

14.8

Morocco

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14.8.1 The original input-output (I/O) table

The purpose of this section is to describe the source and the procedures used to prepare the I/O data base for the Moroccan economy for the Global Trade Analysis Project (GTAP) version 4 data base. The original source for the Moroccan I/O table was obtained from the OECD publication: "A Detailed Input-Output Table for Morocco, 1990", authored by Maurizio Bussolo and David Roland-Holst. This table details the intermediate deliveries, value-added, and final demand for 133 Moroccan production activities. Agriculture is disaggregated into 23 sectors, in addition to 102 other primary and manufacturing sectors and 8 service sectors. This 133-sector table was constructed on the basis of a more aggregated 1990 I/O table developed by the Ministry of Industry with 33 sectors, 7 of which are in agriculture, 18 in industry, and 8 in services (see Bussolo and Roland-Holst, (1993) for a description of the disaggregation procedures used to derive the 133 sector I/O table).

The 133-sector I/O table is reported as a matrix of transactions. The units of accounts are millions of 1990 Moroccan Dirhams (DH). The columns show the values of intermediate inputs absorbed by the industries, value added as payments to primary inputs and indirect tax, aggregate value of imports, tariff or subsidy by sector, as well as a separate entry for (commercial) margins. The indirect taxes are inclusive of any production subsidies, while factor payments to labor include non-wage social costs. The rows show the distribution of products into various industries and final demand categories. The latter consists of: private final consumption, investment, change in stocks, public consumption (government), and exports. Government consumption was not sectorally disaggregated. Imports, exports, and tariff data were reported at the aggregate level. Tariffs were calculated by applying the basic tariff rate against *cif* import values and subtracting exemptions.

14.8.2 Mapping procedure

The first set of changes to the I/O data was to map the 133 sectors in the original table into the 50 GTAP sectors. There were three types of changes to be made: 1) aggregation of sectors; 2) disaggregation of sectors; and 3) addition of GTAP sectors not reported in the original Moroccan I/O table. The aggregation of multiple sectors into a single GTAP sector was performed last. Disaggregation of sectors included separating the crude petroleum sector into three separate sectors: coal, oil, and gas. The split was based on shares derived from OECD data on energy consumption using Mexico as a proxy for Morocco. Even though Mexico is an oil exporter, Mexico was chosen over Turkey (an oil-importing economy like Morocco) because Turkey had an unusually high share of coal in its energy consumption (54% for 1990). Another sector to be split was utilities reported in the Moroccan I/O as electricity, but in GTAP sectors this required the addition of water and gas. Due to lack of available data on water and gas, these sectors were added to the electricity sector based on relative shares taken from Turkish I/O table (for 1990). Another GTAP sector not reported in the Moroccan I/O was dwelling. Here again this sector was estimated using the share of total value of dwelling to final private consumption from the Turkish I/O table.

In order to match the original sectoral break up in the Moroccan I/O table with GTAP sectors, a preliminary aggregation/disaggregation procedure was performed using a utility program DAGG developed by Mark Horridge of the Center of Policy Studies at Monash University. The end result was a transformation of the 132-sector I/O table (excluding “Public Administration” used as final government consumption column) into a 45-sector I/O table. The mapping between the two tables is reported in table 14.8.1. The agricultural sectors such as “livestock products” and “meat products” were not disaggregated due to a lack of reliable data to perform the split. Likewise the two GTAP sectors “Electronic equipment” and “Machinery and equipment n.e.c.” were treated as one sector in the transformed 45-sector I/O table.

14.8.3 Other data adjustments

To create the necessary header arrays to concord with the GTAP data base structure (Huff and McDougall, 1996), several adjustments to the I/O table data were needed. The first adjustment was to rearrange the “margins” row, reported in the original table as a separate row. In the original I/O table, values of intermediate usage reflect point of use and not point of production. That is the values in the commodity matrix include the marketing, transport, and trade margins.

In order to delete the “margins” row while maintaining the balance flow the following procedure was performed. Each row of the intermediate inputs was split uniformly using a ratio of

“margins/total resource use” (total column sum). The column sum of the “computed margins” was added to an existing intermediate flow called “commerce” while the original “margins” row was deleted.

In the original I/O table, indirect taxes and imports were provided as an aggregate in a single row. As such, it was presumed that the original intermediate value flow was inclusive of commodity taxes and combined both domestic and import sources. The next task was to split the basic values of intermediate use into pre-tax values and commodity taxes. A procedure was adopted which is similar to the one used to split the “margins” matrix into two matrices. In making the uniform split of each intermediate row, the ratio of indirect tax over total resources (column sum) was used. Admittedly, the resulting tax data may not reflect the actual picture. But the compounding of taxes in most of the transactions data makes distinctions between producer prices, consumer prices, and the underlying spectrum of fiscal instruments and distortions difficult.

For commodity taxes on household consumption, no taxes were imputed to agricultural commodities and inputs, while negative taxes (subsidies) were imputed to cereals, sugar, oilseeds sectors based on estimates from Morocco’ tariff submissions to GATT. For the other sectors the imputed value added tax rates were taken from Mackenzie et al. (1997). The VAT rates were set at 20% for manufacturing; 14% for construction and services, and 7% for utility services (water, electricity and gas) and petroleum products. A zero tax rate was imputed to food sectors, retail sectors and equipment goods. These rates were taken from the Ministry of Commerce publications. Taxes on government usage, exports, and change in stocks were assumed to be zero.

To create the import matrix, a similar approach was followed as with the commodity tax matrix. Since imports were reported as a single aggregate value for each sector, the ratio of imports/total usage was used as a basis for splitting the basic commodity matrix and the basic tax matrix into four matrices: “intermediate domestic use”, intermediate import use” “commodity tax for domestic use” and commodity tax for import use”. In addition, household consumption and investment were also split between the domestic and import sources. For consumption, the split was based on the import share of consumption (or ratio of consumption by commodity and total import value on consumption). As to investment, the split was based on the ratio of total import over total domestic usage. The same ratio was used to split stocks between domestic and import sources. The single tariff row in the original matrix was used to represent header array AI27 for import duty (see Huff and McDougall, 1996).

References

Bussolo Maurizio and D. Roland-Holst. "A Detailed Input-Output Table for Morocco, 1990".

OECD Technical Paper. No. 90. OECD. Paris 1993.

Huff K. and R. McDougall. "Contributing Input-Output Tables to the GTAP Data Base." GTAP

Technical Paper No. 1. November 1996.

Mackenzie, G.A., D.W.H. Orsmond, and P.R. Gerson. "The Composition of Fiscal Adjustment and Growth: Lessons from Fiscal Reforms in Wight Economies," Occasional Paper 149, IMF;

Washington DC. March 1997.

Table 14.8.1 Mapping from 132 sectors in Moroccan I/O table to 50 GTAP sectors

Moroccan I/O sectors		GTAP (GSC 1) sectors	
5	Rice	1	Paddy rice
1	HardWheat	2	Wheat
2	SoftWheat	2	
3	Barley	3	Cereal grains n.e.c.
4	Maize	3	
12	Vegetables	4	Vegetables, fruits, nuts
15	Citrus	4	
16	Olives	4	
17	Grapes	4	
18	Dates	4	
19	Almonds	4	
20	Otherfruit	4	
10	Oilseeds	5	Oil seeds
8	Sugar beets	6	Sugar cane, sugar beet
9	sugarcane	6	
11	Rawfibre	7	Plant-based fibers
47	Cotton	7	
6	Legumes	8	Crops n.e.c.
13	Alfalfa	8	
14	Bersim	8	
21	Other agriculture	8	
7	Livestock	9	Bovine cattle
		10	Animal products n.e.c.
		11	Raw milk
46	Wl_AnimFb	12	Wool, silk-worm cocoons
22	Forestry	13	Forestry
23	Fishing	14	Fishing
27	CrudePetro	15	Coal
		16	Oil
		17	Gas
24	Phosphates	18	Minerals n.e.c.
25	NonMetMin	18	
26	MetMin	18	
35	MeatPorc	19	Bovine cattle, sheep, goat, horse meat product
		20	Meat products n.e.c.
40	AnimalFeed	21	Vegetable oil and fats
36	ProcDairy	22	Dairy products
		23	Processed rice
32	RefinSugar	24	Sugar
30	Milling	25	Food products n.e.c.
31	Baking	25	
33	Candy	25	
34	FrcFrt_Veg	25	
37	Mt_VgByPr	25	
38	ProcSeafoo	25	
39	OthFoodPrc	25	
41	Brewing	25	
42	Wine	26	Beverages and tobacco products
43	Spirits	26	

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Table 14.8.1 Mapping from 132 sectors in Moroccan I/O table to 50 GTAP sectors (continued)

Moroccan I/O sectors		GTAP (GSC 1) sectors	
44	NonAlBev	26	
45	Tobacco	26	
48	Silk	27	Textiles
49	OthTextile	27	
50	Haberdash	27	
51	Carpets	27	
52	Hosiery	28	Wearing Apparel
53	Shirts	28	
54	Trousers	28	
55	TailorGarm	28	
56	Tanning	29	Leather products
57	Leath_Sub	29	
58	Shoes	29	
59	Lumber	30	Wood products
60	VeneerPanl	30	
61	WoodFrmMb	30	
62	WoodPack	30	
63	Furniture	30	
64	OtherWood	30	
65	PulpNwpCdb	31	Paper products, publishing
66	PaperPr	31	
67	Printing	31	
		28	RefinPetro
		32	Petroleum, coal products
112	Chemicals	33	Chemical, rubber, plastic products
113	FertilizPe	33	
114	Resines	33	
115	Paint	33	
116	Pharmaceut	33	
118	OtherChem	33	
119	Tires	33	
120	RubberObj	33	
121	PlasticObj	33	
68	Ceramics	34	Minerals products n.e.c.
69	Glass	34	
70	Stone	34	
71	Cemt_Pist	34	
72	OthAggiomm	34	
73	Marble	34	
74	Abrasives	34	
75	Iron_Steel	35	Ferrous metals
76	NonferMet	36	Metals n.e.c.
77	SteelCutel	37	Metals products
78	MetalFurnt	37	
79	Forged_Too	37	
80	MetalPack	37	
82	Pipes_Tube	37	

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Table 1.8.1 Mapping from 132 sectors in Moroccan I/O table to 50 GTAP sectors (continued)

Moroccan I/O sectors		GTAP (GSC 1) sectors	
84	OthMetalPr	37	
92	PrivateVeh	38	Motor vehicles and parts
93	TrucksEtc	38	
94	Motocycles	39	Transport equipment
95	FreightCar	39	
96	ShipBulld	39	
97	Aircraft	39	
98	OthTranEqp	39	
		40	Electronic equipment
81	Wire	41	Machinery and equipment n.e.c.
83	HomeUtensi	41	
85	Moto_Turb	41	
86	AgMach	41	
87	MetWdMch	41	
88	MinCstrMch	41	
89	SpecinddMc	41	
90	GenlindMch	41	
91	OtherMach	41	
99	EleMot_Gen	41	
100	Elec_Eqp	41	
101	SignalEqp	41	
103	OthEleEqp	41	
104	DomestAppl	41	
105	Elect_Wire	41	
106	Batt_Accum	41	
107	LightEquip	41	
108	Weighlinst	41	
109	Prec_Inst	41	
110	PhotoProd	41	
111	Watches	41	
122	Jewelery	42	Manufactures n.e.c.
123	MusicalIns	42	
124	SportGames	42	
125	OfficeAccs	42	
117	Toiletry	42	
29	Electricity	43	Electricity
		44	Gas manufacture, distribution *
		45	Water *
126	Construction	46	Construction
127	Commerce	47	Trade, transport
128	Transport	47	
129	Communication	47	
130	Banking	48	Financial, Business, recr. services
131	Insurance	48	
102	RadioTV	48	
132	OthService	49	Public Admin., defense, education, health service
		50	Dwellings*

*: Sectors not reported in the original Moroccan I/O table.