

AO.1 Introduction

This chapter describes the steps taken to convert Panama's 2016 supply and use tables into an input-output table format used by the Global Trade Analysis Project (GTAP). The key information of the source data will be firstly discussed in Section 2, followed by the steps of conversion in Section 3. Section 4 presents the mapping between Panama's 61 original product sectors, GTAP's 65 sectoral classification, revision 3 (GSC3) and the more aggregated 43 sectors of the submitted tables.

AO.2 Data Source

The source of Panama's 2016 supply and use tables is the System of National Accounts (SCNP) webpage of the Panamanian National Institute of Statistics and Census (NISC). The tables used for this submission are contained in two downloadable Excel files: (i) supply and use table 2016 at current prices; and (ii) supplementary tables at current prices. All downloaded data are presented in millions of Panamanian Balboa, a domestic currency pegged with US dollar at par. The use table provides monetary figure for valued-added for each production industry but not on the composition – land, capital, and labour. Information on gross operating surplus, mixed operating surplus, labour compensation and production tax are sought from the supplementary tables. Land rent information is not found on the SCNP webpage.

The supply and use tables are presented at purchaser price. While they are not presented in basic price structure, vectors for product taxes, import duties, export taxes and product subsidies are available even further differentiation among users are not available. Vector for trade margins is also available in the supply table. These vectors are critical for converting the use table into a basic price structure in the next section.

AO.3 Data Processing

The goal of this section is to convert the data files downloaded from the source above to a new unified format described in Huff et al (2000). To ensure the data processing steps discussed in this section can be replicated by other researchers, a set of TAB files very close to those discussed in Horridge et al (2008), linked through a new batch file, is included in the submission to GTAP. The details of each TAB file, written for each step, are discussed in paragraphs below.

In step 1, the main task is to create a preliminary input-output (I-O) table by combining all information downloaded from the webpage. The use table is read into a data file on the start of this step; followed by adding column vectors of imports, taxes on imported goods, import tariffs,

taxes on domestic goods and trade margins to the right-hand side of the use table; and breaking down the value-added row into four rows consisting of labour, capital, land and production taxes. As land rent information is not available on the NISC website, land rents are all marked zero in the submitted table.

Column vectors of imports, VAT taxes on domestic goods and imported goods, import tariffs, trade margins are read directly from the supply table. Row vectors of labour, capital, land and production taxes are read from supplementary tables and then mapped into industries displayed in the use table.

In step 2, the task is to change the preliminary I-O table into a producer price structure. First, the trade margin column vector is transposed into a row vector, giving it the name of “Trade” sector. Second, removing trade margin from the input-output table such that the total of each row and each column are the same prior to transposing the trade margin column vector.

The I-O table after step 2 remains non-diagonal. That is, the number of industries and the number of products in the I-O Table are different. Each product can be produced by various industries and the relationship is represented by a non-diagonal MAKE matrix.

In step 3, a TAB program close to that for Exercise 1, Part D in Horridge et al (2008) is used to diagonalised the previous step I-O table. The new industry columns are named after each product row and are distributed in accordance with the unique product that they produce in 2016.

The I-O table after step 3 becomes diagonal with 61 industries producing 61 products.

In step 4, a TAB program close to that for Exercise 3, Part B in Horridge et al (2008) is used to reorder the columns of the previous step I-O table and check the costs-sales balance of each production sector.

In step 5, a TAB program close to that for Exercise 4, Part B in Horridge et al (2008) is used to split the product rows into domestic or imported. Imports are distributed to all user columns except the “exports” column.

In step 6, a TAB program close to that for Exercise 5, Part B in Horridge et al (2008) is used to change the previous step I-O table from producer price to basic price structure. VAT taxes on domestic goods are allocated to all user columns except the “change of stock” column while VAT taxes on imported goods are allocated to all user columns. For each product, the VAT tax rate on domestic goods is not allowed higher than the VAT tax rate on imported goods.

Import tariffs are allocated to all user columns except the “export” column. Values reported on the “direct purchases aboard” row are redistributed proportionally to imports except about 4 billion Panamanian Balboa on the “exports” column is kept there recognised as re-export.

In step 7, the same TAB program for Exercise 6, Part B in Horridge et al (2008) is used to aggregate the 61 product sectors to 43 sectors. The mapping relationship can be found in Table 8.85 of the next section.

Table 8.85: Mapping relationship between the 61 Panamanian sectors and the aggregated 43 sectors

No.	61 sectors in the Panama's supply and use tables (in Spanish)	43 sectors
1	CEREALES	1 pdrwhtgro
2	LEGUMBRES, RAÍCES Y TUBÉRCULOS	2 v.f
3	FRUTAS Y NUECES	2 v.f
4	SEMILLAS Y FRUTOS OLEAGINOSOS	3 osd
5	PLANTAS VIVAS, FLORES Y CAPULLOS	6 ocr
6	CULTIVOS DE PLANTAS BEBESTIBLES Y ESPECIES MOLIDAS O NO	6 ocr
7	TABACO SIN ELABORAR	6 ocr
8	PLANTAS UTILIZADAS EN LA ELABORACIÓN DE AZUCAR	4 c.b
9	MATERIAS VEGETALES EN BRUTO	5 pfb
10	ANIMALES VIVOS	7 ctloap
11	PRODUCTOS DE ORIGEN ANIMAL	8 rmkwol
12	PRODUCTOS DE LA SILVICULTURA Y LA EXTRACCIÓN DE MADERA	9 frs
13	PESCADO Y OTROS PRODUCTOS DE LA PESCA	10 fsh
14	MINERALES METÁLICOS	12 oxt
15	PIEDRA, ARENA Y ARCILLA	12 oxt
16	SAL COMÚN Y CLORURO DE SODIO	12 oxt
17	OTROS MINERALES	11 coaoilgas
18	CARNE Y PRODUCTOS DE CARNE, Y PESCADO PREPARADO O EN CONSERVAS	13 cmtomt
19	FRUTAS, LEGUMBRES, ACEITES Y GRASAS	14 vol
20	PRODUCTOS LÁCTEOS	15 mil
21	PRODUCTOS DE MOLINERÍA Y ALMIDONES, OTROS PRODUCTOS ALIMENTICIOS	16 ofd
22	BEBIDAS	17 b.t
23	PRODUCTOS DE TABACO	17 b.t
24	FIBRAS TEXTILES, PRODUCTOS TEXTILES Y PRENDAS DE VESTIR	18 texwap
25	CUERO Y PRODUCTOS DE CUERO; CALZADO	19 lea
26	PRODUCTOS DE MADERA, CORCHO, PAJA Y MATERIALES TRENZABLES	20 lum
27	PASTA DE PAPEL, PAPEL Y PRODUCTOS DE PAPEL; IMPRESOS Y ARTÍCULOS ANÁLOGOS	21 ppp
28	PRODUCTOS QUÍMICAS BÁSICOS Y OTROS; FIBRAS TEXTILES MANUFACTURADAS	23 chm
29	PRODUCTOS FARMACÉUTICOS, BOTÁNICOS Y SUST. QUIM. CONEXAS	24 bph
30	PRODUCTOS DE CAUCHO Y PRODUCTOS PLÁSTICOS	25 rpp
31	CEMENTO, CAL Y YESO	26 nmm
32	VIDRIO Y PRODUCTOS DE VIDRIO Y OTROS PRODUCTOS NO METÁLICOS	26 nmm
33	METALES COMUNES	27 i.snfm
34	PRODUCTOS DE LA REFINACIÓN DE PETRÓLEO	22 p.c
35	MUEBLES; OTROS BIENES TRANSPORTABLES, N.C.P.	30 omf
36	DESPERDICIOS O DESECHOS	30 omf
37	PRODUCTOS METÁLICOS ELABORADOS, EXCEPTO MAQUINARIA Y EQUIPO	28 fmp
38	MAQUINARIA, EQUIPO Y APARATOS ELÉCTRICOS	29 m40_44
39	ELECTRICIDAD Y AGUA	31 elywtgrdt
40	CONSTRUCCIÓN Y SERVICIOS DE CONSTRUCCIÓN	32 cns
41	SERVICIOS DE COMERCIO	33 trd
42	REPARACIÓN Y MANTENIMIENTO DE VEHÍCULOS Y ENSERES	39 obs
43	SERVICIOS DE HOTELES Y RESTAURANTES	34 afs

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No.	61 sectors in the Panama's supply and use tables (in Spanish)	43 sectors
44	SERVICIO DE TRANSPORTE Y ALMACENAMIENTO	35 otpatpwtpwhs
45	SERVICIOS POSTALES Y TELECOMUNICACIONES	36 cmn
46	SERVICIOS FINANCIEROS Y SERVICIOS RELACIONADOS	37 ofiins
47	SERVICIOS INMOBILIARIOS	38 rsadwe
48	SERVICIOS DE ALQUILER Y ARRENDAMIENTO	38 rsadwe
49	SERVICIOS DE INFORMÁTICA Y ACTIVIDADES CONEXAS	39 obs
50	SERVICIOS JURÍDICOS Y CONTABLES	39 obs
51	SERVICIOS INVESTIGACION Y DESARROLLO, ASESORAMIENTO A LAS EMPRESAS E INVESTIGACION DE MERCADOS	39 obs
52	SERVICIOS DE PUBLICIDAD	39 obs
53	SERVICIOS DE AGENCIAS DE SEGURIDAD Y OTROS SERVICIOS DE APOYO A LAS EMPRESAS	39 obs
54	SERVICIOS AGROPECUARIOS EXCEPTO SILVICULTURA Y PESCA, SERVICIOS DE EXPLOTACION MINERA, SERVICIOS DE DISTRIBUCION DE AGUA, GAS Y ENERGIA POR COMISION O POR CONTRATO	39 obs
55	SERVICIOS DE MANUFACTURA E INSUMOS FÍSICOS QUE SON PROPIEDAD DE OTROS	39 obs
56	SERVICIOS DE MANTENIMIENTO, REPARACIÓN E INSTALACION DE MAQUINARIA Y EQUIPO	39 obs
57	SERVICIOS DE APU Y OTROS SERVICIOS PARA LA COMUNIDAD EN GENERAL; SERVICIOS DE SEGURIDAD SOCIAL DE AFILIACIÓN OBLIGATORIA	41 osg
58	SERVICIOS DE ENSEÑANZA	42 edu
59	SERVICIOS DE SALUD Y SERVICIOS SOCIALES DE ASISTENCIA	43 hht
60	OTROS SERVICIOS SOCIALES Y PERSONALES	40 ros
61	SERVICIOS DOMÉSTICOS	40 ros

In step 8, the same TAB program for Exercise 7, Part B in Horridge et al (2008) is used to convert the previous step I-O table into the new unified format described in Huff et al (2000).

AO.4 Concordance between GSC3 and Panama's product classification

The 61 product sectors in the Panama's supply and use tables are aggregated into 43 sectors, matching the same sectoral classification of 43 sectors aggregated from the GSC3. The sectoral mapping relationship between the 61 Panamanian sectors and the submitted table are listed in Table 8.85 while the mapping relationship between the GSC3 and the submitted table are listed in Table 8.86.

Table 8.86: Mapping relationship between the GSC3 and the aggregated 43 sectors

No.	No. GTAP 65 sectors (GSC3)	43 sectors
1	Paddy rice	1 pdrwhtgro
2	Wheat	1 pdrwhtgro
3	Cereal grains nec	1 pdrwhtgro
4	Vegetables, fruit, nuts	2 v.f
5	Oil seeds	3 osd

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No.	No. GTAP 65 sectors (GSC3) 43 sectors	43 sectors
6	Sugar cane, sugar beet	4 c_b
7	Plant-based fibers	5 pfb
8	Crops nec	6 ocr
9	Bovine cattle, sheep and goats, horses	7 ctloap
10	Animal products nec	7 ctloap
11	Raw milk	8 rmkwol
12	Wool, silk-worm cocoons	8 rmkwol
13	Forestry	9 frs
14	Fishing	10 fsh
15	Coal	11 coaoilgas
16	Oil	11 coaoilgas
17	Gas	11 coaoilgas
18	Other Extraction (formerly omn Minerals nec)	12 oxt
19	Bovine meat products	13 cmtomt
20	Meat products nec	13 cmtomt
21	Vegetable oils and fats	14 vol
22	Dairy products	15 mil
23	Processed rice	16 ofd
24	Sugar	16 ofd
25	Food products nec	16 ofd
26	Beverages and tobacco products	17 b_t
27	Textiles	18 texwap
28	Wearing apparel	18 texwap
29	Leather products	19 lea
30	Wood products	20 lum
31	Paper products, publishing	21 ppp
32	Petroleum, coal products	22 p_c
33	Chemical products	23 chm
34	Basic pharmaceutical products	24 bph
35	Rubber and plastic products	25 rpp
36	Mineral products nec	26 nmm
37	Ferrous metals	27 i_snfm
38	Metals nec	27 i_snfm
39	Metal products	28 fmp
40	Computer, electronic and optical products	29 m40_44
41	Electrical equipment	29 m40_44
42	Machinery and equipment nec	29 m40_44
43	Motor vehicles and parts	29 m40_44
44	Transport equipment nec	29 m40_44
45	Manufactures nec	30 omf
46	Electricity	31 elywtrgdt
47	Gas manufacture, distribution	31 elywtrgdt
48	Water	31 elywtrgdt
49	Construction	32 cns
50	Trade	33 trd
51	Accommodation, Food and service activities	34 afs
52	Transport nec	35 otpatpwtpwhs
53	Water transport	35 otpatpwtpwhs
54	Air transport	35 otpatpwtpwhs
55	Warehousing and support activities	35 otpatpwtpwhs
56	Communication	36 cmn

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No.	No. GTAP 65 sectors (GSC3) 43 sectors	43 sectors
57	Financial services nec	37 ofins
58	Insurance (formerly isr)	37 ofins
59	Real estate activities	38 rsadwe
60	Business services nec	39 obs
61	Recreational and other services	40 ros
62	Public Administration and defense	41 osg
63	Education	42 edu
64	Human health and social work activities	43 hht
65	Dwellings	38 rsadwe

AO.5 Diagnostics

The submitted data file produced by the final data processing step shows that total sales are equal to total costs for each sector. The basic price values of all flows are non-negative except for the change of stock column. Some negative values in the change of stock column are entirely explained by the original data.

References

- Huff, K., McDougall, R., & Walmsley, T. (2000) Contributing Input-Output Tables to the GTAP Data Base (GTAP Technical No. 01). Purdue University, West Lafayette, IN: Global Trade Analysis Project (GTAP). Retrieved from https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=304
- Horridge, M., McDougall, R., Narayanan, B., & Walmsley, T. (2008) Exercises in Contributing I-O Tables to the GTAP Data Base. Purdue University, West Lafayette, IN: Global Trade Analysis Project (GTAP). Retrieved from https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=2850