Mongolia

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1.   Introduction

This document describes the steps behind the creation of the first Input-Output (I-O) table of Mongolia for the Global Trade Analysis Project (GTAP)[1]. The GTAP I-O table for Mongolia is based on the Mongolian Inter-Sector balance table for 2005 constructed by the National Statistical Office of Mongolia (NSO).

2.   Source Data

The data used to construct the Mongolian I-O table in GTAP are based on an I-O table constructed by the National Statistical Office of Mongolia. The 55 sector Mongolian I-O table has a commodity by industry format, with units in millions of local currency (tugrugs) at producers' prices for the year 2005. The 55 sectors are listed in Table A.1 in the appendix.

The original I-O table contained the following data arrays:

- A commodity-by-commodity MAKE matrix
- A vector of the usage of labour and capital
- A vector of indirect taxes on production
- A vector of taxes on products
- A vector of private consumption
- A vector of public consumption
- A vector of consumption by NGOs
- A vector of capital accumulation
- A vector of net change in precious items
- A vector of net change in working capital
- A vector of exports
- A vector of imports

Other unpublished data from the National Statistical Office of Mongolia were used to make adjustments to the I-O table when necessary.

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3.   *Preparing the GTAP Mongolian I-O Table*

The original I-O table was taken to be an official representation of the Mongolian economy. As such, only minor adjustments were made to suit GTAP's requirements:

- The vector of private consumption was combined with the vector of consumption by NGOs and labeled private consumption.
- The vector of net change in precious items was combined with the vector of net change in working capital and labeled change in inventories
- The value of imports was greater than the value of domestic use for the following sectors from Table 1 in the appendix, thus indicating the presence of re-exports.
    - Clothing and Fur processing
    - Coke, liquid and nuclear fuel
    - Machinery equipment production
    - Other transportation products
    - Secondary raw materials
    - Transport and tourism services activities
- Re-exports were removed from the table by adjusting the value of imports and exports down by the same amount so as to maintain the balance of the table.
- The use of land by agricultural industries was missing from the original I-O table.
    - In GTAP 7 (Badri and Walmsley 2008), within the aggregate crop and livestock sectors in Kazakhstan, land accounts for approximately 30 per cent of total value added.
    - The agriculture sectors in Kazakhstan were considered by the authors to be an appropriate proxy for the Mongolian agriculture sectors
    - Thus, 30 per cent of total value added was allocated to the land primary factor in crops and animal husbandry
- The share of labour by the animal husbandry industry in the original I-O table in total value added was approximately 4 per cent. Likewise, the share of labour in the crop industry in the original I-O table in total value added was approximately 14 per cent.
    - Even though the table contains self-employment income, the authors considered these shares to be very low.
    - Furthermore, the implied average wage rate in the crop and animal husbandry sector was calculated from the table using unpublished data from the NSO on the number of people employed in each sector. This was found to be much lower than the reported average wage rate for the industry (also sourced from unpublished data from the NSO).
    - The authors adjusted the payments to labour in the table such that they were approximately equal to that implied by the number of people employed in each sector times the reported average wage rate for the sector.
    - The payments to capital were then adjusted down such that the sum of value added was equal to the sum of value added in the original I-O table.
- The vector of taxes on products was split into three vectors (one for taxes on domestic use, one for taxes on imported use and one for import tariffs) using unpublished data from the NSO.

After making the adjustments described above, the authors then used the programs described within Horridge *et al.* (2008) and the GEMPACK economic modelling software (Harrison and Pearson 1996) to prepare the GTAP Mongolian I-O table.

The 55 sectors in the original I-O table were aggregated to 34 sectors in the GTAP Mongolian I-O table (Table 1 in the appendix). The mapping used is in Table 1 in the appendix. The mapping between the 34 sectors and the 57 GTAP sectors is also in Table 1. No sectors were disaggregated.

4.   Data Quality

The NSO estimates the size of the informal economy in Mongolia to be approximately 10 per cent of GDP. The authors note that there is significant variation in estimates from other sources.

References

B.G. Narayanan and T.L. Walmsley, Editors (2008). *Global Trade, Assistance, and Production: The GTAP 7 Data Base*, Center for Global Trade Analysis, Purdue University.

W.J. Harrison and K.R. Pearson (1996). Computing solutions for large general equilibrium model using GEMPACK, *Computational Economics*, 9, pp. 83-127.

M. Horridge, R. McDougall, B. Narayanan and T.L. Walmsley (2008). *Exercises in contributing I-O tables to the GTAP Data Base*, Centre for Global Trade Analysis, Purdue University.

Appendix

Table 1: Sectoral Mapping

	34 sectors		**Covering 55 original I-O sectors**		**Covering 57 GTAP sectors**
1	Crops	**1**	Crops	**1**	Paddy Rice
				2	Wheat
				3	Other Grains
				4	Vegetables & Fruit
				5	Oil Seeds
				6	Cane & Beet
				7	Plant Fibers
				8	Other Crops
2	Lstock	**2**	Animal husbandry	**9**	Cattle
				10	Other Animal Products
				11	Raw milk
				12	Wool
3	Frs	**3**	Forestry	**13**	Forestry
4	Fsh	**4**	Fishery	**14**	Fishing
5	Coa	**5**	Coal	**15**	Coal
6	OilGas	**6**	Oil and gas	**16**	Oil
				17	Gas
7	Omn	**7**	Iron ore	**18**	Other Mining
		8	Other mining extraction		
8	Othfood	**9**	Meat, fish, vegetables, fruit, fat, oil processing	**19**	Cattle Meat
		10	Wheat flour, starch, animal feed	**20**	Other Meat
		11	Other food products	**21**	Vegetable Oils
				22	Processed Rice
				23	Sugar
				24	Other Food
9	Mil	**12**	Milk, milk products	**25**	Milk
10	BT	**13**	Beverage	**26**	Beverages and Tobacco products
		14	Tobacco		
11	Tex	**15**	Textiles	**27**	Textiles
12	Wap	**16**	Clothes and fur processing	**28**	Wearing Apparel
13	Lea	**17**	Leather processing, production, footwear	**29**	Leather
14	Lum	**18**	Wood, wooden products (excluding	**30**	Lumber

			furniture)			
15	Ppp	19	Paper, paper products	31	Paper & Paper Products	
		20	Printing, recording			
16	PC	21	Coke, liquid and nuclear fuel	32	Petroleum & Coke	
17	Crp	22	Chemical products	33	Chemical Rubber Products	
		23	Plastic and rubber products			
18	Nmmnfmis	24	Non-ferrous mineral products	34	Non-Metallic Minerals	
		25	Metal production	35	Iron & Steel	
				36	Non-Ferrous Metals	
19	Fmp	26	Metal production excluding machinery equipment	37	Fabricated Metal Products	
20	Mvh	27	Machinery equipment production	38	Motor Vehicles	
21	Ele	28	Stationery and computing equipment	39	Electronic Equipment	
		29	Radio, television, communication equipment production			
22	Ome	30	Electric machinery and equipment	40	Other Machinery & Equipment	
		31	Medical equipment, precision measurement equipment, clock			
23	Otn	32	Other transportation products	41	Other Transport Equipment	
24	Omf	33	Furniture, secondary raw material processing	42	Other Manufacturing	
		34	Secondary raw materials			
25	ElyGdt	35	Electricity, gas, heating	43	Electricity	
				44	Gas Distribution	
26	Wtr	36	Water sanitation, water supply	45	Water	
27	Cns	37	Construction	46	Construction	
28	Trd	38	Wholesale and retail trade	47	Trade	
		39	Hotel, restaurant			
29	Otpwtp	40	Land transportation	48	Other Transport	
		41	Transport and tourism services activities	49	Water transport	
30	Atp	42	Air transportation	50	Air transport	
31	Cmn	43	Postal and communication service	51	Communications	

32	Ofiisr	**44**	Insurance, financial services other than pension	**52**	Other Financial Intermediation
		45	Insurance excluding compulsory social insurance	**53**	Insurance
		46	Supporting financial services activities		
33	Obsdwe	**47**	Real estate related activities	**54**	Other Business Services
		48	Rental: machinery, equipment, household item	**55**	Dwellings
		49	Other business activities		
34	OsgRos	**50**	Activities related to computers	**56**	Recreation & Other Services
		51	Research activities	**57**	Other Services (Government)
		52	Public administration, defence		
		53	Education sector		
		54	Medical and social welfare		
		55	Other social and individual services		