Chapter 19

Updating and Adjusting the Regional Input-Output Tables

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Before incorporating the regional input-output (I-O) tables into the global database, we update them to the data base reference year, eliminate the use category "changes in stocks", and remove the discrepancies between them and the international data sets. This chapter explains how we do that.

19.1 Overview

A single procedure achieves all three objectives. Since the international data sets match the data base reference year, adjusting the I-O tables to the international data sets is a method of updating them. Eliminating changes in stocks is just one more I-O table adjustment, and can conveniently be handled in the same procedure.

In general, we adjust the regional I-O tables to match the international data sets, rather than the other way around. One reason for this is that, as just noted, the international data sets are more up-to-date. Also, the trade and energy data sets are subject to international balance conditions, which the regional I-O tables do not collectively satisfy. Nevertheless, for reasons discussed below, we do make some small adjustments to the energy data.

We call the adjustment procedure fitting the I-O tables, after the program FIT that implements it. FIT applies entropy-theoretic methods (see e.g., Kapur and Kesevan 1992) to adjust an I-O table to various external constraints derived from the international data sets. It was originally developed as part of the SALTER project at the (Australian) Industry Commission (James and McDougall 1993), and has since been extended and rewritten for GTAP.

We apply the fitting procedure after disaggregating the primary I-O tables (chapter 13) and constructing composite tables for the residual regions (chapter 14). The inputs into the procedure are a complete set of fully disaggregated regional I-O tables, and the international data sets listed above; the outputs are the fitted I-O tables and an adjusted energy volumes data set.

The following targets are applied:

— from constraints imposed by the GTAP data base structure: zero values for changes in stocks of domestic product and imports, by commodity;

— from the macroeconomic data set (chapter 18.A): values at purchasers' prices for aggregate private consumption, government consumption, and investment;

— from the trade data set (chapter 15, modified according to the energy data set, chapter 17): border values of exports and imports, by commodity;

— from the protection data set (chapter 16, modified and supplemented from the energy data set, chapter 17): import duty rates, by commodity; export subsidy rates, by commodity; non-commodity indirect tax rates, by industry; commodity tax rates on intermediate usage, by industry and commodity; and rates of tax on private consumption of energy, by commodity; and

— from the energy data set (chapter 17): basic values for intermediate usage of energy, by energy industry and energy commodity; basic values for private consumption of energy, by energy commodity (the energy industries and energy commodities are aggregations of standard GTAP sectors: see further chapter 17).

The FIT program incorporates an I-O quantity model, an I-O price model, and an entropy-theoretic balancing procedure. Broadly speaking, the I-O quantity model serves to remove changes in stocks and adjust exports, consumption, and investment. It feeds these final demand changes backward through the I-O structure to determine new levels for intermediate usage and primary factor employment. The I-O price model feeds tax rate changes forward through the I-O structure to adjust basic and post-tax prices for intermediate usage and final demands. The entropy procedure adjusts taste and technology variables to meet the import and energy usage targets.

As noted above, the general rule in the fitting procedure is to adjust the regional I-O tables to the international data sets, rather than the other way around. There are however some exceptions.

— We calculate target rates of tax on intermediate inputs into agriculture, based on the share of intermediate input subsidies in total domestic support, as given in the protection data set. But since the cost structures of the agricultural industries change during fitting, the domestic support shares in the fitted tables may differ from the target shares.

— In a very few cases, the target shares for domestic support are infeasible *ex ante*. This is liable to happen where the share of intermediate input subsidies in total domestic support is large, but the share of intermediate inputs in total costs is small. In such a case, the share target may imply negative post-subsidy costs for intermediate inputs. To avoid this we impose a ceiling on the subsidy rate of 90 per cent, that is, the subsidy may not exceed 90 per cent of the pre-subsidy cost.

— In a few cases, the energy targets prove infeasible. This is liable to happen where there is a relatively large energy usage target for a relatively small industry. Since we do not know in advance how large each industry will be after fitting, we cannot adjust the energy usage targets ex ante. Instead, we revise FIT so that it adjusts not only the energy use values in the regional I-O table, but also the energy use target from the energy data set. We set this up so that where possible, most of the adjustment is to the regional I-O

table, but where necessary, large adjustments are made to the targets. We make the adjustment by reallocating the energy usage targets across demand categories in such a way that the overall usage target within each region is unchanged.

19.2 Deviations from Targets for Intermediate Input Assistance to Agriculture

As noted above, we expect the fitted tables to show some deviations from the targets for domestic support for agriculture. From the protection data set we have a target level of domestic support for each agricultural industry, expressed as a fraction of the market value of industry output. This domestic support is provided through various instruments, including subsidies on intermediate inputs. For each instrument we have a target share in total domestic support. Putting these together, we have in effect a target level of support for each instrument, expressed as the ratio of the subsidy payment to the market value of output.

Some issues of interpretation and reconciliation need to be addressed in applying the intermediate input subsidy targets to the I-O tables. Not all taxes or subsidies on intermediate inputs into agriculture need be interpreted as (negative or positive) support for agriculture; some may better be interpreted as support for the industry that produces the inputs, or as general government revenue raising measures. Also, besides the agricultural support targets, we have (from the energy module) target powers of taxes on energy inputs into agriculture. Our current stance is not to count taxes on energy inputs as (negative) domestic support to agriculture, but to count taxes and subsidies on all other intermediate inputs.

To ensure that the targets for the intermediate input subsidy payment ratios are truly met, it would be necessary to define the ratios as variables in the FIT program. We do not do this, but simply calculate shocks to the ordinary variables for powers of commodity taxes. In calculating these shocks, we bear in mind that the output and intermediate input subsidies themselves affect the market value of output. This leads us into a little algebra.

For any agricultural sector in any region, we may express the market value (MVO) of output as the sum of the user cost of unsubsidized inputs (UCUI) and the user cost of subsidized inputs (UCSI), less the output subsidy (OS):

$$MVO = UCUI + UCSI - OS$$

For present purposes, unsubsidized inputs are primary factors and energy commodities, and subsidized inputs are all non-energy intermediate inputs. Now the user cost of subsidized inputs is equal to the market value of subsidized inputs (MVSI) less input subsidy (IS):

$$UCSI = MVSI - IS$$

Output subsidy is equal to the product of the market value of output and the output-subsidy-to-output ratio (OSOR):

$$OS = OSOR \times MVO$$

Likewise, input subsidy is equal to the product of the market value of output and the input-subsidy-to-output ratio (ISOR):

$$IS = ISOR \times MVO$$

Combining these relations, and solving for the market value of output, we obtain

$$MVO = (UCUI + MVSI) / (1 + ISOR + OSOR)$$

Then the input subsidy rate (ISR) is equal to the ratio of the input subsidy to the market value of subsidized inputs:

$$\begin{aligned} ISR &= IS / MVSI = ISOR \times MVO/MVSI \\ &= ISOR \times (UCUI + MVSI) / [(1 + ISOR + OSOR) \times MVSI] \end{aligned}$$

Then, assuming that the user cost of unsubsidized inputs (UCUI) and the market value of subsidized inputs (MVSI) are relatively stable within the FIT process, we calculate the input subsidy rate (ISR) from the initial levels of those data and from the targets for the subsidy-to-output ratios.

In practice, of course, the user cost of unsubsidized inputs and the market value of subsidized inputs change through the FIT process. But it is easy to see that this does not lead to error in the input-subsidy-to-output ratio unless there is a change in the ratio of the user cost of unsubsidized inputs and the market value of subsidized inputs. So, for instance, mere change in the scale of production, caused perhaps by an export shock, does not lead to error in the ratio. On the other hand, a change in the price of subsidized inputs, caused perhaps by an output subsidy on agricultural inputs, and unmatched by a proportional change in the price of unsubsidized inputs, does lead to error.

This procedure is new to the GTAP 6 data base; for GTAP 5, we used a simpler procedure, which did not take account of the effect of output subsidies or the intermediate input subsidies themselves on the market value of output.

Table 19.1 reports the largest deviations from target rates in the largest industries. These are much smaller than in GTAP 5, and, in general, involve either relatively small industries (such as Finnish "other crops", with output value of $0.6 billion) or small deviations (as with U.S. "other crops", with a deviation from target of 0.2 percentage points). Nevertheless, as in the Finnish "other crops" example, some cases involve large deviations in industries which if small are non-trivial. Large deviations in small industries are found in both directions: with the actual falling short of the target, as with Finnish "other crops" (target 23.2 per cent, actual 6.0), or exceeding the target, as with Belgian plant-based fibers (target 9.9 per cent, actual 18.9).

In these cases, we generally find that the composition of inputs into the industry has changed considerably in the fitting process. For example, in the Belgian plant-based fibers industry, the share

of non-energy intermediate inputs has increased greatly, driven by an increase in usage of imported plant-based fibers. This is forced on the I-O table by a high target for total imports of plant-based fibers; this forces large increases in usage in the few industries that do initially use considerable quantities of imported plant-based fibers; of these few industries, the plant-based fibers industry is one. In this case then, the deviation reflects less a weakness in the targeting procedure than poor agreement between the I-O and the trade data.

Table 19.1 Intermediate Input Support for Agriculture (Per cent of Market Value of Output)

Region	Industry	Output (US$ billion)	Target Rate	Actual Rate
Finland	Other crops	0.569	23.2	6.0
Rest of EFTA	Raw milk	0.394	21.8	14.3
Belgium	Plant-based fibres	0.183	9.9	18.9
Belgium	Oil seeds	0.062	25.3	42.4
USA	Other crops	30.522	3.7	3.9
Finland	Cattle, sheep, etc.	0.144	58.2	48.4
Greece	Wheat	0.156	2.3	4.6
Germany	Other crops	8.376	1.8	2.1
USA	Raw milk	24.936	4.1	4.3
Greece	Other grains	0.216	1.7	3.3

19.3 Adjustment of Targets for Energy Usage

Another area of difficulty involves the energy usage targets. As noted above, these are sometimes infeasible, when the targeted value of total energy usage exceeds industry total costs. Table 19.2 records the infeasible cases; as it shows, there were just seven of these. Some of these involve small industries in small countries; the most important relate to the iron and steel industry in Viet Nam, Bangladesh, and Peru. The emergence of these moderately significant infeasibilities is new relative to GTAP 5; it may reflect changes in the procedure for converting energy data from IEA to GTAP categories (chapter 17).

Table 19.2 Energy Target Infeasibilities (US$ million)

Region	Industry	Target Energy Cost	Actual Total Cost
Viet Nam	Iron and steel	118.8	113.2
Bangladesh	Iron and steel	96.6	30.8
Peru	Iron and steel	770.2	600.6
Albania	Other minerals	11.0	6.4
Malta	Non-ferrous metals	5.3	5.0
Madagascar	Iron and steel	1.6	0.8
Madagascar	Non-ferrous metals	1.3	0.2

Besides adjusting the energy usage targets where necessary, the FIT procedure aims to keep the adjustments small where possible. Nevertheless all the targets are subject to change to some

extent. These changes may be interpreted as a slight resistance to change in the energy use profile: the final profile depends mainly on the initial energy targets, but is also affected slightly by the initial profile.

Table 19.3 shows some of the larger changes made in cases where the initial targets are not infeasible. As it shows, they are not so large as to have a major effect on energy use profiles. Private consumption is heavily represented in the table, simply because it involves absolutely high usage levels. Of the listed adjustments, the largest in absolute terms is the $1.1 billion decrease in usage of petroleum products in the transport industry in the United States; the largest in relative terms is the 7 per cent decrease in usage of private consumption of gas in "Rest of Former Soviet Union". As noted above, these adjustments are balanced out within each region and energy commodity, so that total energy usage is not affected.

Table 19.3 Selected Adjustments to Feasible Energy Targets (US $billion)

Region	Commodity	Use	Initial	Final
Rest of FSU	Electricity	Private consumption	10.146	9.478
China	Petroleum products	Private consumption	8.539	8.032
Rest of FSU	Gas	Private consumption	3.734	3.459
United States	Petroleum products	Trade and transport	65.492	64.384
United States	Petroleum products	Other services	2.984	3.226
United States	Petroleum products	Private consumption	44.218	45.094
Russia	Electricity	Other services	2.989	3.203
Russia	Electricity	Private consumption	16.028	15.584
United States	Electricity	Chemicals, etc.	22.577	22.094

United States petroleum products usage provides a simple illustration of the workings of the target adjustment mechanism. From table 19.3, we observe a reallocation of target energy usage away from "trade and transport" to other major uses, including private consumption. The share of the transport industry in total electricity usage is higher in the targets than in the initial I-O table; the I-O table share shifts most of the way up toward the target share, but there is also a small adjustment in the target share down toward the initial I-O table share.

As we adjust the energy usage money value targets, we make matching adjustments in the energy volume data. The energy volume adjustments are proportional to the money value adjustments. Because the implicit energy prices are largely, but not entirely, uniform across use classes, the energy volume adjustments conserve totals over use classes approximately, but not exactly.

19.4 Comparison of Initial and Fitted I-O Tables

We now turn from adjustment of targets to examine the effects of the fitting procedure on the I-O tables. This is a large subject, covering a large number of cells in a large number of tables, almost a million cells in total. Obviously we need to be highly selective, to distill some insight without being overwhelmed by data.

To that end, we do not examine individual cells, but confine our examination to row and column totals. More specifically, we calculate totals for various use categories and input categories. The use categories include total costs for each industry, and total expenditure in each final demand category (fixed investment, private consumption, government consumption, and exports, but not inventory investment). The input categories include the market value of sales of each domestic commodity, the market value of sales of each imported commodity, and the market value of

$$D = \frac{1}{2} V \sum_i (F_i - U_u)(\log F_i - \log U_i)$$

employment of each primary factor (labor, capital, land). Since the market value of sales of each domestic commodity is equal to the total costs of the corresponding industry, the use categories and input categories overlap.

We combine the input and usage categories together in a hybrid input/use category collection, and calculate a total for the whole collection. We then calculate the share of each category in the collection total, and compare the shares from the fitted table with those from the unfitted. For each region, we compute an entropy-theoretic measure of change in the share structure:

where U_i denotes the share from the unfitted table, and F_i the share from the fitted table for category *i*. We do not attempt a full motivation for this measure here, but note some of its properties that make it suitable for this task: it is non-negative, zero only when the fitted and unfitted values agree, and a linear combination of non-negative category-specific terms $(F_i - U_i)(\log F_i - \log U_i)$ that are symmetric between F_i and U_i, linearly homogeneous in F_i and U_i together, and approximately quadratic in the relative difference between F_i and U_i. A measure of 0 indicates that the fitted and unfitted table have the same structure, a result of 0.01 indicates that category shares change by an average of approximately 1 per cent.

Table 19.4 records the results for each region. A high change measure indicates that the table had to change significantly in structure to accommodate the trade targets, energy usage targets, and so on from the international data sets. As the table shows, the largest changes tend to be found in small economies, such as Cyprus and Botswana, and composite regions, such as "Rest of the SADC" and "Rest of North America". At the other end of the range, we observe relatively small changes in the largest industrialized economies, including Japan, the United States, and the United Kingdom (all below 0.02).

As an indicator of discrepancies between the contributed I-O tables and the international data sets against which they are balanced, the results in table 19.4 are biased in favor of the regions subject to agricultural production targeting. As explained in chapter 12.C, to help preserve agricultural production levels in the fitting process, the process that applies the agricultural production targets also applies export targets; and these it applies not just to agriculture but to all sectors. Procedures intervening between the agricultural production targeting and the I-O table fitting may reintroduce some deviations from the export targets; so too may revisions to the trade data set made after the agricultural production targeting was complete. Nevertheless, for the regions subject to agricultural production targeting, most of the export profile revision is done before the fitting process, and is therefore not brought to account in table 19.4.

Table 19.4 Change in I-O Structure Under Fitting, by Region, Sorted by Magnitude of Change

Region	Change	Region	Change
Cyprus	0.71	Singapore	0.13
Malta	0.51	Albania	0.13
Botswana	0.47	Philippines	0.13
Madagascar	0.44	Greece	0.12
Rest of SADC	0.38	Rest of North Africa	0.12
Zambia	0.35	Latvia	0.12
RO North America	0.35	Rest of Caribbean	0.12
Bulgaria	0.32	Lithuania	0.11
Rest of Middle East	0.25	Rest of FSU	0.10
Luxembourg	0.21	Estonia	0.10
RO South America	0.21	Czech Republic	0.10
RO Southeast Asia	0.21	Rest of Andean Pact	0.09
Mozambique	0.19	Thailand	0.09
Viet Nam	0.18	Belgium	0.09
Malaysia	0.18	Denmark	0.09
Sri Lanka	0.18	Venezuela	0.09
Zimbabwe	0.18	Rest of East Asia	0.09
Ireland	0.17	Tunisia	0.08
Rest of EFTA	0.16	South Africa	0.08
Hong Kong	0.16	Uganda	0.08
Rest of SACU	0.16	Morocco	0.08
Malawi	0.16	Chile	0.08
Rest of Oceania	0.15	Uruguay	0.07
Tanzania	0.15	Indonesia	0.07
Central America	0.15	Croatia	0.07
RO S-Saharan Africa	0.14	Hungary	0.06
Rest of Europe	0.14	Sweden	0.06

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Table 19.4 Change in I-O Structure Under Fitting, by Region, Sorted by Magnitude of Change (Contd)

Region	Change	Region	Change
Bangladesh	0.06	Mexico	0.03
Slovakia	0.06	Finland	0.03
Rest of FTAA	0.06	Netherlands	0.03
Austria	0.06	New Zealand	0.03
Turkey	0.05	Argentina	0.02
Rest of South Asia	0.05	Italy	0.02
Portugal	0.05	Brazil	0.02
Germany	0.05	Spain	0.02
Switzerland	0.05	United Kingdom	0.02
Romania	0.05	Poland	0.02
France	0.04	Taiwan	0.02
Russia	0.04	Colombia	0.02
Slovenia	0.04	United States	0.02
Peru	0.04	Australia	0.01
Korea	0.04	Japan	0.01
India	0.03	Canada	0.01
China	0.03		

Table 19.5 provides summary statistics for each input or usage category: the number of regions where the category share increases, the number where it decreases, whether average category share increases or decreases, and the power of the increase or decrease. To save space, it omits categories with relatively small average changes.

The categories with the largest average changes include service, agricultural, and energy commodities. As the first row shows, there is a very large decrease in imports of "ownership of dwellings"; this reflects the assumption, imposed in constructing the services trade data set, that trade in this service is negligible. There are also large decreases in imports of several agricultural commodities, notably raw milk and sugar cane and beet; this may reflect differences in classification between some I-O tables and the merchandise trade data. In general, the results are quite similar to those obtained from GTAP 5. One category where results have changed noticeably is imported paddy rice. In GTAP 6, as in GTAP 5, there is an overall increase in fitting; but whereas in GTAP 5 it was only 82 per cent, in GTAP 6 it has climbed to 209 per cent.

Table 19.6 lists some of the major changes to individual I-O tables in the fitting procedure. Of the more than eleven thousand (region, category) pairs, we select those that make the largest contribution to the entropy distance measure discussed above, scaled by a measure of the size of the regional economy. This identifies large sectors in large regions with large relative changes. We comment on a few of the most significant changes; as will appear, these reflect partly general trends and partly case-specific factors.

Some of the regions most altered under fitting, as listed in table 19.4, do not appear in table 19.6, simply because of the small scale of their economy. In fact, the four most affected regions, Cyprus, Malta, Botswana, and Madagascar, together contribute just one entry to table 19.6 (Cyprus, exports).

Table 19.5 Changes Made in Fitting I-O Tables: Summary Statistics for Selected Categories

Category		Regions with:		Average Change	
Name	Type	Increase	Decrease	Direction	Factor
Dwellings	M	0	87	–	1000.90
Raw milk	M	50	37	–	42.01
Sugar cane	M	56	31	–	28.20
Construction	M	69	18	+	3.70
Paddy rice	M	55	32	+	3.09
Gas distribution	D	19	68	–	2.92
Oil seeds	M	63	24	+	2.56
Other business services	M	70	17	+	2.51
Insurance	M	71	16	+	2.47
Other transport	M	68	19	+	2.40
Fishing	M	49	38	–	2.26
Other financial services	M	66	21	+	1.98
Coal	D	22	65	–	1.95
Forestry	M	38	49	–	1.92
Air transport	M	64	23	+	1.90
Communication	M	61	26	+	1.79
Other transport equipt	M	55	32	+	1.71
Petroleum products	M	30	57	+	1.65
Other govt services	M	81	6	–	1.64
Cattle, sheep, etc.	M	39	48	–	1.61
Other grains	M	53	34	+	1.60
Other animal products	M	66	21	+	1.58
Water transport	M	58	29	+	1.57
Gas	M	32	55	–	1.56
Water transport	D	67	20	+	1.55
Vegetables, fruits	M	60	27	+	1.49
Water	M	75	12	-	1.44
Crude oil	D	32	55	+	1.44
Other meat products	M	69	18	+	1.43
Trade	M	59	28	+	1.42
Other mineral products	M	69	18	+	1.40
Wood products	M	79	8	+	1.40
Other minerals	M	38	49	-	1.40

D domestic product
F final demand
M import
P primary factor

Table 19.6 Selected Category Total Comparisons Between Unfitted and Fitted I-O Tables (US$ billion)

Region	Category	Type	Initial	Final
Rest of Middle East	Crude oil	D	2.060	131.935
United States	Other government svcs	M	150.796	20.736
United States	Investment	F	1481.560	1990.635
Germany	Other financial svcs	D	145.450	35.561
Rest of Middle East	Exports	F	67.320	219.042
United States	Gas	D	62.206	6.954
Germany	Other business svcs	M	1.534	37.834
United States	Trade	M	0.126	20.734
United States	Gas distribution	D	134.197	42.727
United States	Government consn	F	1932.728	1528.647
United States	Other business svcs	M	4.957	42.892
France	Other transport eqpt	M	0.219	18.545
RO sub-Saharan Afrc	Crude oil	D	0.361	20.106
Rest of Middle East	Other government svcs	M	0.043	13.626
Germany	Other equipment	M	26.070	82.491
United States	Other transport	M	4.035	33.322
Rest of FSU	Petroleum products	D	57.543	11.860
Rest of Middle East	Other business svcs	M	0.050	11.226
France	Gas	D	12.615	0.157
Germany	Crude oil	M	0.249	14.050
Japan	Gas distribution	D	16.967	0.595
Rest of EFTA	Crude oil	D	1.546	20.230
Germany	Household consn	F	866.042	1080.196
United States	Petroleum products	D	243.166	145.800
Sweden	Other business svcs	M	0.063	9.630
Venezuela	Gas distribution	D	12.380	0.238
China	Exports	F	260.777	388.381
Singapore	Crude oil	M	0.002	5.385
Hong Kong	Wearing apparel	M	26.197	4.389
Hong Kong	Other equipment	D	26.425	4.600
Rest of North Africa	Crude oil	D	1.900	17.507
Rest of Middle East	Other eqpt	M	8.685	37.000
Rest of Middle East	Household consn	F	407.631	353.053
Japan	Government consn	F	591.922	718.340
Rest of SADC	Crude oil	D	0.005	4.873
Bulgaria	Crude oil	D	6.633	0.011
Germany	Gas distribution	D	15.785	1.550
China	Trade	M	4.417	24.038

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Table 19.6 Selected Category Total Comparisons Between Unfitted and Fitted I-O Tables (US$ billion) (Contd)

Region	Category	Type	Initial	Final
Korea	Gas distribution	D	4.642	0.005
United States	Gas	M	37.708	11.238
Italy	Gas distribution	D	15.642	1.573
Philippines	Electronic equipment	D	3.928	23.059
Austria	Other business svcs	M	1.640	15.119
France	Government consn	F	223.367	318.457
Rest of FSU	Gas	M	0.131	7.117
France	Other government svcs	D	233.267	330.001
Rest of Middle East	Capital services	P	329.894	285.023
Singapore	Trade	M	0.001	3.519
Malaysia	Investment	F	39.550	12.938
United States	Crude oil	D	79.026	39.374
United States	Recreational svcs etc	M	0.558	9.850
China	Oil seeds	M	0.118	6.765
Czech Republic	Gas	D	2.573	0.000
United States	Communication	M	0.107	6.453
Bulgaria	Gas distribution	D	5.308	0.010
United States	Construction	D	1178.458	1351.092
Cyprus	Exports	F	0.009	4.326
United Kingdom	Household consn	F	834.635	958.843
Mexico	Eletronic equipment	M	6.247	25.322
Ireland	Other business svcs	M	0.757	10.293
Rest of North Africa	Crude oil	M	5.123	0.017
Bulgaria	Petroleum products	D	14.420	1.224
Rest of Middle East	Petroleum products	D	19.036	50.310
Thailand	Investment	F	52.406	23.146
China	Coal	D	35.093	12.936
Ireland	Trade	M	0.233	7.042
China	Electronic equipment	M	26.736	57.661
Italy	Petroleum products	D	44.005	17.729
Singapore	Petroleum products	M	11.098	1.757
Rest of Middle East	Trade	D	141.590	108.925
France	Other equipment	M	23.430	52.828
Bulgaria	Gas	D	2.714	0.000
Belgium	Other business services	M	0.994	10.649
Rest of EFTA	Water transport	M	0.021	4.128
Greece	Water transport	D	0.556	8.298
Hong Kong	Trade	D	76.093	121.884

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Table 19.6 Selected Category Total Comparisons Between Unfitted and Fitted I-O Tables (US$ billion) (Contd)

Region	Category	Type	Initial	Final
Indonesia	Exports	F	34.457	69.128
Hong Kong	Wearing apparel	D	30.155	10.340
Netherlands	Other transport	M	0.075	5.103
China	Electronic equipment	D	77.135	124.761
Malaysia	Exports	F	84.268	128.137
Australia	Gas	M	2.645	0.001
RO Southeast Asia	Exports	F	37.603	8.700
Rest of Middle East	Motor vehicles	M	2.974	16.771
Germany	Other transport eqpt	M	3.451	16.739
Germany	Labor	P	1056.507	910.437
China	Other business services	M	0.001	2.445
Japan	Construction	M	0.045	4.469
South Africa	Crude oil	M	0.000	2.390
India	Gas	M	2.471	0.001
Philippines	Electronic equipment	M	3.128	16.475
Switzerland	Other manufactures	M	0.553	8.243
Rest of Middle East	Other manufactures	M	1.066	10.445
Caribbean	Other transport eqpt	M	0.478	8.063
France	Petroleum products	D	37.345	16.049
Germany	Coal	D	17.864	4.236
Rest of EFTA	Other transport eqpt	M	0.028	3.934
France	Gas distribution	D	4.139	0.046
France	Electricity	M	5.879	0.232
Greece	Other transport eqpt	M	0.018	3.542
United Kingdom	Electricity	D	68.375	35.708
RO Southeast Asia	Electronic eqpt	M	9.186	0.339

D domestic product
F final demand
M import
P primary factor

On the other hand, regions that are both relatively large and greatly altered do naturally contribute many entries to the table. In particular, the four largest composite regions all appear; these are "Rest of Middle East", "Rest of North Africa", "Rest of EFTA", and "Rest of Sub-Saharan Africa". Especially the largest, "Rest of Middle East", a composite formed from three non-oil-exporting regions (Cyprus, Sri Lanka, Turkey, as reported chapter 14), contributes the single most significant revision; not surprisingly, this is an upward revision in its production of crude oil. In the same vein, significant upward revisions are made to exports from "Rest of Middle East" and to crude oil production in "Rest of North Africa".

The United States, although overall one of the least altered regions, also contributes many entries to table 19.6. This is partly because of the sheer scale of its economy, and partly because there are large revisions to certain aspects of its I-O structure. Imports of "other government services", for example, are revised downward, from $151 billion to $21 billion. The high initial value reflects the action of the I-O table contributors, in assigning "non-comparable imports" (valued at $113 billion) to "other government services" (Hanson and Somwaru, 2002).

Also in the United States, aggregate investment is revised upward by $509 billion, and government consumption is revised downward by $404 billion. Since the contributed table is balanced against 1996 macroeconomic data (Hanson and Somwaru, 2002), and since there has been relatively little change in the shares of investment and government consumption between 1996 and 2001, the reasons for the initial low level of investment and high level of government consumption are unclear.

Germany appears in the table with the fourth entry, a downward revision in its production of financial services, from $145 billion to $36 billion. In the contributed table, this has two notable features: about half its production is absorbed in intra-industry usage, and of the remainder, almost three quarters is applied to inventory investment (not, on the face of it, a likely usage for a service commodity). In fitting the I-O table, we eliminate the inventory investment usage; this in turn leads to the disappearance of most of the intra-industry usage, so that altogether, production declines by about three quarters.

In the sixth and ninth rows of table 19.6, we find severe downward revisions in United States production of gas and "gas distribution". As reported in table 19.5, across all regions, "gas distribution" faces an average 66 per cent downward revision; "gas" is revised down by an average of 28 per cent. This may reflect deficiencies in the estimation of gas prices in the energy data set (chapter 17), in particular, a failure to account specifically for the resale and distribution margins incorporated into the price of "gas distribution" output. Severe downward revisions in production of "gas" or "gas distribution" also appear in table 19.6 for regions including France, Japan, and Venezuela.

The seventh and eighth rows of table 19.6 record upward revisions in services imports, specifically, in imports of "other business services" into Germany and "trade" into the United States. As table 19.5 shows, there is a general tendency to upward revision of "other business services" imports, by an average factor of 2.5. Germany's imports are subject to an unusually severe upward revision, by a factor of almost 25, reflecting an unusually low level of imported "other business services" usage in the contributed I-O table. The even more severe upward revision in United States imports of "trade" (by a factor of more than 160) reflects three factors: unusually low usage of imported "trade" in the contributed table, the assignment of about $11 billion of expenditure by U.S. travelers abroad to the "trade" category, and the reallocation of about $9 billion of U.S. expenditure on imports of merchandise from China to imports of trade services from Hong Kong (chapter 15.C).

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