

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.

GTAP 9 employs agricultural production data for 46 countries (listed in table 8.C.1) supplied by Joanna Komorowska of the Organization for Economic Cooperation and Development (OECD), and for twelve commodities (table 8.C.2) for 2004, 2007, and 2011 base years.

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

Code	Region Name	Code	Region Name
AUS	Australia	ITA	Italy
AUT	Austria	JPN	Japan
BEL	Belgium	KAZ	Kazakhstan
BGR	Bulgaria	KOR	Korea
BRA	Brazil	LTU	Lithuania
CAN	Canada	LUX	Luxembourg
CHE	Switzerland	LVA	Latvia
CHL	Chile	MEX	Mexico
CHN	China	MLT	Malta
CYP	Cyprus	NLD	Netherlands
CZE	Czech Republic	NOR	Norway
DEU	Germany	NZL	New Zealand
DNK	Denmark	POL	Poland
ESP	Spain	PRT	Portugal
EST	Estonia	ROU	Romania
FIN	Finland	RUS	Russian Federation
FRA	France	SVK	Slovakia
GBR	United Kingdom	SVN	Slovenia
GRC	Greece	SWE	Sweden
HUN	Hungary	TUR	Turkey
IDN	Indonesia	UKR	Ukraine
IRL	Ireland	USA	United States
ISR	Israel	ZAF	South Africa

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

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

8.C.2 *Overview*

The purpose of the procedure is 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.

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 fitting I-O tables to international datasets. 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 is not the same as those finally used in GTAP 8 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*

For the 2004 base year, 181 targets are adjusted which is about 33 percent of the total. These include 74 adjustments for hard inconsistencies, and 107 for soft. An example of a hard inconsistency is the Canadian Wheat sector; here the production target of \$2,638 million is insufficient to cover exports of \$2,940 million. An example of a soft inconsistency is the Australian Paddy Rice sector; with production of \$74 million, we can accommodate exports of \$16 million but domestic absorption of \$264 is not possible. The number of inconsistencies increased slightly for the 2007 base year to reach 182, about 33 percent of the total. However, the total number of hard target adjustments declined slightly to 73. For the 2011 base year, the number of hard target adjustments increased to 83 with a total of 201 which is about 36 percent of total.

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, is increased by only 0.3 per cent for 2004 and 2007 and by 0.4 percent for the 2011 base years. So although the adjustments are quite severe in some individual cases, overall the targets are well maintained.

Tables 8.C.3a, 8.C.3.b, and 8.C.3c report some of the notable adjustments for 2004, 2007, and 2011 base years, respectively. Here and in subsequent tables, we select the items for which changes or differences are more significant than others, 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 vegetables and fruits (*v_f*), oilseeds (*osd*), wool (*wol*), and wheat (*wht*).

Table 8.C.3a Production Target Adjustments for 2004: Selected Cases (US\$ million)

GTAP Region	Sector	Domestic Absorption	Exports	Initial Production Target	Adjusted Production Target
BEL	GRO	70	56	50	74
BEL	V_F	264	2,457	1,638	2,523
AUS	WOL	2,694	1,382	1,593	2,056
CAN	WHT	518	2,940	2,638	3,069
NLD	WOL	4	28	6	29
BEL	GRO	70	56	50	74
BEL	WOL	2	22	0	23
ISR	PFB	38	48	37	58
BEL	PFB	31	38	25	45
GBR	PDR	42	7	0	18
FRA	WOL	12	21	7	24
LUX	V_F	-4	29	15	28
NLD	PDR	24	8	0	14
ISR	OSD	53	29	30	42
BEL	PDR	13	8	0	11
LVA	PFB	2	10	0	10
GBR	WOL	13	43	37	46
NZL	OCR	173	123	157	166
KOR	WHT	54	0	5	14
IRL	OSD	21	3	0	8
AUT	PFB	12	5	0	8
BGR	PDR	54	1	6	14
AUS	PDR	264	16	74	82
RUS	OCR	57	34	41	48
SWE	PFB	14	2	0	5
IDN	WHT	22	3	4	9
UKR	PDR	28	0	3	7
ROU	WOL	1	4	0	4

Table 8.C.3b Production Target Adjustments for 2007: Selected Cases (US\$ million)

GTAP Region	Sector	Domestic Absorption	Exports	Initial Production Target	Adjusted Production Target
BEL	WOL	3	20	0	20
CAN	V_F	1,503	2,428	1,882	2,804
AUS	WOL	3,747	1,802	1,932	2,739
AUS	PFB	1,493	507	212	880
GBR	PDR	51	9	0	22
BEL	WOL	3	20	0	20
IRL	OSD	29	12	0	19
FRA	WOL	15	18	4	21
MLT	GRO	15	14	0	18
ITA	WOL	15	25	15	29
FRA	PDR	131	18	37	51
KOR	WHT	80	1	8	21
IRL	C_B	51	0	0	13
BGR	PDR	85	1	10	22
ISR	OSD	70	39	45	56
IRL	WOL	1	17	6	17
NLD	PDR	30	3	0	11
BEL	GRO	90	142	154	164
KAZ	PFB	71	157	165	175
MLT	WHT	4	8	0	9
PRT	WHT	39	21	23	31
IDN	WHT	38	5	6	14
NLD	PFB	38	1	3	10
SWE	PFB	19	2	0	7
POL	PDR	24	0	0	6
AUT	PFB	16	2	0	6
LTU	PFB	15	1	0	5
LVA	PFB	4	4	0	5

Table 8.C.3c Production Target Adjustments for 2011: Selected Cases (US\$ million)

GTAP Region	Sector	Domestic Absorption	Exports	Initial Production Target	Adjusted Production Target
LUX	V_F	-6	55	13	53
USA	PFB	2,401	9,369	6,832	9,970
AUS	WOL	6,100	2,672	2,821	4,197
BEL	V_F	377	2,825	2,018	2,919
DEU	WOL	19	48	8	53
LUX	V_F	-6	55	13	53
NZL	PFB	144	5	2	41
NLD	WOL	5	47	10	48
DEU	PDR	104	12	0	38
BEL	PDR	18	32	0	37
BEL	WOL	3	36	0	36
LVA	OCR	452	35	113	148
FRA	WOL	17	24	3	28
CYP	WHT	7	27	5	29
GRC	OSD	820	71	254	276
IRL	OSD	24	14	0	20
ITA	WOL	16	31	15	35
GBR	PDR	50	6	0	19
IRL	WOL	1	26	10	26
IDN	WHT	75	1	4	19
KOR	WHT	85	1	8	22
HUN	WOL	34	10	5	18
PRT	WHT	40	12	9	22
NLD	PDR	34	4	0	12
CYP	GRO	42	10	9	21
LUX	OSD	21	15	8	20
IRL	C_B	43	0	0	11
NZL	OCR	269	162	219	229

8.C.4 Production Adjustments

Table 8.C.4a, 8.C.4b, and 8.C.4c show the effects of the production adjustments for the three base years respectively. We compare the adjusted production levels (fifth column) to those that would have been obtained without 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, in Australia, Belgium, Canada, New Zealand in 2004 and 2007, and United States, Australia, and Belgium in 2011 (though this reflects partly the larger size of the economy). Large adjustments are especially common for vegetables and fruits (*v_f*), and wool (*wol*), in 2004 and 2007; and for plant based fibers (*pfb*), and wool (*wol*) in 2011. Although there are some upward adjustments (for example, *v_f*, in Russia), most adjustments are downward. Overall, in the countries subject to targeting, agricultural production falls by 15 per cent for 2004 base year; by 14 percent for the 2007 base year, and by 12 percent for 2011 base year.

Table 8.C.4a Production Adjustments for 2004: Selected Cases (US\$ million)

GTAP Region	Sector	Scaled	Without Production Adjustments	With Production Adjustments
BEL	V_F	2,640	1,638	2,523
RUS	V_F	4,600	13,245	13,245
AUS	WOL	4,714	1,593	2,056
CAN	WHT	3,369	2,638	3,069
AUS	OSD	1,207	397	759
AUS	OAP	7,499	1,867	2,053
NZL	OAP	573	401	509
CHE	OSD	187	60	166
AUS	WHT	3,464	3,176	3,281
NLD	OSD	417	2	107
KAZ	PFB	241	120	224
AUS	PFB	1,468	899	979
DEU	PFB	166	0	74
BEL	OSD	87	8	78
CHE	GRO	307	156	225
JPN	PFB	212	2	55
ISR	OCR	624	361	410
ITA	PFB	112	1	42
ESP	PFB	272	100	140

Table 8.C.4b Production Adjustments for 2007: Selected Cases (US\$ million)

GTAP Region	Sector	Scaled	Without Production Adjustments	With Production Adjustments
CAN	V_F	3,868	1,882	2,804
AUS	WOL	6,557	1,932	2,739
AUS	PFB	2,042	212	880
BEL	V_F	2,836	2,127	2,670
BEL	OSD	206	21	198
NLD	OSD	535	4	137
AUS	PDR	369	6	106
AUS	OAP	10,431	2,516	2,612
NZL	OAP	756	454	541
LUX	V_F	84	14	97
FRA	PFB	241	11	86
GBR	PFB	178	1	73
ESP	PFB	300	57	114
EST	OCR	161	69	120
JPN	PFB	200	4	53
ITA	PFB	128	1	42
MEX	OSD	208	30	65
NZL	PFB	181	2	35

Table 8.C.4c Production Adjustments for 2011: Selected Cases (US\$ million)

GTAP Region	Sector	Scaled	Without Production Adjustments	With Production Adjustments
USA	PFB	11,504	6,832	9,970
AUS	WOL	10,673	2,821	4,197
BEL	V_F	3,111	2,018	2,919
CHE	GRO	1,119	134	989
CAN	WHT	6,550	5,191	6,030
AUS	WHT	7,847	6,990	7,684
AUS	OAP	16,977	3,709	4,385
NLD	V_F	6,349	5,052	5,479
LVA	CTL	1,247	38	321
AUS	PFB	3,325	2,981	3,228
CHE	OSD	354	76	317
NZL	OAP	892	581	772
BEL	OSD	233	56	222
NLD	OSD	573	3	147
SVN	OSD	169	30	167
DEU	PFB	205	0	81
HUN	CTL	463	294	361

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

Overall, deviations from target are not extreme. The exceptions are: Chinese Vegetables and Fruits, and Animal products in 2004; and Chinese Vegetables and Fruits, and Indonesian Paddy Rice in 2011. Bearing in mind that the differences presented are those considered most serious, we may say that the targets are well maintained. There is a slight general upward bias in the errors: overall, agricultural production for the targeted countries exceeds the target by only 0.3 per cent for 2004 and 2007 and by 0.4 percent for the 2011 base years.

Table 8.C.5a Deviations from Production Targets for 2004: Selected Cases (US\$ million)

GTAP Region	Sector	Target	Final
CHN	V_F	145,651	158,584
CHN	OAP	101,730	108,066
UKR	V_F	4,809	1,464
ROU	OCR	4,821	7,660
ITA	V_F	14,047	11,625
ESP	OCR	6,393	8,739
RUS	V_F	13,245	15,564
ITA	OCR	12,261	14,479
ESP	OSD	2,985	4,991
ESP	V_F	15,181	13,268
FRA	WHT	4,838	6,519
USA	GRO	25,827	24,183
CZE	V_F	243	177
CZE	CTL	181	116
TUR	OCR	1,019	954
GBR	C_B	509	445
PRT	OAP	1,250	1,186
EST	GRO	47	42

Table 8.C.5b Deviations from Production Targets for 2007: Selected Cases (US\$ million)

GTAP Region	Sector	Target	Final
CHN	V_F	198,128	210,146
CHN	OAP	176,048	181,758
ITA	OCR	12,069	17,144
USA	GRO	57,634	53,123
UKR	V_F	9,847	6,054
TUR	V_F	33,154	30,025
FRA	WHT	9,032	11,928
CHN	WHT	21,820	19,270
CHN	GRO	25,169	22,698
ESP	V_F	18,006	15,575
CHN	PFB	13,324	11,108
IDN	PDR	15,300	13,102
GRC	OCR	1,083	1,155
PRT	OSD	192	265
FRA	PFB	11	83
DNK	WHT	1,310	1,238
GBR	PFB	1	72
CHE	WHT	240	246

Table 8.C.5c Deviations from Production Targets for 2011: Selected Cases (US\$ million)

GTAP Region	Sector	Target	Final
CHN	V_F	271,113	282,035
IDN	PDR	30,368	22,909
IDN	V_F	34,780	27,816
ESP	V_F	13,617	20,155
USA	WHT	14,475	20,609
CHN	OAP	268,472	274,294
USA	GRO	78,996	73,320
RUS	V_F	35,419	29,951
UKR	V_F	14,013	9,248
TUR	V_F	41,308	36,656
RUS	OAP	19,880	15,392
CHN	OSD	36,004	32,201
CHL	OAP	2,851	2,743
GRC	RMK	1,493	1,599
SWE	OCR	1,631	1,525
NOR	GRO	260	366
USA	OAP	55,521	55,415
KOR	OCR	4,791	4,799

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