
nec	Not elsewhere considered
NIS	New Israeli Shekel
OECD	Organisation for Economic Co-operation and Development
PA	Palestinian National Authority
PCBS	Palestinian Central Bureau of Statistics
ROW	Rest of the world
SAM	Social Accounting Matrix
SAMBAL	A GEMPACK-based code to balance SAMs
SCI	Israeli Standard Classification of Industries
SI	Social Insurance
SUT	Supply and Use Table
T	Table
WAC	Worker Advice Center
VA	Value Added
WEMS	Wages and Employment Monthly Statistics
WITS	World Integrated Trade Solutions
WTO	World Trade Organization



# 1 Introduction

## 1.1 Background

A social accounting matrix (SAM) is a consistent data framework that captures information contained in the national income and product accounts and the Input-Output Table (IOT), as well as the monetary flows between institutions within the economy under consideration in a given period of time which is usually one year (Pyatt and Round, 1985). Mathematically, a SAM is a square matrix in which each account is represented by a row and a column. Each cell shows the payment from the account of its column to the account of its row. Thus, the incomes of an account appear along its row and its expenditures along its column. The underlying principle of double-entry accounting requires that each account in the SAM total revenue (the row total) must equal total expenditure (the column total).

Usually SAMs provide data on four major components of the economy – production activities, commodity markets, factors of production, and institutions (households, enterprises, the government, and the rest of the world) – in addition to savings and investments (Robinson, 2006).

Since the development of the Input-Output approach by Wassily Leontief (Leontief, 1936), Input-Output Tables (IOTs) became a popular economic dataset which is prepared periodically in many countries and used as a basis for various types of analytical models.

The first IOT developed for Israel was published in 1958, followed by ten other publications of IOTs in the years 1969, 1971, 1973, 1976, 1978, 1981, 1983, 1988, and 1992. The latest IOT is the 1995 IOT, published in 2002 (ICBS, 2002).

IOTs and SAMs are the most comprehensive economic databases which provide detailed economic information on the economy under consideration for a specific period of time. SAMs are usually developed based on IOTs. Both SAMs and IOTs are the underlying databases for the Computable General Equilibrium (CGE) approach, which is applied to model a wide range of economic policies. Despite the long history of IOT development in Israel, only a few SAMs and CGE models for the Israeli economy have been developed.

According to Palatnik and Shechter (2010), the first SAM for Israel was developed for the year 1995 and published in 2009 (Palatnik, 2009). A more recent SAM for Israel was developed as part of a M.Sc. thesis at the University of Haifa, Israel for the year 2004 (Faitelson, 2011). Both SAMs provide data on 18 sectors and commodities with a major focus on energy sectors. Household and factor accounts are rather aggregated.

The focus of the 2004 SAM for Israel which was developed by Faitelson (2011) and the SAM's disaggregation level does not meet the requirements of our research project which focuses on agricultural product market and labour market integration between Israel and the West Bank. Therefore, the development of a more disaggregated SAM for 2004 was conducted. This SAM, presented here, has a detailed representation of the agricultural sector and the labour and household accounts. The remaining parts of this chapter describe the structure of the SAM, data sources, and its specific characteristics in addition to the organisation of the document.

## **1.2 Structure and Data Sources of the SAM**

Economic integration and overall trade-related and labour market policies are at the core of our project which focuses on agriculture. Policies involving the restriction of movements of goods and production factors within an economy or across countries have direct and indirect effects on the relative prices of commodities produced in a given country and therefore have effects on the production structure as well. Certain features of the SAM presented here directly evolve from this specific project context. First, SAMs for both Israel and the West Bank need to be developed. Therefore, the year 2004 was selected as the base year because of data availability in both countries for an identical time period. Moreover, the year 2004 could be considered as a relatively “normal year” in the region in terms of its ability to represent an equilibrium state of both economies and a year with a comparatively stable political situation between Palestine and Israel.

Second, SAM accounts are disaggregated to meet the special needs of the project. Production activities and commodities are especially detailed for the agricultural sector. Moreover, labour force and household accounts are presented in a manner that accounts for the ethnic composition of the region. All households and labour accounts separate

between Jews and Non-Jews. In addition, illegal foreign workers are incorporated alongside their legal counterparts to allow for elaborated analysis on the movement of labour between Israel and the West Bank.

The Israeli Central Bureau of Statistics (ICBS) is the major data source. Other sources in Israel include the Central Bank of Israel (CBI) and the Israeli Tax Authority (ITA). Sources from outside Israel include the World Trade Organization (WTO), the Organisation for Economic Co-operation and Development (OECD), and the World Integrated Trade Solutions (WITS) database of the World Bank. The ICBS is the source from which the control totals are taken. ICBS data contains tables on national accounts giving details on gross domestic product at factor cost, total domestic supply, gross fixed capital formation, the balance of payments, government statistics, and external trade statistics. In addition, the ICBS publishes annual, quarterly, and monthly reports.

The approach chosen for the construction of the SAM is top-down. First, a macro SAM is developed which includes 13 accounts only. This macro SAM for Israel is based on official data sources and is balanced (see Chapter 2). It represents the base for the construction of a detailed micro SAM. The disaggregation of the accounts of the macro SAM to construct the micro SAM is described in detail in Chapter 3.

### **1.3 Specific Characteristics of the SAM**

Several characteristics distinguish the SAM presented here. First, it differentiates between activities and commodities, allowing for the reflection of the flows of income and expenditure valued at producer prices in the activity accounts and at market prices (including indirect commodity taxes and transactions costs) in the commodity accounts. Moreover, the separation allows for an activity to produce more than one commodity and for the commodity to be produced by more than one activity.

Second, the SAM provides detailed data on marketing margins/transaction costs (trade and transportation). All costs associated with marketing of domestic, imported, and exported commodities are incorporated into the SAM, as each commodity uses other trade and transport services. The marketing margin is the cost of: (1) moving the domestically produced commodity from the producer to the domestic consumer: (2)

moving the imported commodity from the border to the domestic market: or (3) moving the exported commodity from the producer to the border. Marketing margins are further disaggregated into trade and transport margins.

Third, this SAM provides detailed data on factors of production and households. Particularly, it disaggregates labour into 36 subaccounts distinguishing between labour according to its ethnic, educational, and professional backgrounds. Moreover, it provides data on 10 different household categories classified according to income quintiles and further distinguishes households between two ethnic groups, Jews and non-Jews.

Fourth, the core government account is separated from the different tax collection accounts, which eases the economic interpretation of the different related payments and helps avoid ambiguity. Accordingly, remaining SAM payments between the government and other domestic institutions are confined to transfers.

Finally, the SAM reserves 17 accounts for different types of taxes in addition to the 38 accounts reserved for taxes on production factors. In total, 55 tax accounts are provided in the SAM with the possibility of aggregation whenever needed, without affecting the core government account. The 17 accounts for the different types of taxes consist of the following: 3 accounts for production taxes: 5 accounts for taxes on domestic products: 4 accounts for taxes on imported products: and 5 accounts for direct taxes which are separated into 2 accounts for households and enterprises, 2 for the social insurance payments by employees and employers, and 1 for health insurance payments.

#### **1.4 Structure of this Document**

The remaining part of this document is organized as follows: the following chapter covers the construction of a macro SAM for Israel including the data sources and the reconciliation processes. Chapter 3 describes the disaggregation process that lead to a detailed micro SAM for Israel. Finally, Chapter 4 focuses on the procedures applied to balance the individual accounts of the macro and micro SAMs.

## 2 The 2004 Macro SAM for Israel

Table 1 illustrates the general structure and accounts incorporated into the Israeli SAM for the year 2004. It will be used to describe the major concepts and transactions of the SAM approach. In addition, the table shows the data sources from which data are obtained, with ‘NA’ indicating the National Accounts (ICBS, 2009a), ‘SUT’ indicating the Supply and Use Table (ICBS, 2009b), and “T” indicating the particular table of the NA in each cell. Income flows throughout the SAM are also exhibited in Figure 1, which shows all interactions between economic agents as well as their linkages to the rest of the world (ROW).

Table 1 displays the Israeli economy in a 14x14 SAM representing the major components of the Israeli economy. These are commodities, margins, activities, factors, households and enterprises, government, production taxes, taxes on domestic products, taxes on imports, direct taxes, investment, stock changes, and the ROW. The macro SAM of Table 1 is constructed based on the official ICBS data represented by the National Accounts, the Supply and Use Table, and other related unpublished tables obtained from the ICBS. The major T-accounts of the government, non-government institutions, saving-investment, and the ROW are shown in Appendix 1.

Commodity accounts display the components of total supply in the column and the components of total demand in the row. The supply components are domestic production (cell 3A in Table 1), for which data are obtained from the Supply and Use Table (SUT), and imports of goods and services (cell 13A) based on the National Account (NA). In addition, it includes net taxes on domestic products (cell 7A) and taxes on imports (8A) for which data are obtained from the NA and also includes the trade and transport margins (cell 2A) based on the SUT. In their rows, commodity accounts comprise the components of total demand, including trade and transports margins (cell 1B) and intermediate demand (cell 1C), both of which are based on SUT data, as well as household consumption (cell 1E), government consumption (cell 1J), investment demand (cell 1K), stock changes (cell 1L), and exports (cell 1M). The total demand components from column C to M are all based on data from the NA.

**Table 1: Data Sources of the Israeli 2004 Macro SAM**

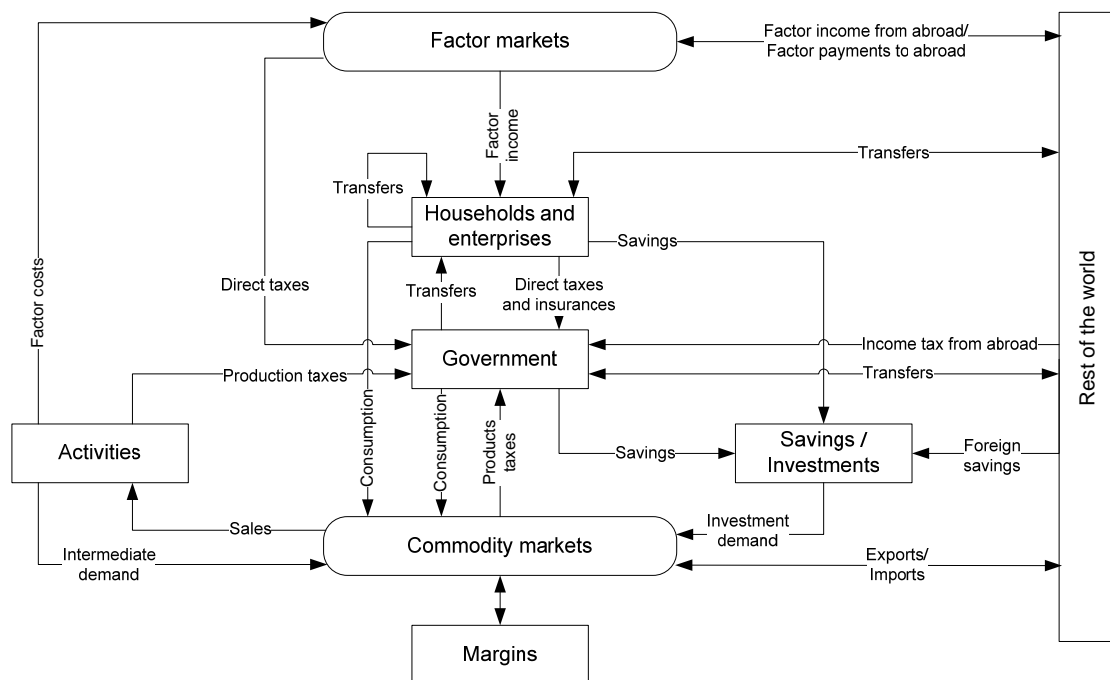
	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Commodities	Margins	Activities	Factors	Households and enterprises	Taxes on production	Taxes on domestic products	Taxes on imported products	Direct taxes	Government consumption	Investments	Stock changes	Rest of world	Total
1	Commodities	Trade and transport margins (SUT)	Intermediate consumption (SUT)		Household consumption (NA: T 1)					Government consumption (NA: T 1)	Investment demand (NA: T 1)	Change in stock (NA: T 1)	Exports (NA: T 1)	Total demand
2	Margins	Margins (SUT)												Margins
3	Activities	Output (SUT)												Total domestic output
4	Factors		VA demand + SI on employers - Residuals in the factor account								Factors transfers from abroad (NA: T 28)		Factors transfers from abroad (NA: T 28)	Total factor income
5	Households and enterprises			HHs and ENT income from factors	Inter-household transfers and Share of dividends					GOV transfers and grants to HHs (NA: T 25, 24)			Income to HHs from abroad (NA: T 28)	Total household income
6	Net taxes on production		Net taxes on production (NA: T 30, 24)											Taxes on production
7	Net taxes on domestic goods products													Taxes on domestic products
8	Net taxes on imported goods products													Taxes on imports
9	Direct taxes			SI on employee + employers (NA: T 24, 30)	Direct income taxes and health insurances					Income tax form abroad (NA: T 23)				Direct taxes
10	Government				Government income from property (NA: T 24)	Net taxes on production	Net taxes on domestic products	Taxes on imported products	Direct taxes and health insurance	Foreign transfers to GOV (NA: T 28)				Government income
11	Savings				Household savings +ENT savings (NA: T 26)					Government savings (NA: T 25)			Deficit on current transaction with ROW (NA: T 28)	Total savings
12	Stock changes										Stock changes			Stock changes
13	Rest of world	Imports of goods and services (NA: T 28)		Factors payments abroad (NA: T 28)	HHs transfers abroad (NA: T 28)					Gov transfers abroad (NA: T 28)				Total income of the Row
14	Total	Total supply	Total domestic production cost	Total factor income	Total household expenditure	Taxes on production	Taxes on domestic products	Taxes on imports	Direct taxes	Government expenditure	Total investment	Stock changes	Total income from the Row	

Source: Own compilation.

Note that cells of Table 1 that have no directly assigned data sources are similar to those of the symmetric account. For instance, the source of “Net taxes on production” is mentioned on the income side only, while it is similar on the expenditure side, although not specifically stated because of considerations of space.

The activity accounts show the value of goods and services produced by each activity in the row account (row 3), while the cost of inputs into each production activity are shown in the column account (column C). Input cost includes the following: intermediate input purchases (cell 2C): payments to primary factors of production including social insurance payments by employers (cell 4C) which are calculated as residuals in the factors’ account: and net taxes on domestic production (cell 6C) which is based on data from the NA and includes subsidies to producers.

**Figure 1: Income Flows in the SAM**



Source: Own compilation.

The factor accounts describe the sources of income from production factors in the row account (row 4), including payments to factors by each production activity (cell 4C), and factor receipts from the ROW (cell 4M). Data on factor income from abroad are obtained

from Table 28 of the NA. The column account of factors (column D) shows the how factor income is further distributed to the various institutions in the economy. The major recipients of factor income are households and enterprises (cell 5D) as well as the ROW (cell 13D). In addition, factors also pay taxes, namely social insurances payments which are classified here as a direct tax because they ultimately relate to income. The social insurance payments by employers are primarily paid to factors by activities as a part of cell 4C. Cell 9D, in contrast, includes the entire social insurances payments to the government as direct taxes. Accordingly, the two kinds of social insurance payments are included in cell 9D, with payments by employees paid from factor income prior to its allocation to households and enterprises.

Accounts for households and enterprises are represented by column 'E' and row '5' of Table 1. Their payments, as shown in the column, include consumption expenditure (cell 1E), inter-institutional transfers (cell 5E), direct taxes and health insurance (cell 9E), transfers to the government in forms of income from property (cell 10E), savings (cell 11E), and transfers abroad (cell 13E). The row account of households and enterprises shows income generated from returns to factors including rents, wages and profits (cell 5D), inter-institutional transfers (cell 5E), transfers from the government (cell 5J), and transfers from the ROW (cell 5M). All entries beside factor income, direct taxes, health insurance, and inter-institutional transfers are from the NA (ICBS, 2009a)

The government account is presented in column 'J' which shows the expenditure categories and row '10' which is reserved for income components. Government income is mainly generated from taxes and four different tax accounts are presented in Table 1: net taxes on production (cell 10F) which include subsidies and factor taxes; net taxes on domestic products (cell 10G); net taxes on imports (cell 10H); and direct taxes (cell 10I) which comprise of health insurance payments by households. Tax data are obtained from Table 30 of the NA (ICBS, 2009a) together with some additional data obtained directly from the ICBS but prepared by OECD. The government also receives returns to its property from state-owned enterprises (cell 10E) and transfers from abroad (cell 10M). The source of data on transfers to the government is ICBS (2009a). In terms of expenditure, the major component is consumption expenditure (cell 1J). Other



expenditure components are transfers and grants to non-governmental institutions (cell 5J) and the ROW (cell 13J). The difference between income and expenditure constitutes the government savings (cell 11J). Data on the expenditure components of the government are obtained from the NA (ICBS, 2009a).

The savings of the different institutions in the economy, namely the government (cell 11J), nongovernmental institutions (cell 11E), and the ROW (cell 11M), represent the income of the SAM account 'Savings-Investments', with data from the NA. Expenditures in the same account (the savings-investments account) include investment expenditures on commodities (cell 1K) and the changes in inventories (cell 12K). These data are also from the NA.

Transactions between the Israeli economy and the ROW are reported in row '13' of Table 1, which shows the income categories of the ROW that simultaneously represent outlays of the Israeli economy. In column 'M' of the same table, the expenditure components of the ROW which represent receipts of the Israeli economy are shown. The ROW income includes imports of goods and services by Israeli residents (cell 13A), factor payments abroad (cell 13D), household transfers abroad (cell 13E), and government transfers abroad (cell 13J). As shown in row 13 of Table 1, all data for the ROW income categories are obtained from the NA. On the other hand, expenditure components of the ROW, shown in column 'M', include exports of goods and services (cell 1M), returns to factors from abroad (cell 4M), transfers to Israeli residents from abroad (cell 5M), income tax from abroad (cell 9M), transfers to the government (cell 10M), and the balancing component of transactions with the ROW (cell 13M). The data source for all expenditure components of the ROW is the NA (ICBS, 2009a).

Table 2 shows the balanced version of the 2004 Israeli macro SAM of Table 1 with the textual descriptions replaced by the corresponding values in million New Israeli Shekel (NIS)<sup>1</sup>. Values of this macro SAM represent the control totals which are preserved in the development of the micro SAM.

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<sup>1</sup> 1 NIS = 0.22 USD = 0.18 €(average exchange rates of 2004).

**Table 2: The Balanced Israeli Macro SAM for 2004 (in NIS million)**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
	Commodities	Margins	Activities	Factors	Households and enterprises	Net taxes on production	Net taxes on domestic products	Taxes on imported products	Direct taxes	Government	Investments	Stock changes	Rest of world	Total
1	Commodities	80,805	523,164		315,860					149,372	92,980	5,331	234,604	1,402,116
2	Margins	80,805												80,805
3	Activities	1,010,487												1,010,487
4	Factors		472,716										13,455	486,171
5	Households & enterprises			434,525	53,907					78,775			16,889	584,096
6	Net taxes on production		14,608											14,608
7	Net taxes on domestic products	51,392												51,392
8	Taxes on imports	24,996												24,996
9	Direct taxes			21,721	85,249								758	107,728
10	Government				5,656	14,608	51,392	24,996	107,728				15,260	219,640
11	Savings				118,898					-8,827			-11,760	98,311
12	Stock changes										5,331			5,331
13	Rest of world	234,435		29,925	4,526					320				269,206
14	Total	1,402,116	1,010,487	486,171	584,096	14,608	51,392	24,996	107,728	219,640	98,311	5,331	269,206	4,354,886

Source: Own compilation.

### **3 The 2004 Micro SAM for Israel**

This chapter describes the disaggregation of the Israeli macro SAM, the selection of sectors to be included, the disaggregation of production factors, households and tax accounts, as well as the processing of raw data. It is attempted to make the construction process of the SAM as transparent as possible by including all crucial calculations, distributions, and data adjustments.

#### **3.1 Activities and Commodities**

The number of activity and commodity accounts of the SAM is chosen to be 47, with the possibility of each activity to produce multiple commodities and each commodity to be produced by more than one activity. The agricultural sectors are disaggregated to the maximum number of activities possible given the constraints of data availability. The SAM provides data on 10 agricultural accounts, 25 industrial accounts, and 12 service accounts.

The disaggregation of activities and commodities is based on several sources of data and governed by four major industrial classifications. Israel has its own standard classification of industries (SCI) that classifies industries in Israel based on a three-digit disaggregation. This classification was published in 1993 (ICBS, 1993) together with its concordance to the International Standard Industrial Classification (ISIC). The most recent Israeli IOT was published in 2002 for the year 1995 (ICBS, 2002). This IOT provides data on three aggregations of the Israeli industries including a 14-Industry, a 65-Industry, and a 162-Industry aggregation. The documentation of the IOT provides the mapping of industries between the previously mentioned three aggregations and a 232-Industry aggregation as well as the SCI of 1993.

For the current SAM of 2004, the major sources of industry-related data are the Supply and Use Tables (SUT) of 2004 (ICBS, 2009b). The SUT provide data on 65 sectors, which is similar to the 65-Industry aggregation of the IOT. The 47 sectors of the SAM presented here are produced out of the 65 sectors of the SUT with additional disaggregation in agriculture and some aggregations in the industrial and services sectors. The 162-industry aggregation of Israel, the ISIC (Rev. 3), the Central Product

Classification (CPC), and the commodity classification in the database of the Global Trade Analysis Project (GTAP) are used to move the 65 accounts of the SUT to the 47 sectors of the SAM (Appendix 1). More specifically, every sector in the 65-industry aggregation that could be directly allocated to one of the 47 sectors is mapped one-to-one<sup>2</sup>. If a sector in the 65-industry aggregation does not correspond directly to one of the 47 sectors (such as agriculture), a more detailed mapping is applied based on coefficients of the 162-industry aggregation of the 1995 IOT. The detailed mapping between all of these classifications is shown in Appendix 2.

Coefficients of the 1995 IOT are used wherever the disaggregation of the 65 sectors is required. All the SUT data including output, imports, exports, final consumption, and intermediate consumption are mapped to 47 sectors in two steps as follows:

Step 1: The 65 sectors are disaggregated to 162 sectors using the corresponding matrix or vector in the IOT. Hence a new matrix or vector with 162 sectors is produced for the year 2004.

Step 2: The new matrix or vector is aggregated to 47 sectors.

Because this exercise had to be repeated for several variables and accounts in the SAM, a GEMPACK<sup>3</sup> code was developed. The code receives two inputs and gives the final 47 sectors matrix or vector of 2004 as an output. The scaling process is based on the mapping of sectors between the three classifications (47, 65, and 162 sectors). The code works as follows:

1. Aggregate the 1995 IOT matrix (A) to 65 sectors (matrix B), based on predefined mapping between the 162 and 65 sectors.
2. Use the newly produced 65 sectors matrix (B) together with matrix (A) to produce a coefficient matrix of 162 accounts (C), by dividing each cell in matrix (A) by its corresponding cell in matrix (B) to which it was aggregated in step 1.

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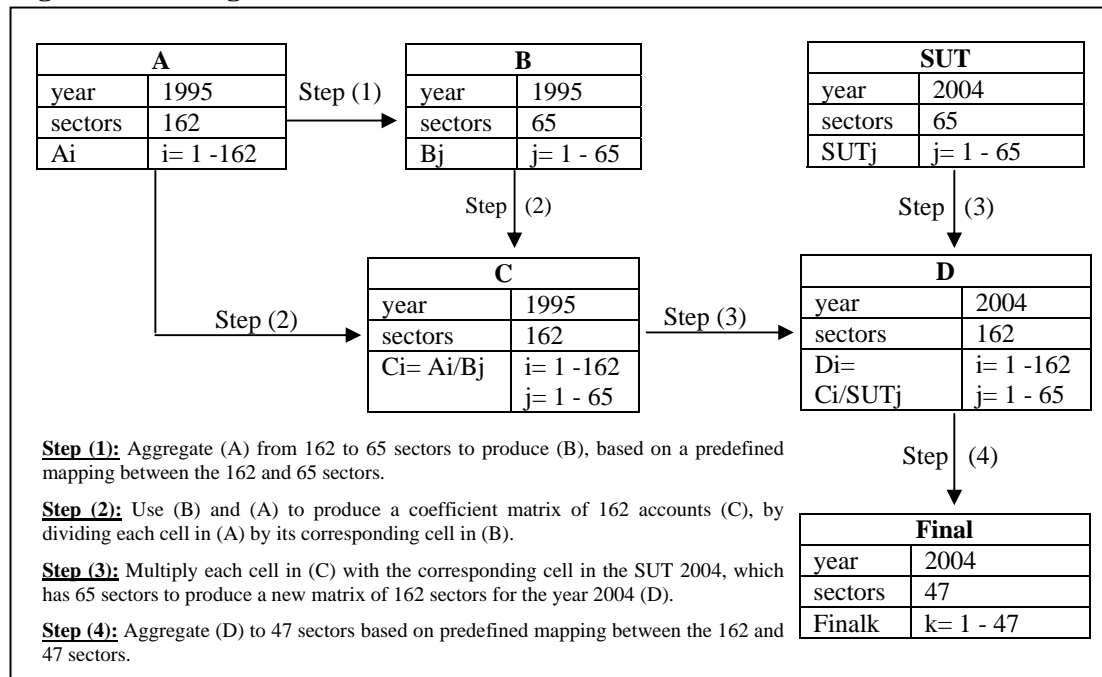
<sup>2</sup> One-to-one mapping means that the sector under consideration remains without disaggregation or aggregation across the different classifications.

<sup>3</sup> GEMPACK is a software developed by and documented in Harrison and Pearson (1996).

3. Multiply each cell in matrix (C) with the corresponding cell in the 2004 SUT, which also has 65 sectors, to produce a new matrix of 162 sectors for the year 2004 (D).
4. Aggregate matrix (D) to 47 sectors based on predefined mapping between the 162 and 47 sectors.

Figure 2 illustrates the procedures applied in the code to move from the 65 sectors of the SUT to the 47 sectors of the 2004 SAM. For simplicity, the diagram shows an example in which a vector of values is converted into a corresponding vector in the 47 sectors of the 2004 format; however, converting matrices follows similar steps.

**Figure 2: Moving from the 65 Sectors of the SUT to the 47 Sectors of the SAM**



Source: Own compilation.

The total domestic output values by each sector for 2004 are available from the SUT 2004: however, the reported output is a matrix of 65 rows and 1 column. Thus, each commodity is produced by only one sector. In the 1995 IOT, output is provided in a 162x162-matrix format and activities are multi-commodity producers. This format is particularly relevant to our objectives, especially for the agricultural and industrial sectors

where activities tend to produce more than one commodity and commodities tend to be produced by more than one activity.

For the scaling software, the total output by each sector in the IOT 1995 (vector of  $162 \times 1$ ) is used to expand the output of the SUT from  $(65 \times 1)$  to  $(162 \times 1)$ . Afterwards, the resulting 2004  $(162 \times 1)$  vector is expanded horizontally to incorporate the 162 commodities used by each activity and therefore become a  $(162 \times 162)$  make matrix based on the IOT coefficient of the corresponding 1995 IOT matrix of output. Finally, the  $(162 \times 162)$  2004 make matrix is aggregated to a  $(47 \times 47)$  matrix.

It is important to note that the disaggregation of the 65 sectors into 162 sectors does not disturb the sectoral structure of the economy at large by using old cost structures and income throughout the whole economy. To illustrate two examples, refer to the concordance table of Appendix 2 where each of the 65 sectors is divided into its corresponding sectors which were used in the 162 sector aggregation. For example, sector (3) in the 65 sector aggregation is fruits and vegetables and includes 10 different kinds of fruits and vegetables in the 162 aggregation. But in the SAM developed here, fruit and vegetables is one sector and therefore the disaggregation according to the old 162 sector I-O coefficients is irrelevant. In contrast, the 162 sector shares are used to break up sector (2), livestock, into 8 subsectors in the 162 sector aggregation and then to aggregate them into two sectors in the SAM presented here: one sector includes bovine cattle, beef, sheep, goats, and horses, while other farming animals are included in the second sector. Thus, the distribution of cost between these two sectors is based on old cost shares, but the outcome does not affect the I-O coefficients for any other sectors.

The total value of Israeli imports in the SUT 2004 is NIS 226,063 million, which does not include defence imports. On the other hand, in Table 12 of the Israeli National Account (NA) (ICBS, 2009a), the total value of imports is NIS 259,377 million, which includes a value of NIS 10,075 million for defence imports. Accordingly, defence imports are

included in the sectoral breakdown and, together with all the sectoral imports, are scaled up to comply with the total values of imports reported in the NA<sup>4</sup>.

The scaling approach for moving from the 65-industry aggregation to the 47-SAM aggregation is also applied to government consumption, investment demand by commodity, stock change, and exports of goods and services.

### **3.2 Trade and Transport Margins**

In the SUT for the year 2004 (ICBS, 2009b), products are presented at both basic and purchaser prices. The transition from basic prices to purchaser prices includes expenses for marketing the product and transporting it to the purchaser. These expenses are defined in the supply table as “trade and transport margins” which includes taxes on and subsidies for products. In accordance with the definition of trade and transport services in the NA, total trade and transport margins are equal to total output of trade industries and transport industries, respectively. The 2004 SUT of the ICBS (2009b) provides data on commodity margins based on the 65-Industry aggregation; it does not, however, separate trade from transport margins. Therefore, data is first distributed to the 47 sectors of our SAM based on the previously described approach. Subsequently, the share of transport and trade in the total value of margins is assumed to be equal for all commodities. Vertically, the total value of each type of margin is distributed among commodities based on the weight of each commodity in the total margin.

Accordingly, trade margins appear in the SAM as payments from the trade margins account to the commodity account “trade services”, while transport margins appear as payments from transport margins to the commodity account “transport and business services nec<sup>5</sup>”. Income to the margin accounts comes from the commodity accounts.

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<sup>4</sup> Defence service is included in the SAM as a part of the sector: Public Administration, Defence, Education, and Health.

<sup>5</sup> „nec” refers to not elsewhere considered.

### **3.3 Production Factors**

In general, value added (VA) is derived from three factors including labour, land, and capital. In this SAM for Israel, labour demand is further disaggregated to foreign and domestic labour whereby the latter is further divided according to ethnic groups and professional backgrounds which creates 32 subgroups. Foreign labour is divided into 4 subgroups according to its origin and legal status. Accordingly, 36 labour-subgroups are created. In addition, the remaining value-added is distributed to capital including other fixed assets and land. Land is only distributed among the agricultural sectors. Accordingly, the current SAM incorporates 38 factor accounts.

#### **3.3.1 Domestic Labour**

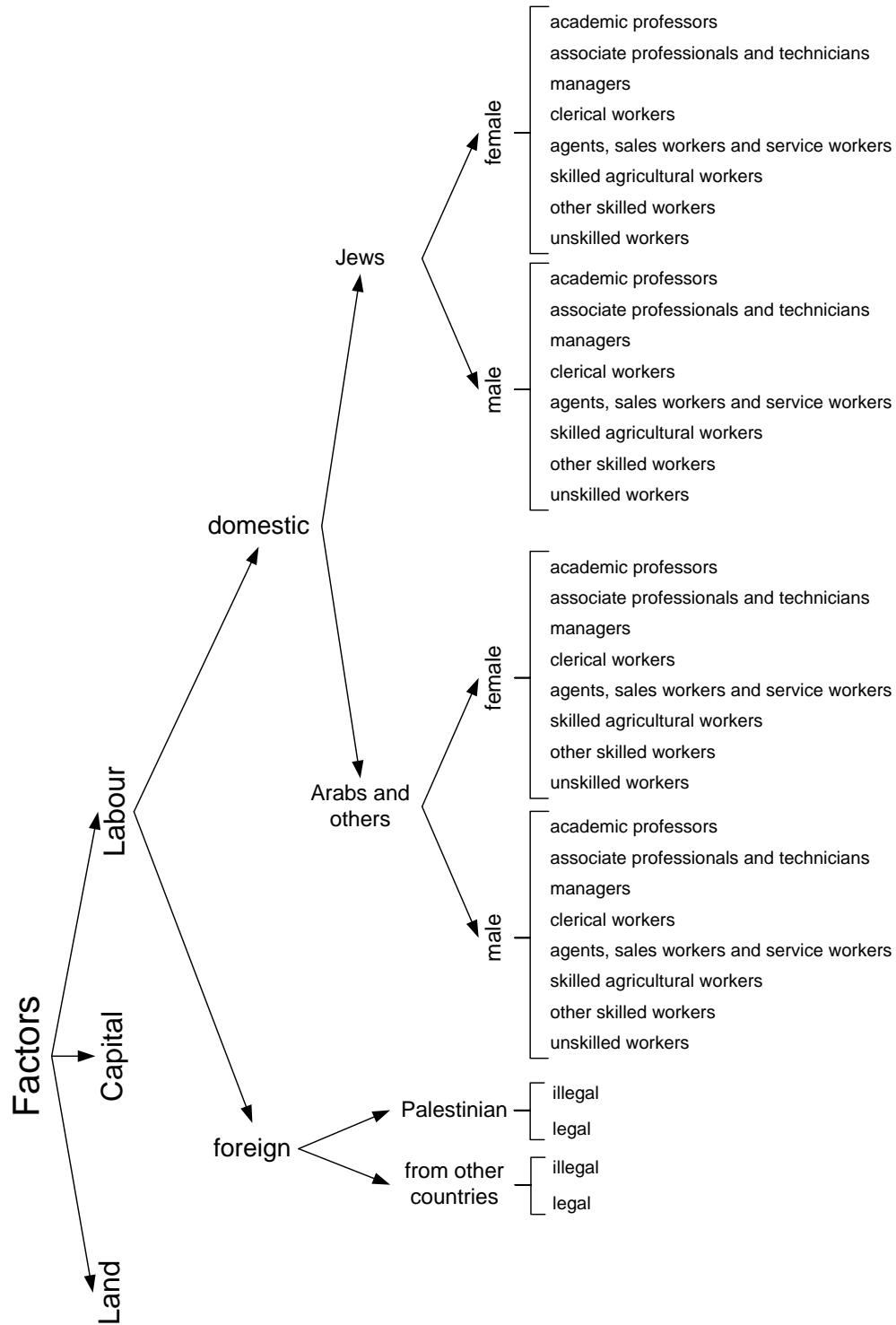
##### **3.3.1.1 Introduction**

Two ICBS publications are used as data sources for the domestic labour account of the current SAM: the Labour Force Survey (LFS) of 2004 (ICBS, 2005a) and the Statistical Abstract of Israel 2006 (ICBS, 2006a) which contains data from the Business Survey (BS) of 2004. From the LFS, figures of the physical labour force are taken, whereas the BS is utilized to obtain data on employees' compensation.

This section is organized as follows: first Section 3.3.1.2 presents the disaggregation of the physical domestic labour force according to the 32 domestic labour accounts: second the generation of wage rates for these labour accounts is described in Section 3.3.1.3 and Section 3.3.1.4 presents the combination and final balance of the information on the physical labour force and wages to generate the final SAM entries of wage payments to the labour accounts.



**Figure 3: Disaggregation of Factor Accounts in the SAM**



Source: Own compilation.

### 3.3.1.2 The Physical Labour Force

The total number of employed persons in 2004 is 2.4 million. Besides employees who work for wages or any other kind of remuneration, this figure includes family members and persons staying in institutions who work at least 15 hours per week as well as all kibbutzim<sup>6</sup> workers. In addition, persons temporary absent from work are also included (ICBS, 2005a).

First the total domestic workforce is split according to ethnic groups into Jewish and Arab, representing the two major ethnic groups in Israeli society. For data availability reasons all other ethnic minorities, which are 71,000 persons, are added to the Arab group of about 274,000 employed persons to form the labour group named "Arab and others". The Jewish group of about 2.1 million persons remains by far the largest.

Second, the domestic workforce is separated into male and female populations within the ethnic subgroups. This separation is important because average gross income from work of female workers is found to be lower than the income of their male counterparts. This difference is on average 37% and is because female workers in the same position as males receive a lower wage-rate and work less hours per week (ICBS, 2006a, Table 12.41). In addition, it is found that a rather high share of women in the Arab population does not work: the number of working women in the Arabs and others group is about 60% smaller than the number of working males, whereas the numbers of female and male employed persons are almost equal in the Jewish population.

Third, the domestic workforce is disaggregated into the following 8 professions: academic professionals, associate professionals and technicians, managers, clerical workers, agents and sales- and service workers, skilled agricultural workers, other skilled workers<sup>7</sup>, and unskilled workers (ICBS, 2005a)<sup>8</sup>.

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<sup>6</sup> A kibbutz ("gathering, clustering"; plural *kibbutzim*) is a collective community in Israel based on agriculture.

<sup>7</sup> In the ICBS publications this group is named "skilled manufacturing, construction and other skilled workers".

<sup>8</sup> For more details and explanation on the 8 professional groups, see ICBS (2005a).

The LFS of 2004 (ICBS, 2005a) provides data on employed persons which is divided according to sex for 15 economic sectors and 71 subsectors. The sectoral affiliation of additional workers is classified as “not known”. Data is presented for the total labour force as well as for the Jewish sub-labour force. The group Arabs and others is created by subtracting the Jewish labour force from the total labour force.

In a few cases, single values are unknown or are not suitable for publication due to large sampling errors in the survey. These values are calculated using simple algebraic methods such as calculating residuals. All workers for whom the sector of employment is classified as “unknown” are added to the defined sectors according to the shares of these sectors in the total labour force. In several cases, the number of workers in subsectors does not sum up to the totals of the respective main sector and thus subsectors are scaled proportionally to maintain their shares in the main sector.

Data on the domestic workforce of different ethnic groups and gender in the 71 economic sectors is combined with information on the profession of employed persons. This information is available for the total domestic labour force only (ethnic groups are not singled out) which is split into 8 professional groups (described above) and 14 economic sectors (ICBS, 2005a, Table 2.20): however, the workforce of the sector “Extra-territorial Organizations and Bodies”, the “unknown sector”, and the category “unknown profession” are not singled out in this table, but are included in the totals. Accordingly, the workforce of the sector “Extra-territorial Organizations and Bodies” is distributed based on the shares of professions in the total labour force. The remaining number of workers in an unknown sector or profession is less than 1.0% of the total in most cases, with the largest share being 6.5% for unknown professions in public administration. These workers in an unknown sector or profession are distributed according to the shares of the professions and sectors in the total labour force.

Apart from this, due to sampling errors data on some sector-profession-combinations are not published and averages of the years before and after are used to calculate impute missing data (ICBS, 2004; ICBS, 2006b). In other cases, figures are calculated based on shares of professions in similar sectors. In any case the calculated numbers are very small compared to the total figures (less than 2% of the respective total). Finally, remaining

workers in an unknown profession or sector are added to the defined professions and sectors according to the shares of these sectors and professions in the total labour force.

To match the data on workers of different professions to the information on workers disaggregated according to gender and ethnic groups, the following assumptions are made:

1. The profession shares in the 71 subsectors are equal to their respective 14 main sectors.
2. There is no difference in profession shares between males and females as well as between the Jewish and the Arab and other groups. This assumption is dropped later on, as will be described.

Under these assumptions, the domestic workforce is disaggregated to 32 labour accounts and 71 economic sectors. To match the 71 sectors of the LFS to the 47 sectors of the SAM, the labour data is first disaggregated to 162 sectors, as there is no direct linkage between the 71 sectors and the 47 sectors of the SAM. To disaggregate the sectors to 162, the 1995 use table (ICBS, 2002, Table 3) is employed. The labour compensation<sup>9</sup> of 162 sectors from this publication is mapped to the 71 sectors for which data is available from the LFS 2004. Percentage shares of the 162 sectors in the respective 71 sectors of the LFS 2004 are calculated. These shares are multiplied by the 2004 labour force figures of the 71 sectors to produce the disaggregated 2004 version.

This procedure could not be applied to three sectors. Because the LFS which is based on the Israeli Standard Classification of Industries (ISC) of 1993 contains a sector called “Extra-territorial Organizations and Bodies”, which does not have a counterpart in the 162 industry aggregation, this sector is added to sector 45 (Public Administration, Defence, Education, and Health). Moreover, sectors 28 (Fruit Trees (from investment to bearing)) and 33 (Soil Preparation) are in the 162 industry classification, but not in the LFS. As Table 3 of the 1995 IOT shows, values for labour compensation in these sectors

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<sup>9</sup> As no data on the physical labour force was available at the 162 sector disaggregation, labour compensation data were taken, assuming equal wage rates over all subsectors (162) within any main sector (71).

are not redundant. Therefore, both sectors are included in sector 1 (crop production) of the LFS.

In Table 2.17 of the LFS of 2004 (ICBS, 2005a), workers are classified based on ethnic group, gender, and profession, but without allocation among the different economic sectors. In this table, the sum of workers per gender and ethnic group over all professions is slightly higher than the stated totals of all workers in case of the total female, Jewish male, and Jewish female populations. These differences are about 0.1% of the total in each group. Moreover, the group of workers with an unknown profession in the same table needs to be allocated. These two problems are resolved by deducting workers from each profession proportionally to equal the total, for example, and allocating workers with unknown profession among professions according to professional shares in the total labour force.

The received figures are subsequently compared to the sum of workers over all sectors, calculated based on the two assumptions stated above (professional shares in the 71 subsectors are equal within 14 main sectors and no difference in professional shares among males/females and Jews/non-Jews). It is found that the totals differ, as assumption 2 does not hold in reality. For example the number of “unskilled” male and female Jewish workers calculated under this assumption is too high, whereas in the “Arabs and others” group the number is too low for female as well as for male workers. Thus, profession shares differ between ethnic groups as well as gender (e.g., too many females and too few males are allocated to the “skilled workers” groups). To solve this problem and balance the labour force data to the modified totals from Table 2.17 (ICBS, 2005a), the SAMBAL program (Zenios et al., 1986), originally designed to balance SAMs using the RAS method, is employed. This method adjusts the cell values to given row and column totals under the condition that the squared deviations from the original cell values summed over all cells is minimised. The code is modified to be applicable to non-squared matrices and GAMS software is used to balance the matrix of the LFS. The column totals (total employed persons of one profession over all sectors) are the modified values from Table 2.17 (ICBS, 2005a), whereas the row totals (total employed persons in each sector over

all professions) remain unchanged. This disaggregates the total domestic workforce to 32 accounts and 162 sectors.

Although this balancing procedure causes changes of more than 5% in 76% of the labour accounts, 80% of the changes that are high in relative terms occur in very small accounts and reflect absolute changes of below 100 workers. In 5% of the labour accounts only are absolute and relative changes greater than 500 workers and 10%, respectively, at the same time.

### **3.3.1.3 Wages**

Data on the physical labour force needs to be complemented by wage data, as the monetary wage payments from activities to labour accounts are included in the SAM. Average wages are used to calculate the total annual compensation of employed persons for each labour account and each sector. They are derived from a Business Survey (BS) based on employers' reports to the National Insurance Institute (ICBS, 2006a, Table 12.38). This imposes several difficulties in matching the wage data to the labour force data due to variations in definitions and coverage, sources, methods of data collection, and estimation procedures (ICBS, 2006a: 92). Two problems are of special relevance when matching labour force and wage data:

- Average wages in the BS are only reported per employee job, which are defined as “jobs (permanent and temporary) of workers on the payroll of establishments or institutions, who worked for at least one day during the surveyed month (or were on paid leave due to illness, vacation, army reserve duty, etc. at least one day during that month)” (ICBS, 2006a: 88). Thus, in contrast to the definition of employed persons used in the LFS and stated previously, only paid workers are considered in this case. This problem is addressed at a later stage as average wages are multiplied by the number of labourers from the data on employed persons of the household survey, which allows for the incorporation of unpaid workers. As a result, the total value of labour compensation is higher than the one reported in the BS.

- According to the BS, “persons holding more than one job with different employers will be counted once in household surveys, but in the business surveys they will be counted once for each job held” (ICBS, 2006a: 92). The ICBS calculates average wages by dividing the gross monthly wages paid in each sector by the number of employee jobs. This results in a figure that is lower than average monthly wages per employee, as one employee can have several jobs. This problem is addressed by using data on average monthly wages per employee job from which employee jobs reported at other workplaces are excluded. According to the ICBS, “to calculate the average monthly wages per employee job in this group, wages from all workplaces are summed up. Therefore, the average monthly wages per employee job, excluding jobs reported as other work places, more closely approximates the average monthly wages per employee” (ICBS, 2006a: 88f).

Finally, some differences in sectoral disaggregation must be addressed:

- The sectors “Services for Households by Domestic Personnel” and “Extra-territorial Organizations and Bodies” of the household survey are not included in the BS. Thus average wages of similar sectors, “Home-help Services” and “Public Administration of the State and the National Institutions”, are employed.
- Whenever subsectors are aggregated in the BS, equal wages are assumed across these subsectors.
- The sector “Mining and Agglomeration of Hard Coal” (sector 10) and “Rough Diamonds (imports)” (sector 12) appear in the BS merged into a group together with “Extraction of Crude Petroleum and Natural Gas” (sector 11) and “Quarrying of stone and sand, mining of minerals and extraction of salts, mining and quarrying of non-metallic minerals nec.” (sector 13), whereas in the LFS only sectors 11 and 13 are shown. Table 3 of the 1995 IOT (ICBS, 2002) suggests zero labour compensation of sectors 10 and 12. Thus, the average wages of the group including sectors 10-13 were accepted as being equal to the average wages of sectors 11 and 13.

Wages are not only differentiated according to economic sectors, but are also differentiated according to profession. Average wages, available in Table 12.41 of the BS (ICBS, 2006a), are disaggregated according to gender and profession, but not according to ethnic group and sector. These monthly wages are divided by the global average wage rate (an average over all professions and both genders). Accordingly, a multiplicative factor differentiated by profession and gender is used to adjust monthly average wages of each sector according to profession and gender. In differentiating the wage rate among the 32 domestic labour force accounts, it is assumed that there are no differences in wages between Jews and “Arabs and others” working in the same sector with the same profession and gender, as no more detailed data is available.

#### **3.3.1.4 Compensation**

Total monthly compensation in each sector is calculated by multiplying average monthly wages by the number of employed persons in each sector received from the LFS. Subsequently, the compensation is scaled to the original compensation values, which were calculated by multiplying the average wage rate in each sector by the number of employed persons in that sector (without disaggregation according to profession). Subsequently, the annual labour compensation is calculated from the monthly values for each sector and labour account.

Finally, the annual labour compensation is balanced to the NA data. The total annual labour compensation (over all 32 domestic labour accounts) is compared to the NA value of compensation of employed persons (Israeli residents) from which the compensation value of Israeli employees abroad is subtracted (ICBS, 2009a, Tables 18 and 32). By dividing the compensation value which is calculated based on the NA by the value calculated based on the LFS and the BS, an adjustment factor is created (taking the value 1.26). This adjustment factor is then multiplied by all cells of the disaggregated labour compensation so that the total sum equals the national account value.

#### **3.3.2 Foreign Workers**

To allow for the analysis of the movement of labour between Israel and Palestine, the SAM differentiates between foreign and domestic workers. Moreover, it distinguishes



between two different categories of foreign workers based on their origin, from Palestine or from the rest of the world. This latter separation is important as Palestinians are unlike other foreign workers in that they mostly commute to work in Israel on a daily basis and thus are affected by border closures.

Many foreign workers in Israel work without legal documents, often overstaying tourist visa or illegally crossing the border (ICBS, 2005b). Estimates on the number of illegal foreign workers in Israel vary widely, but even conservative assessments suggest that the number of illegal foreign workers is as high as the figure of legal foreign workers (e.g. ICBS, 2005b). Because illegal workers represent a considerable part of the total workforce in several sectors, particularly agriculture and construction, two separate accounts in the current SAM are reserved for them: illegal workers from Palestine and illegal workers from the rest of the world.

Data on foreign workers is obtained from the Wages and Employment Monthly Statistics (WEMS) of June, 2005 by the ICBS (2005c): however information on foreign labour is not published in as much detail compared to the domestic labour force. Only part of the missing information can be obtained from additional sources including the CBI (CBI, 2006), the LFS of the Palestinian Central Bureau of Statistics (PCBS, 2005), and the Worker Advice Center (WAC) in Israel and Palestine (WAC, 2004). Additionally some assumptions are made to fill-in the gaps.

Most detailed data on the number of Palestinian workers in Israel is available from the Palestinian LFS (PCBS, 2005). This information is also considered to be more accurate than the data published by the ICBS, as the latter includes workers who receive their wages through the payment department of the Employment Service only, whereas the Palestinian LFS relies on household surveys. As the Palestinian LFS publishes almost all data in percentages only, the number of Palestinian workers in Israel first has to be obtained by calculating 8.7% of the total employed Palestinian persons (PCBS, 2005, Table 17) which is 578,000 (PCBS, 2005: 16). The total number of Palestinian workers in the Israeli economy is then disaggregated to the 6 sectors included in the Palestinian LFS (Table 3). To further disaggregate over sectors it is assumed that sectoral shares of the Palestinian labour force in Israel are equal to those of the Israeli labour force: i.e., the

shares of employed Israelis (from the 162-industry aggregation) in the 6 available sectors are calculated and then the number of Palestinian workers in each of these 6 sectors is multiplied by these shares.

**Table 3: Palestinian Workers in Israel**

Sectors	Number of workers
Agriculture, Hunting, and Fishing	3,872
Mining, Quarrying, and Manufacturing	8,599
Construction	20,768
Commerce, Hotel, and Restaurants	10,309
Transportation, Storage, and Communication	1,408
Services and Other Branches	5,330

Source: own calculations based on PCBS (2005).

Daily wages and the average number of monthly working days of Palestinian workers in Israel are published by the PCBS (PCBS, 2005, Table 41). This information is used to calculate average monthly wages disaggregated to 6 sectors. As no more detailed information on wages is available, it is assumed that average wages in all subsectors equal the wage rate in the 6 main sectors. Accordingly, the annual compensation of Palestinian workers is calculated by multiplying the average monthly wage rate by the number of workers in the 162 sectors and then multiplying this result by 12.

The number of illegal Palestinian workers in Israel is estimated to be 35,000 in 2004 by the WAC (2004). This number is subtracted from the total number of Palestinian workers in Israel, 50,286, from the Palestinian LFS (which is based on a household survey that does not differentiate between illegal and legal workers). This means that about 70% of all Palestinian workers in Israel are undocumented and 30%, or 15,286, are legal. This calculation of the number of legal Palestinian workers is almost double the number published by the ICBS which considers workers who receive their wages through the payment department of the Employment Service only (ICBS, 2006a, Table 12.34). The total annual labour compensation in the different sectors is split according to the shares of legal and illegal Palestinian workers, assuming the same wage rate for legal and illegal workers in all sectors.

The most detailed data on foreign workers from the rest of the world (from here on, “foreign workers”) in Israel in 2004 is obtained from chapter 5, “The Labour Market”, of the CBI annual report 2005 (CBI, 2006). The CBI data is based on the national accounts data of the ICBS and includes reported and unreported foreign workers. As numbers for 2004 are not available (the annual report of the CBI for 2004 does not contain a labour market report), they are calculated using the values of 2005 and the rates of change over the previous year. Additionally, the number of foreign workers in the social welfare sector is obtained from the number of working permits issued in that sector in 2005 and the rate of change over 2004 which is published in the same report (CBI, 2006: 24). Accordingly, the number of foreign workers in 10 distinct sectors is obtained. A sector “other businesses” is created by subtracting figures in the 9 business sectors from the stated total in the business sector. The number of foreign workers is further disaggregated over sectors in the same way as the Palestinian workers, using shares of the Israeli domestic workforce.

Wages of foreign workers are obtained from ICBS (2005c, Table 1.22). This table states the monthly average wages of employee jobs of workers from abroad in 7 distinct sectors and one wage rate for all “other industries”. Housekeepers and homecare workers insured by their employer are excluded from this survey. The following assumptions are made:

1. Every foreign worker has only one Job in Israel, so that average wages per employee job equal average wages per employee.
2. All foreign workers in Israel work for wages and thus are employees.
3. Average wages of illegal foreign workers are similar to those of legal foreign workers<sup>10</sup>.
4. Housekeepers and homecare workers insured by the employer receive the same average monthly wages as foreign workers employed in healthcare services (compare ICBS, 2005c, Table 1.22).
5. Average wage rates of subsectors are equal within the main sectors.

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<sup>10</sup> Although one might assume that illegal workers receive lower wages, several sources report the contrary (Kav LaOved, 2004; Miaari and Sauer, 2006). However, as there is no specific statistical information available, the same wage rates for legal and illegal workers are assumed in this study.

6. The average monthly wage rate in all main sectors for which no specific average wage rate is published equals the wage rate in “other industries”.

Based on these assumptions, the total annual compensation of foreign workers is calculated by multiplying the wage rates by the number of persons employed in the 162 sectors.

The total number of foreign workers is estimated to be 188,000 in 2004 (ICBS, 2005b). This is quite close to 188,500, published by the CBI for the same year (CBI, 2006). ICBS also (2005b) provides data on the number of foreign workers staying in Israel with and without working visas. These values are used to calculate shares of legal and illegal foreign workers (48.7% and 51.3%, respectively) which are applied to all sectors. Finally, the total compensation of non-domestic workers is scaled to the value of compensation of employees paid abroad from the national accounts data (ICBS, 2009a, Table 32), which implies a reduction by 18.3%.

#### *Ownership of dwellings*

The sector “Ownership of Dwellings” (sector 144 in the 162-industry classification) is not included in the Israeli LFS: however, ICBS (2009a, Table 18) provides the value of domestic operating surplus from owner occupied dwellings. This number is deducted from the net domestic product of ownership of dwellings (ICBS, 2009a, Table 16), assuming that the difference equals labour compensation in that sector. For distributing the total value among the different labour accounts, the shares prevailing in the real-estate activities sector are applied. Afterwards, the additional labour compensation is included in the total labour compensation (reducing the adjustment factor to the national accounts data), but is excluded from the balancing process to the national accounts as the labour compensation of this sector is taken directly from national accounts data.

### **3.3.3 Capital Including Fixed Assets**

To estimate capital compensation of each activity, a land-capital composite is calculated as the residual between labour compensation and net domestic product at basic prices. Afterwards, the total value of land is obtained from the land-capital composite, and distributed among the agricultural sectors as described in Section 3.3.4.

The total value of net domestic product as well as its distribution over 13 sectors for 2004 is obtained from ICBS (2009a, Table 16): however, the values for different sectors do not sum up to the total due to an additional term “errors and omissions”. Therefore, the value of errors and omissions is dispersed over the 13 sectors, using their shares in the total assuming that the errors and omissions occurred equally in all sectors. Labour compensation is aggregated from 162 sectors to the 13 sector aggregation from the net domestic product table and then subtracted from the net domestic product in each sector. The residual value in each of the 13 sectors is assumed to account for land and capital compensation (Table 4).

The share of land and capital compensation in the total value added (VA) is rather low in comparison to other OECD member countries. Also, for the sector “Imputed value of bank services” the NA state a negative VA. Because labour compensation in this sector is zero, according to the 1995 IOT (ICBS, 2002, Table 3), capital compensation is negative (Table 4).

To disaggregate the land and capital compensation from 13 to 162 sectors, the direct coefficients of other VA (including capital and land) in the 1995 IOT are used (ICBS, 2002, Table 4). These coefficients are aggregated from 162 to 13 sectors and then the shares of the original coefficients in their respective aggregates are calculated. Based on these shares, data for each sector among the 13 main sectors is disaggregated to its corresponding subsectors. Hence, capital and land values for the 162 sectors are obtained. This assumes that the distribution of capital compensation among the sub-sectors of the respective main sector is similar in 1995 and 2004. Finally, the whole matrix of activities and factors is aggregated from 162 sectors to 47 sectors based on mapping between the two aggregations, as was previously described.

**Table 4: Composition of Value Added (VA) in Israel Compared to other OECD Member Countries**

	Israel				Greece			Spain			
	VA	Compensation of			Labour	Land and Capital	Compensation of		Labour	Land and Capital	Compensation of
		in million NIS	in million NIS	in % of VA			in % of VA	in % of VA			
Agriculture, forestry, and fishing	7,324.5	4,639.9	63.3	2,684.6	36.7	64.9	35.1	63.3	36.7	36.7	
Manufacturing	60,788.8	55,766.1	91.7	5,022.7	8.3	56.9	43.1	58.8	41.2	41.2	
Electricity and water	5,922.6	4,627.9	78.1	1,294.7	21.9	48.6	51.4	29.6	70.4	70.4	
Construction	21,761.5	15,159.7	69.7	6,601.8	30.3	42.8	57.2	65.3	34.7	34.7	
Commerce, restaurants, and hotels	51,104.1	39,714.2	77.7	11,389.9	22.3	23.3	76.7	52.0	48.0	48.0	
Transport, storage, and communications	31,259.1	20,302.8	65.0	10,956.3	35.0	54.9	45.1	41.2	58.8	58.8	
Finance and business services	90,142.6	61,683.8	68.4	28,458.7	31.6	18.2	81.8	43.0	57.0	57.0	
Public administration	36,870.1	20,739.1	56.2	16,131.0	43.8	83.2	16.8	81.9	18.1	18.1	
Education	35,636.8	34,030.7	95.5	1,606.2	4.5						
Health services	34,210.2	28,292.9	82.7	5,917.3	17.3						
Personal and other services	17,050.1	7,094.7	41.6	9,955.4	58.4	55.3	44.7	63.9	36.1	36.1	
Imputed value of bank services	-9,844.4	0.0	0.0	-9,844.4	100.0	-	-	-	-	-	
Ownership of dwellings	44,578.3	13,924.2	31.2	30,654.2	68.8	43.6	56.4	36.7	63.3	63.3	
Total	426,804.3	305,976.0	71.7	120,828.3	28.3	49.6	50.4	57.7	42.3	42.3	

Source: Own calculations based on ICBS (2009a) and Narayanan et al. (2008).

### **3.3.4 Land**

In this SAM land is considered a production factor for agricultural activities only, as other economic activities mostly require a very small land area. In Israel more than 90% of the land is owned by the state. Farmers can lease land on long term contracts lasting 24 to 99 years through the Israeli Land Administration (Egoz, 1996). Leasing rates depend on several factors, including the type of usage, area, and irrigation facilities. There is no free land market in Israel. To calculate the value of land we multiply the area allocated to agricultural activities with annual leasing rates. Data on agricultural area are taken from the Statistical Abstract of Israel 2010 (ICBS, 2010) and FAO (FAOSTAT, 2011). The Israeli Ministry of Justice (IMJ, 2010) publishes leasing rates of land in Israel.

The allocation of agricultural area to the ten agricultural activities of the current SAM is straightforward except for “Permanent meadows and pastures.” This composite sector includes two sectors in the current SAM, “Milk” and “Bovine cattle, sheep, goats, and horses”. Accordingly, the shares of the two activities in the land-capital composite are applied to assign land and capital to each of them. The area for “other animal farming” was set to equal zero, as this sector mainly consists of poultry which, in most cases, does not rely on pastures. For “Fishing”, only the area for aquaculture is assigned. The area of “Gardening, mixed, and unclassified farming” is calculated as a residual of total arable land and land allocated to all other agricultural activities.

Leasing rates for agricultural area are multiplied by the area allocated to each activity. For plant production activities, leasing rates are differentiated according to the area being rain-fed or irrigated. As no information on leasing rates is available for “Forestry” and “Gardening, mixed, and unclassified farming”, the rate for pastures is applied. The resulting total annual lease payments are depicted in Table 5. Finally, the obtained values are deducted from the land-capital composite. For all non-agricultural activities, the land compensation is set to equal zero.

**Table 5: Annual Lease Payments for Land**

Agricultural activity	Area		Annual lease		
	1000 ha	Share of irrigated area	NIS/ha		million NIS
			Rain-fed	Irrigated	Total
Wheat	70.5	0%	199.3	0	14.1
Cereals	12.0	39%	199.3	928.7	5.8
Other crops	76.5	57%	199.3	928.7	47.1
Milk	41.8	0%	20.5	0	0.9
Bovine cattle, sheep, goats, and horses	83.2	0%	20.5	0	1.7
Other animal farming	0.0	0%	20.5	0	0.0
Fruits and vegetables	134.4	100%	696.5	928.7	124.9
Fishing	2.5	0%	928.7	0	2.3
Forestry	154.6	0%	20.5	0	3.2
Gardening, mixed, and unclassified farming	89.3	3%	20.5	928.7	1.8
<b>Total</b>	<b>664.8</b>				<b>201.6</b>

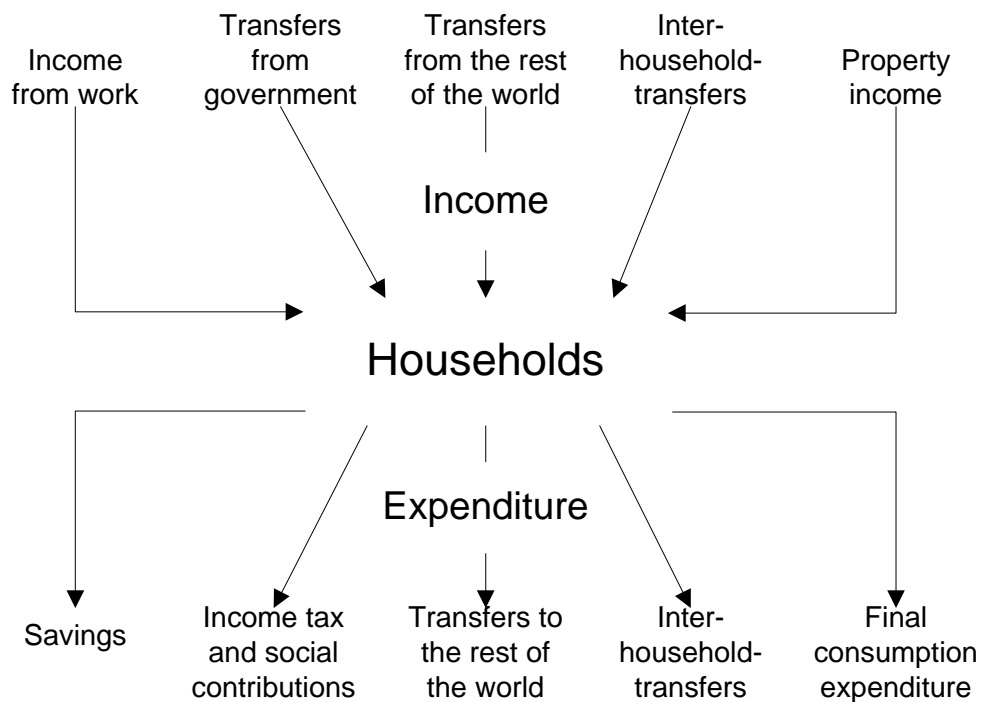
Source: Own calculations based on ICBS (2010), FAO (2011), and IMJ (2010).

### 3.4 Household Accounts

A household is an institutional unit, which is defined as “a group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food” (EC, 2009: 82). In the SAM context, the household earns income from work or other factors of production and receives transfer payments from the government, foreign countries, or other households (Figure 4). Household income is spent on final consumption goods and services, taxes, and transfers to other households (domestic and abroad). The difference between income and expenditures is household savings.



**Figure 4: Monetary Flows to and from Households**



Source: Own compilation.

Household data are obtained from the publications of the ICBS. Namely, sources are the NA 1995-2007 (ICBS, 2008), Expenditure and Income Survey of 2004 (ICBS, 2006c; ICBS 2006d), SUT 2004 (ICBS, 2009b), the General Government Accounts 2000-2005 (ICBS, 2007), and the Social Survey 2004 (ICBS, 2011).

Incorporating details in the household accounts in the SAM is crucial to allow for policy analysis addressing the livelihoods of people and income distribution. Detailed representation of households in the SAM allows for the simulation of various discriminatory policies. Households could, for example, be classified according to their income level, ethnic background, or spatially by state or locality.

In the SAM presented here, the Israeli population is disaggregated into income quintiles differentiating between different household groups based on their living standards. Using income as the only criterion for classifying households according to their living standard is controversial, because it does not reflect the whole range of aspects which comprise the living standard (Haughton and Khandker, 2009). Nevertheless, income is used here as a

proxy for living standard due to the good data availability from the Income Survey and the Expenditure Survey for the year 2004 (ICBS 2006c, 2006d), which provide detailed information on households classified according to income.

More specifically, net income per standard person is used to classify the Israeli population into five income groups. When grouping households according to income per standard person, this takes into account the number of persons in one household as well as household scale economies, arising, for example, from sharing living accommodations and cooking. In addition, the SAM differentiates between Jewish and other population (Arab and others) in Israel to capture income differences between these groups. Beside Jews and Arabs, there are also other ethnic groups which mainly include immigrants from the former Russian federation who are non-Jewish or people who do not have a Jewish mother and therefore are not considered to be Jewish. The share of non-Jews and non-Arabs is about 3.7% of the total Israeli population. Because of this and reasons of data availability, the current SAM merges non-Jews and non-Arabs into the Arab group to shape the category “Arabs and others”. Table 5 provides an overview of the distribution of Israeli households by income quintiles and population group.

**Table 6: Israeli Households Classified by Ethnic Groups and Income**

Income quintiles	Jews		Arabs and others	
	Number of households [thousand]	Percentage share	Number of households [thousand]	Percentage share
Quintile 1	257.0	65.7%	134.0	34.3%
Quintile 2	299.0	76.6%	91.0	23.4%
Quintile 3	336.0	86.3%	53.0	13.7%
Quintile 4	362.0	92.8%	28.0	7.3%
Quintile 5	377.0	96.6%	13.0	3.4%
Total	1630.0	83.6%	320.0	16.4%

Source: ICBS (2006c).

The income quintiles are ranged from one, which represents the household group with the lowest average income, to five, which is the quintile with the highest income for both Jews and Arabs and others. Thus, the SAM includes 10 household groups: total households are first classified according to income and then each quintile is divided into two groups: Jews and non-Jews. As a result, household groups differ substantially in size

with Arabs in the highest income quintile establishing the smallest group (13,000 households) and Jews in the highest income quintile establishing the largest group (377,000 households).

The Income Survey (ICBS, 2006c) provides data on the shares of each ethnic group as well as on the total number of households in the total domestic population. Particularly, Table 4 of the Income Survey divides total population into deciles according to net income per standard person, while it also classifies the population ethnically. In the current SAM, deciles are aggregated into quintiles. As there is no information on average income within the published deciles according to ethnic background, the assumption that the income levels of the different ethnic groups within a similar income quintile are similar is applied.

### **3.4.1 Household Income**

The primary source of household income is the returns to production factors. Households receive income from the factors they own, including land, capital and labour. Income from capital and land represents entrepreneurial and property income and is ultimately received by households via the enterprises account. Income is distributed among household groups in the following steps: (1) Labour compensation is distributed based on data from the Social Survey 2004 (ICBS, 2011); (2) part of the capital compensation is distributed according to data from the 2004 Household Expenditure Survey (HES) (ICBS, 2006d); and (3) the level of income from enterprises is determined to balance household income and expenditures. These three steps are described in detail in the following sections.

#### **3.4.1.1 Household Income from Labour**

Labour compensation is the major component in household income and it includes income from wages and self employment (employees), as well as imputations of wages for employed persons who are not employees (see Section 3.3.1).

For allocating the income from the different factor accounts among different household accounts, Jewish labour groups are allocated to Jewish household groups and Arab and other labour groups are allocated to their corresponding households.

The Social Survey 2004 (ICBS, 2011) provides data on the distribution of different occupations according to the level of total family income, but it is not according to income quintiles and is not differentiated between Arabs and Jews. To estimate the number of earners each household group of the SAM has in each occupation, the groups of different income from the Social Survey are allocated to the household groups, taking into account the number of earners in each household group (ICBS, 2006d, Table 2.2.). Afterwards, the shares each household group holds in the different labour accounts are calculated. These shares are applied to distribute the compensation of labour of each labour group among the different household groups.

When comparing the results of this approach with the income households receive and its distribution in the Expenditure Survey (ICBS, 2006d, Table 2.1.), one can notice significant differences. In total, the compensation of labour published in the NA (see Section 3.3.1) is 46% higher than the household income from labour published in the Expenditure Survey (ICBS, 2006d, Table 2.1.). This may be because imputations for employed persons (see above) are not accounted for in the Expenditure Survey, but are included in the compensation of labour. In addition, after allocating the labour income to the household groups by the approach mentioned above, the share of income from labour the higher quintiles receive is lower and the share of income from labour the lowest quintiles receive is higher compared to the shares published in the Expenditure Survey. This bias may be due to the imputations for employed persons, which are assumed to exist primarily in the lower income quintiles.

#### **3.4.1.2 Household Income from Capital and Enterprises**

Household income from capital is obtained from the 2004 HES (ICBS, 2006d, Table 2.1). It provides information on monthly capital income for income deciles. The monthly values of property income per income decile are converted in yearly values for the final household groups.

Finally, households also receive income from engaging in entrepreneurial activities. Every enterprise is finally owned by households or the government; hence, owners receive the profits of their enterprises. Data on transfers from enterprises to households is not available, thus transfers from enterprises are obtained after deducting transfers to the government, tax payments, as well as enterprise saving from total enterprises income. Transfer payments from enterprises are distributed among the household groups to create a balance between income and expenditure for each household group.

### **3.4.2 Transfers**

The second source of income to households is transfers. These include transfers households receive from other households in Israel and which are part of household expenditure. Transfers households receive from the ROW in terms of remittances and transfers from the government in terms of social insurance benefits and pensions are also included. On the expenditure side, domestic households also remit abroad, transfer money to other domestic households, and make compulsory payments to the government.

#### **3.4.2.1 Inter-Household Transfers**

Data on inter-households transfers are from the HES (ICBS, 2006d, Table 2.1 and Table 1.1). The total amount of household transfers as well as the share of household transfers to the ROW, with the latter being 60% of the former, are reported by ICBS (2009, Table 28). Therefore, domestic inter-households transfers are obtained as residuals (the remaining 40%). These inter-household transfers are distributed among the different household groups according to the distribution of total transfers.

#### **3.4.2.2 Transfers from the Government**

Data on transfers from the government to households is obtained from the General Government Accounts (ICBS, 2007), while information about its distribution among different household groups is based on the HES (ICBS, 2006d). Government transfers to households include social insurance benefits, pensions, and other allowances and assistance. Income from social benefits reported in the HES (ICBS, 2006d, Table 2.1) is found to be lower than that reported in the Government Account (ICBS, 2007, Table 5.4).

Therefore, the former is scaled to the level of the latter as household income is generally undervalued in household surveys.

### **3.4.2.3 Transfers from the ROW**

Data on transfers to households from the ROW is obtained from the NA (ICBS, 2008, Table 28) and distributed among household groups according to household income from allowances and assistance excluding Israeli institutions, which is obtained from the HES (ICBS, 2006d, Table 2.1)<sup>11</sup>. The value of transfer payments of Israeli households to households abroad is distributed among household groups according to the distribution of total transfer spending (ICBS, 2008, Table 28).

## **3.4.3 Household Spending**

### **3.4.3.1 Household Consumption Expenditure**

The HES of the year 2004 provides detailed information on household monthly consumption expenditure by income quintiles (net income per standard person; ICBS, 2006d, Table 1.1). Based on the ISIC (Revision 3) commodity classification, the detailed expenditure data of the survey is moved to the 162-commodity classification, which is used by the 1995 IOT. Accordingly, annual household expenditure data is prepared on the 162, 65, and 47 commodity classifications.

The yearly consumption expenditures of the whole population according to the HES adds up to NIS 234,408 million, while the value published in the NA is 34.7% higher or NIS 315,860 million (ICBS 2008, Table 7). Accordingly, the HES data is scaled-up to the value of the NA. The scaling-up follows the approach of source unification and increases consistency.

The obtained yearly values for quintiles of the population are multiplied by the share of each ethnic group in the total population of the respective quintile to obtain annual consumption expenditures by income quintile and ethnic group. The underlying

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<sup>11</sup> The value of the current transfers from abroad excluding transfers to the Israeli government obtained from the HES is lower than that from the NA, as the latter includes transfer payments to Israeli non-profit institutions as well as transfers from immigrants. Accordingly, the HES value is scaled-up to the NA level.

assumption in ethnic classification is that the consumption pattern of the different ethnic groups in a specific quintile is equal. This is because no data are available on consumption expenditure differentiated according to income and ethnic group. Data on consumption expenditure per ethnic group are available (see ICBS, 2008), but these data also reflect differences in income between ethnic groups and therefore cannot be directly used to differentiate consumption at equal incomes which is required in the SAM household accounts.

### **3.4.3.2 Other Household Expenditures**

Other household expenditures include compulsory payments to the government, including direct income taxes, social insurance payments, and health insurance payments, as well as transfers abroad. Data on these components are provided in the HES (ICBS, 2006d, Table 2.1) and the NA (ICBS, 2008, Table 30). Data from the HES are used and scaled-up to the NA level.

### **3.4.3.3 Household Savings**

The HES (ICBS, 2006d, Table 1.1) provides information on selected savings items. Based on this information, the share of each quintile in total savings is calculated and scaled-up to meet net private savings published in the NA (ICBS, 2008, Table 29). Savings in the third quintile groups obtained by this approach are found too low, resulting in negative transfers from enterprises. Therefore, savings of household groups of the third quintile are increased accordingly, while savings of other household groups are reduced by an equal rate and total household savings are kept constant.

## **3.5 Taxes and Subsidies**

There are four major types of taxes identified in the Israeli economy: taxes on domestic production, taxes on imported products, direct taxes including health and social insurances, and taxes on production factors. Major sources of data on taxes and subsidies are the NA 1995-2007 (ICBS, 2009a, Table 30), the General Government Accounts (ICBS, 2007), and the OECD<sup>12</sup>. The SAM accounts related to taxes on production include

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<sup>12</sup> Table 0900 is prepared by the OECD, but obtained from the ICBS.

indirect taxes on production, production subsidies, export subsidies, value added taxes on domestic products, fuel tax, excises on tobacco and cement, other taxes on domestic products, and sales subsidies on domestic goods (Table 7). Taxes on imported products are represented in the SAM by four accounts: value added taxes on imports; customs; purchases and other taxes on imports; and taxes on defence imports. Direct taxes and insurances are represented by five different accounts. Table 7 shows the different tax accounts of the SAM and the total revenue or outlay to or from the government for each account.

### **3.5.1 Taxes on Products**

The SUT of the year 2004 (ICBS, 2009b) provides data on net taxes and subsidies on products only. Therefore, it could not be used as a data source for the different tax accounts included in the SAM. The distribution of the total value for each tax type over the corresponding accounts and sectors including activities, commodities, and institutions is based on unpublished data by ICBS and personal communication with ICBS staff<sup>13</sup>. Several tax accounts on domestic and imported products based on the 65-industry aggregation are created with the help of this additional information.

Domestic output and import values for each sector according to the 162-industry aggregation are applied to move taxes on domestic products and imports from the 65- to 47-industry aggregation (see Section 3.1). Tax accounts covered by this approach include: (1) value added taxes on domestic products; (2) other purchase, excise duties, and consumption taxes on domestic products; (3) sales subsidies to domestic goods; (4) value added taxes on imports; (5) import customs; and (6) purchase and other taxes on imports.

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<sup>13</sup> The Excel files received from the government account department of the ICBS also include Table 0900 of the OECD.



**Table 7: Tax Accounts in the SAM**

No.	Name of Tax Account	Value (NIS million)	Tax Base (NIS million)	Tax as % of Tax Base	Flow in the SAM (to/from)
	Taxes on domestic production (subtotal, net)	50,565.0	1,010,651.9		5.0
	thereof:				
1	Production taxes	1,350.0	1,010,651.9		0.1 GOV/ACT
2	Production subsidies	-1,928.0	1,010,651.9		-0.2 GOV/ACT
3	Export subsidies	-249.0	234,604.0		-0.1 GOV/COM
4	Value added taxes on domestic products	42,309.0	1,010,651.9		4.2 GOV/COM
5	Fuel tax	7,919.0	16,159.6		49.0 GOV/COM
6	Excises on tobacco and cement	1,793.0			GOV/COM
7	Other taxes on domestic products	1,349.0	1,010,651.9		0.1 GOV/COM
8	Sales subsidies to domestic goods	-1,978.0	234,435.0		-0.8 GOV/COM
	Taxes on imported products (subtotal)	24,996.0	234,435.0		10.7
	thereof:				
9	Value added taxes on imports	11,642.0	234,435.0		5.0 GOV/COM
10	Import customs	1,493.0	234,435.0		0.6 GOV/COM
11	Purchase and other taxes on imports	10,272.0	234,435.0		4.4 GOV/COM
12	Defense imports tax	1,589.0	234,435.0		0.7 GOV/COM
	Direct income taxes and insurances (subtotal)	106,970.0			
	thereof:				
13	Direct income taxes on households	47,690.0	452,789.7		10.5 GOV/HHS
14	Direct income taxes on enterprises	26,340.0	131,555.2		20.0 GOV/ENT
15	Social insurance payments by employees	11,328.0	486,419.7		2.3 GOV/FAC
16	Social insurance payments by employers	10,393.0	486,419.7		2.1 FAC/ACT & GOV/FACT
17	Health insurance payments	11,219.0	452,789.7		2.5 GOV/HHS
	Production factor taxes (subtotal)	15,186.0			
	thereof:				
18	Taxes on capital including land, and fixed assets	9,215.7	121,640.7		7.6 GOV/FAC
19	Total wage bill and payroll taxes	5,970.3	313,133.0		1.9 GOV/FAC
	Net tax revenue	197,717.0			

Source: own classification based on data from ICBS (various issues).

Defence imports tax, which represents about 6.4% of the total value of taxes on imported products, is reported separately in ICBS (2009a, Table 30). Accordingly, it is levied directly on the SAM's commodity account "Public Administration, Defence, Education, and Health". Because defence imports are usually paid by the government, taxes on it are also paid by the government. This necessitates that defence imports tax appears in our SAM as a negative payment from the commodity account "Public Administration, Defence, Education, and Health" to the defence import tax account. Afterwards, the tax account ultimately pays this negative value to the government.

Fuel taxes are sales taxes which are levied on fuel products. Fuel products belong to the SAM commodity account (26) "Petroleum and coal products". This account includes manufacture of refined petroleum and its products. Accordingly, the total value of fuel tax appears as a payment from the account "Petroleum and coal products" to the tax account "fuel tax". The total value of fuel tax is paid afterwards from the tax account to the government account.

Excises on tobacco and cement are levied on tobacco products, part of account (20), and on cement and its products, part of account (28) of the SAM, respectively. As the total value of excise on tobacco and cement is levied on parts of two different commodity accounts, the more detailed 162-industry classification is used to allocate the total value of these excises over them. There are two commodity accounts which correspond to account (85) "Manufacture of cement and its products" and account (52) "Manufacture of alcoholic beverages, beer and tobacco products". The IOT of the year 1995 (ICBS, 2002) provides data on product taxes according to the 162-industry classification. In the IOT the revenue from tax on cement is nearly 10 times higher than the revenue from taxes on tobacco. The distribution of excise on tobacco and cement is assumed to follow these shares.

Data on export subsidies by exported commodity are obtained from the WTO (2010). Israel reports export subsidies on six commodities, which are the same commodities that have been subsidized since the mid-1990s. Table 8 shows the sectors that receive subsidies on exports, the amount supported, and the government outlay in 2004.

**Table 8: Sectors Receiving Export Subsidies in Israel in 2004**

No.	Sectors	Subsidized quantity	Units	Value (1,000 USD)
1	Fresh flowers	683.00	million pieces	6,161
2	Fruit other than citrus	47.60	1,000 ton	4,347
3	Fresh vegetables	79.30	1,000 ton	7,028
4	Citrus fruits	370.00	1,000 ton	13,779
5	Goose liver	0.27	1,000 ton	996
6	Cotton	41.10	1,000 ton	7,328
	Total outlay (1,000 USD)			39,639

Source: WTO (2010).

First, the exchange rate of 4.482 (NIS/USD) in 2004 is used to obtain the NIS values for each sector. The total value obtained for export subsidies is NIS 177.7 million, compared to NIS 249.0 million reported in the NA (ICBS, 2009a). Therefore, shares are calculated for each sector based on the USD values and the total value of NIS 249.0 million is distributed accordingly among the six subsidized sectors. Afterwards, the 6 supported sectors are mapped to the 47 sectors of the SAM, as sectors 1 and 6 belong to the SAM-sector 3 “Other crops”, sectors 2, 3, and 4 belong to the SAM-sector 7 “Fruits and vegetables”, and sector 5 belongs to SAM-sector 6 “Other animal farming”.

### 3.5.2 Direct Income Taxes and Insurances

As shown in Table 7, direct taxes are represented by five different accounts including income taxes on households, income taxes on enterprises, social insurance payments by employees, social insurance payments by employers, and health insurance payments. This detailed disaggregation allows for several policy oriented investigations related to direct taxes and insurance policies in Israel to be simulated.

Enterprises are represented by one single account in the SAM only; therefore, the allocation of income tax to the enterprises account is straightforward. For households, on the other hand, income taxes are levied based on the income tax paid by the different households’ deciles according to the HES. Social insurance payments are reported in two separate categories: social insurance payments by employers and social insurance payments by employees. Social insurance payments by employers are levied on

production activities based on the value of labour compensations by each activity. The payments are merged into the activities payments to labour. Therefore, labour compensations received by production factors from activities include social insurance payments by employers. On the other hand, social insurance payments by employees are levied on income of production factors prior to allocations to households. At this point, production factors pay total social insurance payments by employers, which are already received from activities, as well as the social insurance payments by employees to the corresponding tax account. Again, the distribution of the entire payments is based on labour income.

Health care in Israel is both universal and compulsory and is administered by a small number of organisations which are government funded. All Israeli citizens are entitled to the same uniform benefits package, regardless of which organisation they are a member of, and treatment under this package is funded for all citizens regardless of their financial means (IMFA, 2010). In the current SAM, the total health insurance payments reported in the NA (ICBS, 2009a, Table 30) is distributed among the ten household accounts based on the amount of health insurance paid by household deciles according to the HES.

### **3.5.3 Taxes on Production Factors**

The remaining tax accounts are the taxes on factors of production including land, capital, and labour. The SAM includes three major factor accounts namely, labour, capital and land. Taxes on capital and land are merged together under the name “taxes on capital including land and fixed assets”, which is payable by activities based on shares of capital and land use. On the other hand, the labour account is disaggregated into 36 labour categories. Therefore, total wage bill and payroll taxes are distributed over the activity accounts based on the values they pay for the compensation of labour.

### **3.6 Intermediate Consumption**

The SUT 2004 provides data on intermediate use at purchaser prices for each sector based on the 65-industry classification. A similar approach to the one previously described in moving data vectors from the 65-industry aggregation to the 47 sectors of

the SAM is applied (see Section 3.1). The only difference is that matrix mapping is applied in the use matrix instead of the vector mapping, described previously in Figure 2.

The 2004 use matrix is expanded to a 162x162 matrix using the use matrix of the 1995 IOT based on the predefined mapping between the two aggregations, which is governed by the ISIC and CPC classifications. More specifically, each cell in the 2004 use matrix is expanded to its corresponding cells in the 162-industry classification to create an expanded 2004 use matrix. Afterwards, the expanded use matrix is aggregated to a 47x47 matrix based on the predefined mapping between the two aggregations, which is governed by the ISIC and CPC classifications as well.

### **3.7 Enterprises**

Data on enterprises income and expenditure is obtained from the ICBS including the Statistical Abstract 2005 (ICBS, 2005d, Table 14.12) and the NA (ICBS, 2009a).

Returns to capital are allocated to enterprises and are ultimately distributed among the enterprises expenditure destinations such as government, households, and the ROW. These returns to capital are calculated as residuals of net domestic product at basic prices after a deduction of the compensation of labour and land (Section 3.3)<sup>14</sup>. In addition to income from capital, the Israeli government provides enterprises with non-recurrent grants to investors amounting to NIS 8.1 billion in 2004 (ICBS, 2005d, Table 14.12).

Enterprise income is spent on paying direct income taxes, transfers to the government in terms of returns to state owned enterprises, transfers to households, transfers to the ROW, and savings.

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<sup>14</sup> A detailed description is included in the section on factor accounts (Section 3.3).

## **4 Balancing the final SAM**

### **4.1 The Macro SAM**

As previously mentioned, the top-down approach is applied to construct the current SAM. An aggregated macro SAM with 13x13 accounts is first built based on official Israeli sources of data. The macro SAM is balanced based on the balances of the T-accounts of the major economic actors in Israel including the government, non-government institutions (households, enterprises, and NPISH), saving-investment, and the ROW. Tax accounts are automatically balanced because they represent a major component of the government income; hence, they are balanced within the T-account of the government. Imbalances in the activity and commodity accounts are balanced based on the cells that are sourced from the SUT. These are intermediate consumption, which is reduced by 0.65% and domestic output, which is increased by 0.65%. The balanced T-account for the SUT is shown in Table A5 of Appendix 1.

### **4.2 The Micro SAM**

Afterwards, the Macro SAM is disaggregated as described in Chapter 3. Row totals of the individual accounts of the micro SAM, which show the total income to each account, should match the corresponding column totals showing total expenditure and savings of each account. Therefore, the calculation of the balance between rows and columns represents the second checkpoint of the macro SAM. At the same time, this calculation is the first check of the micro SAM.

**Table 9: The Israeli Macro SAM Corresponding to the Imbalanced Proto-SAM**

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
	Commodities	Margins	Activities	Factors	Households	Enterprises	Net taxes on production	Net taxes on domestic products	Taxes on imported products	Direct Taxes	Government	Investments	Stock Changes	Rest of World	Total
1	Commodities	80,805	523,079		315,860						149,372	92,980	5,331	234,604	1,402,031
2	Margins	80,805													80,805
3	Activities	1,010,652													1,010,652
4	Factors		472,965											13,455	486,420
5	Households			313,133	2,984	31,963					68,861			16,889	433,830
6	Enterprises			121,641							9,915				131,555
7	Net taxes on production		14,608												14,608
8	Net taxes on domestic products	51,143													51,143
9	Taxes on imported products	24,996													24,996
10	Direct Taxes			21,721	58,909	26,340								758	107,728
11	Government					5,905	14,608	51,143	24,996	107,728				15,260	219,640
12	Savings				51,551	67,347					-8,827			-11,760	98,311
13	Stock Changes											5,331			5,331
14	Rest of World	234,435			29,925						320				269,206
O	Total	1,402,031	80,805	1,010,652	486,420	131,555	14,608	51,143	24,996	107,728	219,640	98,311	5,331	269,206	4,336,256
	Imbalance	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

Source: Own compilation.

All aggregated accounts of the current micro SAM are found to balance because they are governed by the control totals of the macro SAM, which is balanced as previously described. On the other hand, activities and commodities show various imbalances at the individual accounts level with the summation of the imbalances of all commodities and all activities equalizing zero. The aggregated version of the micro SAM, which has internal imbalances (“Proto-SAM”), is in Table 9. This aggregated version shows that the macro SAM remains balanced.

At this point, “manual balancing” of the SAM is performed to balance the individual accounts of activities and commodities, while preserving their overall totals that correspond to the balanced macro SAM. Some examples of the manual balancing are described here:

- In the sector “Coal, oil, and gas mining” (SAM sector 11) the make matrix suggests a domestic output of about NIS 480 million. However, this is not reflected by the activity account of our SAM, which is close to zero. The reason for this imbalance is that in the calculation of factor compensation and intermediate input use; the shares of the 1995 IOT (ICBS, 2002) are used, according to which there no domestic production of “coal, oil, and gas mining” was in 1995. The value of domestic output of this sector, which is included in the make matrix of the SAM, is obtained from the SUT 2004. Therefore, shares of the intermediate use, factor compensation, and production taxes of the sector “Minerals nec.” (SAM sector 12) are applied to create a balance in the activity account “Coal, oil, and gas mining”.
- In the sugar sector (SAM sector 19) – which is an imported commodity only in Israel with its production value equal to zero according to the 2004 SUT (ICBS, 2009b) – the intermediate inputs show a total value of NIS 2.78 million. This is set to equal zero because the activity has no production and definitely no intermediate use, but the value of intermediate inputs is due to the use of the 1995 IOT to expand 2004 data to 162 sectors.



Moreover, a case-by-case approach is followed to improve the balance in commodities and activities. Significant improvements are obtained based on changing what is called the “weakest link”. The weakest link of an imbalanced SAM account in this context corresponds to those SAM cells related to the account in which data sources are least trustworthy or data are calculated as residuals. Accordingly, several balances of the commodity and activity accounts are improved by the reallocation of activities’ income and costs.

For instance, the separation of milk from the two other related sectors, which are the „Bovine cattle, sheep, goats, and horses“ sector and the „other animal farming“ sector was based on the 162 IOT shares in which about 23% of the output of „Bovine cattle, sheep, goats, and horses“ is sheep and goats milk, which should be allocated to milk. These reallocations are performed in the output; however, they are difficult to apply to the other related variables such as intermediate use, production factors, and taxes. Therefore, a suspicious imbalance is shown in the proto-SAM especially in the activity accounts. Hence, intermediate inputs, factors use, and taxes are reallocated between the three related sectors to improve the imbalances.

Up to this point, manual balancing was considered helpful in improving the balances in several accounts, where at the same time it is based on justifiable and convincing grounds. Moreover, it reduces the magnitude of changes and reallocations that are left to be made by the balancing program that automatically balances the SAM based on the magnitude of the imbalances in each row or column.

A description of the algorithm applied to achieve the final balance can be found in the Annex (Appendix 3: GAMS Code for Final Balance of the Micro SAM). Although the final automated balancing caused about 40% of the entries to change by more than 10%, these changes occurred mainly in small accounts. Less than 5% of the entries with an absolute value higher than 100 million NIS changed by more than 10% and only 58 entries (1%) changed by more than 25%.

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## Appendices

### Appendix 1: Income and Expenditure of the Major Accounts

**Table A1: T-Account for the Rest of the World**

Income (NIS million)		Expenditure (NIS million)	
Exports of goods and services	234604	234435	Imports of goods and services
Factor transfers from abroad	13455	29925	Factor payments abroad
Transfers from abroad	16889	4526	Transfers abroad
Income tax from abroad	758	320	Government transfers abroad
Foreign transfers to government	15260		
Current transaction with ROW	-11760		
Total	269206	269206	Total
	Balance		0.00

Source: ICBS (2009a), Table 28.

**Table A2: T-Account for the Government**

Income (NIS million)		Expenditure (NIS million)	
Property and entrepreneurial income	5656	149372	Consumption expenditures
Taxes on domestic production and imports	94902	23940	Interest on the public debt paid to resident sectors
Income taxes, fees, levies, and fines	74030	8056	Interest on the public debt paid abroad
National insurance contributions	32940	3906	Subsidies to domestic production
Imputed social contributions	7698	249	Subsidies to exporters
Transfers from institutions	868	36923	National insurance benefits
Transfers from abroad	15259	10151	Pensions to government employees
		15399	Other current transfers
Current deficit	16963	320	Transfers paid abroad
Total	248316	248316	Total
	Balance		0

Source: ICBS (2009a), Table 25.

**Table A3: T-Account for Saving and Investment**

	Income (NIS million)	Expenditure (NIS million)
Net saving of HHs and enterprises	51551.5	92981 Gross fixed capital formation
Net savings of the government	-16963	5331 Changes in inventories
Consumption of fixed capital of the government	8136.5	
Consumption of fixed capital of HHs & ENT	67347	
Current transaction with ROW	-11760	
Total	98312	98312 Total
Balance		0

Source: ICBS (2009a), Table 29.

**Table A4: T-Account for Non-Government Institutions**

	Income (NIS million)	Expenditure (NIS million)
Compensation of employed persons	297373	5656 Government income from property
Domestic operating surplus	91507	74030 Income taxes, fees, levies, and fines
Net transfers from other institutions	53907	11219 Health Insurance
Transfers from abroad	12363	315860 Consumption expenditure
Consumption of fixed capital	67347	118898 Gross savings
Imputed social contributions	7698	4526 Current transfers paid abroad
Total	530195	530189 Total
Balance		6

Source: ICBS (2009a), Tables 18 &amp; 26.

**Table A5: T-Account for the Supply and Use of the NA**

	Use (NIS million)	Supply (NIS million)
Government consumption	149372	1010653 Output at basic price
Household consumption	315860	234435 Imports
Intermediate consumption	523079	24996 Net tax imports
Total investment	92981	51143 Net tax domestic
Stock change	5331	
Exports	234604	
Total	1321227	1321227 Total
Balance		0

Source: ICBS (2009a) and ICBS (2009b), different tables.

Appendix 2: Table of Concordance between SAM Sectors, Israeli IOT, ISIC, CPC, and GTAP Classifications

No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
1	Wheat	Growing of wheat	1	Field crops	1	Growing of wheat	0111	0111	2	Wheat
2	Cereals	Growing of rice (non husked), corn, barley, rye, oats, and other cereals	1	Field crops	2	Growing of other cereals and pulses	0111	0112	1	Paddy rice
								0115	3	Cereal grains nec
								0116	3	
								0119	3	
3	Other crops	Growing of rough fodder, cotton, other plant based fibers, oil seeds, sugar cane and sugar beet, soya beans, groundnuts, tobacco	1	Field crops	3	Growing of rough fodder	0111	0191	8	Oil seeds
		Growing of flowers, seeds, and nursery products			4	Growing of cotton	0111	0144	5	Sugar cane and sugar beet
		Imports of green coffee, cocoa beans, and bulk tea			5	Growing of other field crops (including groundnuts)	0111	01921	7	Plant-based fibers
								01420	5	Crops nec
								01430		
								01490		
								01710	8	Oil seeds
								01790		
								01810	6	Sugar cane and sugar beet
								01820		
								01922	7	Plant-based fibers
								01923		
								01930	8	Oil seeds
								01940		
								01990		
4	Milk	Milk of cattle, sheep, and goats	2	Livestock	6	Cattle farming for milk	0211	02910	11	Raw milk
5	Bovine cattle, sheep, goats, and horses	Bovine cattle, horses, asses, mules, and hinnies; live; Bovine semen, Sheep, and goats, live; includes shorn wool, greasy as well as fleece-washed shorn wool	2	Livestock	7	Cattle farming for meat	0211	02111	9	Bovine cattle, sheep, goats, and horses
								02990		
								02113		
								02112		
								02961	12	Wool and silk-worm cocoons
6	Other animal farming	laying hens, poultry farming, turkey farming	2	Livestock	8	Raising of laying hens	01221	02920	10	Animal products nec
		Farming of other animals			9	Poultry farming for meat	01221	02122		
		Including fine animal hair, not carded or combed and silk-worm cocoons suitable for reeling			10	Poultry hatcheries	01221	02122		
					11	Raising of turkeys and other poultry farming	01221	02122		
					14	Farming of other animals	01222	02121		
								02129		
								02930		
								02940		
								02950		
								02963	12	Wool, silk-worm cocoons



No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
7	Fruits and vegetables	Fruit and vegetables including mate and spices, excluding other fruit dried	3	Fruit and vegetables	15	Growing of citrus	01131	02964	10	Animal products nec
					16	Growing of pome fruits		02972		
					17	Growing of stone fruits		02973		
					18	Growing of nuts		02974		
					19	Growing of grapes		02980		
					20	Growing of bananas		01320	4	Vegetables, fruit, and nuts
					21	Growing of olives		01349		
					22	Growing of subtropical and other tree crops		01360		
								01330		
								01310		
								01349		
								01310		
								01613		
								01620		
								01239		
					23	Growing of vegetables (including melons and pumpkins)	01122	01220		
								0111*		
								01240		
								01231		
								01341		
								01210		
8	Fishing	Pond-culture fisheries	2	Livestock	24	Growing of potatoes	0111*			
		Shore and lake fisheries	5	Other agricultural industries	13	Pond-culture fisheries	05001			
		Forestry, fruit trees (investment to bearing), and imports of natural rubber	5	Other agricultural industries	34	Shore and lake fisheries	05001			
					27	Forestry	02000	03110	13	Forestry
					28	Fruit trees (investment to bearing)		03120		
								03190		
								03220		
								03230		
								03910		
								03920		
								03930		
								86140		
								03210		
10	Gardening as well as mixed and unclassified farming				29	Natural rubber (imports)	0111*			Food products nec
					35	Gardening, as well as mixed and unclassified farming				
11	Coal, oil, and gas	Mining of hard coal, and extraction of crude petroleum and natural gas	6	Mining of hard coal, and extraction of crude petroleum and natural gas	36	Mining and agglomeration of hard coal	1010, 1030		15	Coal
					37	Extraction of crude petroleum and natural gas	1110,1120		16	Oil
									17	Gas
									18	Minerals nec
12	Minerals nec	Other mining and quarrying products	7	Other mining and quarrying products	38	Rough diamonds (imports)	1200, 1310, 1320			
					39	Quarrying of stone and sand				
					40	Extraction of salts, mining and quarrying				
13	Meat products nec	Processing of meat and poultry, including CPC Subclass 02962 (pulled wool, greasy, including fleece-washed pulled wool; coarse animal hair) and CPC Subclass 02971 (raw hides and skins of bovine or equine animals, sheep or lambs, goats or kids)	8	Meat, fish, fruit and vegetables, dairy products, and oil	41	Processing of meat and poultry	1511	211, 2161, 2162	19	Bovine meat products
									20	Meat products nec

No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
14	Processing of fruit, vegetables, and fish products	Processing of fruit, vegetables and fish, including CPC Subclass 01350 (other fruit, dried)			42	Processing of fruit, vegetables, and fish	15130 + 1512	212, 213, 214, 215	25	Food products nec
15	Manufacture of edible oils, margarine, and oil products	Manufacture of edible oils, margarine, and oil products excluding CPC Subclass 21660 (maize (corn) oil and its fractions, not chemically modified)			43	Manufacture of edible oils, margarine, and oil products	15140	21620	20	Meat products nec
16	Dairy products	Dairy products			44	Manufacture of dairy products and ice cream	15140	21630-218	21	Vegetable oils and fats
17	Manufacture of grain-mill products	Manufacture of grain-mill products including husked rice and corn oil	9	Other food products and tobacco products	45	Manufacture of grain-mill products	15310	22	22	Dairy products
18	Other food products	Other food products			46	Bakery and pastry products	1541	231, 232, 233	23	Processed rice
19	Sugar manufacturing	Manufacture of sugar			48	Manufacture of chocolate, cocoa, and sugar confectionery	1544	234	25	Food products nec
20	Beverages and tobacco manufacturing	Manufacture of beverages and tobacco			49	Manufacture of prepared food	15430	236		
21	Textiles	Textiles	10	Textiles	50	Manufacture of food products nec	1549	239		
					51	Manufacture of soft drinks	15420	235	24	Sugar
					52	Manufacture of alcoholic beverages, beer, and tobacco products	15540	24	26	Beverages and tobacco products
					53	Spinning, winding, and interweaving of yarns (including wool)	1551 + 1552 + 1553 + 1600	24 + 25		
					54	Weaving of fabrics, Terry towels, and carpets	17 + 01404		27	Textiles
					55	Finishing of textiles				
					56	Manufacture of bedclothes, bedspreads, and of other textile products				
					57	Manufacture of knitted fabrics and knitted wearing apparel				
22	Wearing apparel	Wearing apparel: clothing, dressing, and dyeing of fur	11	Clothing	58	Manufacture of outerwear (except knitted)	18		28	Wearing apparel
23	Leather products	Manufacture of footwear, leather, and leather products	12	Manufacture of footwear, leather, and leather products	60	Tanneries	19		29	Leather products
24	Wood products	Wood and wood products (excluding furniture)	13	Wood and wood products (excluding furniture)	61	Manufacture of footwear and footwear articles of leather and its substitutes	20		30	Wood products
25	Paper products and publishing	Paper and cardboard, as well as products of printing and publishing	14	Paper and cardboard, and products thereof	62	Manufacture of products of leather and leather substitutes nec	21		31	Paper products, publishing
			15	Printing and publishing	63	Sawmills and manufacture of plywood	22			
					64	Manufacture of builders' carpentry and joinery, and of wood products nec				
26	Petroleum and coal products	Petroleum, coal products	16	Refined petroleum and its products	65	Basic manufacture of paper and cardboard	231, 232, 233		32	Petroleum, coal products
27	Chemical, rubber, and plastic products	Industrial chemicals, fertilizers, pesticides, and disinfectants	17	Industrial chemicals, fertilizers, pesticides, and disinfectants	66	Manufacture of paper and cardboard products			33	Chemical, rubber, plastic products
					67	Publishing of books, pamphlets, and other publications				
					68	Publishing of periodicals nec				
					69	Printing, publishing and reproduction of recorded media				
					70	Manufacture of refined petroleum and its products				
					71	Manufacture of basic industrial chemicals and fertilizers	2411, 2412, 2421			

No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
		Pharmaceutical products for human and veterinary uses, other chemicals Plastic products, rubber products, tires, and tubes	18	Petrochemicals and man-made fibers	72	Manufacture of pesticides and disinfectants	2413			
			19	Pharmaceutical products for human and veterinary uses	73	Manufacture of pharmaceutical products for human and veterinary uses	2423			
			20	Other chemicals	74	Manufacture of paints and varnishes	2422, 2424,			
					75	Manufacture of soap, detergents, and cosmetics	2429			
			21	Plastic products	76	Manufacture of chemical products nec	252			
					77	Manufacture of plastic boards and pipes				
					78	Manufacture of plastic sleeves and sheets				
					79	Manufacture of plastic containers and bottles, products from armoured plastic and plastic products for kitchen				
					80	Manufacture of plastic products for technical, agricultural and industrial uses				
					81	Manufacture of plastic products nec				
			22	Rubber products, tires, and tubes	82	Manufacture of rubber products, tires, and tubes	251			
28	Mineral products	Mineral non-metallic products	23	Mineral non-metallic products	83	Manufacture of glass, glass products, ceramic, and ceramic products	26		34	Mineral products nec
					84	Manufacture of cement and its products				
					85	Processing of stone and non-metallic mineral products nec				
29	Basic metal	Basic metal	24	Basic metal	86	Manufacture of basic iron and steel	2710 + 3710		35	Ferrous metals
					87	Manufacture of non-ferrous and precious metals	2720		36	Metals nec
					88	Foundries of iron, steel, and of non-ferrous metals	2731		35	Ferrous metals
					89	Manufacture of metal pipes	2732		36	Metals nec
					90	Manufacture of structural metal products, tanks, and steam boilers	2710 + 2720		37	Metal products
30	Metal products (excl machinery and equipment)	Metal products (excl machinery and equipment)	25	Metal products (excl machinery and equipment)	91	Metal coating	28			
					92	Manufacture of cutlery and cutting and hand tools				
					93	Manufacture of plumbing fixtures				
					94	Manufacture of tin ware products				
					95	Manufacture of wire and products thereof				
					96	Manufacture of metal products nec and ns				
					97	Manufacture of cars and motorcycles, and parts thereof				
31	Motor vehicles and parts	Manufacture of cars and motorcycles, and parts thereof	31	Manufacture of cars and motorcycles, and parts thereof	115	Manufacture of metal products nec and ns	34		38	Motor vehicles and parts
32	Transport equipment nec	Building and maintenance of ships, aircraft, and other transport equipment	32	Building and maintenance of ships, aircraft, and other transport equipment	116	Building and maintenance of ships, aircraft, and other transport equipment	34		39	Transport equipment nec
33	Electronic equipment	Manufacture of office machinery and computers, electronic components, and communication equipment	27	Manufacture of office machinery and computers	103	Manufacture of office machinery	30		40	Electronic equipment
					104	Manufacture of automatic data-processing machinery (computers)				
					108	Manufacture of electronic components and of electronic communication equipment	32			
					109	Manufacture of telecommunications equipment				
					110	Manufacture of data-communications equipment and of domestic electronic equipment				

No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
34	Machinery and equipment nec	Machinery and equipment nec, electric motors, and electric distribution apparatus	26	Machinery and equipment	99	Manufacture of general-purpose machinery, equipment, parts and maintenance thereof	29		41	Machinery and equipment nec
			100		100	Manufacture of agricultural and forestry machinery, parts and maintenance thereof				
			101		101	Manufacture of industrial machinery, parts and maintenance thereof, and of machinery for construction and road works, parts and maintenance thereof				
			102		102	Manufacture of domestic appliances				
		Medical and scientific equipment, medical equipment, and disposable and other medical articles	28	Electric motors and electric distribution apparatus	105	Manufacture of electric motors, generators and transformers, and maintenance thereof	31			
			30	Medical and scientific equipment	106	Manufacture of electricity distribution, and control apparatus				
					107	Manufacture of insulated wire and cables, cells and batteries				
					111	Manufacture of industrial equipment for control and supervision	33			
					112	Manufacture of medical and surgical equipment				
					113	Manufacture of instruments for measuring, testing, and navigating				
					114	Manufacture of optical instruments and photographic equipment				
			36	Medical equipment and disposable and other medical articles	121	Manufacture of medical equipment and disposable and other medical articles	3311			
35	Manufactures nec	Furniture, diamonds, jewellery, and goldsmith's and silversmith's articles, and miscellaneous manufacturing	33	Furniture	117	Manufacture of furniture (excluding metal and plastic furniture)	361		42	Manufactures nec
			34	Diamonds	118	Manufacture of metal and plastic furniture				
			35	Jewellery, and goldsmith's and silversmith's articles	119	Manufacture of diamonds	3691			
			37	Miscellaneous manufacturing	120	Manufacture of jewellery and goldsmith's and silversmith's articles	3691			
					122	Manufacture of toys and games as well as school and office supplies	369			
					123	Manufacture of musical instruments, sports goods, and products nec				
36	Electricity	Electricity	38	Electricity	124	Electricity	401		43	Electricity
37	Water	Water	39	Water	125	Water	41		45	Water
38	Construction	Residential building, other construction	40	Residential buildings	126	Residential buildings	45		46	Construction
			41	Other construction	127	Construction for agriculture and manufacturing				
					128	Construction for water supply and for electricity distribution				
					129	Buildings for public and business services (business buildings, hotels, institutions, etc.)				
					130	Buildings for transport and other construction works				
39	Trade services	Wholesale and retail trade, maintenance and repair of motor vehicles, accommodation services, and restaurants	42	Wholesale and retail trade	131	Wholesale and retail trade	50.51,52		47	Trade
			43	Maintenance and repair of motor vehicles	132	Maintenance and repair of motor vehicles	5020			
			44	Accommodation services and restaurants	133	Hotels and accommodation services	55		44	Gas manufacture and distribution
					134	Restaurant and dining services				
40	Transport and business services nec	Land transport, port and airport services, other transport services, and real estate activities	45	Land transport	135	Buses, taxis, underground railways, and cable cars	601 - 6022		48	Transport nec
					136	Trucks and trains				

No	Sector in the SAM	Detailed description	No.	Sectors in the 65 aggregation	No.	Sectors in the 162 aggregation	No. in ISIC Rev3	No. in CPC	No. in GTAP	Sectors in GTAP
		Renting of machinery and equipment and of personal and household goods	48	Port and airport services	139	Port and airport services	63		48	Transport nec
		Computerized data processing and commercial research, and other business services	49	Other transport services	140	Other transport services	60,63		48	Transport nec
			53	Real-estate activities	145	Real-estate activities	K,70		54	Business services nec
			55	Renting of machinery and equipment and of personal and household goods	147	Renting of machinery and equipment and of personal and household goods	K,71 6022		48	Transport nec
			56	Computerized data processing and commercial research	148	Computerized data processing and commercial research	K,72,73		54	Business services nec
			57	Other business services	149	Labour recruitment and security and cleaning activities	K,74			
					150	Legal and accounting services				
					151	Business consultation, market research, and public-opinion polling				
					152	Architectural, engineering, and other technical activities				
					153	Advertising and public-relation services				
					154	Photographic activities and other business activities nec				
41	Water transport	Water transport	46	Water transport	137	Water transport	61		49	Water transport
42	Air transport	Air transport	47	Air transport	138	Air transport	62		50	Air transport
43	Communication	Communications, post services, and courier activities	50	Communications, post services, and courier activities	141	Post and courier activities	64		51	Communication
44	Financial services and insurance, including imputed bank services and general expenses	Banking and other financial institutions, insurance, and social insurance funds	51	Banking and other financial institutions	143	Banking and other financial institutions	65,67		52	Financial services nec
			52	Insurance and social insurance funds	144	Insurance and social insurance funds	66		53	Insurance
			65	Imputed bank services and general expenses	162	Imputed bank services and general expenses	672		52	Financial services nec
45	Public Administration, defence, health, recreational, and other services	Public administration, education, and health services as well as welfare and social work (all non-profit institutions, general government, and commercial)	58	Public administration	155	Public administration	75		56	Public Administration, Defence, Education, Health
			59	Education services (non-profit institutions, general government, and commercial)	156	Education services (non-profit institutions, general government, and commercial)	80,9199			
			60	Health services (non-profit institutions, general government, and commercial)	157	Health services (non-profit institutions) general government, and commercial	851,852			
			61	Welfare and social work (non-profit institutions, general government, and commercial)	158	Welfare and social work (non-profit institutions, general government, and commercial)	853			
46	Recreational and other services	Recreational, cultural, and sporting activities, Sanitation services, services for households by domestic personnel, and other personal services, Social and community institutions as well as religious services	62	Recreational, cultural, and sporting activities	159	Recreational, cultural, and sporting activities	9211 - 9249		55	Recreational and other services
			63	Sanitation services, services for households by domestic personnel, and other personal services	160	Sanitation services, services for households by domestic personnel, and other personal services	90 93,95			
			64	Social and community institutions as well as religious services	161	Social and community institutions as well as religious services	91 93			
47	Dwellings	Dwellings: ownership of dwellings (imputed rents of houses occupied by owners)	54	Ownership of dwellings	146	Ownership of dwellings			57	Dwellings

Source: own compilation.

### Appendix 3: GAMS Code for Final Balance of the Micro SAM

After the manual balancing of the SAM, imbalances remain in commodity and activity accounts only, whereby the total of the imbalances is zero. These imbalances are balanced using the same GAMS code used to balance the labour-factor accounts,

Information on government, enterprise, capital, stock changes and ROW accounts as well as trade and transport margins is available on a highly disaggregated level from the original data. That is why these accounts are excluded from the final balancing process. This means entries in the micro SAM of these accounts are not altered.

As described in Section 3.3.1.2 this code is based on the SAMBAL code developed by Zenios et al. (1986). The program uses a  $m \times n$  nonnegative matrix  $X = [x_{ij}]$  and the positive vectors  $u_i^r$  and  $v_j^c$  of the orders  $m$  and  $n$ , respectively, as input. It determines a matrix  $X^*$  which is “close to”  $X$  under the conditions that  $\sum_j x_{ij}^* = u_i^r$  and  $\sum_i x_{ij}^* = v_j^c$ ; and  $x_{ij}^* > 0$  if and only if  $x_{ij} > 0$  (for all  $i,j$ ) to preserve zeros in the original matrix. This is called a “type 1” balancing problem and is described in Fofana et al. (2005).

In this case, the vectors  $u$  and  $v$  are the vectors of row and column totals of the matrix  $X^{15}$ , whereby to either one of their elements the imbalance between row and column accounts of the original SAM are added.

In this case the imbalance of commodity accounts was balanced by adding it to the row vector. This means that balance is achieved via adjusting intermediate and household consumption. This is preferred over adjusting the column totals and thus changing the make-matrix and a few tax accounts, as small absolute changes would be balanced by causing high percentage changes in few accounts. On the other hand, activity accounts are balanced by adjusting the column vector for similar reasons (Table A6).

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<sup>15</sup> This is the original SAM, excluding the Government-, Enterprise-, Capital-, Stock-Changes-, ROW-, and Margin-accounts.

**Table A6: Balancing Setup**

		A	C	D	E	G	N	O	P
		Commodities	Activities	Factors	Households	Indirect taxes	Row total $u_i$	$z_i$	$W_i$
1	Commodities	0	Intermediate consumption	0	Household consumption	Converted products subsidies	$\sum_j x_{ij} - s_j$	Imbalances of commodity accounts	$W_i - z_i$
3	Activities	Domestic output	0	0	0	Converted production subsidies		0	
4	Factors	0	Value added demand	0	0	0		0	
5	Households	0	0	Factor income	Inter-household transfers	0		0	
6	Factor taxes	0	Factor taxes on producers	0	0	0		0	
7	Indirect taxes	Products taxes	Production taxes	0	0	0		0	
8	Direct taxes	0	Social insurance payments by employers	0	Direct taxes and insurances	0		0	
14	Column total $v_j$	$\sum_i x_{ij}$							
15	$t_j$	0	Imbalances of activity accounts	0	0	0			
16	$v_j$	$v_j + t_j$							

Source: own compilation

SAM cells are occasionally negative which leads to problems. Instead of fixing them and thus excluding these cells from the balancing process, negative entries are converted to positive entries at the diagonally opposite position in the SAM. In other words, a payment of -USD 5 to i from j is regarded as a payment of + USD 5 to j from i. This manoeuvre preserves the row and column balance.

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