

Chapter 15

Income and Factor Taxes

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From its first release, the GTAP Data Base has had the implicit capability to record income and factor employment tax payments. Factor employment taxes denotes such taxes as payroll tax, 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 purchasers' prices, EVFP, 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 are represented as income subsidies, though still leaves unrepresented income taxes and factor employment taxes. Since GTAP Data Base 6, we incorporated comprehensive data for income and factor employment taxes. Our principal data source is the International Monetary Fund's Government Finance Statistics (IMF GFS).

For GTAP Data Base 11, the IMF GFS data (IMF 2023) provides a relatively wide country coverage, with 180 countries 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 and 2017, this creates an obvious comparability problem. To address this, we convert the data from money values to ratios to GDP, taking GDP from the IMF's International Financial Statistics. These we hope are relatively stable over time. Starting GTAP Data Base 11, we also extracted data from the OECD (Organisation for Economic Cooperation) Global Revenue Statistics Data Base (OECD 2023) which covers 120 countries to complement the IMF GFS database. The income and factor tax information for reference year 2014 have also been updated because these were not available during the GTAP 10 data cycle.

We fill in data for the missing countries, to extend the country coverage from the initial 180 to the 251 standard GTAP countries. This is done by calculating average tax-to-GDP ratios

across the present 180 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, 139 of 160 countries/regions have complete coverage. As shown in Table 15.1, 9 countries (twm, brn, ecu, ven, pri, lbn, qat, syr and com) and 4 composite regions (xna, xsu, xnf and xtw)) are not covered by the GFS data. while 8 composite regions (xoc, xea, xsm, xcb, xsf, xer, xwf and xec) have partial coverage—with the rest of Caribbean having the lowest coverage status.

Table 15.1: Coverage Status by GTAP Region

Region	Coverage Status
Rest of Oceania (xoc)	0.4
Taiwan (twm)	1.0
Rest of East Asia (xea)	0.3
Brunei Darussalam (brn)	1.0
Rest of North America (xna)	1.0
Ecuador (ecu)	1.0
Venezuela (ven)	1.0
Rest of South America (xsm)	0.4
Puerto Rico (pri)	1.0
Caribbean (xcb)	0.8
Rest of EFTA (xef)	0.2
Rest of Europe (xer)	0.4
Rest of Former Soviet Union (xsu)	1.0
Lebanon (lbn)	1.0
Qatar (qat)	1.0
Syrian Arab Republic (syr)	1.0
Rest of North Africa (xnf)	1.0
Rest of Western Africa (xwf)	0.4
Comoros (com)	1.0
Rest of Eastern Africa (xec)	0.5
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 (endowment commodities). 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 two kinds of labor, capital, agricultural land, and natural resources).¹ For income taxes, we assign

¹In 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.

personal income tax to the two 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 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.

References

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