China

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The original 2010 Input-Output Table doesn't have "multi-product" sector. After some adjustments, the data tables are reclassified and re-balanced to provide the matrices required by GTAP. The format of GTAP tables that we submit is the original version, the second type of permitted format. Many Mark's methods are used in updating database process, and here we give many thanks to Professor Mark Horridge.

1. *Data Source*

The source of China's contributed data is from "Input-Output Table of China-2010" published by National Bureau of Statistics of China (NBS) in 2013. Some trade related data is (Import CIF value, Import tariff rate and value added tax rate) is from China Customs. Unlike benchmark table, 2010 Input-Output Table is extended based on 2007. This means that this table is not totally complied by the large-scale Input-Output survey across the country.

The original 2010 I-O Table includes 41 sectors, of which there are 1 sector for agriculture, 24 sectors for manufacture, and 16 sectors for services. The units are 10 thousand Yuan (RMB) at current producer's price, which includes value-added tax but excludes commercial margin, transportation and telecommunication cost. However, for reducing calculation error, the table we contributing are in ten million Yuan (RMB).

The intermediate input matrix of China's 2010 I-O Table is a commodity by commodity matrix and each sector only produces one commodity. Final demanders include household consumption, government consumption, gross fixed capital formation, changes in stock, and exports. The table also includes an import value column, which is valued at c.i.f. price.

Table 1 shows the general form of China 2010 I-O Table:

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Table1. The general form of China 2010 IO Table (Producer Price, ten thousand Yuan RMB)

Output / Input	Intermediate Use		Final Use								
	Sector 1 … Sector 41		Rural Consumption	Urban Consumption	Government Consumption	Capital Formation	Stock Change	Export	Import	Other	Total Output
Intermediate Input	Sector 1 : Sector 41										
Value added	Labor Payment (VA001) Net Production Tax (VA002) Capital Depreciation (VA003) Operating Surplus (VA004)										
	Total Input										

2. Sector Classification

The sectors classification in 2010 contributed table is 45 sectors. It is the same sector classification like last time. The original I-O Table, however, consists of 33 sectors only. In order to keep the same sector detail, we split the 33 sectors into 45 sectors according to the shares of 2007 Chinese I-O Table. The concordance from GSC2 to the sector classification used in the contributed table is listed in Table A1 and the concordance from 33 sectors to the 45 sectors classification is listed in Table A2.

3. Processing of the Source Data

The NBS 2010 IO table doesn't fully satisfy all aspects of the GTAP requirements set out in Huff, McDougall and Walmsley, so main adjustments to IO table are as follows:

- The removal of the "Error" item;
- Sector split;
- Split of Import and Domestic Matrices;
- Construct of Tax Matrices;
- The final balancing of the database.

3.1 Treatment of the "Error" Item

There is an "Error" vector of each commodity in the original 2010 IO table. The errors are relatively large, 6 of them (41 sectors) beyond 4 percent of sector gross output, and the biggest is 4.8 percent for Crude oil and Gas. We treat as follows: first, we add Error item to stock change, forming new Stock change, and then remove the Error vector. Second, we control that the absolute value of new Stock change doesn't exceed 3% of sector gross output, for example, if the new stock change exceed 3% of sector gross output, we make it equal to 3%; Third, RAS approach is used to make sure sector balance.

3.2 Sector Split

There are seven sectors in the original 2010 IO table to be split to be consistent with the manufacturing and service sector classifications in GSC2, see Table 2. These are "Crops", "Wood Products", "Information Communication and Computer Service and Software", "Finance and Insurance", "Real Estate", "Leasing and Business Service" and "Comprehensive Technical Service".

In addition to real estate, the rest of six sectors are split based on the input and use share derived from the 135 sectors input-output table in 2007. There is no sector of household dwelling in the original IO table. However, there is a real estate sector, for which household consumption and capital formation are the only final demander. The household consumption proportion mainly refers to imputed expenditure by the owner occupied dwellings, and the remained proportion refers to real estate service. So we use household consumption share of final demand to split out Dwelling sector from the Original Real Estate in 2010 I-O Table, see Table 3.

Table 2. Sector Splits in the 2010 table

2010 IO Table	New Sector
Crops	Crops Forestry Fishing Technical services for agriculture, forestry, livestock and fishing
Wood Product	Wood Processing Wooden Furniture
Information Communication and Computer Service and Software	Information Communication Computer Service and Software
Finance and Insurance	Finance Insurance
Real Estate	Residential Real Estate Business Real Estate
Leasing and Business Service	Leasing and Business Service Tourism
Comprehensive Technical Service	Comprehensive Technical Service Geological Prospecting

Table 3. Split of Sector Real Estate, (billion, %)

	Household Consumption	Capital Formation	Share of Household Consumption
Real estate	1530.98	746.36	67.2

Source: 2010 China Input-output table, NBS

3.3 Split of Import and Domestic Matrices

There is only one column vector reporting total import by commodity in the original I-O Table. Using the method suggested by Professor Mark Horridge, we first calculate the share of total import in total domestic use (intermediate and final). Assuming the import shares of all users using each commodity is same, and then multiplying the import share by total use by all user we obtain Import Matrix. Subtracting Import Matrix from Total Use Matrix, Domestic Use Matrix is obtained.

3.4 Construct of Tax Matrices

After splitting out Import and Domestic Matrices, Domestic Tax and Import Tax Matrices are split out. We assume different users pay different tax rates, for example, tax factors of industry and export are both 0.5, no taxes are levied in change in stocks (i.e., use a factor of 0), and of all remain users pay full taxes, factor of 1. Domestic Commodity tax vector is used to split out Domestic Tax Matrix according to tax factor and domestic commodity usage value of different users. Similarly, Import Commodity tax vector (MTax) is used to split out Import Tax Matrix according to corresponding tax factor and import commodity usage.

3.5 Balancing the data base

Once all adjustments are completed, RAS method is used to ensure data balance condition: total output equals total costs of each sector; total sales equal total output of each commodity; income GDP equals expenditure GDP. After RAS balance, the data meets GTAP's requirements.

4. Improvements

Compared with early China's data contributed to GTAP, there are two aspects that we are improving. First, we are using the latest input-output tables; its benchmark year is 2010. Second, when splitting import value of each commodity into three types, import value-added tax (Mtax), import tariff (Mtar) and import c.i.f. value, we aggregate HS 10-digit international trade data from China Customs, and then obtain weighted average of tariff rate and value-added tax rate of each commodity.

5. Diagnostics

The China GTAP data base was checked to ensure that:

- All sign conditions are met. All pre-tax commodity usage values (except changes in stocks) are non-negative, where pre-tax commodity usage values are strictly positive, post-tax values are also strictly positive, and all factor usage values are non-negative.
- All balance conditions are met. Total output equal total costs of each sector, and total sales equal to total output of each commodity.
- No ridiculous tax rates exist in data. Taxes on domestic and imported commodities are all non-negative.
- The GTAP entropy IO cost shares appear correct.

References

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Appendix

Table A1. Concordance from GSC2 to the Classification Used in the Contributed Table

Classification in the Contributed table		GSC2 sectors	
1	Crops	1	Paddy rice
		2	Wheat
		3	Cereal grains nec
		4	Vegetables, fruit, nuts
		5	Oil seeds
		6	Sugar cane, sugar beet
		7	Plant-based fibers
		8	Crops nec
2	Livestock	9	Cattle, sheep, goats, horses
		10	Animal products nec
		11	Raw milk
		12	Wool, silk-worm cocoons
3	Forestry	13	Forestry
4	Fishing	14	Fishing
5	Coal	15	Coal
6	Oil and Gas	16	OilGas
7	Minerals nec	18	Minerals nec
8	Processed rice	23	Processed rice
9	Vegetable oils and fats	21	Vegetable oils and fats
10	Sugar	24	Sugar
11	Meat products	19	Meat: cattle, sheep, goats, horse
		20	Meat products nec
12	Dairy products	22	Dairy products
13	other food products	25	Food products nec
14	Beverages and tobacco products	26	Beverages and tobacco products
15	Textiles	27	Textiles
16	Wearing apparel	28	Wearing apparel
17	Leather products	29	Leather products
18	Wood products	30	Wood products
19	Paper products, publishing	31	Paper products, publishing
20	Petroleum, coal products	32	Petroleum, coal products
21	Chemical, rubber, plastic prods	33	Chemical, rubber, plastic prods
22	Mineral products nec	34	Mineral products nec
23	Ferrous metals	35	Ferrous metals
24	Metals nec	36	Metals nec
25	Metal products	37	Metal products
26	Motor vehicles and parts	38	Motor vehicles and parts
27	Transport equipment nec	39	Transport equipment nec
28	Electronic equipment	40	Electronic equipment
29	Machinery and equipment nec	41	Machinery and equipment nec
30	Manufactures nec	42	Manufactures nec

Classification in the Contributed table		GSC2 sectors	
31	Electricity	43	Electricity
32	Gas manufacture, distribution	44	Gas manufacture, distribution
33	Water	45	Water
34	Construction	46	Construction
35	Trade	47	Trade
36	Transport nec	48	Transport nec
37	Sea transport	49	Sea transport
38	Air transport	50	Air transport
39	Communication	51	Communication
40	Financial services nec	52	Financial services nec
41	Insurance	53	Insurance
42	Business services nec	54	Business services nec
43	Recreation and other services	55	Recreation and other services
44	PubAdmin/Defence/Health/Education	56	PubAdmin/Defence/Health/Education
45	Dwellings	57	Dwellings

Table A2. Concordance from 33 sectors to the Classification Used in the 45 sectors Contributed Table

33 Sectors Classification		45 Sectors Classification	
1	Crops	1	Crops
		2	Livestock
2	Forestry	3	Forestry
3	Fishing	4	Fishing
4	Coal	5	Coal
5	Oil and Gas	6	Oil and Gas
6	Mineral nec	7	Minerals nec
7	Food product and Beverages	8	Processed rice
		9	Vegetable oils and fats
		10	Sugar
		11	Meat products
		12	Dairy products
		13	other food products
		14	Beverages and tobacco products
8	Textiles	15	Textiles
9	Wearing apparel and Leather products	16	Wearing apparel
		17	Leather products
10	Wood Products	18	Wood products
11	Paper products, publishing	19	Paper products, publishing
12	Petroleum, coal products	20	Petroleum, coal products
13	Chemical and Rubber	21	Chemical, rubber, plastic products
14	Mineral products nec	22	Mineral products nec
15	Ferrous and metals products	23	Ferrous metals
		24	Metals nec
16	Metal Products	25	Metal products
17	Transports equipment	26	Motor vehicles and parts
		27	Transport equipment nec
18	Electronic equipment	28	Electronic equipment
19	Machinery and equipment nec	29	Machinery and equipment nec
20	Manufactures nec	30	Manufactures nec
21	Electricity	31	Electricity
22	Gas manufacture	32	Gas manufacture, distribution
23	Water	33	Water
24	Construction	34	Construction
25	Trade	35	Trade
26	Transport nec	36	Transport nec
		37	Sea transport
		38	Air transport
27	Communication	39	Communication
28	Financial Service	40	Financial services nec
29	Insurance	41	Insurance

33 Sectors Classification		45 Sectors Classification	
30	Business services nec	42	Business services nec
31	Recreation and other services	43	Recreation and other services
32	Public Administration	44	PubAdmin/Defence/Health/Educat
33	Dwelling	45	Dwellings