11.N

Central and Eastern Europe

Martin Banse and Terrie Walmsley

11.N.1 Introduction

This document describes the methodology used in constructing individual GTAP input-output tables for eleven countries of Central and Eastern Europe and of the Former Soviet Union. Firstly, it outlines the available data for Bulgaria, the Czech Republic, Estonia, Latvia, Lithuania, Romania, Slovakia, Slovenia, Croatia, Cyprus, and Malta. The document then describes the methodology for compiling the I-O tables for the GTAP Data Base.

This study provides I-O tables for eleven countries which were previously grouped with three composite regions in the GTAP 5 Data Base. Composite regions are those for which composite I-O tables are constructed by combining the I-O tables of primary regions, the countries for which GTAP has national I-O tables. Bulgaria, the Czech Republic, Romania, Slovakia, and Slovenia, fully comprised the composite region referred to as "Rest of Central European Associates" (XCE) in the GTAP 5 Data Base. Estonia, Latvia, and Lithuania were part of the composite region called "Former Soviet Union" (XSU). Croatia, Cyprus, and Malta were grouped with the residual composite region called "Rest of World (XRW)."

The steps followed in compiling the regional I-O tables for the GTAP Data Base are:

— collecting national I-O tables and national account data for 1997;

— mapping older detailed I-O tables to the more aggregated 1997 I-O tables, if available;

— mapping the national sector classifications to the GTAP sector classification, exclusive of agricultural and food processing disaggregation;

— updating the I-O tables to 1997 values based on national account data if an I-O table for 1997 is not available[1];

— disaggregating the agricultural and food processing industries by using additional data from national statistics;

— disaggregating the aggregated trade flows into bilateral trade flows based on national trade statistics, the UNCTAD TRAINS data base, as well as EUROSTAT trade statistics;

[1] Editor's note: Updating of I-O tables to the reference year of the GTAP Data Base is typically done at the Center for Global Trade Analysis as part of the data base construction process (see Chapter 19); it need not be done by the contributor of the I-O table.

— integrating the extended I-O tables into the framework of Social Accounting Matrices (SAMs)

— conversion of the I-O tables into GTAP-ready format.

11.N.2 Collecting National I-O Tables

Input-output tables were collected for most Central European countries in co-operation with the national statistical offices. Table 11.N.1 lists the I-O tables or Supply and Use tables available for the eleven countries covered by this study. The table provides information about the reference year of the original data and the number of sectors in the classification.

Table 11.N.1 Characteristics of National Input-Output Tables

Country	Reference Year	Number of Sectors		
		Total	Agriculture	Food Processing
Bulgaria	1996	18	7	7
Croatia	1995	57	12	8
Czech Republic	1996	27	1	1
Estonia	1997	15	1	included in total manufacturing
Latvia	1997	59	1	1
Lithuania*	1997			
Romania	1997	105	3	10
Slovakia	1997	36	1	1
Slovenia	1997	59	1	1
Cyprus	1986	33	1	1
Malta	1996	20	1	1

Note: * The publication of an input-output table for Lithuania was postponed by the Lithuanian Central Statistical Office until the end of 2002. At the time of this study only aggregated numbers for national accounts were available.

Most of the countries' symmetric input-output tables are available based on the System of National Accounts. In addition, most of the tables comply with the calculation methodology requirements of the European System of Accounts (ESA). Symmetric I-O tables were compiled by converting the information in the supply and use tables. Unlike the Supply and Use table, expenditures in the symmetric I-O table, both in the rows and columns (use and input), refer to a defined kind of product. It is required that the number of rows and columns coincide and the content must also be mutually consistent. By contrast, the columns of the Supply and Use table include industries but the rows show the products that form the consumption of these industries; the number of rows and columns may differ. I-O tables compiled according to ESA have a standard sectoral breakdown of 59 activities (see Table 11.N.A1). This includes the I-O tables for Croatia, Latvia, Slovakia, Slovenia, and Romania. The breakdown of activities of the I-O tables which are not compiled according to ESA standards are listed in the appendix for the individual countries, namely: Czech Republic, Estonia, Malta, and Cyprus (see Tables 11.N.A2 – 11.N.A5). Information about the I-O tables of Bulgaria and Lithuania are given in Appendix 2.

There are two steps in compiling the I-O tables for the GTAP Data Base. The first step is to update an older detailed I-O table to 1997 values using the 1997 data of an I-O table which is more aggregated. If an older detailed table is not available, the 1997 I-O table which includes 59 sectors is disaggregated according to the GTAP sectoral classification.

11.N.3 Mapping to a Common Valuation

The GTAP Data Base requires information about the commodity tax structure and about the import structure in a region. To match the commodity tax structure, I-O tables valued at basic prices are required. However, intermediate demands are given at producer prices (including net commodity taxes) in all the I-O tables. This means that the sectoral intermediate demands in the I-O tables are inclusive of net commodity taxes, while the tax matrix remains empty.

Apart from the Latvian I-O table, the I-O tables of the other countries all consist of a domestic use matrix and an aggregated import vector valued at *c.i.f.* prices. Such a separation is in accordance with the GTAP Data Base. However, for all countries, there is only a single column that reports value-added taxes (VAT) by commodity. With the help of the structure implied by the total use matrix (sum of domestic and import use), the amount of the row total of VAT allocated to each sector was computed (by the percentage of the row total of uses to each sector). Then, the estimated VAT matrix was subtracted from the total use matrix, while the column totals of the VAT matrix were considered as primary costs.

11.N.4 Mapping Non-Agricultural and Non-Food Sectors

For each national I-O table, a concordance from the source classification to GTAP sectoral classification (GSC2) was made. Appendix Table 11.N.A1 shows the mappings for those countries which published I-O tables according to the ESA classification. Some source sectors were much too aggregated to match the GTAP sectoral breakdown. In such cases a split is imposed (indicated by an asterisk).

It is only for Romania, with its detailed I-O table of 105 activities, that the sectors apart from agriculture and food processing were calculated without additional disaggregation. For the countries with I-O tables published based on the ESA classification, the extraction of crude oil and natural gas, metal processing, and the activity including production and distribution of electricity and gas were aggregated. To match the GTAP sectoral classification, the extraction of crude oil and natural gas was split into "extraction of crude oil" and "extraction of crude gas." The metal processing activity was split into "manufacture of basic iron and steel" and "manufacture of basic precious and non-ferrous metals". The activity including production and distribution of electricity and gas was split into "production and distribution of electricity" and

"manufacture and distribution of gas". The breakdown of these non-food sectors at the national level were derived from compatible detailed sector information from the countries' statistical yearbooks.

11.N.5 Disaggregating the Agricultural and Food Processing Sectors

The SPEL/EU-model[2] of EUROSTAT was used as the basis for splitting agricultural sectors according to the GTAP sectoral classification. This model contains information on revenues and costs of 49 production activities (35 crop and 13 animal production activities and a fallow land activity) for all the EU member states and for four central European countries -- the Czech Republic, Hungary, Poland and Slovakia (see Henrichsmeyer et al., 1999). Tables 11.N.A6 and 11.N.A7 in Appendix 1 show the mapping used to associate the production activities of SPEL with the GTAP classification. All the activities in the SPEL/EU-model produce commodities that are either used within agriculture again or leave agriculture to be processed, exported or consumed.[3]

The input-output framework based on SPEL was then used to disaggregate the agricultural sectors of the I-O tables. The input of each sector as a percentage of the total inputs into agriculture according to SPEL was used to divide the total inputs into agriculture in the I-O tables. The first problem that arose was the lack of detail in the SPEL data. Therefore, in many cases, the same input items were used to disaggregate several different rows of the I-O tables.

For those countries not covered in the SPEL data base, data of countries' Farm and Accountancy Data Network (FADN), national agricultural statistical yearbooks, and the FAO's supply utilization accounts were used to disaggregate the agricultural and food processing sectors to match the GTAP classification. In addition, information for agriculture and food processing industries were also derived from issue papers published by the advisory body of the Network of Independent Agricultural Experts in the CEEC Candidate Countries. Reports No. 2 ("Development of Farm Income in the CEE Candidate Countries") and No. 6 ("Key Developments in the Agri-food Chain and on Restructuring and Privatisation") were used as a source of additional information.

[2] SPEL/EU-model: Sectorales Produktions- and Einkommensmodell der Landwirtschaft der Europaischen Union (Sectoral Production and Income Model for the European Union)

[3] For further details on the dis-aggregation of the agricultural sectors based on the SPEL/EU-model, see van Leeuwen and Verhoog (1998).

11.N.6 Compiling SAMs

After the compilation of an I-O table according to the GTAP classification, the I-O table is integrated in the framework of a Social Accounting Matrix (SAM), which provides the underlying data framework for computable general equilibrium models.[4] As in most countries, I-O tables in Central European countries are collected at long intervals (usually five years or more), while national income and production data are available annually, but with a lag. Supporting data also come from a variety of sources, e.g., censuses of manufacturing, labor surveys, agricultural data, government accounts, international trade accounts, and household surveys. The problem in estimating a SAM for 1997, which is the base year of this study, is to find an efficient (and cost-effective) way to incorporate and reconcile information from a variety of sources, including data from prior years. The traditional RAS approach requires that we start with a consistent SAM for a particular year and "update" it for a later year given new information on row and column sums.

However, this approach has been extended by applying a flexible "cross-entropy" approach to estimate a consistent SAM starting from inconsistent data estimated with error, a common experience in the countries covered by this study. The method is flexible and powerful when dealing with scattered and inconsistent data. It allows incorporating errors in variables, inequality constraints, and prior knowledge about any part of the SAM (not just row and column sums). Since the input-output accounts are contained within the SAM framework, updating an input-output table is a special case of the general SAM estimation problem.[5] The cross-entropy method for all individual I-O tables and SAMs was calculated in a GAMS program. [6]

11.N.7 Disaggregating the Trade Flows

Trade flows in I-O tables and SAMs are usually compiled as aggregated trade flows of a particular country with the rest of the world. For this study, these aggregated trade flows were disaggregated into bilateral trade flows with selected countries or country groups like EFTA or MERCOSUR. [7] Table 11.N.A8 presents the aggregation of countries and groups of countries used in disaggregating the trade flows. The UNCTAD TRAINS data base (UNCTAD, 2000) and the Eurostat trade data base were used to gather trade data for the countries included in this study.

---

[4] For a general discussion of SAMs, see Pyatt and Round (1985).

[5] For further details, see Robinson, Cattaneo and El-Said (1998) and Robinson and El-Said (2000).

[6] The GAMS program checks that the SAM that is entered is balanced, i.e., that for each account, the row and column totals are equal. If the absolute value of the sum of account imbalances exceeds a cutoff point, an optimization program is used to estimate a balanced SAM. The program, which minimizes the entropy distance of the cells of the estimated SAM from those of the initial SAM subject to the constraint that row and column totals are equal, is primarily intended to remove rounding errors.

[7] Editor's note: Bilateral trade data for all regions in the GTAP Data Base is obtained from a reconciled bilateral merchandise trade and services trade dataset (see Chapter 15). It is not necessary to include bilateral trade data with I-O tables contributed to the GTAP Data Base.

11.N.8 Converting SAMS to I-O Table Format

A number of changes were required before converting the SAMS to I-O tables in GTAP format, namely: a) re-exports had to be removed; b) demand for commodities was split according to demand for imports and domestic commodities; and c) negative values were removed.

Re-exports

In a number of cases, the value of exports exceeded production (and/or imports exceed total domestic demand for a commodity). This is an indication that re-exports are included in the export and import figures. Re-exports are not permitted in the GTAP framework and hence they were removed from imports and exports. The value of re-exports was determined using a pro-rata system.

In a SAM, the following identity holds for each commodity:

$$M + P = X + A \qquad (1)$$

Where: M is imports; P is production, X is exports and A is absorption.

Since no additional information were available, re-exports were estimated using the following equation:

$$RX = \frac{M}{M + P} * X \qquad (2)$$

This procedure was undertaken for all commodities where exports exceeded production. These re-exports were then subtracted from total exports of that commodity and from total imports of that commodity, to ensure that the SAM balances. Table 11.N.2 reports the commodities in each country for which re-exports had to be removed.

Table 11.N.2: Commodities for which Re-exports were Removed, by Country

Country	GTAP Sectors
Estonia	(7) pfb, (23) pcr, (35) i_s, (38) mvh, (41) ome, (49) wtp, (50) atp
Croatia	(1) pdr, (15) coa, (18) omn, (29) lea, (35) i_s
Czech Republic	(7) pfb, (23) pcr
Latvia	(1) pdr, (16) oil, (23) pcr, (38) mvh
Lithuania	(1) pdr, (16) oil, (22) mil, (23) pcr
Malta	(1) pdr, (3) gro, (4) v_f, (7) pfb, (8) ocr, (13) frs, (18) omn, (23) pcr, (27) tex, 28 wap, (29) lea, (30) lum, (31) ppp, (32) p_c, (33) crp, (34) nmm, (35) i_s, 36 nfm, 37 fmp, (38) mvh, (39) otn, (40) ele, (41) ome, (49) wtp, (50) atp
Slovakia	(1) pdr, (7) pfb, (23) pcr, (49) wtp, (50) atp
Slovenia	(7) pfb, (23) pcr

Split between Domestic and Imported Commodities

The standard SAM structure indicates total demand for commodities for intermediate use, consumption, investment and government spending. However, for use in the GTAP Data Base, total demand should also be split according to demand for imported goods and demand for domestic goods. Total demand was split across imported and domestic sources using the method outlined in Huff, McDougall and Walmsley (2000). We used the column vector reporting total imports by commodity to create an imports matrix. Total imports were then allocated, pro-rata, across uses by applying the structure implied by the total use matrix. The import matrix was obtained by multiplying total imports of the commodity by the appropriate percentage for each sector. Finally, the new imports matrix was subtracted from the total use matrix to obtain the domestic use matrix.

Negative Values

There were also a number of negative values for the use of value-added in production of a commodity, particularly the use of capital in production. Although negative values are not uncommon in I-O tables, for use in the GTAP Data Base, these negative values had to be replaced with 'normal' positive values to reflect the fact that returns should normally be positive. For the Central and Eastern European economies, the negative value for factor usage in production of a commodity was replaced with a positive value based on the average share of the factor in all of value-added. The average was taken to be the average for all the Central and Eastern European tables.

References

Balaz, P.,V. Mokrasova, J. Lapisakova. 2000. "Compiling of Supply and Use Tables – The Slovak Experience," Paper presented at the 13th International Conference on Input-Output Techniques, Macerata, Italy, 21-25 August 2000.

Central Statistical Bureau of Latvia. 2000. *Input-Output Table for the Republic of Latvia 1997*. Riga.

Central Statistical Office. 2000. *Ágazati Kapcsolatok Mérlege* Input-Output Table of Hungary, 1997-98. Budapest.

Czech Statistical Office. 1998. *Annual National Accounts 1997*. Prague.

Czech Statistical Office. 2000. *Input-Output Table for the Czech Republic 1997*. Prague.

Dimaranan, Betina V. and Robert A. McDougall (editors). 2002. *Global Trade, Assistance and Production: The GTAP 5 Data Base*, Center for Global Trade Analysis, Purdue University.

Eurostat. 1997. *SPEL/EU Data, User Manual*. Theme 5. Series C. Luxembourg.

Eurostat. 2001. *Intra- and Extra-EU Trade*. Luxembourg.

Forgon, M and C. Ligeti. 2000. "ESA '95 & the Practice: Hungarian IOT, 1998," Paper presented at the 13th International Conference on Input-Output Techniques, Macerata, Italy, 21-25 August 2000.

GAMS. 2000. GAMS IDE 2.0.7.11. GAMS Development Corporation. Washington, DC.

Henrichsmeyer, W., J. Köckler, A. Quiring and T. Möllmann. 1999. SPEL/CEEC Data, Unpublished data base. Bonn.

Huff, K., McDougall, R. and T. Walmsley. 2000. "Contributing Input-Output Tables to the GTAP Data Base," GTAP Technical Paper No. 1, Center for Global Trade Analysis, Purdue University.

Input-Output Tables, National Account and Trade Statistics of Statistical Offices in Central Europe, Malta and Cyprus.

Ivan-Ungureanu, C., M.-I. Gheorghe. 2000. "The Possibility and Pitfalls for Input-Output Analysis in the Transitional Economy of Romania," Paper presented at the 13th International Conference on Input-Output Techniques, Macerata, Italy, 21-25 August 2000.

Kurcalte, M., V. Vdovins. 2000. “Input-Output Tables for Latvia: Compilation Practices and First Results,” Paper presented at the 13th International Conference on Input-Output Techniques, Macerata, Italy, 21-25 August 2000.

Lavrac, I., J. Kalin. 2000. “Findings in Compiling Supply and Use Tables in Slovenia: Lessons for the Transition of Data Sources,” Paper presented at the 13th International Conference on Input-Output Techniques Macerata, Italy, 21-25 August 2000.

Leeuwen, M. van and D. Verhoog. 1998. “European Union,” Chapter 14.17 in McDougall, R.A., A. Elbehri, and T.P. Truong (1998). *Global Trade Assistance and Protection: The GTAP 4 Data Base*, Center for Global Trade Analysis, Purdue University.

National Institute of Statistics. 2000. *Conturi Nationale* National Accounts – 1997-1998. Bucharest.

National Statistical Institute. 2000. Input Output Table for Bulgaria 1997. Sofia. Unpublished data.

National Statistics Office. 2000. *National Accounts of the Maltese Islands 1997*. Valletta.

Network of Independent Agricultural Experts in the CEE Candidate Countries. 2000. Development of Farm Income in the CEE Candidate Countries. Various authors. Brussels.

Network of Independent Agricultural Experts in the CEE Candidate Countries. 2001. Key Developments in the Agri-food Chain and on Restructuring and Privatisation. Various authors. Brussels.

Polish Official Statistics. 1999. National Accounts by Institutional Sectors and Sub-sectors, 1997-1998.

Pyatt, G. and J. Round. 1985. *Social Accounting Matrices: A Basis for Planning*. Washington D.C.: The World Bank.

Robinson, S. and M. El-Said. 2000. “A Social Accounting Matrix (SAM) Using Cross Entropy (CE) Methods,” International Food Policy Research Institute, Trade and Macroeconomics Division, TMD Discussion Paper No. 64, Washington, DC.

Robinson, S., A. Cattaneo and M. El-Said. 1998. “Estimating a Social Accounting Matrix. Using Cross Entropy Methods,” International Food Policy Research Institute, Trade and Macroeconomics Division, TMD Discussion Paper No 33, Washington, DC.

Statistical Office of Estonia. 2000. Description of the Sources and Methods used to Compile Non-financial National Accounts. Macroeconomic Statistics Division. Tallinn.

Statistical Office of Estonia. 2000. Supply and Use Tables by Commodities and Industries for Estonia 1997. Tallinn. Unpublished data.

Statistical Office of the Republic of Slovenia. 2000. *Input-output Tables, Slovenia, 1997*. Ljubljana.

Statistical Office of the Slovak Republic. 2000. *Komoditno-odvetvové tabuľky dodávok a použitia v SR za rok 1996*. Supply and Use Tables by Commodities and Industries in the Slovak Republic the Year 1996. Bratislava.

Statistical Service of the Republic of Cyprus. 2000. *National Accounts 1995-1998*. Nicosia.

Statistical Service of the Republic of Cyprus. 1999. *National Economic Accounts 1998* (Provisional Estimates). Nicosia.

Statistics Lithuania. 2000. *National Accounts 2000*. Vilnius.

Statistics Lithuania. 2000. Supply and Use Tables by Commodities and Industries 1998. Vilnius. Unpublished data.

Todorov, T. 1997. The Role of Agriculture in Transition to a Market Economy. SAMS for Bulgaria. Interim Report, National Statistical Institute, Sofia.

United Nations Conference on Trade and Development. 2000. Trade Analysis and Information System (TRAINS). Version 7.0. I/2000. Geneva.

Appendix 1

Table 11.N.A1 A Standard Sectoral Breakdown of an I-O table in "ESA"-Format: Croatia, Latvia, the Slovak Republic, Slovenia and Romania

National Classification			GTAP Sector Number
1	(01)	* Agriculture and hunting products	1-12
2	(02)	Forestry products	13
3	(05)	Fishing products	14
4	(10)	Coal and peat	15
5	(11-12)	* Crude oil and natural gas	16+17
6	(13)	Metal ores	18
7	(14)	Other mining products	18
8	(15)	* Food and beverages	19-25
9	(16)	Tobacco products	26
10	(17)	Textiles	27
11	(18)	Wearing apparel	28
12	(19)	Leather and leather products	29
13	(20)	Wood and products of wood	30
14	(21)	Paper and paper products	31
15	(22)	Printed matter and recorded media	31
16	(23)	Coke, refined petroleum products	32
17	(24)	Chemicals and chemical products	33
18	(25)	Rubber and plastic products	33
19	(26)	Other non-metallic mineral products	34
20	(27)	* Basic metals	35+36
21	(28)	Metal products	37
22	(29)	Machinery and equipment	41
23	(30)	Office machinery and computers	40
24	(31)	Electrical machinery and apparatus	41
25	(32)	Radio, television and communication	40
26	(33)	Medical and optical instruments	41
27	(34)	Motor vehicles	38
28	(35)	Other transport equipment	39
29	(36)	Furniture. other manufactured goods	42
30	(37)	Recovered secondary raw materials	42
31	(40)	* Elect., gas, steam and hot water	43+44
32	(41)	Cold water and distribution	45
33	(45)	Construction work	46
34	(50)	Sale and repairs of vehicles	47
35	(51)	Wholesale and commission trade services	47
36	(52)	Retail trade services	47
37	(55)	Hotel and restaurant services	47
38	(60)	Land and pipeline transport services	48
39	(61)	Water transport services	49
40	(62)	Air transport services	50
41	(63)	Tourism services	48
42	(64)	Post and telecommunication services	51
43	(65)	Financial services	52
44	(66)	Insurance and pension funding services	53

Continued

Table 11.N.A1 A Standard Sectoral Breakdown of an I-O table in "ESA"-Format: Croatia, Latvia, the Slovak Republic, Slovenia and Romania (Contd)

National Classification			GTAP Sector Number
45	(67)	Services auxiliary to financial services	52
46	(70)	Real estate services	54
47	(71)	Renting services of machinery	54
48	(72)	Computer and related services	54
49	(73)	Research and development services	54
50	(74)	Other business services	54
51	(75)	Public administration services	56
52	(80)	Education services	56
53	(85)	Health services	56
54	(90)	Sewage and refuse disposal services	56
55	(91)	Membership organization services	56
56	(92)	Recreational, cultural and sporting services	55
57	(93)	Other services	55

* Denotes sectors which had to be split between the GTAP categories.

Table 11.N.A2 Breakdown of the Original I-O Table of the Czech Republic

National Classification		GTAP Sectors	
A1	Products of agriculture and hunting	Agriculture and hunting products	1-12
A2	Products of forestry and logging	Forestry products	13
B	Fish and other fishing products	Fishing products	14
CA	Energy-producing raw materials	Energy	16-17
CB	Metal ores and other mining and quarrying products	Meat products nec	18
DA	Food products, beverages and tobacco	Food products, beverages and tobacco	19-26
DB	Textile and textile products	Textile and textile products	27-28
DC	Leather and leather products	Leather products	29
DD	Wood and wood products	Wood products	30
DE	Pulp, paper and paper products, recording media, printing services	Paper products, publishing	31
DF	Coke, refined petroleum products and nuclear fuel	Petroleum, coal products	32
DG	Chemicals, chemical products and man-made fibers	Chemical, rubber, plastic products	33
DH	Rubber and plastic products	Chemical, rubber, plastic products	33
DI	Other non-metallic mineral products	Mineral products nec	34
DJ	Basic metals and fabricated metal products	Basic metals and fabricated metal products	35-37
DK	Machinery and equipment nec	Machinery and equipment nec	41
DL	Electrical and optical equipment	Machinery and equipment nec	41
DM	Transport equipment	Transport equipment	39-40
DN	Furniture; other manufactured goods nec	Manufactures nec	42
E	Electrical energy, gas, steam and hot water	Electrical energy, gas, steam and hot water	43-45
F	Construction work	Construction	46
G	Whole sale and retail trade services, repairs of motor vehicles, etc.	Trade	47
H	Hotel and restaurant services	Trade	47
I	Transport, storage and communication services	Transport, storage and communication services	48-51
J1	Financial intermediation incl. insurance	Financial intermediation incl. insurance	52-53
K	Real estate, renting and business services	Business services nec	54
L-Q	Other services	Other services	55-56

Table 11.N.A3 Breakdown of the Original I-O Table of Estonia

National Classification		GTAP Sectors	
(1)	Products of agriculture and forestry	Products of agriculture and forestry	1-13
(2)	Fishing products	Fishing	14
(3)	Products from mining and quarrying	Products from mining and quarrying	15-18
(4)	Manufactured products	Manufactured products	19-42
(5)	Electricity, gas, steam and hot water	Electricity, gas, steam and hot water	43-45
(6)	Construction work	Construction	46
(7)	Wholesale and retail trade services; repair services of motor vehicles, motorcycles and personal and household goods	Trade	47
(8)	Hotel and restaurant services	Trade	47
(9)	Transport, storage and communication services	Transport, storage and communication services	48-51
(10)	Financial intermediation services	Financial services nec	52
(11)	Real estate, renting and business services	Real estate, renting and business services	53-54
(12)	Public administration, defense and social security services	Public Admin, Defense, Education, Health	56
(13)	Educational services	Public Admin, Defense, Education, Health	56
(14)	Health and social services	Public Admin, Defense, Education, Health	56
(15)	Other community, social and personal services	Recreational and other services	55

Table 11.N.A4 Breakdown of the Original I-O Table of Malta

National Classification		GTAP Sectors	
1	Agriculture and fisheries	Agriculture and Fisheries	1-14
2	Mining and quarrying	Mining and Quarrying	15-18
3	Food	Food	19-25
4	Beverages	Beverages and Tobacco Products	26
5	Tobacco	Beverages and Tobacco Products	26
6	Textiles	Textiles	27
7	Footwear	Leather Products	29
8	Wearing apparel	Wearing Apparel	28
9	Furniture and fittings	Manufactures nec	42
10	Printing	Paper Products, Publishing	31
11	Leather	Leather Products	29
12	Chemicals	Chemical industries	32-33
13	Non-metallic Minerals	Non-metallic Minerals	34
14	Metals	Metals	35-37
15	Machinery	Machinery	38,40-41
16	Rubber, transport and shipyards	Transport Equipment nec	39
17	Miscellaneous	Manufactures nec	42
18	Construction	Construction	18
19	Gas	Gas Manufacture, distribution	44
20	Electricity	Electricity	43
21	Water	Water	45
22	Services to Tourism	Transport nec	48
23	Trade & Services	Trade & Services	47,49-56
24	Other industries	Manufactures nec	42

Table 11.N.A5 Breakdown of the Original I-O Table of Cyprus

National Classification		GTAP Sectors	
(1)	Agriculture and hunting	Agriculture and hunting	1-12
(2)	Forestry and logging	Forestry	13
(3)	Fishing	Fishing	14
(4)	Metal ore mining	Minerals nec	18
(5)	Other mining	Other mining	15-16
(6)	Food, beverages and tobacco	Food, beverages and tobacco	19-26
(7)	Textile, wearing apparel and leather industries	Textiles, wearing apparel, and leather industries	27-29
(8)	Wood and wood products	Wood Products	30
(9)	Paper and paper products, publishing	Paper Products, Publishing	31
(10)	Chemical industries	Chemical industries	32-33
(11)	Non-metallic mineral products	Non-metallic minerals	34
(12)	Metal products, machinery and trans. equipment	Metal products, machinery and trans. Equipment	35-41
(13)	Other manufacturing	Manufactures nec	42
(14)	Electricity	Electricity	43
(15)	Gas	Gas Manufacture, distribution	44
(16)	Water works and supply	Water	45
(17)	Construction	Construction	46
(18)	Wholesale and retail trade	Trade	47
(19)	Restaurants and hotels	Trade	47
(20)	Transport and storage	Transport and storage	48-50
(21)	Communication	Communication	51
(22)	Financial institutions	Financial services nec	52
(23)	Insurance	Insurance	53
(24)	Owner occupied dwellings	Dwellings	58
(25)	Other real estate	Business services nec	54
(26)	Business services	Business services nec	54
(27)	Sanitary and similar services	Public Admin, Defense, Education, Health	56
(28)	Social and related services	Public Admin, Defense, Education, Health	56
(29)	Recreational and cultural services	Recreational and other services	55
(30)	Personal and household services	Recreational and other services	55
(31)	Public administration and defense	Public Admin, Defense, Education, Health	56
(32)	Public services	Public Admin, Defense, Education, Health	56
(33)	Other products (non-profit)	Recreational and other services	55

Table 11.N.A6 Mapping between SPEL/CEEC Activities and the GTAP Classification

GTAP Sectors		SPEL Activities
1	Paddy Rice	Paddy rice
2	Wheat	Soft wheat, durum wheat
3	Cereal grains nec	Rye and meslin, barley, oats, maize, other cereals
4	Vegetables, fruits, nuts	Potato, cauliflower, tomato, other vegetables, apple, pears and peaches, other fruits, citrus fruits
5	Oilseeds	Rape and turnip seed, sunflower seed, soy beans, olives for oil, other oilseeds
6	Sugar cane, sugar beet	Sugar beets
7	Plant-based fibers	Flax and hemp
8	Crops nec	Pulses, tobacco non-manufactured other industrial crops, table grapes, table olives, table wine, other wine nursery plants, flowers, ornamental plants, other final crop products
9	Bovine cattle, sheep and goats, horses	Male adult cattle for fattening, calves for fattening, calves, rearing, heifers, sheep and goats for fattening
10	Animal products nec	Pigs for fattening, pig breeding, laying hens, poultry for fattening, other animals
11	Raw milk	Dairy cows, other cows
12	Wool, silk-worm cocoons	Ewes and goats

Table 11.N.A7 Mapping between SPEL/CEEC Inputs and the GTAP Classification

GTAP Sectors		SPEL/CEEC Inputs
1-12	Agriculture	Seed and feed
13	Forestry	Variable and overheads other inputs
14	Fishing	Variable and overheads other inputs
15	Coal	Variable and overheads energy
16	Oil	Variable and overheads energy
17	Gas	Variable and overheads energy
18	Minerals nec	Variable and overheads energy
19	Bovine cattle/sheep/goats/horse meat	Total fodder input
20	Meat products nec	Total fodder input
21	Vegetable oils and fats	Fodder: other
22	Dairy products	Fodder: milk
23	Processed rice	Fodder: cereal
24	Sugar	Total fodder input
25	Food products nec	Total fodder input
26	Beverages and tobacco products	Variable and overheads other inputs
27	Textiles	Variable and overheads other inputs
28	Wearing apparel	Variable and overheads other inputs
29	Leather products	Variable and overheads other inputs
30	Wood products	Variable and overheads repairs
31	Paper products, publishing	Variable and overheads other inputs
32	Petroleum, coal products	Variable and overheads energy
33	Chemical, rubber, plastic products	Mineral Fertilizer and plant protection
34	Mineral products nec	Mineral Fertilizer and plant protection
35	Ferrous metals	Variable and overheads repairs
36	Metals nec	Variable and overheads repairs
37	Metal products	Variable and overheads repairs
38	Motor vehicles and parts	Variable and overheads repairs
39	Transport equipment nec	Variable and overheads repairs
40	Electronic equipment	Variable and overheads repairs
41	Machinery and equipment nec	Variable and overheads repairs
42	Manufactures nec	Variable and overheads other inputs
43	Electricity	Variable and overheads energy
44	Gas manufacture, distribution	Variable and overheads energy
45	Water	Variable and overheads water
46	Construction	Variable and overheads repairs
47	Trade	Variable and overheads other inputs
48	Transport nec	Variable and overheads other inputs
49	Water transport	Variable and overheads other inputs
50	Air transport	Variable and overheads other inputs
51	Communication	Variable and overheads other inputs
52	Financial services nec	Variable and overheads other inputs
53	Insurance	Variable and overheads other inputs
54	Business services nec	Variable and overheads other inputs
55	Recreational and other services	Variable and overheads other inputs
56	Public administration, defense, education, health	Pharmaceutical inputs
57	Dwellings	Variable and overheads other inputs

Table 11.N.A8 Aggregation of Countries for the CEEC Trade Data

GTAP 5 and some component regions		Regions for the CEEC-GTAP Data Base
AUS	Australia	Australia
NZL	New Zealand	New Zealand
CHN	China	China + Hong Kong
HKG	Hong Kong	China + Hong Kong
JPN	Japan	Japan
KOR	Korea, Republic of	Rest of Asia
TWN	Taiwan	Rest of Asia
IDN	Indonesia	Rest of Asia
MYS	Malaysia	Rest of Asia
PHL	Philippines	Rest of Asia
SGP	Singapore	Rest of Asia
THA	Thailand	Rest of Asia
VNM	Viet Nam	Rest of Asia
BGD	Bangladesh	Rest of Asia
IND	India	India
LKA	Sri Lanka	Rest of Asia
XSA	Rest of South Asia	Rest of Asia
CAN	Canada	Canada
USA	United States	United States
MEX	Mexico	Mexico
XCM	Central America and Caribbean	Central America
COL	Colombia	Rest of South America
PER	Peru	Rest of South America
VEN	Venezuela	Rest of South America
XAP	Rest of Andean Pact	Rest of South America
ARG	Argentina	MERCOSUR
BRA	Brazil	MERCOSUR
CHL	Chile	Rest of South America
URY	Uruguay	MERCOSUR
XSM	Rest of South America	Rest of South America
	Paraguay	MERCOSUR
AUT	Austria	Austria
DNK	Denmark	Denmark
FIN	Finland	Finland
FRA	France	France
DEU	Germany	Germany
GBR	United Kingdom	United Kingdom
GRC	Greece	Greece
IRL	Ireland	Ireland
ITA	Italy	Italy
NLD	Netherlands	Netherlands
PRT	Portugal	Portugal
ESP	Spain	Spain
SWE	Sweden	Sweden
XBL	Belgium and Luxembourg	Belgium and Luxembourg

Continued

Table 11.N.A8 Aggregation of Countries for the CEEC Trade Data (Contd)

GTAP 5 and some component regions		Regions for the CEEC-GTAP Data Base
CHE	Switzerland	EFTA
XEF	Rest of EFTA	EFTA
HUN	Hungary	Hungary
POL	Poland	Poland
XCE	Rest of Central European Associates	
	Bulgaria	Bulgaria
	Czech Republic	Czech Republic
	Romania	Romania
	Slovakia	Slovak Republic
	Slovenia	Slovenia
XSU	Former Soviet Union	Former Soviet Union
	Estonia	Estonia
	Latvia	Latvia
	Lithuania	Lithuania
TUR	Turkey	Turkey
XME	Rest of Middle East	Rest of the world
	Israel	Israel
	Jordan	Jordan
	Lebanon	Lebanon
	Palestine	Palestine
	Syria	Syria
MAR	Morocco	Morocco
XNF	Rest of North Africa	
	Algeria	Algeria
	Egypt	Egypt
	Libya	Libya
	Tunisia	Tunisia
BWA	Botswana	Rest of world
XSC	Rest of SACU	Rest of world
	Republic of South Africa	Republic of South Africa
MWI	Malawi	Rest of world
MOZ	Mozambique	Rest of world
TZA	Tanzania, United Republic of	Rest of world
ZMB	Zambia	Rest of world
ZWE	Zimbabwe	Rest of world
XSF	Rest of Southern Africa	Rest of world
UGA	Uganda	Rest of world
XSS	Rest of Sub-Saharan Africa	Rest of world
XRW	Rest of world	Rest of world
	Croatia	Croatia
	Cyprus	Cyprus
	Malta	Malta

Appendix 2

Lithuania

For Lithuania, neither an I-O table nor a Use and Supply Table has been published at the time of this study. However, national account statistics for 1997 for sectoral output and sectoral value-added were published. These data were used to compile a preliminary I-O table for Lithuania for 1997 by using the structure of the Latvian I-O table in GTAP format. The agricultural production and the production of the food processing industries were split according to the Lithuanian reports by Natalija Kazlauskiene and William H. Meyers of the "Network of Independent Agricultural Experts in the CEEC Candidate Countries."

Bulgaria[8]

The complete information on input-output tables, trade flows, and institutional accounts in this data base originates from data provided by the National Statistical Institute of Bulgaria (NSI). All this information can be found in the various publications of the NSI and - in part - on the internet at: www.nsi.bg. The organization and labeling of the input-output data follows Table 1 in Huff et al. (1999). Only AI15 ("Employment of land by industry") is not included since there is no reliable information on the return to land available.

The sectoral classification follows the GTAP standard GSC2 as closely as possible. In general, the aggregation of the available data is comparable to the one required by GSC2. However, there are two differences: first, "Dwellings" (GSC2 57) are not reported in the original data. Second, information about the technology used for the production of the first 12 agricultural goods in GSC2 is not separately available by commodity. Instead, input-output data for Bulgaria only shows the technology for two aggregates, "plant growing" and "livestock breeding." However, additional information reporting the production of each of the 12 GSC2 commodities is available. Therefore, with the assumption of constant technologies in all land-growing activities and animal-breeding activities, we used the share of each of the 12 GSC2 commodities in either "plant growing" or "animal breeding" to dis-aggregate these two composites into the 12 GSC2 commodities.

The matrix AI07 (Government Consumption of Domestic Products) includes "General Government Collective Final Consumption Expenditure" and "General Government Individual Final Consumption Expenditure." The difference is that for three products—"Trade," "Recreational and other Services" and "Public Administration and Defense, Education and Health"—the government provides public goods and services, which are consumed by individual households, but financed by the government. Therefore, total government expenditure is the sum of both. Consequently, household consumption (AI05 and AI06) is given on an expenditure basis.

[8] The Bulgarian data set was compiled by Ferdinand Pavel (Centre for World Food Studies; Free University of Amsterdam, The Netherlands), Todor Todorov (National Accounts Division; National Statistical Institute of Bulgaria), Julia Georgieva Kirilova, Milen Petrov Kolev, Antoaneta Petrova Christova, Ilona Pankova Novanska, Tanja Lazarova Abazova, Valja Radneva Georgieva, Veselin Kolev Uzunov (all Input-Output Sector; National Statistical Institute of Bulgaria).