

Chapter 3

What's new in GTAP 12

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This is the twelfth release of the GTAP Data Base since the Project began in 1992. The Data Base cycle typically begins by updating the data base to a new reference year. For version 12, we expanded the time dimension of the GTAP Data Base by adding 2019 and 2023 to the previous reference years of version 11: 2004, 2007, 2011, 2014, and 2017. The national data or input-output tables (IOTs) are combined with international datasets on macroeconomic aggregates, bilateral trade, energy, and protection for the new reference year. Interim releases of GTAP are constructed as significant updated datasets become available. Improvements are also made in data sourcing, scope, and methodology. Part III of this documentation provides detailed information on the sources and procedures employed in the construction of GTAP 12. This chapter provides a summary of the changes that have been made since the previous version.

3.1 Domestic Data

3.1.1 New and Updated Regions

In version 12, the new countries extracted from previous regional aggregates are: Angola, Burundi, Mauritania and São Tomé and Príncipe. References to the IOTs used for each of these new and updated countries are available on the GTAP website¹ and listed in Table 3.1.

In GTAP 12 we continue to match IOTs' base year to their closest GTAP reference year. Table 3.2 shows the countries for which we have more than one IOT for all the reference years. For the remaining countries in GTAP we still use a single IOT. We look forward to more frequent contributions so we can capture structural changes over time.

For the GTAP Data Base, we collect a lot of non-I-O information at country-level. In earlier releases, prior to version 8, we had 226 standard GTAP countries, which were mapped to different numbers of GTAP regions (113 in version 7, for example). For GTAP 8 to 10, we considered 244 countries listed by the International Organization for Standardization (ISO) using

¹For new and updated country information included in version 12, please refer to the documentation web page.

Table 3.1: New and updated national country IOTs in GTAP 12.

Country	IO Year(s)	Country	IO Year(s)
Angola*	2015	Mauritania*	2017
Azerbaijan	2021	Mauritius	2018
Burundi*	2016	Morocco	2019
Cameroon	2019	Nigeria	2018
Canada	2017, 2019	Oman	2018
DR Congo	2019	Peru	2022
Jordan	2018	São Tomé and Príncipe*	2019
Korea	2020	Saudi Arabia	2021
Malaysia	2019	United Arab Emirates	2014
Madagascar	2019	United Kingdom	2018, 2019

An asterisk (*) is used to signal that the country is now separately identified.

three letter codes. Since GTAP 11, we consider 251 countries, which expands the latest ISO list of 249 by considering Kosovo and Sark.²

3.1.2 Agricultural Production Targeting

Prior to GTAP 11, several OECD member countries were pre-adjusted to match agricultural production statistics by sector for each reference year to more accurately reflect domestic support payments. Starting with GTAP 11, we complement with the use of FAO data to target agricultural production for 193 countries, some of which are subsequently aggregated into regions (Chepeliev 2020). The following sub-sections explain other supplementary data.

3.2 *International Datasets: Sources and Procedure Changes*

3.2.1 Macroeconomic Data

Macroeconomic aggregates (GDP, private consumption, government consumption, and investment) are used in updating the input-output tables to common reference years 2004, 2007, 2011, 2014, 2017, 2019 and 2023. The primary source of macroeconomic data is the World Development Indicators from the World Bank. Other data sources include the United Nations National Accounts and the International Monetary Fund.

²Full list of ISO country codes using their “Online Browsing Platform”.

Table 3.2: I-O Table base year allocation across GTAP reference years

Countries — Reference Years	2004	2007	2011	2014	2017	2019	2023
Australia	2005	2010	2010	2015	2018	2018	2018
Azerbaijan	2001	2001	2016	2016	2016	2021	2021
Bolivia	2004	2004	2014	2014	2014	2014	2014
Botswana	1994	2016	2016	2016	2016	2016	2016
Brazil	2005	2005	2010	2015	2015	2015	2015
Cameroon	2003	2003	2017	2017	2017	2019	2019
Canada	2003	2011	2011	2014	2017	2019	2019
Chile	2003	2003	2016	2016	2016	2016	2016
China	2002	2007	2010	2012	2017	2017	2017
Colombia	2003	2007	2007	2014	2014	2014	2014
Costa Rica	2002	2011	2011	2017	2017	2017	2017
DR Congo	2013	2013	2013	2013	2019	2019	2019
Ecuador	2001	2007	2013	2013	2019	2019	2019
India	2003	2007	2007	2015	2015	2015	2015
Indonesia	2004	2004	2017	2017	2017	2017	2017
Iran	2001	2012	2012	2012	2012	2012	2012
Japan	2005	2005	2011	2011	2011	2011	2011
Jordan	2006	2006	2006	2018	2018	2018	2018
Kazakhstan	2004	2004	2015	2015	2017	2017	2017
Korea	2003	2007	2010	2014	2015	2020	2020
Laos	2002	2002	2017	2017	2017	2017	2017
Malaysia	2005	2005	2005	2019	2019	2019	2019
Madagascar	1999	1999	2019	2019	2019	2019	2019
Mauritius	1997	1997	2018	2018	2018	2018	2018
Mexico	2003	2003	2013	2013	2013	2013	2013
Mongolia	2005	2005	2016	2016	2016	2016	2016
Morocco	2004	2004	2004	2019	2019	2019	2019
Mozambique	2007	2007	2015	2015	2015	2015	2015
New Zealand	2007	2007	2013	2013	2013	2013	2013
Nigeria	2006	2006	2006	2018	2018	2018	2018
Norway	2004	2007	2011	2014	2017	2017	2017
Oman	2005	2005	2005	2018	2018	2018	2018
Pakistan	2002	2011	2011	2011	2017	2017	2017
Panama	1996	2016	2016	2016	2016	2016	2016
Paraguay	2009	2009	2014	2014	2014	2014	2014
Peru	2004	2004	2004	2022	2022	2022	2022
Philippines	2000	2006	2006	2018	2018	2018	2018
Russian Federation	2003	2003	2016	2016	2016	2016	2016
Saudi Arabia	2005	2005	2005	2021	2021	2021	2021
South Africa	2005	2005	2017	2017	2017	2017	2017
Sri Lanka	2000	2000	2011	2011	2011	2011	2011
Switzerland	2005	2008	2011	2014	2014	2014	2014
Thailand	2005	2005	2010	2015	2015	2015	2015
Turkey	2002	2002	2012	2012	2012	2012	2012
Uganda	2002	2007	2007	2007	2007	2007	2007
Ukraine	2004	2007	2013	2013	2017	2017	2017
United States	2002	2012	2012	2012	2012	2012	2012
United Arab Emirates	2005	2005	2014	2014	2014	2014	2014
United Kingdom	2010	2010	2010	2013	2018	2019	2019
Uruguay	1997	2016	2016	2016	2016	2016	2016
Vietnam	2003	2005	2016	2016	2016	2016	2016
Zimbabwe	1991	2017	2017	2017	2017	2017	2017

3.2.2 Trade Data

As in previous versions of the GTAP Data Base, reconciled bilateral merchandise trade data, based on data from COMTRADE, was contributed by Mark Gehlhar of U.S. Department of Interior. Documentation on the reconciliation procedure is available online. In terms of trade in services, since GTAP 11, we take advantage of a dataset provided by the OECD and WTO called the Balanced Trade in Services (BaTiS) (Liberatore and Wettstein 2021), which provides bilateral flows that do not need to be reconciled. The starting point for BaTiS is the trade in services dataset developed jointly by the WTO and the United Nations Conference on Trade and Development (WTO-UNCTAD).

Using bilateral balanced data is convenient, however the sectoral coverage does not map perfectly to GTAP's 20 services sector. There are 4 services sectors that are not covered by BaTiS: electricity, gas distribution, water supply, and ownership of dwellings. As in previous versions, for these and other energy sectors including electricity and gas distribution, energy trade data is constructed using data from the International Energy Agency (IEA) as documented in Chepeliev 2022b. The two remaining sectors (i.e., water supply and dwellings) are assumed not to be traded.

Since some sectors in BaTiS are too aggregated for GTAP, we disaggregate using another dataset that focuses on services trade by mode of supply, which provides more detailed information, but is not bilateral (Wettstein et al. 2021). The Trade in Services by Mode of Supply (TiSMoS) dataset is produced by the WTO and funded by the Directorate-General for Trade of the European Commission (Wettstein et al. 2021).³

3.2.3 Protection Data

Domestic Support

Domestic support data for 2004, 2007, 2011, 2014, 2017, 2019, and 2023 from the OECD PSE/CSE database are incorporated in GTAP 12. Five domestic support categories are considered- output subsidies, input subsidies, land-based payments, labor-based payments and capital-based payments. This data gives us the breakup of activity-specific, group-generic and activity-generic payments. For the EU, the JRC provided this data for 2011, 2014 and 2017. Hans Jensen (then at FOI) provided this data for all the EU-27 countries in 2007 and EU-25 countries in 2004. Domestic support data are now available for the following OECD countries: Australia, Canada, Iceland, Israel, Japan, Korea, Mexico, New Zealand, Norway, Switzerland, Turkey, and the United States. The non-OECD member economies covered in the domestic support dataset for all five years are: Brazil, China, Indonesia, Kazakhstan, Russia, Ukraine, South Africa, Chile, Colombia, Vietnam, Costa Rica, India, Argentina. Unfortunately, for 2023 and 2019 the OECD could not release EU member information so we use 2017 rates for the 2 new reference years.

³ Another possible data source is the International Trade in Services Statistics by the OECD, which is bilateral but with emphasis on OECD member countries.

Agricultural Export Subsidies

Aziz Elbehri of the Food and Agriculture Organization of the United Nations (FAO), with inputs from David Laborde (IFPRI) and Hans Jensen, contributed agricultural export subsidy data for 2004, calculated from country notifications to the WTO and “Financial report on the European Agricultural Guidance and Guarantee Fund”.

For 2023, only Korea posted information, Jayson Beckman (ERS/USDA) submitted 2022 information for 2 additional countries (Morocco, and Türkiye). For 2017 and 2019, Kayode Aje-wole (ERS/USDA) contributed data based on WTO notifications. For 2011 and 2014, Jayson Beckman (ERS/USDA) contributed these subsidies using the same sources and procedures as before. For 2007, David Laborde contributed a much richer export subsidy data, based on a bilateral and disaggregated-sector-level monthly export subsidy and bilateral trade dataset, for 36 exporting countries, 15 GTAP sectors (in agriculture and manufacturing) and 230 importing countries. We continue to use a common agricultural export subsidy rate for the EU member countries.

MFA Export Tax Equivalents

Estimates of the export tax equivalent (ETE) of the export quotas on textiles and clothing (wearing apparel) exports under the Agreement on Textiles and Clothing (ATC) were provided by Joseph Francois and Julia Wörz. For Canada and the EU15, the ETE estimates are for 2003 and for the USA, the ETE estimates are for 2004. For 2007, all of these ETE’s are zero, given the phasing out of MFA quotas, but quotas on Chinese exports remain in US, Canada and EU. We extrapolated ETEs from 2004 data to 2007 for China, based on the extent to which the quotas for Chinese exports were allowed to grow in each of these countries.

Import Tariffs

For years 2007, 2011, 2014, 2017, 2019 and 2023 we obtained the tariff data in GTAP Data Base directly from the ITC MAcMap data base, which is compiled from primary national customs information. Its documentation is available from chapter 10.D of this documentation. For 2004, we continue to use the dataset contributed for version 7 by David Laborde through the joint efforts of ITC and CEPII.

3.2.4 Energy Data and Emissions

For version 12, the IEA energy volume, taxes and prices data has been incorporated for all reference years. In addition, fossil-fuel consumption subsidies based on estimates from the International Monetary Fund (IMF) and IEA data are now integrated in the standard database following the approach developed in Chepeliev, McDougall, and Mensbrugghe 2018.

Several important modifications are introduced to the new treatment of energy data since

GTAP 11, in part due to changes to the accounting of CO₂ emissions (Chepeliev 2022b). First, in addition to relying on the extended International Energy Agency (IEA) energy balances, we also utilize more aggregate energy balances reported by the UN (UN 2021) to represent countries not explicitly covered by the IEA.

Second, for a more consistent representation of the bilateral energy trade flows, we rely on data from British Petroleum (BP 2022) and the statistical office of the European Union (Eurostat 2022). In combination with the UN-COMTRADE trade flows, these are then used to bilateralize the unilateral trade data from IEA. These updates result in a more consistent representation of trade between key energy exporters and importers, and allow us to address the widely-recognized weakness of UN-COMTRADE in capturing energy trade (Bellora, Cotterlaz, and Thie 2022).

Third, while refining the GTAP CO₂ emission estimates, we introduce blast furnace gas and other recovered gases into the energy database. Finally, we discard the energy flows associated with flaring from the GTAP energy database, to be consistent with the IEA energy balance accounting as well as with the definition of fossil fuel combustion emissions from the Intergovernmental Panel on Climate Change (IPCC) (Chepeliev 2022a). This new treatment assures that flaring-related energy and emission flows are aligned with the corresponding estimates from international data sources.

3.2.5 Behavioral Parameters

The GTAP Data Base includes a parameters file that consists of the various behavioral parameters used in the standard GTAP Model. Armington elasticities in GTAP 12 Data Base are the same since version 9. With the release of GTAP Model version 7 (Corong et al. 2017) a regionally calibrated elasticity is available in separate headers of the parameters file. Also, in GTAP 12, we added headers containing recent estimates of trade elasticities at the GTAP level estimated by Fontagné, Guimbard, and Orefice 2022. In addition, the Constant Difference Elasticity (CDE) parameters were calibrated from expenditure elasticities that are calculated using parameters from the AIDADS model estimated using GTAP data, as reported in Reimer and Hertel 2004. Additional details are available in Chapter 16.

3.2.6 Other Features

GTAP 12 reports balance of payments flows that help us further refine the calibration of Savings in the database, see Chapter 7. The flows that we report are foreign investment income, official development aid, and remittances. We do not have bilateral information on these, but rather unidirectional flows in and out of the country.⁴

As mentioned in chapter 2, we have five labor categories in this version of the data base. Since GTAP 11, we updated Weingarden and Tsigas 2010 by using more detailed industry and

⁴The exception is official development aid for which we do have donor countries linked to recipient countries.

occupation wage from the ILO, to estimate imputed wages for the 2017, 2019 and 2023 reference years.

Also, since version 6, we consider estimates of income taxes and factor taxes (payroll, land, etc.) based on data from the IMF Government Financial Statistics. Population data, in millions, is reported in the global flows data file (header POP). This may be useful for use in post-simulation calculations.⁵ Reconciled bilateral time series trade data for 1995 to 2017 based on COMTRADE from Mark Gehlhar (U.S. DOI) have been incorporated into the time series trade data.⁶

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⁵Population data is not read in by the current standard version of the GTAP Model file (TAB file).

⁶Since version 9 these data was distributed separately from the standard data base due to the increased size of the distribution file.

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