

Chapter 6

Macroeconomic Data

Angel H. Aguiar and Betina V. Dimaranan

6.1 Uses of Macroeconomic Data

During the GTAP Data Base construction process, macroeconomic data are used in various stages. The primary use of macroeconomic data is in updating the regional input-output (I-O) tables to a common base year – 2004 for the GTAP 7 Data Base. As a first step, all the coefficients in the regional I-O tables, initially in national currency units, are scaled-up by the ratio of gross domestic product (GDP) calculated from the I-O tables to external GDP data in 2004 US dollars. Then, data on GDP aggregates – private consumption (C), gross capital formation (I), and government consumption (G) – are used in the FIT process to update the values of these aggregates in the regional I-O tables (see Chapter 15.A).

Per capita GDP data are also required in the construction of input-output tables for composite regions, i.e. the aggregate regions for which input-output data are generated based on the I-O tables of the primary regions. Similarity in per capita GDP is used as a criterion for matching a member country in a composite region to one of the primary regions within the same geographic area (see Chapter 8.E). A combination of one or more primary region I-O tables is then used to generate an I-O table for a composite region.

Macroeconomic data are also used in extending various data sets to the standard country coverage and as weights for aggregating data from standard countries to GTAP regions. Macroeconomic data, particularly GDP and GDP shares, are used in extending the trade datasets (Chapter 9) to 226 standard countries in the GTAP 7 Data Base. GDP data are also used as weights for aggregating data on domestic support (Chapter 10.B), factor shares (Chapter 12.A), and labor shares (Chapter 12.B) from standard countries to GTAP regions.

Finally, macroeconomic data, government consumption and GDP are used to check and potentially revise the share of government consumption in each I-O table. This procedure, started in GTAP 6 Data Base, imposes a more uniform treatment of government consumption expenditure across countries and is explained in greater detail in Chapter 8.E.

6.2 Data Sources and Processing

Since macroeconomic data, particularly GDP, are used in extending other datasets to the full set of standard countries, GDP and population data are required for all the 226 standard countries. Our primary source for macroeconomic data is the data base maintained by the Development Economics Prospects Group of the World Bank. The World Bank data base is a suitable source of

macroeconomic data for GTAP since it covers a wide range of countries and includes data that is already reconciled for statistical discrepancies. It is the underlying data base for the *Global Economic Prospects and the Developing Countries*, an annual publication of the World Bank.

The construction of the GTAP Data Base does not directly require data on exchange rates. All the coefficients in the regional I-O tables are simply scaled up to match the GDP data in 2004 US dollars. Since most the 2004 GDP data comes from the World Bank's data base, the underlying exchange rate is the Atlas conversion factor¹ that is used by the World Bank in its national accounts data.

From the World Bank data base, we obtained data on real GDP, GDP aggregates (private consumption, government consumption, gross domestic fixed investment, stocks, total exports, total imports), and population data for 130 countries, covering the world's major economies. The GDP and GDP aggregates data are in millions of 2004 US dollars. For the 96 remaining countries, GDP and population data for 2004 or the closest available year, were compiled from other sources such as the *World Development Report* and the *CIA World Factbook*.

Estimates of the GDP aggregates were generated for the 96 countries for which only GDP and population data are available. This was done by first mapping the 226 countries with a smaller number of 19 geographic regions.² This is one extra region compared to the GTAP 6 Data Base because Southern Asia has now been separated from South-eastern Asia. For each geographic region, the average share of each GDP aggregate to total GDP was calculated for the countries for which GDP aggregates data are available. Estimates of the GDP aggregates were then generated for the countries with no GDP aggregates data by multiplying GDP of each country with the average share of the GDP aggregate in the geographic region to which the country belongs. The estimates for each GDP aggregate were then summed up for each GTAP region after estimates have been generated for the data gaps. This practice is based on the assumption that a country would have a similar macroeconomic profile to its neighboring countries.

Starting with the GTAP 6 Data Base, we modified the processing of the data on GDP aggregates and we give the same treatment in the GTAP 7 Data Base. Our practice in previous versions of the data base was to use the estimates of C, I, G from the macroeconomic dataset as targets in adjusting the regional I-O tables. However, for exports (X) and imports (I), we use the trade totals from the reconciled merchandise trade data and services trade data (see Chapter 9). Since the trade totals do not match the total exports and imports in the World Bank dataset, the resulting final GDP does not match the World Bank's GDP totals. In constructing the GTAP 7 Data Base, we revised this practice by scaling the GDP aggregates (C, I, G) so that together with the trade data totals the resulting GDP matches the GDP totals in the macroeconomic dataset.

¹ The Atlas conversion factor for any year is the average of a country's exchange rate (or alternative conversion factor) for that year and its exchange rates for the two preceding years, adjusted for the difference between the rate of inflation in the country and, for 2001 onwards, that in countries including the Euro Zone, Japan, the United Kingdom, and the United States. A country's inflation rate is measured by the change in its GDP deflator (<http://www.worldbank.org/data/aboutdata/working-meth.html>).

² The 19 regions are: Oceania, Eastern Asia, South-eastern Asia, Southern Asia, Central Asia, Western Asia, North America, Caribbean, Central America, South America, Northern Africa, Eastern Africa, Western Africa, Central Africa, Southern Africa, Northern Europe, Eastern Europe, Western Europe, and Southern Europe.

The first four columns of Table 6.1 presents GDP, private consumption, gross capital formation (investment), and government consumption data expressed in 2004 US \$ million for the 113 regions in the GTAP 7 Data Base.

6.3 *Capital Stock and Depreciation*

The GTAP Data Base reports data on physical capital stock and depreciation. Like the GDP aggregates data described in the previous section, capital stock data in 2004 US \$ million were also obtained from the data base of the Development Economics Prospects Group of the World Bank.

Similar to the procedure for filling data gaps in the GDP aggregates data, data gaps for capital stock were filled by first calculating the average ratio of capital stock to GDP for the countries for which capital stock data are available. Estimates of capital stock were then generated for the countries with no capital stock data by multiplying GDP in each country with the average ratio of capital stock to GDP in the geographic region to which the country belongs. The capital stock estimates were then summed up for each region after estimates have been generated for the data gaps.

Depreciation is estimated at four percent of the 2004 physical capital stock. The last two columns of Table 6.1 present capital stock and depreciation data in millions of 2004 US dollars for the 113 regions of the GTAP 7 Data Base.

Table 6.1 Macroeconomic Data (2004 US\$ million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Capital Formation	Government Consumption	Capital Stock	Depreciation
AUS	637,790	378,379	155,383	113,756	1,669,800	66,792
NZL	96,443	56,934	21,248	16,637	249,785	9,991
XOC	21,275	14,359	5,856	4,339	59,388	2,376
CHN	1,674,127	712,367	700,905	195,009	3,954,260	158,170
HKG	163,005	111,485	41,728	19,029	449,982	17,999
JPN	4,658,740	2,619,321	1,090,985	815,676	16,803,566	672,143
KOR	676,497	342,332	196,234	89,672	2,003,755	80,150
TWN	305,291	190,923	60,976	37,830	575,957	23,038
XEA	25,587	11,528	6,113	3,359	81,396	3,256
KHM	4,884	2,519	952	424	16,509	660
IDN	254,702	174,730	49,311	20,033	542,502	21,700
LAO	2,452	1,780	673	299	8,288	332
MMR	7,733	5,207	1,967	875	9,141	366
MYS	114,899	38,858	18,004	12,103	332,386	13,295
PHL	84,476	58,899	14,109	8,748	224,975	8,999
SGP	106,814	55,809	31,693	14,043	311,821	12,473
THA	161,698	87,252	40,520	16,199	1,047,800	41,912
VNM	43,026	28,964	14,983	2,781	145,436	5,817
XSE	5,586	1,812	685	305	18,882	755
BGD	55,910	41,858	13,639	3,085	128,210	5,128
IND	641,258	431,432	155,465	73,534	1,368,041	54,722
PAK	94,734	79,303	16,914	8,894	195,556	7,822
LKA	20,084	15,763	5,182	1,684	55,843	2,234
XSA	13,902	11,476	3,376	1,803	29,080	1,163
CAN	979,128	556,946	204,119	196,839	2,464,201	98,568
USA	11,673,375	8,200,607	2,189,810	1,802,797	26,138,044	1,045,522
MEX	683,236	465,617	140,382	79,298	1,943,492	77,740
XNA	5,889	6,007	1,641	1,370	13,312	532
ARG	150,397	92,128	28,528	16,403	358,338	14,334
BOL	8,778	6,174	1,151	1,373	18,922	757
BRA	616,540	344,477	122,104	116,898	1,772,846	70,914
CHL	89,640	50,467	18,630	9,896	171,281	6,851
COL	97,463	59,104	18,559	19,507	151,784	6,071
ECU	29,965	19,545	6,478	2,709	84,546	3,382
PRY	8,424	6,063	1,235	471	22,064	883
PER	68,631	47,103	12,345	6,940	185,505	7,420
URY	13,691	10,774	1,791	1,656	23,814	953

Table 6.1 Macroeconomic Data (2004 US\$ million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Capital Formation	Government Consumption	Capital Stock	Depreciation
VEN	108,234	55,817	21,762	14,682	318,220	12,729
XSM	3,521	2,141	720	586	14,075	563
CRI	19,466	11,256	3,015	2,465	54,337	2,173
GTM	27,445	25,101	4,930	1,160	52,490	2,100
NIC	4,385	3,585	1,224	483	19,190	768
PAN	12,601	8,761	2,465	2,105	27,672	1,107
XCA	24,147	20,182	4,471	2,774	54,631	2,185
XCB	193,123	139,692	51,372	15,146	661,677	26,467
AUT	292,312	171,866	66,924	54,733	974,865	38,995
BEL	352,312	219,678	71,806	79,669	942,412	37,696
CYP	15,418	9,174	3,278	3,392	42,932	1,717
CZE	108,031	55,821	29,362	24,732	394,464	15,779
DNK	243,730	118,580	47,659	64,395	635,395	25,416
EST	10,219	6,081	3,114	2,063	26,572	1,063
FIN	185,920	97,831	35,241	42,356	599,951	23,998
FRA	2,046,465	1,163,111	397,414	496,362	5,776,071	231,043
DEU	2,740,500	1,635,215	475,795	517,733	8,772,083	350,883
GRC	205,197	137,059	53,000	35,476	627,451	25,098
HUN	99,653	70,250	22,803	11,011	328,203	13,128
IRL	182,242	70,758	39,346	23,575	397,473	15,899
ITA	1,677,820	1,027,797	332,531	328,946	5,049,871	201,995
LVA	13,465	9,442	4,125	3,025	35,014	1,401
LTU	21,200	15,100	5,011	4,301	55,126	2,205
LUX	31,864	21,566	7,049	7,821	85,234	3,409
MLT	5,322	2,907	1,113	907	15,628	625
NLD	578,980	290,149	121,590	150,375	1,748,121	69,925
POL	233,622	157,169	44,982	44,699	677,948	27,118
PRT	167,715	107,047	38,470	36,351	462,003	18,480
SVK	41,546	22,820	10,233	8,325	96,848	3,874
SVN	32,520	18,162	8,299	6,779	95,661	3,826
ESP	1,039,899	605,494	292,115	185,520	2,920,422	116,817
SWE	346,413	166,811	55,474	96,203	951,515	38,061
GBR	2,123,599	1,398,459	362,668	456,813	5,293,533	211,741
CHE	357,542	215,102	74,896	42,479	1,136,332	45,453
NOR	250,052	112,795	45,396	55,399	783,304	31,332
XEF	15,713	9,021	3,324	3,957	45,651	1,826
ALB	8,994	7,873	2,230	838	26,457	1,058

Table 6.1 Macroeconomic Data (2004 US\$ million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Capital Formation	Government Consumption	Capital Stock	Depreciation
BGR	24,571	17,529	5,292	4,782	107,197	4,288
BLR	21,960	14,803	6,458	5,300	51,191	2,048
HRV	33,926	20,687	9,826	7,085	99,796	3,992
ROU	74,423	51,967	18,683	11,295	414,743	16,590
RUS	569,838	290,214	106,604	97,055	665,263	26,611
UKR	60,975	38,684	13,636	12,682	142,137	5,685
XEE	2,595	2,420	868	739	6,049	242
XER	44,978	34,194	12,948	10,291	163,670	6,547
KAZ	44,351	25,420	9,677	5,539	121,522	4,861
KGZ	2,205	2,052	322	428	6,042	242
XSU	20,200	10,006	3,663	2,174	22,578	903
ARM	3,340	2,968	749	403	8,641	346
AZE	8,729	6,077	5,383	1,157	22,581	903
GEO	4,474	3,852	1,343	468	11,574	463
IRN	157,862	77,810	55,041	21,080	342,225	13,689
TUR	295,831	211,927	59,370	40,833	823,035	32,921
XWS	691,097	329,909	131,648	162,059	1,726,905	69,076
EGY	76,806	54,861	12,756	9,408	182,215	7,289
MAR	50,245	30,532	12,002	10,441	134,845	5,394
TUN	27,994	18,252	6,501	4,616	91,202	3,648
XNF	112,385	52,204	27,773	16,818	501,541	20,062
NGA	68,567	25,195	15,455	14,833	155,316	6,213
SEN	7,195	6,585	1,364	1,115	19,170	767
XWF	50,731	43,704	9,937	5,882	142,926	5,717
XCF	38,008	20,369	9,257	3,620	183,761	7,350
XAC	23,886	11,880	4,652	6,947	103,688	4,148
ETH	7,280	6,073	1,680	1,526	13,589	544
MDG	4,352	3,015	708	302	9,380	375
MWI	1,792	1,657	224	281	4,981	199
MUS	5,920	3,593	1,329	839	18,920	757
MOZ	6,086	4,295	1,090	809	12,904	516
TZA	11,473	9,078	2,316	1,403	17,360	694
UGA	7,273	5,092	1,444	1,018	12,383	495
ZMB	5,402	3,714	943	700	13,886	555
ZWE	4,080	2,680	630	762	12,765	511
XEC	50,186	38,795	9,445	7,013	104,013	4,161
BWA	8,722	3,064	2,145	3,384	21,068	843

Table 6.1 Macroeconomic Data (2004 US\$ million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Capital Formation	Government Consumption	Capital Stock	Depreciation
ZAF	213,934	132,172	35,036	40,837	713,846	28,554
XSC	9,062	4,304	1,982	1,490	32,847	1,314

Addendum to

Chapter 6

Macroeconomic Data

Angel H. Aguiar and Terrie L. Walmsley

In the GTAP 7.1 Data Base adjustments were made to improve the Macroeconomic data used in the GTAP 7 Data Base. With the inclusion of 27 new EU I-O tables into the GTAP 7.1 Data Base, comparisons were made of the macroeconomic data used in the GTAP 7 Data Base and those used in the compilation of the EU SAMs. Further investigation of the discrepancies led to us to revise and update the macroeconomic data used in the GTAP 7 Data Base. The Private Consumption, Gross Capital Formation, and Government Consumption data for Belgium, Bulgaria, Cyprus, Greece, Hungary, Luxembourg, and Malta were modified using OECD NIA and EUROSTAT data.

Table A.1 presents gross domestic product, private consumption, gross capital formation (investment), and government consumption data expressed in 2004 US \$ million for the selected countries for which we have modified these macro data and the percentage change with respect to the originally used data.

Table A.1 Adjusted Macroeconomic Data (2004 US\$ million)

GTAP Regions	Gross Domestic Product	Private Consumption	% Change	Gross Capital Formation	% Change	Government Consumption	% Change
BEL	352,312	211,802	-3.59%	73,356	2.16%	91,602	14.98%
BGR	24,571	18,010	2.74%	5,174	-2.22%	4,178	-12.63%
CYP	15,418	10,288	12.14%	2,875	-12.31%	2,691	-20.66%
GRC	205,197	144,324	5.30%	46,604	-12.07%	34,859	-1.74%
HUN	99,653	57,278	-18.47%	23,038	1.03%	23,514	113.55%
LUX	31,864	18,912	-12.31%	8,317	17.99%	8,085	3.38%
MLT	5,322	3,048	4.83%	1,003	-9.87%	906	-0.08%