

11.E

Korea

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11.E.1 Introduction

This chapter documents the procedure and considerations underlying the construction of the Korean input-output (*I-O*) table for version 5 of the Global Trade Analysis Project (*GTAP*) data base. The documentation is organized as follows. Section 2 provides a short description of the general characteristics of the Korean I-O table. Section 3 shows how the Korean I-O table is mapped to the GTAP concordance. Section 4 and 5 explain how negative values in the initial Korean I-O table are adjusted and commodity taxes on imports are calculated, respectively. In the final section, information not available from the Korean I-O table is mentioned.

11.E.2 Data Source

The Korean I-O table used for version 5 of the GTAP data base is compiled by the Bank of Korea in Seoul (The Bank of Korea, 1998). The reference year of the Korean I-O table is 1995 and the units of accounts are million Korean won. The Korean I-O table is grouped commodity by commodity and includes 402 sectors. Two different kinds of tables are available: a transactions table at producer's prices and a transactions table of imported goods and services. The transactions table of domestic goods and services was obtained by subtracting the second table (transaction table of imports) from the first table (transaction table of total uses). Before doing this, however, negative values in the tables were adjusted.

The matrix of final demand in the transactions table of domestic products and that of the transactions table of imports include private consumption expenditure, government consumption expenditure, gross private fixed capital formation, gross government fixed capital formation, change in stocks, and exports (of course, the transactions table of imports doesn't include a column of exports). Gross government fixed capital formation was added to gross private fixed capital formation to create a vector of investment usage of domestic products and a vector of investment usage of imports.

The matrix of value added in the transactions table at producer's prices includes compensation of employees, operating surplus, depreciation of fixed capital, indirect taxes and (less) subsidies. Depreciation of fixed capital was added to operating surplus to obtain a vector of employment of capital. Subsidies were subtracted from indirect taxes to get a vector of net non-commodity indirect taxes.

11.E.3 Commodity Concordance

Table 11.E.A1 in the Appendix shows how the sectoral classification of the Korean I-O table is mapped to the GTAP sectoral classification (GSC2). Since the Korean I-O table is more disaggregated than the GTAP sectoral classification in all sectors except for three sectors (sector 6: sugar cane, sugar beet; sector 9: bovine cattle, sheep and goats, horses; sector 12: wool, silk-worm cocoons) it easily fulfills the requirements of GSC2.

There are neither domestic production nor imports of sugar cane and sugar beet, nor their imports in Korea. Wool and silk-worm cocoons are included in sector 22 (other livestock breeding) of the Korean I-O table. Beef cattle is treated as a sector (sector 19) in the Korean I-O table, but sheep and goats, and horses are also included in the sector 22 (other livestock breeding). Therefore, sector 22 (other livestock breeding) of the Korean I-O table had to be split in consistence with the GSC2. The splits of sector 22 of the Korean I-O table are shown in table 11.E.1.

Table 11.E.1 Splits of Sector 22 (Other Livestock Breeding) to be Consistent with GSC2

GTAP (GSC2)	Korean I-O table
09 Bovine Cattle, sheep and goats, horses	19 Beef cattle
	22* Other livestock breeding
10 Animal products nec	20 Swine
	21 Poultry and eggs
	22* Other livestock breeding
12 Wool, silk-worm cocoons	22* Other livestock Breeding

Note: The * signifies the sector affected by the split.

The split of sector 22 of the Korean I-O table (the transactions table of domestic products and that of imports) was estimated on the basis of value of domestic output and imports of sheep and goats, horses, wool, silk-worm cocoons, and other livestock products as shown in table 11.E.2.

Table 11.E.2 Shares of Splits of Sector 22 (Other Livestock Breeding)

	Domestic Production		Imports	
	Value	Share (%)	Value	Share (%)
Sheep and goats	19612	7.38	217	0.05
Horses	1693	0.64	6446	1.47
Wool	95	0.04	184755	42.24
Silk-worm cocoons	1711	0.64	6496	1.49

Source: The Bank of Korea (1998), *Input-Output Tables (1970 ~ 1995)*, CD-ROM.

11.E.4 Adjustment of Negative Values

In the initial Korean I-O table, there are negative values in the intermediate usage of domestic products, household consumption of domestic products, and investment usage of domestic products. This is mostly due to the scraps which are registered as negative values on the basis of the Stone's method and to the government subsidy for processed rice traded which is registered as negative values in the cell of trade and processed rice (sector 47, sector 23). (In the Korean I-O table, this subsidy to support the income of farm households producing rice is not treated as a production subsidy registered as negative value in the column of net non-commodity indirect taxes, but as negative value in the cell of trade and processed rice in the matrix of intermediate usage of domestic products.) There is also a negative value in the employment of capital in the coal industry owing to operating loss in a sector.

The offending negative values in intermediate usage of domestic products (in rows), household usage of domestic products, and investment usage of domestic products were all set to zero and sectoral balance was restored by adjusting "changes in stocks". The a offending negative values in intermediate usage of domestic products (in columns) were also set to zero and sectoral balance was restored by adjusting non-commodity indirect taxes .

However, the negative capital earnings of the coal industry (-27,447 million won) was not set to zero, but adjusted to have a positive value, since the value, ideally, should reflect the earnings needed to earn a normal return on the capital employed in the industry. The average capital earnings ratio of coal industry of all regions in version 4 of GTAP data base was used to estimate a normal capital cost of the coal industry in Korea. The total input cost of the coal industry of all regions in GTAP 4 is US\$142,783 million. This is the cost of all inputs into production, at commodity-tax-

inclusive prices, but does not include non-commodity indirect tax. Of this total, US\$14,711 million represents cost of capital, and US\$ 128,072 million represents cost of other inputs. Thus, the average capital earnings ratio of all regions in GTAP 4 is 10.3 %. As the total input cost of the coal industry in Korea is 276,447 million won, the normal capital cost of the coal industry amounts to 28,474 million won. The value equivalent to the difference between this capital cost of the coal industry and its negative capital earnings was subtracted from the net non-commodity indirect taxes to restore balance in this sector.

11.E.5 Calculating Commodity Taxes on Imports

The initial Korean I-O table includes only a column vector reporting commodity taxes on total imports by commodity. This column vector was used as the column total to generate the following arrays:

- AI17: commodity tax on intermediate usage of imports, by commodity and industry
- AI19: commodity tax on household consumption of imports, by commodity
- AI21: commodity tax on investment usage of imports, by commodity
- AI23: commodity tax on government usage of imports, by commodity
- AI26: commodity tax on change in stocks of imports, by commodity.

This was done by first calculating the percentage shares of the base values corresponding to the above arrays to the value of total imports. Then the percentage shares were multiplied to the vector of commodity taxes on total imports.

11.E.6 Information Not Available from the Korean I-O Table

There is no available information from the initial Korean I-O table for some of the arrays required in the GTAP I-O table specification, as given in table 2 of GTAP Technical Paper No. 1, “Contributing Input-Output Tables to the GTAP Data Base.” Zero values were assigned to the following arrays:

- AI15: employment of land, by industry
- AI16: commodity tax on intermediate usage of domestic products, by commodity and industry
- AI18: commodity tax on household consumption of domestic products, by commodity

- AI20: commodity tax on investment usage of domestic products, by commodity
- AI22: commodity tax on government usage of domestic products, by commodity
- AI24: commodity tax on exports, by commodity
- AI25: commodity tax on change in stocks of domestic products, by commodity

References

The Bank of Korea. 1998. *Input-Output Tables of Korea 1995*, Seoul.

The Bank of Korea. 1998. *Input-Output Tables (1970 ~ 1995)*, CD-ROM.

Appendix

Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
02	pdr	Paddy rice	1	Unmilled rice
02	wht	Wheat	2	Wheat
03	gro	Cereal grains n.e.c	3	Barley
			4	Miscellaneous cereals
04	v_f	Vegetables, fruits, nuts	5	Vegetables
			6	Fruits
			7	Pulses
05	psd	Oil seeds	9	Oleaginous crops
06	c_b	Sugar cane, sugar beet	Not existent	
07	pfb	Plant-based fibers	12	Cotton and hemp
08	ocr	Crops n.e.c.	8	Potatoes
			10	Cultivated medicinal herbs
			11	Other edible crops
			13	Leaf tobacco
			14	Ornamental floriculture
			15	Natural rubber
			16	Seeds and seedlings
			17	Other Inedible crops
09	ctl	Bovine cattle, sheep and goats, horses	19	Beef cattle
			22*	Other livestock breeding
10	oap	Animal products n.e.c.	20	Swine
			21	Poultry and eggs
			22*	Other livestock breeding
11	rmk	Raw milk	18	Dairy farming
12	wol	Wool, silk-worm cocoons	22*	Other livestock breeding
13	for	Forestry	23	Forest planting and conservation
			24	Raw timber
			25	Edible forestry products
			26	Misc. forestry products
14	fsh	Fishing	27	Marine fishing
			28	Fresh water fishing
			29	Marine culture
			30	Fresh water culture
15	col	Coal	31	Anthracite
			32	Bituminous coal
16	oil	Oil	33	Crude petroleum
17	gas	Gas	34	Natural gas

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
18	omn	Minerals n.e.c.	35	Iron ores
			36	Copper ores
			37	Lead and zinc ores
			38	Misc. nonferrous metal ores
			39	Sand and gravel
			40	Crushed and broken stone
			41	Other bulk stones
			42	Limestone
			43	Materials for ceramics
			44	Crude salt
			45	Misc. nonmetallic minerals
19	cmt	Bovine cattle, sheep and goat, horse meat products	46	Slaughtering and meat processing
20	omt	Meat products n.e.c.	47	Poultry slaughtering and processing
			48	Prepared meat products
21	vol	Vegetable oils and fats	71	Animal and marine fats and oils
			72	Vegetable fats and oils, and
22	mil	Dairy products	49	Milk
			50	Milk products
			51	Ice cream
23	pcr	Processed rice	57	Polished rice
24	sgr	Sugar	60	Raw sugar
			61	Refined sugar
25	ofd	Food products n.e.c.	52	Fish fillets and fish cake products
			53	Canned sea foods
			54	Frozen fish and sea foods
			55	Salted, dried and smoked sea foods
			56	Misc. processed sea foods
			58	Polished barley
			59	Flour and cereal preparations
			62	Starches
			63	Glucose, glucose syrup and maltose
			64	Bakery products
			65	Confectionery products
			66	Noodles
			67	Refined salt
			68	Fermented seasonings
			69	Other seasonings
			70	Soy sauce and bean paste
			73	Canned or cured fruits and vegetables
			74	Coffee and tea
			75	Ginseng products
			76	Malt and yeast
			77	Bean curd
			78	Miscellaneous foodstuffs
			87	Prepared livestock feeds

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
26	b_t	Beverages and tobacco products	79	Ethyl alcohol for beverages
			80	Distilled spirits (soju)
			81	Unrefined liquors and rice wine
			82	Beer
			83	Other liquors
			84	Soft drinks
			85	Mineral and spring water
			86	Manufactured ice
			88	Tobacco products
27	tex	Textiles	89	Silk yarn
			90	Woolen yarn
			91	Cotton yarn
			92	Hempen yarn
			93	Regenerated fiber yarn
			94	Synthetic fiber yarn
			95	Thread and other fiber yarns
			96	Silk fabrics
			97	Woolen fabrics
			98	Cotton fabrics
			99	Hempen fabrics
			100	Regenerated fiber fabrics
			101	Synthetic fiber fabrics
			102	Other fiber fabrics
			103	Knitted fabrics
			104	Fiber bleaching and dyeing
			111	Textile products
			112	Misc. textile products
			113	Cordage, rope, and fishing nets
28	wap	Wearing apparel	105	Knitted wearing apparels
			106	Knitted clothing accessories
			107	Textile wearing apparels
			108	Other clothing accessories
			109	Leather wearing apparels
			110	Fur wearing apparels
29	lea	Leather products	114	Leather
			115	Fur
			116	Luggage and handbags
			117	Leather footwear
			118	Textile footwear and other shoes
			119	Other leather products
30	lum	Wood products	120	Lumber
			121	Plywood
			122	Reconstituted and densified wood
			123	Wooden products for construction
			124	Wooden containers
			125	Other wooden products
			296	Wood furniture

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
31	ppp	Paper products, publishing	126	Pulp
			127	Newsprint
			128	Printing paper
			129	Other raw paper and paperboard
			130	Corrugated paper and solid fiber boxes
			131	Paper containers
			132	Stationery paper and office paper
			133	Sanitary paper products
			134	Other paper products
			135	Newspapers
			136	Publishing
			137	Printing
			138	Publishing and reproduction of recorded media
32	p_c	petroleum, coal products	139	Coal briquettes
			140	Coke and other coal products
			141	Naphtha
			142	Gasoline
			143	Jet oil
			144	Kerosene
			145	Light oil
			146	Heavy oil
			147	Liquefied petroleum gas
			148	Lubricants
			149	Misc. petroleum refinery products crp
33	crp	Chemical, rubber, plastic products	150	Petrochemical basic products
			151	Petrochemical intermediate products
			152	Coal chemicals
			153	Other basic organic chemicals
			154	Industrial gases
			155	Basic inorganic chemicals
			156	Synthetic resins
			157	Synthetic rubber
			158	Regenerated cellulose fibers
			159	Synthetic fibers
			160	Nitrogen compounds
			161	Fertilizers
			162	Pesticides and other agricultural chemicals
			163	Medicaments
			164	Cosmetics and dentifrices
			165	Soap and detergents
			166	Dyes, pigments, and tanning materials
			167	Paints, varnishes, and allied products
			168	Printing ink
			169	Adhesives, gelatin and sealants
			170	Explosives and fireworks products
			171	Recording media for electronic equipments
			172	Photographic chemical products
			173	Misc. chemical products
			174	Primary plastic products
			175	Industrial plastic products
			176	Household articles of plastic material
			177	Tires and tubes
			178	Industrial rubber products
			179	Misc. rubber products

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
34	mmm	Mineral products n.e.c.	180	Sheet glass and primary glass products
			181	Industrial glass products
			182	Household glass products and others
			183	Industrial pottery products
			184	Pottery, china and earthenware for home use
			185	Clay refractories
			186	Clay products for construction
			187	Cement
			188	Ready mixed concrete
			189	Concrete blocks, bricks, and other concrete products
			190	Lime, gypsum, and plaster products
			191	Cut stone & stone products
			192	Asbestos and mineral wool products
			193	Abrasives
			194	Asphalts
			195	Misc. nonmetallic mineral products
35	i_s	Ferrous metals	196	Pig iron
			197	Ferroalloys
			198	Steel ingots and semifinished products
			199	Steel rods and bar
			200	Section steel
			201	Rails and wires
			202	Hot rolled steel plates and sheets
			203	Steel pipe and tubes, except foundry iron pipe and tubes
			204	Cold rolled steel sheet, strip, and bars
			205	Iron foundries and foundry iron pipe and tubes
			206	Forgings
			207	Coated steel plates
			208	Misc. primary iron and steel products
36	nfm	Metals n.e.c.	209	Copper ingots
			210	Aluminum ingots
			211	Lead and zinc ingots
			212	Gold and silver ingots
			213	Other nonferrous metal ingots
			214	Primary copper products
			215	Primary aluminum products
			216	Other nonferrous metal castings and forgings, and primary nonferrous metals
37	fmp	Metal products	217	Metal products for construction
			218	Structural metal products
			219	Metal tanks and reservoirs
			220	Metal cans, barrels, and drums
			221	Hand tools
			222	Bolts, nuts, screws, rivets, and washers
			223	Fabricated wire products
			224	Fastening metal products
			225	Treatment and coating of metals
			226	Household metallic utensils
			227	Misc. fabricated metal products

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
38	mvh	Motor vehicles and parts	282	Passenger automobiles
			283	Buses and vans
			284	Trucks
			285	Motor vehicles with special equipment
			286	Motor vehicle engines
			287	Motor vehicle chassis, bodies and parts
			288	Trailers and containers
39	otn	Transport Equipment n.e.c.	289	Steel ships
			290	Other ships
			291	Ship repairing and ship parts
			292	Railroad vehicles and parts
			293	Aircraft and parts
			294	Motorcycles and parts
			295	Bicycles and parts and misc. transportation
40	ele	Electronic equipment	263	Television receiving sets
			264	Video cassette recorders and players
			265	Electric household audio equipment
			266	Other audio and visual equipment
			267	Wire telephone and telegraph equipment
			268	Radio and television broadcasting and wireless communications equipment
			269	Computer and peripheral equipment
			270	Office machines and devices
41	ome	Machinery and equipment	228	Engines and turbines
			229	Valves
			230	Bearings, gears, gearing and driving elements
			231	Conveyors and conveying equipment
			232	Air-conditioning equipment and industrial refrigeration equipment
			233	Boiler
			234	Heating apparatus and cooking appliances
			235	Pumps and compressors
			236	Filtering or purifying machinery for liquid and gases
			237	Misc. machinery and equipment of general purpose
			238	Metal cutting type machine tools
			239	Metal forming machine tools
			240	Agricultural implements and machinery
			241	Construction and mining machinery
			242	Food processing machinery
			243	Textile machinery
			244	Metal molds and industrial patterns
			245	Printing machinery
			246	Misc. machinery and equipment of special purpose
			247	Motors and generators
			248	Electric transformers
			249	Capacitors and rectifiers
			250	Electric transmission and distribution equipment
			251	Insulated wires and cables
			252	Batteries
			253	Electric lamps and electric lighting fixtures
			254	Misc. electric equipment and supplies

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
41	ome	Machinery and equipment n.e.c. cont	255	Electron tubes
			256	Other electronic signal equipment
			257	Semiconductor devices
			258	Integrated circuits
			259	Electric resistors and storage batteries
			260	Electric coils, transformers and other inductors
			261	Printed circuit boards
			262	Misc. electronic components
			271	Household refrigerators and freezers
			272	Household laundry equipment
			273	Electric household fans
			274	Household electric cooking and heating equipment
			275	Other household electrical appliances
			276	Medical instruments and supplies
			277	Industrial automatic regulators
			278	Measuring and analytical instruments
			279	Cinematograph cameras and projectors
			280	Other photographic and optical instruments
			281	Watches and clocks
42	omf	Manufactures n.e.c.	297	Metal furniture
			298	Other furniture
			299	Toys and games
			300	Sporting and athletic goods
			301	Musical instruments
			302	Pens, pencils, and other artists' materials
			303	Jewelry and plated ware
			304	Models and decorations
			305	Misc. manufactured products
43	ely	Electricity	306	Water power generation
			307	Thermal power generation
			308	Atomic power generation
			309	Self-Power generation
44	gdt	Gas manufacture, distribution	310	Manufactured gas supply
			311	Steam and hot water supply
45	wtr	Water	312	Water Supply
46	cns	Construction	313	Steel concrete residential building construction
			314	Wooden and other residential building construction
			315	Steel concrete nonresidential building construction
			316	Wooden and other nonresidential building construction
			317	Building repairs
			318	Road construction
			319	Railroad construction
			320	Subway construction
			321	Breakwater, pier, and harbor construction
			322	Airport construction
			323	Dam, levee, and flood control project construction
			324	Water main line and drainage project construction
			325	Land clearing and reclamation, and irrigation project construction

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
46	cns	Construction (contd)	326	Land leveling and athletic field construction
			327	Electric power plant construction
			328	Communications line construction
			329	Misc. construction
47	trd	Trade	330	Wholesale trade
			331	Retail trade
			332	Eating and drinking places
			333	Hotels and other lodging places
48	otp	Transport n.e.c.	334	Railroad passenger transportation
			335	Railroad freight transportation
			336	Road passenger transportation
			337	Road freight transportation
			341	Services incidental to road transportation
			342	Services incidental to water transportation
			343	Airports, flying, fields and airport terminal services
			344	Cargo loading or unloading operations
			345	Warehousing and storage
			346	Other services incidental to transportation
49	wtp	Water transport	338	Coastal and inland water transportation
			339	Deep sea transportation
50	atp	Air transport	340	Air transport
51	cmn	Communication	347	Postal services
			348	Telegraph and telephone
			349	Value added communication
			350	Broadcasting (private, nonprofit)
			351	Broadcasting (commercial)
52	ofi	Financial services n.e.c.	352	Depository institutions
			353	Nondepository credit institutions
			356	Services auxiliary to finance and insurance
53	isr	Insurance	354	Life insurance
			355	Casualty insurance
54	obs	Business services n.e.c.	358	Real estate rental
			359	Real estate agents and managers
			360	Legal and accounting services
			361	Architecture and civil engineering services
			362	Other engineering services
			363	Computer programming, data processing, and other computer related services
			364	Renting of machinery and goods
			365	Advertising services
			366	Research and news syndicates services
			367	Cleaning and disinfection services
			368	Agriculture and fishing services
			369	Misc. business services

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Table 11.E.A1 Mapping of the 402 Sector Korean I-O Table to the GTAP Sectoral Classification (continued)

GTAP Sectoral Classification (GSC2)			Korean I-O Table Sectoral Classification	
55	ros	Recreational and other services	386	Culture services (public)
			387	Culture services (other)
			388	Motion picture production and distribution
			389	Theatrical producers, bands, and entertainers
			390	Sports organizations and sports facility operation
			391	Misc. amusement and recreation services
			392	Business associations and professional membership organizations
			393	Religious, political, labor, and other social organizations
			394	Motor repair services
			395	Other personal repair services
			396	Laundry and cleaning services
			397	Barber and beauty shops
			398	Domestic services
			399	Other personal services
			400	Office supplies
			401	Business consumption expenditures
			402	Nonclassifiable activities
56	osg	Public administration and defense, education health	370	Public government
			371	Local government
			372	School education (public)
			373	School education (private, non-profit)
			374	School education (commercial)
			375	Research institutes(public)
			376	Research institutes (private, non-profit)
			377	Research institutes (commercial)
			378	Research and experiment in enterprise
			379	Medical and health services(public)
			380	Medical and health services (private, non-profit)
			381	Medical and health services (commercial)
			382	Social welfare services (public)
			383	Social welfare services (private, non-profit)
			384	Sanitary services(public)
			385	Sanitary services (commercial)
57	dwe	Dwellings	357	Owner-occupied dwellings (imputed rent)

* Requirements of the GTAP sectoral classification are not fulfilled.