

## ***Q São Tomé and Príncipe***

***Ana Justina Filipe Da Costa Almeida***

### **Q.1 Introduction**

This document describes the adaptation of São Tomé and Príncipe's 2019 input-output (IO) table for input into the Global Trade Analysis Project (GTAP). The article is organised as follows: Section 2 briefly describes the source data. Section 3 discusses the strengths and limitations of the published input-output (IO) data. Section 4 discusses processing to correct anomalies in the raw data. Section 5 presents the mapping between São Tomé and Príncipe's 22 IO sectors, 65 GTAP sectors and 25 more aggregated sectors from the submitted table. And section 6 refers to the sectoral balance and non-negativity checks.

### **Q.2 Source Data**

The main source of data is input-output data for 22 sectors published by the Department of National Accounts of São Tomé and Príncipe. The 2019 OI data was measured in million dobras. We converted this to thousand fold by dividing all values by 1000. The 2019 raw input-output data fulfils the sectoral balance condition and contains most of the data ready for conversion to GTAP format. This data includes:

1. tables of resources and utilisations at purchasers' prices for 22 sectors. The Supply table shows the total production of 22 national products, total imports, transport and trade margins and taxes on national and imported goods, by product. The utilisation table shows the demand for these products by industry, households, government, investment, changes in stocks and exports.
2. A matrix of domestic production at basic prices, product by activity. The matrix shows the production of 22 activities by 22 products. This matrix is symmetrical because the basic products are the same as the industries. However, it is not diagonal. Many branches of activity produce more than one product and many products are produced by more than one branch of activity.
3. An absorption matrix at basic prices showing the use of 22 domestically produced products by 22 industries and five end users (private consumption, government consumption, investment, exports and changes in stocks).
4. National production absorption matrix at market prices, product by branch of activity.

In addition, we have the following data from the National Accounts Department:

1. Two matrices for trade and transport margins for domestic and imported products in 2019. Two matrices for taxes on domestic and imported products in 2019.

2. Public administration revenues detailed in the State Financial Operation Table (TOFE) for year 2

### **Q.3 Strengths and Limitations of the Original Input-Output Data**

We carry out a series of checks on the data. These include checks on the non-negativity condition and the balancing conditions of the tables. We also checked the plausibility of the tax rates, the margin rates implicit in the data and the cost and sales structure of the industries. This section discusses the strengths and limitations of the data.

#### **Strengths**

1. As can be seen from the previous section, the original data contains detailed data on the supply and use of 22 products and branches of activities that provide most of the necessary data, namely:
  - (a) There are separate domestic and import matrices in basic values;
  - (b) There are separate trade margins for domestic and imported products; and
  - (c) There are separate tax data for domestic and imported goods.
2. The matrices are balanced.

#### **Limitations**

1. There is no detailed data on employment by branch of activity, number of salaried and non-salaried workers.
2. There are no separate figures for capital, labour and land rental. These figures were estimated according to value added and only for capital and labour.
3. There is no data on taxes on production.
4. There is no data for export tariffs or taxes, as exported products are tax-free.

### **Q.4 Data processing**

In this section we discuss the adjustment procedures, the sources of additional data and the assumptions we adopted to solve the data problems described in the previous section.

1. With regard to some negative values in the tables: because they were too small, they were replaced with zeros.

Table 8.30: Macro-aggregates of the São Tomé and Príncipe 2019 IO table Componentes do PIB  
ótica da despesa Componentes do PIB na ótica da produção

| Item              | Value         | (%)    | Item              | Value         | (%)  |
|-------------------|---------------|--------|-------------------|---------------|------|
| 1 Consumo privado | 9 902 388     | 108,75 | 1 Trabalho        | 3 349 111     | 37,0 |
| 2 Investimento    | 1 077 608     | 11,8   | 2 capitais        | 5 023 666     | 55,0 |
| 3 Governo         | 1 221 132     | 13,4   | 3 terreno         | 0             | 0    |
| 4 Stocks          | 12 825        | 0,1    | 4 Imposto e taxas | 732 893       | 8,0  |
| 5 Exportações     | 1 522 428     | 16,7   |                   |               |      |
| 6 Importações     | -4 630 710    | -50,95 |                   |               |      |
| PIB               | 9 105 670 100 | 100    | PIB               | 9 105 670 100 | 100  |

2. We removed all non-zero values from the service stocks in the basic, tax and margin tables.
3. We set the entire export column in the absorption matrix for imports to zero and then deducted the same value from the export column in the absorption matrix for domestically produced goods. This procedure ensures that the trade balance remains unchanged.
4. We adjusted the data on labour remuneration for each sector to take into account the income of the self-employed and unpaid family workers (self-employed labour). In the original IO tables, this unpaid labour income - usually a mixture of capital and labour income - was treated as a form of entrepreneurial income.

Table 8.30 reports some summarised data from our final input-output table.

## Q.5 Converting São Tomé and Príncipe's IO table to GTAP format

GTAP favours commodity-by-commodity input-output tables. Our initial IO table is made up of products and sectors of activity. To convert it into an STP product table for GTAP products, we used the technological assumption and the procedure described in Horridge et al. (2008)<sup>10</sup>.

### Placing margins in respective rows for product margin

There were eight margin services in the initial IO data. The data contained separate values for direct use and product margin use. The GTAP database does not distinguish between these uses. Therefore, for each product margin, we added up the total usage (margin and direct) by each user and allocated this usage to the respective product margin line.

### Mapping between STP IO sectors and GTAP sectors

The 22 sectors of the STP IO table were aggregated into a set of 25 sectors that best correspond to the elements of the 65 GTAP standard products. The mappings of sectors 22 and 65 to these 25

sectors are reported in Table 8.31.

Table 8.31: Concordance between 22 STP IO sectors, 65 GTAP sectors and 25 sectors in the contributed table

| Number | Code | Code | Description                                                                                                                                    |
|--------|------|------|------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | pdr  | 113  | Rice                                                                                                                                           |
| 2      | wht  | 111  | Wheat                                                                                                                                          |
| 3      | gro  | 112  | Maize (corn) Cereais                                                                                                                           |
|        |      | 114  | Sorghum                                                                                                                                        |
|        |      | 115  | Barley                                                                                                                                         |
|        |      | 116  | Rye                                                                                                                                            |
|        |      | 117  | Oats                                                                                                                                           |
|        |      | 118  | Millet                                                                                                                                         |
|        |      | 119  | Other cereals                                                                                                                                  |
| 4      | v_f  | 12   | Vegetables Tuberculos                                                                                                                          |
|        |      | 13   | Fruit and nuts Banana                                                                                                                          |
|        |      | 15   | Edible roots and tubers with high starch or inulin content                                                                                     |
|        |      | 17   | Pulses (dried leguminous vegetables)                                                                                                           |
| 5      | osd  | 14   | Oil seeds and oleaginous fruit producto de oleaginosos                                                                                         |
| 6      | c_b  | 18   | Sugar crops Outras produtos de agricultura                                                                                                     |
| 7      | pfb  | 192  | Fibre crops                                                                                                                                    |
| 8      | ocr  | 16   | Stimulant, spice and aromatic crops Cacau e café                                                                                               |
|        |      | 191  | Forage products                                                                                                                                |
|        |      | 193  | Plants and parts of plants used primarily in perfumery, in pharmacy, or for insecticidal, fungicidal or similar purposes                       |
|        |      | 194  | Beet seeds (excluding sugar beet seeds) and seeds of forage plants                                                                             |
|        |      | 195  | Natural rubber in primary forms or in plates, sheets or strip                                                                                  |
|        |      | 196  | Living plants; cut flowers and flower buds; flower seeds                                                                                       |
|        |      | 197  | Unmanufactured tobacco                                                                                                                         |
|        |      | 199  | Other raw vegetable materials nec                                                                                                              |
| 9      | ctl  | 211  | Bovine animals, live Bovinos vivos (cabeça)                                                                                                    |
|        |      | 212  | Other ruminants Ovinos e Caprinos vivos                                                                                                        |
|        |      | 213  | Horses and other equines                                                                                                                       |
|        |      | 299  | Bovine semen                                                                                                                                   |
| 10     | oap  | 214  | Swine / pigs Porcos (porcius)                                                                                                                  |
|        |      | 215  | Poultry Aves                                                                                                                                   |
|        |      | 219  | Other live animals                                                                                                                             |
|        |      | 23   | Eggs of hens or other birds in shell, fresh Outros produtos de elevage (ovos, leite, Mel.etc..), produto de caça, serviços relacionados a caça |
|        |      | 24   | Reproductive materials of animals                                                                                                              |
|        |      | 291  | Natural honey                                                                                                                                  |

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| Number | Code | Code      | Description                                                                  |                                                         |
|--------|------|-----------|------------------------------------------------------------------------------|---------------------------------------------------------|
|        |      | 292       | Snails, fresh, chilled, frozen, dried, salted or in brine, except sea snails |                                                         |
|        |      | 293       | Edible products of animal origin n.e.c.                                      |                                                         |
|        |      | 295       | Hides, skins and furskins, raw                                               |                                                         |
|        |      | 296       | Insect waxes and spermaceti, whether or not refined or coloured              |                                                         |
| 11     | rmk  | 22        | Raw milk                                                                     |                                                         |
| 12     | wol  | 294       | Raw animal materials used in textiles                                        |                                                         |
| 13     | frs  | 3         | Forestry and logging products                                                | madeira para fabricação                                 |
| 14     | fsh  | 3         | Fishing and aquaculture                                                      | Produtos da pesca, piscicultura e aquicultura           |
|        |      | 17        | Hunting, trapping and related service activities                             |                                                         |
| 15     | col  | 5         | Mining of coal and lignite                                                   | Producto das Industrias extrativas                      |
| 16     | oil  | 61        | Extraction of crude petroleum                                                |                                                         |
|        |      | 091(part) | Support activities for petroleum and natural gas extraction (part)           |                                                         |
| 17     | gas  | 62        | Extraction of natural gas                                                    |                                                         |
|        |      | 091(part) | Support activities for petroleum and natural gas extraction (part)           |                                                         |
| 18     | oxt  | 7         | Mining of metal ores                                                         |                                                         |
|        |      | 8         | Other mining and quarrying                                                   | Producto das Industrias extrativas                      |
|        |      | 99        | Support activities for other mining and quarrying                            |                                                         |
| 19     | cmt  | 2111      | Meat of cattle, fresh or chilled                                             | Produto de abate, transformacao e conservacao de carnes |
|        |      | 21112     | Meat of buffalo, fresh or chilled                                            |                                                         |
|        |      | 21115     | Meat of sheep, fresh or chilled                                              |                                                         |
|        |      | 21116     | Meat of goat, fresh or chilled                                               |                                                         |
|        |      | 21117     | Meat of camels and camelids, fresh or chilled                                |                                                         |
|        |      | 21118     | Meat of horses and other equines, fresh or chilled                           |                                                         |
|        |      | 21119     | Other meat of mammals, fresh or chilled                                      |                                                         |
|        |      | 2113      | Meat of mammals, frozen                                                      |                                                         |
|        |      | 2115      | Edible offal of mammals, fresh, chilled or frozen                            |                                                         |
| 20     | omt  | 21113     | Meat of pigs, fresh or chilled                                               | Produto de abate, transformacao e conservacao de carnes |
|        |      | 21114     | Meat of rabbits and hares, fresh or chilled                                  |                                                         |
|        |      | 2112      | Meat of poultry, fresh or chilled                                            |                                                         |
|        |      | 2114      | Meat of poultry, frozen                                                      |                                                         |
|        |      | 2116      | Edible offal of poultry, fresh, chilled or frozen                            |                                                         |
|        |      | 2117      | Other meat and edible offal, fresh, chilled or frozen                        |                                                         |

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| Number | Code | Code | Description                                                                                                                                                                                                                                                                                              |                                                                       |
|--------|------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|
|        |      | 2118 | Preserves and preparations of meat, meat offal or blood                                                                                                                                                                                                                                                  |                                                                       |
|        |      | 2119 | Flours, meals and pellets of meat or meat offal, inedible; greaves                                                                                                                                                                                                                                       |                                                                       |
| 21     | vol  | 215  | Animal fats                                                                                                                                                                                                                                                                                              |                                                                       |
|        |      | 216  | Vegetable oils                                                                                                                                                                                                                                                                                           | Outros produtos agroalimentares ne                                    |
|        |      | 217  | Margarine and similar preparations                                                                                                                                                                                                                                                                       |                                                                       |
|        |      | 218  | Cotton linters                                                                                                                                                                                                                                                                                           |                                                                       |
|        |      | 219  | Oil-cake and other residues resulting from the extraction of vegetable fats or oils; flours and meals of oil seeds or oleaginous fruits, except those of mustard; vegetable waxes, except triglycerides; degreas; residues resulting from the treatment of fatty substances or animal or vegetable waxes |                                                                       |
| 22     | mil  | 22   | Dairy products                                                                                                                                                                                                                                                                                           | Outros produtos agroalimentares ne                                    |
| 23     | pcr  | 2316 | Rice, semi- or wholly milled, or husked                                                                                                                                                                                                                                                                  | arroz descascado                                                      |
| 24     | sgr  | 235  | Sugar and molasses                                                                                                                                                                                                                                                                                       | Açúcar                                                                |
| 25     | ofd  | 212  | Prepared and preserved fish, crustaceans, molluscs and other aquatic invertebrates                                                                                                                                                                                                                       | Farinha e outros produtos de transformação de cereais e de tubérculos |
|        |      | 213  | Prepared and preserved vegetables, pulses and potatoes                                                                                                                                                                                                                                                   |                                                                       |
|        |      | 214  | Prepared and preserved fruits and nuts                                                                                                                                                                                                                                                                   |                                                                       |
|        |      | 2311 | Wheat and meslin flour                                                                                                                                                                                                                                                                                   |                                                                       |
|        |      | 2312 | Other cereal flours                                                                                                                                                                                                                                                                                      |                                                                       |
|        |      | 2313 | Groats, meal and pellets of wheat and other cereals                                                                                                                                                                                                                                                      |                                                                       |
|        |      | 2314 | Other cereal grain products (including corn flakes)                                                                                                                                                                                                                                                      |                                                                       |
|        |      | 2317 | Other vegetable flours and meals                                                                                                                                                                                                                                                                         |                                                                       |
|        |      | 2318 | Mixes and doughs for the preparation of bakers' wares                                                                                                                                                                                                                                                    |                                                                       |
|        |      | 232  | Starches and starch products; sugars and sugar syrups n.e.c.                                                                                                                                                                                                                                             |                                                                       |
|        |      | 233  | Preparations used in animal feeding; lucerne (alfalfa) meal and pellets                                                                                                                                                                                                                                  |                                                                       |
|        |      | 234  | Bakery products                                                                                                                                                                                                                                                                                          |                                                                       |
|        |      | 236  | Cocoa, chocolate and sugar confectionery                                                                                                                                                                                                                                                                 |                                                                       |
|        |      | 237  | Macaroni, noodles, couscous and similar farinaceous products                                                                                                                                                                                                                                             |                                                                       |
|        |      | 239  | Food products n.e.c.                                                                                                                                                                                                                                                                                     |                                                                       |

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| Number | Code | Code | Description                                                                                                                     |                                                                  |
|--------|------|------|---------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 26     | b_t  | 24   | Beverages                                                                                                                       | bebidas não alcoólicas, água potável                             |
|        |      | 25   | Tobacco products                                                                                                                |                                                                  |
| 27     | tex  | 13   | Manufacture of textiles                                                                                                         | Produtos Textil e artigos em têxtil                              |
| 28     | wap  | 14   | Manufacture of wearing apparel                                                                                                  | Produtos Textil e artigos em têxtil                              |
| 29     | lea  | 15   | Manufacture of leather and related products                                                                                     | Couro trabalhado, artigos de viagem e sapatos                    |
| 30     | lum  | 16   | Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials | Madeira trabalhada, obras de madeira ou cestaria (exceto móveis) |
| 31     | ppp  | 17   | Manufacture of paper and paper products                                                                                         | Artigos de papel, papel ou cartão                                |
|        |      | 18   | Printing and reproduction of record media                                                                                       |                                                                  |
| 32     | p_c  | 19   | Manufacture of coke and refined petroleum products                                                                              | Produtos petrolíferos refinados e coque                          |
| 33     | chm  | 20   | Manufacture of chemicals and chemical products                                                                                  | Produtos químicos (nao medicamentos)                             |
| 34     | bph  | 21   | Manufacture of pharmaceuticals, medicinal chemical and botanical products                                                       | Produtos farmacêuticos e tradicionais                            |
| 35     | rpp  | 22   | Manufacture of rubber and plastics products                                                                                     |                                                                  |
| 36     | nmm  | 23   | Manufacture of other non-metallic mineral products                                                                              | Cimento, Materiais e obras em cimento, betão ou reboco           |
| 37     | i_s  | 241  | Manufacture of basic iron and steel                                                                                             | Artigos de metal; serralharia                                    |
|        |      | 2431 | Casting of iron and steel                                                                                                       | Cimento, Materiais e obras em cimento, betão ou reboco           |
| 38     | nfm  | 242  | Manufacture of basic precious and other non-ferrous metals                                                                      | Artigos de metal; serralharia                                    |
|        |      | 2432 | Casting of non-ferrous metals                                                                                                   |                                                                  |
| 39     | fmp  | 25   | Manufacture of fabricated metal products, except machinery and equipment                                                        |                                                                  |
| 40     | ele  | 26   | Manufacture of computer, electronic and optical products                                                                        | Produtos eletrônicos, computadores, máquinas e equipamentos      |
| 41     | eeq  | 27   | Manufacture of electrical equipment                                                                                             |                                                                  |
| 42     | ome  | 28   | Manufacture of machinery and equipment n.e.c.                                                                                   |                                                                  |
| 43     | mvh  | 29   | Manufacture of motor vehicles, trailers and semi-trailers                                                                       | Veículos, automóveis e acessórios                                |
| 44     | otn  | 30   | Manufacture of other transport equipment                                                                                        |                                                                  |
| 45     | omf  | 31   | Manufacture of furniture                                                                                                        |                                                                  |
|        |      | 32   | Other manufacturing                                                                                                             | Outros productos                                                 |
|        |      | 33   | Repair and installation of machinery and equipment                                                                              |                                                                  |

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| Number | Code | Code | Description                                                                                                |
|--------|------|------|------------------------------------------------------------------------------------------------------------|
| 46     | ely  | 351  | Production, collection and distribution of electricity                                                     |
|        |      | 353  | Steam and hot water supply                                                                                 |
| 47     | gdt  | 352  | Manufacture of gas; distribution of gaseous fuels through mains                                            |
| 48     | wtr  | 36   | Collection, purification and distribution of water, water collection, treatment and supply                 |
|        |      | 37   | Sewerage                                                                                                   |
|        |      | 38   | Waste collection, treatment and disposal activities; materials recovery                                    |
|        |      | 39   | Remediation activities and other waste management services                                                 |
| 49     | cns  | 41   | Construction of buildings                                                                                  |
|        |      | 42   | Civil engineering                                                                                          |
|        |      | 43   | Specialized construction activities                                                                        |
| 50     | trd  | 45   | Wholesale and retail trade and repair of motor vehicles and motorcycles                                    |
|        |      | 46   | Wholesale trade, except of motor vehicles and motorcycles                                                  |
|        |      | 47   | Retail trade, except of motor vehicles and motorcycles                                                     |
| 51     | afs  | 55   | Accommodation                                                                                              |
|        |      | 56   | Food and beverage service activities                                                                       |
| 52     | otp  | 49   | Land transport and transport via pipelines                                                                 |
| 53     | wtp  | 50   | Water transport                                                                                            |
| 54     | atp  | 51   | Air transport                                                                                              |
| 55     | whs  | 52   | Warehousing and support activities for transportation                                                      |
| 56     | cmn  | 53   | Postal and courier activities                                                                              |
|        |      | 58   | Publishing activities                                                                                      |
|        |      | 59   | Motion picture, video and television programme production, sound recording and music publishing activities |
|        |      | 60   | Programming and broadcasting activities                                                                    |
|        |      | 61   | Telecommunications                                                                                         |
|        |      | 62   | Computer programming, consultancy and related activities                                                   |
|        |      | 63   | Information service activities                                                                             |

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| Number | Code | Code     | Description                                                                                                                                                                              |                                                             |
|--------|------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| 57     | ofi  | 64       | Financial service activities, except insurance and pension funding                                                                                                                       | Serviços bancários centrais                                 |
|        |      | 66(part) | Activities auxiliary to financial service and insurance activities (part)                                                                                                                |                                                             |
| 58     | ins  | 65       | Insurance, reinsurance and pension funding, except compulsory social security                                                                                                            | serviços de seguros e Auxiliares financeiros                |
|        |      | 66(part) | Activities auxiliary to financial service and insurance activities (part)                                                                                                                |                                                             |
| 59     | rsa  | 68       | Real estate activities                                                                                                                                                                   | Aluguel de imóveis e serviços de agência imobiliária        |
| 60     | obs  | M, N     | Professional, scientific and technical activities and Administrative and support service activities                                                                                      | Serviços de pesquisa e desenvolvimento e exploração mineral |
| 61     | ros  | R, S, T  | Arts, entertainment and recreation; Other service activities; Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use | serviços artísticos, desportivos e recreativos              |
| 62     | osg  | 84       | Public administration and defence; compulsory social security                                                                                                                            | serviços da administração pública                           |
|        |      | 99       | Activities of extraterritorial organizations and bodies                                                                                                                                  | correção territorial                                        |
| 63     | edu  | 85       | Education                                                                                                                                                                                | serviço de educação                                         |
| 64     | hht  | Q        | Human health and social work activities                                                                                                                                                  | Serviços de saúde humana                                    |
| 65     | dwe  | n.a.     | n.a.                                                                                                                                                                                     | esperando produto                                           |

## Q.6 Verification of sectoral balance and non-negativity conditions

After converting the STP IO tables into the format required by the GTAP database, we carried out the sectoral balance and non-negativity checks. The new database passed the sectoral balance check and the non-negativity conditions.