

Chapter 8.C

Agricultural Production Targeting

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8.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 8.A and 8.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, a special version of the GTAP Data Base was prepared for exclusive use of GTAP Consortium members, 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. In GTAP 6, this targeting was incorporated for the first time into a public data release. Since then, Consortium members interested in agricultural policy analysis have pressed for the extension of the targeting to non-EU countries.

The EU tables processed in the initial application provided full GTAP sectoral detail, and the original implementation of the procedure relied on such provision. We now find ourselves applying it to regions whose contributed tables require disaggregation. Rather than enhance the procedure to remove this limitation, we work around it by performing a partial run of the main GTAP data construction procedure, up to and including I-O table fitting, input the fitted tables into the production targeting procedure. The tables input into the production targeting procedure are therefore fully disaggregated, and also cleaned and fitted. That they are fitted is not strictly necessary, but we hope that it may minimize the deviations from the production targets within the main build, discussed in sections 8.C.2 and 8.C.5 below. The tables output from the targeting procedure are then fed into a complete and final run of the main construction procedure.

For GTAP 7, we apply production targets, supplied by Hsin Huang of the Organization for Economic Cooperation and Development, to thirty-seven countries (listed in table 8.C.1) and nine commodities (table 8.C.2).

8.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 15) 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 the procedure was originally designed to deal with raw I-O tables that have not undergone the cleaning procedures described in chapter 7, it contains safeguards against anomalous conditions that could abort processing.

Table 8.C.1 Countries Subject to Agricultural Production Targeting

Code	Region Name	Code	Region Name
AUS	Australia	NLD	Netherlands
NZL	New Zealand	NOR	Norway
JPN	Japan	PRT	Portugal
KOR	Korea	ESP	Spain
CAN	Canada	SWE	Sweden
USA	United States	CHE	Switzerland
MEX	Mexico	CYP	Cyprus
BRA	Brazil	CZE	Czech Republic
AUT	Austria	HUN	Hungary
BEL	Belgium	POL	Poland
BGR	Bulgaria	ROA	Romania
DNK	Denmark	SVK	Slovakia
FIN	Finland	SVN	Slovenia
FRA	France	EST	Estonia
DEU	Germany	LVA	Latvia
GBR	United Kingdom	LTU	Lithuania
GRC	Greece	TUR	Turkey
IRL	Ireland	ZAF	South Africa
ITA	Italy		

Table 8.C.2 Commodities Subject to Agricultural Production Targeting

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

We do not perform the full range of cleaning operations from the main construction procedure, but just those we have found necessary from time to time 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 do this for imported cattle and wool in Brazil, and domestically produced coal in Italy. Given that in the current release, the procedure uses tables that have already undergone cleaning in the main build, it is not clear how these anomalous conditions have persisted, though we note that, for unrelated reasons, since the partial run from which they obtain, we have revised the I-O table cleaning procedure in the main build.

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 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 7 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 8.C.3, and the production adjustments themselves in section 8.C.4. Finally, in section 8.C.5, we see how well the production targets are maintained in the data base construction program.

8.C.3 *Export-Production Inconsistencies*

Altogether 115 targets are adjusted, 35 per cent of the total. These include 67 adjustments for hard inconsistencies, and 48 for soft. An example of a hard inconsistency is the South African wool sector; here the production target is zero, but exports are \$105 million. An example of a soft inconsistency is the raw milk sector in Bulgaria; production of \$374 million can accommodate exports of \$1 million, but domestic absorption would need to fall from \$6400 million to \$373 million.

Although so many 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 2.3 per cent. So although the adjustments are quite severe in many individual cases, overall the targets are well maintained.

Table 8.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 Bulgaria, Turkey, and Canada are among the most heavily adjusted countries, while among the most heavily adjusted sectors are wool, wheat, and oil seeds.

Table 8.C.3 Production Target Adjustments: Selected Cases (US\$ million)

GTAP Region	Sector	Domestic Absorption	Exports	Initial Production Target	Adjusted Production Target
BGR	RMK	6400	1	374	1601
JPN	WOL	1000	1	0	251
BGR	OAP	6336	40	528	1624
BGR	C_B	838	0	1	210
ZAF	WOL	281	105	0	175
BGR	WOL	684	2	0	173
CAN	C_B	683	0	0	171
BGR	PDR	618	1	0	155
BGR	CTL	3202	21	208	821
BGR	GRO	5039	62	483	1321
BGR	WHT	5198	95	616	1394

TUR	OSD	3055	64	325	828
NLD	OSD	470	4	2	121
USA	WHT	11748	6115	7337	9052
TUR	WOL	202	10	0	60
TUR	PDR	208	0	0	52
ROU	CTL	3656	188	631	1102
BRA	WOL	155	7	0	46
KOR	WHT	181	0	0	45
CAN	WHT	2248	2941	2638	3503

8.C.4 *Production Adjustments*

Table 8.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, notably the United States and Bulgaria. Large adjustments are especially common for *ctl*, cattle, and *rmk*, raw milk. Although there are some upward adjustments (for example, *oap*, other animal products, in Mexico), most adjustments are downward. Overall, in the countries subject to targeting, agricultural production falls by 34 per cent.

Table 8.C.4 Production Adjustments: Selected Cases (US\$ million)

GTAP Region	Sector	Scaled	Without Production Adjustments	With Production Adjustments
USA	CTL	83175	79092	35161
USA	GRO	58049	62159	25829
FRA	RMK	28510	28333	9160
MEX	OAP	1187	1252	6484
GBR	RMK	12542	12705	4676
BGR	RMK	6415	6463	1601
BGR	OAP	6349	6436	1624
USA	WHT	14168	18383	9052
ITA	CTL	9284	10466	4289
BGR	WHT	5263	5322	1394
BGR	GRO	5081	5125	1321
USA	RMK	40590	39937	27429
DEU	RMK	19086	18071	10070
MEX	C_B	5028	5204	1526
ESP	RMK	7704	7291	3057

ROA	CTL	3775	3932	1102
SWE	RMK	4249	4183	1254
BGR	CTL	3240	3292	821
TUR	OSD	3221	3192	828
ITA	RMK	9684	10133	5352

8.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 8.C.5, therefore, we examine the largest deviations between the production targets and the final data.

Deviations from targets are especially severe in Brazil and Mexico, and for OSD, oilseeds, and gro, “other grains”. We expect the greatest source of deviation from target to be changes in I-O structure in the I-O table fitting procedure (chapter 15). For Mexican “other grains”, for instance, the overshooting of the target derives largely from growth in its main purchaser, the “other foods industry”; likewise Mexican raw milk output increases with growth in the milk processing industry. For Brazilian cattle, the greatest factor is the elimination of changes in stocks, a strong positive source of demand in the contributed table. Overall the targets are reasonably well maintained. It would be possible in future to revise the production targeting procedure to take account of more sources of change in fitting, for instance, the elimination of changes in stocks, but the better and in the end the only thoroughly satisfactory solution would be to integrate it into the I-O table fitting module.

Table 8.C.5 Deviations from Production Targets: Selected Cases (US\$ million)

GTAP Region	Sector	Target	Final
MEX	GRO	3948	7648
BRA	CTL	10720	6987
MEX	RMK	2496	4178
MEX	OAP	6484	8975
BRA	OSD	11195	13508
KOR	PDR	8870	7049
BRA	OAP	8244	6727
MEX	CTL	2601	3336
BRA	C_B	3984	3178
BEL	C_B	286	547
BRA	GRO	4328	3518
USA	GRO	25829	24111
BRA	WHT	815	540
DEU	RMK	10070	11123
USA	WHT	9052	8190

BRA	PDR	2877	2406
KOR	CTL	1630	1285
DEU	OAP	9455	10263
CAN	WHT	3503	3054
KOR	OAP	4404	3901

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.