India

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1. Data Source

The India contribution to GTAP Data Base has been compiled using input-output transactions table (IOTT) for the year 2003-04 published by the Central Statistical Organization (CSO), Government of India (CSO, 2008a). There are 130 sectors of production (Table 1). The supply of a commodity/ service is given as a row and consists of intermediate usage and total final usage (TFU). Intermediate usage is absorbed by 130 sectors of production. TFU consists of five categories: (i) Private Final Consumption Expenditure (PFCE), (ii) Government Final Consumption Expenditure (GFCE), (iii) Gross Fixed Capital Formation (GFCF), (iv) Change in Stocks (CIS) and (v) Net exports (exports *minus* imports). Exports are recorded on f.o.b. basis. Imports are reported as c.i.f. values and are exclusive of import duties and domestic taxes. Columns of each of the 130 sectors provide information on inputs consumed. The bottom two rows of IOTT provide information on net indirect tax (NIT) and gross value added (GVA). NIT constitutes indirect taxes *less* subsidies. The IOTT matrices are available in commodity x industry (C x I) and commodity x commodity (C x C) formats. The reported C x C matrix has been constructed from the C x I matrix following a methodology based on the industry technology assumption as suggested in the System of National Accounts of the United Nations (1968).

2. Sector Classification

The constitution of 130 sectors of production includes 37 primary, 68 manufacturing and 25 sectors of services. The primary sectors include 20 agricultural sectors, 4 animal husbandry, forestry, fishing and 11 mining sectors. The manufacturing sectors comprise of 8 agro processing sectors, 9 textile and wearing apparel sectors, and 51 other manufacturing sectors. The 25 service sectors include construction, electricity, water supply, transport, storage, communication, trade, hotels, banking and insurance.[2]

3. Data Processing

CSO provides inter-industry flows as composite of domestic production and imports. As the first step, IOTT has been split to construct two matrices of flows of domestic production and imports. The second step involves distribution of the value-added into three primary inputs namely land, labor and capital. The third step computes tax inclusive matrices of domestic flows and imports. Finally, a scheme has been designed to map India's 130 IOTT sectors as per GTAP requirements.

3.1 Splitting of IOTT Matrix

The import flow matrix (C x I) available from CSO has been transformed into C x C format. The matrix with inter-industry flows of domestic production is obtained as residue of absorption matrix and the import flow matrix. This is further transformed to generate a C x C matrix of domestic flows.

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[2] Refer chapter 2 of CSO (2008a) for detailed description of primary sources of data for all 130 sectors.

The final use vectors of the domestic flow matrix are similarly obtained from the two matrices and are exclusive of any imports.

3.2 Distribution of Value-Added

The value-added is reported for industries in absorption (C x I) matrix and for commodities in IOTT (C x C). The value-added as reported in C x C matrix has been split into shares of labor and capital.[3] In case of agricultural sectors (IOTT sectors 1-20), the share of capital has been assumed to be composite of land and capital shares. These shares have been worked out using information available from Ministry of Agriculture, Government of India (2007).

3.3 Tax Computations

The 130 x 130 NIT matrix is available from CSO. NITs are composite of commodity and non-commodity taxes. Commodity taxes include union and state excise duties, sales tax, custom duties (on imports and exports), and various other duties and cesses. Subsidies are negative commodity taxes. On the other hand, non-commodity taxes include stamp duties and levies like electricity duty, motor vehicle tax, entertainment tax, etc. These taxes are reported as columns indicating total tax paid for sales across a row viz. intermediate usage and final demand. Export duties, excise and subsidies are allocated across domestic flows. Import duty has its distribution across import flows. In addition, sales and service taxes are apportioned between domestic and import flow matrices.

3.4 Mapping Scheme for Aggregation

India's IOTT sectors have been mapped to GTAP sectors. While some of the GTAP sectors could be mapped one-on-one with India IOTT sectors, others had mapping relationship with more than one India IOTT sector and vice-versa. For example, India IOTT sector 53 (ready made garments and made up textile goods) is mapped one-on-one with GSC2 sector 28 (wap)[4]. Some of the GTAP sectors have been concorded with multiple IOTT sectors. For example, the GSC2 sector 31 (ppp) is mapped with IOTT sectors 57 (paper, paper products and newsprint) and 58 (printing, publishing and allied activities). On the other hand, two GSC2 sectors viz., 1 (pdr) and 23 (pcr) have been mapped with a single IOTT sector 1 (paddy, rice milling). More complex relationships include mapping of the aggregate IOTT sectors 22 (animal services), 23 (poultry and eggs) and 24 (other livestock products) with the aggregate of GSC2 sectors 9 (ctl), 10 (oap) and 12 (wol). This aggregate sector has been referred as MCOW (refer Table 2). Similarly, IOTT sectors 42 (tea and coffee processing) and 43 (miscellaneous food products) have been aggregated and mapped with the aggregate of four GSC2 sectors viz., 19 (cmt), 20 (omt), 22 (mil) and 25 (ofd). This composite sector is referred as COMO. The aggregate of IOTT sectors 63 (petroleum products and LPG) and 64 (coal tar products) has been mapped with aggregate of GSC2 sectors 32 (p_c) and 44 (gdt); jointly named as PTGD.

Based on the sectoral matching, comprehensive mapping has been prepared for 130 IOTT sectors to 50 GTAP sectors. The disaggregation of these 50 sectors into 57 GSC2 sectors has been executed by the GTAP research team.

4. Adjustments

Following are the changes made to address some anomalies observed during the earlier procedures.

4.1 Adjustment of Negative Pre-tax Domestic Flows

[3] The splitting is based on a concordance of 130 IOTT sectors of 2003-04 with 73 IOTT sectors of 1993-94 (Saluja and Yadav, 2006).

[4] For GSC2 sectors numbers and codes refer Karen et al (2000), for IOTT sector numbers and names refer Table 1.

In some cases, the domestic flow values turned out to be negative due to reported high values of imports. For such sectors, import values have been recomputed based on ratio of intermediate use to import in India IOTT 1993-94. The necessary adjustments have been made in the value of CIS in corresponding rows.

4.2 Adjustment of High Subsides in the Domestic Usage

Relatively high value of subsidy has been reported for domestic output of ships and boats (IOTT sector 95). Such a high value appeared to be inconsistent. The same has been scaled down based on share of subsidy in total indirect tax as was observed in India IOTT 1993-94. The necessary adjustments have been made in overall structure of subsidies.

Adjustment of Value-Added in select sectors

The distribution of value-added between labor and capital in case of three sectors namely fishing, wood and wood products (except furniture) and electricity was observed to be incongruous. These shares have been reworked based on India IOTT 1993-94.

4.3 Adjustments in the Cost Structure of Wheat

The reported India IOTT Data Base combines wheat and wheat milling in one sector namely Wheat (IOTT sector 2). This led to an anomaly reporting 27 per cent wheat going as input to this sector itself. Necessary adjustments have been made to ensure that wheat accounts for 5 per cent of input as seeds. The remaining share of wheat (flour) output flow has been adjusted across food sectors using wheat flour as input. Other suitable adjustments have been made in reallocation of primary factors.

References

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Table 1: Sector Specification of the IOTT, 2003-04

IOTT Sector	Sector Name	IOTT Sector	Sector Name
1	Paddy	**43**	Miscellaneous food products
2	Wheat	**44**	Beverages
3	Jowar	**45**	Tobacco products
4	Bajra	**46**	Khadi, cotton textiles (handlooms)
5	Maize	**47**	Cotton textiles
6	Gram	**48**	Woolen textiles
7	Pulses	**49**	Silk textiles
8	Sugarcane	**50**	Art silk, synthetic fiber textiles
9	Groundnut	**51**	Jute, hemp, mesta textiles
10	Coconut	**52**	Carpet weaving
11	Other oilseeds	**53**	Readymade garments
12	Jute	**54**	Miscellaneous textile products
13	Cotton	**55**	Furniture and fixtures-wooden
14	Tea	**56**	Wood and wood products
15	Coffee	**57**	Paper, paper prods. & newsprint
16	Rubber	**58**	Printing and publishing
17	Tobacco	**59**	Leather footwear
18	Fruits	**60**	Leather and leather products
19	Vegetables	**61**	Rubber products
20	Other crops	**62**	Plastic products
21	Milk and milk products	**63**	Petroleum products
22	Animal services(agricultural)	**64**	Coal tar products
23	Poultry & Eggs	**65**	Inorganic heavy chemicals
24	Other liv.st. produ. & Gobar Gas	**66**	Organic heavy chemicals
25	Forestry and logging	**67**	Fertilizers
26	Fishing	**68**	Pesticides
27	Coal and lignite	**69**	Paints, varnishes and lacquers
28	Natural gas	**70**	Drugs and medicines
29	Crude petroleum	**71**	Soaps, cosmetics & glycerin
30	Iron ore	**72**	Synthetic fibers, resin
31	Manganese ore	**73**	Other chemicals
32	Bauxite	**74**	Structural clay products
33	Copper ore	**75**	Cement
34	Other metallic minerals	**76**	Other non-metallic mineral prods.
35	Lime stone	**77**	Iron, steel and ferro alloys
36	Mica	**78**	Iron and steel casting & forging
37	Other non metallic minerals	**79**	Iron and steel foundries
38	Sugar	**80**	Non-ferrous basic metals
39	Khandsari, boora	**81**	Hand tools, hardware
40	Hydrogenated oil (vanaspati)	**82**	Miscellaneous metal products
41	Edible oils other than vanaspati	**83**	Tractors and agri. implements
42	Tea and coffee processing	**84**	Industrial machinery (F & T)
85	Industrial machinery(others)	**108**	Water supply
86	Machine tools	**109**	Railway transport services
87	Other non-electrical machinery	**110**	Land tpt including via pipeline
88	Electrical industrial Machinery	**111**	Water transport
89	Electrical wires & cables	**112**	Air transport
90	Batteries	**113**	Supporting and aux. tpt activities
91	Electrical appliances	**114**	Storage and warehousing

IOTT Sector	Sector Name	IOTT Sector	Sector Name
92	Communication equipments	**115**	Communication
93	Other electrical Machinery	**116**	Trade
94	Electronic equipments (incl.TV)	**117**	Hotels and restaurants
95	Ships and boats	**118**	Banking
96	Rail equipments	**119**	Insurance
97	Motor vehicles	**120**	Ownership of dwellings
98	Motor cycles and scooters	**121**	Education and research
99	Bicycles, cycle-rickshaw	**122**	Medical and health
100	Other transport equipments	**123**	Business services
101	Watches and clocks	**124**	Computer & related activities
102	Medical, precision & optical instruments	**125**	Legal services
103	Gems & jewellery	**126**	Real estate activities
104	Aircraft & spacecraft	**127**	Renting of machinery & equipment
105	Miscellaneous manufacturing	**128**	O.com, social & personal services
106	Construction	**129**	Other services
107	Electricity	**130**	Public administration

Source: Appendix 3, CSO (2008a)

Table 2: Mapping of the GSC2 sectors with India IO 2003-04

S.No	GTAP 50 sectors*	GSC_57	IO-India_130
1	**RICE**	**1_PDR, 23_PCR**	**1**
2	2_WHT	2_WHT	2
3	3_GRO	3_GRO	3-5
4	4_V_F	4_V_F	6-7,18-19
5	5_OSD	5_OSD	9-11
6	6_C_B	6_C_B	8
7	7_PFB	7_PFB	12-13
8	8_OCR	8_OCR	14-17,20
9	**MCOW**	**9_CTL, 10_OAP, 12_WOL**	**22+23+24**
10	11_RMK	11_RMK	21
11	13_FOR	13_FOR	25
12	14_FSH	14_FSH	26
13	15_COL	15_COL	27
14	16_OIL	16_OIL	29
15	17_GAS	17_GAS	28
16	18_OMN	18_OMN	30-37
17	**COMO**	**19_CMT, 20_OMT, 22_MIL, 25_OFD**	**42+43**
18	21_VOL	21_VOL	40-41
19	24_SGR	24_SGR	38-39
20	26_B_T	26_B_T	44-45
21	27_TEX	27_TEX	46-52, 54
22	28_WAP	28_WAP	53
23	29_LEA	29_LEA	59-60
24	30_LUM	30_LUM	56
25	31_PPP	31_PPP	57-58
26	**PTGD**	**32_P_C, 44_GDT**	**63+64**
27	33_CRP	33_CRP	61-62, 65-73
28	34_NMM	34_NMM	74-76
29	35_I_S	35_I_S	77-78
30	36_NFM	36_NFM	80
31	37_FMP	37_FMP	79, 81-82
32	38_MVH	38_MVH	97
33	39_OTN	39_OTN	95-96, 98-100
34	40_ELE	40_ELE	92,94
35	41_OME	41_OME	83-91, 93, 101
36	42_OMF	42_OMF	55,102-105
37	43_ELY	43_ELY	107
38	45_WTR	45_WTR	108
39	46_CNS	46_CNS	106
40	47_TRD	47_TRD	116-117
41	48_OTP	48_OTP	109-110, 113-114

S.No	GTAP 50 sectors*	GSC_57	IO-India_130
42	49_WTP	49_WTP	111
43	50_ATP	50_ATP	112
44	51_CMN	51_CMN	115
45	52_OFI	52_OFI	118
46	53_ISR	53_ISR	119
47	54_OBS	54_OBS	123-128
48	55_ROS	55_ROS	129
49	56_OSG	56_OSG	121-122, 130
50	57_DWE	57_DWE	120

Notes:

*Sector name includes Serial Number of the GSC2 sector followed by corresponding code; for identification the names of the composite sectors have four alphabets

RICE: Paddy and **Rice**

MCOW: **M**eat, **C**TL, **O**MT, **W**OL

COMO: **C**MT, **O**MT, **M**IL, **O**FD

PTGD: **Pe**t**r**oleum products, **G**as **d**istribution and coal tar products