12.A

Food and Agricultural Data Base

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One of the main features of the GTAP Data Base is a detailed sectoral classification of agricultural and food products. Twelve sectors within agriculture and eight sectors within the area of food, beverages, and tobacco are identified. This however creates a problem in data collection, since not all countries' Input-Output (I-O) statistics provide such fine sectoral detail.

To address this problem, the I-O data contributors for some countries undertook the agricultural and food disaggregation themselves. Table 12.1 lists the 52 countries/regions for which I-O tables are available at the full GTAP version 6 sectoral classifications for food and agriculture. For the remaining countries/regions, the disaggregation was undertaken centrally. To support this centralized disaggregation process, the present author created a new multi country agriculture and food products data set. This chapter documents that data set.

The agricultural and food products data set consists of two components. The first component consists of information on the quantities produced, imported, and exported, plus information on producer prices for a broad set of agricultural commodities for a variety of countries. This information is then used to determine the value of production and trade, at producer prices, for as many GTAP agricultural and food commodities as possible. The second component uses the above information, along with I-O tables supplied for earlier GTAP versions to develop an initial I-O table focused on the GTAP agricultural and food commodities for each country/region listed in table 12.1 that lack this detail. These initial I-O tables are then used as the starting point for the centralized disaggregation process.

12.1 Production, Trade, and Price Data

In the absence of an I-O table available at the GTAP version 6 level of aggregation, supplemental data are needed to provide guidance on how to disaggregate the agricultural and food commodities in the existing I-O table into the version 6 commodities. A first step in the disaggregation process is to determine the relative magnitude of total sales of the GTAP commodities (for domestic uses and exports) produced in the region in question and the relative magnitude of total imports of the GTAP commodities into that region. In terms of an I-O table, one can think of these values as row sum targets. Only relative magnitudes are required because the existing I-O table contains the appropriate absolute magnitudes of agricultural and food sales and imports for the region in question. The goal of the disaggregation process is to determine how to allocate these values reported in the existing I-O table to the GTAP commodities. Assuming no changes in the stocks of agricultural and food commodities, total sales of a GTAP commodity produced within a given region are equal to the value of domestic production. By subtracting out the value of exports, one can obtain the value of commodity sales for domestic uses.

Because information on value of production and trade is needed across many regions, the supplemental data should come from a data base with consistent commodity definitions across regions, rather than data for individual countries. Fortunately, the Food and Agricultural Organization (FAO) of the United Nations provides data bases on commodity balances and producer prices that meet these criteria. The FAO commodity balance data base provides information on the quantity of a commodity produced, imported and exported for a given country. Because the commodities in these data are more disaggregate than the GTAP version 6 commodity definitions, a concordance between the FAO commodities and the GTAP version 6 commodities is required. Table 12.2 provides this concordance.

The FAO producer price data base provides information on producer prices for selected commodities by country. However, for composite commodities in the commodity balance data base, such as other cereals, nuts, other fruits, etc., producer prices are available at a more disaggregate level. Table 12.3 provides a concordance between the composite FAO crop commodities and the associated producer prices. Table 12.4 provides a concordance between the GTAP livestock commodities and the FAO producer prices. Corresponding composite producer prices are computed as a production quantity weighted average of the underlying producer prices, with the production quantities obtained from the FAO agricultural production data base. Unfortunately, the FAO producer price data base does not contain prices for all processed food products. Thus, prices for various vegetable oil and meal products, sugar, other sweeteners, cotton, dairy products, and meat by-products were obtained from a variety of other sources, which are documented in table 12.5.

The dollar values of production, imports, and exports at producer prices are then calculated by multiplying the appropriate quantity, producer price, and exchange rate together. For some countries, producer prices are not available for all FAO commodities. For example, a producer price of wheat is not available for Vietnam. In these instances, a production quantity weighted average price, computed

using all countries with a reported producer price, is used to compute the value of production, imports, or exports.

The commodity balance data for only reports quantities of meat products produced and traded. Because of a lack of data on a live weight, or farm-level quantities, the value of production for livestock products are computed using the dressed (wholesale level) weight multiplied by a farm-level price (defined as "biological" in the FAO producer price data). As such, the value of production of livestock products will be underestimated at the farm-level. However, the relative value of production shares for livestock commodities, which are most important when disaggregating existing I-O tables, are not affected. This underestimation will only be a problem if the existing I-O table does not identify a total value of livestock production.

Because the FAO commodity balance data base is focused more on agricultural commodities than processed food products, it is not possible to compute the value of production, imports, and exports for the GTAP version 6 commodities "food products, n.e.c. and beverages and tobacco products." For some of the processed food products contained in the GTAP food products, n.e.c., such as grain milling products (i.e., flour, breakfast cereals), bakery products (bread), and sugar confectionery, the FAO commodity balance data base has converted production of these processed food products into their agricultural commodity primary equivalence. The same is true for tobacco. In other cases, such as alcoholic beverages (i.e., wine, beer, distilled alcoholic beverages), there are available data. But this leaves a gap of all non-alcoholic beverages, such as soft drinks, which likely constituents a significant portion of production and trade for the GTAP commodity beverage and tobacco products in many regions. As documented in the next section, the values of production, imports, and exports for the GTAP commodities food products, n.e.c. and beverages and tobacco products are estimated econometrically using available data from the FAO data bases and gross domestic product (GDP).

The FAO commodity balance data base does not contain information for two of the GTAP version 6 regions: China and Singapore. For China, production, import, and export data are obtained from the USDA Economics and Statistics System, which has compiled time series data on Chinese agriculture from a variety of sources.1 The FAO producer price data base does contain producer price information for China and is used to compute value of productions of the GTAP commodities for China. The agricultural trade data for China is reported in dollar value. No data are available on agricultural production in Singapore. Thus, the I-O table for Singapore in the GTAP version 6 data base is an updated version of the GTAP version 5 I-O table.

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1 The USDA Economics and Statistics System contain nearly 300 reports and datasets from the economics agencies of the U.S. Department of Agriculture and is available online through the Mann Library at Cornell University. The URL of this site is http://usda.mannlib.cornell.edu/. The datasets utilized were: China: Fibers and Oilseeds Statistics, China: Grain Statistics, China: International Agricultural Trade, China: Livestock Statistics, and China: Miscellaneous Crop Statistics.

12.2 Developing Initial Agricultural and Food I-O Tables

The agricultural and food I-O table consists of two tables: uses of domestically produced agricultural and food commodities and uses of imported agricultural and food commodities. Using the values of production and imports identified from the FAO data as row totals, the next step is to determine how to allocate the row totals across the elements in each row of the agricultural and food I-O tables. This process requires identification of where the non-zero elements will occur within each row and the magnitude of each non-zero element. In the domestic use table, the non-zero elements represent intermediate uses, such as inputs to processed food products, sales to consumers, and exports. In the import use table, the non-zero elements represent intermediate use of imports by domestic firms and purchases of imported agricultural and food products by domestic households.

12.2.1 Identification of Key Non-zero Elements

The identification of the key non-zero elements in the domestic and import use tables is based on observed patterns in regional I-O tables supplied for earlier versions of GTAP data bases. The regions utilized include Australia, New Zealand, Indonesia, Japan, Korea, Thailand, Taiwan, Bangladesh, India, United States, Venezuela, Colombia, Uruguay, United Kingdom, Denmark, Austria, Switzerland, Germany, Spain, Finland, France, Hungary, Ireland, Italy, Netherlands, Poland, Portugal, Sweden, Greece, Albania, Bulgaria, Croatia, Czech Republic, Malta, Romania, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Russian Federation, Cyprus, Botswana, Mozambique, Malawi, Tanzania, Uganda, Zambia, and Zimbabwe. The non-zero elements are identified in four major blocks (or sub-matrices) within the domestic use table: sales of agricultural and food commodities within the agricultural sector, sales of agricultural commodities to the food processors and textiles, sales of processed food commodities within the food processing sector, and consumption and exports.

To begin, consider the sales of GTAP agricultural and food commodities to the agricultural sector. Table 12.6 shows the location of the non-zero elements within the agricultural sector. There are two main types of entries in table 12.6. First is the own-use of each GTAP agricultural commodity by firms that produce that commodity. For the crop commodities, this could represent the withholding of some production for seed usage in the next growing season, or for livestock commodities, the need to withhold some livestock as replacements for the breeding herd. Having non-zero own-use entries are typical in most existing I-O tables. The second type of non-zero elements is the sale of crop commodities to the livestock industries. This may be thought of as representing feed usage. Since all grains and oilseeds have the potential of being feed to livestock, non-zero entries are allowed for these commodities. Because the GTAP commodity crops, n.e.c. (ocr) contains forages and straw (for

bedding), the potential for positive sales to the livestock industries is also allowed. Also note that sales from the GTAP commodity food products, n.e.c. (ofd) to the GTAP livestock industries are allowed to account for prepared animal feed sales.

Table 12.7 identifies the key sales of agricultural commodities to food processors and textiles. Paddy rice (pdr) is sold to rice processors (pcr) and to beverages and tobacco (b_t) to account for its potential use in beverages, such as beer. Wheat (wht) and cereal grain, n.e.c. (gro) are sold to ofd, whose firms perform all grain milling activities, and to b_t to account for grain use in beverages, such as beer or distilled alcoholic beverages. Vegetables, fruit, nuts (v_f) are also sold to ofd, whose firms produce prepared and preserved vegetables, fruits, and nuts, as well fruit and vegetable juices, and to beverages and tobacco to account for vegetables use (e.g., grapes) in beverages (e.g., wine). Oilseeds (osd) are sold to firms that produce vegetable oils and fats (vol) and to firms that produce animal feeds (e.g. ofd). Sugar cane and sugar beets (c_b) are sold to sugar processors (sgr). Plant-based fibers (pfb) and wool (wol) are sold to textile manufacturers (tex). Sales of crops, n.e.c. (ocr) to b_t represents the sales of tobacco leaf and beverage and spice crops to be processed into cigarettes (or other manufactured tobacco products) and beverages. Based on the GTAP commodity definitions, bovine cattle, sheep and goat, horses (ctl) are sold to bovine cattle, sheep and goat, horse meat products (cmt), and animals products, n.e.c. (oap) are sold to meat products, n.e.c. (omt). Finally, the only processing use of raw milk (rmk) is in the manufacture of dairy products (mil).

The key sales of processed food products to food processing and other manufacturing firms are listed in table 12.8. All food processors are assumed to use some of their own product as an intermediate input. The same is true for beverage and tobacco firms. The ofd industry uses all other processed food products as intermediate inputs (e.g., processed meats are used in frozen entries, vegetable oils and sugar are used in the preparation of processed foods, and rice and dairy products, such as cheese, are used in prepared entries). Animal hides from meat processing (cmt and omt) are used to produce leather products. Also, animal fats and vegetable oils may be refined into chemicals or plastics. Thus, potential sales from meat processors (cmt and omt) and vegetable oils and fats (vol) to chemical, rubber, and plastic products (crp) are also allowed. Firms that produce beverages and tobacco products purchase intermediate inputs from processed rice (for use in beverages such as beer), sugar (for use in a variety of beverages, such as soft drinks), and ofd (e.g. grain mill products, such as malted barley, for use in beer or distilled alcoholic beverages). Finally, most of the existing I-O tables have ofd sales to all other food processing industries.

The last groups of non-zero row elements are purchases by the domestic household (e.g., consumption) and exports. While all agricultural and food products may be purchased by the household, expenditures on paddy rice, sugar cane and sugar beets, plant-based fibers, and livestock products should be small in most regions. Exports of paddy rice, sugar cane and sugar beets, and raw milk as assumed to be zero for all regions because of their relatively low value when compared to transportation costs. With the exception of livestock commodities, export data from the FAO commodity balance data base determines whether a region exports the remaining GTAP agricultural or food commodities. Because the FAO commodity balance data base reports only exports of meat

products, whether a region exports livestock is based on predicted livestock export values, which are discuss in more detail below.

The non-zero elements in the import use table are assumed to be the same as the domestic use table, with the following exception. Because paddy rice, sugar cane and sugar beets, and raw milk are assumed to be non-traded, there are no intermediate uses or purchases by the domestic household of these commodities.

12.2.2 Determining the Magnitude of Non-zero Elements

The magnitude of sales for each non-zero element identified in the previous section is predicted using data from the existing I-O tables with full GTAP food and agricultural sectoral disaggregation and per-capita GDP. Per-capita sales values in the existing I-O tables for each non-zero element are related to per-capita total sales (or value of production), computed as the sum of the value of all domestic uses and exports in the existing I-O table, of the GTAP commodities and per-capita GDP using a linear (or log-linear) model:

$$Sales_{ij} = \beta_0 + \sum_{k=1}^{m} \beta_k FSales_{ik} + \delta PGDP_i + e_{ij} , \qquad (1)$$

where $Sales_{ij}$ is the values of per-capita sales from the *i*th region for the *j*th non-zero element in the domestic use or import use table, $FSales_{ik}$ is per-capita total sales of the *k*th GTAP commodity in the *i*th region, $PGDP_i$ is the per-capita GDP for the *i*th region, e_{ij} is an error term corresponding to the *i*th region and *j*th non-zero element, and $\beta_0, \beta_k,$ and δ are unknown parameters to be estimated. Equation (1) is estimated on a per-capita basis to control for differences in country size. Total sales are obtained by multiplying the predicted per-capita sales obtained from equation (1) by population.

The choice of independent variables in equation (1) is dictated by the information that will be available for all regions that do not have an existing I-O table with full GTAP agricultural and food disaggregation. In the most aggregated case, there will be only a single row and column for agricultural and food processing. Thus, the only data available for all regions are the value of production, imports, and exports from the FAO data base and per-capita GDP. Note that the value of the index *m* is allowed to vary across non-zero elements.

Because the per-capita sales value in the existing I-O tables can and do take on a value of zero for some regions, equation (1) is estimated using a Tobit estimation procedure. Using a Tobit procedure avoids possible sample selection bias in the parameter estimates. If all per-capita sales values are positive in the sample, then the Tobit procedure yields the same parameter estimates as Ordinary Least Squares (OLS).

The maximum sample size used to estimate equation (1) is 49. However, in many instances, the sample size is smaller than 49. Whenever the value of total sales of an agricultural or food commodity is less than $1 million, that region is excluded from the sample. For example, Botswana, Mozambique, Malawi, and Uganda have wheat sales of less than $1 million and these regions are not included in any of the samples used to predict the non-zero elements in the wheat (wht) row of the domestic use table. The rationale for this exclusion is that only the regions that have a "significant" industry should be included in the sample used to predict the magnitudes of the non-zero values. A threshold value of $1 million is chosen based on the data in the existing I-O tables. In most instances, regions with less than $1 million in total sales have different sales patterns than those regions with more that $1 million in total sales.

12.2.2.1 Domestic Uses

To begin, consider the own-use of agricultural and food commodities, which is posited to be a linear function of the total sales and GDP. In general, one would expect a positive relationship between own-use and total sales. Because production practices may differ between wealthy and poorer regions, GDP is included in the model to attempt to control for differences in the own-use of agricultural and food commodities across regions. Table 12.9 lists the Tobit estimates of equation (1) for the own-use of agricultural and food commodities. Per-capita total sales are positively and significantly related to the own-use for all agricultural commodities with the exception of oap. Per-capita GDP has a significantly negative impact on the own-use of gro, osd, oap, cmt, pcr, and b_t.

Sales of crop commodities to the livestock industries are posited to be a function of the total sales of the crop commodity, GDP, total grain sales (sum of wht and gro sales), and a multiplicative interaction between wheat and cereal grain sales. The last two variables are included in the model because the availability of grain in a given region will likely affect the mix of feedstuffs utilized by the livestock industries.2 Based on observed sales patterns in the existing I-O tables, four crop commodities, wht, gro, v_f, and ocr are utilized by three livestock industries, ctl, oap, and rmk. It is interesting to note that virtually no crop commodities were sold to the wool (industry). This likely reflects the extensive use of grazing land to produce wool rather than grains.

Table 12.10 presents the results for equations that predict crop commodity sales to the livestock industries. Increases in per-capita crop sales either have a positive effect or no effect on sales to the livestock industries. The overall level of wht production (or sales) does not have a significant effect on the sales of wht to oap or rmk. Similarly, the level of ocr production does not have a significant effect on sales of ocr to ctl or rmk. The two variables for total grain sales have mixed effects: positive impacts on wht and ocr sales and negative effects on gro and v_f sales to the livestock industries. Finally, per-capita GDP only had significant effects (negative) on ocr sales to ctl and rmk.

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2 An alternative model specification that included per-capita crop sales and per-capita livestock sales as independent variables was also estimated but did not perform as well.

The sale of prepared feed to each livestock industry is estimated as a function of the total per-capita sales of the livestock commodity, total per-capita sales of ofd, and per-capita GDP. Increases in the production of the livestock commodity should increase the use of prepared feeds at constant prices. Thus, at constant prices, an increase in livestock sales should be associated with an increase the sales of prepared feeds. However, the magnitude of prepared feed sales may also depend on the size of the "prepared feeds industry." Thus, regions with higher total sales of ofd are hypothesized to have higher prepared feed sales. Finally, per-capita GDP is included to control for differences in production techniques in rich and poor regions. Table 12.11 reports the Tobit parameters estimates for prepared feed sales. As hypothesized, increases in livestock sales and ofd sales do positively affect prepared feed sales.

In general, the sale of agricultural commodities to food and fiber processors is posited to be a linear function of the total per-capita sales of the agricultural commodity, total per-capita sales of the processed commodity, and per-capita GDP. For example, the level of per-capita sales of pdr to pcr is a linear function of the total per-capita sales of pdr and pcr, and per-capita GDP. An increase in agricultural production implies a larger supply available to be processed and an increase in processor production implies a higher demand for the agricultural commodity. Thus, increasing either of these variables should lead to an increase in the sale of the agricultural commodity to processors. Also, because the livestock commodities ctl, oap, and rmk have a significant amount of home consumption in many regions, the level of per-capita consumption of these (unprocessed) commodities is included as an independent variable in the model for these commodities. Because more home consumption of these livestock commodities reduces the amount of livestock available to be processed, it should have a negative impact on livestock sales to meat processors. Table 12.12 reports the parameter estimates for agricultural sales to food and fiber processors. In general, the parameter estimates have the expected signs. The only exceptions are a negative affect of osd production on osd sales to vol and a negative affect of cmt production on ctl sales to cmt.

Tables 12.13 through 12.16 report the parameter estimates that are used to predict domestic intermediate uses of processed food and tobacco products. In general, the models used to predict the per-capita intermediate sales are linear functions of the total per-capita sales of the selling and purchasing processed food and tobacco industry and per-capita GDP. For example, the sale of cmt to ofd is a function of per-capita cmt sales, per-capita ofd sales, and per-capita GDP. Again, a positive relationship is expected between the level of per-capita production of the buying industry (higher demand) and the selling industry (larger availability) to the level of per-capita intermediate sales. Tables 12.13 and 12.14 verify that a positive relationship exists between at least one of these independent variables and the level of intermediate sales. Tables 12.15 and 12.16 also show a positive relationship between per-capita sales and per-capita intermediate use, with the exception of ofd sales to b_t.

The magnitude of per-capita consumer expenditures on domestically produced agricultural and processed food products is specified as a linear function of total per-capita sales of the given agricultural or food commodity and per-capita GDP. As shown in table 12.17, there is a strong

positive relationship between the level of per-capita processed food sales and per-capita consumption. This relationship is more mixed for the agricultural commodities with six out of twelve commodities having no statistically significant relationship between per-capita production and per-capita consumption. There is a negative relationship between per-capita GDP and per-capita consumption for half of the agricultural commodities. This indicates that consumers in higher income countries purchase less "unprocessed" agricultural commodities than do consumers in lower income countries. The only exception to this is a positive relationship between per-capita GDP and per-capita consumption of ocr. This may be due to higher purchases of horticultural and possibly tobacco products by consumers in higher income countries.

As mentioned earlier, because the FAO data bases do not contain information on production and exports of ofd, b_t, ctl, and oap, the value of these activities must be estimated. The value of total per-capita sales of ofd and b_t are estimated as a log-linear function of per-capita GDP and total per-capita sales of all agricultural and processed food commodities (other than ofd and b_t). Table 12.18 shows that a one percent increase in the level of per-capita sales of all other agricultural and processed food commodities lead to a 1.2% and 1.35% increase in ofd and b_t per-capita sales respectively. Exports of ctl, oap, ofd, and b_t are posited to be a linear function of total per-capita sales and per-capital consumption of the respective commodity and per-capita GDP. An increase in per-capita sales is expected to lead to an increase in exports while an increase in per-capita consumption is expected to lead to a reduction in exports. The results in table 12.19 verify this hypothesis.

12.2.2.2 Import Uses

Tables 12.20 through 12.29 report the parameter estimates used to predict the value of the non-zero elements in the import use table. Essentially, the same procedures used to predict the value of the non-zero elements in the domestic use table are used for the import use table. One main difference is that the value of per-capita imports is substituted for per-capita sales of the commodity in question in the econometric.3 For example, the per-capita own-use of imported agricultural commodities is specified as a linear function of the total per-capita imports of that commodity and per-capita GDP. The rationale for the substitution is that the total per-capita import value represents its availability for intermediate use or consumption. As such, its role in the estimated equations is the same as the role of per-capita sales in determining domestic uses.

The other difference in the procedures used to predict import uses is in the models used to predict the level of per-capita imports of ctl, oap, ofd, and b_t. (Again, import values are not available in the FAO data base.) The level of per-capita ctl imports is posited as a linear function of per-capita domestic sales of ctl and cmt, per-capita imports of cmt, and per-capita GDP. Similarly, per-capita imports of oap is posited as a linear function of per-capita domestic sales of oap and omt, per-capita imports of omt, and per-capita GDP. Higher levels of domestic livestock

3 Another difference is that the level of domestic consumption is not included in the model to predict the

and meat production are expected to increase livestock imports because larger livestock and meat industries will likely have larger absolute levels of intermediate import usage. Also, an increase meat imports may be associated with higher livestock imports, which may be used to increase domestic livestock production or domestic meat production. The first two columns of table 12.29 shows that the level of meat imports have a strong positive impact on the level of livestock imports while the size of the domestic livestock and meat industries have a smaller or no effect on livestock imports. Imports of ofd and b_t are posited to be linear functions of the per-capita sales of the respective industries and per-capita GDP. The last two columns in table 12.29 shows a strong and positive relationship between the size of the domestic industry and the level of imports.

In general, the results for import use are similar to the results for domestic use. Import availability is either positively related or has no effect on the magnitude of the import use. The size of the domestic industries, as measure by the per-value value of production, is either positively related or has no effect of import use. Thus, a larger domestic industry will use more imports as intermediate inputs. Finally, while per-capita GDP has some mixed effects on import use, in general it has no effect on import use.

12.2.3 Determining the Magnitude of Value Added

Table 12.30 reports the parameter estimates used to predict the magnitudes of land, skilled labor, unskilled labor, and capital factor payments for the agricultural and food I-O tables. For each of the primary factors, factory payments are posited as a log-linear function of total per-capita sales of each commodity and per-capita GDP. Because the data in the existing I-O tables indicated positive factor payments for all GTAP agricultural and food commodities in all regions, an OLS estimation procedure is utilized. Also, the sample size is smaller than that used to estimate domestic and import use because the I-O tables for the Eastern European countries aggregated land and capital together.

Total per-capita commodity sales, which measure the relative size of the industry, is positively related to the land, unskilled labor, labor, and capital factor payments. Thus, as an industry gets larger in size, the magnitude of factor payments also increases. Per-capita GDP has its largest affects on land and skill labor factor payments. For half of the agricultural commodities (pdr, gro, v_f, osd, pfb, and ctl), an increase in per-capita GDP leads to lower land factor payments. There is no statistically significant relationship between per-capita GDP and land payments for the other agricultural commodities. Per-capita GDP is positively related to skilled factor payments for twelve of the twenty GTAP agricultural and food commodities (pdr, wht, v_f, osd, c_b, ctl, oap, cmt, vol, mil, sgr, and b_t) and not related to skilled factor payments for the remaining eight GTAP commodities. The relationship between per-capita GDP and unskilled labor and capital are mixed. In agriculture, per-capita GDP is negatively related to unskilled labor factor payments for five commodities (pdr, gro, v_f, osd, and pfb) and negatively related to capital factor payments for two commodities (pfb and ocr).

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level of imports purchased by domestic households.

In food and tobacco processing, per-capita GDP is positively related to unskilled labor factor payments in cmt and vol and negatively related to capital factor payments in pcr. However, per-capita GDP is positively related to capital factor payments in sugar processing (sgr).

12.2.4 Balancing the Initial I-O Table

All non-zero elements in the domestic use and import use table previously identified are predicted using the parameter estimates from tables 12.9 through 12.33, along with estimates of the value of production (or total sales), exports, and imports from the FAO data bases, plus estimates of per-capita GDP. This is done for all regions listed in the bottom half of table 12.1.

The initial agricultural and food I-O table for each region is then balanced using the following procedure. First, for each commodity, the predicted row sum in the domestic use table, plus predicted household purchases, plus the value of exports from the FAO data base is compared with the estimated value of production from the FAO data base. (In the case of ofd and b_t, this predicted sum is compared to predicted total sales for these commodities based on the parameter estimates in table 12.18.) Adjustments are made in individual row elements in the domestic use table and in household purchases in order to equate the predicted value of production with the estimate from the FAO data. Second, the predicted row sum of the import use table plus predicted household purchases of imports is compared with the estimated value of imports from the FAO data. (In the case of ctl, oap, ofd, and b_t, the total value of imports are predicted using the parameter estimates in table 12.29.) Again, adjustments are made in the individual row elements in the import use table or in household purchases such that the predicted value of imports equals the target value for each commodity. Finally, for each commodity, the column sum in the domestic use table, plus the sum of all factor payments, plus the column sum of in the import use table is compared with the target value of production (or total sales). This ensures that all receipts are exhausted on intermediate inputs and primary factors.

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Table 12.1 Regions With and Without Full Agricultural and Food Sectoral I-O Data

Regions with Full Sectoral I-O Data	
Australia	Spain
New Zealand	Sweden
Japan	Switzerland
Korea	Rest of EFTA
Taiwan	Albania
Bangladesh	Bulgaria
India	Croatia
Sri Lanka	Czech Republic
United States	Hungary
Colombia	Malta
Peru	Poland
Venezuela	Romania
Uruguay	Slovakia
Austria	Slovenia
Belgium	Estonia
Denmark	Latvia
Finland	Lithuania
France	Russian Federation
Germany	Cyprus
United Kingdom	Botswana
Greece	Rest of South African Customs Union
Ireland	Malawi
Italy	Mozambique
Luxembourg	Tanzania
Netherlands	Zambia
Portugal	Zimbabwe

Regions without Full Sectoral I-O Data	
China	Morocco
Hong Kong	Uganda
Indonesia	
Malaysia	
Singapore	
Philippines	
Thailand	
Vietnam	
Canada	
Mexico	
Argentina	
Brazil	
Chile	
Rest of Former Soviet Union	
Turkey	

Table 12.2 Concordance between FAO and GTAP commodities

GTAP commodity	FAO commodity
Paddy Rice	Rice (Paddy Equivalent)
Wheat	Wheat
Cereal Grains, nec	Barley
	Cereals, Other
	Maize
	Millet
	Oats
	Rye
	Sorghum
Vegetables, fruit, nuts	Apples
	Bananas
	Beans
	Cassava
	Citrus, Other
	Dates
	Fruits, Other
	Grapefruit
	Grapes
	Lemons, Limes
	Nuts
	Olives
	Onions
	Oranges, Mandarines
	Peas
	Pineapples
	Plantains
	Potatoes
	Pulses, Other
	Roots, Other
	Sweet Potatoes
	Tomatoes
	Vegetables, Other
	Yams

contd

Table 12.2 Concordance between FAO and GTAP commodities (continued)

GTAP commodity	FAO commodity
Oil seeds	Cottonseed
	Groundnuts (Shelled Eq)
	Oilcrops, Other
	Palmkernels
	Rape and Mustardseed
	Sesameseed
	Soyabeans
	Sunflowerseed
Sugar cane, sugar beet	Sugar Beet
	Sugar Cane
Plant-based fibers	Abaca
	Cotton Lint
	Jute
	Jute-like fibres
	Sisal
Crops, nec	Cloves
	Cocoa Beans
	Coconuts - Incl Copra
	Coffee
	Hard Fibres, Other
	Soft-Fibres, Other
	Rubber
	Pepper
	Pimento
	Spices, Other
	Tea
	Tobacco
Sugar	Sugar, Non-centrifugal
	Sugar, Refined Equiv
	Sweeteners, Other
Processed rice	Rice (Milled Equivalent)

contd

Table 12.2 Concordance between FAO and GTAP commodities (continued)

GTAP commodity	FAO commodity
Vegetable oils and fats	Copra Cake
	Coconut Oil
	Cottonseed Cake
	Cottonseed Oil
	Groundnut Cake
	Groundnut Oil
	Maize Germ Oil
	Oilcrops Oil, Other
	Oilseed Cakes, Other
	Olive Oil
	Palmkernel Cake
	Palmkernel Oil
	Palm Oil
	Rape and Mustard Cake
	Rape and Mustard Oil
	Rice Bran Oil
	Sesameseed Cake
	Sesameseed Oil
	Soyabean Cake
	Soyabean Oil
	Sunflowerseed Cake
	Sunflowerseed Oil
	Fats, Animals, Raw
Bovine cattle, sheep and goat meat[a]	Meat & Products, Bovine
	Meat & Prod, Sheep&Goat
Meat Products, nec	Eggs & Products
	Meat & Prod, Other Anim.
	Meat & Products, Pig
	Meat & Products, Poultry
Raw milk	Milk, Whole

contd

Table 12.2 Concordance between FAO and GTAP commodities (continued)

GTAP commodity	FAO commodity
Wool, silk-worm cocoons	Silk
	Wool (Clean Equivalent)
Dairy products	Butter ,Ghee
	Cheese
	Cream
	Milk, Skim
	Whey & Products
Other animal products not classified by species[b]	Hides & Skins
	Meat & Blood Meal
	Offals, Edible

[a] FAO quantity data are based on wholesale, dressed weights. Because of a lack of data on a live weight (or farm-level) basis, the corresponding livestock values are computed using the same quantity data, multiplied by a farm-level rather than wholesale price.

[b] Non-species specific products are allocated using the quantity shares of the specie specific meat products.

Table 12.3 Concordance between FAO Producer Price and Supply Utilization Crop Categories

FAO Supply Utilization Category	FAO Producer Price
Cereals, Other	Buckwheat
	Canary Seed
	Cereals Nes
	Fonio
	Mixed Grain
	Pop Corn
	Quinoa
Spices, Other	Cinnamon (Canella)
	Ginger
	Spices Nes
	Vanilla
	Nutmeg, Mace, Cardamons
Oilcrops, Other	Castor Beans
	Hempseed
	Kapokseed In Shell
	Karite Nuts (Sheanuts)
	Linseed
	Melonseed
	Oil Palm Fruit
	Oilseeds Nes
	Poppy Seed
	Safflower Seed
	Tung Nuts
Pulses, Other	Broad Beans, Dry
	Chick-Peas
	Cow Peas, Dry
	Lentils
	Lupins
	Pigeon Peas
	Pulses Nes
	Vetches

contd

Table 12.3 Concordance between FAO Producer Price and Supply Utilization Crop Categories (Continued)

FAO Supply Utilization Category	FAO Producer Price
Fruits, Other	Avocados
	Berries Nes
	Blueberries
	Cantaloupes+Oth Melons
	Cherries
	Cranberries
	Currants
	Figs
	Fruit Fresh Nes
	Fruit Tropical Fresh Nes
	Gooseberries
	Kiwi Fruit
	Mangoes
	Papayas
	Peaches And Nectarines
	Pears
	Persimmons
	Plums
	Quinces
	Raspberries
	Sour Cherries
	Stone Fruit Nes, Fresh
	Strawberries
	Watermelons
	Apricots
Nuts	Almonds
	Brazil Nuts
	Cashew Nuts
	Chestnuts
	Hazelnuts (Filberts)
	Kolanuts
	Nuts Nes
	Pistachios
	Walnuts

contd

Table 12.3 Concordance between FAO Producer Price and Supply Utilization Crop Categories (Continued)

FAO Supply Utilization Category	FAO Producer Price
Oranges, Mandarines	Oranges
	Tangerines, Mandarines, Clementines, Satsuma
Tea	Mate
	Tea
Roots, Other	Roots And Tubers Nes
	Taro (Coco Yam)
	Yautia (Cocoyam)
Vegetables, Other	Artichokes
	Asparagus
	Beans, Green
	Broad Beans, Green
	Cabbages
	Carobs
	Carrots
	Cauliflower
	Chicory Roots
	Chilies + Peppers, Green
	Cucumbers And Gherkins
	Eggplants
	Garlic
	Green Corn (Maize)
	Hops
	Lettuce
	Mushrooms
	Okra
	Onions + Shallots, Green
	Peas, Green
	Peppermint
	Pumpkins, Squash, Gourds
	Spinach
	String Beans
	Vegetables Fresh Nes

Table 12.4 Concordance between GTAP and FAO Producer Prices for Livestock Commodities

GTAP Livestock Commodity	FAO Producer Price
Bovine cattle, sheep and goats	Biological Ass Meat[a]
	Biological Buffalo Meat
	Biological Cattle Meat
	Biological Goat Meat
	Biological Horse Meat
	Biological Mule Meat
	Biological Sheep Meat
Animal products, nec	Biological Camel Meat
	Biological Chicken Meat
	Biological Duck Meat
	Biological Geese Meat
	Biological Other Camel
	Biological Other Poultry
	Biological Pig Meat
	Biological Turkey Meat
	Eggs, Primary
	Game Meat
	Rabbit Meat Biological
Raw milk	Buffalo Milk
	Camel Milk
	Cow Milk, Whole, Fresh
	Goat Milk
	Sheep Milk
Wool, silk-worm cocoons	Cocoons, Reelable
	Wool, Greasy
Bovine cattle, sheep and goat meat	Indigenous Ass Meat[b]
	Indigenous Buffalo Meat
	Indigenous Cattle Meat
	Indigenous Goat Meat
	Indigenous Horse Meat
	Indigenous Mule Meat
	Indigenous Sheep Meat

contd

Table 12.4 Concordance between GTAP and FAO Producer Prices for Livestock Commodities (Continued)

GTAP Livestock Commodity	FAO Producer Price
Meat products, nec	Indigenous Camel Meat
	Indigenous Chicken Meat
	Indigenous Duck Meat
	Indigenous Geese Meat
	Indigenous Other Camel
	Indigenous Other Poultry
	Indigenous Pigmeat
	Indigenous Turkey Meat
	Rabbit Meat Indigenous

d

[a] The term “biological” refers to prices given on a live weight basis.

[b] The term “indigenous” refers to prices given on a carcass or dressed weight basis.

Table 12.5 Non-FAO Producer Prices Utilized and Their Source

FAO Commodity	Price ($/mt)[a]	Source	Description
Soybean Oil	591	USDA, Oil Crops Yearbook	Crude, tank cars, f.o.b. Decatur
Groundnut Oil	916	USDA, Oil Crops Yearbook	Peanut Oil, crude, tank cars, f.o.b. Southeastern mills
Sunflowerseed Oil	604	USDA, Oil Crops Yearbook	Crude, Minneapolis
Rape & Mustard Oil	1145	USDA, Oil Crops Yearbook	Refined, denatured, tanks, N.Y.
Cottonseed Oil	625	USDA, Oil Crops Yearbook	PBSY, Greenwood, MS
Palm Kernel Oil	695	FAO, Value of Exports[b]	
Palm Oil	728	USDA, Oil Crops Yearbook	Refined, c.i.f., bulk, U.S. ports
Coconut Oil	750	USDA, Oil Crops Yearbook	Crude, tank cars, N.Y.
Sesameseed Oil	2385	FAO, Value of Exports	
Olive Oil	2425	USDA, Oil Crops Yearbook	
Rice Bran Oil	755	FAO, Value of Exports	
Corn Oil	588	USDA, Oil Crops Yearbook	Crude, tank cars, Chicago
Other Oil[c]	1100		
Castor Oil	992	USDA, Oil Crops Yearbook	No. 1, Brazilian tanks, N.Y.
Safflower Oil		USDA, Oil Crops Yearbook	Tanks, N.Y.
Linseed Oil		USDA, Oil Crops Yearbook	Raw, tank cars, Minneapolis
Tung Oil		USDA, Oil Crops Yearbook	Imported, drums, f.o.b., N.Y.
Soybean Cake	192	USDA, Oil Crops Yearbook	49% Protein, Decatur
Groundnut Cake	142	USDA, Oil Crops Outlook	Peanut Meal, 50% Protein SE Mills
Sunflower Cake	80	USDA, Oil Crops Yearbook	28% Protein
Rape & Mustard Cake	125	FAO, Value of Exports	
Cottonseed Cake	136	USDA, Oil Crops Yearbook	41% protein, solvent, Memphis
Palm Kernel Cake	90	FAO, Value of Exports	
Copra Cake	100	FAO, Value of Exports	
Sesameseed Cake	490	FAO, Value of Exports	
Other Oilseed Cake	125		
Sugar, non-centrifugal	100		
Refined Sugar	397	USDA, Sugar & Sweetener Yearbook	Contract No. 5, London Daily Price, f.o.b. Europe, spot.
Other Sweeteners[d]	330		
Glucsose Syrup	319	USDA, Sugar & Sweetener Yearbook	U.S. Wholesale list price, Midwest, dry
HFCS-42	345	USDA, Sugar & Sweetener Yearbook	U.S. spot price, Midwest, dry
Cotton	1887	USDA, Cotton and Wool Yearbook	Average price of U.S. cotton, c.i.f. Northern Europe
Milled Rice[e]	330		
Thailand	341	USDA, Rice Yearbook	100% Grade B, f.o.b., Bangkok
SW Louisiana	320	USDA, Rice Yearbook	Long grain, U.S. No. 2
Houston, Texan	324	USDA, Rice Yearbook	Long grain, U.S. No. 2

contd

Table 12.5 Non-FAO Producer Prices Utilized and Their Source (Continued)

FAO Commodity	Price ($/mt)[a]	Source	Description
Raw animal fats	510	FAO, Value of Exports	
Edible Offals	1390	FAO, Value of Exports	Value of fresh, edible offals
Meat Meal	295	FAO, Value of Exports	
Soft-fibers, Other	265	FAO, Value of Exports	Export value of Jute
Hard-fibers, Other	560	FAO, Value of Exports	Value of sisal and other agaves
Whole milk	550	FAO, Value of Exports	Value of fresh milk
Butter, Ghee	2900	FAO, Value of Exports	Value of butter
Cheese	4150	FAO, Value of Exports	Value of cheese & curd
Whey	790	FAO, Value of Exports	Value of dry whey
Cream	1960	FAO, Value of Exports	Value of fresh cream

[a] All prices are for 1995 to match time periods with the FAO producer prices.

[b] World value of exports divided by world quantity of exports, FAO Agriculture and Food Trade data base.

c The price of other oil is an average of the price of castor oil, safflower oil, linseed oil, and tung oil.

[d] The price of other sweeteners is an average of the price of glucose syrup and high fructose corn syrup, on a dry weight basis.

[e] The price of milled rice is an average of the prices of rice in the U.S. and Thailand.

Table 12.6 Sales of GTAP agricultural and food commodities within GTAP agricultural sector

GTAP Commodity	Pdr	wht	gro	v_f	osd	c_b	pfb	ocr	ctl	oap	rmk	wol
pdr	OU[a]	0	0	0	0	0	0	0	FEED[b]	FEED	FEED	FEED
wht	0	OU	0	0	0	0	0	0	FEED	FEED	FEED	FEED
gro	0	0	OU	0	0	0	0	0	FEED	FEED	FEED	FEED
v_f	0	0	0	OU	0	0	0	0	FEED	FEED	FEED	FEED
osd	0	0	0	0	OU	0	0	0	FEED	FEED	FEED	FEED
c_b	0	0	0	0	0	OU	0	0	0	0	0	0
pfb	0	0	0	0	0	0	OU	0	0	0	0	0
ocr	0	0	0	0	0	0	0	OU	FEED	FEED	FEED	FEED
ctl	0	0	0	0	0	0	0	0	OU	0	0	0
oap	0	0	0	0	0	0	0	0	0	OU	0	0
rmk	0	0	0	0	0	0	0	0	0	0	OU	0
wol	0	0	0	0	0	0	0	0	0	0	0	OU
cmt	0	0	0	0	0	0	0	0	0	0	0	0
omt	0	0	0	0	0	0	0	0	0	0	0	0
vol	0	0	0	0	0	0	0	0	0	0	0	0
mil	0	0	0	0	0	0	0	0	0	0	0	0
pcr	0	0	0	0	0	0	0	0	0	0	0	0
sgr	0	0	0	0	0	0	0	0	0	0	0	0
ofd	0	0	0	0	0	0	0	0	FEED	FEED	FEED	FEED
b_t	0	0	0	0	0	0	0	0	0	0	0	0

[a] Own-use of agricultural commodity.
[b] Feed use of crop commodities for livestock production.

Table 12.7 Sales of GTAP agricultural commodities to GTAP food processing industries and textiles

GTAP Commodity	cmt	omt	vol	mil	pcr	sgr	ofd	b_t	tex
pdr	0	0	0	0	NZ	0	0	NZ	0
wht	0	0	0	0	0	0	NZ	NZ	0
gro	0	0	0	0	0	0	NZ	NZ	0
v_f	0	0	0	0	0	0	NZ	NZ	0
osd	0	0	NZ	0	0	0	NZ	0	0
c_b	0	0	0	0	0	NZ	0	0	0
pfb	0	0	0	0	0	0	0	0	NZ
ocr	0	0	0	0	0	0	0	NZ	0
ctl	NZ[a]	0	0	0	0	0	0	0	0
oap	0	NZ	0	0	0	0	0	0	0
rmk	0	0	0	NZ	0	0	0	0	0
wol	0	0	0	0	0	0	0	0	NZ

[a] Represents a non-zero element in matrix.

Table 12.8 Sales of GTAP processed food commodities to GTAP food processing industries and other manufacturers

GTAP Commodity	cmt	omt	vol	mil	pcr	sgr	ofd	b_t	lea	crp
cmt	OU[a]	0	0	0	0	0	NZ[b]	0	NZ	NZ
omt	0	OU	0	0	0	0	NZ	0	NZ	NZ
vol	0	0	OU	0	0	0	NZ	0	0	NZ
mil	0	0	0	OU	0	0	NZ	0	0	0
pcr	0	0	0	0	OU	0	NZ	NZ	0	0
sgr	0	0	0	0	0	OU	NZ	NZ	0	0
ofd	NZ	NZ	NZ	NZ	NZ	NZ	OU	NZ	0	0
b_t	0	0	0	0	0	0	0	OU	0	0

[a] Own-use of GTAP commodity.
[b] Represents a non-zero element in matrix.

Table 12.9 Parameter estimates use to predict magnitude of per-capita own-use of agricultural and food commodities

Independent Variables	GTAP Commodities									
	pdr	wht	gro	v_f	osd	c_b	pfb	ocr	ctl	oap
Intercept	0.081	-1.88	-0.14	0.68	-0.27	-0.68	-4.78	-0.69	6.17	2.89
	(0.75)[b]	(0.17)	(0.93)	(0.77)	(0.58)	(0.23)	(0.0001)	(0.80)	(0.11)	(0.01)
Per-capita GDP	0.00000	-0.00011	-0.00019	-0.00010	-0.00005	-0.00004	0.00005	-0.00017	-0.00018	-0.00015
	(0.96)	(0.14)	(0.03)	(0.33)	(0.03)	(0.23)	(0.50)	(0.22)	(0.46)	(0.02)
Per-capita sales[a]	0.011	0.15	0.13	0.051	0.048	0.069	0.36	0.071	0.10	0.0022
	(0.0008)	(0.0001)	(0.0001)	(0.0004)	(0.03)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.72)
Number of observations	37	45	49	49	43	49	39	49	49	49
Number of left censored	9	6	4	4	21	17	18	7	15	12
Log-likelihood	-40.91	-122.58	-151.18	-160.89	-52.12	-79.80	-66.18	-162.32	-151.98	-116.37

contd

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.9 Parameter estimates use to predict magnitude of per-capita own-use of agricultural and food commodities

Independent Variables	GTAP Commodities									
	rmk	wol	cmt	omt	vol	mil	pcr	sgr	ofd	b_t
Intercept	-2.66	-1.02	-5.50	3.48	-1.02	-3.77	0.20	-0.38	7.62	-17.51
	(0.31)[b]	(0.02)	(0.035)	(0.36)	(0.37)	(0.48)	(0.74)	(0.78)	(0.25)	(0.20)
Per-capita GDP	-0.00015	0.00001	-0.00028	-0.00031	0.00003	-0.00020	-0.00010	-0.00008	-0.00053	-0.00125
	(0.35)	(0.74)	(0.08)	(0.21)	(0.66)	(0.58)	(0.0070)	(0.31)	(0.16)	(0.083)
Per-capita Sales[a]	0.064	0.041	0.15	0.086	0.082	0.13	0.016	0.091	0.090	0.21
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	0.0095	(0.0001)	(0.0001)	(0.0001)
Number of observations	46	41	49	49	48	49	41	48	49	49
Number of left censored	10	24	9	8	7	7	23	8	0	4
Log-likelihood	-140.87	-43.45	-156.74	-178.24	-123.27	-196.00	-49.68	-131.36	-231.33	-243.65

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.10 Parameter estimates used to predict crop commodity sales to livestock industries

Independent Variables	GTAP Commodities			
	wht	gro	v_f	ocr
Bovine cattle – ctl				
Intercept	-0.32	-5.51	-1.37	0.31
	(0.43)[d]	(0.0023)	(0.0054)	(0.66)
Per-capita sales[a]	0.040	0.37	0.014	0.0047
	(0.0031)	(0.0001)	(0.0001)	(0.41)
Grain sales[b]	-0.0044	-0.094	0.0049	0.0088
	(0.57)	(0.020)	(0.26)	(0.23)
wht-gro interaction[c]	0.00003	-0.00036	-0.00005	0.00032
	(0.23)	(0.0094)	(0.097)	(0.0001)
Per-capita GDP	0.00001	0.00004	-0.00002	-0.00005
	(0.68)	(0.68)	(0.38)	(0.094)
Number of observations	45	49	49	49
Number of left censored	10	8	16	7
Log-likelihood	-65.63	-139.02	-65.24	-99.67
Animal product nec – oap				
Intercept	-2.82	-3.13	-1.26	-0.83
	(0.15)	(0.18)	(0.047)	(0.46)
Per-capita sales	0.039	0.044	0.012	0.019
	(0.55)	(0.59)	(0.0004)	(0.030)
Grain sales	0.031	0.073	0.0090	0.0050
	(0.39)	(0.16)	(0.14)	(0.66)
wht-gro interaction	0.00049	0.00023	-0.00009	0.00055
	(0.0004)	(0.20)	(0.086)	(0.0001)
Per-capita GDP	0.00007	0.00012	0.00000	-0.00006
	(0.46)	(0.30)	(0.91)	(0.26)
Number of observations	45	49	49	49
Number of left censored	10	8	15	13
Log-likelihood	-119.62	-149.27	-75.51	-104.33

contd

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Grain sales are the sum of per-capita wht and gro value of production.

[c] Per-capita wht sales multiplied by per-capita gro sales.

[d] Values in parentheses are *p*-values.

Table 12.10 Parameter estimates used to predict crop commodity sales to livestock industries

Independent Variables	GTAP Commodities			
	wht	gro	v_f	ocr
Raw milk – rmk				
Intercept	-0.43	-3.77	-1.88	3.20
	(0.46)	(0.0013)	(0.06)	(0.050)
Per-capita sales[a]	0.024	0.26	0.015	0.0030
	(0.21)	(0.0001)	(0.005)	(0.82)
Grain sales[b]	0.0035	-0.056	0.014	-0.021
	(0.74)	(0.029)	(0.11)	(0.22)
wht-gro interaction[c]	0.00022	-0.00010	-0.00010	0.0015
	(0.0001)	(0.27)	(0.082)	(0.0001)
Per-capita GDP	-0.00001	0.00002	-0.00003	-0.00024
	(0.71)	(0.67)	(0.41)	(0.0012)
Number of observations	45	49	49	49
Number of left censored	13	11	17	10
Log-likelihood	-72.20	-114.13	-84.97	-125.79

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Grain sales are the sum of per-capita wht and gro value of production.

[c] Per-capita wht sales multiplied by per-capita gro sales.

[d] Values in parentheses are *p*-values.

Table 12.11 Parameter estimates used to predict prepared feed sales to livestock industries

Independent Variables	Livestock Categories			
	ctl	oap	rmk	wol
Intercept	-2.62	0.29	-1.93	-0.12
	(0.24)[c]	(0.96)	(0.50)	(0.59)
Per-capita GDP	0.00005	-0.00018	-0.00008	-0.00002
	(0.70)	(0.55)	(0.66)	(0.21)
Per-capita sales[a]				
ofd[b]	0.015	0.038	0.014	0.00066
	(0.0009)	(0.0008)	(0.036)	(0.12)
ctl	0.035			
	(0.020)			
oap		0.058		
		(0.075)		
rmk			0.058	
			(0.0001)	
wol				0.0030
				(0.28)
Number of observations	49	49	46	41
Number of left censored	2	1	2	14
Log-likelihood	-171.74	-215.42	-170.47	-42.13

[a] Per-capita sales refer to per-capita value of production.

[b] Per-capita sales of food products, n.e.c.

[c] Values in parentheses are *p*-values.

Table 12.12 Parameter estimates used to predict agricultural commodity sales to food and fiber processors

Independent Variables	GTAP Commodities								
	pdr to pcr	pdr to b_t	wht to ofd	wht to b_t	gro to ofd	gro to b_t	v_f to ofd	v_f to b_t	osd to vol
Intercept	-3.96	-1.52	0.58	-0.88	0.41	-0.059	0.51	-3.09	3.38
	(0.15)[b]	(0.015)	(0.75)	(0.51)	(0.77)	(0.97)	(0.85)	(0.17)	(0.28)
Per-capita GDP	0.00013	-0.0007	0.00006	-0.00005	0.00004	-0.00003	-0.00012	-0.00005	0.0001
	(0.31)	(0.039)	(0.59)	(0.49)	(0.62)	(0.68)	(0.36)	(0.65)	(0.49)
Per-capita Sales[a]									
Agricultural	0.90	0.024	0.12	0.021	0.13	0.027	0.051	0.063	-0.39
	(0.0001)	(0.0014)	(0.0001)	(0.19)	(0.0001)	(0.11)	(0.013)	(0.0001)	(0.033)
Processor	0.011	0.0032	0.0071	0.0044	0.0016	0.0044	0.011	-0.011	0.053
	(0.85)	(0.060)	(0.036)	(0.36)	(0.54)	(0.35)	(0.029)	(0.86)	(0.18)
ctl									0.038
									(0.026)
Per-capita consumption									
Number of observations	33	37	45	45	49	49	49	49	42
Number of left censored		26	1	14	1	9		5	4
Log-likelihood/Adjusted R^2	0.960	-29.69	-146.95	-100.15	-149.96	-128.79	0.302	-153.42	-144.33

contd

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.12 Parameter estimates used to predict agricultural commodity sales to food and fiber processors

Independent Variables	GTAP Commodities								
	osd to ofd	c_b to sgr	pfb to tex	ocr to ofd	ocr to b_t	ctl to cmt	oap to omt	rmk to mil	wol to tex
Intercept	-1.04	2.52	-1.32	2.68	2.48	10.23	-9.08	-5.98	-2.48
	(0.28)[b]	(0.28)	(0.18)	(0.57)	(0.17)	(0.33)	(0.11)	(0.36)	(0.035)
Per-capita GDP	0	0.0003	0.00005	0.00013	-0.00011	0.00017	0.00013	0.0003	-0.00006
	(0.92)	(0.0082)	(0.37)	(0.62)	(0.25)	(0.75)	(0.64)	(0.44)	(0.51)
Per-capita Sales[a]									
Agricultural	0.018	-0.018	0.11	0.13	0.019	1.01	0.75	0.53	0.22
	(0.71)	(0.79)	(0.0002)	(0.0006)	(0.23)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Processor	0.003	0.063		-0.011	0.0094	-0.30	0.036	0.18	
	(0.85)	(0.017)		(0.23)	(0.23)	(0.0005)	(0.61)	(0.0054)	
Per-capita consumption						-0.91	-0.84	-1.06	
						(0.0085)	(0.0001)	(0.0001)	
Number of observations	43	40	39	49	49	38	37	35	41
Number of left censored	22		13	4	3				21
Log-likelihood/Adjusted R^2	-64.60	0.271	-78.37	-196.87	-155.43	0.836	0.971	0.979	-67.57

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.13 Parameter estimates used to predict purchases of processed food products by food products, n.e.c.

Independent Variables	GTAP Commodities					
	cmt	omt	vol	mil	pcr	sgr
Intercept	-0.57	-1.12	-1.76	-2.72	-0.40	-0.99
	(0.40)[b]	(0.034)	(0.16)	(0.052)	(0.72)	(0.48)
Per-capita GDP	-0.00004	0.00002	0.00002	-0.00002	-0.00007	-0.00005
	(0.26)	(0.44)	(0.76)	(0.77)	(0.20)	(0.49)
Per-capita sales[a]						
ofd	0.0041	0.0052	0.0062	0.012	0.0006	0.013
	(0.0016)	(0.0001)	(0.0069)	(0.0005)	(0.72)	(0.0001)
cmt	0.0092					
	(0.001)					
omt		0.0056				
		(0.032)				
vol			0.071			
			(0.0001)			
mil				0.015		
				(0.0081)		
pcr					0.063	
					(0.0001)	
sgr						0.072
						(0.0001)
Number of observations	49	49	48	49	41	48
Number of left censored	7	9	0	4	12	4
Log-likelihood	-104.07	-90.49	-143.20	-143.61	-86.38	-139.02

[a] Per-capita sales refer to per-capita value of production.

[b] Values in parentheses are *p*-values.

Table 12.14 Parameter estimates used to predict sales of food products, n.e.c. to other food processors

Independent Variables	GTAP Commodities					
	cmt	omt	vol	mil	pcr	sgr
Intercept	0.24	0.53	-2.91	-0.29	-2.16	-8.72
	(0.61)[b]	(0.33)	(0.003)	(0.66)	(0.43)	(0.012)
Per-capita GDP	-0.00004	-0.00005	0.00011	-0.00009	-0.00022	-0.00017
	(0.17)	(0.12)	(0.018)	(0.030)	(0.14)	(0.34)
Per-capita sales[a]						
ofd	0.0018	0.0032	0.0011	0.0034	0.0018	0.0036
	(0.055)	(0.012)	(0.50)	(0.031)	(0.69)	(0.52)
cmt	0.0029					
	(0.14)					
omt		0.0004				
		(0.89)				
vol			0.042			
			(0.0007)			
mil				0.014		
				(0.0001)		
pcr					0.015	
					(0.58)	
sgr						0.14
						(0.0001)
Number of observations	49	49	48	49	41	48
Number of left censored	11	8	14	6	24	22
Log-likelihood	-85.55	-96.15	-96.28	-105.48	-71.86	-110.30

[a] Per-capita sales refers to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.15 Parameter estimates used to predict purchases of processed food products by beverages and tobacco and chemical, rubber, and plastic industries

Independent Variables	GTAP Commodities					
	pcr to b_t	sgr to b_t	ofd to b_t	cmt to crp	omt to crp	vol to crp
Intercept	-2.34	-1.26	-0.19	-0.45	-0.58	-0.70
	(0.061)[b]	(0.45)	(0.94)	(0.40)	(0.021)	(0.15)
Per-capita GDP	-0.00012	-0.00014	-0.00024	-0.00001	0.00002	0.00004
	(0.051)	(0.092)	(0.11)	(0.74)	(0.16)	(0.13)
Per-capita sales[a]						
b_t	0.011	0.022	0.067			
	(0.0012)	(0.0001)	(0.0001)			
pcr	0.020					
	(0.096)					
sgr		0.031				
		(0.089)				
ofd			-0.016			
			(0.045)			
cmt				0.0044		
				(0.032)		
omt					0.0034	
					(0.0007)	
vol						0.024
						(0.0002)
Number of observations	41	48	49	49	49	48
Number of left censored	17	6	8	18	20	10
Log-likelihood	-74.74	-140.11	-157.50	-77.69	-52.19	-83.70

[a] Per-capita sales refers to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.16 Parameter estimates used to predict purchases of meat products by the leather industry

Independent Variables	GTAP Commodity	
	cmt	omt
Intercept	0.20	-0.34
	(0.75)[b]	(0.63)
Per-capita GDP	-0.00001	-0.00003
	(0.82)	(0.53)
Per-capita sales[a]		
cmt	0.0094	
	(0.0003)	
omt		0.0063
		(0.041)
Number of observations	49	49
Number of left censored	11	20
Log-likelihood	-99.20	-84.53

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.17 Parameter estimates use to predict purchases of agricultural and processed food products by domestic households

Independent Variables	GTAP Commodities									
	pdr	wht	gro	v_f	osd	c_b	pfb	ocr	ctl	oap
Intercept	-0.26	2.84	3.80	7.27	-0.93	0.77	-0.18	-1.62	18.44	27.60
	(0.88)[b]	(0.24)	(0.0085)	(0.52)	(0.40)	(0.34)	(0.72)	(0.75)	(0.0003)	(0.0001)
Per-capita GDP	-0.00014	-0.00037	-0.00003	0.00008	-0.00004	-0.00006	-0.00005	0.00045	-0.00092	-0.0098
	(0.13)	(0.014)	(0.65)	(0.87)	(0.42)	(0.15)	(0.073)	(0.073)	(0.0035)	(0.012)
Per-capita sales[a]	-0.0058	0.060	0.0060	0.39	0.084	0.076	0.0050	0.12	0.027	0.054
	(0.84)	(0.021)	(0.69)	(0.0001)	(0.079)	(0.0047)	(0.77)	(0.0003)	(0.38)	(0.12)
Number of observations	36	44	48	48	42	48	38	48	48	48
Number of left censored	15	14	4		19	5	24	3	9	2
Log-likelihood/Adj R^2	-55.95	-118.08	-142.69	0.394	-72.21	-113.74	-37.24	-198.44	-180.56	-220.18

contd

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.17 Parameter estimates use to predict purchases of agricultural and processed food products by domestic households

Independent Variables	GTAP Commodities									
	rmk	wol	cmt	omt	vol	mil	pcr	sgr	ofd	b_t
Intercept	18.02	1.55	27.41	33.70	2.28	22.31	-4.79	-13.06	5.55	17.69
	(0.0001)[b]	(0.076)	(0.0002)	(0.0017)	(0.43)	(0.031)	(0.23)	(0.0013)	(0.84)	(0.38)
Per-capita GDP	-0.00061	-0.00015	-0.00013	-0.00014	0.00002	0.00082	0.00003	0.00033	-0.00092	0.00085
	(0.019)	(0.025)	(0.75)	(0.83)	(0.89)	(0.21)	(0.88)	(0.14)	(0.55)	(0.41)
Per-capita sales[a]	0.031	0.030	0.21	0.26	0.27	0.22	0.56	0.44	0.42	0.45
	(0.94)	(0.030)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of observations	45	40	48	48	47	48	40	47	48	48
Number of left censored	5	9			1		1	5		
Log-likelihood/Adj R^2	-175.27	-88.50	0.533	0.454	-176.23	0.561	-159.24	-180.04	0.631	0.602

[a] Per-capita sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.18 Parameter estimates used to predict per-capita sales of food products, n.e.c. and beverages and tobacco

Independent Variables	GTAP Commodity	
	ofd	b_t
Intercept	-3.36	-3.97
	(0.0001)[b]	(0.0001)
Log of per-capita GDP	0.074	-0.030
	(0.27)	(0.64)
Log of total per-capita sales[a]	1.20	1.35
	(0.0001)	(0.0001)
Number of observations	49	49
Adjusted R^2	0.788	0.827

[a] Total per-capita sales is the sum of the per-capita value of domestic production for all agricultural and food commodities except for ofd and b_t.

[b] Values in parentheses are *p*-values.

Table 12.19 Parameter estimates used to predict exports of livestock commodities, food products, n.e.c., and beverages and tobacco

Independent Variables	GTAP Commodities			
	ctl	oap	ofd	b_t
Intercept	-2.78	-2.44	-23.82	-2.99
	(0.21)[b]	(0.68)	(0.17)	(0.80)
Per-capita GDP	0.000002	0.00025	0.0010	0.00087
	(0.98)	(0.40)	(0.31)	(0.15)
Per-capita sales[a]				
ctl	0.069			
	(0.0001)			
oap		0.16		
		(0.0001)		
ofd			0.57	
			(0.0001)	
b_t				0.18
				(0.0003)
Per-capita Consumption Expenditures[b]				
ctl	-0.072			
	(0.26)			
oap		-0.33		
		(0.0056)		
ofd			-0.78	
			(0.0001)	
b_t				-0.10
				(0.23)
Number of observations	49	49	49	49
Number of left censored	14	5	1	3
Log Likelihood	-129.12	-198.48	-274.04	-241.77

[a] Total sales refers to value of domestic production.

[b] Value of consumption expenditures.

[c] Values in parentheses are *p*-values.

Table 12.20 Parameter estimates use to predict magnitude of own-use of imported agricultural and food commodities

Independent Variables	GTAP Commodities							
	wht	gro	v_f	pfb	ocr	ctl	oap	wol
Intercept	0.40	0.66	-0.69	0.0009	-1.69	-0.59	-0.43	-0.25
	(0.41)[a]	(0.22)	(0.51)	(0.99)	(0.11)	(0.097)	(0.39)	(0.014)
Per-capita GDP	-0.00003	-0.00004	-0.00003	0.00001	0.00008	0.00004	0.00004	0.00001
	(0.28)	(0.17)	(0.60)	(0.83)	(0.19)	(0.048)	(0.19)	(0.44)
Per-capita imports	0.017	0.013	0.049	-0.011	0.045	0.12	0.069	0.068
	(0.46)	(0.49)	(0.0027)	(0.29)	(0.032)	(0.0001)	(0.016)	(0.053)
Number of observations	45	48	48	40	49	41	45	31
Number of left censored	13	13	16	19	12	13	7	17
Log-likelihood	-76.35	-88.15	-101.86	-22.27	-116.35	-56.41	-84.84	-10.36

contd

[a] Values in parentheses are *p*-values.

Table 12.20 Parameter estimates use to predict magnitude of own-use of imported agricultural and food commodities

Independent Variables	GTAP Commodities							
	cmt	omt	vol	mil	pcr	sgr	ofd	b_t
Intercept	-1.63	-3.23	-0.54	-1.76	-0.62	-1.16	-3.17	-2.16
	(0.34)[a]	(0.082)	(0.63)	(0.28)	(0.061)	(0.073)	(0.15)	(0.088)
Per-capita GDP	-0.00014	-0.00012	-0.00007	-0.00009	-0.00001	0.00001	-0.00013	0.00005
	(0.17)	(0.28)	(0.33)	(0.36)	(0.85)	(0.80)	(0.33)	(0.49)
Per-capita imports	0.26	0.35	0.20	0.26	0.052	0.27	0.25	0.14
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.073)	(0.0001)	(0.0001)	(0.0001)
Number of observations	47	45	47	47	48	46	48	49
Number of left censored	12	7	6	5	25	12	1	8
Log-likelihood	-124.13	-132.61	-127.04	-142.30	-47.51	-84.78	-177.10	-131.17

[a] Values in parentheses are *p*-values.

Table 12.21 Parameter estimates used to predict imported crop commodity sales to livestock industries

Independent Variables	GTAP Commodities			
	wht	gro	v_f	ocr
Bovine cattle – ctl				
Intercept	-0.22	-3.07	-1.13	-0.48
	(0.032)[c]	(0.034)	(0.014)	(0.12)
Per-capita imports	0.0083	0.18	0.0025	0.0007
	(0.015)	(0.0001)	(0.59)	(0.88)
Grain sales[a]	0.0028	0.024	0.017	0.011
	(0.013)	(0.15)	(0.060)	(0.0041)
wht-gro interaction[b]	-1.30×10^{-5}	-0.00013	-0.00026	-5.40×10^{-5}
	(0.058)	(0.20)	(0.13)	(0.015)
Per-capita GDP	-9.72×10^{-6}	-0.00015	-0.00002	-3.07×10^{-5}
	(0.089)	(0.047)	(0.28)	(0.062)
Number of observations	45	48	48	49
Number of left censored	25	21	31	24
Log-likelihood	-15.38	-82.69	-34.11	-46.08
Animal product nec – oap				
Intercept	-0.76	-0.42	-0.97	-1.22
	(0.044)	(0.093)	(0.035)	(0.030)
Per-capita imports	0.035	0.019	-0.0018	-0.0055
	(0.0058)	(0.0031)	(0.76)	(0.63)
Grain sales	0.016	0.0071	0.014	0.019
	(0.0010)	(0.013)	(0.082)	(0.0031)
wht-gro interaction	-6.03×10^{-5}	-2.72×10^{-5}	-0.00024	-9.49×10^{-5}
	(0.015)	(0.084)	(0.18)	(0.0097)
Per-capita GDP	-3.82×10^{-5}	-2.26×10^{-5}	-0.00003	-4.31×10^{-5}
	(0.069)	(0.050)	(0.17)	(0.13)
Number of observations	45	48	48	49
Number of left censored	25	22	33	30
Log-likelihood	-38.12	-34.60	-31.03	-46.31

contd

[a] Grain sales are the sum of domestic per-capita wht and gro value of production.

[b] Per-capita domestic wht sales multiplied by domestic per-capita gro sales.

[c] Values in parentheses are *p*-values.

Table 12.21 Parameter estimates used to predict imported crop commodity sales to livestock industries

Independent Variables	GTAP Commodities			
	wht	gro	v_f	ocr
Raw milk – rmk				
Intercept	-0.50	-1.71	-0.88	-0.91
	(0.054)	(0.053)	(0.051)	(0.15)
Per-capita imports	0.012	0.090	0.0025	0.013
	(0.11)	(0.0001)	(0.66)	(0.28)
Grain sales[a]	0.0073	0.022	0.013	0.024
	(0.014)	(0.036)	(0.14)	(0.0015)
wht-gro interaction[b]	$-3.57\text{x}10^{-5}$	$-8.38\text{x}10^{-5}$	-0.00020	$-1.12\text{x}10^{-4}$
	(0.0385)	(0.14)	(0.24)	(0.013)
Per-capita GDP	$-4.09\text{x}10^{-5}$	$-6.62\text{x}10^{-5}$	-0.00003	$-8.82\text{x}10^{-5}$
	(0.011)	(0.12)	(0.16)	0.0094)
Number of observations	45	48	48	49
Number of left censored	27	25	32	24
Log-likelihood	-25.53	-60.11	-33.60	-64.55

[a] Grain sales are the sum of domestic per-capita wht and gro value of production.

[b] Per-capita domestic wht sales multiplied by domestic per-capita gro sales.

[c] Values in parentheses are *p*-values.

Table 12.22 Parameter estimates used to predict imported prepared feed sales to livestock industries

Independent Variables	Livestock Categories		
	ctl	oap	rmk
Intercept	-0.32	-1.05	0.44
	(0.46)[b]	(0.27)	(0.68)
Per-capita GDP	0.00001	0.00006	0.00006
	(0.88)	(0.28)	(0.23)
Per-capita ofd imports	0.014	0.024	0.0088
	(0.0025)	(0.0043)	(0.27)
Per-capita sales[a]			
ofd	-0.0011	-0.0061	-0.0029
	(0.37)	(0.036)	(0.16)
ctl	0.0027		
	(0.30)		
oap		0.025	
		(0.0001)	
rmk			0.0044
			(0.42)
Number of observations	41	45	22
Number of left censored	7	7	4
Log-likelihood	-68.38	-107.76	-40.35

[a] Per-capita sales refer to per-capita value of production.

[b] Values in parentheses are *p*-values.

Table 12.23 Parameter estimates used to predict imported agricultural commodity sales to food and fiber processors

Independent Variables	GTAP Commodities					
	wht to ofd	wht to b_t	gro to ofd	gro to b_t	v_f to ofd	v_f to b_t
Intercept	-3.52	-0.31	-3.48	-0.29	-0.80	
	(0.012)[b]	(0.45)	(0.026)	(0.080)	(0.19)	
Per-capita GDP	-0.00003	-0.00001	0.00019	0.00001	0.00001	
	(0.72)	(0.88)	(0.22)	(0.64)	(0.66)	
Per-capita imports	0.65	0.036	0.73	-0.0014	0.016	
	(0.0001)	(0.063)	(0.0001)	(0.76)	(0.11)	
Domestic processor sales[a]	0.0071	0.0008	-0.0037	0.0016	0.0024	
	(0.020)	(0.55)	(0.18)	(0.0005)	(0.21)	
Number of observations	45	45	48	48	48	
Number of left censored	1	15	5	16	15	
Log-likelihood/Adjusted R^2	-138.24	-63.44	-140.07	-36.50	-81.39	

contd

[a] Domestic processor sales refer to the per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.23 Parameter estimates used to predict imported agricultural commodity sales to food and fiber processors

Independent Variables	GTAP Commodities					
	pfb to tex	ocr to ofd	ocr to b_t	ctl to cmt	oap to omt	wol to tex
Intercept	-0.11	-1.42	0.10	-2.16	-1.03	-0.96
	(0.94)[b]	(0.60)	(0.96)	(0.0009)	(0.21)	(0.066)
Per-capita GDP	0.00007	-0.00014	-0.00033	-0.00001	-0.00004	0.00002
	(0.34)	(0.35)	(0.0020)	(0.77)	(0.44)	(0.45)
Per-capita imports	0.29	0.21	0.26	0.80	0.17	0.46
	(0.012)	(0.0004)	(0.0001)	(0.0001)	(0.0027)	(0.0009)
Domestic processor sales[a]		0.0043	0.0024	0.0012	0.013	
		(0.45)	(0.71)	(0.64)	(0.0019)	
Number of observations	40	49	49	41	44	31
Number of left censored	6	7	6	11	7	11
Log-likelihood/Adjusted R^2	-110.11	-163.27	-150.54	-73.58	-101.88	-45.26

[a] Domestic processor sales refer to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.24 Parameter estimates used to predict purchases of imported processed food products by food products, n.e.c.

Independent Variables	GTAP Commodities					
	cmt	omt	vol	mil	pcr	sgr
Intercept	-0.71 (0.0001)[b]	-0.80 (0.024)	-0.29 (0.84)	-464 (0.0080)	-0.42 (0.30)	-1.07 (0.061)
Per-capita GDP	0.00002 (0.11)	0.00001 (0.36)	0.00008 (0.36)	-0.00016 (0.12)	-0.0004 (0.12)	0.00002 (0.63)
Per-capita imports						
cmt	0.027 (0.0008)					
omt		0.018 (0.063)				
vol			0.20 (0.0002)			
mil				0.18 (0.0001)		
pcr					0.097 (0.084)	
sgr						0.26 (0.0001)
Per-capita sales of ofd[a]	0.0007 (0.073)	0.0018 (0.0040)	-0.0018 (0.59)	0.0062 (0.14)	0.0017 (0.12)	0.0008 (0.45)
Number of observations	47	45	47	47	48	46
Number of left censored	13	8	0	11	13	7
Log-likelihood	-38.99	-55.95	-150.42	-122.72	-74.51	-88.05

[a] Per-capita sales refer to per-capita value of production.

[b] Values in parentheses are *p*-values.

Table 12.25 Parameter estimates used to predict sales of imported food products, n.e.c. to other food processors

Independent Variables	GTAP Commodities					
	cmt	omt	vol	mil	pcr	sgr
Intercept	-0.068 (0.58)[b]	-0.0044 (0.98)	-9.90 (0.0001)	-0.65 (0.020)	-0.39 (0.056)	-1.51 (0.0001)
Per-capita GDP	-0.00001 (0.50)	-0.00001 (0.60)	-0.00014 (0.30)	0.00001 (0.65)	0.00001 (0.58)	2.51×10^{-5} (0.10)
Per-capita imports of ofd	0.0026 (0.0099)	0.0040 (0.027)	0.028 (0.11)	0.011 (0.0002)	-0.0028 (0.17)	-0.0013 (0.50)
Per-capita sales[a]						
cmt	0.0006 (0.18)					
omt		-0.00001 (0.99)				
vol			0.16 (0.0001)			
mil				0.0020 (0.10)		
pcr					0.0038 (0.028)	
sgr						0.024 (0.0001)
Number of observations	47	45	47	47	48	46
Number of left censored	14	11	18	10	37	28
Log-likelihood	-31.51	-39.30	-106.64	-62.28	-21.91	-30.89

[a] Per-capita sales refers to per-capita value of domestic production.

[b] Values in parentheses are *p*-values.

Table 12.26 Parameter estimates used to predict purchases of imported processed food products by beverages and tobacco and chemical, rubber, and plastic industries

Independent Variables	GTAP Commodities					
	pcr to b_t	sgr to b_t	ofd to b_t	cmt to crp	omt to crp	vol to crp
Intercept	-0.25	-0.79	-1.97	-2.48	-1.75	-0.87
	(0.15)[c]	(0.026)	(0.080)	(0.0001)	(0.0002)	(0.029)
Per-capita GDP	-0.00001	0.00001	-0.00009	5.60×10^{-5}	5.40×10^{-5}	0.00003
	(0.42)	(0.48)	(0.18)	(0.027)	(0.012)	(0.30)
Per-capita imports[a]	-0.0043	0.10	0.045	0.060	0.026	0.057
	(0.79)	(0.0001)	(0.0001)	(0.0001)	(0.016)	(0.0001)
Per-capita b_t sales[b]	0.0016	0.0013	0.0040			
	(0.0027)	(0.13)	(0.31)			
Number of observations	48	46	49	47	45	47
Number of left censored	19	14	11	30	27	14
Log-likelihood	-35.34	-57.18	-113.66	-39.30	-39.45	-70.67

[a] Per-capita imports of processed food product purchased by b_t and crp.

[b] Per-capita sales of domestic b_t sector.

[c] Values in parentheses are *p*-values.

Table 12.27 Parameter estimates used to predict purchases of imported meat products by the leather industry

Independent Variables	GTAP Commodity	
	cmt	omt
Intercept	-1.55	-0.62
	(0.11)[a]	(0.024)
Per-capita GDP	0.00006	0.00002
	(0.28)	(0.18)
Per-capita imports		
cmt	0.054	
	(0.13)	
omt		0.017
		(0.027)
Number of observations	47	45
Number of left censored	15	21
Log-likelihood	-96.13	-44.54

[a] Values in parentheses are *p*-values.

Table 12.28 Parameter estimates use to predict purchases of imported agricultural and processed food products by domestic households

Independent Variables	GTAP Commodities							
	wht	gro	v_f	pfb	ocr	ctl	oap	wol
Intercept	0.45	0.46	-2.99	0.18	-6.27	0.69	0.74	-0.015
	(0.49)[a]	(0.13)	(0.45)	(0.40)	(0.0039)	(0.15)	(0.43)	(0.94)
Per-capita GDP	-0.00012	-0.00002	0.00003	-0.00005	0.00025	-7.85×10^{-5}	-0.00021	-0.00002
	(0.017)	(0.22)	(0.91)	(0.0073)	(0.054)	(0.036)	(0.0007)	(0.31)
Per-capita imports	0.075	0.019	0.67	0.0065	0.42	0.11	0.40	0.11
	(0.018)	(0.079)	(0.0001)	(0.70)	(0.0001)	(0.0049)	(0.0001)	(0.088)
Number of observations	46	48	48	40	49	41	45	31
Number of left censored	16	7	0	24	3	11	8	12
Log-likelihood/Adj R^2	-78.41	-74.96	0.721	-27.37	-170.27	-70.96	-110.76	-28.07

contd

[a] Values in parentheses are *p*-values.

Table 12.28 Parameter estimates use to predict purchases of imported agricultural and processed food products by domestic households

Independent Variables	GTAP Commodities							
	cmt	omt	vol	mil	pcr	sgr	ofd	b_t
Intercept	0.0029	0.75	3.49	2.61	-0.62	0.12	3.39	2.34
	(0.99)[a]	(0.59)	(0.021)	(0.38)	(0.21)	(0.87)	(0.45)	(0.36)
Per-capita GDP	0.00004	0.00009	-0.00005	0.00005	0.00003	-0.00002	0.00006	-0.00026
	(0.64)	(0.29)	(0.60)	(0.75)	(0.43)	(0.69)	(0.81)	(0.091)
Per-capita imports	0.55	0.48	0.19	0.43	0.55	0.27	0.48	0.75
	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Number of observations	47	45	47	47	48	46	48	49
Number of left censored	0	0	0	0	6	3	0	0
Log-likelihood/Adj R^2	0.763	0.768	0.252	0.535	-95.98	-109.62	0.812	0.852

[a] Values in parentheses are *p*-values.

Table 12.29 Parameter estimates used to predict imports of livestock commodities, food products, n.e.c., and beverages and tobacco

Independent Variables	GTAP Commodities			
	ctl	oap	ofd[c]	b_t[c]
Intercept	-3.01	0.91	-2.38	-2.02
	(0.10)	(0.68)	(0.0080)	(0.071)
Per-capita GDP	-0.00009	0.00004	-0.066	0.11
	(0.41)	(0.76)	(0.48)	(0.37)
Per-capita sales[a]				
ctl	0.075			
	(0.0017)			
oap		-0.0021		
		(0.93)		
cmt	-0.023			
	(0.15)			
omt		0.025		
		(0.24)		
ofd			1.19	
			(0.0001)	
b_t				0.78
				(0.0001)
Per-capita imports				
cmt	0.19			
	(0.0068)			
omt		0.28		
		(0.001)		
Number of observations	49	49	49	49
Number of left censored	8	4	0	0
Log Likelihood/Adj. R^2	-143.52	-162.38	0.766	0.512

[a] Total sales refers to value of domestic production.

[b] Values in parentheses are *p*-values.

[c] Natural logarithmic transformation applied to all variables yielding a log-linear model.

Table 12.30 Parameter estimates used to predict primary factor payments for GTAP agricultural and food commodities

Independent Variables	GTAP Commodities					
	pdr	wht	gro	v_f	osd	c_b
Land						
Intercept	0.033	-2.26	-0.52	0.070	0.068	-1.69
	(0.97)[c]	(0.089)	(0.54)	(0.92)	(0.93)	(0.081)
Per-capita GDP	-0.34	-0.21	-0.23	-0.33	-0.35	-0.027
	(0.0007)	(0.27)	(0.065)	(0.055)	(0.0063)	(0.84)
Per-capita sales[b]	1.23	1.50	1.016	1.12	1.20	0.78
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0009)
F Value	126.38	39.86	16.67	25.30	33.21	11.44
Adjusted R^2	0.869	0.696	0.452	0.561	0.629	0.387
Skilled Labor						
Intercept	-8.54	-11.36	-9.31	-8.40	-8.78	-11.07
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Per-capita GDP	0.53	0.73	0.20	0.45	0.38	0.78
	(0.0001)	(0.0002)	(0.24)	(0.054)	(0.043)	(0.0001)
Per-capita sales	0.55	1.024	1.74	0.90	1.10	0.65
	(0.0002)	(0.0002)	(0.0001)	(0.0094)	(0.0003)	(0.0061)
F Value	28.87	60.38	30.59	59.00	31.96	59.51
Adjusted R^2	0.666	0.793	0.615	0.753	0.632	0.785
Unskilled Labor						
Intercept	0.32	-2.38	-0.19	0.31	0.12	-1.69
	(0.62)	(0.12)	(0.79)	(0.53)	(0.87)	(0.0091)
Per-capita GDP	-0.23	-0.079	-0.20	-0.22	-0.20	0.080
	(0.0044)	(0.71)	(0.059)	(0.082)	(0.075)	(0.35)
Per-capita sales	1.12	1.50	1.17	1.089	1.079	0.83
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
F Value	147.71	37.18	32.71	61.75	40.72	84.14
Adjusted R^2	0.891	0.674	0.625	0.762	0.676	0.826
Capital						
Intercept	-1.20	-3.44	-1.56	-1.56	-1.28	-3.25
	(0.14)	(0.049)	(0.063)	(0.014)	(0.14)	(0.0001)
Per-capita GDP	-0.15	-0.11	-0.19	0.086	-0.16	0.17
	(0.12)	(0.65)	(0.12)	(0.56)	(0.22)	(0.11)
Per-capita sales	1.028	1.64	1.26	0.69	1.092	0.75
	(0.0001)	(0.0001)	(0.0001)	(0.0025)	(0.0001)	(0.0001)
F Value	63.86	32.03	29.82	39.68	33.45	50.39
Adjusted R^2	0.782	0.646	0.603	0.671	0.631	0.744

contd

[a] All independent variables are in natural logarithms.

[b] Total per-capita sales of GTAP commodity.

[c] Values in parentheses are *p*-values.

Table 12.30 Parameter estimates used to predict primary factor payments for GTAP agricultural and food commodities

Independent Variables	GTAP Commodities					
	pfb	ocr	ctl	oap	rmk	wol
Land						
Intercept	2.79	0.36	-0.095	-1.25	-1.22	-0.95
	(0.061)[c]	(0.62)	(0.89)	(0.20)	(0.11)	(0.73)
Per-capita GDP	-0.69	-0.057	-0.38	-0.052	-0.10	-0.26
	(0.0005)	(0.68)	(0.0031)	(0.79)	(0.33)	(0.39)
Per-capita sales[b]	0.89	0.45	1.23	0.72	0.91	0.91
	(0.0001)	(0.028)	(0.0001)	(0.0029)	(0.0001)	(0.0001)
F Value	16.06	5.76	136.61	25.81	284.11	10.36
Adjusted R^2	0.493	0.200	0.877	0.566	0.940	0.401
Skilled Labor						
Intercept	-6.69	-6.98	-10.13	-10.46	-9.29	-7.18
	(0.0008)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.057)
Per-capita GDP	0.21	0.10	0.50	0.82	0.26	0.25
	(0.34)	(0.51)	(0.064)	(0.0040)	(0.16)	(0.51)
Per-capita sales	0.49	1.31	1.14	0.47	1.45	0.78
	(0.035)	(0.0001)	(0.0008)	(0.14)	(0.0001)	(0.0050)
F Value	4.95	65.38	52.76	60.22	108.06	5.23
Adjusted R^2	0.283	0.777	0.747	0.757	0.877	0.308
Unskilled Labor						
Intercept	3.71	1.00	-0.89	-1.51	-0.79	-2.26
	(0.020)	(0.091)	(0.22)	(0.052)	(0.32)	(0.40)
Per-capita GDP	-0.69	-0.16	-0.032	0.19	-0.057	0.0035
	(0.0008)	(0.14)	(0.80)	(0.22)	(0.60)	(0.99)
Per-capita sales	0.72	0.81	0.94	0.53	0.97	0.90
	(0.0003)	(0.0001)	(0.0001)	(0.0059)	(0.0001)	(0.0001)
F Value	10.63	24.31	116.77	50.06	442.36	12.83
Adjusted R^2	0.369	0.551	0.859	0.721	0.959	0.449
Capital						
Intercept	2.19	-0.23	-2.03	-2.90	-1.66	-3.35
	(0.17)	(0.71)	(0.023)	(0.0055)	(0.099)	(0.22)
Per-capita GDP	-0.60	-0.21	-0.046	0.24	-0.10	0.048
	(0.0039)	(0.082)	(0.77)	(0.24)	(0.47)	(0.87)
Per-capita sales	0.71	0.97	1.015	0.53	1.046	0.85
	(0.0005)	(0.0001)	(0.0001)	(0.031)	(0.0001)	(0.0001)
F Value	9.07	29.12	92.41	33.52	264.76	10.72
Adjusted R^2	0.342	0.597	0.828	0.631	0.934	0.410

contd

[a] All independent variables are in natural logarithms.

[b] Total per-capita sales of GTAP commodity.

[c] Values in parentheses are *p*-values.

Table 12.30 Parameter estimates used to predict primary factor payments for GTAP agricultural and food commodities

Independent Variables	GTAP Commodities					
	cmt	omt	vol	mil	pcr	sgr
Skilled Labor						
Intercept	-8.66	-6.22	-8.14	-6.87	-4.40	-4.83
	(0.0001)[c]	(0.0001)	(0.0001)	(0.0001)	(0.0006)	(0.0001)
Per-capita GDP	0.77	0.24	0.70	0.44	0.059	0.28
	(0.0001)	(0.29)	(0.0001)	(0.10)	(0.68)	(0.068)
Per-capita sales[b]	0.50	1.047	0.42	0.79	0.70	0.65
	(0.0005)	(0.0001)	(0.039)	(0.0002)	(0.0001)	(0.0003)
F Value	109.72	106.93	58.90	192.23	17.52	56.17
Adjusted R^2	0.861	0.851	0.758	0.910	0.524	0.759
Unskilled Labor						
Intercept	-6.02	-4.04	-5.62	-3.42	-1.01	-2.20
	(0.0001)	(0.0052)	(0.0001)	(0.023)	(0.46)	(0.025)
Per-capita GDP	0.50	0.17	0.55	0.16	-0.25	0.11
	(0.019)	(0.44)	(0.0027)	(0.50)	(0.14)	(0.48)
Per-capita sales	0.73	0.97	0.44	0.87	0.87	0.70
	(0.0001)	(0.0001)	(0.046)	(0.0001)	(0.0001)	(0.0001)
F Value	105.52	89.30	37.86	186.80	14.95	43.53
Adjusted R^2	0.846	0.827	0.666	0.907	0.466	0.708
Capital						
Intercept	-2.64	-3.14	-3.98	-3.01	1.61	-4.17
	(0.037)	(0.045)	(0.0015)	(0.069)	(0.26)	(0.0045)
Per-capita GDP	0.039	0.15	0.26	0.15	-0.45	0.44
	(0.84)	(0.54)	(0.20)	(0.57)	(0.011)	(0.047)
Per-capita sales	0.95	0.84	0.78	0.86	0.85	0.44
	(0.0001)	(0.0002)	(0.0033)	(0.0001)	(0.0001)	(0.055)
F Value	105.66	53.70	27.34	145.40	16.56	23.54
Adjusted R^2	0.846	0.740	0.594	0.884	0.464	0.556

contd

[a] All independent variables are in natural logarithms.

[b] Total per-capita sales of GTAP commodity.

[c] Values in parentheses are *p*-values.

Table 12.30 Parameter estimates used to predict primary factor payments for GTAP agricultural and food commodities

Independent Variables	ofd	b_t
Skilled Labor		
Intercept	-4.93	-6.60
	(0.0001)[c]	(0.0001)
Per-capita GDP	0.15	0.37
	(0.36)	(0.043)
Per-capita sales[b]	1.014	0.89
	(0.0001)	(0.0001)
F Value	262.80	172.09
Adjusted R^2	0.932	0.904
Unskilled Labor		
Intercept	-2.47	-2.72
	(0.0005)	(0.0012)
Per-capita GDP	-0.011	0.037
	(0.95)	(0.84)
Per-capita sales	1.057	0.98
	(0.0001)	(0.0001)
F Value	218.91	103.86
Adjusted R^2	0.920	0.848
Capital		
Intercept	-1.63	-1.59
	(0.13)	(0.062)
Per-capita GDP	-0.13	-0.14
	(0.62)	(0.47)
Per-capita sales	1.11	1.22
	(0.0001)	(0.0001)
F Value	75.89	102.09
Adjusted R^2	0.798	0.845

[a] All independent variables are in natural logarithms.

[b] Total per-capita sales of GTAP commodity.

[c] Values in parentheses are *p*-values.