16.4 Central European Associates and Former Soviet Union

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(Editor's note) At the time this work was undertaken there was tremendous interest in the question of Central and Eastern European accession to the EU. Unfortunately, give the state of disarray in the region, it was not possible to identify in-country collaborators to develop IO tables for these countries. Professor Thomas Wahl of Washington State University volunteered to supply this information, based on data he had obtained from the World Bank.

As the reader can see this information is often quite old, and insufficiently disaggregated. The authors' data disaggregation strategy, which followed advice from the Center for Global Trade Analysis, gave unsatisfactory results for many sectors. Since the problems encountered were extensive rather than local, Center staff undertook a complete revision of the contributed tables before undertaking the standard updates and adjustments. This revision removed the major perceived problems, but also weakened the connection with the source input-output statistics, which is therefore less strong for these than for other regions (section 16.4.6).

As with other regions, the tables have been updated and adjusted (Chapter 19) to reflect observed, 1992 macroeconomic, trade and protection data (Chapters 11 - 15).

16.4.1 Czechoslovakia

Commodities:	42
Industries:	42
Reference Year:	1987
Source:	World Bank
Currency:	10 thousand US dollars.

This table is from World Bank. The original table has 42 sectors and when aggregated into GTAP categories, we got 24 sectors, therefore further disaggregation is needed. We need to disaggregate agriculture into pdr, wht, gro, ngc, wol, olp and fsh; disaggregate coal, pet, gas into col, oil, gas; disaggregate food into pcr, met, mil, ofp, b_t; disaggregate p_c from crp, trn from omf and dwe from cns. Most of the disaggregation is done by using Korea's input-output table (1985), from "Early Stage Processing of International Trade and Input-Output Data for Salter" by John Hambley (Salter working paper No. 15).

What we did is as follows:
1. For agriculture, all sectors except pdr are disaggregated according to the following formula. Pdr production is zero in Czech.

$$T^p = \sum_{i=1}^{6} \sum_{j=1}^{6} X_{ij}^p$$

where T^p is the preliminary total and X_{ij}^p is the preliminary flow of input-output, calculated by the formula

$$X_{ij}^p = a_{ij} \times VTO$$

where a_{ij} are Korean's technical coefficients and VTO is the value of total output for the 6 sectors in Czechoslovakia in 1987 (output obtained from USDA file called PSD, price in US$ is obtained from United Nations' "Prices of Agricultural Products and Selected Inputs in Europe and North America 1990/1991)". VTO of the 6 commodities are as follows: wht=209508, gro=215640, ngc=110395, wol=2354, olp=1111795, fsh=9016.
Now,

$$X_{ij}^f = \frac{\text{Total value of agriculture in Czech's I/O}}{T^p}$$

where X_{ij}^f is the final flows in agricultural sectors.

2. For all other sectors that needed to be disaggregated, we just simply use the Korean proportion and multiply by the total value in Czech's I/O. For example, for trn , we will disaggregate it from omf under forestry. Therefore we have,

	forestry
trn	0.9924 * 4056 = 4025
omf	0.0076 * 4056 = 31

where 0.9924 and 0.0076 are Korean's proportions, and 4056 is the total value under forestry for omf.

3. For some sectors, we were unable to get information from the Korean table, for example, col, oil and gas. We then disaggregated those sectors according to Czech's production proportions of col, oil, gas of 1987.

4. For cns and dwe, we just arbitrarily disaggregated them in order to balance the total sales and total costs of dwe.

5. For imports, we have a row vector. However, we got the import column vector through the United Nations publication Supplement to the "World Trade Annual, Volume 1, 1987". In this way, we can get domestic transactions by subtracting import from total use matrix.

6. We left the row vector for taxes and subsidies which could not be disaggregated.

GTAP-Czech I/O Concordance

GTAP Sector	Czech I/O Sector
1. pdr	1 *Agriculture
2. wht	1 *Agriculture
3. gro	1 *Agriculture
4. ngc	1 *Agriculture
5. wol	1 *Agriculture
6. olp	1 *Agriculture
7. for	2 Forestry
8. fsh	1 *Agriculture
9. col	4 *Coal, Pet, Gas
10. oil	4 *Coal, Pet, Gas
11. gas	4 *Coal, Pet, Gas
12. omn	24 Geological Act

13. pcr	20 *Food Products(Except Frozen)
	21 *Frozen and Tobacco Prod
14. met	20 *Food Products(Except Frozen)
	21 *Frozen and Tobacco Prod
15. mil	20 *Food Products(Except Frozen)
	21 *Frozen and Tobacco Prod
16. ofp	20 *Food Products(Except Frozen)
	21 *Frozen and Tobacco Prod
17. b_t	20 *Food Products(Except Frozen)
	21 *Frozen and Tobacco Prod
18. tex	16 Textiles
19. wap	17 Wearing Apparel
20. lea	18 Prod of Fur \& Leather, Footwear
21. lum	12 Products of Wood, Furniture
22. ppp	14 Paper & Paper Prod
	19 Printing \& Publishing
23. p_c	8 *Chem & Rubber Prod
24. crp	8 *Chem & Rubber Prod
25. nmm	15 Glass and Ceramic Prod
26. i_s	6 Iron & Steel
27. nfm	7 Non-ferrous Metals
28. fmp	13 Other Metal Prod
29. trn	22 *Other Indus Products
30. ome	9 Mach & Equip
	10 Elec Mach
31. omf	22 *Other Indus Products
32. egw	3 Water
	5 Elec, Hot Water, Steam
33. cns	11 *BLDG Mat
	23 *Construction
34. t_t	26 Transport
	27 Post And Telecommunication
	28 Trade(Home And Foreign), Restaurants
	29 Wholesale For Industry
	30 Wholesale For Agri Raw Prod
35. osp	31 Real Estate Ac
	32 Hotels And Accommodation
	33 Travel Agencies Ac
	34 Pers Serv, Urban Public Util

	38	Business & Other Mart Serv
	41	Finance & Insurance
	42	Membership Organiz & Sport Act
36. osg	35	Education
	36	Cultural Ac
	37	Health & Social Work
	39	Public Administration
	40	R&D
37. dwe	11	*BLDG Mat
	23	*Construction

PRIMARY FACTOR CATEGORIES
Imports
Employees Income
Depreciation
Property Income
Taxes and Subsidies

FINAL DEMAND CATEGORIES
Private Consumption
Government
Capital Formation
Stock
Exports

16.4.2 Hungary

Commodities:	21
Industries:	21
Reference Year:	1989
Source:	World Bank, National Planning Office
Currency:	10 thousand US dollars.

The table is from the World Bank. The original table has 21 sectors and when aggregated to the GTAP categories, we only got 14 sectors, therefore further disaggregation is
needed. We need to disaggregate agriculture into pdr, wht, gro, ngc, wol, olp and fsh; disaggregate mining into col, oil, gas and omn; disaggregate food into pcr, met, mil, ofp, b_t; disaggregate light

industry into tex, wap, lea, lum, ppp and nmm; disaggregate chemical industry into p_c and crp; disaggregate metallurgy into i_s and nfm; disaggregate machinery into fmp and ome; disaggregate other industries into trn and omf; and disaggregate dwe from cns. Fortunately, we have Hungary 1968 I/O table from a German publication by Jozsef Fay and Gerhard Fink. The table has some detailed information on mining, col, mil, b_t, the light industry, the chemical industry, and metallurgy. Thus, we disaggregated all those sectors using the 1968 proportions. For the rest of the disaggregation, we mainly based on the Korean I/O table (1985).

What we did is as follows:

1. For agriculture, all sectors are disaggregated according to the following formula.

$$T^p = \sum_{i=1}^{7} \sum_{j=1}^{7} X_{ij}^p$$

where T^p is the preliminary total and X_{ij}^p is the preliminary flow of input-output, calculated by the formula

$$X_{ij}^p = a_{ij} \times VTO$$

where a_{ij} are Korean's technical coefficients and VTO is the value of total output for the 7 sectors in Hungary in 1989 (output obtained from USDA file called PSD, price in US$ is obtained from United Nations' "Prices of Agricultural Products and Selected Inputs in Europe and North America 1990/1991"). VTO of the 7 commodities are as follows: pdr=39, wht=9303, gro=13667, ngc=10331, wol=152, olp=25385, fsh=625.
Now,

$$X_{ij}^f = \frac{\text{Total value of agriculture in Hungarys' I/O}}{T^p}$$

where X_{ij}^f is the final flows in agricultural sectors.

2. For all other sectors that needed to be disaggregated, we just simply use the Korean proportion and multiply by the total value in Hungary's I/O. For example, for trn , we will disaggregate it from omf under forestry. Therefore we have,

	forestry
trn	0.9924 * 30 = 29.8

omf 0.0076 * 30 = 0.2

where 0.9924 and 0.0076 are Korean's proportions, and 30 is the total value under forestry for omf.

3. For some sectors, we were unable to get information from the Korean table, for example, col, oil, gas and omn. We then disaggregated those sectors according to Hungary's production proportions of col, oil, gas and omn of 1989.

4. For cns and dwe, we just arbitrarily disaggregated them in order to balance the total sales and total costs of dwe.

5. For imports, we have a row vector. However, we got the import column vector through the United Nations publication "Supplement to the World Trade Annual, Volume 1, 1989". In this way, we can get domestic transactions by subtracting import from total use matrix.

6. We have a row vector for taxes and subsidies and have no idea right now of how to disaggregate.

GTAP-Hungary I/O Concordance

GTAP Sector	Hungary I/O Sector
1. pdr	12 *Agriculture
2. wht	12 *Agriculture
3. gro	12 *Agriculture
4. ngc	12 *Agriculture
5. wol	12 *Agriculture
6. olp	12 *Agriculture
7. for	13 Forestry
8. fsh	12 *Agriculture
9. col	1 *mining
10. oil	1 *mining
11. gas	1 *mining
12. omn	1 *mining
13. pcr	9 *Food Industries
14. met	9 *Food Industries
15. mil	9 *Food Industries
16. ofp	9 *Food Industries
17. b_t	9 *Food Industries
18. tex	7 *Light Industry
19. wap	7 *Light Industry

20. lea	7 *Light Industry
21. lum	7 *Light Industry
22. ppp	7 *Light Industry
23. p_c	6 *Chemical Industry
24. crp	6 *Chemical Industry
25. nmm	7 *Light Industry
26. i_s	3 *Metallurgy
27. nfm	3 *Metallurgy
28. fmp	4 *Machinery
29. trn	8 *Other Industries
30. ome	4 *Machinery
31. omf	8 *Other Industries
32. egw	2 Electricity
	18 Water Economy
33. cns	5 *Building Materials
	11 *Construction
34. t_t	14 Transport
	16 Domestic Trade
	17 Foreign Trade
35. osp	19 Other Material Services
	21 Personal and Economic Services
36. osg	22 Health, Social, Cultural Services
	23 Public Services
37. dwe	5 *Building materials
	11 *Construction

PRIMARY FACTOR CATEGORIES
Imports
Depreciation
Taxes and Subsidies
Net National Product

FINAL DEMAND CATEGORIES
Private Consumption
Government
Investments
Increase in Stocks
Exports

16.4.3 Poland

Commodities: 38
Industries: 38
Reference Year: 1988
Source: World Bank
Currency: 10 thousand US dollars.

The table is from World Bank. The original table has 38 sectors and when aggregated into GTAP categories, we got only 24 sectors, therefore further disaggregation is needed. We need to disaggregate agriculture into pdr, wht, gro, ngc, wol, olp and fsh; disaggregate fuel into oil, gas and omn; disaggregate food into pcr, met, mil, ofp, b_t; disaggregate p_c from crp and dwe from cns. Most of the disaggregation is done by using Korea's input-output table (1985).

What we did is as follows:

1. For agriculture, all sectors except pdr are disaggregated according to the following formula. Pdr production is zero in Poland.

$$T^p = \sum_{i=1}^{6} \sum_{j=1}^{6} X_{ij}^p$$

where T^p is the preliminary total and X_{ij}^p is the preliminary flow of input-output, calculated by the formula

$$X_{ij}^p = a_{ij} \times VTO$$

where a_{ij} are Korean's technical coefficients and VTO is the value of total output for the 6 sectors in Poland in 1988 (output obtained from USDA file called PSD, price in US$ is obtained from United Nations' "Prices of Agricultural Products and Selected Inputs in Europe and North America 1990/1991"). VTO of the 6 commodities are as follows: wht=314735, gro=644787, ngc=657631, wol=5313, olp=2274596, fsh=249186.
Now,

$$X_{ij}^f = \frac{\text{Total value of agriculture in Poland's I/O}}{T^p}$$

where X_{ij}^{f} is the final flows in agricultural sectors.
2. For all other sectors that needed to be disaggregated, we just simply use the Korean proportion and multiply by the total value in Poland's I/O.

3. For some sectors, we were unable to get information from the Korean table, for example, oil, gas and omn. We then disaggregated those sectors according to Poland's production proportions of oil, gas and omn of 1988.

4. For cns and dwe, we just arbitrarily disaggregated them in order to balance the total sales and total costs of dwe.

5. We have a row vector for taxes and subsidies which could not be disaggregated.

GTAP-Poland I/O Concordance

GTAP Sector	Poland I/O Sector
1. pdr	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
2. wht	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
3. gro	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
4. ngc	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
5. wol	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
6. olp	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
7. for	33 Forestry
8. fsh	30 *Vegetable Products
	31 *Animal Products
	32 *Agricultural Services
9. col	1 Coal

10. oil	2	*Fuel
11. gas	2	*Fuel
12. omn	2	*Fuel
13. pcr	21	*Animal Prdcts Processing
	22	*Veget. Prdcts Processing
14. met	21	*Animal Prdcts Processing
	22	*Veget. Prdcts Processing
15. mil	21	*Animal Prdcts Processing
	22	*Veget. Prdcts Processing
16. ofp	21	*Animal Prdcts Processing
	22	*Veget. Prdcts Processing
17. b_t	21	*Animal Prdcts Processing
	22	*Veget. Prdcts Processing
18. tex	18	Textiles
19. wap	19	Wearing Apparel
20. lea	20	Leather
21. lum	16	Wood
22. ppp	17	Paper
	24	Printing
23. p_c	11	*Heavy Chemicals
	12	*Light Chemicals
24. crp	11	*Heavy Chemicals
	12	*Light Chemicals
25. nmm	14	Glass
	15	Pottery, China
26. i_s	4	Ferrous Metallurgy
27. nfm	5	Non-ferrous Metallurgy
28. fmp	6	Metal Products
29. trn	9	Transport Equipment
30. ome	7	Engineering
	8	Precision Industry
	10	Electr. & el-engineering
31. omf	25	Other Ind. Branches
32. egw	3	Power
	23	Fodder and Utilit. Ind.
33. cns	13	*Building Materials
	26	*General Construction
	27	*Productions Construction
	28	*Special Construction

	29	*Other Construction
34. t_t	34	Transport
	35	Communication
	36	Trade
35. osp	37	Other Mater.
36. osg	38	Municipal Services
37. dwe	13	*Building Materials
	26	*General Construction
	27	*Productions Construction
	28	*Special Construction
	29	*Other Construction

PRIMARY FACTOR CATEGORIES
Imports
Depreciation
Wages
Profit1
Turnover Tax, Subsidies

FINAL DEMAND CATEGORIES
Private Consumption
Social Consumption
Gross Investments
Inventories
Export

16.4.4 Romania

Commodities:	36
Industries:	36
Reference Year:	1989
Source:	World Bank
Currency:	10 thousand US dollars.

The table is from World Bank. The original table has 36 sectors and when aggregated into GTAP categories, we got only 24 sectors, therefore further disaggregation is needed. We need to disaggregate agriculture into pdr, wht, gro, ngc, wol, olp and fsh; disaggregate food into pcr, met,

mil, ofp, b_t; disaggregate fmp from ome, trn from omf and dwe from cns. Most of the disaggregation is done by using Korea's input-output table (1985).

What we did is as follows:

1. For all sectors that needed to be disaggregated, we simply use the Korean proportion and multiply by the total value in Romania's I/O. We are not treating agriculture differently from the other three countries because we are unable to get the prices for agriculture products for Romania.

2. For cns and dwe, we arbitrarily disaggregated them in order to balance the total sales and total costs of dwe.

3. We don't have any information on taxes and subsidies on Romania, therefore, we just took the difference between total sales and total costs as taxes and subsidies, and entered the difference as a row vector.

GTAP-Romania I/O Concordance

GTAP Sector	Romania I/O Sector
1. pdr	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
2. wht	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
3. gro	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
4. ngc	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
5. wol	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
6. olp	27 *Vegetables
	28 *Animal Breeding
	29 *Agricultural Services
7. for	30 Forestry
8. fsh	27 *Vegetables

	28	*Animal Breeding
	29	*Agricultural Services
9. col	1	Extract & Prep of Coal
	15	Abrasive Material, coal, and Graphite
10. oil	2	Extract of Crude Oil and Related Gases
11. gas	3	Extract of Natural Gas
12. omn	4	Extract And Prep of Ferrous Metals
	5	Extract And Prep of Non-ferrous & Precious Metals
	6	Extract And Prep of Nonmetallic Deposits
	7	Extract And Prep of Constructed Materials
13. pcr	23	*Food Industry
14. met	23	*Food Industry
15. mil	23	*Food Industry
16. ofp	23	*Food Industry
17. b_t	23	*Food Industry
18. tex	19	Textile
19. wap	20	Clothing
20. lea	21	Leather, Fur And Shoes
21. lum	8	Wood And Reed
	17	Wood
22. ppp	18	Pulp And Paper
	24	Paper And Poligraphics
23. p_c	10	Chemical Coal
24. crp	14	Chemical Industry And Refineries
25. nmm	22	Glass, Porceline, And Tile Industry
26. i_s	11	Ferrous Metals
27. nfm	12	Non-ferrous Metals
28. fmp	13	*Construction of Machinery And Equip
29. trn	25	*Other Activities of Industrial Character
30. ome	13	*Construction of Machinery And Equip
31. omf	25	*Other Activities of Industrial Character
32. egw	9	Electric And Thermal Energy
33. cns	16	*Construction Materials
	26	*Construction
34. t_t	31	Transportation
	33	Distribution of Goods
35. osp	32	Telecommunication
	35	Tourism And Hotel Activities
36. osg	34	Scientific Research

	36	Publishing And Studio Film
37. dwe	16	*Construction Materials
	26	*Construction

PRIMARY FACTOR CATEGORIES
Imports
Depreciation
National Revenue

FINAL DEMAND CATEGORIES
Population Consumption
Fund Consumption of General Interest
Accumulation
Variation of Stocks
Export
Other Uses

16.4.5 Former Soviet Union

Commodities:	12
Industries:	12
Reference Year:	1989
Source:	World Bank
Currency:	millions of Roubles

The table is from the World Bank. The original table has only 12 sectors, therefore further disaggregation is needed. Fortunately, we had a detailed USSR 1966 I/O table from "Studies in Soviet Input-Output Analysis" edited by Vladimir G. Treml. In that table, it had 29 sectors. Therefore, we first disaggregated the 12 sectors of 1989 according to the 1966 table, and got 29 sectors. They are: crops, animal husbandry, for, fsh, col, oil, gas, omn, met, mil, food, tex, wap, lea, lum, ppp, p_c, crp, nmm, i_s, nfm, fmp, trn, ome, omf, egw, t_t, cns, and other branch. We then disaggregated crops into pdr, wht, gro, ngc; animal husbandry into wol, olp; food into pcr, ofp, b_t; other branch into osp, osg; and dwe from cns. Similar to the previous four countries, most of the disaggregation at this step is done by using Korea's input-output table (1985).

What we did is as follows:

16-4-16

1. For all sectors that needed to be disaggregated, we just simply use the Korean proportion and multiply by the total value in USSR's I/O.

2. For cns and dwe, we just arbitrarily disaggregated them in order to balance the total sales and total costs of dwe.

3. For imports, we got the import column vector through the United Nations publication "Supplement to the World Trade Annual, Volume 1, 1989". In this way, we can get domestic transactions by subtracting import from total use matrix.

4. We converted the Rouble into US$ using 1989 exchange rate: 1 Rouble = $1.588. Now the table is in million US$.

GTAP-USSR I/O Concordance

GTAP Sector	USSR I/O Sector
1. pdr	10 *Agric&for
2. wht	10 *Agric&for
3. gro	10 *Agric&for
4. ngc	10 *Agric&for
5. wol	10 *Agric&for
6. olp	10 *Agric&for
7. for	10 *Agric&for
8. fsh	10 *Agric&for
9. col	2 *Fuel
10. oil	2 *Fuel
11. gas	2 *Fuel
12. omn	2 *Fuel
13. pcr	8 *Food
14. met	8 *Food
15. mil	8 *Food
16. ofp	8 *Food
17. b_t	8 *Food
18. tex	7 *Light
19. wap	7 *Light
20. lea	7 *Light
21. lum	6 Wood & Constmat
22. ppp	7 *Light
23. p_c	4 *Chemicals

24. crp	4	*Chemicals
25. nmm	7	*Light
26. i_s	3	*Metallurgy
27. nfm	3	*Metallurgy
28. fmp	5	*MBMW& Ind. Nec.
29. trn	5	*MBMW& Ind. Nec.
30. ome	5	*MBMW& Ind. Nec.
31. omf	5	*MBMW& Ind. Nec.
32. egw	1	Power
33. cns	9	*Construction
34. t_t	11	T&T
35. osp	12	*Other
36. osg	12	*Other
37. dwe	9	*Construction

PRIMARY FACTOR CATEGORIES
Imports
Depreciation
Wages
Surplus Prod
National Income

FINAL DEMAND CATEGORIES
Consumption
Total FD

16.4.6 Post-construction processing

(Editor's note) As noted in the introduction to section 16.4, the disaggregation strategy described above gave unsatisfactory results for many sectors. In particular, highly abnormal cost structures were encountered, in all the tables covered in 16.4.1-5, for a wide range of industries. The abnormalities went beyond what could plausibly be attributed to the non-market economic institutions of these economies.

Since the problems spanned a wide range of industries, Center staff undertook an extensive revision of the tables. The effect of these revisions was to retain the final demand structure of the contributed tables — that is, the commodity composition of consumption, exports and investment— but to replace the industry cost structures. The new cost structures were taken from a *representative*

table synthesized from other contributed tables; in effect, they are cost structures averaged over many regions.

In conclusion, the GTAP cost structures for the CEA and FSU are not based on input-output statistics for those regions. There is an exception: the CEA cost structures do incorporate original cost data for Hungary (contributed by Martin Banse); but Hungary of course accounts for only a minor share of CEA economic activity. This should be borne in mind in any application of GTAP data for Eastern European issues.