

Chapter 6

Macroeconomic Data

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This chapter provides an overview of the macroeconomic features of the GTAP 8 Data Base. We will first present how the macroeconomic data base is collected and processed. Then, the section will focus on highlighting the salient features of the uses of Gross Domestic Product (GDP) for 2004 and 2007 base years.

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. 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 current US dollars. Then, data on GDP aggregates – private consumption (C), gross fixed 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. Similar 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 244 standard countries in the GTAP 8 Data Base. GDP data are also used as weights for aggregating data on domestic support, 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 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 244 countries for both 2004 and 2007 base years. Our primary source of macroeconomic data is the World Development Indicators (WDI). This World Bank data is a suitable source of data for GTAP since it covers a wide range of countries and includes data that is already reconciled for statistical discrepancies. From the World Bank data base, we obtained data on GDP, GDP aggregates (private consumption, government consumption, and gross fixed capital formation), and population data that covers the world's major economies. The GDP and GDP aggregates data are in millions of current US dollars. For some countries, GDP and population data for 2004 and 2007 were not available in WDI, for those countries we compiled data from other sources such as the UN Statistics Division and the CIA World Factbook.

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 and 2007 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.

Estimates of the GDP aggregates were generated for the countries for which only GDP and population data are available. This was done by first mapping the 244 countries with a smaller number of 19 geographic regions. 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 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.

Since GTAP 6 Data Base, GDP aggregates (C, I, G) are scaled in order to maintain consistency of the collected GDP data with the reconciled trade data (see Chapter 9). The reconciled trade data do not match the total exports and imports in the World Bank dataset, therefore, if we do not scale the GDP aggregates, the resulting final GDP will be different than that of World Bank's GDP totals.

Finally, we would like to highlight the fact that GTAP Version 7 and Version 8 Data Bases share the same 2004 base year. While some data remain the same, there are some notable changes. The first major difference is the expansion of standard country set from 226 to 244. The additional 18 regions are small countries (both in terms of GDP and population) and are not countries for which we have IO tables. The second issue is that additional regions change the composition of some of the GTAP composite regions, a fact we should keep in mind when

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>).

comparing the two base years. Third, for the remaining regions the 2004 base year data in Version 8 represents a substantial improvement to that of Version 7 data base. For Version 7 we used World Bank data for 130 countries, leaving us to collect data from other sources for the other 96 countries. For Version 8, the WDI had both expanded its country coverage and updated the 2004 macroeconomic data. As a result, we collected GDP data for 193 countries from WDI and 51 from other sources.

For a few of the tiny countries/territories added in Version 8, the GDP data was missing or zero, but population data was available. For such countries, we assumed the per-capita GDP to be the average per-capita-GDP of the corresponding geographical region to calculate the approximate GDP. For South Georgia and the South Sandwich Islands and Heard and MacDonal Islands, there was no data on GDP or population, so we assumed zero for these territories.

6.3. Capital Stock and Depreciation

The GTAP Data Base also reports data on physical capital stock and depreciation. Capital stock data was collected from the database 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.

Capital depreciation is estimated at four percent of the physical capital stock for both base years. The last two columns of Table 6.1 and Table 6.2 present capital stock and depreciation data in millions of 2004 and 2007 US dollars, respectively for the 129 regions of the GTAP 8 Data Base.

Table 6.1 Macroeconomic Data (2004 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
AUS	615346	350503	152072	106982	1612205	64488
NZL	102210	60032	23815	17723	264725	10589
XOC	24171	15613	5524	5929	66876	2675
CHN	1931644	787968	786750	269840	4558680	182347
HKG	165886	98603	35315	16349	457846	18314
JPN	4605921	2628899	1045896	826930	16627374	665095
KOR	721975	379859	210836	96155	2137047	85482
MNG	1816	1197	558	264	5710	228
TWN	339940	203641	80551	43217	641325	25653
XEA	21419	8731	4777	2698	67363	2695
KHM	5510	4792	978	247	14533	581
IDN	256837	171486	57656	21374	547063	21883
LAO	2508	1909	799	188	6614	265
MYS	124749	54887	26141	15693	360526	14421
PHL	86930	59720	13991	8781	231234	9249
SGP	109664	46483	25422	11825	320219	12809
THA	161340	92269	41813	17915	537262	21490
VNM	45404	29548	15110	2904	119748	4790
XSE	18435	10981	2334	2394	33699	1348
BGD	56561	42385	13588	3127	129524	5181
IND	720909	427035	207315	79260	1535536	61421
NPL	7274	5682	1480	629	14766	591
PAK	97978	72689	14675	8033	201834	8073
LKA	20663	14657	4678	2610	57442	2298
XSA	7182	6701	1673	887	15442	618
CAN	992227	553348	201580	190156	2500412	100016
USA	11812300	8285100	2218200	1862400	26459552	1058382
MEX	759777	502714	149656	81597	2157768	86311
XNA	6334	4095	1336	1867	14551	582
ARG	153129	95877	29351	17044	364448	14578
BOL	8773	5958	1025	1426	18950	758
BRA	663760	396790	106843	127618	1911629	76465
CHL	95653	56790	18449	10919	182697	7308
COL	117255	78526	22046	18459	182917	7317
ECU	32642	21963	7045	3716	92051	3682
PRY	6950	5100	1297	685	18208	728
PER	69725	47726	12471	6946	188258	7530
URY	13686	9413	1966	1506	23814	953
VEN	112577	55406	20644	13460	330977	13239

Table 6.1 Macroeconomic Data (2004 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
XSM	5682	3363	1110	2199	19866	795
CRI	18596	12268	3462	2627	51884	2075
GTM	23965	20495	4395	2100	45774	1831
HND	8871	6559	2402	1332	25105	1004
NIC	4467	3935	1186	503	19564	783
PAN	14179	9073	2351	1930	31194	1248
SLV	15798	14439	2474	1525	30965	1239
XCA	1056	793	187	148	2616	105
XCB	194598	117610	30462	32490	637846	25514
AUT	289039	158519	63463	53836	962499	38500
BEL	361110	186386	71563	81877	964163	38567
CYP	15823	10199	3000	2820	43988	1760
CZE	109525	55133	28295	24186	399915	15997
DNK	244728	118045	47227	64935	638740	25550
EST	12031	6779	3716	2123	31269	1251
FIN	189424	97204	36671	41981	611684	24467
FRA	2095567	1186716	403845	498470	5910066	236403
DEU	2745215	1618012	480552	516362	8784688	351388
GRC	230719	161795	50646	39605	705999	28240
HUN	102076	68377	22932	10201	335831	13433
IRL	185131	85972	45321	28327	403585	16143
ITA	1727826	1012974	354458	342997	5200755	208030
LVA	13762	8678	3779	2686	35766	1431
LTU	22552	14655	5025	4373	58610	2344
LUX	34091	12654	7331	5775	91024	3641
MLT	5600	3710	1076	1167	16465	659
NLD	609890	301455	114763	147687	1841868	73675
POL	252769	161139	45701	46845	733030	29321
PRT	184795	118699	43086	37051	508186	20327
SVK	56032	32115	13481	10657	130610	5224
SVN	33724	18534	8411	6374	98574	3943
ESP	1044299	604793	292793	185948	2934481	117379
SWE	362090	175028	61677	95922	995747	39830
GBR	2202490	1426387	366939	459764	5484200	219368
CHE	362991	219005	75550	42643	1154310	46172
NOR	258582	116597	46618	55378	809360	32374
XEF	16688	9644	3832	3725	48461	1938
ALB	7464	6618	1779	711	19400	776
BGR	25283	17528	5148	4902	110235	4409

Table 6.1 Macroeconomic Data (2004 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
BLR	23142	12433	5859	4768	53943	2158
HRV	40692	24914	10154	7800	118942	4758
ROU	75489	58075	16329	7404	420476	16819
RUS	591017	298094	108660	100305	691490	27660
UKR	64883	35790	14631	11729	151242	6050
XEE	2598	2281	551	399	6056	242
XER	60764	40975	12048	12418	212517	8501
KAZ	43152	23079	10824	5012	118236	4729
KGZ	2212	1682	326	402	6060	242
XSU	20945	11862	4626	3135	57388	2296
ARM	3577	2950	854	364	9307	372
AZE	8681	5028	5009	936	22589	904
GEO	5126	3754	1407	720	13339	534
BHR	11236	4394	2723	1881	10562	422
IRN	163227	74329	46641	18600	354202	14168
ISR	126843	70473	22050	33556	273981	10959
KWT	59441	22243	8904	11802	106993	4280
OMN	24674	9152	6310	5553	54282	2171
QAT	31675	6734	9564	7199	82428	3297
SAU	250339	76189	41693	59147	598310	23932
TUR	392166	279593	79773	46862	1090222	43609
ARE	103784	52456	22125	13302	350790	14032
XWS	92543	65758	18589	18515	273124	10925
EGY	78845	56506	12932	10057	186863	7475
MAR	56948	32544	14966	10636	152621	6105
TUN	28129	17820	6354	4340	91701	3668
XNF	118841	44620	25211	16182	525005	21000
CMR	15775	11257	2879	1603	52690	2108
CIV	15481	11052	1524	1290	34523	1381
GHA	8872	7143	2518	1080	35842	1434
NGA	87845	65000	6495	5913	199409	7976
SEN	8041	6217	1823	1104	21388	856
XWF	27637	22116	5742	3824	73637	2946
XCF	22859	9301	6014	1929	132247	5290
XAC	26345	12885	2642	5378	114443	4578
ETH	10034	8223	2555	1310	18764	751
KEN	16096	12157	2617	2875	38792	1552
MDG	4364	2840	1020	303	9426	377
MWI	2625	1754	426	321	7298	292

Table 6.1 Macroeconomic Data (2004 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
MUS	6386	4067	1382	911	20434	817
MOZ	5698	4640	1063	617	13065	523
TZA	11351	8308	2724	1806	17141	686
UGA	8469	6440	1692	1178	14397	576
ZMB	5423	3544	1251	980	13938	558
ZWE	4712	3423	290	1096	14749	590
XEC	30363	21587	5281	4422	53752	2150
BWA	10049	3627	2494	2125	24318	973
NAM	6606	4011	1226	1345	18100	724
ZAF	219093	137925	35014	42422	731770	29271
XSC	3487	2695	698	817	17057	682
XTW	90	52	21	16	237	9

Table 6.2 Macroeconomic Data(2007 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
AUS	856911	459272	223550	146209	2245108	89804
NZL	138317	80076	31621	25688	358240	14330
XOC	31830	21560	8538	7324	89178	3567
CHN	3494056	1256783	1366396	471908	8245972	329839
HKG	207069	124596	41704	16715	571510	22860
JPN	4377944	2484189	1004099	783138	15804377	632175
KOR	1049236	570631	299343	154168	3105739	124230
MNG	3930	1958	1456	511	11750	470
TWN	393762	228943	87100	46393	742866	29715
XEA	32973	11147	10970	3584	98588	3944
KHM	8358	6531	1706	479	21872	875
IDN	432105	274571	107797	36066	920384	36815
LAO	4286	2923	1643	374	11218	449
MYS	186642	85186	40231	22790	539396	21576
PHL	144070	99936	21199	14166	383227	15329
SGP	176766	64364	40048	16223	516158	20646
THA	247111	132017	65181	30093	822881	32915
VNM	68435	44315	27214	4143	179095	7164
XSE	28601	15788	4037	3732	51953	2078
BGD	68415	50711	16737	3780	156671	6267
IND	1232816	701558	406261	128404	2625899	105036
NPL	10283	8147	2096	944	20874	835
PAK	143171	108035	29955	13143	294933	11797
LKA	32351	21725	7998	4941	89936	3597
XSA	12017	10699	4181	1710	25815	1033
CAN	1424066	792853	323253	273353	3588646	143546
USA	14061800	9806300	2647000	2225900	31498432	1259937
MEX	1025583	669461	218964	107887	2912656	116506
XNA	8201	5233	1716	2337	18898	756
ARG	260789	152751	63113	33708	620678	24827
BOL	13120	8295	2118	1845	28339	1134
BRA	1365983	801264	238227	276683	3934030	157361
CHL	164315	89307	32506	18038	313842	12554
COL	207363	134887	45807	32229	323486	12939
ECU	45789	29350	10129	5196	129126	5165
PRY	12222	9059	2125	1324	32023	1281
PER	107492	65948	23255	9814	290229	11609
URY	23952	16862	4444	2714	41676	1667
VEN	226791	122945	54022	27076	666766	26671

Table 6.2 Macroeconomic Data(2007 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
XSM	5923	3512	2839	2569	22580	903
CRI	26267	17565	5725	3504	73285	2931
GTM	34113	29570	6682	2954	65156	2606
HND	12392	9691	3927	2052	35071	1403
NIC	5618	5141	1685	709	24608	984
PAN	19794	11701	4358	2236	43547	1742
SLV	20377	19676	3246	1850	39938	1598
XCA	1277	852	246	195	3143	126
XCB	263735	163784	40594	44162	828513	33141
AUT	372291	196830	79764	67743	1239730	49589
BEL	458620	233994	99566	102394	1224515	48981
CYP	21447	14223	4720	3802	59623	2385
CZE	174215	83121	43868	35390	636121	25445
DNK	310721	150708	67729	80824	810982	32439
EST	21384	11822	7384	3606	55700	2228
FIN	246584	124526	52628	52979	796266	31851
FRA	2638200	1500267	565035	609036	7435904	297436
DEU	3329145	1887310	622128	595206	10653265	426131
GRC	309917	224078	65061	53858	948345	37934
HUN	138757	90020	29185	13453	456511	18260
IRL	259706	123463	68531	41818	566159	22646
ITA	2116202	1242128	448797	416322	6369767	254791
LVA	28766	17931	9683	5012	74928	2997
LTU	39104	25260	11065	6990	101857	4074
LUX	51278	16427	10643	7576	136913	5477
MLT	7449	4564	1639	1442	21899	876
NLD	778312	361464	156493	196913	2350501	94020
POL	425321	253572	91708	80003	1233432	49337
PRT	230945	151422	51502	45165	635098	25404
SVK	84242	47162	21966	14563	186534	7461
SVN	47315	24936	13101	8198	137841	5514
ESP	1440837	827262	442412	264801	4048751	161950
SWE	462513	216040	90544	117982	1271910	50876
GBR	2799040	1792862	499262	592416	6969611	278784
CHE	434117	247248	93489	46968	1380491	55220
NOR	387539	160377	85971	76181	1212996	48520
XEF	24809	14355	6823	5444	71907	2876
ALB	10834	9492	3188	959	28220	1129
BGR	42114	29045	12080	7015	183616	7345

Table 6.2 Macroeconomic Data(2007 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
BLR	45276	23458	14206	8387	100253	4010
HRV	58558	35213	15564	10855	170596	6824
ROU	169282	114985	48736	22393	942904	37716
RUS	1299706	633976	272877	224817	1520656	60826
UKR	142719	84887	38649	26126	316019	12641
XEE	4402	4052	1501	831	9748	390
XER	91845	62245	22873	18578	326537	13061
KAZ	104853	48998	31474	11590	287299	11492
KGZ	3803	3847	936	650	10419	417
XSU	38685	21171	7781	5521	105997	4240
ARM	9206	6595	3400	937	24163	967
AZE	33049	9645	7072	3426	86743	3470
GEO	10173	7192	2616	2226	26700	1068
BHR	18473	6194	4873	2604	17365	695
IRN	286058	128787	73682	31978	620746	24830
ISR	166990	94745	32640	41805	360698	14428
KWT	114739	34092	24014	16067	206531	8261
OMN	41909	13831	12815	7917	92200	3688
QAT	80751	14494	29237	17451	211944	8478
SAU	384076	112389	78816	85935	917940	36718
TUR	647155	461462	141314	82751	1799091	71964
ARE	207570	87134	40436	20749	701586	28063
XWS	133216	92869	30669	21554	400263	16011
EGY	130473	94458	27206	14786	309221	12369
MAR	75226	43840	23507	13700	201607	8064
TUN	35620	22137	8259	5038	116120	4645
XNF	208140	60912	53368	23737	902003	36080
CMR	20686	14837	3533	1909	69091	2764
CIV	19796	13629	1719	1717	44144	1766
GHA	24632	20154	4953	2847	99515	3981
NGA	165921	123651	15224	13052	376640	15066
SEN	11334	9230	3502	1133	30149	1206
XWF	38150	29760	8089	5448	101782	4071
XCF	41364	14915	10805	3572	246951	9878
XAC	69241	17168	10245	7775	324626	12985
ETH	19182	15966	4500	1991	35871	1435
KEN	27166	20554	5275	4871	65471	2619
MDG	7343	2903	2378	348	15861	634
MWI	3586	2124	829	411	9969	399

Table 6.2 Macroeconomic Data(2007 US\$ Million)

GTAP Regions	Gross Domestic Product	Private Consumption	Gross Fixed Capital Formation	Government Consumption	Capital Stock	Depreciation
MUS	7521	5294	1890	982	24068	963
MOZ	8030	6576	1296	945	18090	724
TZA	16826	11430	4988	2130	25407	1016
UGA	11892	9316	2603	1535	20217	809
ZMB	11541	7124	2750	1190	29661	1186
ZWE	4424	3134	1043	270	13846	554
XEC	58478	38137	14828	9121	101890	4076
BWA	12386	4253	2960	2400	29973	1199
NAM	8806	5055	2085	1820	24128	965
ZAF	286302	179500	57757	54421	956249	38250
XSC	4527	3488	820	1042	22152	886
XTW	123	68	30	21	322	13