12.C

Agricultural Production Targeting

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12.C.1 Background

Agricultural production targeting is a procedure applied to certain I-O tables before the main data construction phase. Except for its agricultural orientation, it is unrelated to the agricultural I-O data disaggregation discussed in sub-chapters 12.A and 12.B of this chapter. Rather, it arises from concerns that arose with the GTAP 5 Data Base, that in the data for European Union (*EU*) member countries there were considerable inaccuracies in levels and international distribution of agricultural production, and, consequently, in the budgetary cost of assistance. This led to problems in analysis of EU agricultural reform.

Investigation revealed that these inaccuracies largely reflected discrepancies between the representation of agriculture in the contributed I-O tables for EU member countries (van Leeuwen, 2002) and EUROSTAT production data relied upon by EU stakeholders. These arose partly from differences in reference years (the I-O data being older), but more from basic data differences.

In response, the GTAP Center prepared a special version of the data base, for use only by members of the GTAP Consortium, in which the agricultural production levels in EU member countries were revised. The revisions were made not within the data base construction procedure itself but as adjustments to the I-O tables entering into the procedure. This was originally intended as an interim measure, until I-O tables that better reflected the EUROSTAT production data might be contributed.

Since then, no such tables have been contributed, while, on the other hand, Consortium members interested in agricultural policy analysis have pressed for the extension of the targeting to non-EU countries. In the GTAP 6 Data Base, this targeting is incorporated into a public data release. We apply production targets, supplied by Hsin Huang of the Organization for Economic Cooperation and Development, to thirty-six countries (listed in table 12.C.1) and twelve commodities (table 12.C.2).

12.C.2 Overview

The purpose of the adjustment is simple, to adjust the I-O tables to match the agricultural production targets. But circumstances complicate the situation. The adjustment is done before the data base

construction procedure, but parts of that procedure, especially I-O table fitting (chapter 19) affect agricultural production levels in the I-O tables. In some cases, the agricultural production targets are incompatible with other data targets, more specifically, with export targets. And since we are dealing with raw I-O tables that have not undergone the cleaning procedures described in chapter 11.A, we are liable to find in them anomalous conditions that can abort processing.

Table 12.C.1 Countries Subject to Agricultural Production Targeting

Code	Region Name	Code	Region Name
AUS	Australia	LUX	Luxembourg
NZL	New Zealand	NLD	Netherlands
JPN	Japan	PRT	Portugal
KOR	Korea	ESP	Spain
CAN	Canada	SWE	Sweden
USA	United States	CHE	Switzerland
MEX	Mexico	CZE	Czech Republic
BRA	Brazil	HUN	Hungary
AUT	Austria	MLT	Malta
BEL	Belgium	POL	Poland
DNK	Denmark	ROM	Romania
FIN	Finland	SVK	Slovakia
FRA	France	SVN	Slovenia
DEU	Germany	EST	Estonia
GBR	United Kingdom	LVA	Latvia
GRC	Greece	LTU	Lithuania
IRL	Ireland	RUS	Russian Federation
ITA	Italy	TUR	Turkey

Table 12.C.2 Commodities Subject to Agricultural Production Targeting

Code	Description	Code	Description
PDR	Paddy rice	PFB	Plant-based fibres
WHT	Wheat	OCR	Crops n.e.c.
GRO	Cereal grains n.e.c.	CTL	Bovine cattle, sheep and goats, horses
V_F	Vegetables, fruit, nuts	OAP	Animal products n.e.c.
OSD	Oil seeds	RMK	Raw milk
C_B	Sugar cane, sugar beet	WOL	Wool, silk-worm cocoons

We do not perform the full range of cleaning operations from the main construction procedure, but just those found necessary to ensure that the adjustment procedure runs. As it turns out, there is just one dirty data condition that we must eliminate. In a few tables, for a few

commodities, there is non-zero usage in inventory investment but zero usage in all other use categories. In these cases, we eliminate the inventory investment usage, so that total usage of the commodity is zero. We then eliminate all inputs into production of the commodity. This is done for Brazil, Finland, Ireland, Italy, and Malta. The offending entries are small non-zeros, presumably artifacts of the I-O table preparation.

In the data base construction process, there are many steps that affect agricultural production levels in the I-O data, but the main step is the I-O table fitting. Here again, there are many factors that affect agricultural production levels, but three of these are dominant: the targeting of GDP, exports, and production taxes. GDP targeting is achieved in effect by rescaling the whole I-O table, so it affects production levels for all commodities. Changes in exports entail corresponding changes in production levels. Changes in production tax rates imply either changes in either input or output values; an increase in the production tax rate, for instance, can be achieved either by increasing the money value of output or by reducing the money values of the intermediate and factor inputs. In practice, it is achieved by a combination of the two, leaning toward output value changes for domestically-oriented sectors and input value changes for export-oriented sectors.

It would be futile to target production levels in the incoming I-O tables if these were then altered drastically by the GDP, export, and production tax targeting. We therefore anticipate these adjustments in the production level targeting: we adjust not the production levels only but GDP, exports, and production taxes also. The tables going into the FIT process should therefore require little adjustment in these variables; we may then hope that the FIT process will have little effect on agricultural production levels.

As the agricultural production targeting is done outside and before the main data construction procedure, it uses early versions of the macroeconomic, trade, and protection data. In particular, the trade data used in the production targeting are not the same as those finally used in GTAP 6 itself.

The attempt to anticipate the FIT export adjustments exposes another problem. In some cases, the export and agricultural production targets are simply incompatible. We encounter both *hard inconsistencies*, where the export target exceeds the production target, and *soft inconsistencies*, where the export target is lower than the production target, but still leaves very little domestic product available to the domestic market. Since the trade data are central to the whole data reconciliation process, in these cases, it is the production targets not the export targets that must give way. Accordingly, in such cases, we adjust the production targets before applying them to the I-O data.

To operationalize the concept of soft inconsistency, we deem a soft inconsistency to exist if the production target is less than the export target plus one quarter of the initial level of domestic absorption. But it would be meaningless to use the absorption level from the initial table, since that table may have any scale. So before testing for inconsistencies, we scale the I-O tables to match the GDP target. Having identified the inconsistencies, we then adjust the inconsistent production targets

to exports plus one quarter of initial domestic absorption. In other words, we permit the production targeting to remove no more than three quarters of initial domestic absorption.

The general outline of operations is therefore:

— Clean the I-O tables.

— Adjust the tables to match the GDP targets.

— Identify inconsistencies between export and production and export targets; adjust the production targets.

— Adjust the tables to match export, output subsidy, and agricultural production targets.

We discuss the handling of export-production inconsistencies further in section 12.C.3, and the production adjustments themselves in section 12.C.4. Finally, in section 12.C.5, we see how well the production targets are maintained in the data base construction program.

12.C.3 Export-Production Inconsistencies

Altogether 154 targets are adjusted, 35 per cent of the total. These include 99 adjustments for hard inconsistencies, and 55 for soft. An example of a hard inconsistency is the Russian “other crops” sector; here the production target, $15 million, is insufficient to cover exports of $45 million. An example of a soft inconsistency is the Polish cattle sector; with production of $240 million, we can accommodate exports of $118 million, but would need to reduce domestic absorption from $1803 million to $122 million.

Although a large share of the targets are adjusted, targets for many of the largest sectors undergo no adjustment. In fact, the total target, summed over sectors and countries, increases by only 1.6 per cent. So although the adjustments are quite severe in many individual cases, overall the structure is well maintained.

Table 12.C.3 reports some of the more notable adjustments. Here and in subsequent tables, we select the items for which changes or differences are most significant, where the criterion for “most significant” takes account both of the absolute magnitude of the item and the relative magnitude of the change or difference. We see that adjustments are more prevalent among non-EU countries, and for the commodities *pfb* (plant-based fibers), *wol* (wool), *osd* (oilseeds), and *wht* (wheat). The largest differences presumably reflect differences in concepts and categories between the production target data on the one hand and the I-O or trade data on the other. In a few cases, these differences were partially resolved as the GTAP 6 Data Base was prepared. In particular, trade data for the Netherlands were revised, with oilseed exports moving sharply downward; if these revisions had been incorporated into the production targeting, oilseeds in the Netherlands would have shown a soft rather than a hard inconsistency.

Table 12.C.3 Production Target Adjustments: Selected Cases (US$ million)

GTAP Region	Sector	Domestic Absorption	Exports	Initial Production Target	Adjusted Production Target
RUS	OCR	3587	45	15	942
MEX	PFB	2288	27	0	599
NLD	OSD	302	340	3	416
JPN	PFB	1215	2	0	306
JPN	WOL	1009	2	0	254
MEX	OSD	1047	30	20	292
NZL	OCR	7	76	0	78
CAN	WHT	895	2848	2027	3072
CHE	PFB	83	51	0	72
BEL	PFB	2	173	15	173
TUR	WOL	168	11	0	53
POL	CTL	1803	118	240	569
MEX	WHT	3000	80	424	830
DEU	PFB	4	46	0	47
BRA	WOL	30	35	0	42
USA	WHT	11126	3826	5440	6607
TUR	OSD	1766	36	212	477
USA	WOL	439	10	15	119
GRC	OCR	3016	363	700	1117
BEL	OSD	20	74	6	79

12.C.4 Production Adjustments

Table 12.C.4 shows the effects of the production adjustments. We compare the adjusted production levels (fifth column) not to the original levels but to those that would have been obtained had just the export and production subsidy adjustments been applied (fourth column). We also report the production levels without production, export or production subsidy adjustments but after GDP scaling (third column).

We find that the largest adjustments are concentrated in a few countries, the United States, Mexico, and the United Kingdom (though especially for the United States, this reflects partly the larger size of the economy). Large adjustments are especially common for *v_f*, vegetables and fruits, and *rmk*, raw milk. Although there are some upward adjustments (for example, *ocr*, other crops, in Mexico), most adjustments are downward. Overall, in the countries subject to targeting, agricultural production falls by 35 per cent.

Table 12.C.4 Production Adjustments: Selected Cases (US$ million)

GTAP Region	Sector	Scaled	Without Production Adjustments	With Production Adjustments
USA	CTL	79549	77962	32040
USA	GRO	59933	58504	20286
USA	V_F	55744	58059	26118
MEX	GRO	14499	12749	3647
MEX	OCR	1135	1521	7976
GBR	CTL	11527	9776	2900
BRA	OCR	15174	17470	7566
USA	C_B	8384	8009	2098
MEX	V_F	18549	18210	8250
MEX	OAP	16260	14150	5975
USA	WHT	14835	15082	6607
USA	OSD	25241	23335	12576
USA	RMK	37936	38632	24679
GBR	RMK	11019	10070	3840
GBR	OAP	10282	9553	3659
TUR	RMK	6066	5576	1536
BRA	V_F	5713	6094	1947
MEX	RMK	8731	7499	2842
GBR	V_F	7660	7204	2740
JPN	V_F	34029	32903	22854

12.C.5 Deviations from Targets in the Main Data Base Construction Program

As noted above, the production adjustment is performed before the main data construction program. The adjusted targets are attained quite accurately within the adjustment program itself, but nothing in the main program guarantees that they will be maintained through the regular I-O processing. In table 12.C.5, therefore, we examine the largest deviations between the production targets and the final data.

Overall, with a few notable exceptions (Korean wheat, Dutch oilseeds), deviations from target are not extreme. Bearing in mind that the differences presented are those considered most serious, we may say that the targets have been moderately well (but only moderately well) maintained. There is a slight general upward bias in the errors: overall, agricultural production for the targeted countries exceeds the target by about 4 per cent.

We expect that the greatest source of deviation from target is the I-O table fitting procedure (chapter 19). But instead, we find that the greatest deviations appear to occur either before fitting (as with Korean wheat or Dutch oilseeds) or after fitting (as with United States oilseeds). This warrants further attention in later releases.

Table 12.C.5 Deviations from Production Targets: Selected Cases (US$ million)

GTAP Region	Sector	Target	Final
KOR	WHT	0	1225
NLD	OSD	416	4
USA	OSD	12576	16455
BRA	CTL	7749	5633
ITA	OSD	1438	2460
BRA	OSD	4671	6308
USA	PDR	888	1631
ESP	OSD	1093	1850
DEU	V_F	2946	4065
KOR	CTL	1565	2398
JPN	C_B	782	1341
GBR	PFB	15	122
DEU	OCR	7117	8411
DNK	RMK	1361	874
LUX	RMK	80	257
USE	GRO	20286	22329
DEU	RMK	8420	9718
GBR	OAP	3659	4530
GBR	RMK	3840	4712
BRA	OAP	6331	5334

References

van Leeuwen, M. 2002. Ch. 11.M, “The European Union,” in Dimaranan, B.V. and McDougall, R.A., Elbehri, A., and Truong, T.P. *Global Trade, Assistance, and Production: The GTAP 5 Data Base*, Center for Global Trade Analysis, Purdue University.