

AE.1 Introduction

This chapter describes the procedure and considerations underlying the construction of the Korean input-output (I-O) table for the Global Trade Analysis Project (GTAP) database version 11. The document is organized as follows. Section 2 provides a short description of 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 explains how negative values in the initial Korean I-O table are adjusted and Section 5 shows how commodity taxes on domestic products and imports are calculated. In the final section, information not available from the Korean I-O table is mentioned.

AE.2 Data source

The Korean I-O table used for the GTAP database version 11 was compiled by the Bank of Korea in Seoul (The Bank of Korea, 2019). The reference year of the Korean I-O table is 2015 and the unit of accounts is million Korean won (KRW). The Korean I-O table for 2015 is grouped commodity by commodity and includes 381 commodities. It was calculated by multiplying the supply table consisting of 381 commodities and 278 industries by the use table consisting of 381 commodities and 278 industries. The Korean I-O table for 2015 is one of the I-O tables compiled using survey data like the Korean I-O table for 2010 used for the GTAP database version 9. The Korean I-O table for 2010 is Korea's first I-O table generated using the supply and use tables in compliance with the system of national accounts (SNA) of 2008. In other words, the supply and use tables were first compiled based on the SNA (2008), and the Korean I-O tables for 2010 and 2015 were calculated by multiplying the supply table by the use table.³⁶

The Korean I-O tables for 2015 are evaluated at 3 different prices: purchaser prices, producer prices and basic prices. Each of the Korean I-O tables for 2015 evaluated at 3 different prices includes three different transaction tables: a transaction table of domestically produced goods and services, a transaction table of imported goods and services and a transaction table of composite goods and services composed of domestic and imported goods and services. The matrix of final

³⁶The Korean I-O table for 2017, which was intended to be used for the GTAP database version 11, is an I-O table compiled using non-survey data based on the Korean I-O table for 2015. The Bank of Korea has compiled an I-O table using survey data every 5 years (for example, the I-O tables for 2005, 2010 and 2015) and an annual I-O table (for example, the I-O tables for 2016 and 2017) using non-survey data based on the I-O table compiled using survey data. By the way, the I-O tables for 2016 and 2017 were evaluated at producer prices only, while the I-O tables for 2015 were evaluated at 3 different prices: purchaser prices, producer prices and basic prices, which makes it possible to calculate commodity taxes on domestically produced goods and services and commodity taxes on imported goods and services by subtracting relevant data at basic prices from relevant data at producer prices (refer to 5. Calculating commodity taxes on domestic products and imports for more details). Therefore, the I-O table for 2017 was not used for the GTAP database version 11, but the I-O table for 2015 was used.

demand in the transaction table of domestic products and the matrix of final demand in the transaction table of imported products include private consumption, government expenditure, private fixed capital formation, government fixed capital formation, change in stocks, acquisition less disposal of valuables, and exports.³⁷ Acquisition less disposal of valuables was added to change in stocks. Government fixed capital formation was added to private fixed capital formation to get a vector of investment usage of domestic products and a vector of investment usage of imports. The matrix of value added in the transaction table of composite goods includes compensation of employees, operating surplus, depreciation of fixed capital, and net indirect taxes (less subsidies). Depreciation of fixed capital was added to operating surplus to obtain a vector of employment of capital.

AE.3 Mapping the Korean I-O table to the GTAP sectoral classification

Table 8.75 in the appendix shows how 381 sectors of the Korean I-O table are mapped to the GTAP sectoral classification (GSEC3). There is no domestic production of sugar cane and sugar beet in Korea and the Korean I-O table does not include sugar cane and sugar beet (sector 6 of the GTAP data base). There are 10 sectors which should be split into more than one sector of the GTAP data base: sector 2 (wheat and other crops), sector 13 (other incredible crops), sector 14 (dairy farming), sector 18 (other livestock breeding), sector 25 (agriculture, forestry and fishing services), sector 35 (slaughtering and meat processing), sector 41 (polished rice, barley and others), sector 49 (animal and marine fats and oils), sector 336 (services auxiliary to finance and insurance), and sector 337 (residential services) of the Korean I-O table. The data required to calculate the splits are based on the data on supplies of domestic and imported goods attached to the Korean I-O tables for 2015. For the splitting of the 10 sectors of the Korean I-O table to more than one sector of the GTAP data base, the data on the total supply of more than 3,000 commodities consisting of domestic production and imports are used, which are attached to the Korean I-O table.

Sector 2 (wheat and other crops) of the Korean I-O table includes wheat and other crops and is split into sector 2 (wheat) and sector 3 (cereal grains nec) of the GSEC3, as seen in Tables 8.53 and 8.54. The * signifies the Korean I-O table sector affected by the split. 31.71 percent and 68.29 percent of sector 2 (wheat and other crops) of the Korean I-O table were assigned to sector 2 (wheat) and sector 3 (cereal grains nec) of the GSEC3, respectively, as shown in Table 8.54.

Table 8.53: Split of sector 2 (wheat and other crops) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
02 Wheat	2* Wheat and other crops
03 Cereal grains nec	2* Wheat and other crops

Sector 13 (other incredible crops) of the Korean I-O table is split into sector 7 (plant-based fibers) and sector 8 (crops nec) of the GSEC3, as seen in Tables 8.55 and 8.56. 55.62 percent

³⁷The transaction table of imports does not include a column of exports.

Table 8.54: Shares of components of sector 2 (wheat and other crops) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Wheat	27,582	1,250,118	1,277,700	31.32
Buckwheat	12,467	1,585	14,052	0.34
By-product (wheat)	1,860	0	1,860	0.05
Subtotal	41,909	1,251,703	1,293,612	31.71
Rye	61,627	217	61,844	1.52
Unhulled barley	32,747	9,333	42,080	1.03
Beer barley	27,716	15,932	43,648	1.07
Corn	87,871	2,492,650	2,580,521	63.25
Miscellaneous	17,648	34,819	52,467	1.29
By-product (grain)	5,592	104	5,696	0.14
Subtotal	233,201	2,553,055	2,786,256	68.29
Total	275,110	3,804,758	4,079,868	100.00

and 44.38 percent of sector 13 (other incredible crops) of the Korean I-O table were assigned to 7 (plant-based fibers) and sector 8 (crops nec) of the GSEC3, respectively, as shown in Table 8.56.

Table 8.55: Split of sector 13 (other inedible crops) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
07 Plant-based fibers	13* Other inedible crops
08 Crops nec	04 Potatoes
	07 Floricultural crops
	08 Cultivated medicinal herbs
	09 Leaf tobacco
	10 Natural rubber
	12 Other edible crops
	13* Other inedible crops

Domestic prod. Imports Total supply Share (%)

Sector 14 (dairy farming) of the Korean I-O table is split into sector 11 (raw milk) and sector 9 (bovine cattle, sheep and goats, horses) of the GSEC3, as seen in Tables 8.57 and 8.58. 88.16 percent and 11.84 percent of sector 14 (dairy farming) of the Korean I-O table were assigned to sector 11 (raw milk) and sector 9 (bovine cattle, sheep and goats, horses) of the GSEC3, respectively, as shown in Table 8.58.

Sector 18 (other livestock breeding) of the Korean I-O table is split into sector 9 (bovine cattle, sheep and goats, horses), sector 10 (animal products nec), and sector 12 (wool, silk-worm cocoons) of the GSEC3, as shown in Table 8.59. The shares of components of sector 18 (other livestock breeding) of the Korean I-O table are presented in Table 8.60. 24.82 percent, 41.73

Table 8.56: Shares of components of sector 13 (other inedible crops) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Fiber crops	1,261	544,884	546,145	55.62
Fodder crops	0	362,521	362,521	36.92
Other crops	73,224	0	73,224	7.46
Subtotal	73,224	362,521	435,745	44.38
Total	74,485	907,405	981,890	100.00

Table 8.57: Split of sector 14 (dairy farming) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
11 Raw milk	14* Dairy farming
09 Bovine cattle, sheep and goats, horses	14* Dairy farming

Table 8.58: Shares of components of sector 14 (dairy farming) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Raw milk	2,285,072	0	2,285,072	88.16
Milk cow (female)	121,163	1,065	122,228	4.72
By-product	184,763	0	184,763	7.13
Subtotal	305,926	1,065	306,991	11.84
Total	2,590,998	1,065	2,592,063	100.00

percent and 33.45 percent of sector 18 (other livestock breeding) of the Korean I-O table were assigned to sector 9 (bovine cattle, sheep and goats, horses), sector 10 (animal products nec), and sector 12 (wool, silk-worm cocoons) of the GSEC3, respectively, as shown in Table 8.60.

Table 8.59: Split of sector 18 (other livestock breeding) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
09 Bovine cattle, sheep and goats, horses	14* Dairy farming
	15 Beef cattle
	18* Other livestock breeding
10 Animal products nec	16 Swine
	17 Poultry and eggs
	18* Other livestock breeding
12 Wool, silk-worm cocoons	14* Dairy farming
	18* Other livestock breeding

Table 8.60: Shares of components of sector 18 (other livestock breeding) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Goats	75,828	0	75,828	7.48
Goat milk	74,594	0	74,594	7.36
Deer	18,721	0	18,721	1.85
Antlers of the deer	45,802	36,744	82,546	8.14
Subtotal	214,945	36,744	251,689	24.82
Honey	356,655	11,896	368,551	36.35
Nectar	18,598	15,634	34,232	3.38
Dog	0	2,436	2,436	0.24
Rabbit	9,562	1	9,563	0.94
Other livestock products	0	8,408	8,408	0.83
Subtotal	384,815	38,375	423,190	41.73
Silk-worm cocoons	12,751	97	12,848	1.27
Fur	218	116,655	116,873	11.53
Green skin and pelt	0	135,681	135,681	13.38
By-products	11,744	61,997	73,741	7.27
Subtotal	24,713	314,430	339,143	33.45
Total	624,473	389,549	1,014,022	100.00

Sector 25 (agriculture, forestry and fishing services) of the Korean I-O table is split into sectors 1-14 of the GSEC3, as shown in Table 8.62. Services of agriculture, livestock, forestry and fishing in the data on supplies of domestic and imported goods attached to the Korean I-O tables for 2015 are shown in Table 8.61. By the way, sector 25 (agriculture, forestry and fishing services) of the Korean I-O table is only one sector, not split into 4 parts for agriculture, livestock, forestry and fishing in the Korean I-O table. After 16.27 percent and 6.81 percent of sector 25 (agriculture,

forestry and fishing services) of the Korean I-O table were assigned to sector 13 (for) and sector 14 (fsh), respectively, as seen in Table 8.61, 45.04 percent of sector 25 (agriculture, forestry and fishing services) of the Korean I-O table were assigned to sectors 1-8 of GSEC3, and 31.88 percent to sectors 9-12 of GSEC3, as shown in Table 8.63.

Table 8.61: Agriculture, forestry and fishing services (sector 25) of the Korean I-O table

Services by sector	Domestic production (mil. won)	Shares (%)
Agriculture services	510,806	45.04
Livestock services	361,578	31.88
Forestry services	184,549	16.27
Fishing services	77,231	6.81
Total	1,134,164	100.00

Sector 35 (slaughtering and meat processing) of the Korean I-O table is split into sector 19 (bovine cattle, sheep and goats, horse meat products) and sector 20 (meat products nec) of the GSEC3, as shown in Tables 8.64 and 8.65. 35.73 percent and 64.27 percent of sector 35 (slaughtering and meat processing) of the Korean I-O table were assigned to sector 19 (bovine cattle, sheep and goats, horse meat products) and sector 20 (meat products nec) of the GSEC3, respectively, as seen in Table 8.65.

Sector 49 (animal and vegetable fats and oils) of the Korean I-O table is split into sector 20 (meat products nec) and sector 21 (vegetable oils and fats) of the GSEC3, as seen in Tables 8.66 and 8.67. 7.0 percent and 93.0 percent of sector 49 (animal and vegetable fats and oils) of the Korean I-O table were assigned to sector 20 (meat products nec) and sector 21 (vegetable oils and fats) of the GSEC3, respectively, as shown in Table 8.67.

Sector 41 (polished rice, barley and others) of the Korean I-O table is split into sector 23 (processed rice) and sector 25 (food products nec) of the GSEC3, as shown in Tables 8.68 and 8.69. The split of sector 41 of the Korean I-O table was done using the shares of total supply consisting of domestic output and imports of processed rice, processed barley, other processed grains, and processed by-products, as seen in Table 8.69. 92.89 percent and 7.11 percent of sector 41 (polished rice, barley and others) of the Korean I-O table were assigned to sector 23 (processed rice) and sector 25 (food products nec) of the GSEC3, respectively.

Sector 336 (services auxiliary to finance and insurance) of the Korean I-O table is split into sector 57 (financial services nec) and sector 58 (insurance) of the GTAP data base, as shown in Table 8.70. Shares of the split of sector 336 are presented in Table 8.71. 63.11 percent and 36.89 percent of total supply of sector 336 were assigned to sector 57 (financial services nec) and sector 58 (insurance) of the GTAP data base, respectively, as seen in Table 8.71.

Sector 337 (residential services) of the Korean I-O table is split into sectors 59 (rsa) and 65 (dwe) of GSEC3, as shown in Tables 20 and 21. 40.83 percent and 59.17 percent of sector 337 (residential services) of the Korean I-O table were allocated to sector 59 (rsa) and sector 65 (dwe), respectively, as seen Table 21.

Table 8.62: Split of sector 25 (agriculture, forestry and fishing services) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
01 Paddy rice	01 Unmilled rice
	25* Agriculture, forestry and fishing services
02 Wheat	02* Wheat and other crops
	25* Agriculture, forestry and fishing services
03 Cereal grains nec	02* Wheat and other crops
	25* Agriculture, forestry and fishing services
04 Vegetables, fruit, nuts	03 Pulses
	05 Vegetables
	06 Fruits
	25* Agriculture, forestry and fishing services
05 Oil seeds	11 Seeds
	25* Agriculture, forestry and fishing services
06 Sugar cane, sugar beet	Not existent
07 Plant-based fibers	13 Other inedible crops
	25* Agriculture, forestry and fishing services
08 Crops nec	04 Potatoes
	07 Floricultural crops
	08 Cultivated medicinal herbs
	09 Leaf tobacco
	10 Natural rubber
	12 Other edible crops
	25* Agriculture, forestry and fishing services
09 Bovine cattle, sheep and goats, horses	14* Dairy farming
	15 Beef cattle
	18* Other livestock breeding
	25* Agriculture, forestry and fishing services
10 Animal products nec	16 Swine
	17 Poultry and eggs
	18* Other livestock breeding
	25* Agriculture, forestry and fishing services
11 Raw milk	14* Dairy farming
	25* Agriculture, forestry and fishing services
12 Wool, silk-worm cocoons	18* Other livestock breeding
	25* Agriculture, forestry and fishing services
13 Forestry	19 Forest planting and conservation
	20 Raw timber
	21 Edible forestry products
	22 Misc. forestry products
	25* Agriculture, forestry and fishing services
14 Fishing	23 Fishing
	24 Aquaculture
	25* Agriculture, forestry and fishing services

Table 8.63: Shares of sectors 1-24 of the Korean I-O table for the split of sector 25 (agriculture, forestry and fishing services) of the Korean I-O table

GTAP sectors	Sectors of Korean I-O table	Domestic production (mil. Won)	Share (%)	Share (%) used
01 pdr	01 Unmilled rice	7,085,319	14.42	11.09
02 wht	02* Wheat and other crops	41,909	0.09	0.07
03 gro	02* Wheat and other crops	233,201	0.47	0.37
04 v_f	03 Pulses	498,451	1.01	
	05 Vegetables	12,359,509	25.16	
	06 Fruits	4,913,993	10	
Subtotal of 04 v_f		17,771,953	36.18	27.83
05 osd	11 Seeds	47,797	0.1	0.07
06 c_b	Not existent	0	0	0
07 pfb	13 Other inedible crops	74,485	0.15	0.12
08 ocr	04 Potatoes	1,043,829	2.12	
	07 Floricultural crops	634,090	1.29	
	08 Cultivated medicinal herbs	1,930,779	3.93	
	09 Leaf tobacco	87,170	0.18	
	10 Natural rubber	0	0	
	12 Other edible crops	660,762	1.35	
Subtotal of 08 ocr		4,356,630	8.87	6.82
09 ctl	14* Dairy farming	305,926	0.62	
	15 Beef cattle	4,655,608	9.48	
	18* Other livestock breeding	214,945	0.44	
Subtotal of 09 ctl		5,176,479	10.54	8.11
10 oap	16 Swine	6,533,195	13.3	
	17 Poultry and eggs	5,108,748	10.4	
	18* Other livestock breeding	384,815	0.78	
Subtotal of 10 oap		12,026,758	24.48	18.83
11 rmk	14* Dairy farming	2,285,072	4.65	3.58
12 wol	18* Other livestock breeding	24,713	0.05	0.04
Total		49,124,316.00	100	76.92

Table 8.64: Split of sector 35 (slaughtering and meat processing) and sector 49 (animal and marine fats and oils) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
19 Bovine cattle, sheep and goats, horse meat products	35* Slaughtering and meat processing
20 Meat products nec	35* Slaughtering and meat processing
	36 Poultry slaughtering and processing
	37 Prepared meat products
	49* Animal and vegetable fats and oils
21 Vegetable oils and fats	49* Animal and vegetable fats and oils

Table 8.65: Shares of components of sector 35 (slaughtering and meat processing) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Beef	5,960,073	2,055,290	8,015,363	31.09
Green skin	65,821	506,230	572,051	2.22
Other slaughtered meat	122,722	501,071	623,793	2.42
Subtotal	6,148,616	3,062,591	9,211,207	35.73
Pig meat	6,868,848	1,488,423	8,357,271	32.41
Chicken	3,878,454	239,284	4,117,738	15.97
Duck meat	600,422	2,837	603,259	2.34
Poultry by-products	72,752	102,232	174,984	0.68
Ham and bacon	752,798	12,900	765,698	2.97
Sausage	836,797	34,817	871,614	3.38
Canned meat products	11,314	21,314	32,628	0.13
Poultry processed products	537,739	113,073	650,812	2.52
Other processed meat products	962,851	34,073	996,924	3.87
Subtotal	14,521,975	2,048,953	16,570,928	64.27
Total	20,670,591	5,111,544	25,782,135	100.00

Table 8.66: Split of sector 49 (animal and vegetable fats and oils) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
20 Meat products nec	35* Slaughtering and meat processing
	36 Poultry slaughtering and processing
	37 Prepared meat products
	49* Animal and vegetable fats and oils
21 Vegetable oils and fats	49* Animal and vegetable fats and oils

Table 8.67: Shares of components of sector 49 (animal and vegetable fats and oils) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Edible animal fats	102,505	0	102,505	1.92
Inedible animal fats	13,079	20,091	33,170	0.62
Fish fats	27,332	15,064	42,396	0.79
Animal oil cake	195,946	0	195,946	3.67
Subtotal	338,862	35,155	374,017.00	7
Sesame oil	327,742	2,132	329,874	6.18
Perilla oil	70,861	4,263	75,124	1.41
Raw corn oil	17,560	2,187	19,747	0.37
Rapeseed oil	24,028	1,317	25,345	0.47
Other vegetable oils	52,201	464,457	516,658	9.68
Soy bean oil	562,347	231,992	794,339	14.88
Corn oil	82,683	617	83,300	1.56
Olive oil	225,983	68,852	294,835	5.52
Other edible refined oil	225,531	337,282	562,813	10.54
Margarine	70,727	9,724	80,451	1.51
Shortening	104,421	7,509	111,930	2.1
Other oils	26,902	39,240	66,142	1.24
Soybean meal	592,882	952,679	1,545,561	28.95
Other vegetable oil cake	18,330	440,950	459,280	8.6
Subtotal	2,402,198	2,563,201	4,965,399.00	93
Total	2,741,060	2,598,356	5,339,416	100

Table 8.68: Split of sector 41 (polished rice, barley and others) of the Korean I-O table in accordance with GSC3

GTAP (GSEC3)	Korean I-O table
23 Processed rice	41* Polished rice, barley and others
25 Food products nec	41* Polished rice, barley and others
	39 Processed fish and sea foods
	40 Frozen, salted, dried and smoked fish and sea foods
	42 Flour and cereal preparations
	45 Starches, glucose, glucose syrup and maltose
	46 Bakery and confectionery products
	47 Noodles
	48 Seasonings
	50 Canned or cured fruits and vegetables
	51 Coffee and tea
	52 Ginseng products
	53 Miscellaneous foodstuffs
	54 Prepared livestock feeds

Table 8.69: Shares of components of sector 41 (polished rice, barley and others) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Processed rice	6,628,225	376,898	7,005,123	92.89
Processed barley	105,469	12	105,481	1.4
Other processed grains	374,054	13,166	387,220	5.13
Processed by-products	36,889	6,885	43,774	0.58
Subtotal	516,412	20,063	536,475	7.11
Total	7,144,637	396,961	7,541,598	100

Table 8.70: Split of sector 336 (services auxiliary to finance and insurance) of the Korean I-O table in consistence with GSEC3

GTAP (GSEC3)	Korean I-O table
57 Financial services nec	330 Central bank and banking institutions
58 Insurance	331 Financial investment institutions
	332 Other financial intermediaries
	336* Services auxiliary to finance and insurance
	333 Life insurance
	334 Pension fund
	335 Casualty insurance
	346* Services auxiliary to finance and insurance

Table 8.71: Shares of components of sector 336 (services auxiliary to finance and insurance) of the Korean I-O table

Commodity	Domestic production (mil. won)	Imports (mil. won)	Total supply (mil. won)	Share (%)
Central bank and banking institutions	49,283,718	966,313	50,250,031	37.68
Financial investment institutions	5,019,882	102,470	5,122,352	3.84
Other financial intermediaries	28,211,793	577,757	28,789,550	21.59
Subtotal	82,515,393	1,646,540	84,161,933	63.11
Life insurance	25,086,792	114,360	25,201,152	18.9
Pension fund	584,990	0	584,990	0.44
Casualty insurance	22,464,212	934,931	23,399,143	17.55
Subtotal	48,135,994	1,049,291	49,185,285.00	36.89
Total	130,651,387	2,695,831	133,347,218	100

Table 8.72: Split of sector 337 (residential services) of the Korean I-O table in accordance with GSEC3

GTAP (GSEC3)	Korean I-O table
59 Real estate activities	337* Residential services
	338 Non-residential building rental
	339 Real estate development and supply
	340 Real estate agents and managers
65 Dwellings	337* Residential services

Table 8.73: Shares of components of sector 337 (residential services) of the Korean I-O table

Component	Domestic production (mil. won)	Share (%)
Paid rent	42,393,562	40.83
Imputed rent	61,425,700	59.17
Total	103,819,262	100.00

AE.4 Adjustment of negative values

There are some negative values in the intermediate usage of domestic products, household consumption of domestic products, government consumption of domestic products and investment usage of domestic products in the Korean I-O table used for GTAP database version 11.³⁸

The negative values come from the treatment of self-processing of wastes, according to the so-called Stone method, the negative input method. Table 8.74 shows the sectors of the Korean I-O table to be treated in the self- processing of wastes.

There are negative values of operating surplus in the Korean I-O table for 2015³⁹: sector 152 (ferroalloys), sector 250 (steel ships), sector 251 (other ships), sector 253 (railroad vehicles and parts), sector 255 (motor vehicles and parts), sector 269 (water power generation), and sector 298 (railroad passenger and freight transportation).

³⁸There were some negative values in the intermediate usage of domestic products, household consumption of domestic products, and investment usage of domestic products in the Korean I-O tables used for the previous versions 5 (Ko and Cheong, 2002), 6 (Ko, 2006), 7 (Ko, 2008), and 8 (Ko, 2012) of the GTAP databases, while there was no negative value in the intermediate usage of domestic products, household consumption of domestic products, and investment usage of domestic products in the Korean I-O tables used for GTAP database versions 9 and 10. It was because a 'new' row vector of scraps including negative values was introduced in the Korean I-O tables used for GTAP database versions 9 and 10, which does not belong to either the matrix of intermediate inputs or the matrix of value-added. The negative values of the vector of scraps were set to zeroes and the sectoral balance was restored by adjusting "non-commodity indirect taxes of the matrix of value added".

³⁹There were negative values of operating surplus in the Korean I-O table for 2014 used for GTAP DB version 10: sector 26 (anthracite), sector 256 (steel ships), sector 257 (other ships), sector 304 (railroad passenger transportation), and sector 305 (railroad freight transportation), sector 309 (coastal and inland water transportation), sector 310 (deep sea transportation), and sector 311 (air transportation).

Table 8.74: Sectors of the Korean I-O Table to be Treated in the Self-Processing of Wastes

Sector	Description	Sector	Description
95	Coke and other coal products	153	Steel ingots and semifinished products
97	Naphtha	157	Steel plates (more than 5 mm thick)
107	Aliphatic petrochemical basic products	158	Hot rolled steel sheets
108	Aromatic petrochemical basic products	161	Cold rolled steel sheets, strip, and bars
109	Petrochemical intermediate products	222	Engines and turbines
110	Other basic organic chemicals	248	Motor vehicle engines
151	Pig iron		

Before correcting the negative values, 381 sectors of the Korean I-O table were aggregated into 65 sectors in concordance with the GTAP sectoral classification (GSEC3). Then, the still offending cells in the intermediate usage of domestic products, household consumption of domestic products, government consumption of domestic products, investment usage of domestic products, and operating surplus were set to zeroes and the sectoral balance was restored by adjusting “non-commodity indirect taxes (AI12)” and “change in stocks of domestic products (AI09)”.

AE.5 Calculating commodity taxes on domestic products and imports

The matrix of commodity tax on intermediate usage of domestic products (AI16) was calculated by subtracting the matrix of intermediate usage of domestic products (AI01) at basic prices from the matrix of intermediate usage of domestic products (AI01) at producer prices.⁴⁰ Commodity tax on household consumption of domestic products (AI18)⁴¹, commodity tax on investment usage of domestic products (AI20), commodity tax on government usage of domestic products (AI22), and commodity tax on change in stocks of domestic products (AI25) were calculated by subtracting the corresponding vector of domestic products at basic prices from the corresponding vector of domestic products at producer prices. For example, the vector of commodity tax on household consumption of domestic products (AI18) was calculated by subtracting the vector of household consumption of domestic products (AI05) at basic prices from the vector of household consumption of domestic products (AI05) at producer prices.

The matrix of commodity tax on intermediate usage of imported products (AI17) was calculated by subtracting the matrix of intermediate usage of imported products (AI02) at basic prices from the matrix of intermediate usage of imported products (AI02) at producer prices.⁴² Commodity tax on household consumption of imported products (AI19), commodity tax on investment

⁴⁰In the case of the Korean I-O table for 2014 used for GTAP database version 10, the matrix of commodity tax on intermediate usage of domestic products (AI16) was calculated from a row vector of net commodity taxes on domestic intermediate inputs.

⁴¹In the case of the Korean I-O table for 2014 used for GTAP database version 10, AI18, AI20, AI22, and AI25 were calculated from a scalar of total net commodity taxes on domestic goods for each of them.

⁴²In the case of the Korean I-O table for 2014 used for GTAP database version 10, the matrix of commodity tax on intermediate usage of imported products (AI17) was calculated from a row vector of net commodity taxes on imported intermediate inputs.

usage of imported products (AI21), commodity tax on government usage of imported products (AI23), and commodity tax on change in stocks of imported products (AI26) were computed by subtracting the corresponding vector of imported products at basic prices from the corresponding vector of imported products at producer prices.⁴³ For example, the vector of commodity tax on household consumption of imported products (AI19) was calculated by subtracting the vector of household consumption of imported products (AI06) at basic prices from the vector of household consumption of imported products (AI06) at producer prices.

Commodity tax on government consumption of domestic products (AI22), commodity tax on government consumption of imports (AI23), and commodity tax on exports (AI24) are zeroes in the Korean I-O table.

AE.6 Information not available from the Korean I-O table

Of the information mentioned in Table 2 of GTAP Technical Paper No. 1, “Contributing Input-Output Tables to the GTAP Data Base”, Release 4.2, January 2000, only employment of land, by industry (AI15) is not available from the Korean I-O table. This array is filled with zeroes.

References

Huff, K., R. McDougall, and T. Walmsley (2000). “Contributing Input-Output Tables to the GTAP Data Base,” Technical Paper No. 1, Center for Global Trade Analysis, Purdue University.

Ko, J.-H. and I. Cheong (2002). “Chapter 11.E: Korea”, in Dimaranan, Betina V. and Robert A. McDougall (eds.). Global Trade, Assistance, and Production: The GTAP 5 Data Base, Center for Global Trade Analysis, Purdue University.

Ko, J.-H. (2006). “Chapter 11.D: Korea,” in Dimaranan, Betina V. (ed.). Global Trade, Assistance, and Production: The GTAP 6 Data Base, Center for Global Trade Analysis, Purdue University.

Ko, J.-H. (2008). “Chapter 7.C: Korea,” in Badri Narayanan G. and Terrie L. Walmsley (eds.). Global Trade, Assistance, and Production: The GTAP 7 Data Base, Center for Global Trade Analysis, Purdue University.

Ko, J.-H. (2012). “Korea”, in Badri Narayanan G., Angel Aguiar and Robert McDougall (eds.), Global Trade, Assistance, and Production: The GTAP 8 Data Base, Center for Global Trade Analysis, Purdue University.

Ko, J.-H. (2016). “Chapter 7.K: Korea”, in Aguiar, Angel, Badri Narayanan, & Robert McDougall. “An Overview of the GTAP 9 Data Base.” Journal of Global Economic Analysis

⁴³In the case of the Korean I-O table for 2014 used for GTAP database version 10, AI19, AI21, AI23, and AI26 were calculated from a scalar of total net commodity taxes on imported goods for each of them.

1, no. 1 (June 3, 2016): 181-208. Retrieved from <https://jgea.org/ojs/index.php/jgea/article/view/23>.

Ko, J.-H. (2019). "Chapter 7.K: Korea", in Aguiar, A., Chepeliev, M., Corong, E., McDougall, R., & van der Mensbrugghe, D. (2019). The GTAP Data Base: Version 10. *Journal of Global Economic Analysis*, 4(1), 1-27. Retrieved from <https://www.jgea.org/ojs/index.php/jgea/article/view/77>.

The Bank of Korea (2007). *Input-Output Tables of Korea 2003*. Seoul.

The Bank of Korea (2009). *Input-Output Tables of Korea 2007*. Seoul.

The Bank of Korea (2014). *Input-Output Tables of Korea 2010*. Seoul.

The Bank of Korea (2016). *Input-Output Tables of Korea 2014*. Seoul.

The Bank of Korea (2019). *Input-Output Tables of Korea 2015*. Seoul. The United Nations Statistical Commission (2009). *System of National Accounts 2008*. (<http://unstats.un.org/unsd/nationalaccount/docs/SNA2008.pdf>)

Appendix

Table 8.75: A mapping of 381 sectors of Korean I-O table to GTAP sectoral classification

GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
1	pdr	Paddy rice	1 Unmilled rice
2	wht	Wheat	25* Agriculture, forestry and fishing services
3	gro	Cereal grains nec	2* Wheat and other crops
4	v_f	Vegetables, fruit, nuts	25* Agriculture, forestry and fishing services
			2* Wheat and other crops
			25* Agriculture, forestry and fishing services
			3 Pulses
			5 Vegetables
			6 Fruits
			25* Agriculture, forestry and fishing services
5	osd	Oil seeds	11 Seeds
6	c_b	Sugar cane, sugar beet	25* Agriculture, forestry and fishing services
7	pfb	Plant-based fibers	Not existent
			13* Other inedible crops
			25* Agriculture, forestry and fishing services
8	ocr	Crops nec	4 Potatoes
			7 Floricultural crops
			8 Cultivated medicinal herbs
			9 Leaf tobacco
			10 Natural rubber
			12 Other edible crops
			13* Other inedible crops
			25* Agriculture, forestry and fishing services
9	ctl	Bovine cattle, sheep and goats, horses	14* Dairy farming
			15 Beef cattle
			18* Other livestock breeding
			25* Agriculture, forestry and fishing services
10	oap	Animal products nec	16 Swine
			17 Poultry and eggs
			18* Other livestock breeding
			25* Agriculture, forestry and fishing services
11	rmk	Raw milk	14* Dairy farming
			25* Agriculture, forestry and fishing services
12	wol	Wool, silk-worm cocoons	18* Other livestock breeding
			25* Agriculture, forestry and fishing services
13	for	Forestry	19 Forest planting and conservation
			20 Raw timber
			21 Edible forestry products
			22 Misc. forestry products
			25* Agriculture, forestry and fishing services
14	fsh	Fishing	23 Fishing
			24 Aquaculture
			25* Agriculture, forestry and fishing services
15	col	Coal	26 Anthracite
			27 Bituminous coal
16	oil	Oil	28 Crude petroleum
17	gas	Gas	29 Natural gas

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
18	omn	Minerals nec	30 Iron ores
			31 Other nonferrous metal ores
			32 Sand and stones
			33 Limestone
			34 Misc. nonmetallic minerals
19	cmt	Bovine cattle, sheep and goat, horse meat products	35* Slaughtering and meat processing
20	omt	Meat products nec	35* Slaughtering and meat processing
			36 Poultry slaughtering and processing
			37 Prepared meat products
			49* Animal and vegetable fats and oils
21	vol	Vegetable oils and fats	49* Animal and vegetable fats and oils
22	mil	Dairy products	38 Dairy products
23	pcr	Processed rice	41* Polished rice, barley and others
24	sgr	Sugar	43 Raw sugar
			44 Refined sugar
25	ofd	Food products nec	39 Processed fish and sea foods
			40 Frozen, salted, dried and smoked fish and sea foods
			41* Polished rice and barley and others
			42 Flour and cereal preparations
			45 Starches, glucose, glucose syrup and maltose
			46 Bakery and confectionery products
			47 Noodles
			48 Seasonings
			50 Canned or cured fruits and vegetables
			51 Coffee and tea
			52 Ginseng products
			53 Miscellaneous foodstuffs
			54 Prepared livestock feeds
26	b.t	Beverages and tobacco products	55 Ethyl alcohol for beverages
			56 Distilled spirits (soju)
			57 Beer
			58 Other liquors
			59 Nonalcoholic drinks and ice
			60 Tobacco products
27	tex	Textiles	61 Natural and chemical fiber yarns
			62 Other fiber yarn
			63 Natural and chemical fiber fabrics
			64 Other fiber fabrics
			65 Knitted fabrics
			66 Fiber bleaching and dyeing
			67 Textile products
			68 Non-woven fabric and pelt
			69 Misc. textile products
28	wap	Wearing apparel	70 Textile wearing apparels
			71 Knitted wearing apparels
			72 Leather wearing apparels
			73 Fur wearing apparels and products
			74 Clothing accessories
29	lea	Leather products	75 Leather

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			76 Fur
			77 Luggage and handbags
			78 Footwear
			79 Other leather products
30	lum	Wood products	80 Lumber
			81 Plywood
			82 Reconstituted and densified wood
			83 Wooden products for construction
			84 Wooden containers
			85 Other wooden products
31	ppp	Paper products, printing	86 Pulp
			87 Printing paper
			88 Other raw paper and paperboard
			89 Corrugated paper and solid fiber boxes
			90 Paper containers
			91 Stationery paper and office paper
			92 Sanitary paper products
			93 Other paper products
			94 Publishing and reproduction of recorded media
32	p_c	Petroleum, coal products	95 Coke and other coal products
			96 Coal briquettes
			97 Naphtha
			98 Gasoline
			99 Jet oil
			100 Kerosene
			101 Light oil
			102 Heavy oil
			103 Liquefied petroleum gas
			104 Refined mixed oil
			105 Lubricants and grease
			106 Misc. petroleum refinery products
33	chm	Chemical products	107 Aliphatic petrochemical basic products
			108 Aromatic petrochemical basic products
			109 Petrochemical intermediate products
			110 Other basic organic chemicals
			111 Industrial gases
			112 Basic inorganic chemicals
			113 Dyes, pigments, and tanning materials
			114 Synthetic resins
			115 Synthetic rubber
			116 Chemical fibers
			118 Fertilizers and nitrogen compounds
			119 Pesticides
			120 Paints, varnishes, and allied products
			121 Printing ink
			122 Soap, detergents and dentifrices
			123 Cosmetics
			124 Adhesives, gelatin and sealants
			125 Photographic chemical products
			126 Misc. chemical products
34	bph	Basic pharmaceutical products	117 Medicaments

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
35	rpp	Rubber and plastic products	127 Primary plastic products
			128 Plastic products for construction
			129 Plastic products for package
			130 Plastic products for assembly & transport equip.
			131 Misc. plastic products
			132 Tires and tubes
			133 Industrial rubber products
36	nmm	Mineral products nec	134 Misc. rubber products
			135 Sheet glass and primary glass products
			136 Glass products for electronics
			137 Industrial glass products except 136
			138 Other glass products
			139 Pottery, china and earthenware for home use
			140 Industrial pottery products
			141 Clay refractories
			142 Clay products for construction
			143 Cement
			144 Ready mixed concrete
			145 Concrete blocks, bricks, and other concrete products
			146 Lime, gypsum, and plaster products
			147 Cut stone & stone products
			148 Abrasives
			149 Asbestos and asphalts
			150 Misc. nonmetallic mineral products
37	i_s	Ferrous metals	151 Pig iron
			152 Ferroalloys
			153 Steel ingots and semifinished products
			154 Steel rods and bars
			155 Section steel
			156 Rails and wires
			157 Steel plates (with more than 3 mm)
			158 Hot rolled steel sheets
			159 Fabricated wire products
			160 Steel pipe and tubes
			161 Cold rolled steel sheet, strip, and bars
			162 Coated steel plates
			163 Misc. primary iron and steel products
38	nfm	Metals nec	164 Copper smelting, refining and alloy
			165 Aluminium smelting, refining and alloy
			166 Lead and zinc smelting, refining and alloy
			167 Gold and silver ingots
			168 Other nonferrous metal ingots
			169 Primary copper products
			170 Primary aluminium products
39	fmp	Metal products	171 Other nonferrous metal castings and forgings, and primary nonferrous metals
			172 Metal foundries
			173 Metal products for construction
			174 Structural metal products
			175 Metal tanks and reservoirs

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			176 Industrial boiler and steam generator
			177 Metal forgings and metallurgical products
			178 Metal pressed products
			179 Treatment and coating of metals
			180 Products made of coated metals
			181 Household metallic utensils
			182 Fastening metal products
			183 Hand tools
			184 Bolts, nuts, screws, rivets, and washers
			185 Metal cans, barrels, and drums
			186 Other metal products
40	ele	Computer, electronic and optical equipment	187 Semiconductor devices
			188 Integrated circuits
			189 LCD flat display
			190 Misc. electronic display equipment
			191 Printed circuit boards
			192 Electric resistors, storage batteries, electric coils, and transformers
			193 Misc. electronic components
			194 Computers
			195 Computer memory storage
			196 Computer and peripheral equipment
			197 Wire telephone and telegraph equipment
			198 Mobile communications equipment
			199 Misc. communication and broadcasting equipment
			200 Television receiving sets
			201 Film production equipment
			202 Audio and sound equipment
41	eeq	Electrical equipment	209 Motors and generators
			210 Electric transformers
			211 Capacitors and rectifiers
			212 electric circuit switch and connection equipment
			213 Panel boards and automatic control panels
			214 Batteries
			215 Insulated wires and cables
			216 Household refrigerators and freezers
			217 Cooking appliances and heating apparatus
			218 Other household electronic appliances
			219 Electric bulbs and lamps
			220 Electric lighting fixtures
			221 Misc. electric equipment and supplies
42	ome	Machinery and equipment nec	222 Engines and turbines
			223 Pumps and compressors
			224 Valves
			225 Bearings, gears, gearing and driving elements
			226 Conveyors and conveying equipment
			227 Air-conditioning equipment and industrial refrigeration equipment

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			228 Filtering or purifying machinery for liquid and Gases
			229 Office machines and devices
			230 Misc. machinery and equipment of general purpose
			231 Agricultural implements and machines
			232 Construction and mining machines
			233 Metal forming equipment
			234 Metal molds and industrial patterns
			235 Semiconductor machines
			236 Display machines
			237 Food processing machines
			238 Textile and apparel machines
			239 Industrial robots
			240 Printing machines
			241 Rubber and plastic surgery equipment
			242 Misc. special purpose equipment
			203 Medical instruments and supplies
			204 Measuring and analytical instruments
			205 Industrial automatic regulators
			206 Cinematograph cameras and projectors
			207 Other photographic and optical instruments
			208 Watches and clocks
43	mvh	Motor vehicles and parts	243 Passenger automobiles
			244 Buses and vans
			245 Trucks
			246 Motor vehicles with special equipment
			247 Motor vehicle engines
			248 Trailers and containers
			249 Motor vehicle chassis, bodies and parts
44	otn	Transport equipment nec	250 Steel ships
			251 Other ships
			252 Ship repairing and ship parts
			253 Railroad vehicles and parts
			254 Aircraft and parts
			255 Motorcycles and parts
			256 Bicycles and parts and misc. transportation
45	omf	Manufactures nec	257 Wood furniture
			258 Metal furniture
			259 Other furniture
			260 Toys and games
			261 Sporting and athletic goods
			262 Musical instruments
			263 Pens, pencils, and other artists' materials
			264 Jewelry and plated ware
			265 Models and decorations
			266 Misc. manufactured products
			267 Manufacturing and processing services
			268 Repairs of industrial machinery and equipment
46	ely	Electricity	269 Water power generation
			270 Thermal power generation

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			271 Atomic power generation
			272 In-house power generation
			273 Renewable energy generation
			275 Steam and hot water supply
47	gdt	Gas manufacture, distribution	274 Manufactured gas supply
48	wtr	Water	276 Water supply
			277 Treatment of sewage, waste water, and night soil(public)
			278 Treatment of sewage, waste water, and night soil (commercial)
			279 Collection and disposal of wastes (public)
			280 Collection and disposal of wastes (commercial)
			281 Resource recycling services
49	cns	Construction	282 Residential building construction
			283 Nonresidential building construction
			284 Building repairs
			285 Road construction
			286 Railroad construction
			287 Breakwater, pier, and harbor construction
			288 Dam, levee, and flood control project construction
			289 Water main line and drainage project construction
			290 Land clearing and reclamation, and irrigation project construction
			291 Land leveling and athletic field construction
			292 Environment purification facilities
			293 Communications line construction
			294 Electric power plant construction
			295 Industrial plant construction
			296 Miscellaneous construction
50	trd	Trade	297 Wholesale and retail trade
			375 Motor repair services
51	afs	Accommodation, food and service activities	312 General eating places
			313 Misc. eating and drinking places
			314 Drinking places
			315 Non-alcohol beverage store
			316 Hotels and other lodging places
52	otp	Land transport and transport via pipelines	298 Railroad passenger and freight transportation
			299 Road passenger transportation
			300 Road freight transportation
			311 Parcel delivery service
53	wtp	Water transport	301 Coastal and inland water transportation
			302 Deep sea transportation
54	atp	Air transport	303 Air transportation
55	whs	Warehousing and support activities	304 Services incidental to road transportation
			305 Services incidental to water transportation
			306 Airports, flying, fields and airport terminal services

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			307 Cargo loading or unloading operations
			308 Warehousing and storage
			309 Other services incidental to transportation
56	cmn	Information and communication	310 Postal services
			317 Wire communication services
			318 Wireless & satellite communication services
			319 Communication resale & intermediation service
			320 Misc. communication services
			321 Terrestrial broadcasting
			322 Cable and satellite broadcasting
			323 Information provision service
			324 Game software publication
			325 Software development and supply
			326 Misc. IT services
			327 Newspapers and publishing
			328 Movie and audio production and distribution
			329 Showing of movies
57	ofi	Financial services nec	330 Central bank and banking institutions
			331 Financial investment institutions
			332 Other financial intermediaries
			336* Services auxiliary to finance and insurance
58	isr	Insurance	333 Life insurance
			334 Pension fund
			335 Casualty insurance
			336* Services auxiliary to finance and insurance
59	rsa	Real estate activities	337* Residential services
			338 Non-residential building rental
			339 Real estate development and supply
			340 Real estate agents and managers
60	obs	Other business services	341 Research and development(public)
			342 Research and development (non-profit)
			343 Research and development (commercial)
			344 Research and development in enterprise
			345 Legal and accounting services
			346 Market survey and management consulting services
			347 Advertising services
			348 Architectural and civil engineering services
			349 Engineering-related services
			350 Science and technology services
			351 Misc. special services
			352 Lease of equipment, appliances and intellectual property rights
			353 Maintenance of business facilities and landscape services
			354 Manpower supply services
			355 Misc. business services
61	ros	Recreational and other services	367 Culture services (public)
			368 Theatrical producers, bands, and entertainers
			369 Other culture services
			370 Travel agency and travel-related services

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GTAP sectoral classification (GSC3)			Korean I-O table sectoral classification
			371 Sports services
			372 Amusement and recreation services
			373 Business associations and professional membership organizations
			374 Religious, political, labor, and other social organizations
			376 Electronic communication devices and home repair services
			377 Barber and beauty shops
			378 Laundry and cleaning services
			379 Domestic services
			380 Other personal services
62	osg	Public administration and defense; compulsory social security; and activities of extraterritorial organizations and bodies	356 Central government
			357 Local government
			358 Social insurance (public)
63	edu	Education	359 Education services (public)
			360 Education services (non-profit)
			361 Education services (commercial)
64	hht	Human health and social work activities	362 Medical and health services(public)
			363 Medical and health services (non-profit)
			364 Medical and health services (commercial)
			365 Social welfare services (public)
			366 Social welfare services (non-profit)
65	dwe	Dwellings	337* Residential services (imputed rent)

The * signifies the sectors of the Korean I-O table affected by the split.