Chapter 3
What's New in GTAP 6?

Betina V. Dimaranan

The GTAP 6 Data Base is the sixth major public release of the GTAP Data Base since the Project began in 1992. A GTAP Data Base cycle typically begins with updating of the data base to a new reference year – 2001 for GTAP 6. The domestic data bases or input-output (I-O) tables are combined with international datasets on macroeconomic aggregates, bilateral trade, energy, agricultural input-output, and protection for the new reference year. Interim releases of the data base are constructed as significant updated datasets become available. Improvements are also made in data sourcing, scope, and construction procedures. Part III of this volume provides detailed information on the sources and procedures employed in the construction of the GTAP 6 Data Base. This chapter provides a summary of the changes that have been made since the GTAP 5 Data Base. Table 3.1 provides a quick comparison of the GTAP 5 Data Base, the GTAP 5.4 interim release, the GTAP 6 beta release and the GTAP 6 Data Base.

3.1 Domestic Data

3.1.1 Renamed Sectors

The disaggregation of each regional economy to 57 sectors remains the same in the GTAP 5 and GTAP 6 Data Bases. However, the 3-letter codes for two sectors were revised in GTAP 6 in order to avoid confusion between reserved words in some software programs and with 3-letter codes for regions. The 3-letter code for the GTAP sector "Forestry" was changed from FOR to FRS and that for "Coal" was changed from COL to COA.

3.1.2 New Regions

A total of 16 new primary regions have been added to the GTAP Data Base since GTAP 5 bringing the total to 87 regions. Primary regions are the countries for which we have national input-output tables. The 13 new regions introduced in the GTAP 5.4 Data Base are: Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Malta, Romania, Slovakia, Slovenia, Estonia, Latvia, and Lithuania and the Russian Federation. Tunisia, South Africa, and Madagascar are included in the GTAP 6 beta release. A detailed listing of the 87 GTAP 6 regions and their country composition is available in Chapter 2.

3.1.3 *Updated Regions*

Aside from introducing new regions, updated input-output tables for regions that are already in the data base were also incorporated in the GTAP 6 Data Base. More recent input-output tables for the Southeast Asian countries (Indonesia, Malaysia, Philippines, Thailand, Singapore) were included in GTAP 5.4. Updated input-output tables for 11 countries (Australia, New Zealand, Korea, Taiwan, Singapore, India, Argentina, Brazil, Colombia, Netherlands, Turkey) are included in the GTAP 6 Data Base.

3.1.4 *Agricultural Production Targeting*

The input-output tables of several countries, especially the OECD members, are pre-adjusted to match 2001 agricultural production statistics by sector. This was done initially for the European Union member countries to more accurately reflect the shares of each member to total agricultural production in the EU. The 2001 agricultural production targets for the EU are sourced from EUROSTAT and contributed to GTAP by Hans Grinsted Jensen of FOI. Pre-adjustment of agricultural production in the I-O tables also became necessary in order to more accurately reflect domestic support payments. GTAP calculates domestic support rates from OECD PSE data and applies these to the value of production in the GTAP Data Base to get the total value of support. The decision to pre-adjust the I-O tables for other OECD countries came about because of the observed large discrepancy between the actual value of agricultural support and the value of agricultural support calculated from the GTAP data base. The I-O tables for the EU15, Australia, New Zealand, Japan, Korea, USA, Canada, Mexico, Switzerland, Czechoslovakia, Hungary, Poland, Slovakia, Russian Federation, Turkey, and Brazil are now pre-adjusted to match 2001 agricultural production data. Hsin Huang (OECD) supplied GTAP with the agricultural production targets for the non-EU15 OECD countries. Agricultural production targeting is documented in chapter 12.C of this volume.

3.1.5 *Composite Regions*

The I-O data for composite regions are constructed from the I-O tables of primary regions, i.e. the regions for which we have contributed I-O tables. In the GTAP 6 Data Base, we eliminated the Rest of World region (XRW) in the GTAP 5 and GTAP 5.4 Data Bases and replaced it with several geographic composite regions. This is designed to better facilitate the analysis of regional agreements. The GTAP 6 Data Base includes 18 composite regions.

The general procedure for constructing I-O tables for composite regions, as outlined in Chapter 14 of the GTAP 5 documentation, involves matching the countries comprising the composite region with the primary regions on the basis of similarity in per capita GDP, and then summing up the I-O data for the matched primary regions according to GDP share weights. In some cases, this

mapping is revised so that the I-O table for the composite region is based only on one or a few primary regions which share similar geographic characteristics. In constructing the GTAP 6 Data Base, we have now revised this procedure so that the countries comprising the composite region are matched on the basis of similarity in per capita GDP only with the primary regions which are in the same geographic area. Thus, for example, the I-O table for the Rest of South America is now constructed from the I-O tables of Colombia, Argentina, and Uruguay only. The revised procedure and the country composition of composite regions are reported in Chapter 14 of this volume.

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 a common reference year 2001. The primary source of 2001 macroeconomic data used in the GTAP 6 Data Base is the World Bank. The data is augmented with macroeconomic data from other published sources such as the World Development Report and the CIA Factbook. The handling of GDP aggregates data has been revised in the GTAP 6 Data Base. Our practice in previous versions of the data base was to use the estimates of private consumption (C), investment (I), and government consumption (G) from the macroeconomic dataset from the World Bank as targets in adjusting the regional input-output data. However, for exports (X) and imports (I), we use the trade totals from the reconciled bilateral merchandise trade data from Mark Gehlhar of ERS/USDA plus the services trade data. Since the trade totals do not match the total export and imports in the World Bank dataset, the resulting final GDP does not match the World Bank's GDP estimates. We have now adjusted the GDP aggregates (C, I, G) so that together with the trade data totals the resulting GDP in GTAP 6 now matches that from the World Bank macroeconomic dataset.

Another adjustment introduced in the GTAP 6 Data Base is in the composition of government consumption expenditures. The ratio of government consumption to GDP in the I-O tables is compared to data from the International Financial Statistics. When this ratio is significantly different, typically too low, then the sectoral composition of government consumption in the I-O table is adjusted according to data from the representative table. This adjustment affected the domestic databases of Canada, Argentina, Uruguay, and Morocco. This procedure is documented in Chapter 18.B of this volume.

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 ERS/USDA. Documentation on the reconciliation procedure is given in Chapter 15.B of the GTAP 5 documentation. In the GTAP 6 Data Base, the bilateral trade data was augmented with national trade data from the Netherlands in order to more accurately account for Dutch re-exports. Services trade data was updated to 2001 using the IMF Balance of Payments Statistics. Modal shares based on merchandise trade data for the U.S. were also updated to 2001.

3.2.3 Protection Data

Domestic Support

Domestic support data for 2001 from the OECD PSE/CSE database are incorporated in the GTAP 6 Data Base (see Chapter 16.B). We follow the same procedure and mapping of the PSE components into four domestic support categories (output subsidies, input subsidies, land-based payments, and capital-based payments) as documented in Chapter 16.A. Hans Grinsted Jensen (FOI) supplied the disaggregated agricultural domestic support for the EU countries for 2001 (Chapter 16.C).

There are a couple of changes in the coverage of the domestic support data for the GTAP 6 Data Base. The country coverage of the data has been expanded to include some non-OECD member countries. Hsin Huang (OECD) supplied data not only for the OECD countries but also for non-member economies. Domestic support data are now available for the following OECD countries: Australia, Canada, European Union, Hungary, Iceland, Japan, Korea, Mexico, Norway, Poland, Slovakia, Switzerland, Turkey, and the United States. The non-OECD member economies covered in the domestic support dataset are: Bulgaria, Romania, Slovenia, Estonia, Latvia, Lithuania, and Russia.

The second modification is in the treatment of data for the following GTAP sectors: fruits and vegetables (v_f), plant-based fibers (pfb), and other crops (ocr). Since these GTAP commodities are not separately identified in the OECD PSE/CSE database but are all grouped under "Miscellaneous Commodities", we did not have domestic support data for these sectors in the GTAP 5 Data Base. For GTAP 6, Hans Grinsted Jensen supplied disaggregated data for these commodities for the EU countries. To have a treatment parallel for non-EU countries, we assigned the average domestic support reported for "Miscellaneous Commodities" in the OECD PSE data uniformly to these GTAP commodities for the non-EU countries covered in the domestic support dataset.

Agricultural Export Subsidies

Agricultural export subsidy data for 2001, calculated from country notifications to the WTO, was contributed by Aziz Elbehri of ERS/USDA (Chapter 16.E).Agricultural export subsidies are identified for the United States, Norway, Hungary, Poland, Israel, Slovakia, and the European Union. Data is still for 2000 for Korea, Canada, Switzerland, Czech Republic, and Turkey. We continue to use a common agricultural export subsidy rate for the EU member countries.

We have revised the treatment of export subsidies/taxes for services commodities. In the past, we used the export subsidy/taxes data available in some of the I-O tables to cover data that are missing from the external protection datasets. We continue to do so for the small number of missing data for non-agricultural merchandise commodities. However, because there is no external data source for services protection, we used to rely completely on protection for services that is extracted from the I-O tables. We have now dropped this practice since not all of the I-O tables report protection data and because the services protection data for some regions may be outdated and/or erroneous.

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) for 2001 were provided by Joseph Francois and Dean Spinanger. Francois and Spinanger generated the ETE estimates using a non-linear least squares estimation model with bilateral trade data on textiles and clothing, underlying tariffs, and the coverage of the ATC quotas.

Import Tariffs

The tariff data for the GTAP 6 Data Base has changed significantly in terms of sourcing, coverage, nature and quality, and data processing. The tariff data is a central feature of the GTAP 6 Data Base in light of quantitative analyses of the Doha Development Agenda and the burgeoning number preferential trading arrangements in the past few years.

In the GTAP 5 Data Base, agricultural tariffs and merchandise tariffs were obtained from the two separate sources. Agricultural tariff data were obtained from the Agricultural Trade Policy Database which is based on the Agricultural Market Access Database (AMAD). The non-bilateralized data on agricultural tariffs for 46 countries were MFN applied rates for 1998, where available, or bound rates for countries where applied rates were not reported. Data on merchandise tariffs were obtained from the World Bank and UNCTAD through an early version of the World Integrated Trade Software (WITS). Bilateral, MFN applied, trade-weighted tariff data for 1997 or for the closest available year were obtained for 118 importers and 238 partner exporters.

The 2001 tariff data in the GTAP 6 Data Base is from the Market Access Maps (MAcMap) contributed by the *Centre d'Etudes Prospectives et d'Information Internationales* (CEPII). The

MAcMap data base is compiled from UNCTAD TRAINS data, country notifications to the WTO, AMAD, and from national customs information. Documentation about the MAcMap data base, its sources and methodology are available in Chapter 18.D. In the GTAP 6 Data Base, we use trade-weighted preferential rates data on ad valorem tariffs (including tariff rate quotas) plus the *ad valorem* equivalents (AVEs) of specific tariffs. The MAcMap tariff data for agriculture and merchandise commodities is provided to GTAP at the GTAP sectoral classification for 163 importer countries and 208 partner exporters. The data is then aggregated to the GTAP regional classification using GTAP's reconciled bilateral trade data as weights.

Since we are now using preferential rates tariff data, we have stopped using our previous approach of applying zero rates for known free trade areas (CER, NAFTA, EU, EU-EFTA, and SACU). In the case of missing data, we still use our usual approach of using the protection rates implied in the input-output tables. However, we have excluded services commodities from this practice.

3.2.4　　Energy Data

In the GTAP 5 Data Base, we used 1997 IEA energy volume data and 1997 price data that came from many different sources. In the GTAP 6 Data Base we incorporated 2001 IEA energy volume data and the 1997 energy prices data updated to 2001 using price indices and exchange rates. Since inclusion of 2001 IEA price data will entail a significant overhauling of the energy module, this was not done for the GTAP 6 Data Base. Documentaion about the energy is available is Chapter 17 of this volume.

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. These include the source substitution or Armington elasticities (ESUBD and ESUDM), the factor substitution elasticities (ESUBVA), the factor transformation elasticities (ETRAE), the investment parameters (RORDELTA and RORFLEX), and the consumer demand parameters (SUBPAR and INCPAR). The behavioral parameters are documented in Chapter 20 of this volume. Improved consumer demand parameters and Armington elasticity estimates, based on recent econometric work, are incorporated in the GTAP 6 Data Base.

Consumer Demand Parameters

SUBPAR and INCPAR, respectively, are the substitution and the expansion parameters in the constant difference of elasticities (CDE) demand function used in the specification of private household demands in the GTAP model. The CDE demand parameters in previous versions of the GTAP data base were calibrated from income elasticity estimates that were compiled from the World Food Model of the FAO and from other published sources. The CDE demand parameters in GTAP 6 are now calibrated from expenditure elasticities that are in turn calculated using parameters from

the AIDADS model estimated using GTAP data. The econometric work is reported in Reimer and Hertel (2004).

Trade Elasticities

ESUBM is the elasticity of substitution among sources of imports in the Armington aggregation structure for all agents in all regions. In previous versions of the GTAP data base, the source substitution elasticities were taken from the SALTER model. The new estimates of ESUBM introduced in the GTAP 6 Data Base are based on recent econometric work reported in Hertel, Hummels, Ivanic, and Keeney, 2004. For the elasticity of substitution between domestic and imported goods (ESUBD), we continue to rely on the "rule of two" where $ESUBM = 2*ESUBD$. The revised trade elasticity estimates are available for the 42 GTAP merchandise commodities. We continue to use the previous GTAP trade elasticities that were obtained from the SALTER project for the 15 services sectors.

3.2.6 Income and Factor Taxes

Estimates of income taxes and factor taxes (payroll, land, etc.) based on data from the IMF Government Financial Statistics, assembled by Jan Hagemejer and Robert McDougall, were incorporated into the GTAP 6 Data Base. A new header, $FTRV(e,j,r)$, reporting factor endowment tax revenue, is now included in the global flows data file. $FTRV(e,j,r)$ is used to distinguish the factor tax revenue from the factor-based subsidy payments, $FBEP(e,j,r)$, which are part of the domestic support data obtained from the OECD PSE dataset. Documentation about this new component of the GTAP Data base is available in Chapter 18.E of this volume

3.2.7 Population Data

Population data for 2001, in millions, is now reported in the global flows data file (header POP). This may be useful for use in post-simulation calculations. Population data is not read in by the current standard version of the GTAP model file (GTAP.TAB).

3.2.8 Time Series Trade Data

Reconciled bilateral time series trade data for 1992 to 2002 from Mark Gehlhar (ERS/USDA) have been incorporated into the time series trade data file which originally covered 1965 to 1998. The data from the later series was used to replace data from the earlier series for 1992 to 1998. The original 1965-1998 dataset was provided by Mark Gehlhar for the 66 regions of the GTAP 5 Data Base. Each time new regions were introduced, the time series data was simply adjusted by introducing zeroes as data for the new regions. The new 1992-2002 dataset was provided by Mark for the 87 regions of the GTAP 6 Data Base. Therefore there are discontinuities in the combined dataset for the new regions introduced since GTAP 5 and also in the data for the composite ("Rest of ...") regions.

Discontinuities also arise directly from the raw data source due to changes in reporting status of countries in some regions, e.g. Former Soviet Union and former Yugoslavia. Documentation for the time series trade data is available in Chapter 8 of this volume.

Table 3.1 Comparison of GTAP 5, 5.4, and GTAP 6 Data Bases

	GTAP 5	GTAP 5.4	GTAP 6 Beta (6 pre-release 5)	GTAP 6
Reference year	1997	1997	2001	2001
No. of Sectors	57	57	57	57
Sector Names	No change since the GTAP 4 Data Base	No change since the last release	Revised: Forestry (FOR renamed FRS), Coal (COL renamed COA)	No change since the last release
No. of Regions	66	78	87	87
New Primary Regions		Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Malta, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Russian Federation	Madagascar, Tunisia, South Africa	No change since the last release
Updated I-O Tables		Indonesia, Malaysia, Philippines, Singapore, Thailand	Australia, New Zealand, Korea, Taiwan, Singapore, India, Argentina, Brazil, Colombia, Netherlands, Turkey	No change since the last release
Macroeconomic Data	1997; World Bank and other sources	No change since the last release	2001; World Bank and other sources; revised procedure (see section 3.2.1)	No change since the last release
Government Consumption	as available in I-O tables	No change since the last release	revised treatment (see section 3.2.1)	No change since the last release
Trade Data	1997; COMTRADE through ERS/USDA	No change since the last release	2001; COMTRADE through ERS/USDA; re-exports data for NLD	No change since the last release
Domestic Support	1997; OECD PSE data, covers OECD countries; with EU disaggregation	No change since the last release	2001; OECD PSE data, covers OECD and some non-member countries, with EU disaggregation	No change since the last release

Table 3.1 Comparison of GTAP 5, 5.4, and GTAP 6 Data Bases

	GTAP 5	GTAP 5.4	GTAP 6 Beta (6 pre-release 5)	GTAP 6
Export Subsidies	1998	No change since the last release	2001	No change since the last release
MFA Export Tax Equivalent	1997 estimates	No change since the last release	2001 estimates	No change since the last release
Agricultural Tariffs	1997 MFN; AMAD	No change since the last release	2001 Preferential MAcMap (AMAD is one of the source datasets)	No change since the last release
Merchandise Tariffs	1997 MFN; UNCTAD/World Bank through WITS	No change since the last release	2001 Preferential MAcMap	No change since the last release
Energy Data	1997 energy volumes and prices data	No change since the last release	2001 energy volumes data with 1997 energy prices data	1997 energy prices data updated to 2001 using price indices
Income and Factor Taxes	none	none	none	2001 data from IMF
Demand Elasticities	from FAO and other sources	No change since the last release	Revised (see section 3.2.5)	No change since the last release
Trade Elasticities	from SALTER	No change since the last release	Revised (see section 3.2.5)	No change since the last release
Population Data	none	none	2001 data from World Bank	No change since the last release
Time Series Trade	1965-1998	No change since the last release	No changes	Extended to 2002 using new data for 1992-2002