Chapter 18

Behavioral parameters

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This chapter relates how we obtained the initial data for the 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 18.1 summarizes for these parameters: the associated notation, the set over which they are indexed, and their description. In this section we explain the role of each parameter in the GTAP model, and we describe how we obtained the current settings.

Most of the parameters treated here enter directly into the GTAP data base. For whereas with the data file, an extensive and elaborate process of transformation is required to remove the inconsistencies and repair the omissions of the initial data sets, no such processing is required for most of the behavioral parameters. For the most part, each individual parameter is an independent datum, which stands or falls on its own merits, and does not enter into consistency conditions with the other parameters. The one exception to this rule is the consumer demand parameters. Here we do find consistency conditions — the triad of Engel aggregation, Cournot aggregation and symmetry — and also encounter the 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. We discuss the consistency conditions in this chapter, but discussion of the derivation of the demand system invariants (the so-called calibration problem) in chapter 20.

Table 18.1 Behavioral Parameters in the GTAP Model

	Parameters	Set Index	Description
σ_{VA}	ESUBVA(j)	i∈ PROD_COMM	Elasticity of substitution between primary factors
σ_{D}	ESUBD(i)	i∈ TRAD_COMM	Elasticity of substitution between domestic and imported goods in the Armington aggregation structure for all agents in all regions
σ_{M}	ESUBM(i)	i∈ TRAD_COMM	Elasticity of substitution among imports from different destinations in the Armington aggregation structure of all agents in all regions
σ_{T}	ETRAE(i)	i∈ ENDWS_COMM	Elasticity of transformation for sluggish primary factor endowments.
	RORFLEX(r)	r∈ REG	Flexibility of expected net rate of return of capital stock in region r, with respect to investment
	RORDELTA		Binary coefficient which determines the mechanism of allocating investment funds across regions.
α	SUBPAR(i,r)	i∈ TRAD_COMM r∈ REG	The substitution parameter in the CDE minimum expenditure function $\alpha = 1- \beta$
γ	INCPAR(i,r)	i∈ TRAD_COMM r∈ REG	The expansion parameter in the CDE minimum expenditure function

18.1 Source substitution elasticities

The data base contains two sets of source substitution elasticities. One relates to substitution between domestic products and imports, the other to substitution between imports from different regions. To define these parameters precisely we need to describe a little of the theoretical structure of the GTAP model. The elasticities of substitution do not describe economy-wide demand behavior, but apply to the behavior of various representative agents within each region. For each commodity and region, the domestic-import mix is determined separately for each region for each industry, and for each of the final demand categories, investment, household consumption and government consumption. The sourcing of imports is determined separately for intermediate usage (for all industries together) and for each final demand category. The GTAP model assumes that for each commodity, all agents in all regions display the same substitution elasticity.

The source substitution elasticities for GTAP are taken from the SALTER model (Jomini *et al.* 1991). Since GTAP derives its sectoral classification from SALTER, we can adopt the SALTER parameters without any remapping of commodities. The settings adopted are shown in the second and third columns of table 18.1. The SALTER settings represent a compromise between econometric evidence and prior belief. A search of the econometric literature indicated relatively low elasticities. The prior belief concerned the plausible strength of terms of trade effects of commercial policy changes; the belief was that these are generally quite weak. Such weak terms of trade effects imply relatively high elasticities. The settings adopted are generally higher than indicated by the econometric literature, but still low enough to generate significant terms of trade effects (Jomini *et al.* 1991).

An aspect of the SALTER compromise is a divergence between domestic-import and import-import substitution elasticities. The econometric evidence related mostly though not entirely to domestic-import substitution. On the other hand, the terms of trade effects depend largely on the import-import substitution elasticities (if these are high, then a given region can displace other regions in its export markets without greatly reducing its export prices). By setting the import-import substitution elasticities higher than the domestic-import substitution elasticities, one can reconcile low domestic-import substitution elasticities with weak terms of trade effects. After reviewing a fairly sparse literature on import-import substitution elasticities, the SALTER team concluded that these might plausibly be set twice as high as the import-domestic elasticities.

In summary, the SALTER elasticities were set as follows: the domestic-import substitution elasticities were are based on preferred estimates from the econometric literature with some upward adjustment. The import-import substitution elasticities were then set at double the domestic-import elasticities. This procedure has been brought over without change into GTAP (see Table 18.1). However, it may be of interest that in long-run projections applications, GTAP staff have commonly

increased the standard settings of these parameters. This is based on Gehlhar's observation that increasing the trade elasticities improved the fit of the model to East Asian trade shares over the 1980's (Gehlhar, 1994).

18.2 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 commodity prices -- or alternatively they help determine the nature of economy wide response to a shock to factor endowments. These parameters also play an important role in determining sectoral supply response, in the presence of sector-specific and sluggish factors of production. For example, with the supply of agricultural land fixed in the model, the ability to expand farm output can be directly linked to the ease of substitution of labor and capital for land.

The first column of Table 12.1 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 international cross-section studies which estimate this parameter, by industry, by using data from a wide range of countries. Note the relatively small elasticity of substitution in primary production. In light of the linkage between this parameter and sectoral supply response in the face of sector-specific factors, we can infer that the presence of sector-specific, or sluggish factors of production in these sectors will significantly constrain supply response. The greatest degree of substitutability (1.68) arises in the trade and transport sector.

18.3 Factor transformation elasticities

The third class of behavioral parameters in GTAP describes the degree of primary factor mobility in a given simulation. Within each region, the model distinguishes between primary factors that are perfectly mobile across productive sectors and those factors that are sluggish. In an experiment with sluggish endowment commodities, it is important to determine *how much of a disparity in relative sectoral returns can be sustained over the simulation period.* This disparity is governed by the elasticity of transformation, $\sigma_T < 0$, for sluggish endowment commodities. If σ_T is close to zero, then the allocation of factors across uses is nearly fixed and unresponsive to changes in relative returns. As σ_T takes on more negative values, then the supply of factors to various uses becomes more and

more responsive to relative returns [see equation (51) in Table 2.14 of Chapter 2]. 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. If this is the case, then the factor in question should be reclassified into the set of mobile endowment commodities.

In the default sets file which is generated from a standard aggregation of the data base, labor and capital are treated as perfectly mobile, whereas agricultural land is treated as a sluggish factor of production. Since the latter input is only used in agricultural activities, its sluggishness is only relevant if the aggregation in question contains more than one farm sector.

18.4 Investment flexibility parameters

In addition to the elasticity of transformation for endowment commodities, there is another set of "mobility" parameters that determine the flexibility of regional investment. If the GTAP user chooses to allow the allocation of global investment to regional economies to respond to region-specific rates of return on capital (parameter *RORDELTA* is 1), then parameter $RORFLEX(r) > 0$ must be properly specified [equation (58) of Table 2.15 in Chapter 2 of Hertel and Tsigas (1997)]. The smaller the value of $RORFLEX(r)$, the greater the responsiveness of international investment to a change in the rate of return in region r. Because $RORFLEX(r)$ is indexed over regions, it is possible to have some regions where investment is quite sensitive to changing rates of return, and others where this is not the case.

18.5 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 nonhomothetic 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:

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

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 β(i,r) and combined in an additive form. The calibration problem (discussed in Chapter 20) involves choosing the values of the substitution parameter, α(i,r) or SUBPAR(i,r), where α=1-β, to replicate the desired compensated, own-price elasticities of demand, then choosing the expansion parameters, γ(i,r) or INCPAR(i,r) to replicate the targeted income elasticities of demand. In this section, we document the sources and assumptions behind the estimates of commodity and region-specific income and price elasticities of demand that are used as targets in the CDE calibration procedure.

We draw on available estimates of income elasticities from cross-country demand studies for adaptation to GTAP's 37 sectors and 30 regions. Cross-country demand studies are preferable over single country demand studies since they provide demand elasticity estimates which are consistent across countries in terms of data and estimation procedure used. These cross-country consumer demand studies typically carry the assumption of preference independence and hence of additivity of the utility function as applied to broadly defined commodity groups. In adapting income elasticity estimates for GTAP, we must allocate estimates from the more aggregate commodity groupings in demand studies to our more disaggregated commodity classification.

Income Elasticities of Demand. Two studies provide recent income elasticity estimates and more adequate country and commodity coverage for us 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 Seale (1989). The income elasticity estimates used in World Food Model (WFM) were themselves obtained from the literature or estimated using simple models. The WFM covers 147 countries and 13 agricultural commodity groups, namely: wheat, rice, maize, millet and sorghum, other coarse grains, total fats and oils, bovine/cattle, sheep and goat, pig, poultry, diary products excluding butter, and butter.

The Theil, Chung and Seale study (TCS) used 1980 consumption data for 51 countries from phase IV of the International Comparison Project (ICP). Assuming preference independence, consumption data was fitted to Working's model of consumption expenditure defined for 10 broad commodity aggregates. The commodity aggregates are food, beverages and tobacco, clothing and footwear, gross rent and fuel, house furnishings and operations, medical care, transport and communications, recreation, education, and others. For some countries not covered in the TCS study, the income elasticity estimates are taken from Theil and Clements (1987). This is an earlier study which used 1975 consumption data and covered 30 countries and the same 10 commodity aggregates.

The income elasticity estimates for food and for the commodity aggregates are mapped to GTAP's 37 commodities according to the commodity concordance shown in Table 18.2. The income elasticity estimates for food were adapted mostly from the FAO World Food Model, except for non-grain crops and for other food products. The income elasticity estimates for nonfood commodities were obtained from a mapping with the broad commodity aggregates in Theil, Chung and Seale. In adapting all of these estimates to GTAP, we used 0.01 as the lower bound for income elasticities because smaller values can cause calibration problems for the CDE function. For example, 0.01 is

used as the income elasticity for rice for which a negative value is otherwise reported for some regions, e.g. Japan.

GTAP's 30 regions also had to be mapped with the countries covered by WFM and TCS to arrive at income elasticity estimates. For GTAP single regions that are not covered by these studies, we used estimates for other single regions with similar per capita GDP. This regional concordance between GTAP and the WFM and TCS countries is shown in Table 18.3. Since "China" in the WFM covers both the People's Republic of China and Taiwan and since China is not covered in the TCS study, the results of more recent econometric work which are separately based on either urban or rural household surveys was used in obtaining income elasticity estimates for the PRC. Income elasticity estimates for food commodities for urban households were obtained from Chern and Wang (1994) and for broad commodity aggregates from Zhi and Kinsey (1994). For the rural households, we adapted the income elasticities estimated by Fan, Wailes, and Cramer (1995) using a 2-stage LES-AIDS model on 5 broad commodity aggregates in the first stage and on disaggregate food commodities in the second stage. A mapping of the broad commodity aggregates to GTAP's 37 sectors was also required before getting the average of the urban household and rural household income elasticity estimates for GTAP's China region.

Table 18.4 presents the income elasticities of demand chosen for GTAP compiled using the sources procedure and described above. Engel aggregation does not hold for all regional income elasticities in Table 18.4, since these are obtained from different studies, base in different years. Consequently, we impose this condition in the calibration phase by proportionately adjusting all income elasticities (see Chapter 20).

Price Elasticities of Demand. Unfortunately, the cross section studies mentioned above are not in a strong position to generate information on price elasticities of demand. Reliable price data can be difficult to obtain, and, as noted above, most of these studies simply assume additive preferences, such that the price elasticities are determined by the income elasticity of demand in conjunction with a single substitution parameter. For this reason, we do not attempt to specify price elasticities of demand for all of the commodities in all of the regions. Instead, we simply use 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 exercise, 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 presented in Table 18.4, the values for own-price elasticities of demand were computed following the procedure and formula outlined in Zeitsch et al. (1991) for own-price elasticities of demand:

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

where ε_{ii} is the uncompensated own-price 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.

Table 18.2 GTAP Substitution Elasticities

	Value-Added (σ_{VA})	Domestic/Imported (σ_D)	Sourcing of Imports(σ_M)

Paddy rice (PDR)	0.56	2.2	4.4
Wheat (WHT)	0.56	2.2	4.4
Grains (other than rice and wheat: GRO)	0.56	2.2	4.4
Nongrain crops (NGC)	0.56	2.2	4.4
Wool (WOL)	0.56	2.2	4.4
Other livestock (OLP)	0.56	2.8	5.6
Forestry (FOR)	0.56	2.8	5.6
Fishing (FSH)	0.56	2.8	5.6
Coal(COL)	1.12	2.8	5.6
Oil (OIL)	1.12	2.8	5.6
Gas (GAS)	1.12	2.8	5.6
Other minerals (OMN)	1.12	2.8	5.6
Processed rice (PCR)	1.12	2.2	4.4
Meat products (MET)	1.12	2.2	4.4
Milk products (MIL)	1.12	2.2	4.4
Other food products (OFP)	1.12	2.2	4.4
Beverages and tobacco (BT)	1.12	3.1	6.2
Textiles (TEX)	1.26	2.2	4.4
Wearing apparel (WAP)	1.26	4.4	8.8
Leather, etc. (LEA)	1.26	4.4	8.8
Lumber and wood (LUM)	1.26	2.8	5.6
Pulp, paper, etc. (PPP)	1.26	1.8	3.6
Petroleum and coal products (PC)	1.26	1.9	3.8
Chemicals, rubber and plastics (CRP)	1.26	1.9	3.8
Nonmetallic mineral products (NMM)	1.26	2.8	5.6
Primary ferrous metals (IS)	1.26	2.8	5.6
Nonferrous metals (NFM)	1.26	2.8	5.6
Fabricated metal products nec. (FMP)	1.26	2.8	5.6
Transport Equipment (TRN)	1.26	5.2	10.4
Machinery and equipment (OME)	1.26	2.8	5.6
Other manufacturing (OMF)	1.26	2.8	5.6
Electricity, water, and gas (EGW)	1.26	2.8	5.6
Construction (CNS)	1.4	1.9	3.8
Trade and transport (TT)	1.68	1.9	3.8
Other services (private) (OSP)	1.26	1.9	3.8
Other services (government) (OSG)	1.26	1.9	3.8
Ownership of dwellings (DWE)	1.26	1.9	3.8

Source: Jomini *et al.*, table 4.3, 1991.

Table 18.3 Commodity classification concordance for income elasticity estimates, by source: FAO's World Food Model (WFM) and the Theil, Chung and Seale study (TCS)

GTAP Commodities	Commodity Groups	Source
Paddy rice	rice	WFM
Wheat	wheat	WFM
Grains	linear average[a]	WFM
Non-grain Crops	food (aggregate)	TCS
Wool	0.5 * clothing and footwear	TCS
Other Livestock Products	linear average[b]	WFM
Forestry	other	TCS
Fishing	other	TCS
Coal	other	TCS
Oil	other	TCS
Gas	other	TCS
Other Minerals	other	TCS
Processed Rice	rice	WFM
Meat Products	linear average[b]	WFM
Milk Products	linear average[c]	WFM
Other Food Products	food (aggregate)	TCS
Beverages and Tobacco	beverages and tobacco	TCS
Textiles	clothing and footwear	TCS
Wearing Apparel	clothing and footwear	TCS
Leather, etc	other	TCS
Lumber and Wood	other	TCS
Pulp, Paper, etc	other	TCS
Petroleum and Coal Products	other	TCS
Chemicals, Rubber, and Plastics	other	TCS
Non-metallic Mineral Products	other	TCS
Primary Ferrous Metals	other	TCS
Non-ferrous Metals	other	TCS
Fabricated Metal Products Nec	other	TCS
Transport Industries	house furnishings and operations	TCS
Machinery and Equipment	house furnishings and operations	TCS
Other Manufacturing	house furnishings and operations	TCS
Electricity, Water and Gas	gross rent and fuel	TCS
Construction	gross rent and fuel	TCS
Trade and Transport	transport and communications	TCS
Other Services (private)	linear average[d]	TCS
Other Services (government)	gross rent and fuel	TCS
Ownership of Dwellings	gross rent and fuel	TCS

[a]maize, millet and sorghum, and other coarse grains; [b] bovine/cattle, sheep and goat, pig, and poultry; [c]dairy products excluding butter and butter; [d]medical care, recreation, and education

Table 18.4 Concordance of GTAP Regions with WFM and TCS countries

GTAP Regions	WFM countries	TCS countries
Australia	Australia	*Canada*
New Zealand	New Zealand	Korea, Rep. of
Japan	Japan	Japan
Korea, Rep. of	Korea, Rep. of	Korea, Rep. of
Indonesia	Indonesia	Indonesia
Malaysia	Malaysia	Malaysia (Theil & Clements)
Philippines	Philippines	Philippines
Singapore	Singapore	Canada
Thailand	Thailand	Thailand (Theil & Clements)
China	*N.A.*	*N.A.*
Hong Kong	Hong Kong	Hong Kong
Taiwan	Korea, Rep. of	*Korea, Rep. of*
India	India	India
Rest of South Asia	*weighted average*[a]	*weighted average*[a]
Canada	Canada	Canada
United States	United States	United States
Mexico	Mexico	Mexico (Theil and Clements)
Central America and Caribbean	*composite weights*[b]	*composite weights*[b]
Argentina	Argentina	Argentina
Brazil	Brazil	Brazil
Chile	Chile	Chile
Rest of South America	*weighted average*[a]	*weighted average*[a]
European Union	*weighted average*[a]	*weighted average*[a]
Austria, Finland, and Sweden	*weighted average*[a]	*weighted average*[a]
European Free Trade Area	*weighted average*[a]	*weighted average*[a]
Central European Associates	*weighted average*[a]	*weighted average*[a]
Former Soviet Union	*same as CEA*[a]	*same as CEA*[a]
Middle East and North Africa	*composite weights*[b]	*composite weights*[b]
Sub-Saharan Africa	*composite weights*[b]	*composite weights*[b]
Rest of the World	*composite weights*[b]	*composite weights*[b]

[a]The weighted average of the income elasticity estimates reported for all or a subset of the individual countries which comprise that region and which are covered in the WFM or the TCS study, using 1992 GDP per capita in US dollars as weights. The computed income elasticity estimates for the Central European Associates were applied to the Former Soviet Union.

[b]The income elasticity estimates were computed as the GDP per capita weighted sum of the income elasticity estimates for the individual GTAP regions (the same weighting scheme used in the creation of input-output tables for the composite or regions).

Table 18.5 GTAP Version 3 Income Elasticities of Demand

	AUS	NZL	JPN	KOR	IDN	MYS
Paddy rice	0.20	0.10	0.01	0.20	0.50	0.20
Wheat	0.01	0.01	0.01	0.30	1.00	0.31
Other grains	0.01	0.01	0.01	0.20	0.10	0.17
Nongrain crops	0.15	0.64	0.39	0.64	0.72	0.63
Wool	0.48	0.48	0.48	0.48	0.48	0.48
Other livestock	0.20	0.01	0.70	0.64	0.86	0.36
Forestry	1.25	1.40	1.28	1.40	1.59	1.46
Fishing	1.25	1.40	1.28	1.40	1.59	1.46
Coal	1.25	1.40	1.28	1.40	1.59	1.46
Oil	1.25	1.40	1.28	1.40	1.59	1.46
Gas	1.25	1.40	1.28	1.40	1.59	1.46
Other minerals	1.25	1.40	1.28	1.40	1.59	1.46
Processed rice	0.20	0.10	0.01	0.20	0.10	0.20
Meat products	0.20	0.01	0.70	0.64	0.86	0.36
Milk products	0.01	0.01	0.80	0.74	1.07	0.43
Other food prods	0.15	0.64	0.39	0.64	0.72	0.63
Bevs, tobacco	1.02	1.02	1.02	1.02	1.02	1.02
Textiles	0.96	0.96	0.96	0.96	0.96	0.95
Wearing apparel	0.96	0.96	0.96	0.96	0.96	0.95
Leather etc.	1.25	1.40	1.28	1.40	1.59	1.46
Lumber, wood	1.25	1.40	1.28	1.40	1.59	1.46
Pulp, paper etc	1.25	1.40	1.28	1.40	1.59	1.46
Petrol. etc. prods	1.25	1.40	1.28	1.40	1.59	1.46
Chem etc. prods	1.25	1.40	1.28	1.40	1.59	1.46
Mineral prods nec	1.25	1.40	1.28	1.40	1.59	1.46
Ferrous metals	1.25	1.40	1.28	1.40	1.59	1.46
Other metals	1.25	1.40	1.28	1.40	1.59	1.46
Metal prods	1.25	1.40	1.28	1.40	1.59	1.46
Transport eqpt	1.16	1.22	1.18	1.22	1.27	1.45
Other machinery	1.16	1.22	1.18	1.22	1.27	1.45
Other mfg	1.16	1.22	1.18	1.22	1.27	1.45
Electricity etc	1.12	1.15	1.13	1.15	1.17	1.34
Construction	1.12	1.15	1.13	1.15	1.17	1.34
Trade, transport	1.24	1.38	1.27	1.38	1.55	1.43
Servs nec, priv.	1.19	1.21	1.22	1.31	1.45	1.31
Servs nec, govt.	1.12	1.15	1.13	1.15	1.17	1.34
Dwellings	1.12	1.15	1.13	1.15	1.17	1.34

(Con't)

Table 18.5 GTAP Version 3 Income Elasticities of Demand (continued)

	PHL	SGP	THA	CHN	HKG	TWN
Paddy rice	0.20	0.30	0.10	0.21	0.20	0.20
Wheat	0.50	0.10	0.50	0.35	0.40	0.30
Other grains	0.20	0.01	0.10	0.09	0.01	0.20
Nongrain crops	0.66	0.15	0.67	0.72	0.35	0.64
Wool	0.48	0.48	0.48	0.51	0.48	0.48
Other livestock	0.66	0.56	0.40	1.08	0.38	0.64
Forestry	1.44	1.25	1.53	1.49	1.27	1.40
Fishing	1.44	1.25	1.53	0.83	1.27	1.40
Coal	1.44	1.25	1.53	0.88	1.27	1.40
Oil	1.44	1.25	1.53	0.88	1.27	1.40
Gas	1.44	1.25	1.53	0.88	1.27	1.40
Other minerals	1.44	1.25	1.53	1.49	1.27	1.40
Processed rice	0.20	0.30	0.10	0.21	0.20	0.20
Meat products	0.66	0.56	0.40	1.08	0.38	0.64
Milk products	0.59	0.47	0.61	0.83	0.51	0.74
Other food prods	0.66	0.15	0.67	0.83	0.35	0.64
Bevs, tobacco	1.02	1.02	1.02	1.07	1.02	1.02
Textiles	0.96	0.96	0.95	1.03	0.96	0.96
Wearing apparel	0.96	0.96	0.95	1.03	0.96	0.96
Leather etc.	1.44	1.25	1.53	1.03	1.27	1.40
Lumber, wood	1.44	1.25	1.53	1.49	1.27	1.40
Pulp, paper etc	1.44	1.25	1.53	1.49	1.27	1.40
Petrol. etc. prods	1.44	1.25	1.53	0.88	1.27	1.40
Chem etc. prods	1.44	1.25	1.53	1.49	1.27	1.40
Mineral prods	1.44	1.25	1.53	1.49	1.27	1.40
Ferrous metals	1.44	1.25	1.53	1.49	1.27	1.40
Other metals	1.44	1.25	1.53	1.49	1.27	1.40
Metal prods	1.44	1.25	1.53	1.49	1.27	1.40
Transport eqpt	1.23	1.16	1.52	1.49	1.17	1.22
Other machinery	1.23	1.16	1.52	1.49	1.17	1.22
Other mfg	1.23	1.16	1.52	1.49	1.17	1.22
Electricity etc	1.15	1.12	1.38	1.17	1.13	1.15
Construction	1.15	1.12	1.38	1.54	1.13	1.15
Trade, transport	1.41	1.24	1.49	1.17	1.26	1.38
Servs nec, priv.	1.34	1.19	1.37	1.17	1.21	1.31
Servs nec, govt.	1.15	1.12	1.38	1.17	1.13	1.15
Dwellings	1.15	1.12	1.38	1.54	1.13	1.15

(Con't)

Table 18.5 GTAP Version 3 Income Elasticities of Demand (continued)

	IDI	RAS	CAN	USA	MEX	CAM
Paddy rice	0.32	0.35	0.20	0.20	0.30	0.21
Wheat	0.50	0.37	0.01	0.01	0.40	0.45
Other grains	0.10	0.14	0.01	0.01	0.01	0.09
Nongrain crops	0.76	0.69	0.15	0.14	0.51	0.62
Wool	0.48	0.48	0.48	0.48	0.48	0.48
Other livestock	0.73	0.91	0.22	0.01	0.41	0.54
Forestry	1.89	1.50	1.25	1.25	1.35	1.44
Fishing	1.89	1.50	1.25	1.25	1.35	1.42
Coal	1.89	1.50	1.25	1.25	1.35	1.42
Oil	1.89	1.50	1.25	1.25	1.35	1.42
Gas	1.89	1.50	1.25	1.25	1.35	1.42
Other minerals	1.89	1.50	1.25	1.25	1.35	1.44
Processed rice	0.15	0.35	0.20	0.20	0.30	0.18
Meat products	0.73	0.91	0.22	0.01	0.41	0.54
Milk products	0.47	0.56	0.01	0.01	0.57	0.57
Other food prods	0.76	0.69	0.15	0.14	0.51	0.63
Bevs, tobacco	1.02	1.02	1.02	1.02	1.02	1.02
Textiles	0.96	0.96	0.96	0.96	0.95	0.96
Wearing apparel	0.96	0.96	0.96	0.96	0.95	0.96
Leather etc.	1.89	1.50	1.25	1.25	1.35	1.42
Lumber, wood	1.89	1.50	1.25	1.25	1.35	1.44
Pulp, paper etc	1.89	1.50	1.25	1.25	1.35	1.44
Petrol. etc. prods	1.89	1.50	1.25	1.25	1.35	1.42
Chem etc. prods	1.89	1.50	1.25	1.25	1.35	1.44
Mineral prods nec	1.89	1.50	1.25	1.25	1.35	1.44
Ferrous metals	1.89	1.50	1.25	1.25	1.35	1.44
Other metals	1.89	1.50	1.25	1.25	1.35	1.44
Metal prods	1.89	1.50	1.25	1.25	1.35	1.44
Transport eqpt	1.31	1.24	1.16	1.16	1.35	1.29
Other machinery	1.31	1.24	1.16	1.16	1.35	1.29
Other mfg	1.31	1.24	1.16	1.16	1.35	1.29
Electricity etc	1.19	1.16	1.12	1.12	1.28	1.20
Construction	1.19	1.16	1.12	1.12	1.28	1.21
Trade, transport	1.80	1.47	1.24	1.24	1.33	1.40
Servs nec, priv.	1.70	1.39	1.19	1.19	1.23	1.32
Servs nec, govt.	1.19	1.16	1.12	1.12	1.28	1.20
Dwellings	1.19	1.16	1.12	1.12	1.28	1.21

(Con't)

Table 18.5 GTAP Version 3 Income Elasticities of Demand (continued)

	ARG	BRA	CHL	RAM	E_U	EU3
Paddy rice	0.10	0.20	0.30	0.31	0.22	0.30
Wheat	0.01	0.40	0.20	0.33	0.01	0.01
Other grains	0.01	0.01	0.20	0.14	0.01	0.01
Nongrain crops	0.54	0.54	0.56	0.57	0.32	0.35
Wool	0.48	0.48	0.48	0.48	0.48	0.48
Other livestock	0.18	0.56	0.62	0.45	0.34	0.15
Forestry	1.33	1.32	1.34	1.35	1.27	1.27
Fishing	1.33	1.32	1.34	1.35	1.27	1.27
Coal	1.33	1.32	1.34	1.35	1.27	1.27
Oil	1.33	1.32	1.34	1.35	1.27	1.27
Gas	1.33	1.32	1.34	1.35	1.27	1.27
Other minerals	1.33	1.32	1.34	1.35	1.27	1.27
Processed rice	0.10	0.20	0.20	0.31	0.22	0.30
Meat products	0.18	0.56	0.62	0.45	0.34	0.15
Milk products	0.27	0.54	0.41	0.46	0.03	0.01
Other food prods	0.54	0.54	0.56	0.57	0.32	0.35
Bevs, tobacco	1.02	1.02	1.02	1.02	1.02	1.02
Textiles	0.96	0.96	0.96	0.96	0.96	0.96
Wearing apparel	0.96	0.96	0.96	0.96	0.96	0.96
Leather etc.	1.33	1.32	1.34	1.35	1.27	1.27
Lumber, wood	1.33	1.32	1.34	1.35	1.27	1.27
Pulp, paper etc	1.33	1.32	1.34	1.35	1.27	1.27
Petrol. etc. prods	1.33	1.32	1.34	1.35	1.27	1.27
Chem etc. prods	1.33	1.32	1.34	1.35	1.27	1.27
Mineral prods nec	1.33	1.32	1.34	1.35	1.27	1.27
Ferrous metals	1.33	1.32	1.34	1.35	1.27	1.27
Other metals	1.33	1.32	1.34	1.35	1.27	1.27
Metal prods	1.33	1.32	1.34	1.35	1.27	1.27
Transport eqpt	1.20	1.19	1.20	1.20	1.17	1.17
Other machinery	1.20	1.19	1.20	1.20	1.17	1.17
Other mfg	1.20	1.19	1.20	1.20	1.17	1.17
Electricity etc	1.14	1.14	1.14	1.14	1.12	1.13
Construction	1.14	1.14	1.14	1.14	1.12	1.13
Trade, transport	1.31	1.31	1.33	1.34	1.26	1.26
Servs nec, priv.	1.25	1.25	1.26	1.28	1.21	1.21
Servs nec, govt.	1.14	1.14	1.14	1.14	1.12	1.13
Dwellings	1.14	1.14	1.14	1.14	1.12	1.13

(Con't)

Table 18.5 GTAP Version 3 Income Elasticities of Demand (continued)

	EFTA	CEA	FSU	MEA	SSA	ROW
Paddy rice	0.01	0.17	0.17	0.14	0.23	0.20
Wheat	0.01	0.01	0.01	0.29	0.39	0.42
Other grains	0.01	0.01	0.01	0.06	0.14	0.06
Nongrain crops	0.34	0.54	0.54	0.59	0.67	0.59
Wool	0.48	0.48	0.48	0.48	0.48	0.48
Other livestock	0.22	0.45	0.45	0.32	0.58	0.56
Forestry	1.27	1.32	1.32	1.44	1.57	1.39
Fishing	1.27	1.32	1.32	1.43	1.48	1.39
Coal	1.27	1.32	1.32	1.43	1.49	1.39
Oil	1.27	1.32	1.32	1.43	1.49	1.39
Gas	1.27	1.32	1.32	1.43	1.49	1.39
Other minerals	1.27	1.32	1.32	1.44	1.57	1.39
Processed rice	0.01	0.17	0.17	0.11	0.18	0.19
Meat products	0.22	0.45	0.45	0.32	0.58	0.56
Milk products	0.01	0.44	0.44	0.43	0.51	0.53
Other food prods	0.34	0.54	0.54	0.59	0.69	0.59
Bevs, tobacco	1.02	1.02	1.02	1.02	1.03	1.02
Textiles	0.96	0.96	0.96	0.96	0.96	0.96
Wearing apparel	0.96	0.96	0.96	0.96	0.96	0.96
Leather etc.	1.27	1.32	1.32	1.43	1.51	1.39
Lumber, wood	1.27	1.32	1.32	1.44	1.57	1.39
Pulp, paper etc	1.27	1.32	1.32	1.44	1.57	1.39
Petrol. etc. prods	1.27	1.32	1.32	1.43	1.49	1.39
Chem etc. prods	1.27	1.32	1.32	1.44	1.57	1.39
Mineral prods nec	1.27	1.32	1.32	1.44	1.57	1.39
Ferrous metals	1.27	1.32	1.32	1.44	1.57	1.39
Other metals	1.27	1.32	1.32	1.44	1.57	1.39
Metal prods	1.27	1.32	1.32	1.44	1.57	1.39
Transport eqpt	1.17	1.19	1.19	1.34	1.39	1.22
Other machinery	1.17	1.19	1.19	1.34	1.39	1.22
Other mfg	1.17	1.19	1.19	1.34	1.39	1.22
Electricity etc	1.13	1.14	1.14	1.24	1.25	1.16
Construction	1.13	1.14	1.14	1.24	1.30	1.16
Trade, transport	1.26	1.31	1.31	1.41	1.48	1.37
Servs nec, priv.	1.21	1.25	1.25	1.31	1.39	1.30
Servs nec, govt.	1.13	1.14	1.14	1.24	1.25	1.16
Dwellings	1.13	1.14	1.14	1.24	1.30	1.16

Table 18.6 Frisch parameter values

GTAP Region	ω	GTAP Region	ω
Australia	-1.71	Unites States	-1.53
New Zealand	-1.95	Mexico	-2.94
Japan	-1.41	Central America & Caribbean	-4.00
Korea, Rep.	-2.36	Argentina	-2.38
Indonesia	-5.42	Brazil	-3.34
Malaysia	-3.16	Chile	-3.15
Philippines	-5.08	Rest of South America	-3.94
Singapore	-1.70	European Union 12	-1.61
Thailand	-3.74	Austria, Finland, and Sweden	-1.49
China	-6.88	EFTA	-1.38
Hong Kong	-1.73	Central European Associates	-3.63
Taiwan	-2.08	Former Soviet Union	-3.62
India	-7.57	Middle East and North Africa	-3.54
Rest of South Asia	-7.18	Sub-Saharan Africa	-5.85
Canada	-1.62	Rest of the World	-4.45

Table 18.7 GTAP Version 3 Price Elasticities of Demand

	AUS	NZL	JPN	KOR	IDN	MYS
Paddy rice	-0.12	-0.05	-0.01	-0.08	-0.09	-0.07
Wheat	-0.01	-0.01	-0.01	-0.13	-0.18	-0.10
Other grains	-0.01	-0.01	-0.01	-0.08	-0.02	-0.05
Nongrain crops	-0.09	-0.33	-0.28	-0.30	-0.19	-0.20
Wool	-0.28	-0.25	-0.34	-0.20	-0.09	-0.15
Other livestock	-0.12	-0.01	-0.50	-0.28	-0.17	-0.12
Forestry	-0.73	-0.72	-0.91	-0.60	-0.30	-0.46
Fishing	-0.73	-0.72	-0.91	-0.60	-0.32	-0.49
Coal	-0.73	-0.72	-0.91	-0.60	-0.29	-0.46
Oil	-0.73	-0.72	-0.91	-0.59	-0.29	-0.46
Gas	-0.73	-0.72	-0.91	-0.59	-0.29	-0.47
Other minerals	-0.73	-0.72	-0.91	-0.59	-0.29	-0.46
Processed rice	-0.12	-0.05	-0.01	-0.09	-0.03	-0.07
Meat products	-0.12	-0.01	-0.50	-0.29	-0.17	-0.12
Milk products	-0.01	-0.01	-0.57	-0.32	-0.20	-0.14
Other food prods	-0.10	-0.35	-0.30	-0.32	-0.17	-0.23
Bevs, tobacco	-0.61	-0.53	-0.73	-0.46	-0.23	-0.35
Textiles	-0.57	-0.50	-0.68	-0.41	-0.20	-0.32
Wearing apparel	-0.57	-0.50	-0.69	-0.42	-0.18	-0.31
Leather etc.	-0.73	-0.72	-0.91	-0.60	-0.30	-0.46
Lumber, wood	-0.73	-0.72	-0.91	-0.60	-0.30	-0.47
Pulp, paper etc	-0.73	-0.72	-0.91	-0.60	-0.30	-0.47
Petrol. etc. prods	-0.74	-0.72	-0.91	-0.60	-0.31	-0.49
Chem etc. prods	-0.74	-0.73	-0.91	-0.62	-0.33	-0.51
Mineral prods nec	-0.73	-0.72	-0.91	-0.60	-0.30	-0.46
Ferrous metals	-0.73	-0.72	-0.91	-0.59	-0.29	-0.46
Other metals	-0.73	-0.72	-0.91	-0.59	-0.29	-0.46
Metal prods	-0.73	-0.72	-0.91	-0.60	-0.29	-0.47
Transport eqpt	-0.69	-0.64	-0.84	-0.52	-0.26	-0.53
Other machinery	-0.69	-0.64	-0.84	-0.54	-0.26	-0.55
Other mfg	-0.68	-0.63	-0.84	-0.52	-0.24	-0.47
Electricity etc	-0.66	-0.60	-0.81	-0.50	-0.23	-0.44
Construction	-0.65	-0.59	-0.80	-0.49	-0.22	-0.42
Trade, transport	-0.82	-0.81	-0.94	-0.69	-0.48	-0.58
Servs nec, priv.	-0.73	-0.70	-0.91	-0.65	-0.48	-0.46
Servs nec, govt.	-0.70	-0.64	-0.82	-0.53	-0.24	-0.44
Dwellings	-0.72	-0.66	-0.80	-0.53	-0.26	-0.47

(Con't)

Table 18.7 GTAP Version 3 Price Elasticities of Demand (continued)

	PHL	SGP	THA	CHN	HKG	TWN
Paddy rice	-0.04	-0.18	-0.03	-0.04	-0.12	-0.10
Wheat	-0.10	-0.06	-0.13	-0.06	-0.23	-0.15
Other grains	-0.04	-0.01	-0.03	-0.02	-0.01	-0.10
Nongrain crops	-0.15	-0.10	-0.20	-0.18	-0.21	-0.32
Wool	-0.09	-0.28	-0.13	-0.08	-0.28	-0.23
Other livestock	-0.14	-0.34	-0.12	-0.25	-0.22	-0.31
Forestry	-0.29	-0.74	-0.42	-0.22	-0.74	-0.67
Fishing	-0.35	-0.74	-0.43	-0.14	-0.74	-0.68
Coal	-0.28	-0.74	-0.41	-0.13	-0.74	-0.67
Oil	-0.28	-0.74	-0.41	-0.13	-0.74	-0.67
Gas	-0.28	-0.74	-0.41	-0.13	-0.74	-0.67
Other minerals	-0.29	-0.74	-0.41	-0.22	-0.74	-0.67
Processed rice	-0.05	-0.18	-0.03	-0.04	-0.12	-0.10
Meat products	-0.16	-0.33	-0.13	-0.17	-0.22	-0.33
Milk products	-0.13	-0.28	-0.17	-0.12	-0.29	-0.36
Other food prods	-0.21	-0.10	-0.21	-0.16	-0.21	-0.35
Bevs, tobacco	-0.25	-0.62	-0.31	-0.22	-0.60	-0.53
Textiles	-0.20	-0.60	-0.27	-0.20	-0.58	-0.46
Wearing apparel	-0.20	-0.58	-0.30	-0.17	-0.63	-0.48
Leather etc.	-0.29	-0.75	-0.42	-0.16	-0.75	-0.68
Lumber, wood	-0.29	-0.74	-0.41	-0.22	-0.74	-0.67
Pulp, paper etc	-0.29	-0.74	-0.41	-0.23	-0.74	-0.68
Petrol. etc. prods	-0.30	-0.75	-0.42	-0.13	-0.74	-0.68
Chem etc. prods	-0.32	-0.75	-0.44	-0.25	-0.74	-0.68
Mineral prods nec	-0.28	-0.74	-0.41	-0.22	-0.74	-0.67
Ferrous metals	-0.28	-0.74	-0.41	-0.22	-0.74	-0.67
Other metals	-0.28	-0.74	-0.41	-0.22	-0.74	-0.67
Metal prods	-0.29	-0.74	-0.41	-0.23	-0.74	-0.67
Transport eqpt	-0.25	-0.69	-0.42	-0.22	-0.68	-0.61
Other machinery	-0.26	-0.73	-0.43	-0.31	-0.71	-0.60
Other mfg	-0.25	-0.72	-0.42	-0.22	-0.69	-0.59
Electricity etc	-0.24	-0.66	-0.38	-0.18	-0.66	-0.57
Construction	-0.23	-0.66	-0.37	-0.22	-0.65	-0.55
Trade, transport	-0.53	-0.80	-0.69	-0.26	-0.84	-0.78
Servs nec, priv.	-0.33	-0.73	-0.49	-0.20	-0.73	-0.66
Servs nec, govt.	-0.26	-0.67	-0.39	-0.21	-0.65	-0.59
Dwellings	-0.29	-0.67	-0.37	-0.27	-0.67	-0.62

(Con't)

Table 18.7 GTAP Version 3 Price Elasticities of Demand (continued)

	IDI	RAS	CAN	USA	MEX	CAM
Paddy rice	-0.07	-0.07	-0.12	-0.13	-0.10	-0.05
Wheat	-0.08	-0.06	-0.01	-0.01	-0.14	-0.11
Other grains	-0.02	-0.03	-0.01	-0.01	-0.00	-0.02
Nongrain crops	-0.16	-0.16	-0.09	-0.09	-0.19	-0.17
Wool	-0.06	-0.07	-0.30	-0.31	-0.16	-0.12
Other livestock	-0.16	-0.20	-0.13	-0.01	-0.15	-0.14
Forestry	-0.27	-0.22	-0.77	-0.82	-0.46	-0.36
Fishing	-0.26	-0.23	-0.77	-0.82	-0.46	-0.38
Coal	-0.25	-0.21	-0.77	-0.82	-0.46	-0.35
Oil	-0.25	-0.21	-0.77	-0.82	-0.46	-0.35
Gas	-0.25	-0.21	-0.77	-0.82	-0.46	-0.35
Other minerals	-0.25	-0.21	-0.77	-0.82	-0.46	-0.36
Processed rice	-0.02	-0.05	-0.12	-0.13	-0.10	-0.05
Meat products	-0.10	-0.13	-0.14	-0.01	-0.16	-0.16
Milk products	-0.06	-0.08	-0.01	-0.01	-0.20	-0.15
Other food prods	-0.15	-0.14	-0.10	-0.10	-0.21	-0.20
Bevs, tobacco	-0.15	-0.18	-0.64	-0.67	-0.37	-0.29
Textiles	-0.21	-0.20	-0.59	-0.63	-0.33	-0.25
Wearing apparel	-0.14	-0.15	-0.60	-0.63	-0.34	-0.30
Leather etc.	-0.26	-0.22	-0.77	-0.82	-0.47	-0.37
Lumber, wood	-0.25	-0.21	-0.77	-0.82	-0.47	-0.37
Pulp, paper etc	-0.26	-0.22	-0.77	-0.82	-0.46	-0.37
Petrol. etc. prods	-0.27	-0.22	-0.78	-0.82	-0.46	-0.37
Chem etc. prods	-0.29	-0.24	-0.78	-0.82	-0.48	-0.39
Mineral prods nec	-0.26	-0.21	-0.77	-0.82	-0.47	-0.36
Ferrous metals	-0.25	-0.21	-0.77	-0.82	-0.46	-0.36
Other metals	-0.25	-0.21	-0.77	-0.82	-0.46	-0.36
Metal prods	-0.25	-0.22	-0.77	-0.82	-0.46	-0.36
Transport eqpt	-0.18	-0.18	-0.73	-0.77	-0.47	-0.36
Other machinery	-0.18	-0.22	-0.72	-0.76	-0.48	-0.35
Other mfg	-0.19	-0.18	-0.72	-0.76	-0.47	-0.34
Electricity etc	-0.16	-0.17	-0.70	-0.74	-0.44	-0.31
Construction	-0.16	-0.16	-0.69	-0.73	-0.43	-0.30
Trade, transport	-0.44	-0.34	-0.85	-0.87	-0.70	-0.56
Servs nec, priv.	-0.24	-0.22	-0.78	-0.83	-0.52	-0.41
Servs nec, govt.	-0.26	-0.23	-0.70	-0.78	-0.46	-0.33
Dwellings	-0.21	-0.21	-0.76	-0.76	-0.43	-0.34

(Con't)

Table 18.7 GTAP Version 3 Price Elasticities of Demand (continued)

	ARG	BRA	CHL	RAM	E_U	EU3
Paddy rice	-0.04	-0.06	-0.10	-0.08	-0.13	-0.20
Wheat	-0.00	-0.12	-0.06	-0.08	-0.01	-0.01
Other grains	-0.00	-0.00	-0.06	-0.04	-0.01	-0.01
Nongrain crops	-0.24	-0.18	-0.19	-0.16	-0.20	-0.24
Wool	-0.20	-0.14	-0.15	-0.12	-0.30	-0.32
Other livestock	-0.08	-0.17	-0.20	-0.12	-0.21	-0.11
Forestry	-0.56	-0.40	-0.43	-0.35	-0.79	-0.85
Fishing	-0.56	-0.40	-0.43	-0.36	-0.79	-0.85
Coal	-0.56	-0.39	-0.43	-0.34	-0.79	-0.85
Oil	-0.56	-0.39	-0.43	-0.34	-0.79	-0.85
Gas	-0.56	-0.39	-0.43	-0.34	-0.79	-0.85
Other minerals	-0.56	-0.39	-0.43	-0.34	-0.79	-0.85
Processed rice	-0.04	-0.06	-0.06	-0.09	-0.13	-0.20
Meat products	-0.08	-0.19	-0.22	-0.14	-0.22	-0.11
Milk products	-0.12	-0.17	-0.14	-0.12	-0.02	-0.01
Other food prods	-0.26	-0.20	-0.22	-0.18	-0.21	-0.25
Bevs, tobacco	-0.46	-0.32	-0.36	-0.29	-0.65	-0.70
Textiles	-0.43	-0.30	-0.32	-0.26	-0.61	-0.65
Wearing apparel	-0.42	-0.32	-0.33	-0.29	-0.60	-0.65
Leather etc.	-0.57	-0.41	-0.43	-0.35	-0.79	-0.85
Lumber, wood	-0.56	-0.41	-0.43	-0.35	-0.79	-0.86
Pulp, paper etc	-0.57	-0.40	-0.44	-0.35	-0.79	-0.86
Petrol. etc. prods	-0.59	-0.42	-0.45	-0.36	-0.80	-0.86
Chem etc. prods	-0.59	-0.44	-0.45	-0.38	-0.80	-0.86
Mineral prods nec	-0.56	-0.40	-0.43	-0.35	-0.79	-0.85
Ferrous metals	-0.56	-0.39	-0.43	-0.34	-0.79	-0.85
Other metals	-0.56	-0.40	-0.43	-0.34	-0.79	-0.85
Metal prods	-0.57	-0.40	-0.43	-0.35	-0.79	-0.85
Transport eqpt	-0.53	-0.38	-0.39	-0.32	-0.74	-0.80
Other machinery	-0.52	-0.38	-0.40	-0.33	-0.74	-0.79
Other mfg	-0.51	-0.37	-0.39	-0.32	-0.73	-0.79
Electricity etc	-0.50	-0.36	-0.38	-0.30	-0.71	-0.77
Construction	-0.48	-0.34	-0.36	-0.29	-0.70	-0.76
Trade, transport	-0.63	-0.58	-0.59	-0.59	-0.84	-0.90
Servs nec, priv.	-0.70	-0.43	-0.51	-0.42	-0.84	-0.84
Servs nec, govt.	-0.48	-0.39	-0.37	-0.33	-0.71	-0.77
Dwellings	-0.48	-0.39	-0.44	-0.31	-0.73	-0.79

(Con't)

Table 18.7 GTAP Version 3 Price Elasticities of Demand (continued)

	EFTA	CEA	FSU	MEA	SSA	ROW
Paddy rice	-0.01	-0.05	-0.05	-0.04	-0.05	-0.05
Wheat	-0.01	-0.00	-0.00	-0.08	-0.07	-0.09
Other grains	-0.01	-0.00	-0.00	-0.02	-0.03	-0.01
Nongrain crops	-0.25	-0.17	-0.15	-0.18	-0.14	-0.15
Wool	-0.35	-0.13	-0.13	-0.14	-0.08	-0.11
Other livestock	-0.16	-0.14	-0.13	-0.10	-0.12	-0.14
Forestry	-0.92	-0.37	-0.37	-0.41	-0.27	-0.32
Fishing	-0.92	-0.37	-0.37	-0.41	-0.29	-0.33
Coal	-0.92	-0.38	-0.37	-0.40	-0.26	-0.31
Oil	-0.92	-0.37	-0.37	-0.40	-0.25	-0.31
Gas	-0.92	-0.37	-0.37	-0.40	-0.26	-0.31
Other minerals	-0.92	-0.37	-0.37	-0.41	-0.27	-0.31
Processed rice	-0.01	-0.05	-0.05	-0.03	-0.04	-0.05
Meat products	-0.16	-0.15	-0.13	-0.10	-0.11	-0.15
Milk products	-0.01	-0.13	-0.13	-0.13	-0.09	-0.13
Other food prods	-0.26	-0.19	-0.17	-0.20	-0.16	-0.18
Bevs, tobacco	-0.75	-0.33	-0.30	-0.32	-0.21	-0.26
Textiles	-0.70	-0.30	-0.28	-0.29	-0.20	-0.23
Wearing apparel	-0.71	-0.29	-0.28	-0.30	-0.18	-0.25
Leather etc.	-0.92	-0.39	-0.37	-0.41	-0.26	-0.33
Lumber, wood	-0.92	-0.38	-0.37	-0.41	-0.27	-0.33
Pulp, paper etc	-0.92	-0.37	-0.38	-0.41	-0.28	-0.32
Petrol. etc. prods	-0.92	-0.37	-0.39	-0.42	-0.28	-0.34
Chem etc. prods	-0.92	-0.39	-0.39	-0.44	-0.31	-0.35
Mineral prods nec	-0.92	-0.37	-0.37	-0.41	-0.27	-0.32
Ferrous metals	-0.92	-0.37	-0.37	-0.41	-0.27	-0.31
Other metals	-0.92	-0.37	-0.37	-0.41	-0.27	-0.31
Metal prods	-0.92	-0.38	-0.37	-0.41	-0.27	-0.32
Transport eqpt	-0.85	-0.35	-0.35	-0.40	-0.29	-0.30
Other machinery	-0.85	-0.36	-0.35	-0.40	-0.28	-0.30
Other mfg	-0.85	-0.33	-0.34	-0.39	-0.25	-0.29
Electricity etc	-0.83	-0.33	-0.34	-0.37	-0.23	-0.27
Construction	-0.82	-0.31	-0.32	-0.35	-0.22	-0.26
Trade, transport	-0.95	-0.52	-0.57	-0.60	-0.46	-0.52
Servs nec, priv.	-0.92	-0.39	-0.57	-0.51	-0.30	-0.36
Servs nec, govt.	-0.84	-0.35	-0.37	-0.38	-0.26	-0.31
Dwellings	-0.82	-0.33	-0.35	-0.38	-0.28	-0.31

References

Chern, W. and G. Wang. 1994. “Angel Function and Complete Food Demand System for Chinese Urban Households,” China Economic Review, 5(Spring 1994):35-58.

Fan, S., E. Wails, and G. Cramer. 1995. “Household Demand in Rural China: A Two-Stage LES-AIDS Model,” American Journal of Agricultural Economics, 77(February 1995):54-62.

Food and Agriculture Organization. 1993. “World Food Model,” supplement to the FAO Agricultural Projections to 2000, Rome: FAO.

Frisch, R. (1959) "A Complete Scheme for Computing All Direct and Cross Elasticities in a Model with Many Sectors," *Econometrics* 27:177–196.

Hanoch, G. 1975. “Production and demand Models with Direct and Indirect Implicit Additivity,” Econometrica. 43:395-419.

Hertel, T.H. (Editor). 1997. *Global Trade Analysis: Modeling and Applications*. Cambridge University Press.

Huff, K., K. Hanslow, T.W. Hertel, and M.E. Tsigas 1997. “GTAP Behavior Parameters,” in T.W. Hertel (ed), *Global Trade Analysis: Modeling and Applications*. Cambridge University Press.

Jomini, P., R. McDougall, G. Watts, and P.S. Dee. 1994. The SALTER Model of the World Economy: Model Stricture, Database and Parameters. Canberra, Australia: Industry Commission.

Jomini, P., J.F. Zeitsch, R. McDougall, A. Welsh, S. Brown, J.Hambley and J. Kelly. 1991. SALTER: A General Equilibrium Model of the World Economy, Vol. 1. Model Structure, Database, and Parameters. Canberra, Australia: Industry Commission.

Lluch, C., A. Powell, and R. Williams. 1977. Patterns in Household Demand and Savings. New York: Oxford University Press.

Theil, H., C.F. Chung, and J.L. Seale, Jr. 1989. International Evidence on Consumption Patterns. Supplement 1 to Advances in Econometrics. Greenwich, CT: JAI Press.

Theil, H. and K.W. Clements. 1987. Applied Demand Analysis: Results from System-Wide Approaches. Cambridge, MA: Ballinger Publishing Company.

Zhi, W. and J. Kinsey. 1994. “Consumption and Saving Behavior under Strict and Partial Rationing,” China Economic Review, 5(Spring 1994):83-100.