

Chapter 16

Behavioral Parameters

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This chapter describes how we obtained the initial estimates for the Global Trade Analysis Project (GTAP) behavioral parameters file. These include the source substitution or Armington elasticities, the factor substitution elasticities, the factor transformation elasticities, the investment parameters, and the consumer demand elasticities. Table 16.1 summarizes for these parameters: the associated notation, the set over which they are indexed, and their description. In this chapter we explain the role of each parameter in the GTAP Model, and describe how we obtained the current settings.

Most of the parameters treated here enter directly into the GTAP Data Base. In contrast with the rest of the data file where an extensive and elaborate process of transformation is required to remove any inconsistencies, and repair the omissions in the initial data sets, no such processing is required here for most of the behavioral parameters. For the most part, each individual parameter is an independent datum, which stands or falls on its own, and does not require any consistency checks with other parameters. The one exception to this rule is the consumer demand parameters (see section E). Here we do need to ensure consistency—the triad of Engel aggregation, Cournot aggregation and symmetry conditions. Also, there is a need to transform the data, from elasticities, for which we find empirical estimates, to the invariant parameters needed for our preferred functional form for the consumer demand system. The majority of default elasticities and parameters described in sections A, B, C and D have not been changed since the release of GTAP 6 Data Base, while recent trade elasticities have been added, the consumer demand parameters have been updated in this version.

A Import Substitution Elasticities

The GTAP Data Base contains two sets of source substitution elasticities. One relates to the substitution between domestic products and imports, and the other to the substitution between imports from different regions. To define these parameters precisely, we need to refer to the theoretical structure of the GTAP Model. In that model, the source substitution elasticities are defined separately for each of the representative agents within each region rather than referring to a single economy-wide demand behavior, as in many other global CGE models. This means that for each commodity within each region, the domestic-import mix is determined separately for each industry, and for each of the final demand categories, namely investment, household consumption, and

government consumption. The sourcing of imports is also determined separately for intermediate usage (for all industries together) and for each of the final demand categories. Finally, for cross-regional behavior, the GTAP Model assumes that for each commodity, all agents in all regions display the same substitution elasticity.

Table 16.1: Behavioral Parameters in the GTAP Model

	Parameter	Set index	Description
σ_D	ESUBD (c, r)	$c \in \text{COMM}$ $r \in \text{REG}$	Armington elasticity of substitution between domestic and imported goods at region level
σ_M	ESUBM (c, r)	$c \in \text{COMM}$ $r \in \text{REG}$	Armington elasticity of substitution of imports at region level
σ_{VA}	ESUBVA (a, r)	$a \in \text{ACTS}$ $r \in \text{REG}$	Elasticity of substitution between primary factors in the production at region level
	ESUBT (a, r)	$a \in \text{ACTS}$ $r \in \text{REG}$	Elasticity of substitution between composite intermediate inputs and value-added at region level
σ_T	ETRAE (e, r)	$e \in \text{ENDW}$ $r \in \text{REG}$	Elasticity of transformation for sluggish primary factor endowments
	ENDOWFLAG (e, t)	$e \in \text{ENDW}$ $t \in \text{ENDWT}$	Binary flag for endowment mobility (i.e., ENDWT is either mobile, sluggish, or fixed)
	RORFLEX (r)	$r \in \text{REG}$	Expected net rate of return flexibility parameter
	RORDELTA		Binary switch coefficient which determines the mechanism of allocating investment funds across regions
β	SUBPAR (c, r)	$c \in \text{COMM}$ $r \in \text{REG}$	The substitution parameter in the CDE minimum expenditure function
γ	INCPAR (c, r)	$c \in \text{COMM}$ $r \in \text{REG}$	The expansion parameter in the CDE minimum expenditure function

The source substitution elasticities used in the original version of the GTAP Data Base were taken from the SALTER model (Jomini et al. 1991). The SALTER settings were based on a synthesis of estimates from the econometric literature and original econometric work for one country—New Zealand. Since GTAP Data Base 6, we incorporate source substitution elasticities obtained from econometric work done by Hertel et al. 2003. The authors estimated the elasticity of substitution among imports from different sources using the approach used by Hummels 1999, who identifies σ_i by exploiting cross-sectional variation in delivered (CIF) prices.

The estimates of the elasticities of substitution among imports from different sources, σ_M , obtained by Hertel et al. 2003 are given in the second column of elasticities reported in Table 16.2. Compared to the trade elasticities used in previous versions of the GTAP Data Base, the simple average of the new trade elasticities, 7.0, is fairly similar to the previous average trade elasticity of 5.3. However, there is much greater sectoral variation in the econometrically estimated elasticities.

The substitution elasticities between domestic and imported commodities, σ_D , also reported in Table 16.2, are linked to the σ_M , by the “rule of two”, i.e. $\sigma_M = 2\sigma_D$. This rule was

first proposed by Jomini et al. 1991 and has been retained on the GTAP parameters file. This rule was tested by Liu, Arndt, and Hertel 2004 in a back-casting exercise with a simplified version of the GTAP Model. While those authors reject the validity of the GTAP trade elasticities, they fail to reject the rule of two, thereby lending additional support to this approach.

With the release of the GTAP 7 Model (Corong et al. 2017), various elasticities consider a regional dimension in addition to their sectoral dimension. After aggregation, trade weighted elasticities are available to users see for example, headers SBVR, SBDR, SBMR. Those who have a license to recompile their model, can edit the GTAP model to read the Armington elasticity of substitution between domestic and imported goods from header ‘SBDR’ instead of the default ‘ESBD’. Alternatively, one can rename the headers in ViewHAR.

Fontagné, Guimbard, and Orefice 2022 published trade elasticities at various product levels, one of which being the GTAP classification. Fontagné, Guimbard, and Orefice 2022 estimate tariff elasticities over the 2001 and 2016 period and are available including standard errors in Table 16.3. Headers ‘ESMC’ contains the algebraic calculation based on Fontagné, Guimbard, and Orefice 2022 and ‘ESDC’ following the rule of two. For 5 GTAP sectors we revert to the values estimated by Hertel et al. 2003 because they were not reported by Fontagné, Guimbard, and Orefice 2022 due to low significance.

B Factor Substitution Elasticities

The nested CES production functions in the GTAP Model are similar to those used in many other applied general equilibrium models. Primary factors of production are assumed to substitute for one another according to the constant elasticity of substitution, σ_{VA} , while composite value-added and intermediates are used in fixed proportions. The overall elasticity of substitution among primary factors determines the ability of the economy to alter its output mix in response to changes in relative prices, or changes in the endowments of these factors. These parameters also play an important role in determining the sectoral supply response in the presence of sector-specific and sluggish factors of production. For example, with the supply of agricultural land being fixed in the model, the ability to expand farm output can be directly linked to the ease of substitution between land and labor, and land and capital.

The third column of Table 16.2 reports the assumed values for σ_{VA} for each of the GTAP sectors. Like the trade elasticities, these are taken from the SALTER parameter file (Jomini et al. 1991). They are based on a review of the international cross-section studies which estimated this parameter, for various industries, using data from a wide range of countries. Note the relatively small elasticity of substitution in primary production. In light of the discussion regarding the linkage between this parameter and the sectoral supply response in the face of sector-specific factors, we can infer that whenever sector-specific, or sluggish factors of production are present in these sectors, this will significantly constrain the supply response of the sectors. Finally, we note that the greatest degree of substitutability (1.68) arises in the trade and transport sectors.

Although composite value-added and composite intermediate inputs are used in fixed pro-

portions in the standard GTAP Model, a parameter specifying the elasticity of substitution (ESUBT) between composite intermediates and composite value-added has recently been introduced into the model (Corong et al. 2017). This modification allows the user to specify the elasticity of substitution at the top nest of the production structure. The default setting of the elasticity is zero for all commodities, hence the ratio of composite intermediate inputs and value-added used in production is fixed.

C Factor Transformation Elasticities

The third class of behavioral parameters in GTAP describes the degree of primary factor mobility between the sectors. Within each region, the model distinguishes between primary factors that are perfectly mobile across productive sectors and those that are sluggish. In an experiment with sluggish factor endowments, it is important to assess how much of a disparity in relative sectoral returns can be sustained over the simulation period. This result is governed by the value of the elasticity of transformation, $\sigma_T < 0$. If σ_T is close to zero, then the allocation of factors across sectors is nearly fixed, and therefore factor supply is unresponsive to changes in relative returns. As σ_T takes on larger negative values, then the supply of factors will become more and more responsive to relative returns [see equation (51) in table 2.14 of Chapter 2 in Hertel 1997]. In the limit, as $\sigma_T \rightarrow -\infty$, this factor is perfectly mobile and no differential return can be sustained over the time horizon envisioned in the simulation. In this case, the factor should be reclassified as a perfectly mobile factor.

In the default setting which is generated from a standard aggregation of the database, all labor types and capital are treated as perfectly mobile, whereas natural resources and agricultural land are treated as sluggish factors of production. Since agricultural land is used only in primary agricultural activities, the sluggishness of land is relevant only if the aggregation in question contains more than one farm sector.

The binary matrix ENDOWFLAG allows users to change the default setting and switch the specification of an endowment from sluggish to mobile (or fixed) by editing the values in header EFLG in the parameter file.

D Investment Flexibility Parameters

Investment flexibility parameters refer to the degree of flexibility of regional investment. In the GTAP Model, if the user chooses to allow the allocation of global investment to regional economies to be responsive to region-specific rates of return on capital (parameter RORDELTA is 1), then the parameter $\text{RORFLEX}(r) > 0$ must be properly specified [equation (79) on page 44 in Corong et al. 2017].¹ The smaller the value of $\text{RORFLEX}(r)$, the greater the responsiveness of international investment to a change in the rate of return in region r . Because $\text{RORFLEX}(r)$ is indexed over

¹Or equation (58) of table 2.15 in Chapter 2 of Hertel 1997.

regions, it is possible to have some regions where investment is quite sensitive to changing rates of return, and others where this is not.

E Consumer Demand Elasticities

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 somewhere between the non-homothetic CES and 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:

$$\sum_{i \in TRAD} B_{i,r} UP_r^{\beta_{i,r} \gamma_{i,r}} \left[\frac{PP_{i,r}}{E_r(PP_r, UP_r)} \right]^{\beta_{i,r}} \equiv 1$$

where $E_r(\cdot)$ represents the minimum expenditure required to attain a pre-specified 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, $\beta_{i,r}$ or $SUBPAR(i, r)$, to replicate the desired compensated, own-price elasticities of demand, then choosing the expansion parameters, $\gamma_{i,r}$ or $INCPAR(i, r)$, to replicate the targeted income elasticities of demand.

In the early versions of the GTAP Data Base, we obtained available estimates of income elasticities from cross-country demand studies. Two studies provided income elasticity estimates which have country and commodity coverage for use with the disaggregate GTAP sectors and region. These are the World Food Model of the Food and Agriculture Organization (FAO, 1993) and the cross-country demand study by Theil, Chung, and Jr. 1989. In the current GTAP Data Base we continue to draw on the work done by Reimer and Hertel 2004 who estimated an implicit, directly additive demand system (AIDADS) first using cross-country data on consumer expenditures from the International Comparison Project (ICP) and then using GTAP data. The authors found that the two data sets produced results that are quite consistent despite their differing origins and the fact that the ICP data are based on consumer goods that embody wholesale/retail margins, while margins demand are treated separately in GTAP. Given the similarity of the results, the estimation based on GTAP data was found to be favorable since it readily matched the input-output-based production and trade data.

The AIDADS demand system was estimated for 10 commodity categories following the procedure of Cranfield et al. 2002. The mapping between the categories and the GTAP commodities is given in Table 16.4. The AIDADS parameter estimates based upon GTAP 10 data are presented in table 16.5. The first two columns of table 16.5 report α_n and β_n , which represent the bounds of the marginal budget shares.

The parameter estimates appear to be quite sensible for all commodities. Consider, for ex-

ample, the values corresponding to the "Grains, other crops" category in Table 16.5. Its α_n estimate indicates that at low income levels, this category accounts for 26 cents of each additional dollar of expenditure. However, its β_n estimate of zero suggests that at higher income levels, "Grains, other crops" is no longer part of any increases in expenditure. Note that α_n does not equal β_n for any category of expenditure. This suggests that there is a great richness of behavior that would have been missed had we assumed that α_n equal β_n such that marginal budget shares are constant, as in the LES demand system estimated by Hunter and Markusen (1988), among others. The estimated subsistence budget shares (γ_n) for "Meat, dairy, fish", "Utilities, other housing services", and "Transport, communication" are small while staple foods tend to have larger subsistence budget shares, at 0.122 and 0.031 for "Grains, other crops" and "Processed food, beverages, tobacco", respectively. This indicates that staple food products are necessary for survival at the lowest levels of income, whereas utilities, transport, and communications are not.

The estimates α_n , β_n , and γ_n obtained by Reimer and Hertel 2004 are updated with GTAP data on private consumption (VPA) and imports at market and world prices to generate income elasticity estimates for the 10 commodity categories for each of the 163 regions in GTAP 12. Estimates of own-price elasticities of demand were generated using the relationship for directly additive preferences proposed by Frisch 1959 and embodied in the Linear Expenditure System (LES). As discussed in Huff et al. 1997, the CDE is a more flexible functional form than the LES, and we could have used independent information on own-price demand elasticities in this calibration had it been available. In the future, we hope to supplement the elasticities file with cross-country studies of own-price responses. In addition, by using the CDE, GTAP modelers are given the flexibility to adjust commodity-specific substitution effects to conform with outside information on own-price elasticities of demand for key commodities in any particular application.

Using the income elasticity estimates, the values for own-price elasticities of demand were computed following the procedure and formula outlined in Zeitsch et al. 1991:

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

where ε_{ii} is the uncompensated own-price elasticity of demand 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. The compensated own-price elasticities, ν_{ii} , are then computed as:

$$\nu_{ii} = -\varepsilon_{ii} + s_i \eta_i$$

Using the above methods, we end up with estimates for income and compensated own-price elasticities of demand for 10 commodity categories and 145 countries.² These are then used as targets in the CDE calibration procedure.

²GTAP 12 describes 163 regions, 145 of these are countries for which we have an IO table; the remaining countries in the world have been aggregated into 18 regions.

E.1 CDE Calibration Procedure

The calibration problem involves calculating the values of the substitution parameter, $\beta_{i,r}$ or referred to in the code as $\text{SUBPAR}(i, r)$, to replicate the desired compensated, own-price elasticities of demand, then calculating the expansion parameters, $\gamma_{i,r}$ or $\text{INCPAR}(i, r)$ to replicate the targeted income elasticities of demand. The calibration of the CDE parameters for GTAP 12 follows the procedure used in earlier databases, which is discussed more fully in Liu, Surry, et al. 1999. The procedure is a modification of the Surry 1997 approach which uses maximum entropy to calibrate a non-homothetic CDE expenditure function with subsistence quantities for three goods. Surry's procedure was modified to accommodate a larger number of goods with widely varying budget shares.

The income elasticities, expenditure shares, and uncompensated direct price elasticities serve as target inputs into the calibration program. Fuzzy constraints were introduced into the model to permit departures from the target elasticities and to provide room for mutually inconsistent target inputs. The two constraints in the form of income elasticities of demand and uncompensated direct price elasticities of demand, became, respectively:

$$\begin{aligned}\eta_i(\text{estimated}) &= \eta_i + \text{diff1} = \frac{\sum_k s_k e_k \alpha_k + e_i(1 - \alpha_i)}{\sum_k s_k e_k} + \alpha_i - \sum_k s_k \alpha_k \\ \varepsilon_{ii}(\text{estimated}) &= \varepsilon_{ii} + \text{diff2} = -\nu_{ii} + s_i \eta_i = s_i [2\alpha_i - \sum_k s_k \alpha_k] - \alpha_i + s_i \eta_i\end{aligned}$$

where η_i , s_i , e_i , α_i , ν_{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} as inputs while e_i and α_i are positive variables in the program.

Harsh penalties were imposed on the absolute values of diff1 and diff2 to ensure minimal departures from the target elasticities. The approach turned 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 use the same 10 commodities categories for the CDE calibration. Tables 16.6 and 16.7 report the income and uncompensated own-price demand elasticity targets for all 163 regions and 10 commodity categories, respectively. After the estimation was done for the aggregated commodities, the CDE parameters for the aggregated system were then extended to the 65-commodity level by assuming that all in-group commodities have the same parameter estimates as their aggregated parents.

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Table 16.2: GTAP Substitution Elasticities

GTAP Commodities		Domestic/ Imported (σ_D)	Sourcing of Imports (σ_M)	Value-added ($\sigma_V A$)
pdr	Paddy rice	5.05	10.10	0.26
wht	Wheat	4.45	8.90	0.26
gro	Cereal grains nec	1.30	2.60	0.26
v_f	Vegetables, fruit, nuts	1.85	3.70	0.26
osd	Oil seeds	2.45	4.90	0.26
c_b	Sugar cane, sugar beet	2.70	5.40	0.26
pfb	Plant-based fibers	2.50	5.00	0.26
ocr	Crops nec	3.25	6.50	0.26
ctl	Bovine cattle, sheep and goats, horses	2.00	4.00	0.26
oap	Animal products nec	1.30	2.60	0.26
rmk	Raw milk	3.65	7.30	0.26
wol	Wool, silk-worm cocoons	6.45	12.90	0.26
frs	Forestry	2.50	5.00	0.20
fsh	Fishing	1.25	2.50	0.20
coa	Coal	3.05	6.10	0.20
oil	Oil	5.20	10.40	0.20
gas	Gas	17.20	34.40	0.20
oxt	Minerals nec	0.90	1.80	0.20
cmt	Bovine meat products	3.85	7.70	1.12
omt	Meat products nec	4.40	8.80	1.12
vol	Vegetable oils and fats	3.30	6.60	1.12
mil	Dairy products	3.65	7.30	1.12
pcr	Processed rice	2.60	5.20	1.12
sgr	Sugar	2.70	5.40	1.12
ofd	Food products nec	2.00	4.00	1.12
b_t	Beverages and tobacco products	1.15	2.30	1.12
tex	Textiles	3.75	7.50	1.26
wap	Wearing apparel	3.70	7.40	1.26
lea	Leather products	4.05	8.10	1.26
lum	Wood products	3.40	6.80	1.26
ppp	Paper products, publishing	2.95	5.90	1.26
p_c	Petroleum, coal products	2.10	4.20	1.26
chm	Chemical products	3.30	6.60	1.26
bph	Basic pharmaceutical products	3.30	6.60	1.26
rpp	Rubber and plastic products	3.30	6.60	1.26
nmn	Mineral products nec	2.90	5.80	1.26
i_s	Ferrous metals	2.95	5.90	1.26
nfm	Metals nec	4.20	8.40	1.26
fmp	Metal products	3.75	7.50	1.26
ele	Computer, electronic and optical products	4.40	8.80	1.26
eeq	Electrical equipment	4.40	8.80	1.26
ome	Machinery and equipment nec	4.05	8.10	1.26

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GTAP Commodities		Domestic/ Imported (σ_D)	Sourcing of Imports (σ_M)	Value-added ($\sigma_V A$)
mvh	Motor vehicles and parts	2.80	5.60	1.26
otn	Transport equipment nec	4.30	8.60	1.26
omf	Manufactures nec	3.75	7.50	1.26
ely	Electricity	2.80	5.60	1.26
gdt	Gas manufacture, distribution	2.80	5.60	1.26
wtr	Water	2.80	5.60	1.26
cns	Construction	1.90	3.80	1.40
trd	Trade	1.90	3.80	1.68
afs	Accommodation, Food and service activities	1.90	3.80	1.68
otp	Transport nec	1.90	3.80	1.68
wtp	Water transport	1.90	3.80	1.68
atp	Air transport	1.90	3.80	1.68
whs	Warehousing and support activities	1.90	3.80	1.68
cmn	Communication	1.90	3.80	1.26
ofi	Financial services nec	1.90	3.80	1.26
ins	Insurance	1.90	3.80	1.26
rsa	Real estate activities	1.90	3.80	1.26
obs	Business services nec	1.90	3.80	1.26
ros	Recreational and other services	1.90	3.80	1.26
osg	Public Administration and defense	1.90	3.80	1.26
edu	Education	1.90	3.80	1.26
hht	Human health and social work activities	1.90	3.80	1.26
dwe	Dwellings	1.90	3.80	1.26

Table 16.3: Fontagné, Guimbard, and Orefice 2022 Elasticities

GTAP Commodities		Estimated Tariff Elasticity	Standard Error	Trade Elasticity (ESMC)
pdr	Paddy rice	8.6252	1.4918	7.6252
wht	Wheat	3.6096	0.5441	2.6096
v_f	Vegetables, fruit, nuts	5.0194	0.2157	4.0194
osd	Oil seeds	3.0519	0.6018	2.0519
c_b	Sugar cane, sugar beet	3.3348	0.7418	2.3348
pfb	Plant-based fibers	13.0440	2.2448	12.0440
ocr	Crops nec	3.8711	0.2284	2.8711
ctl	Bovine cattle, sheep and goats, horses	7.3888	0.5488	6.3888
oap	Animal products nec	5.2722	0.3623	4.2722
wol	Wool, silk-worm cocoons	8.2821	1.0263	7.2821
frs	Forestry	3.5282	1.0795	2.5282
fsh	Fishing	7.6473	0.7999	6.6473
oil	Oil	11.8923	3.4686	10.8923
oxt	Minerals nec	9.2774	1.9002	8.2774
cmt	Bovine meat products	5.0426	0.3515	4.0426
omt	Meat products nec	6.1728	0.4380	5.1728
vol	Vegetable oils and fats	3.7465	0.5855	2.7465
mil	Dairy products	5.7696	0.1943	4.7696
pcr	Processed rice	7.4600	0.6884	6.4600
sgr	Sugar	4.7635	0.2263	3.7635
ofd	Food products nec	5.6982	0.1278	4.6982
b_t	Beverages and tobacco products	3.7272	0.3230	2.7272
tex	Textiles	7.0373	0.1061	6.0373
wap	Wearing apparel	4.8382	0.1213	3.8382
lea	Leather products	6.9944	0.2376	5.9944
lum	Wood products	9.6862	0.3086	8.6862
ppp	Paper products, publishing	9.1770	0.2335	8.1770
p_c	Petroleum, coal products	4.6382	0.5277	3.6382
chm	Chemical products	8.8290	0.2070	7.8290
bph	Basic pharmaceutical products	8.9163	0.6565	7.9163
rpp	Rubber and plastic products	8.0373	0.1686	7.0373
nmm	Mineral products nec	5.8275	0.1816	4.8275
i_s	Ferrous metals	4.4486	0.2610	3.4486
nfm	Metals nec	14.3875	1.1004	13.3875
fmp	Metal products	5.2502	0.1964	4.2502
ele	Computer, electronic and optical products	6.2582	0.4513	5.2582
eeq	Electrical equipment	5.6212	0.1767	4.6212
ome	Machinery and equipment nec	5.2310	0.1868	4.2310
mvh	Motor vehicles and parts	9.9807	0.3132	8.9807
otn	Transport equipment nec	8.9832	0.5930	7.9832
omf	Manufactures nec	5.9058	0.3513	4.9058
ely	Electricity	10.4813	0.0004	9.4813

Table 16.4: Mapping of GTAP Commodities with 10 Commodity Aggregates

GTAP Sectors	Aggregated Commodities	GTAP Sectors	Aggregated Commodities
pdr	GrainCrops	i_s	Mnfcs
wht	GrainCrops	nfm	Mnfcs
gro	GrainCrops	fmp	Mnfcs
v_f	GrainCrops	ele	Mnfcs
osd	GrainCrops	eeq	Mnfcs
c_b	GrainCrops	ome	Mnfcs
pfb	TextAppar	mvh	Mnfcs
ocr	GrainCrops	otn	TransComm
ctl	MeatDairy	omf	Mnfcs
oap	MeatDairy	ely	HousUtils
rmk	MeatDairy	gdt	HousUtils
wol	TextAppar	wtr	HousUtils
frs	Mnfcs	cns	HousUtils
fsh	MeatDairy	trd	WRTrade
coa	HousUtils	afs	WRTrade
oil	GrainCrops	otp	TransComm
gas	HousUtils	wtp	TransComm
oxt	Mnfcs	atp	TransComm
cmt	MeatDairy	whs	TransComm
omt	MeatDairy	cmn	TransComm
vol	OthFoodBev	ofi	FinService
mil	MeatDairy	ins	HousUtils
pcr	GrainCrops	rsa	FinService
sgr	OthFoodBev	obs	FinService
ofd	OthFoodBev	ros	HousOthServ
b_t	OthFoodBev	osg	HousOthServ
tex	TextAppar	edu	HousOthServ
wap	TextAppar	hht	HousOthServ
lea	TextAppar	dwe	HousOthServ
lum	Mnfcs		
ppp	Mnfcs		
p_c	Mnfcs		
chm	Mnfcs		
bph	Mnfcs		
rpp	Mnfcs		
nmm	Mnfcs		

Table 16.5: GTAP-Based AIDADS Estimates: Household Consumption Expenditures

Commodity Categories	α_n	β_n	γ_n
Grains, other crops	0.259	0	0.122
Meat, dairy, fish	0.153	0.053	0
Processed food, beverages, tobacco	0.248	0.054	0.031
Textiles, apparel, footwear	0.117	0.038	0
Utilities, housing services	0.027	0.068	0.042
Wholesale/retail trade	0.009	0.175	0
Manufactures, electronics	0.052	0.158	0.253
Transport Communication	0.104	0.133	0
Financial and business services	0.002	0.079	0.004
Housing, education, health, public services	0.029	0.243	0.24

Source: Author's calculations based on Reimer and Hertel (2004)

Table 16.6: Income Demand Elasticities

GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRtrade	Mnfes	Trans- Comm	Fin- Service	Hous- OthServ
aus	0.000309	0.904723	0.840312	0.899342	1.012746	1.032155	1.012345	0.995995	1.033508	1.028315
nzl	0.004114	0.887632	0.814114	0.881415	1.015372	1.038924	1.014886	0.995181	1.040574	1.034248
xoc	0.28848	0.623118	0.52882	0.613641	0.991118	1.163134	0.967681	0.902812	1.1757	1.124169
chn	0.279713	0.725898	0.60895	0.714148	1.143814	1.309428	1.126756	1.047719	1.32153	1.27288
hkg	-0.003226	0.935518	0.883249	0.931217	1.019396	1.034014	1.019109	1.006702	1.035025	1.031134
jpn	0.003129	0.882087	0.801377	0.875217	1.025699	1.052676	1.025245	1.002673	1.054574	1.047306
kor	-0.001653	0.839604	0.738479	0.83077	1.035883	1.0754	1.035142	1.002834	1.078219	1.067468
mng	0.396755	0.701604	0.611311	0.69244	1.092612	1.319702	1.053446	0.996104	1.336088	1.266374
twm	0.030593	0.800348	0.691787	0.790672	1.026307	1.074704	1.025063	0.986832	1.078168	1.064911
xea	0.50333	0.664017	0.612281	0.659143	0.910248	1.224306	0.825679	0.85983	1.245003	1.137979
brn	0.098277	0.696173	0.581561	0.685349	0.988647	1.064561	0.985765	0.931953	1.070054	1.048818
khn	0.610491	0.816846	0.750741	0.810573	1.133677	1.51458	1.027437	1.065904	1.540014	1.411018
idn	0.390688	0.692312	0.603383	0.683255	1.077323	1.296855	1.042487	0.981892	1.312742	1.245236
lao	0.647434	0.877683	0.804483	0.870635	1.231991	1.629154	1.130311	1.153187	1.655971	1.522676
mys	0.141042	0.73858	0.612393	0.726444	1.088651	1.188204	1.083493	1.017714	1.195439	1.167297
phl	0.381702	0.685975	0.597031	0.676894	1.071322	1.28949	1.037781	0.975732	1.305311	1.238237
sgp	-0.000984	0.909652	0.849522	0.904653	1.009016	1.026683	1.008697	0.993734	1.027911	1.023192
tha	0.235246	0.681351	0.566897	0.669902	1.079494	1.230466	1.065713	0.98881	1.24155	1.197334
vnm	0.479272	0.775468	0.685762	0.766369	1.186241	1.460648	1.136381	1.083447	1.480343	1.394167
xse	0.696196	0.862481	0.807845	0.858214	1.051987	1.555124	0.88136	1.053697	1.582267	1.397488
afg	0.712869	0.8897	0.836576	0.886892	0.912947	1.557521	0.656925	1.027857	1.570569	1.317902
bgd	0.616965	0.857783	0.780962	0.850421	1.225801	1.607552	1.109461	1.140625	1.633725	1.506665
ind	0.53539	0.741768	0.673824	0.735714	1.046177	1.404381	0.946279	0.98072	1.428565	1.308186
npl	0.648664	0.831247	0.77101	0.826196	1.078211	1.526342	0.914706	1.046762	1.553615	1.395449
pak	0.596143	0.793208	0.72938	0.787277	1.090914	1.47051	0.967723	1.030919	1.495485	1.366973
lka	0.353274	0.723307	0.616559	0.71261	1.156099	1.37402	1.1207	1.049882	1.390011	1.323815
xsa	0.346094	0.709773	0.60671	0.699351	1.12032	1.317638	1.084142	1.021122	1.332019	1.272625
can	-0.000535	0.896892	0.827502	0.891071	1.015091	1.03659	1.014701	0.996583	1.038093	1.032329
usa	-0.004613	0.932686	0.886664	0.928925	1.005162	1.017642	1.004869	0.994305	1.018502	1.015187
mex	0.130564	0.728276	0.604162	0.716377	1.067276	1.161967	1.062471	0.999135	1.168846	1.142129
xna	-0.006086	0.92262	0.869884	0.918328	1.006398	1.021006	1.005056	0.993707	1.022017	1.018127
arg	0.122166	0.708816	0.587907	0.697261	1.035951	1.12649	1.029269	0.970465	1.133067	1.107545
bol	0.429426	0.706133	0.622651	0.697654	1.083882	1.327182	1.03609	0.989479	1.344668	1.268651

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WTrade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
bra	0.153416	0.701305	0.579705	0.689505	1.05501	1.161309	1.045541	0.981476	1.169057	1.138805
chl	0.080816	0.770461	0.649544	0.759231	1.058931	1.128907	1.056714	1.004975	1.13395	1.114532
col	0.226915	0.717247	0.596759	0.705262	1.11384	1.252906	1.101671	1.026239	1.263063	1.222786
ecu	0.281889	0.747185	0.625316	0.734945	1.182417	1.35429	1.160952	1.082179	1.366883	1.31634
pry	0.248544	0.714281	0.596526	0.70251	1.115907	1.264081	1.101192	1.025635	1.274902	1.231736
per	0.219159	0.692385	0.576508	0.68086	1.072433	1.205013	1.06239	0.988696	1.214688	1.176325
ury	0.04331	0.80868	0.696773	0.798611	1.047216	1.099288	1.044905	1.005122	1.103015	1.088728
ven	0.251903	0.661305	0.553816	0.650506	1.046481	1.199461	1.02465	0.957639	1.210666	1.165652
xsm	0.153236	0.723457	0.594233	0.710916	1.105602	1.222866	1.094666	1.025163	1.231456	1.197946
cri	0.101085	0.758024	0.632771	0.746218	1.075886	1.157917	1.072617	1.0144	1.163857	1.140916
gtm	0.275193	0.715986	0.601149	0.704425	1.125585	1.286756	1.109708	1.031578	1.29853	1.251209
hnd	0.47715	0.751189	0.667496	0.742721	1.139887	1.413478	1.085849	1.042735	1.433028	1.346528
nic	0.584982	0.797917	0.730224	0.791382	1.125907	1.48446	1.034039	1.051953	1.508792	1.388785
pan	0.039054	0.797797	0.683432	0.787478	1.045012	1.099676	1.042572	1.000987	1.103601	1.08857
slv	0.307117	0.741153	0.625564	0.729466	1.167188	1.343679	1.148216	1.067963	1.356562	1.304429
xca	0.160625	0.764428	0.61377	0.750477	1.204927	1.346654	1.191716	1.109764	1.357131	1.316282
dom	0.17733	0.748104	0.618647	0.735474	1.134021	1.253394	1.125049	1.052804	1.262101	1.228017
hti	0.067399	0.818616	0.684212	0.806193	1.140163	1.218611	1.135489	1.079551	1.224297	1.202462
jam	0.203912	0.688714	0.569049	0.676919	1.077512	1.212553	1.062963	0.991686	1.222453	1.183334
pri	0.004139	0.876368	0.804334	0.87028	1.001325	1.024333	1.000938	0.981594	1.025944	1.019766
tto	0.059661	0.793199	0.664923	0.781434	1.093602	1.165593	1.090058	1.037528	1.170804	1.150809
xcb	0.230268	0.702613	0.583265	0.690781	1.103173	1.248642	1.084473	1.013403	1.259298	1.216948
aut	0.00252	0.902923	0.832048	0.896957	1.02441	1.046588	1.024011	1.005346	1.048139	1.042191
bel	0.002475	0.913816	0.841275	0.907708	1.038425	1.061213	1.037975	1.018843	1.062807	1.056693
bgr	0.150369	0.739623	0.613256	0.727417	1.0961	1.199339	1.09078	1.023283	1.206844	1.177603
hrv	0.081392	0.799895	0.674811	0.788296	1.096769	1.168386	1.094489	1.041365	1.173548	1.153678
cyp	0.027501	0.827184	0.726234	0.818273	1.028192	1.069512	1.02729	0.994007	1.072451	1.061196
cze	0.058255	0.806001	0.688514	0.795294	1.067206	1.12641	1.065613	1.020115	1.130659	1.114349
dnk	0.000075	0.922068	0.8557	0.916521	1.033565	1.053628	1.033181	1.016254	1.055027	1.049657
est	0.034507	0.858986	0.749387	0.849246	1.082262	1.129068	1.081189	1.043826	1.132404	1.119625
fin	0.002522	0.902964	0.83174	0.896967	1.025174	1.047501	1.024751	1.005984	1.049063	1.043074
fra	0.005802	0.895089	0.816584	0.88842	1.033523	1.059337	1.033054	1.011461	1.061149	1.054205
deu	0.003966	0.899835	0.824646	0.893476	1.030676	1.054834	1.030222	1.009971	1.056527	1.050037
grc	0.032855	0.846426	0.738992	0.836886	1.064655	1.110282	1.063658	1.027146	1.113534	1.10108
hun	0.089082	0.765421	0.642948	0.753982	1.064418	1.138593	1.061832	1.007785	1.143948	1.123304

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRTade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
irl	0.015512	0.847981	0.75796	0.840178	1.016887	1.049944	1.016237	0.989061	1.052281	1.043332
ita	0.009498	0.877525	0.793414	0.870318	1.029818	1.058797	1.029281	1.0052	1.060838	1.053021
lva	0.049408	0.854074	0.735101	0.843338	1.109587	1.165705	1.108174	1.064349	1.169723	1.154317
ltu	0.048369	0.841218	0.72402	0.830644	1.092828	1.148077	1.091442	1.048284	1.152032	1.136865
lux	-0.005379	0.956726	0.919797	0.95374	1.013218	1.022772	1.012971	1.004897	1.023425	1.020898
mlt	0.00722	0.88842	0.807965	0.881562	1.031657	1.058556	1.031142	1.008715	1.060446	1.053203
nld	0.004312	0.896376	0.820421	0.889945	1.029019	1.053575	1.028549	1.007987	1.055297	1.048697
pol	0.070022	0.798116	0.676551	0.786929	1.078547	1.144373	1.076572	1.02698	1.149109	1.130901
prt	0.02302	0.854599	0.755252	0.84589	1.047961	1.08696	1.047202	1.015472	1.089728	1.07913
rou	0.098157	0.789858	0.662005	0.777872	1.106775	1.186619	1.103898	1.046261	1.192388	1.170127
svk	0.053504	0.821474	0.704612	0.810877	1.07661	1.133474	1.075183	1.031058	1.137549	1.121913
svn	0.022281	0.869353	0.769782	0.860639	1.061998	1.100653	1.061249	1.029738	1.103395	1.092897
esp	0.015175	0.858652	0.767272	0.850733	1.03013	1.0637	1.029494	1.00187	1.066075	1.056985
swe	0.004164	0.900295	0.824964	0.893923	1.031452	1.055677	1.031008	1.010693	1.057374	1.050866
gbr	0.000105	0.903391	0.837587	0.897887	1.014196	1.03417	1.013792	0.99697	1.035563	1.030216
che	-0.006321	0.946882	0.904102	0.943405	1.013402	1.02477	1.013153	1.003502	1.025551	1.022536
nor	-0.006072	0.923154	0.866173	0.918449	1.015828	1.03214	1.015533	1.001676	1.033272	1.028921
xef	-0.004983	0.936499	0.888241	0.93255	1.012901	1.026106	1.012624	1.001418	1.027017	1.023507
alb	0.236852	0.716019	0.596836	0.704127	1.114977	1.258181	1.103252	1.026193	1.268636	1.227069
srb	0.196039	0.722684	0.59899	0.710502	1.107632	1.233054	1.099053	1.024923	1.242207	1.206189
blr	0.279516	0.761233	0.637238	0.748787	1.195483	1.361786	1.179355	1.096617	1.373941	1.325263
rus	0.144788	0.727918	0.601976	0.715764	1.084377	1.188113	1.077577	1.011308	1.195669	1.166252
ukr	0.370548	0.681778	0.591311	0.672549	1.066623	1.275979	1.034827	0.971696	1.291171	1.22716
xee	0.302039	0.698845	0.591884	0.687996	1.101627	1.27422	1.08318	1.006952	1.286814	1.23562
xer	0.134684	0.745347	0.617078	0.733045	1.098529	1.198227	1.091057	1.02716	1.205478	1.177311
kaz	0.170841	0.766266	0.634193	0.753422	1.151718	1.267821	1.144065	1.071546	1.276279	1.243236
kgz	0.529218	0.805468	0.720071	0.796858	1.208876	1.513381	1.143957	1.108527	1.535003	1.437858
tjk	0.691428	0.858845	0.804218	0.854433	1.060368	1.552161	0.886665	1.054766	1.579455	1.400134
uzb	0.575808	0.750833	0.69421	0.745653	1.012537	1.387311	0.891851	0.963805	1.411531	1.28183
xsu	0.482639	0.712737	0.641079	0.705538	1.055633	1.332426	0.99835	0.971182	1.351914	1.262907
arm	0.298531	0.762293	0.640555	0.750023	1.200849	1.376019	1.182213	1.099696	1.388822	1.337287
aze	0.371288	0.72651	0.625006	0.716173	1.144191	1.355836	1.110205	1.04222	1.371245	1.3071
geo	0.248244	0.738498	0.615928	0.726259	1.151444	1.300953	1.138903	1.059208	1.311873	1.268412
bhr	0.039635	0.782791	0.673295	0.772979	1.015497	1.066346	1.013825	0.974384	1.069989	1.056032
irn	0.4609	0.697873	0.624002	0.690566	1.044607	1.321465	0.962021	0.959218	1.341031	1.25228

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRTade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
irq	0.373346	0.656877	0.573537	0.648356	1.019119	1.226032	0.987675	0.929425	1.24098	1.177374
isr	0.001273	0.905295	0.833132	0.89922	1.029286	1.051967	1.028851	1.009792	1.053554	1.047468
jor	0.27341	0.682959	0.573885	0.671998	1.079796	1.241949	1.061318	0.98763	1.253809	1.205971
kwt	0.048149	0.787906	0.675725	0.777765	1.031455	1.085587	1.029572	0.988056	1.089466	1.074591
lbn	0.079815	0.749345	0.627797	0.738006	1.045999	1.119581	1.042957	0.989727	1.124903	1.104409
omn	0.101363	0.754469	0.630042	0.742757	1.069434	1.150609	1.065522	1.008566	1.156484	1.13379
pse	0.355996	0.681062	0.587995	0.671555	1.067275	1.265786	1.039847	0.972927	1.280201	1.219979
qat	0.032661	0.80708	0.702551	0.797789	1.021004	1.066084	1.019515	0.984049	1.069301	1.056983
sau	0.059381	0.772966	0.656319	0.762301	1.037409	1.098572	1.034852	0.989149	1.102972	1.086076
syr	0.546295	0.72859	0.670057	0.723187	1.00218	1.353603	0.886237	0.946121	1.376818	1.256744
tur	0.153471	0.701692	0.575405	0.689405	1.081305	1.200103	1.0743	1.000639	1.208822	1.174778
are	-0.0042	0.916935	0.854125	0.911759	1.020114	1.03851	1.019626	1.004206	1.039791	1.034875
xws	0.703769	0.856488	0.804456	0.853551	0.913786	1.506686	0.681856	0.998768	1.52423	1.293238
dza	0.555043	0.835831	0.747723	0.827112	1.25063	1.580041	1.16628	1.147698	1.603397	1.497463
egy	0.389087	0.730719	0.627576	0.720544	1.155035	1.384259	1.117069	1.049973	1.400992	1.330812
mar	0.408051	0.695548	0.60947	0.686832	1.079467	1.319027	1.038872	0.983618	1.33633	1.261835
tun	0.40001	0.704938	0.613425	0.695726	1.102873	1.337093	1.060803	1.003463	1.354108	1.281624
xnf	0.332012	0.838915	0.705426	0.825468	1.321166	1.515119	1.299331	1.209787	1.529286	1.472201
ben	0.674611	0.879186	0.810595	0.873259	1.177871	1.629984	1.021608	1.125383	1.658926	1.501384
bfa	0.798635	0.984224	0.925038	0.981318	0.986387	1.711362	0.689546	1.128723	1.72085	1.433544
cmr	0.61805	0.821297	0.753065	0.815345	1.12336	1.533129	0.974123	1.063753	1.560021	1.418832
civ	0.579053	0.835074	0.753409	0.827139	1.223754	1.575232	1.12593	1.129543	1.599819	1.484811
gha	0.561549	0.843735	0.754527	0.834978	1.262697	1.60097	1.176142	1.158717	1.624974	1.515843
gin	0.823545	1.018374	0.952684	1.014046	1.176868	1.826675	0.909401	1.219752	1.856128	1.610232
mli	0.748041	0.919353	0.862478	0.916481	0.943196	1.60797	0.673964	1.060881	1.620973	1.358631
mrt	0.601536	0.789542	0.726953	0.783991	1.070365	1.462998	0.932679	1.016795	1.488501	1.352974
ner	0.804442	1.01331	0.942994	1.011151	0.867242	1.712487	0.534904	1.125827	1.676746	1.339792
nga	0.487804	0.726341	0.65055	0.718906	1.082012	1.371076	1.006965	0.994072	1.391514	1.298287
sen	0.667805	0.878668	0.809342	0.872555	1.18558	1.630962	1.034623	1.130141	1.659645	1.506162
tgo	0.725352	0.924273	0.857049	0.918814	1.191104	1.697968	1.005855	1.159337	1.728561	1.547488
xwf	0.847634	1.043231	0.975179	1.039364	1.145679	1.852398	0.854367	1.228194	1.877546	1.604339
ago	0.565344	0.746258	0.68638	0.740945	1.015454	1.385684	0.897534	0.963167	1.409863	1.282223
caf	0.760473	0.963745	0.896119	0.961521	0.856526	1.642853	0.524892	1.078496	1.62122	1.307074
tcd	0.797569	0.983388	0.916295	0.980727	0.945179	1.700343	0.621843	1.117634	1.700665	1.399558
cog	0.817092	1.003701	0.939259	1.000502	1.037184	1.760933	0.735592	1.160919	1.776395	1.491115

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRTade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
cod	0.702021	0.870192	0.811866	0.867992	0.805301	1.494334	0.526816	0.98222	1.487614	1.214419
gnq	0.270125	0.657188	0.551672	0.646622	1.049754	1.217146	1.019208	0.957141	1.229436	1.179694
gab	0.272209	0.699745	0.585235	0.68832	1.11302	1.281042	1.083561	1.016905	1.293368	1.243755
stp	0.441522	0.683493	0.608561	0.676006	1.03294	1.291867	0.970698	0.94567	1.31033	1.22784
bdi	0.753125	1.193574	1.049214	1.192398	0.596317	1.835204	0.275745	1.259226	1.403771	1.069174
com	0.564974	0.773142	0.706129	0.766707	1.095091	1.438816	0.989178	1.02182	1.462188	1.34755
eth	0.795752	0.976207	0.91273	0.97283	1.042844	1.723879	0.755869	1.139806	1.743985	1.478398
ken	0.569107	0.834482	0.751738	0.826427	1.229599	1.585248	1.134431	1.133326	1.61024	1.493747
mdg	0.764364	0.951665	0.88767	0.949687	0.796158	1.602032	0.493377	1.055019	1.564932	1.248232
mwi	0.875445	1.064583	1.002371	1.061288	1.090316	1.856813	0.786927	1.227088	1.871623	1.569119
mus	0.08988	0.801864	0.674286	0.789976	1.110729	1.186742	1.108035	1.052472	1.192227	1.17109
moz	0.854205	1.065141	0.99753	1.062871	0.915141	1.797289	0.580861	1.183328	1.761593	1.409562
rwa	0.814626	0.991633	0.930227	0.988189	1.061508	1.755026	0.78503	1.158519	1.776021	1.504803
sdn	0.68813	0.857696	0.800205	0.853815	1.012393	1.550167	0.783208	1.036163	1.576363	1.374559
tza	0.752746	0.950098	0.887898	0.946583	1.03989	1.693466	0.773556	1.118588	1.716095	1.462706
uga	0.65898	0.810408	0.760927	0.807394	0.891738	1.437703	0.670046	0.954377	1.457402	1.246584
zmb	0.771386	0.938789	0.884217	0.935684	0.987997	1.646207	0.726827	1.090151	1.663464	1.405648
zwe	0.557357	0.734741	0.6775	0.729428	1.003681	1.360677	0.889657	0.950041	1.384098	1.261677
xec	0.782278	0.980279	0.916119	0.976056	1.136948	1.76324	0.864031	1.176406	1.791847	1.555245
bwa	0.342197	0.707646	0.605392	0.697227	1.114892	1.307733	1.0907	1.016862	1.321782	1.263864
swz	0.47362	0.729639	0.650945	0.721672	1.098836	1.367813	1.046421	1.006865	1.386946	1.30158
nam	0.296832	0.743164	0.625583	0.731299	1.169327	1.341177	1.152212	1.07082	1.353726	1.303126
zaf	0.23837	0.715187	0.594981	0.703169	1.124174	1.273934	1.109604	1.032233	1.284908	1.241261
xsc	0.685156	0.842031	0.791237	0.838132	1.005088	1.509955	0.831428	1.019406	1.53566	1.348183
xtw	0.009748	0.886882	0.80332	0.879729	1.037534	1.066097	1.037056	1.013247	1.068107	1.060406

Table 16.7: Compensated Own-price Demand Elasticities

GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRtrade	Mnfes	Trans- Comm	Fin- Service	Hous- OthServ
aus	0.000273	0.781354	0.699601	0.776956	0.82228	0.630908	0.812265	0.810835	0.868072	0.625399
nzl	0.003341	0.696196	0.622143	0.700812	0.736016	0.612125	0.762017	0.711574	0.824148	0.584975
xoc	0.122454	0.256019	0.214141	0.2571	0.38132	0.317359	0.330905	0.348219	0.48442	0.322472
chn	0.130387	0.326852	0.273665	0.325484	0.5192	0.506358	0.466506	0.453953	0.6081	0.419
hkg	-0.002677	0.753971	0.702128	0.713882	0.81163	0.518228	0.683113	0.756814	0.831023	0.770972
jpn	0.002463	0.684999	0.591019	0.676756	0.733559	0.620806	0.747089	0.708319	0.815115	0.510967
kor	-0.001203	0.598812	0.514028	0.584101	0.650893	0.573368	0.674951	0.65586	0.752793	0.561611
mng	0.149619	0.236666	0.21615	0.257265	0.344518	0.410405	0.381968	0.29327	0.496482	0.371441
twm	0.020992	0.534991	0.45694	0.532109	0.657787	0.51935	0.639691	0.62286	0.693662	0.468934
xea	0.187042	0.237357	0.218591	0.221993	0.319142	0.17691	0.287465	0.285127	0.44211	0.348322
brn	0.077285	0.542731	0.452351	0.531546	0.674994	0.336845	0.704786	0.615157	0.81672	0.769547
khn	0.138409	0.191508	0.165186	0.196737	0.273882	0.315473	0.22265	0.250298	0.388313	0.281689
idn	0.142429	0.247947	0.207106	0.250009	0.389573	0.382104	0.341116	0.334378	0.476628	0.287126
lao	0.149401	0.228525	0.171878	0.235507	0.321968	0.362774	0.301025	0.29441	0.453848	0.351669
mys	0.070739	0.356226	0.286304	0.353711	0.496782	0.436438	0.451167	0.430876	0.567973	0.511679
phl	0.131796	0.223244	0.196055	0.23139	0.358445	0.318238	0.336053	0.300952	0.421828	0.330603
sgp	-0.000919	0.837698	0.768916	0.831478	0.856262	0.763043	0.804843	0.78029	0.877985	0.695541
tha	0.107083	0.302033	0.244644	0.288846	0.466058	0.328744	0.410053	0.404996	0.543817	0.483708
vnm	0.150169	0.215737	0.201466	0.227293	0.344126	0.447748	0.288876	0.321388	0.452345	0.363739
xse	0.143451	0.190026	0.173001	0.201539	0.242446	0.329972	0.19847	0.241431	0.384818	0.250396
afg	0.121977	0.122054	0.132595	0.151354	0.158622	0.237137	0.107574	0.163685	0.275072	0.177135
bgd	0.134576	0.200231	0.184216	0.207452	0.297296	0.389695	0.264283	0.27362	0.420706	0.280225
ind	0.150481	0.203419	0.184424	0.208766	0.291038	0.312548	0.258952	0.247939	0.408821	0.295458
npl	0.128283	0.176782	0.170091	0.18341	0.22676	0.313172	0.183566	0.208075	0.356332	0.237792
pak	0.144729	0.167261	0.162152	0.183755	0.251187	0.335794	0.222634	0.21458	0.37011	0.241594
lka	0.12041	0.238528	0.194352	0.239559	0.378038	0.325468	0.354673	0.309266	0.470268	0.411023
xsa	0.144201	0.284494	0.238461	0.289143	0.440121	0.408153	0.417646	0.372885	0.525289	0.452448
can	-0.000445	0.730199	0.6549	0.724153	0.748068	0.648161	0.752598	0.740398	0.794136	0.62332
usa	-0.004283	0.850223	0.79551	0.842131	0.854803	0.781829	0.842206	0.872701	0.873131	0.515548
mex	0.065226	0.348584	0.278435	0.350043	0.514219	0.47754	0.459278	0.412572	0.57117	0.367722
xna	-0.006275	0.939507	0.866636	0.931042	0.818668	0.88998	0.958872	0.830408	0.943044	0.820149
arg	0.061805	0.34391	0.284638	0.344948	0.482855	0.41735	0.473391	0.437714	0.534525	0.368797
bol	0.147473	0.224175	0.201198	0.239692	0.358984	0.379949	0.336269	0.286444	0.451375	0.301767

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRTade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
bra	0.07374	0.324264	0.266396	0.321998	0.454218	0.448363	0.42532	0.406163	0.528255	0.392598
chl	0.044981	0.409253	0.337842	0.402964	0.543615	0.506941	0.527171	0.485082	0.580372	0.445988
col	0.093163	0.277146	0.230299	0.284085	0.431742	0.378566	0.415066	0.360459	0.518302	0.376112
ecu	0.109027	0.266711	0.225381	0.271116	0.436384	0.480411	0.380276	0.340545	0.497977	0.429423
pry	0.099243	0.254711	0.22132	0.273332	0.417039	0.344409	0.370728	0.357392	0.506864	0.428661
per	0.096613	0.291236	0.239116	0.294182	0.453595	0.399343	0.42161	0.327024	0.487079	0.423673
ury	0.025741	0.458237	0.387505	0.456008	0.593522	0.49404	0.568448	0.531533	0.650413	0.403573
ven	0.102731	0.257538	0.214494	0.262226	0.401973	0.323928	0.387431	0.322997	0.47575	0.345794
xsm	0.069159	0.308408	0.249145	0.312165	0.472313	0.41477	0.441627	0.404154	0.550466	0.385313
cri	0.052977	0.377148	0.30806	0.386696	0.510534	0.45554	0.504584	0.455563	0.573819	0.464791
gtm	0.099627	0.245308	0.195621	0.245005	0.389643	0.405089	0.355392	0.350615	0.467379	0.267182
hnd	0.140401	0.204265	0.168571	0.208826	0.316234	0.356438	0.276976	0.280128	0.411669	0.309628
nic	0.152593	0.196923	0.170422	0.190369	0.263951	0.332643	0.246678	0.244282	0.392593	0.334684
pan	0.022637	0.441216	0.374547	0.432689	0.568053	0.471614	0.50254	0.511775	0.61159	0.490238
slv	0.103942	0.241157	0.203192	0.231954	0.386745	0.396293	0.314082	0.311333	0.46217	0.355438
xca	0.060474	0.275953	0.193977	0.270231	0.428693	0.445531	0.399736	0.385165	0.490761	0.355995
dom	0.076945	0.306765	0.246385	0.316597	0.47986	0.411119	0.442724	0.374062	0.546711	0.408109
hti	0.028717	0.338002	0.269359	0.333245	0.471485	0.447875	0.325768	0.409528	0.496289	0.442387
jam	0.082364	0.269917	0.217199	0.272801	0.403859	0.31661	0.398649	0.349843	0.471956	0.374891
pri	0.003042	0.636865	0.574746	0.624014	0.706924	0.517122	0.660875	0.666372	0.697788	0.476944
tto	0.032827	0.420214	0.318334	0.423732	0.546059	0.495438	0.54195	0.469218	0.578743	0.557739
xcb	0.09741	0.292573	0.231751	0.287807	0.435358	0.403705	0.383813	0.396436	0.507228	0.393438
aut	0.00213	0.742339	0.667963	0.721397	0.772522	0.625614	0.756161	0.751218	0.858779	0.696569
bel	0.002011	0.72129	0.622695	0.695625	0.748344	0.731216	0.701212	0.745066	0.819738	0.656803
bgr	0.071466	0.334781	0.26714	0.33572	0.464711	0.454865	0.42924	0.410745	0.567283	0.448218
hrv	0.043749	0.401454	0.334052	0.397901	0.542101	0.489337	0.494954	0.499167	0.613202	0.507237
cyp	0.017407	0.51369	0.442465	0.504038	0.609846	0.483793	0.561467	0.532001	0.652327	0.494374
cze	0.037833	0.50238	0.416309	0.504218	0.53359	0.607465	0.603613	0.532326	0.689142	0.662058
dnk	0.000067	0.797446	0.712727	0.778224	0.785728	0.761771	0.791843	0.808262	0.876856	0.73642
est	0.021593	0.503707	0.432201	0.509253	0.610577	0.537789	0.604431	0.588689	0.680622	0.555243
fin	0.002105	0.725154	0.656889	0.727777	0.758642	0.657924	0.756567	0.754666	0.83895	0.636754
fra	0.004578	0.677725	0.607404	0.681009	0.705158	0.640408	0.713173	0.710454	0.8111	0.630466
deu	0.003258	0.721596	0.632962	0.701243	0.73676	0.684177	0.722343	0.731399	0.822628	0.679022
grc	0.019499	0.484634	0.411618	0.470827	0.543312	0.488751	0.570533	0.498409	0.631904	0.573785
hun	0.05182	0.422941	0.349725	0.425315	0.559282	0.50978	0.534218	0.528192	0.634633	0.480631

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WRTade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
irl	0.015996	0.859918	0.75199	0.845271	0.897792	0.717099	0.980394	0.825761	0.991813	0.937431
ita	0.006975	0.619652	0.556971	0.614981	0.687384	0.545395	0.675308	0.6625	0.755932	0.571085
lva	0.027541	0.455299	0.351882	0.451416	0.561387	0.507115	0.53596	0.549927	0.643912	0.512943
ltu	0.02812	0.459896	0.379471	0.46259	0.590746	0.474485	0.543176	0.53852	0.654219	0.575688
lux	-0.006064	1.046555	0.955172	1.034389	0.953588	0.854374	0.980565	0.939071	1.085119	1.083146
mlt	0.005192	0.607247	0.559094	0.595569	0.662351	0.542486	0.626636	0.596459	0.73327	0.687541
nld	0.0037	0.745832	0.664258	0.714373	0.75814	0.678444	0.789405	0.751351	0.873481	0.726751
pol	0.038688	0.414201	0.349788	0.413508	0.50958	0.510799	0.492487	0.498429	0.601255	0.53696
prt	0.014744	0.526511	0.454227	0.518859	0.583042	0.484597	0.583863	0.560513	0.661013	0.617938
rou	0.049936	0.376476	0.307993	0.382643	0.498232	0.482684	0.487752	0.478666	0.596057	0.462223
svk	0.031814	0.464297	0.390018	0.458534	0.534031	0.56556	0.518245	0.51893	0.636106	0.603658
svn	0.014577	0.541952	0.472843	0.52859	0.644273	0.568813	0.549816	0.605659	0.699284	0.575675
esp	0.01072	0.587883	0.512003	0.575417	0.662669	0.506794	0.665509	0.639092	0.732908	0.549874
swe	0.003556	0.741073	0.663399	0.731619	0.751716	0.70706	0.787245	0.751333	0.859649	0.698136
gbr	0.000084	0.71262	0.651997	0.702344	0.720729	0.613694	0.735746	0.720736	0.778646	0.582171
che	-0.006414	0.931097	0.893844	0.914554	0.93371	0.808811	0.933649	0.937909	0.976115	0.669104
nor	-0.005981	0.876945	0.828943	0.888745	0.84634	0.723693	0.903871	0.809705	0.954004	0.865738
xef	-0.004946	0.89988	0.840453	0.904175	0.802871	0.745842	0.919376	0.826977	0.957767	0.890837
alb	0.090332	0.25476	0.224265	0.260402	0.374377	0.30918	0.37943	0.343745	0.476975	0.43695
srb	0.082123	0.295172	0.235843	0.294383	0.408633	0.389257	0.420761	0.383244	0.50528	0.386854
blr	0.108025	0.24939	0.242017	0.283404	0.398641	0.479143	0.402849	0.36831	0.534765	0.433749
rus	0.0743	0.342004	0.292462	0.357188	0.482488	0.391331	0.479219	0.450802	0.601759	0.551477
ukr	0.12885	0.220387	0.198928	0.231649	0.337613	0.270957	0.326198	0.315149	0.447928	0.361215
xee	0.10396	0.221756	0.194376	0.233459	0.353478	0.274058	0.341807	0.320313	0.441488	0.356246
xer	0.062663	0.33502	0.266987	0.334323	0.452913	0.420053	0.458879	0.41383	0.540947	0.426809
kaz	0.077525	0.30505	0.272852	0.324734	0.478373	0.468284	0.456713	0.430868	0.573968	0.455743
kgz	0.120357	0.177972	0.159891	0.124632	0.241038	0.269384	0.250715	0.233606	0.355097	0.324474
tjk	0.130476	0.159363	0.14778	0.152597	0.198514	0.263559	0.174593	0.188619	0.325937	0.253388
uzb	0.156555	0.200025	0.186949	0.201347	0.264743	0.281418	0.23382	0.263167	0.37392	0.307865
xsu	0.222835	0.288414	0.281503	0.325715	0.452627	0.455218	0.430317	0.382922	0.624902	0.450593
arm	0.102963	0.224707	0.200545	0.259866	0.357691	0.363054	0.370551	0.35813	0.47641	0.422301
aze	0.134211	0.251069	0.216873	0.23541	0.386877	0.341018	0.363301	0.346509	0.498658	0.42114
geo	0.087778	0.233603	0.2021	0.253087	0.385	0.41135	0.345224	0.315258	0.463951	0.325294
bhr	0.027637	0.533609	0.460076	0.527978	0.64453	0.635005	0.568968	0.587309	0.564886	0.604327
irn	0.156671	0.23344	0.209627	0.2416	0.329676	0.348117	0.318722	0.305438	0.464285	0.300267

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WTrade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
irq	0.165337	0.275304	0.243144	0.283494	0.400759	0.511793	0.415039	0.304435	0.531465	0.255005
isr	0.001048	0.717205	0.639129	0.718484	0.782863	0.672701	0.775192	0.739903	0.837447	0.568362
jor	0.100779	0.239577	0.196733	0.243727	0.360827	0.36737	0.334386	0.323613	0.413235	0.345661
kwt	0.035301	0.566193	0.483175	0.553491	0.688401	0.674993	0.621376	0.614076	0.654967	0.623494
lbn	0.037423	0.344712	0.284254	0.339422	0.450091	0.410229	0.42372	0.426525	0.501664	0.318438
omn	0.061779	0.440469	0.369997	0.443688	0.550167	0.525036	0.544872	0.491951	0.681566	0.617985
pse	0.12377	0.225194	0.197505	0.236995	0.323669	0.329686	0.357719	0.289305	0.430777	0.318568
qat	0.03103	0.751623	0.6537	0.738529	0.880153	0.84067	0.736678	0.802577	0.881859	0.806537
sau	0.039662	0.501219	0.419282	0.495524	0.541703	0.480829	0.629304	0.596169	0.695582	0.630653
syr	0.125334	0.173584	0.157568	0.17691	0.223216	0.272801	0.200011	0.212603	0.327015	0.192078
tur	0.073349	0.317795	0.262115	0.316607	0.478696	0.416452	0.459863	0.406175	0.553618	0.428551
are	-0.003425	0.735182	0.681369	0.716601	0.744459	0.718065	0.668044	0.715916	0.815575	0.57808
xws	0.10741	0.136337	0.123646	0.130591	0.146891	0.214206	0.105242	0.154562	0.247231	0.149601
dza	0.161668	0.24659	0.223992	0.259369	0.364798	0.470261	0.322116	0.252573	0.515009	0.462849
egy	0.119929	0.212781	0.181207	0.207903	0.335676	0.368774	0.308382	0.27753	0.421303	0.328239
mar	0.143697	0.227859	0.198086	0.23377	0.338421	0.342382	0.336368	0.305307	0.457221	0.351976
tun	0.137361	0.227631	0.193264	0.226205	0.354057	0.363492	0.285823	0.311363	0.458628	0.350884
xnf	0.131044	0.320918	0.272955	0.332619	0.512635	0.575647	0.463257	0.341921	0.632295	0.583682
ben	0.126101	0.178239	0.143898	0.163198	0.246921	0.297677	0.207347	0.207979	0.352546	0.27547
bfa	0.136238	0.131882	0.151038	0.174294	0.18499	0.294565	0.120524	0.199372	0.323259	0.250745
cmr	0.131529	0.193385	0.170955	0.194052	0.270308	0.295908	0.219383	0.226699	0.381395	0.297068
civ	0.140447	0.206817	0.178405	0.21582	0.310684	0.395018	0.255162	0.239233	0.417412	0.345118
gha	0.130612	0.198209	0.169382	0.199694	0.310965	0.387682	0.246083	0.263382	0.406211	0.319861
gin	0.132635	0.160348	0.161186	0.175931	0.21883	0.348993	0.149224	0.219666	0.354143	0.293067
mli	0.126265	0.178557	0.152653	0.171804	0.190961	0.247726	0.132809	0.208818	0.33608	0.252614
mrt	0.160343	0.187488	0.178309	0.193215	0.273657	0.310136	0.243142	0.243122	0.39567	0.312575
ner	0.085637	0.160622	0.156618	0.175916	0.149991	0.238972	0.092072	0.182435	0.288745	0.21974
nga	0.137175	0.21491	0.189122	0.210548	0.316066	0.288874	0.293699	0.227788	0.405637	0.324558
sen	0.138425	0.178917	0.160199	0.188696	0.249481	0.351985	0.212586	0.21934	0.358449	0.323436
tgo	0.124991	0.159559	0.124938	0.140927	0.216705	0.299509	0.167138	0.185613	0.316487	0.258988
xwf	0.132038	0.16298	0.152654	0.166387	0.190953	0.278304	0.083904	0.195436	0.31358	0.261488
ago	0.157188	0.213635	0.197176	0.228294	0.29989	0.224264	0.268916	0.259148	0.425642	0.361892
caf	0.108459	0.145231	0.096853	0.15939	0.139012	0.19475	0.085177	0.172998	0.267522	0.213377
tcd	0.122956	0.130892	0.151766	0.183956	0.177789	0.309211	0.115397	0.173313	0.321661	0.228187
cog	0.166585	0.245955	0.232978	0.274295	0.262273	0.445587	0.202534	0.292484	0.503826	0.405408

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GTAP Regions	Grain- Crops	Meat- Dairy	Other FoodBev	Text- Appar	Hous- Util	WTrade	Mnfcs	Trans- Comm	Fin- Service	Hous- OthServ
cod	0.127898	0.164423	0.122035	0.167973	0.159515	0.18744	0.103224	0.1783	0.300085	0.203337
gnq	0.127252	0.290669	0.253199	0.299568	0.454917	0.486828	0.315492	0.39783	0.55279	0.419215
gab	0.120317	0.295833	0.243079	0.294934	0.45765	0.457552	0.446353	0.378081	0.565445	0.382456
stp	0.128994	0.188443	0.169475	0.199231	0.266185	0.277819	0.251561	0.245573	0.324244	0.327755
bdi	0.077116	0.152268	0.132615	0.160271	0.080086	0.162229	0.036893	0.164556	0.192561	0.123977
com	0.138851	0.162786	0.170029	0.188123	0.252194	0.331115	0.228058	0.212754	0.352628	0.267446
eth	0.133915	0.166066	0.148318	0.165272	0.194099	0.321086	0.130544	0.206457	0.336005	0.232438
ken	0.133513	0.190569	0.157892	0.196143	0.295158	0.392926	0.26036	0.27147	0.391309	0.270261
mdg	0.115407	0.152571	0.133007	0.163081	0.142808	0.233819	0.088124	0.175606	0.27991	0.189671
mwi	0.071457	0.151251	0.144959	0.165182	0.169655	0.284895	0.121097	0.187423	0.295569	0.217662
mus	0.043161	0.366866	0.28765	0.371281	0.489258	0.513397	0.439899	0.429793	0.536063	0.438123
moz	0.096926	0.153645	0.142859	0.161164	0.142773	0.268554	0.089531	0.172683	0.28329	0.210448
rwa	0.109199	0.177959	0.147438	0.173644	0.196049	0.308272	0.132092	0.203326	0.330753	0.225717
sdn	0.128511	0.148341	0.140676	0.162959	0.184939	0.261941	0.144423	0.176062	0.283465	0.258155
tza	0.138255	0.166504	0.155737	0.18326	0.21457	0.297059	0.147587	0.228199	0.362981	0.279321
uga	0.142126	0.17869	0.145797	0.180013	0.189734	0.229356	0.137466	0.19683	0.331588	0.191045
zmb	0.170864	0.180724	0.14583	0.199879	0.214164	0.360326	0.164271	0.244797	0.387817	0.26628
zwe	0.136896	0.19252	0.16792	0.192142	0.248992	0.290422	0.200138	0.244738	0.324349	0.240124
xec	0.103418	0.16032	0.134668	0.163477	0.197333	0.295162	0.145221	0.195378	0.313621	0.23777
bwa	0.146	0.274593	0.233494	0.292492	0.423688	0.483775	0.39388	0.401573	0.503277	0.427322
swz	0.165627	0.237452	0.212076	0.243654	0.370465	0.351797	0.287712	0.32594	0.480408	0.409793
nam	0.108836	0.256795	0.199431	0.255543	0.412617	0.466263	0.327988	0.360429	0.482951	0.338077
zaf	0.099609	0.285018	0.228614	0.276436	0.381453	0.500878	0.393869	0.389643	0.516125	0.37581
xsc	0.152152	0.170852	0.158898	0.172067	0.2153	0.262157	0.161326	0.20124	0.343107	0.278118
xtw	0.006494	0.568576	0.49443	0.574466	0.588975	0.559526	0.590983	0.615463	0.692974	0.530051