

S United Arab Emirates

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S.1 Introduction

This document describes the adaptation of the 2014 United Arab Emirates (UAE) Social Accounting Matrix (SAM) table for input to the Global Trade Analysis Project (GTAP). The paper is organized as follows. Section 2 briefly describes the source data. Section 3 discusses strengths and limitations of the published Social Accounting Matrix (SAM) data. Section 4 discusses the processing to correct anomalies in the raw data. Section 5 presents the mapping between the 28 UAE I-O sectors and the respective GTAP sectors that were submitted.

S.2 Data Sources

The primary raw input was 28-sector SAM data sourced by the Economic and Social Commission for Western Asia (ESCWA) and the Ministry of Economy in UAE. The 2014 SAM data was measured in millions United Arab Emirates Dirham (AED). Prima facie, the 2014 original SAM data satisfy the sectoral balance condition and contains most of the data ready for conversion to the GTAP format. These data include:

1. The SAM for UAE is a square matrix valued at basic prices containing: 28 activities, 28 commodities, 2 factors of production (labor and capital), government and enterprise accounts, final demand components including household consumption, government consumption, savings-investment, capital stock, and exports (rest of the world), and tax, subsidy, and margin accounts including indirect taxes, import taxes, direct taxes, subsidies on products, and trade and transport margins.
2. The UAE SAM is organized in a supply-use framework where the 28 activities can purchase from the 28 commodities as intermediate inputs (use matrix: commodity rows x activity columns) and produce commodity output (supply/make matrix: activity rows x commodity columns). Activities generate value-added by employing labor and capital. Commodities then flow to final uses, such as household consumption, government consumption, savings-investment, inventory changes and exports. The rest of world account captures both imports (commodity supply from abroad) and exports (commodity demand from abroad). In the SAM, government accounts record tax revenues, subsidies, and expenditures on commodity consumption, while enterprise accounts capture payments to labor and capital as part of value-added generation.
3. The initial UAE SAM satisfies fundamental accounting identities where each row total equals its corresponding column total. For commodities, total supply (domestic production plus imports, adjusted for taxes, subsidies, and margins) equals total demand (intermediate use plus final demand). For activities, total output equals total costs (intermediate input plus

value-added plus net production taxes). For factors and institutions, total income equals total expenditure.

S.3 Strengths and Limitations of the Original Input- Output Data

We have conducted several checks on the data. They include checks of the non-negativity condition and the balance conditions of the tables. We also check the plausibility of tax rates, and margin rates implied in the data, and the structure of industries' costs and sales. This section discusses the strengths and limitations of the data. The procedures that we used to address these limitations are discussed in the next section.

Strengths

1. In the previous section we saw that the original data contains detailed supply and use data for 28 commodities and activities. Specifically: (a) detailed tax structure: the SAM distinguishes between multiple tax instruments with separated tax data for domestic and imported commodities; (b) explicit margin reconciliation with trade and transport margins as a separate account; (c) no large tax rates over 100%.
2. The tables are balanced.

Limitations

1. The original SAM, developed with the UAE's Ministry of Economy based on official Supply-Use table, includes only one sector related to agriculture called: agriculture, forestry, and fishing. The sector has been disaggregated into the three sub-sectors required by GTAP: forestry, fishing, and agriculture. The estimation of the new technological coefficients has been based on available micro data but not official data. Therefore, the disaggregation of the agricultural sector is not based on formal data.
2. The UAE data is highly aggregated into 28 sectors, requiring further disaggregation afterward.
3. There are non-zero flows for changes in inventories of services, and there are margins and taxes on the service sector, other services activities. Generally, these flows should be zeros, because services cannot be stored.
4. The SAM does not distinguish between capital and land rentals. There is a single operating surplus vector.
5. Although dwellings should primarily use capital and labor to produce housing services consumed by households, this SAM shows an inconsistent aggregate structure: 37% of inputs come from capital, 25% from labor, while only 32% of the output is sold to households. However, the data for dwellings is entirely sourced from the official input-output table.

S.4 Data Processing

In this section we discuss the adjustments procedures, the additional data sources, and the assumptions that we adopt to address the data issues described in the previous section.

1. We start by verifying the initial data. A balance check was performed to confirm that total sales equaled total costs. A sign check was then conducted to ensure that all intermediate and value-added inputs to production were non-negative, and that all final demand components (except changes in stocks, but including imports) were also non-negative. Additionally, we confirmed that there were no entries for value-added, production taxes, or domestic commodity taxes in the final demand or import categories. Finally, we verified that the final demand categories were ordered in the following order: Investment, Consumption, Government, Changes in Stocks, and Exports, and that the value-added categories were ordered as: Labor, Capital, and Land (which in our case is an empty vector).
2. Since the initial data does not distinguish between the use of domestic products and imports, but this separation is required by GTAP, we had to create separate matrices for the use of domestic products and imports. To express the import matrix at producers' prices, consistent with the domestic product matrix, we calculated import values at producers' prices as the sum of the CIF value, import duties, and commodity taxes. These vectors were combined to obtain total imports at producers' prices by commodity. We then allocated these import values across users under the assumption that imports are zero for exports and that the import share is uniform across all other domestic users. The import share was calculated as import matrix was derived by multiplying the domestic use matrix by the import share.
3. The next step was to separate taxes from the total commodity flows. Since commodity flows are measured at producers' (tax-inclusive) prices, we decomposed them into basic values and tax components. Normally two taxes matrices are required: one for domestic products and one for imports, each indexed by commodity and user. However, since the initial data only provided tax information as vectors, we assumed that the tax-to-value ratio at producers' prices was uniform across the missing index. This ratio was calculated for each commodity and source (domestic production or import). To be able to have uniform or non-uniform tax rates across different uses we follow the same approach as with imports.
4. The final step was to convert the data from the previous stages into the GTAP-compatible format. This step involved only reformatting of the data, with no additional assumptions.

S.5 Converting the UAE IO table into GTAP Format

IO Table COM x COM

GTAP requires input-output tables in a commodity-by-commodity format. Since our initial I-O table is already structured in this way, no further conversion was necessary for this component.

Mapping Between UAE I-O Sectors and GTAP Sectors

The 28 sectors of the UAE input-output table were aligned with 28 corresponding GTAP sectors, with certain sectors combined by aggregating multiple original GTAP sectors where necessary.

S.6 Checking Sectoral Balance and Non-negativity Conditions

After converting the UAE input-output tables into the format required by the GTAP Data Base, we carried out sectoral balance and non-negativity checks. The revised database successfully passed both the sectoral balance verification and the non-negativity criteria.

Table 8.35: Concordance between 28 UAE I-O sectors, GTAP aggregated 28 sectors and the original GTAP sectors in the Contributed table

28 Sectors - Initial table	28 GTAP sectors	Original GTAP sectors
AGR	agr	pdr; wht; gro; v_f; osd; c_b; pfb; ocr; ctl; oap; rmk; wol
FOR	frs	frs
FISH	fsh	fsh
MIFE	extr	coa; oil; gas; oxt
FOOD	food	cmt; omt; vol; mil; pcr; sgr; ofd; b_t
PETR	tex	tex
CHEM	wap	wap
META	lea	lea
MACH	omach	lum; ppp
TEXT	p_c	p_c
APPA	chem	chm; bph; rpp
LEAT	metals	nmm; i_s; nfm; fmp
OTMN	mach	ele; eeq; ome; mvh; otn; omf
ELWA	energ	ely; gdt; wtr
CONS	cons	cns
WRTR	trd	trd
ROTR	otp	otp
WATR	wtp	wtp
AITR	atp	atp
STOR	whs	whs
ACCO	afs	afs
PUBL	ros	ros
COMM	cmn	cmn
FINA	fin	ofi; ins
ADMI	osg	osg
EDUC	edu	edu
HEAL	hht	hht
OTSE	serv	dwe