

Georgia

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1. Introduction

Georgia is not represented individually in version 6 of the GTAP Data Base. The country is only represented indirectly via the composite region *Rest of Former Soviet Union* (labeled XSU), which also accounts for 10 other member states of the Commonwealth of Independent States (CIS).

This document describes the procedure used for preparation of an input-output table for Georgia to GTAP. The reference year of the table is 2001 and the original table has 14 sectors. Additional data is used to disaggregate the table, and the disaggregated table has 32 sectors.

2. The Original Input-Output Table

An official input-output table for Georgia could not be obtained. The table submitted to GTAP is based on an unofficial table provided by the Economic Policy Research Center (EPRC) in Georgia. The unit of the table is millions of lari. The data is presented in consumer prices.

The use matrix represents total use, i.e., the sum of domestic and imported commodities used as intermediates or consumed as final products. Imports are reported by commodities, but only as total imports (not by category of use). Matrices for the use of domestic and imported commodities are consequently obtained by pro-rating the totals across uses using the structure of the total use matrix. That is, it is assumed that the ratio of imports to domestic production is constant for each commodity across all uses.

The table has some detail regarding taxes. There is data on total VAT and excise taxes by commodity. VAT and excise taxes are assumed to apply uniformly to uses of both imported and domestically produced commodities. There is also data on “Other taxes on production” and “Other subsidies on production”, which are mapped to net subsidy rates.

Factor demands include “Wages”, which are mapped to “Labor”, and “Gross profit”, which are mapped to “Capital”. Factor demands also include “Gross mixed income”, which is partly mapped to “Labor” and partly mapped to “Capital” to get value shares for capital and labor that are comparable to those of other GTAP countries.

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Final demands distinguish household consumptions, government consumption, fixed capital formation, changes in inventories, and exports, which corresponds directly to the final demand categories used for submission of an input-output table to GTAP.

3. Sectoral Classification

Most of the service sectors in the input-output table correspond directly with GTAP sectors. The table has little details regarding agricultural and manufacturing sectors: There is one sector for “Agriculture, Forestry & Fishing” and one sector for all manufacturing. Furthermore, one sector represents processing of food products by households. This sector is added to the aggregate manufacturing sector, yielding a table with 13 sectors.

Various data sources have been used to disaggregate the table. Table 1 shows the map between the 13 sectors in the original table and the 32 sectors in the disaggregated table. Table 2 shows the map between the 32 sectors and the GTAP sectors.

Statistical Yearbook of Georgia: 2006 published by the Department of Statistics, Georgia, provides data for the year 2001 on the value of output by detailed manufacturing sectors, which correspond directly with almost all GTAP manufacturing sectors. These data are used to calculate the weights for the manufacturing sectors in Table 1.

The value of gas and oil production is not listed separately in the output data and other economic data on oil and gas production could not be obtained. Physical data on output suggests that gas production is significant, but that oil accounts for the majority of production in this sector. Oil is assigned the weight 90% and gas 10% within this sector.

The Department of Statistics, Georgia, has provided additional data on value added by selected agricultural and services sectors (including dwellings), which corresponds directly with GTAP sectors. These data have been used to calculate the remaining shares listed in Table 1.

The disaggregation procedure first splits domestic production, imports and final demands by pro-rating all totals for the aggregate sectors using the weights for the disaggregated sectors. Given that the aggregate table is balanced, this first step results in a balanced disaggregated table.

The disaggregation procedure then incorporates detailed information on imports, exports and domestic use of the disaggregated commodities. This step results in an estimated table, which is initially imbalanced. The table is subsequently re-estimated using a balancing procedure as explained below.

Exports and imports are disaggregated with value share data calculated from export and import data by GTAP commodity for Georgia for the year 2001. These data has been provided by the GTAP Center and were used for version 6 of the GTAP Data Base.

Comparison of the GTAP trade data with energy balances provided by the International Energy Agency (IEA) and with output data in *Statistical Yearbook of Georgia: 2006* suggests significant re-exports for both oil and petroleum products. In both cases, exports exceed domestic production.

Comparison of the GTAP trade data with output data and trade data in *Statistical Yearbook of Georgia: 2006* suggests significant re-exports for “Machinery and electronic equipment.” Again, exports exceed domestic production.

Data on re-exports could not be obtained, and re-exports by commodity are therefore estimated using the procedure suggested by the GTAP Center. That is, the estimated share of re-exports equals imports divided by imports plus domestic production. Total re-exports by commodity are then subtracted from both total exports and total imports.

The domestic use of domestic production and imports are disaggregated with coefficients based on a representative input-output table from version 6.0 of the GTAP Data Base. Coefficients from most of the Southern, Central and Eastern European countries are applied to the data for Georgia and compared to find the most relevant table. The coefficients based on the table for Bulgaria result in the smallest deviations between total supply and total demand for almost all of the disaggregated sectors. The table for Bulgaria is therefore chosen as representative for Georgia.

The coefficients for the disaggregation of the agriculture sector are calculated by dividing the use of each of the disaggregated commodities by the sum of all uses of agricultural commodities. The coefficients for all the disaggregated commodities are calculated individually for all production sectors to reflect differences in technologies.

The same procedure is used to obtain the coefficients for the manufacturing sector. A few adjustments are made in the use of energy. According to energy balances provided by the International Energy Agency (IEA), very little coal is used in Georgia. Consequently, the coefficients for energy use are adjusted such that the coefficients for coal used in electricity generation and for coal consumed by households are allocated to gas instead.

The coefficients for disaggregation of the real estate sector into other business services and dwellings are obtained in two steps. First, it is assumed that all output from the dwelling sector is sold to households. Second, the output from the sector producing other business services is allocated to intermediate and final use following the structure of the aggregate real estate sector.

4. Balancing of the Disaggregated Table

The incorporation of the detailed information on imports, exports and domestic use results in a table, which is initially imbalanced. The table is re-estimated using a balancing procedure for the disaggregated sectors and commodities. All other parts of the table are held constant.

The balancing is done automatically by solving a minimization problem where an objective function measures adjustments of the initial estimates and where a set of equations represents the constraints that the solution must observe.

The objective function corresponds to a weighted least-squares balancing of the estimated table. The functional form is:

$$\sum_{i,j} \frac{(x_{ij}^* - x_{ij})^2}{x_{ij}}$$

where x is a data matrix with dimensions i and j , and where a star denotes the adjusted estimate of the matrix. The objective function includes the estimated matrices for value-added, final demands, international trade, and intermediate demands.

Three types of constraints must be observed in a solution to the minimization problem. First, the value of domestic output equals value-added plus total costs of intermediate input. Second, the sum of domestic output and imports equals the sum of intermediate and final demands. Third, GDP measured from the income side equals GDP measure from the expenditure side.

Table 1. Map between sectors in original input-output table and disaggregated table

Acronym	Label	Weight	Acronym	Label
AGF	Agriculture, Forestry & Fishing	0.471	GFV	Grains, fruits, vegetables, crops nec
		0.449	LIV	Livestock
		0.063	FRS	Forestry
		0.016	FSH	Fishing
MME	Manufacturing, Mining, Energy	0.000	COA	Coal
		0.022	OIL	Oil
		0.002	GAS	Gas
		0.035	OMN	Mining and quarrying
		0.285	FBT	Food products, beverages and tobacco
		0.005	TXW	Textiles and textile goods
		0.004	LEA	Leather products
		0.006	LUM	Wood products
		0.023	PPP	Paper products, publishing
		0.006	P_C	Petroleum, coal products
		0.043	CRP	Chemical, rubber, plastic products
		0.049	NMM	Mineral products nec
		0.075	MEP	Metals and metal products
		0.054	TEQ	Transport equipment
		0.015	MEL	Machinery and electronic equipment
		0.004	OMF	Manufactures nec
		0.331	ELY	Electricity
		0.010	GDT	Gas manufacture, distribution
		0.030	WTR	Water
CNS	Construction	1	CNS	Construction
CMN	Communications	1	CMN	Communications
FIN	Financial Services	1	FIN	Banking lending and insurance
TRS	Trade Services	1	TRD	Trade
HRS	Hotel and Restaurant Services	1		
TRN	Transportation and Storage Services	1	TRN	Transportation and Storage Services
REA	Real Estate	0.325	OBS	Business services nec
		0.675	DWE	Housing and dwellings
PUB	Public Administration	1	OSG	Public administration, education, health care
EDU	Education	1		
HEA	Healthcare	1		
OCS	Other Communal, Social and Personal Services	1	ROS	Other Communal, Social and Personal Services

Table 2. Map between sectors in disaggregated table and GTAP sectors

Acronym	Label	Acronym	Label
GFV	Grains, fruits, vegetables, crops nec	PDR	Paddy rice
		WHT	Wheat
		GRO	Cereal grains nec
		V_F	Vegetables, fruit, nuts
		OSD	Oil seeds
		C_B	Sugar cane, sugar beet
		PFB	Plant-based fibers
		OCR	Crops nec
LIV	Livestock	CTL	Bovine cattle, sheep and goats, horses
		OAP	Animal products nec
		RMK	Raw milk
		WOL	Wool, silk-worm cocoons
FRS	Forestry	FRS	Forestry
FSH	Fishing	FSH	Fishing
COA	Coal	COA	Coal
OIL	Oil	OIL	Oil
GAS	Gas	GAS	Gas
OMN	Mining and quarrying	OMN	Minerals nec
FBT	Food products, beverages and tobacco	CMT	Bovine meat products
		OMT	Meat products nec
		VOL	Vegetable oils and fats
		MIL	Dairy products
		PCR	Processed rice
		SGR	Sugar
		OFD	Food products nec
		B_T	Beverages and tobacco products
TXW	Textiles and textile goods	TEX	Textiles
		WAP	Wearing apparel
LEA	Leather products	LEA	Leather products
LUM	Wood products	LUM	Wood products
PPP	Paper products, publishing	PPP	Paper products, publishing
P_C	Petroleum, coal products	P_C	Petroleum, coal products
CRP	Chemical, rubber, plastic products	CRP	Chemical, rubber, plastic products
NMM	Mineral products nec	NMM	Mineral products nec
MEP	Metals and metal products	I_S	Ferrous metals
		NFM	Metals nec
		FMP	Metal products
TEQ	Transport equipment	MVH	Motor vehicles and parts
		OTN	Transport equipment nec
MEL	Machinery and electronic equipment	ELE	Electronic equipment
		OME	Machinery and equipment nec

OMF	Manufactures nec	OMF	Manufactures nec
ELY	Electricity	ELY	Electricity

Acronym	Label	Acronym	Label
GDT	Gas manufacture, distribution	GDT	Gas manufacture, distribution
WTR	Water	WTR	Water
CNS	Construction	CNS	Construction
TRD	Trade	TRD	Trade
TRN	Transportation and Storage Services	OTP	Transport nec
		WTP	Water transport
		ATP	Air transport
CMN	Communications	CMN	Communication
FIN	Banking lending and insurance	OFI	Financial services nec
		ISR	Insurance
OBS	Business services nec	OBS	Business services nec
ROS	Other Communal, Social and Personal Services	ROS	Recreational and other services
OSG	Public administration, education, health care	OSG	Public Administration, Defense, Education, Health
DWE	Housing and dwellings	DWE	Dwellings