

# *Chapter 15*

## *Income and Factor Taxes*

*Erwin Corong, Yutaro Inoue, Maria Seara e Pereira*

From its first release, the GTAP Data Base has had the implicit capability to record income and factor employment tax payments. Factor employment taxes include those such as payroll taxes, social security levies, and land taxes. Although no arrays have represented these data explicitly, they are implicit as the difference between different valuations of primary factor flows. Income tax, by factor (endowment) type and region is the difference between the value paid by firms at basic prices (EVFB) and the tax-exclusive value received by factor suppliers or owners of factors (EVOS). On the other hand, factor employment tax, by factor, industry and region is the difference between the basic value paid by firms to employ factors (EVFB), and the purchasers' value (EVFP).

In early releases, however, this capability was unused; the relevant valuations were equated, so that the implicit tax payments were zero. In GTAP 5, the capability was used, but in a limited way, to represent land-based and capital-based components of domestic support to agriculture (Dimaranan 2002). These were represented as income subsidies, leaving income taxes and factor employment taxes still unrepresented. Since GTAP Data Base 6, comprehensive data for income and factor employment taxes have been incorporated. Our principal data source is the International Monetary Fund's Government Finance Statistics, IMF GFS (IMF 2026a). Since GTAP Data Base 11, data from the OECD (Organisation for Economic Cooperation and Development) Global Revenue Statistics Data Base (OECD 2026) have also been extracted to complement the IMF GFS database.

For GTAP 12 Data Base, both the IMF GFS Statement of Operations data and the OECD Global Revenue Statistics Data Base have been used since these datasets provide a relatively wide country coverage, with 181 countries/regions nominally covered—though for some countries the series coverage is patchy, and for later years there are many missing observations. We extract five series: taxes on income and profits, corporate; taxes on income and profits, individuals; social security contributions; taxes — payroll, manpower; and taxes on property. We sum the fourth and fifth items, that is, “taxes — payroll, manpower”, and “taxes on property”, to calculate total factor employment tax excluding social security contributions. To deal with the missing observations problem, we extract data for 1997, the earliest year for which data are available for most countries in the data set. Since our reference years are 2004, 2007, 2011, 2014, 2017, 2019, and 2023, this creates an obvious comparability problem. To address this, we convert the data from money values to ratios relative to GDP, taking GDP from the IMF's National Economic Accounts (IMF 2026b) and World Economic Outlook (IMF 2026c). These we hope are relatively stable over time.

We fill in data for the missing countries, to extend the country coverage from the initial

181 to the 251 standard GTAP countries. This is done by calculating average tax-to-GDP ratios across the present 181 countries, and applying them to the missing countries. We then aggregate from standard GTAP countries to GTAP regions.

Table 15.1 shows the GTAP regions not covered or only partly covered in the source statistics. The table reports a coverage status, defined as the share in regional GDP accounted by uncovered countries. The coverage status therefore lies between 0 and 1, with lower numbers better, and a status of 0 representing complete coverage. In total, 147 of 164 countries/regions have complete coverage. As shown in Table 15.1, 6 countries (twi, brn, ven, pri, lbn, and syr) and 4 composite regions (xna, xsu, xnf and xtw) are covered by neither of the GFS data nor the OECD Global Revenue Statistics Data Base. For 5 composite regions (xoc, xea, xcb, xer, and xec) have partial coverage-with the Rest of the Caribbean having the lowest coverage status.

Table 15.1: Coverage Status by GTAP Region

| Region                            | Coverage Status |
|-----------------------------------|-----------------|
| Rest of Oceania (xoc)             | 0.3             |
| Taiwan (twi)                      | 1.0             |
| Rest of East Asia (xea)           | 0.3             |
| Brunei Darussalam (brn)           | 1.0             |
| Rest of North America (xna)       | 1.0             |
| Venezuela (ven)                   | 1.0             |
| Haiti (hti)                       | 1.0             |
| Puerto Rico (pri)                 | 1.0             |
| Rest of the Caribbean (xcb)       | 0.1             |
| Rest of Europe (xer)              | 0.2             |
| Rest of Former Soviet Union (xsu) | 1.0             |
| Lebanon (lbn)                     | 1.0             |
| Syrian Arab Republic (syr)        | 1.0             |
| Rest of North Africa (xnf)        | 1.0             |
| Rest of Eastern Africa (xec)      | 0.3             |
| Rest of the World (xtw)           | 1.0             |

We incorporate these regional tax ratios into the main GTAP data file. For each region, we calculate GDP from the I-O data; multiplying this by the tax ratios gives us the taxes as money values and also map from our GFS data series to GTAP primary factors (endowments). For taxes on factor employment, we assign all social security contributions to labor, and distribute them pro rata between skilled and unskilled labor. We assume all other factor employment taxes to bear equally on all factors, so we distribute them pro rata across all five GTAP primary factors (the labor categories, capital, agricultural land, and natural resources).<sup>1</sup>

For income taxes, we assign personal income tax to the five labor primary factors, and corporate income tax to the three non-labor primary factors. Certainly, in almost all countries, personal income tax includes in principle income from both labor services and capital; in assigning

<sup>1</sup>In future versions, it should be possible to improve on this treatment, by mapping “taxes — payroll, manpower” to labor, and property taxes to the non-labor factors.

it all to labor, we take the (disputable) view that in practice, recipients of non-labor income have much better access to arrangements for tax avoidance.

For factor employment taxes, we allocate not only across factors but also across industries. We assume that the rate of tax is uniform across industries. Finally, we consider the relation between land- and capital-based domestic support to agriculture and income tax. We take the view that these are separable, more specifically, that the GFS tax estimates do not include domestic support to agriculture. Our final income taxes are therefore the sum of GFS income tax and land- and capital-based domestic support. Although it makes no difference to the operation of the model, for the information of users we record the domestic support values separately in the array FBEP in the data file.

For the 2023 reference year, several countries require attention because their income and factor employment tax payments were calculated using observations from more than five years prior. Table 15.2 summarizes the countries whose income and factor employment tax data are based on observations predating 2023 by more than five years.

Table 15.2: Countries with Large Year Gaps

| Region                           | Data Source             |
|----------------------------------|-------------------------|
| Iran, Islamic Republic of        | GTAP 2011               |
| Qatar                            | IMF 2010                |
| Kuwait                           | IMF 2011                |
| Suriname                         | IMF 2012                |
| Yemen                            | IMF 2012                |
| Benin                            | IMF 2013                |
| Liberia                          | IMF 2013                |
| Oman                             | IMF 2013                |
| Montenegro                       | IMF 2015                |
| Sudan                            | IMF 2016 and 1999       |
| Saint Vincent and the Grenadines | IMF 2017                |
| Dominican Republic               | IMF 2017                |
| Grenada                          | IMF 2017                |
| Afghanistan                      | IMF 2017                |
| Zimbabwe                         | IMF 2018                |
| Gambia                           | IMF 2018                |
| Pakistan                         | OECD 2023 and GTAP 2011 |

Note: “IMF YEAR” indicates that data from the IMF GFS for that year are used to impute the 2023 value. Similarly, “OECD YEAR” and “GTAP YEAR” denote the data source and year from which the 2023 value is imputed. Where more than one data source is listed in the Data Source column, multiple sources were used to impute the individual (C1111) and corporate (C1112) income tax split. For Pakistan, the OECD Revenue Statistics provides the 2023 aggregate income tax value (C111) but does not report the individual and corporate income tax split. The C111 value is therefore split based on GTAP 2011 archive data. For Sudan, neither the OECD nor the IMF GFS records values close to 2023. The IMF GFS 2016 aggregate income tax value is used, with the split into C1111 and C1112 based on IMF GFS 1999 data.

Table 15.2 reflects a trade-off inherent to both sources: the IMF GFS covers more coun-

tries but lacks recent observations for several of them, while the OECD Global Revenue Statistics records values closer to 2023 but has narrower geographic scope. The combined approach described above exploits the complementary strengths of both databases to maximize coverage.

## ***References***

- Dimaranan, Betina (2002). “Construction of the Protection Data Base”. In: *Global Trade, Assistance, and Production: The GTAP 5 Data Base*. Ed. by Betina V. Dimaranan and Robert A. McDougall. Department of Agricultural Economics, Purdue University, West Lafayette, IN. Chap. Data. URL: [https://www.gtap.agecon.purdue.edu/resources/res\\_display.asp?RecordID=771](https://www.gtap.agecon.purdue.edu/resources/res_display.asp?RecordID=771).
- IMF (2026a). *Government Financial Statistics Statement of Operations*. URL: [https://data.imf.org/en/datasets/IMF.STA:GFS\\_S00](https://data.imf.org/en/datasets/IMF.STA:GFS_S00).
- (2026b). *National Economic Accounts*. URL: <https://data.imf.org/en/datasets/IMF.STA:ANEA>.
- (2026c). *World Economic Outlook*. URL: <https://data.imf.org/en/datasets/IMF.RES:WEO>.
- OECD (2026). *Global Revenue Statistics Database*. URL: <https://www.oecd.org/tax/tax-policy/global-revenue-statistics-database.htm>.