

Turkey

Mustafa Acar

1. *The Original Input-Output Table*

The source table for Turkey's input-output (I-O) table is "The Input-Output Structure of the Turkish Economy 1998," published by the State Institute of statistics¹ in May 2004. The 1998 I-O table has 97 sectors presented as commodity by industry.² All transactions are reported in millions of Turkish Lira (TL). Several separate matrices are reported in the 1998 I-O tables. These include 1) The Supply Table (in terms of basic and consumers' prices), 2) The Use Table (consumers' prices), 3) Trade Margins Table, 4) Transportation Margins Table, 5) Net Tax Matrix, 6) The Use Table (basic prices), 7) Input-Output Table (basic prices), 8) Domestic Input-Output Matrix (basic prices), 9) Import Input-Output Table (basic prices), 10) Coefficient Matrix, 11) Leontief Inverse Coefficients Matrix.

The I-O matrix records total transactions, or the flows of goods and services among industries. The table is organized in such a way that the columns show the values of the inputs absorbed by the industries and payments to primary inputs, whereas the rows show the distribution of products into various industries and final demand categories.

In the 1998 I-O table GDP is given at basic prices. As far as the income approach is concerned this measure of GDP is the sum of all income payments accruing to the factors of production excluding net indirect taxes, i.e. taxes minus subsidies. Import tariffs are added to this value in order to obtain GDP at market prices.

The final uses of GDP have been classified into six categories: 1) private final consumption expenditures, 2) public final consumption expenditures, 3) private fixed capital formation, 4) public fixed capital formation, 5) change in stocks, and 6) exports. Imports are reported at *cif* values and they are exclusive of import duties. Exports are given at ex-factory prices. Indirect taxes are not distinguished as commodity taxes and other indirect taxes.

Gross and net value added (both at factor cost) are given as row vectors. The break-up of net value added into returns to labor and capital is not available from the I-O table.

2. *Turkish I-O table for GTAP*

In the first step, the 97-sector original Turkish I-O table was aggregated up to 46-sector table in partial concordance to GTAP. Table 1 shows the mapping between the sectors from the original table (97 sectors) to the aggregated table (46 sectors). Table 2 shows the mapping between the 46 Turkish sectors into 57 GTAP sectors. After mapping 97x97 original I-O table to 46x46 GTAP-adjusted I-O table and modifications for taxes and the shares of primary factors of production with the help of supplementary data, there emerged some minor balance problems—i.e. total sales

¹ The institution has been reorganized and named Turkish Statistical Institute (TURKSTAT) since 2005.

² Therefore in the I-O table rows show output disposition of a commodity, and columns show input composition of an industry.

were not exactly equal total costs. Balance condition is satisfied, then, by modifying “change in stocks” column.

Twenty-seven matrices have been reported with GTAP sectoral classification: AI01-AI27 as specified in GTAP Technical Paper No. 1 (Huff, McDougall, and Walmsley, 2000), including intermediate usage of domestic products and imports, investment usage of domestic products and imports, household consumption of domestic products and imports, government consumption of domestic products and imports, change in stocks of domestic products and imports, exports, commodity tax on intermediate usage of domestic products and imports, commodity tax on household consumption of domestic products and imports, commodity tax on investment usage of domestic products and imports, commodity tax on government consumption of domestic products and imports, commodity tax on exports, commodity tax on change in stocks of domestic products and imports.

As far as the data on factors of production are concerned, no information was available in the original I-O table regarding the employment of land. The data available on employment of labor (“compensation of employees”) and operating surplus—which supposedly include payments to all other factors of production—were distributed among land, labor and capital based on the shares provided by GTAP Data Base version 6.0, Yeldan and Köse (1996) and Voyvoda and Yeldan (2001).

There was one composite sector to be split into two single sectors to meet the GTAP sectoral requirement: crude petroleum and natural gas. The following procedure was implemented to split it into “oil” and “gas” by using the information provided by TURKSTAT.

Disaggregating energy sectors	
GTAP sectors	Turkish sectors
16 Oil	.93 * TUR 9: crude petroleum and natural gas
17 Gas	.07 * TUR 9: crude petroleum and natural gas

Table 1. Mapping from 97-sector original I-O Table to 46-sector interim I-O table

	Turkish (97-sector)		Turkish/GTAP (46-sector)
1	growing of cereals and other crops nec	1	Rice, wheat, crops nec
2	growing of vegetables, horticultural specialties and nursery products	2	vegetables, fruits, nuts
3	growing of fruit, nuts, beverage and spice crops		
4	farming of animals	3	animal husbandry
5	agricultural and animal husbandry services		
6	forestry	4	forestry
7	fishing	5	fishing
8	mining of coal and lignite	6	coal
9	crude petroleum and natural gas (93%)	7	oil
9	crude petroleum and natural gas (7%)	8	gas
10	mining of metal ores	9	minerals n.e.c.
11	quarrying of stone, sand and clay		
12	mining and quarrying nec		
13	production, processing and preserving of meat and meat products	10	meat products
16	vegetable and animal oils and fats	11	vegetable oils and fats
17	dairy products	12	dairy products
21	sugar	13	sugar
14	production and preserving of fish and fish products	14	food products nec
15	processing and preserving of fruits and vegetables		
18	grain mill products, starches and starch products		
19	prepared animal feeds		
20	bakery products		
22	other food products nec		
23	alcoholic beverages	15	beverages and tobacco products
24	soft drinks and mineral waters		
25	tobacco products		
26	manufacture of textiles	16	textiles
27	manufacture of other textiles		
28	manufacture of knitted and crocheted fabrics and articles		
29	manufacture of wearing apparels except fur	17	wearing apparel
30	dressing and dyeing of fur, man of fur products		
31	tanning and dressing of leather, luggage, handbags	18	leather products
32	manufacture of footwear		
33	sawmilling and planing of wood and wood products	19	wood products
34	man. of wood and wood products		
35	man. of paper and paper products	20	paper products, publishing

Turkish (97-sector)		Turkish/GTAP (46-sector)	
36	publishing		
37	printing and printing services		
38	man. of coke, refined petroleum products	21	petroleum, coal products
39	man. of basic chemicals, plastics in primary forms, synthetics rubber	22	chemical, rubber, plastic products
40	man. of fertilizers and nitrogen compounds		
41	manufacture of pesticides, other agro-chemicals and paints, varnishes		
42	manufacture of pharmaceuticals, medicinal chemicals and botanical products		
43	manufacture of cleaning materials, cosmetics and other chemicals and man-made fibers		
44	manufacture of rubber products		
45	manufacture of plastic products		
46	manufacture of glass and glass products	23	mineral products n.e.c.
47	manufacture of ceramic products		
48	manufacture of cement, lime and plaster related articles these items.		
49	Cutting and finishing of stone and man. of other non-metallic mineral products n.e.c.		
50	Manufacture of basic iron and steel	24	ferrous metals
51	man of basic precious and non-ferrous metals	25	metals nec
52	Casting of metals	26	metal products
53	Manufacture of fabricated metal products, tanks, reservoirs and steam generators.		
54	Manufacture of other fabricated metal products; metal working service activities		
55	Manufacture of general purpose machinery	30	machinery and equipment n.e.c.
56	Manufacture of special purpose machinery		
57	Manufacture of domestic appliances n.e.c.		
58	Manufacture of office, accounting and computing machinery	29	electronic equipment
59	Manufacture of electrical machinery and apparatus n.e.c.		
60	Manufacture of radio, television and communication equipment and apparatus		
61	Manufacture of medical, precision and optical instruments, watches and clocks	30	machinery and equipment n.e.c.
62	Manufacture of motor vehicles, trailers and semi-trailers	27	motor vehicles and parts
63	Building and repairing of ships, pleasure and sporting boats	28	transport equipment nec
64	Manufacture of railway and tramway locomotives and rolling stock		
65	Manufacture of aircraft and spacecraft		
66	Manufacture of transport equipment n.e.c.		
67	Manufacture of furniture	31	manufactures nec
68	Manufacturing n.e.c.		
69	Production, collection and distribution of	32	electricity

	Turkish (97-sector)		Turkish/GTAP (46-sector)
	electricity		
70	Manufacture of gas; distribution of gaseous fuels through mains	33	gas manufacture, distribution
71	Collection, purification and distribution of water	34	water
72	Construction	35	construction
73	Sale, maintenance and repair of motor vehicles, motorcycles; retail sale of fuel	36	trade
74	Wholesale trade and commission trade, except for motor vehicles and motorcycles		
75	Retail trade, except for motor vehicles and motorcycles		
76	Hotels, camping sites and other provision of short-stay accommodation		
77	Restaurants, bars and canteens		
78	Transport via railways	37	transport nec
79	Land transport; transport via pipelines		
80	Water transport	38	water transport
81	Air transport	39	air transport
82	Supporting and auxiliary transport activities; activities of travel agencies	37	transport nec
83	Postal services and telecommunication	40	communication
84	Financial intermediation, except insurance and pension funding	41	financial services
85	Insurance and pension funding, except compulsory social security	42	insurance
86	Real estate activities	43	business services nec
87	Renting of machinery & equip. without operator and of personal and household goods		
88	Computer and related activities		
89	Research and development		
90	Other business activities		
91	Education	45	public adm. and defense, education, health
92	Health and social work		
93	Activities of membership organizations n.e.c auxiliary to financial intermediation		
94	Recreational, cultural and sporting activities	44	recreational and other services
95	Other service activities		
96	Public administration and defence; compulsory social security	45	public adm. and defence, education, health
97	Ownership of dwelling	46	dwellings

Table 2. Mapping from 46 Turkish sectors to 57 GTAP sectors

Turkish/GTAP		GTAP	
1	rice, wheat, crops nec	1	pdr
1	rice, wheat, crops nec	2	wht
1	rice, wheat, crops nec	3	gro
2	vegetables, fruits, nuts	4	v_f
1	rice, wheat, crops nec	5	osd
1	rice, wheat, crops nec	6	c_b
1	rice, wheat, crops nec	7	pbf
1	rice, wheat, crops nec	8	ocr
3	animal husbandry	9	ctl
3	animal husbandry	10	oap
3	animal husbandry	11	rmk
3	animal husbandry	12	wol
4	forestry	13	for
5	fishing	14	fsh
6	coal	15	col
7	oil	16	oil
8	gas	17	gas
9	minerals n.e.c.	18	omn
10	meat products	19	cmt
10	meat products	20	cmt
11	vegetable and animal oils and fats	21	vol
12	dairy products	22	mil
14	food products n.e.c.	23	pcr
13	sugar	24	sgr
14	food products n.e.c.	25	ofd
15	beverages and tobacco products	26	b_t
16	textiles	27	tex
17	wearing apparel	28	wap
18	leather products	29	lea
19	wood products	30	lum
20	paper products and publishing	31	ppp
21	petroleum, coal products	32	p_c
22	chemical, rubber, plastic products	33	crp
23	mineral products n.e.c.	34	nmn
24	iron and steel	35	i_s
25	metals n.e.c.	36	Nfm
26	metal products	37	fmp
27	motor vehicles and parts	38	mvh
28	transport equipment n.e.c.	39	otn
29	electronic equipment	40	ele

Turkish/GTAP		GTAP	
30	machinery and equipment n.e.c.	41	ome
31	manufactures nec	42	omf
32	electricity	43	ely
33	gas manufacture, distribution	44	gdt
34	water	45	wtr
35	construction	46	cns
36	trade	47	trd
37	transport nec	48	otp
38	water transport	49	wtp
39	air transport	50	atp
40	communication	51	cmn
41	financial services nec	52	ofi
42	insurance	53	isr
43	business services nec	54	obs
44	recreational and other services	55	ros
45	public adm. and defence, education, health	56	osg
46	dwellings	57	dwe

Table 3. Summary of the Sectoral Concordance

Sectors	TR/GTAP	GTAP SC	Turkish_I-O
Rice, wheat, crops nec	01	1,2,3,5,6,7,8	1
Vegetables, fruits, nuts	02	4	2,3
Animal husbandry	03	9,10,11,12	4,5
Forestry	04	13	6
Fishing	05	14	7
Coal	06	15	8
Oil	07	16	9
Gas	08	17	9
Minerals nec	09	18	10,11,12
Meat products	10	19,20	13
Vegetable oils and fats	11	21	16
Dairy products	12	22	17
Sugar	13	24	21
Food products nec	14	23,25	14,15,18,19,20,22
Beverages and tobacco products	15	26	23,24,25
Textiles	16	27	26,27,28
Wearing apparel	17	28	29,30
Leather products	18	29	31,32
Wood products	19	30	33,34
Paper products, publishing	20	31	35,36,37
Petroleum, coal products	21	32	38
Chemical, rubber, plastic products	22	33	39,40,41,42,43,44,45
Mineral products nec	23	34	46,47,48,49
Ferrous metals	24	35	50
Metals nec	25	36	51
Metal products	26	37	52,53,54
Motor vehicles and parts	27	38	62
Transportation equipment nec	28	39	63,64,65,66
Electronic equipment	29	40	58,59,60
Machinery and equip nec	30	41	55,56,57,61
Manufactures nec	31	42	67,68
Electricity	32	43	69
Gas manufacture, distribution	33	44	70
Water	34	45	71
Construction	35	46	71
Trade	36	47	73,74,75,76,77
Transport nec	37	48	78,79,82
Water transport	38	49	80
Air transport	39	50	81
Communication	40	51	83
Financial services	41	52	84
Insurance	42	53	85
Business services nec	43	54	86,87,88,89,90
Recreation and other services	44	55	94,95
Public services	45	56	91,92,93,96
Dwellings	46	57	97

References

- Huff, K., R. McDougall, and T. Walmsley. 2000. "Contributing Input-Output Tables to the GTAP Data Base," *GTAP Technical Paper*, No. 1, Release 4.2, GTAP: Purdue University, USA. <https://www.gtap.agecon.purdue.edu/resources/download/1916.pdf> .
- Yeldan, E. and A. Köse. 1996. "Türkiye Ekonomisinde Sektörel İsgücü İstihdami ve Ücret Yapısı Üzerine Bir Deneme" (A Study on the Sectoral Employment and Wage Structure in the Turkish Economy), *İktisat, İşletme ve Finans*, 11(118): 11-25.
- Voyvoda, E. and E. Yeldan. 2001. "Patterns of Productivity Growth and the Wage Cycle in Turkish Manufacturing," *International Review of Applied Economics*, 15(4): 375-396.