Chapter 21

CDE calibration

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21.1 Introduction

The Global Trade Analysis Project (GTAP) employs the constant difference of elasticities (CDE) functional form in the specification of private household demands. The CDE, introduced by Hanoch (1975), can be classified as a model somewhere between the non-homothetic CES and the more flexible functional forms. It is based on the assumption of implicit additivity and allows for a richer representation of income effects on the demand system. The CDE implicit expenditure function is given by:

$$\sum_{i \in TRAD} B(i,r) * UP(r)^{\beta(i,r)\gamma(i,r)} * [PP(i,r)/E(PP(r),UP(r))]^{\beta(i,r)} \equiv 1$$

Where E(.) represents the minimum expenditure required to attain a prespecified level of private household utility, UP(r), given the vector of private household prices, PP(r). Individual prices are normalized using minimum expenditure and then raised to the power $\beta(i,r)$ and combined in an additive form. The calibration problem involves choosing the values of the substitution parameter, $\alpha(i,r)$, where $\alpha(i,r) = 1-\beta(i,r)$, to replicate the desired compensated, own-price elasticities of demand, then choosing the expansion parameters, $\gamma(i,r)$, to replicate the targeted income elasticities of demand. The *target* income and own-price elasticities are obtained or estimated from various sources. Because they came from different sources, these target elasticities can be mutually

inconsistent. Also, they may not be consistent with the CDE function itself. Therefore, a calibration procedure is required. The goal of the procedure is to generate *model* income and own-price elasticities that are mutually consistent, while remaining sufficiently close to the *target* income and own-price elasticities.

21.2 Previous methodology

The previous method can be illustrated by the procedure used in the GTAP version 3 data base (Dimaranan, McDougall and Hertel, 1997). We draw on available estimates of income elasticities from cross-country demand studies for adaptation to the 50 commodities and 45 regions of the GTAP version 4 data base. Income elasticity estimates for disaggregated food commodities were obtained from the World Food Model of the Food and Agriculture Organization (FAO, 1993) and broad commodity aggregates were obtained from the cross-country demand study by Theil, Chung and Seale (1989). Both these sources provide extensive regional coverage which is suitable for our purposes. The income elasticity estimates for food and commodity aggregates were mapped to the 50 GTAP commodities by region. A lower bound of 0.10 was imposed on the income elasticities to avoid calibration problems. Mapping of the regions was also done. This includes providing estimates for missing data by using the income elasticity estimates for regions with similar per capita GDP and generating income elasticity estimates for the composite regions. The income elasticity estimates were then proportionately adjusted to satisfy the Engel aggregation condition before being used as target income elasticities for the calibration process.

Since the cross-section studies mentioned above are not in a strong position to generate information on price elasticities of demand, the values for own-price elasticities of demand were computed following the procedure and formula outlined in Jomini *et al.* (1991):

$$\epsilon_{ii} = -s_i \eta_i \left(1 + \frac{\eta_i}{\omega}\right) + \frac{\eta_i}{\omega},$$

where ϵ_{ii} is the uncompensated own-price demand elasticity for commodity i, η_i is the income elasticity of demand for commodity i, s_i is the expenditure share of commodity i, and ω is the Frisch parameter, that is, minus the reciprocal of the marginal utility of income, or the money flexibility (Frisch 1959). The compensated own-price elasticities, v_{ii}, are then computed as:

$$v_{ii} = -\epsilon_{ii} + s_i \eta_i.$$

Using the above methods, we end up with estimates for income and compensated own-price elasticities of demand for 50 commodities and 45 regions that can be used as targets for the CDE calibration procedure. However, the use of the same calibration procedure as that used in the version

3 (described in Dimaranan, Hertel, and McDougall, 1997) will result in calibration difficulties and generally unsatisfactory results for this larger data base. Therefore, to improve on the previous calibration procedure and with the objective of producing demand elasticities that are as close to the original target elasticities as possible, we turn to another calibration procedure which uses the maximum entropy approach.

21.3 New methodology

Surry (1997)[1] has developed a GAMS program which uses the maximum entrophy approach to calibrate a non-homothetic CDE expenditure function with subsistence quantities for three goods (agriculture, manufactures, and services) for the United States. To use this procedure for our purposes, first, we need to modify Surry's work in order to accommodate a larger number of goods, with widely varying budget shares. To do this, we need to recognize that there are two key constraints in our calibration procedure. The first comes in the form of a formula for income elasticities of demand (Hanoch 1975):

$$\eta_i = [\sum^k(s_k e_k \alpha_k) + e_i(1-\alpha_i)] / [\sum^k(s_k e_k)] + (\alpha_i - \sum^k s_k \alpha_k), \text{ and}$$

the second is the formula for uncompensated direct price elasticities of demand:

$$\epsilon_{ii} = - v_{ii} + s_i \eta_i = s_i[2\alpha_i - \sum^k s_k \alpha_k] - \alpha_i + s_i \eta_i ,$$

where η_i, s_i , e_i, α_i, v_{ii}, ϵ_{ii} are income elasticity, expenditure share, expansion parameter, substitution parameter, compensated own direct price elasticity, and uncompensated direct price elasticity, respectively, for commodity i. We have target values for η_i, s_i, and ϵ_{ii} which serve as inputs into the program, while e_i and α_i are positive variables in the program. The problem is that the above two constraints may be infeasible.

A key feature of the adjustments to the Surry calibration procedure is the introduction of some fuzzy constraints. The new model permits departures from the target elasticities, thereby leaving room for mutually inconsistent target inputs. By introducing fuzzy terms, the above two constraints become:

$$\eta_i(\text{estimated}) = \eta_i + \text{diff1} = [\sum^k(s_k e_k \alpha_k) + e_i(1-\alpha_i)] / [\sum^k(s_k e_k)] + (\alpha_i - \sum^k s_k \alpha_k), \text{ and}$$

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[1] This is part of the work in progress undertaken in association with Dr. Ludo Peeters on the generalization and estimation of consumer demand systems with minimum subsistence quantities.

$$\epsilon_{ii}(\text{estimated}) = \epsilon_{ii} + \text{diff2} = -v_{ii} + s_i\eta_i = s_i[2\alpha_i - \sum^k s_k\alpha_k] - \alpha_i + s_i\eta_i .$$

We put a harsh penalty on the absolute values of diff1 and diff2 to ensure minimal departures from the target elasticities. The new approach turns out to be quite robust with respect to these departures.

Since the inclusion of more commodities increases the possibility that the program will not converge, we are uncertain about the optimum number of commodities that should be included in the model. Ideally, the demand elasticities for all 50 GTAP commodities should be calibrated by the model. However, there is a trade-off between the number of commodities used and the seriousness of violations measured by the introduction of the fuzzy terms. It is very likely that the scales of fuzzy terms for some regions will become intolerably large if we include all 50 commodities. Therefore, an aggregation over the commodities to keep the number of aggregated commodities down to a minimum is necessary. Another reason for the aggregation stems from the fact that the source estimates for target income and price elasticities are generally fairly aggregate in the first place.

After the estimation is done for the aggregated commodities, we then extend the CDE parameters for the aggregated system to the 50 commodity level by assuming that all in-group commodities have the same parameter estimates as their aggregated parents. To make the above assumption plausible, we aggregate all 50 GTAP commodities based on their similarities. Since the input (target) elasticities were compiled from studies on disaggregated food commodities as well as on broad commodity aggregates, aggregation of the commodities was achieved mostly by mapping the 50 GTAP commodities back to the same broad aggregate commodities which are consistent with the original studies. Eleven commodity groupings were identified - grain products (grains), other food products (other food), meat and livestock products (meatlvstk), dairy products (dairy), beverages and tobacco (bev_tob), textiles and wearing apparel (textwapp), rent and fuel (rent_fuel), other commodities (others), transport, durables, and services. Table 21.1 shows the mapping between the 50 GTAP commodities and the 11 aggregated commodities. Tables 21.2 and 21.3 report the income and uncompensated own-price demand elasticity targets for all 50 regions and 11 commodities, respectively.

21.4 Results

We found that the income and own-price elasticity estimates which result from the maximum entropy calibration of the CDE substitution and expansion parameters are superior to those that we obtained using the previous calibration procedure used in the version 3: we are able to get closer to the target values. To compare the estimated model demand elasticities and the target demand elasticities, we compute their difference in relative and in absolute terms (see tables 21.4 to 21.7).

Based on the results as reported in tables 21.4-21.7, we can make some observations. First, in the vast majority of cases, we are able to come very close to the targeted elasticities with this new calibration procedure. Second, the performance of the CDE with respect to the price elasticities is somewhat better than that for the income elasticities. Third, the majority of the problems for income elasticities arise in the case of food products in the OECD regions, where the target elasticity is very low, and although some of these percentage deviations are large, the absolute differences are still relatively small.

In conclusion, it is observed that the current procedure to calibrate the CDE function in the GTAP version 4 data base is an improvement over that used in the version 3. However, there are still some weaknesses in the new procedure. This stems from the implicit assumption that there are some pre-established separable structures which separate the 50 commodities into eleven aggregate groups. Then, within each group, it is assumed that all in-group commodities have the same parameter estimates as their aggregated parents. This latter assumption is somewhat strong and can be relaxed by applying the maximum entropy calibration procedure again for the in-group, but this assumes that the consumer demand for in-group commodities also follow a linearly homogenous CDE expenditure function. This would result in the creation of eleven additional CDE functions for each region with different substitution parameters, and the procedure becomes computationally burdensome, as well as informationally demanding.

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Table 21.1 Mapping of GTAP commodities and 11 commodity aggregates

GTAP V4 50 commodities	Aggregated 11 commodities	GTAP V4 50 commodities	Aggregated 11 commodities
pdr	grains	b_t	bev_tob
wht	grains	tex	textwapp
gro	grains	wap	textwapp
v_f	other food	lea	other
osd	other food	lum	other
c_b	other food	ppp	other
pfb	other food	p_c	other
ocr	other food	crp	other
ctl	meatlvstk	nmm	other
oap	meatlvstk	i_s	other
rmk	dairy	nfm	other
wol	textwapp	fmp	other
for	other	mvh	transport
fsh	other food	otn	transport
col	rent_fuel	ele	durables
oil	rent_fuel	ome	durables
gas	rent_fuel	omf	durables
omn	other	ely	rent_fuel
cmt	meatlvstk	gdt	rent_fuel
omt	meatlvstk	wtr	rent_fuel
vol	other food	cns	rent_fuel
mil	dairy	t_t	transport
pcr	grains	osp	service
sgr	other food	osg	service
ofd	other food	dwe	rent_fuel

Table 21.2 Target income elasticities of demand

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	0.16	0.14	0.24	0.09	0.93	0.87	1.02	1.14	1.13	1.06	1.10
NZL	0.09	0.41	0.09	0.09	0.89	0.83	0.98	1.13	1.12	1.04	1.11
JPN	0.09	0.34	0.71	0.54	0.90	0.85	0.99	1.13	1.12	1.04	1.12
KOR	0.18	0.59	0.64	0.71	0.94	0.89	1.06	1.29	1.28	1.13	1.28
IDN	0.41	0.66	0.77	1.08	0.89	0.83	1.03	1.39	1.36	1.11	1.41
MYS	0.18	0.58	0.36	0.36	0.93	0.87	1.04	1.20	1.20	1.09	1.20
PHL	0.19	0.64	0.66	0.50	0.96	0.90	1.08	1.33	1.32	1.15	1.33
SGP	0.27	0.22	0.46	0.40	0.96	0.90	1.05	1.17	1.16	1.09	1.16
THA	0.10	0.56	0.34	0.47	0.85	0.80	0.96	1.14	1.14	1.02	1.16
VNM	0.34	0.65	0.98	0.85	0.87	0.82	1.01	1.45	1.44	1.10	1.39
CHN	0.40	0.86	1.10	0.80	0.97	0.93	1.11	1.31	1.07	1.35	1.06
HKG	0.18	0.33	0.32	0.48	0.92	0.87	1.02	1.15	1.14	1.06	1.17
TWN	0.10	0.49	0.52	0.24	0.95	0.90	1.07	1.23	1.23	1.11	1.19
IND	0.30	0.74	0.69	0.62	0.92	0.86	1.07	1.70	1.62	1.18	1.40
LKA	0.40	0.69	1.00	0.67	1.02	0.96	1.16	1.49	1.46	1.24	1.56
RAS	0.32	0.79	0.83	0.68	1.01	0.95	1.15	1.50	1.47	1.23	1.31
CAN	0.14	0.14	0.17	0.09	0.92	0.86	1.01	1.12	1.12	1.04	1.12
USA	0.16	0.12	0.10	0.09	0.90	0.85	0.99	1.10	1.09	1.02	1.07
MEX	0.09	0.55	0.34	0.44	0.89	0.83	1.00	1.21	1.19	1.06	1.21
CAM	0.34	0.60	0.52	0.46	0.91	0.85	1.02	1.24	1.23	1.09	1.21
VEN	0.14	0.48	0.33	0.30	0.91	0.85	1.01	1.16	1.15	1.06	1.14
COL	0.30	0.57	0.49	0.35	0.87	0.81	0.97	1.16	1.15	1.03	1.13
RAP	0.26	0.58	0.62	0.51	0.89	0.83	1.00	1.23	1.21	1.06	1.27
ARG	0.09	0.50	0.17	0.13	0.93	0.87	1.04	1.21	1.19	1.09	1.24
BRA	0.19	0.53	0.52	0.41	0.95	0.89	1.06	1.23	1.22	1.11	1.19
CHL	0.20	0.53	0.56	0.41	0.94	0.88	1.05	1.23	1.22	1.10	1.25
URY	0.18	0.51	0.20	0.13	0.99	0.87	1.11	1.27	1.26	1.16	1.24
RSM	0.28	0.59	0.46	0.43	0.88	0.80	1.00	1.25	1.23	1.07	1.22
GBR	0.09	0.29	0.19	0.09	0.91	0.85	1.01	1.13	1.12	1.04	1.12
DEU	0.15	0.23	0.30	0.09	0.94	0.89	1.04	1.16	1.16	1.08	1.12
DNK	0.15	0.24	0.29	0.09	0.93	0.88	1.02	1.15	1.14	1.07	1.12
SWE	0.22	0.27	0.10	0.09	0.94	0.89	1.04	1.17	1.16	1.08	1.15
FIN	0.19	0.36	0.13	0.09	0.93	0.87	1.03	1.16	1.15	1.07	1.16
REU	0.18	0.33	0.30	0.21	0.90	0.84	0.99	1.12	1.11	1.03	1.13
EFT	0.12	0.31	0.16	0.09	0.93	0.88	1.04	1.16	1.15	1.07	1.13
CEA	0.17	0.55	0.41	0.40	1.02	0.96	1.14	1.32	1.32	1.20	1.29
FSU	0.19	0.54	0.29	0.26	0.81	0.76	0.92	1.15	1.13	0.97	1.16
TUR	0.17	0.56	0.60	0.48	0.95	0.89	1.06	1.24	1.23	1.11	1.28
RME	0.31	0.52	0.57	0.50	0.90	0.83	1.01	1.21	1.19	1.06	1.18
MAR	0.18	0.70	0.70	0.65	0.99	0.90	1.12	1.48	1.46	1.21	1.28
RNF	0.23	0.68	0.68	0.55	1.04	0.95	1.17	1.45	1.43	1.25	1.29
SAF	0.50	0.55	0.63	0.65	0.77	0.72	0.88	1.17	1.12	0.95	1.21
RSA	0.65	0.61	0.52	0.53	0.76	0.71	0.89	1.54	1.46	1.00	1.35
RSS	0.68	0.62	0.62	0.52	0.82	0.77	0.96	1.52	1.46	1.06	1.39
ROW	0.33	0.56	0.57	0.55	0.90	0.85	1.02	1.27	1.25	1.08	1.32

Table 21.3 Target uncompensated own-price elasticities of demand

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	-0.10	-0.09	-0.16	-0.06	-0.58	-0.56	-0.53	-0.73	-0.47	-0.68	-0.62
NZL	-0.06	-0.27	-0.06	-0.06	-0.55	-0.53	-0.52	-0.71	-0.43	-0.66	-0.62
JPN	-0.08	-0.30	-0.62	-0.48	-0.76	-0.72	-0.87	-0.98	-0.64	-0.90	-0.66
KOR	-0.09	-0.29	-0.32	-0.36	-0.45	-0.44	-0.51	-0.64	-0.50	-0.56	-0.53
IDN	-0.09	-0.15	-0.18	-0.25	-0.20	-0.19	-0.23	-0.32	-0.21	-0.26	-0.29
MYS	-0.07	-0.21	-0.13	-0.14	-0.34	-0.32	-0.37	-0.43	-0.36	-0.37	-0.41
PHL	-0.04	-0.14	-0.15	-0.11	-0.20	-0.20	-0.23	-0.29	-0.18	-0.26	-0.27
SGP	-0.20	-0.16	-0.33	-0.29	-0.67	-0.63	-0.75	-0.82	-0.59	-0.71	-0.73
THA	-0.03	-0.20	-0.12	-0.17	-0.30	-0.28	-0.33	-0.38	-0.28	-0.36	-0.38
VNM	-0.05	-0.08	-0.13	-0.11	-0.10	-0.11	-0.13	-0.19	-0.16	-0.15	-0.18
CHN	-0.07	-0.15	-0.18	-0.15	-0.17	-0.16	-0.20	-0.23	-0.17	-0.24	-0.19
HKG	-0.13	-0.23	-0.23	-0.33	-0.64	-0.56	-0.68	-0.78	-0.47	-0.70	-0.74
TWN	-0.05	-0.26	-0.27	-0.13	-0.48	-0.47	-0.51	-0.65	-0.47	-0.59	-0.59
IND	-0.05	-0.11	-0.10	-0.09	-0.14	-0.12	-0.16	-0.25	-0.19	-0.18	-0.19
LKA	-0.07	-0.11	-0.18	-0.12	-0.18	-0.16	-0.21	-0.26	-0.18	-0.22	-0.25
RAS	-0.04	-0.11	-0.12	-0.09	-0.14	-0.12	-0.15	-0.20	-0.17	-0.17	-0.17
CAN	-0.09	-0.09	-0.11	-0.06	-0.59	-0.56	-0.53	-0.73	-0.48	-0.67	-0.63
USA	-0.12	-0.09	-0.07	-0.07	-0.67	-0.63	-0.68	-0.83	-0.59	-0.77	-0.64
MEX	-0.03	-0.18	-0.11	-0.15	-0.29	-0.27	-0.34	-0.40	-0.22	-0.35	-0.34
CAM	-0.09	-0.15	-0.13	-0.12	-0.22	-0.21	-0.25	-0.31	-0.22	-0.27	-0.28
VEN	-0.05	-0.17	-0.12	-0.11	-0.31	-0.30	-0.34	-0.40	-0.25	-0.37	-0.35
COL	-0.09	-0.17	-0.15	-0.11	-0.26	-0.25	-0.28	-0.35	-0.22	-0.32	-0.30
RAP	-0.08	-0.16	-0.18	-0.15	-0.25	-0.24	-0.27	-0.35	-0.25	-0.31	-0.30
ARG	-0.04	-0.23	-0.08	-0.06	-0.42	-0.40	-0.49	-0.55	-0.48	-0.51	-0.34
BRA	-0.07	-0.19	-0.19	-0.15	-0.35	-0.32	-0.38	-0.44	-0.33	-0.41	-0.41
CHL	-0.08	-0.20	-0.21	-0.16	-0.35	-0.33	-0.37	-0.46	-0.34	-0.42	-0.39
URY	-0.07	-0.19	-0.08	-0.05	-0.36	-0.33	-0.34	-0.48	-0.36	-0.45	-0.44
RSM	-0.08	-0.16	-0.12	-0.12	-0.21	-0.21	-0.24	-0.32	-0.27	-0.28	-0.31
GBR	-0.06	-0.19	-0.12	-0.06	-0.59	-0.55	-0.60	-0.74	-0.41	-0.67	-0.64
DEU	-0.11	-0.17	-0.22	-0.07	-0.68	-0.64	-0.65	-0.85	-0.62	-0.78	-0.76
DNK	-0.12	-0.19	-0.23	-0.07	-0.72	-0.67	-0.61	-0.89	-0.56	-0.83	-0.80
SWE	-0.16	-0.19	-0.07	-0.07	-0.66	-0.62	-0.62	-0.82	-0.54	-0.76	-0.70
FIN	-0.13	-0.25	-0.09	-0.06	-0.62	-0.61	-0.56	-0.81	-0.53	-0.75	-0.72
REU	-0.12	-0.22	-0.20	-0.15	-0.60	-0.57	-0.66	-0.76	-0.61	-0.70	-0.45
EFT	-0.10	-0.26	-0.14	-0.08	-0.76	-0.71	-0.71	-0.95	-0.68	-0.87	-0.85
CEA	-0.05	-0.16	-0.12	-0.12	-0.29	-0.28	-0.34	-0.39	-0.31	-0.36	-0.37
FSU	-0.06	-0.17	-0.09	-0.08	-0.24	-0.23	-0.28	-0.34	-0.25	-0.30	-0.25
TUR	-0.05	-0.17	-0.19	-0.15	-0.29	-0.27	-0.32	-0.37	-0.21	-0.34	-0.38
RME	-0.12	-0.19	-0.21	-0.18	-0.32	-0.30	-0.34	-0.43	-0.28	-0.39	-0.38
MAR	-0.04	-0.15	-0.15	-0.15	-0.22	-0.20	-0.24	-0.32	-0.28	-0.27	-0.23
RNF	-0.05	-0.15	-0.15	-0.12	-0.23	-0.20	-0.25	-0.31	-0.27	-0.28	-0.23
SAF	-0.20	-0.22	-0.25	-0.26	-0.29	-0.29	-0.35	-0.46	-0.28	-0.38	-0.36
RSA	-0.12	-0.11	-0.09	-0.10	-0.13	-0.13	-0.16	-0.27	-0.20	-0.18	-0.23
RSS	-0.11	-0.10	-0.10	-0.08	-0.13	-0.12	-0.15	-0.25	-0.18	-0.17	-0.21
ROW	-0.10	-0.16	-0.17	-0.16	-0.25	-0.24	-0.30	-0.36	-0.26	-0.32	-0.31

Table 21.4 Absolute difference between target and estimated income elasticities

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	0.017	/	/	/	/	/	/	/	/	/	/
NZL	0.028	/	/	0.023	/	/	/	/	/	/	/
JPN	0.078	0.016	0.012	0.029	/	/	/	-0.034	/	/	/
KOR	/	/	/	/	/	/	/	/	/	/	/
IDN	/	/	/	/	/	/	/	/	/	/	/
MYS	/	/	/	/	/	/	/	/	/	/	/
PHL	/	/	/	/	/	/	/	/	/	/	/
SGP	0.012	/	/	/	/	/	/	/	/	/	/
THA	/	/	/	/	/	/	/	/	/	/	/
VNM	/	/	/	/	/	/	/	/	/	/	/
CHN	/	/	/	/	/	/	/	/	/	/	/
HKG	0.02	/	/	/	/	/	/	/	/	/	/
TWN	/	/	/	/	/	/	/	/	/	/	/
IND	/	/	/	/	/	/	/	/	/	/	/
LKA	/	/	/	/	/	/	/	/	/	/	/
RAS	/	/	/	/	/	/	/	/	/	/	/
CAN	0.02	/	/	0.03	/	/	/	/	/	/	/
USA	/	/	/	0.012	/	/	/	/	0.042	/	-0.039
MEX	/	/	/	/	/	/	/	/	/	/	/
CAM	/	/	/	/	/	/	/	/	/	/	/
COL	/	/	/	/	/	/	/	/	/	/	/
RAP	/	/	/	/	/	/	/	/	/	/	/
VEN	/	/	/	/	/	/	/	/	/	/	/

contd

Table 21.4 Absolute difference between target and estimated income elasticities (continued)

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
ARG	0.034	/	/	/	/	/	/	/	/	/	/
BRA	/	/	/	/	/	/	/	/	/	/	/
CHL	/	/	/	/	/	/	/	/	/	/	/
URY	/	/	/	/	/	/	/	/	/	/	/
RSM	/	/	/	/	/	/	/	/	/	/	/
GBR	0.042	/	/	0.034	/	/	/	/	/	/	/
DEU	0.07	/	/	0.075	/	/	/	/	/	/	/
DNK	0.062	0.02	0.02	0.064	/	/	/	/	/	/	-0.021
SWE	0.045	/	0.055	0.063	/	/	/	/	/	/	-0.019
FIN	0.051	/	/	0.025	/	/	/	/	/	/	/
REU	0.026	/	/	/	/	/	/	/	/	/	/
EFT	0.06	/	0.03	0.054	/	/	/	-0.087	0.042	/	-0.051
CEA	/	/	/	/	/	/	/	/	/	/	/
FSU	/	/	/	/	/	/	/	/	/	/	/
TUR	/	/	/	/	/	/	/	/	/	/	/
RME	/	/	/	/	/	/	/	/	/	/	/
MAR	/	/	/	/	/	/	/	/	/	/	/
RNF	/	/	/	/	/	/	/	/	/	/	/
SAF	/	/	/	/	/	/	/	/	/	/	/
RSA	/	/	/	/	/	/	/	/	/	/	/
RSS	/	/	/	/	/	/	/	/	/	/	/
ROW	/	/	/	/	/	/	/	/	/	/	/

[a] Entrees equal to diff1= (target - estimate).

[b] / = negligible and the scale of its corresponding value is less than 1%.

Table 21.5 Percentage difference between target and estimated income elasticities

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	10.49	/	/	/	/	/	/	/	/	/	/
NZL	31.66	/	/	26.23	/	/	/	/	/	/	/
JPN	89.14	/	/	5.36	/	/	/	/	/	/	/
KOR	/	/	/	/	/	/	/	/	/	/	/
IDN	/	/	/	/	/	/	/	/	/	/	/
MYS	/	/	/	/	/	/	/	/	/	/	/
PHL	/	/	/	/	/	/	/	/	/	/	/
SGP	/	/	/	/	/	/	/	/	/	/	/
THA	/	/	/	/	/	/	/	/	/	/	/
VNM	/	/	/	/	/	/	/	/	/	/	/
CHN	/	/	/	/	/	/	/	/	/	/	/
HKG	11.08	/	/	/	/	/	/	/	/	/	/
TWN	9.19	/	/	/	/	/	/	/	/	/	/
IND	/	/	/	/	/	/	/	/	/	/	/
LKA	/	/	/	/	/	/	/	/	/	/	/
RAS	/	/	/	/	/	/	/	/	/	/	/
CAN	14.65	/	/	33.09	/	/	/	/	/	/	/
USA	/	/	/	13.40	/	/	/	/	/	/	/
MEX	/	/	/	/	/	/	/	/	/	/	/
CAM	/	/	/	/	/	/	/	/	/	/	/
VEN	/	/	/	/	/	/	/	/	/	/	/
COL	/	/	/	/	/	/	/	/	/	/	/
RAP	/	/	/	/	/	/	/	/	/	/	/
ARG	37.22	/	/	/	/	/	/	/	/	/	/
BRA	/	/	/	/	/	/	/	/	/	/	/

contd

Table 21.5 Percentage difference between target and estimated income elasticities (continued)

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
CHL	/	/	/	/	/	/	/	/	/	/	/
URY	/	/	/	/	/	/	/	/	/	/	/
RSM	/	/	/	/	/	/	/	/	/	/	/
GBR	47.09	/	/	37.72	/	/	/	/	/	/	/
DEU	46.11	/	/	81.19	/	/	/	/	/	/	/
DNK	40.17	8.36	6.98	70.27	/	/	/	/	/	/	/
SWE	20.63	/	54.90	68.26	/	/	/	/	/	/	/
FIN	27.34	/	/	27.40	/	/	/	/	/	/	/
REU	14.71	/	/	/	/	/	/	/	/	/	/
EFT	49.38	/	18.47	58.42	/	/	/	-7.45	/	/	/
CEA	/	/	/	/	/	/	/	/	/	/	/
FSU	/	/	/	/	/	/	/	/	/	/	/
TUR	/	/	/	/	/	/	/	/	/	/	/
RME	/	/	/	/	/	/	/	/	/	/	/
MAR	/	/	/	/	/	/	/	/	/	/	/
RNF	/	/	/	/	/	/	/	/	/	/	/
SAF	/	/	/	/	/	/	/	/	/	/	/
RSA	/	/	/	/	/	/	/	/	/	/	/
RSS	/	/	/	/	/	/	/	/	/	/	/
ROW	/	/	/	/	/	/	/	/	/	/	/

[a] Entrees are calculated as follows: [estimate - target]/target * 100%.

[b] / = negligible and the scale of its corresponding value is less than 5%.

Table 21.6 Absolute difference between target and estimated uncompensated price elasticities

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	/	/	/	0.033	/	/	/	/	/	/	/
NZL	/	/	0.016	/	/	/	/	/	/	/	/
JPN	/	/	/	/	/	/	/	0.035	/	/	0.114
KOR	/	/	/	/	/	/	/	/	/	/	/
IDN	/	/	/	/	/	/	/	/	/	/	/
MYS	/	/	/	/	/	/	/	/	/	/	/
PHL	/	/	/	/	/	/	/	/	/	/	/
SGP	/	/	/	/	/	/	/	/	/	-0.016	/
THA	/	/	/	/	/	/	/	/	/	/	/
VNM	/	/	/	/	/	/	/	/	/	/	/
CHN	/	/	/	/	/	/	/	/	/	/	/
HKG	/	/	/	/	/	/	/	/	/	/	/
TWN	0.037	/	/	/	/	/	/	/	/	/	/
IND	/	/	/	/	/	/	/	/	/	/	/
LKA	/	/	/	/	/	/	/	/	/	/	/
RAS	/	/	/	/	/	/	/	/	/	/	/
CAN	/	/	/	/	/	/	/	/	/	/	/
USA	/	/	/	/	/	/	/	/	-0.013	/	0.06
MEX	/	/	/	/	/	/	/	/	/	/	/
CAM	/	/	/	/	/	/	/	/	/	/	/
VEN	/	/	/	/	/	/	/	/	/	/	/
COL	/	/	/	/	/	/	/	/	/	/	/
RAP	/	/	/	/	/	/	/	/	/	/	/

contd

Table 21.6 Absolute difference between target and estimated uncompensated price elasticities (continued)

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
ARG	/	/	/	/	/	/	/	/	/	/	/
BRA	/	/	/	/	/	/	/	/	/	/	/
CHL	/	/	/	/	/	/	/	/	/	/	/
URY	/	/	/	/	/	/	/	/	/	/	/
RSM	/	/	/	/	/	/	/	/	/	/	/
GBR	/	/	/	/	/	/	/	/	/	/	/
DEU	/	0.018	0.016	/	/	/	/	/	0.074	/	/
DNK	/	/	/	/	/	/	/	/	/	/	/
SWE	/	/	/	/	/	/	/	/	/	/	/
FIN	/	/	0.048	0.037	/	/	/	/	/	/	/
REU	/	/	/	/	/	/	/	/	/	/	/
EFT	/	/	/	/	/	/	/	0.047	0.067	/	0.032
CEA	/	/	/	/	/	/	/	/	/	/	/
FSU	/	/	/	/	/	/	/	/	/	/	/
TUR	/	/	/	/	/	/	/	/	/	/	/
RME	/	/	/	/	/	/	/	/	/	/	/
MAR	/	/	/	/	/	/	/	/	/	/	/
RNF	/	/	/	/	/	/	/	/	/	/	/
SAF	/	/	/	/	/	/	/	/	/	/	/
RSA	/	/	/	/	/	/	/	/	/	/	/
RSS	/	/	/	/	/	/	/	/	/	/	/
ROW	/	/	/	/	/	/	/	/	/	/	/

[a] Entrees equal to diff2 = (estimate - target).

[b] / = negligible and the scale of its corresponding value is less than 1%.

Table 21.7 Percentage difference between target and estimated uncompensated price elasticities

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
AUS	/	/	/	-54.95	/	/	/	/	/	/	/
NZL	/	/	-27.19	/	/	/	/	/	/	/	/
JPN	/	/	/	/	/	/	/	/	/	/	-10.43
KOR	/	/	/	/	/	/	/	/	/	/	/
IDN	/	/	/	/	/	/	/	/	/	/	/
MYS	/	/	/	/	/	/	/	/	/	/	/
PHL	/	/	/	/	/	/	/	/	/	/	/
SGP	/	/	/	/	/	/	/	/	/	/	/
THA	/	/	/	/	/	/	/	/	/	/	/
VNM	/	/	/	/	/	/	/	/	/	/	/
CHN	/	/	/	/	/	/	/	/	/	/	/
HKG	/	/	/	/	/	/	/	/	/	/	/
TWN	-69.33	/	/	/	/	/	/	/	/	/	/
IND	/	/	/	/	/	/	/	/	/	/	/
LKA	/	/	/	/	/	/	/	/	/	/	/
RAS	/	/	/	/	/	/	/	/	/	/	/
CAN	/	/	/	/	/	/	/	/	/	/	/
USA	/	/	/	/	/	/	/	/	/	/	-5.91
MEX	/	/	/	/	/	/	/	/	/	/	/
CAM	/	/	/	/	/	/	/	/	/	/	/
VEN	/	/	/	/	/	/	/	/	/	/	/
COL	/	/	/	/	/	/	/	/	/	/	/
RAP	/	/	/	/	/	/	/	/	/	/	/
ARG	/	/	/	/	/	/	/	/	/	/	/
BRA	/	/	/	/	/	/	/	/	/	/	/
CHL	/	/	/	/	/	/	/	/	/	/	/

contd

Table 21.7 Percentage difference between target and estimated uncompensated price elasticities (continued)

	grains	other food	meatlvstk	dairy	bev_tob	textwapp	rent_fuel	other	transport	durables	service
URY	/	/	/	/	/	/	/	/	/	/	/
RSM	/	/	/	/	/	/	/	/	/	/	/
GBR	/	/	/	/	/	/	/	/	/	/	/
DEU	/	-9.70	-6.61	/	/	/	/	/	-7.37	/	/
DNK	/	/	/	/	/	/	/	/	/	/	/
SWE	/	/	/	/	/	/	/	/	/	/	/
FIN	/	/	-50.41	-54.66	/	/	/	/	/	/	/
REU	/	/	/	/	/	/	/	/	/	/	/
EFT	/	/	/	/	/	/	/	/	-6.37	/	/
CEA	/	/	/	/	/	/	/	/	/	/	/
FSU	/	/	/	/	/	/	/	/	/	/	/
TUR	/	/	/	/	/	/	/	/	/	/	/
RME	/	/	/	/	/	/	/	/	/	/	/
MAR	/	/	/	/	/	/	/	/	/	/	/
RNF	/	/	/	/	/	/	/	/	/	/	/
SAF	/	/	/	/	/	/	/	/	/	/	/
RSA	/	/	/	/	/	/	/	/	/	/	/
RSS	/	/	/	/	/	/	/	/	/	/	/
ROW	/	/	/	/	/	/	/	/	/	/	/

[a] Entrees equal to (estimate - target)/target *100%

[b] / = negligible and the scale of its corresponding value is less than 5%.