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International Evidence on Food Consumption Patterns

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Abstract

The analysis presented here suggests that low-, middle-, and high-income countries all respond differently to changes in income and food prices and, furthermore that low-income countries are more responsive than high-income countries to such changes. These conclusions are based on a two-stage, cross-country demand system fit to the 1996 International Comparison Project (ICP) data for nine broad categories and eight food sub-categories of goods across 114 countries. The broad consumption groups include: food, beverage, and tobacco; clothing and footwear; education; gross rent, fuel, and power; house furnishings and operations; medical care; recreation; transport and communications; and other items. The food sub-groups include bread and cereals, meat, fish, dairy products, oils and fats, fruit and vegetables, beverages and tobacco, and other food products. The country data exhibit group heteroskedasticity, and a maximum likelihood procedure that corrects for group heteroskedasticity is developed and used to estimate the model. Theil's information inaccuracy measures are calculated to measure the goodness of fit of the system of equations, while Strobel measures are calculated to measure the goodness of fit on an individual equation basis. Using the estimated parameters, income and price elasticities are calculated for the broad consumption categories and the food sub-categories.

Keywords: Consumption, cross-country demand, complete demand system, food demand, elasticity, heteroskedasticity, maximum likelihood.

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The data in the technical bulletin are available at
<http://www.ers.usda.gov/data/internationalfooddemand>

Summary

A number of forces in the developing and the developed countries are driving changes in global food consumption patterns, with income growth being one of the most important. As food purchasing power increased among most consumers in the world during the past few decades, consumers shifted to more expensive forms of nutrients. This study presents information on consumer responsiveness to changes in food prices and income. Such information can be used to predict future food needs as well as enhance the ability to assess the need for different types of food among different countries.

The findings of this study suggest that low-, middle-, and high-income countries have distinct demand responses; low-income countries are more responsive to income changes than middle- and high-income countries. Additionally, the magnitude of demand responses varies among consumption items, with smaller responses to income changes for staple consumption categories such as food and clothing, and larger responses for rent, medical care, and other luxury items such as recreation.

Consumers make their food purchase decisions based on a budget that also must cover expenses for clothing, housing, and other goods and services. The overall budget available for food depends on the amount of total household budget spent on other goods and services. Therefore, an in-depth study on food demand requires an understanding of the complete demand patterns of consumers. Using a two-stage demand model, this study provides such a complete analysis of demand patterns, while focusing on food demand in the second stage of the model.

Expenditure and consumption volume data were obtained for 114 countries from the 1996 International Comparison Project (ICP) for nine broad categories of goods and eight sub-categories of food. The ICP provides the only available consumption data that are consistent and comparable across a large number of countries.

The 1996 ICP data indicate that low-income countries spend a greater portion of their budget on necessities such as food than wealthier countries do. On the other hand, relatively larger shares of the total household budget in the wealthier countries are spent on rent and fuel, medical care, transport and communication, and recreation. Low-value staples, such as cereals, account for a larger share of the food budget in poorer countries, while higher-valued food items, such as dairy and meat, are a larger share of the food budget in richer countries.

Demand responses to price changes are also generally the largest for poorer countries and decrease with affluence. However, when food price changes are accompanied by equivalent income changes, the wealthier low-income and middle-income countries make the largest adjustments to their total food budget. Like the response to income change, price change responses are larger for items such as medical care and recreation than for necessities like food and clothing.

Individual food subgroup responses to income changes are the largest for the poorest country and decline in magnitude with affluence. Staple food like cereals have smaller demand responses to income changes than higher-valued food items, such as meat, fish, and dairy.

Demand response to food subgroup price changes are also the largest for the poorest country and decline in magnitude with affluence. As with income changes, responses to price changes are larger for higher valued food products, such as beverages, meat, and dairy, than for staple food products, such as breads and cereals.

International Evidence on Food Consumption Patterns

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Introduction

Recent shifts in food trade reveal dramatic changes in demand for food around the world that likely will continue well into the future (Regmi, May 2001). A number of forces in both developing and developed countries are driving these changes, the most important being income growth. In the past two decades, average inflation-adjusted per capita income levels more than doubled in many countries, and food-purchasing power increased among most consumers in the world. Increased caloric intake and population growth in developing countries have continued to maintain significant demand for grains and oilseeds. Although the food budget may grow at a relatively slow rate among high-income consumers, global food consumption patterns are rapidly changing—with growing demands for quality, variety, and convenience. Globalization, improved transportation, and increased purchasing power have generally increased the demand for higher value food products—such as fruit and vegetables, meats, and processed food products—across all countries.

With the globalization of food markets, consumer demand for food in a country is of interest to producers in all countries. Farmers in countries with large agricultural exports are starting to rely more on global markets for a significant part of their income. Trade in agricultural products also affects the livelihoods of individuals along the entire farm-to-table chain in both rural and urban sectors of the world. Knowing how consumers respond to rises and falls in income can help policymakers assess future food and trade needs as well as the demand for associated transportation infrastructure and facilities. An understanding of food demand and food trends across countries and the ability to predict potential shifts in demand for different food products will be an invaluable tool for all individuals involved in the agricultural sector.

This study analyzes demand across 114 countries and presents results that can be used to predict future food needs for these countries. Consumers make their food purchase decisions based on a budget that also must cover their expenses for clothing, housing, and other goods and services. The overall budget available for food is dependent on the amount of total household budget spent on other goods and services. Therefore, an in-depth study on food demand requires an understanding of the complete demand patterns of consumers. In this study, we present such a complete demand analysis where household decisionmaking is examined in two steps. In the first step, a consumer is assumed to make budgetary decisions across broad consumption categories, such as food, clothing, education, and other goods. In the second step, the total food budget is further allocated to different food items. In conducting such a complete analysis, we provide results on nine broad consumption categories in addition to results on eight food sub-categories. The results of this study not only enhance the ability to predict future food needs, but can also be used to predict the need for clothing, transportation, medical care, and other broad consumption categories for the countries included in this study.

We developed a complete demand system consistent with the economic theory of constrained utility maximization to study the demand patterns across 114 countries. It is a major challenge to develop a complete demand system that appropriately reflects consumer behavior across countries spanning a wide

range of income levels. Many economic cross-country models fail to account for the fact that consumer responsiveness to income changes is dependent on the initial income endowment. In other words, the actual utility functions are not homothetic with identically shaped functions at every income level. Rather, the shape of the utility function (the demand responsiveness) differs between consumers at low income levels and those at high income levels. In this study, we used a non-homothetic complete demand system satisfying constrained utility maximization—especially designed by Theil, Chung, and Seale (1989) to analyze cross-country demand. In addition to examining the demand and consumer responsiveness to income and price changes for aggregate groups of goods and services, this report extends the work of Theil, Chung, and Seale to examine the demand for food sub-groups.

Background on Demand Analysis

Demand analysis can be described as a science of consumer choice or preferences among different goods and services. Since the demand for any one good or group of goods is dependent on the prices and availability of other products,¹ analyzing consumer demand is essentially the act of analyzing consumer preferences, that is, how consumers choose to allocate their income among different products. Economists use the concept of utility to define the level of satisfaction or welfare that comes from a specific allocation of income among different products. The basis of demand analysis is the problem of how to maximize utility subject to a given level of income, the latter also being known as the budget constraint. This can be expressed as:

$$\text{Maximize } u = v(q_1, q_2, \dots, q_n) \text{ subject to } \sum p_k q_k = x, \quad (1)$$

where u is a utility function of the quantities of goods consumed, x is total income, and p and q are prices and quantities, respectively. Solving this maximization problem by setting up the Lagrangean function will lead to a set of demand equations that express the quantity demanded for each good as a function of the price and total income,

$$q_i = g_i(x, P), \quad (2)$$

where P is the vector of commodity prices. This type of demand function, based on utility maximization, is known as a Marshallian or uncompensated demand function. For a logarithmic utility function, both income and price elasticities can be calculated by taking the derivative of the Lagrangean function, resulting in the following equation,

$$d \log q_i = \eta_i d \log x + \sum_{j=1}^n \mu_{ij} d \log p_j, \quad (3)$$

where η_i is the income elasticity and μ_{ij} are the uncompensated price elasticities.² So that changes in prices and total expenditure do not violate the budget constraint in the demand function, the following conditions on the elasticities must hold,

$$\sum_{j=1}^n w_j \eta_j = 1 \quad \text{and} \quad \sum_{j=1}^n w_i \mu_{ij} + w_j = 0, \quad (4)$$

where w is the budget share. These two conditions are known as Engel and Cournot aggregation, respectively, and together are sometimes referred to as the adding-up restriction.

The Marshallian demand function is the solution to the consumer's problem of maximizing utility subject to the budget constraint. However, the consumer's problem can also be expressed as one of minimizing total expenditures or costs subject to a predetermined utility level or,

$$\text{Minimize } x = \sum p_k q_k \text{ subject to } v(q_1, q_2, \dots, q_n) = u. \quad (5)$$

¹ Assuming a relatively free-market economy.

² The compensated price elasticity measures demand response when price changes are compensated by equivalent income changes such that the real income (and utility) remains unchanged. By contrast, the uncompensated price elasticity represents demand response when price changes are not compensated by income change—depicting the case where real income and total utility changes—while monetary income remains unchanged.

The solution to this problem is the Hicksian demand function, which is equivalent to the Marshallian demand function when evaluated at the optimal utility level,

$$q_i = h_i(u, P) = g_i(x, P). \quad (6)$$

The Hicksian demand function is also known as the compensated demand function, since it represents demand when utility is held constant. Price elasticities derived from the Hicksian demand function are called “compensated” or “Slutsky” price elasticities and are equal to the uncompensated price elasticity (also called “Cournot” price elasticities) plus the product of the income elasticity and the budget share, or,

$$\varepsilon_{ij} = u_{ij} + \eta_i w_j, \quad (7)$$

where ε_{ij} is the Slutsky price elasticity.

Restrictions on Demand Equations

Besides the adding-up restriction, there are three basic restrictions on demand equations. These can be expressed in terms of the compensated price elasticities as follows:

$$\text{Homogeneity: } \sum_{j=1}^n \varepsilon_{ij} = 0 \quad (8)$$

$$\text{Symmetry: } \varepsilon_{ij} = \varepsilon_{ji} \quad (9)$$

$$\text{Negativity: } \sum_{i=1}^n \sum_{j=1}^n x_i w_j \varepsilon_{ij} x_j < 0, \text{ for all } x_i \text{ and } x_j \text{ that are not constants.} \quad (10)$$

The homogeneity restriction implies that a proportionate change in income and prices of all goods will leave consumption of any one good unchanged. The symmetry restriction means the increase in the price of any good i will cause an increase in the compensated quantity demanded of j equal to the increase in the compensated quantity demanded of i caused by an increase in the price of j . Without this restriction, inconsistent choices between products would be made and there would be no substitute or complement products. The negativity restriction comes from the convexity of the utility function, which is due to the fact that the utility is maximized in the Marshallian demand function, or alternatively, that costs are minimized in the Hicksian demand function.

The adding-up, homogeneity, symmetry, and negativity restrictions represent the basic restrictions imposed on all demand functions. Determining income and price elasticities that meet these restrictions is the primary aim of demand analysis. Of course, it is possible to determine income and price elasticities without using demand equations derived from utility maximization or cost minimization. A logarithmic-demand model directly specifies the logarithmic quantity demanded as a function of logarithmic income and prices with income and price elasticities acting as coefficients. Such coefficients can be easily estimated by applying ordinary least squares (OLS) to cross-sectional or time series data. However, in order to maximize utility and satisfy the necessary restrictions, this model would require constant budget shares and constant elasticities, which is inconsistent with observations that budget shares change when income changes (Deaton and Muellbauer, 1984).

Choice of Demand Models

Both Marshallian and Hicksian demand equations satisfy the restrictions imposed by demand theory. An example of a Marshallian demand equation is the Linear Expenditure System (LES), first estimated by Stone and widely applied using individual country data. Although easy to use, the LES assumes additive

preferences, severely restricting substitution possibilities, and it also rules out inferior goods.³ Another major weakness of the model is that marginal budget shares obtained from estimation are constant with income changes. This property, known as “homotheticity,” can lead to estimations where the income elasticity for necessities actually increases when income rises (Theil and Clements, 1987).

The Rotterdam model, first proposed by Barten (1964) and Theil (1965), uses both Marshallian and Hicksian demand functions. Unlike the LES, where restrictions are maintained or imposed algebraically within the model, restrictions must be imposed on the Rotterdam model and can be statistically tested. The Rotterdam model also allows the estimation of substitutes and complements. Moreover, the Rotterdam model allows for the separability of preferences, a desirable and useful property in demand analysis. If separability holds, total expenditure can be partitioned into groups of goods, making it possible to analyze the preferences in one group independent of the quantities in other groups. However, the Rotterdam model has a strong disadvantage in that it produces, like the LES model, constant marginal shares, leading to counterintuitive results, particularly with cross-country analysis, in terms of changes in income (Theil and Clements, 1987).

The problem of constant marginal budget shares is avoided, using a popular Hicksian demand function called the Almost Ideal Demand System (AIDS) model. The AIDS model can be used to generate systems of demand equations that can be estimated over broadly defined groups of commodities. Since budget shares are not constant, income elasticities change with income changes. However, the AIDS model has several disadvantages: parameters in the AIDS model are non-linear and are difficult to estimate, negativity is not satisfied at all data points, and separability is not nested in the general specification. However, Theil, Chung, and Seale (1989) overcame these problems by combining the core of the AIDS model, called “the Working’s model,” with the differential approach and separability attributes of the Rotterdam model.

The Working’s model (1943) expresses budget shares as a linear function of total real expenditures. In its general form, Working’s (1943) model states that, for n goods, $i = 1, \dots, n$,

$$w_i = \alpha_i + \beta_i \log E + \varepsilon_i, \quad (11)$$

where $w_i = \frac{P_i E_i}{E}$ equals the budget share for good i , P_i and E_i represent the price of and the expenditure on good i , respectively. $E = \sum_{i=1}^n E_i$ is total real expenditure, ε_i is a residual term, and the α_i and β_i are parameters to be estimated. Since the budget shares across all consumption groups sum to 1, the α ’s and β ’s are subject to the adding-up conditions,

$$\sum_{i=1}^n \alpha_i = 1 \quad \text{and} \quad \sum_{i=1}^n \beta_i = 0. \quad (12)$$

The marginal budget share, θ_i , is not constant but varies by affluence, and it exceeds the budget shares by β_i ;

$$\theta_i = \frac{dE_i}{dE} = \alpha_i + \beta_i(1 + \log E) = w_i + \beta_i. \quad (13)$$

Accordingly, when income changes, w_i changes as does the marginal share. The income elasticity is the ratio of the marginal share to the budget share, given as follows:

$$\frac{\theta_i}{w_i} = \frac{\frac{dE_i}{dE} \frac{E}{E_i}}{\frac{dE_i}{dE} \frac{E}{E_i}} = \frac{d(\log E_i)}{d(\log E)}. \quad (14)$$

³ Inferior goods are goods for which the quantity demanded falls as income rises; that is, the income effect is negative.

Dividing θ_i in equation 13 by w_i results in:

$$\frac{\theta_i}{w_i} = 1 + \frac{\beta_i}{w_i}. \quad (15)$$

Equation 15 shows that β_i is greater than zero for a luxury good (has an income elasticity greater than 1), while it is less than zero for a necessity (has an income elasticity less than 1). If $\beta_i = 0$, then the good has unitary elasticity. Equation 15 also shows that, if the good is a luxury or a necessity (whether the β s are less than or greater than zero), the income elasticity of good i will decline as income increases. This is due to the fact that the budget shares (w_i) of necessities decline as income increases whereas the budget shares of luxuries increase as income increases. In the case of unitary elasticities, income elasticities remain unchanged with income changes. This is because the budget shares do not change for unitary elastic goods as income levels change.

Using the differential approach in the Rotterdam model, Theil, Chung, and Seale extended the model to incorporate prices adding a non-linear substitution term to the basic linear function. This model, known as the Working Preference Independence (PI) or the Florida model,⁴ allows for separability and has fewer parameters to be estimated than in the AIDS model. This model is further discussed in chapter 3.

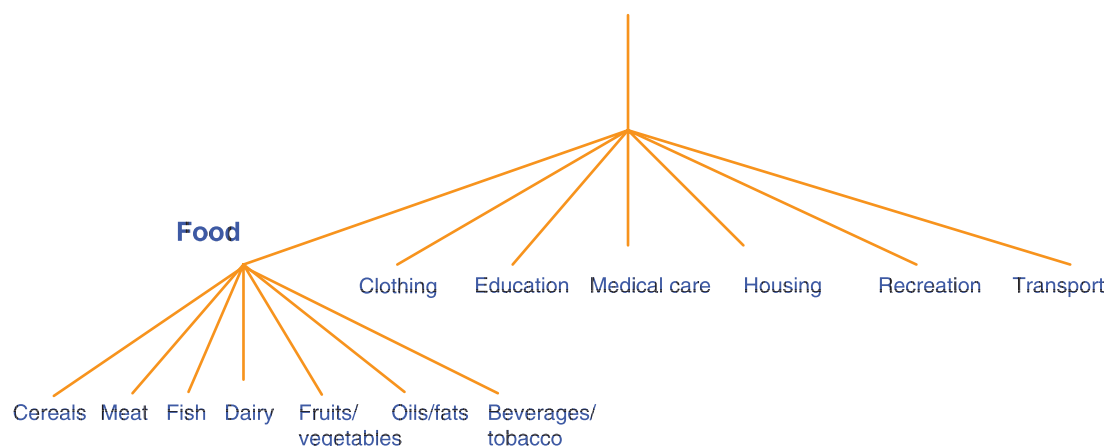
Preference Independence, Block Independence, and Stepwise Budgeting

Preference independence or strong separability implies that the preference ordering among goods is not dependent on the quantities consumed of any other goods. Block independence applies this idea to broad groups or categories of goods. Block independence or strong group-separability implies that the preference ordering among items within one broad consumption group is not dependent on the quantities of items consumed in other groups. This enables stepwise demand analysis, which assumes that consumers spend their income in steps or stages. In the first stage, consumers allocate their incomes among broad categories of goods, like food, shelter, and entertainment. In the second stage, consumers spend their budget on goods within these broad categories. Figure 1 depicts the stepwise budgeting procedure assumed in our analysis.

⁴ The model, developed by Theil, Chung, and Seale (1989), was originally named the “Working PI” (Preference Independence) model but was renamed the Florida model by Seale, Walker, and Kim (1991). In later writings, Theil (1996) also referred to it as the “Florida model.”

Figure 1

Stepwise (two-stage) budgeting procedure



While it is reasonable to assume that expenditures among broad consumption categories in the first stage of the budgeting process might be independent of each other, demand for goods within the food categories may not be independent. For example, many food products are substitutes or complements and have cross-price effects. Therefore, when estimating the second stage of the model, preference independence is generally replaced by the weak separability assumption. In our analysis of food sub-categories, the Florida-Slutsky model using the weak-separability assumption replaces the Florida-PI model. Both the Florida-PI and Florida Slutsky model are further discussed in Chapter 3.

International Comparison Project Data

Expenditure and price data for the two-stage cross-country demand model were obtained from the International Comparison Project (ICP), which was originally initiated by researchers at the University of Pennsylvania (Kravis, Heston, and Summers, 1975). The ICP is maintained by the International Comparison Program Development Data Group of the World Bank. Over the years, data collected by the ICP have increased from 10 countries in Phase I (1970) to 115 countries in 1996 (table 1). Theil, Chung, and Seale (1989) used the data from the first four phases, covering a total of 60 countries (seven countries from the earlier phases were excluded in Phase IV.) The 1996 data includes an additional 65 countries (additional to the 60 countries from Phase IV), but 10 countries present in the earlier three phases are excluded, resulting in a total of 115 countries. The current analysis uses 114 of the 115 countries, excluding Herzegovina, for which the 1996 population data were unavailable. Figure 2 shows a world map highlighting the countries that were covered in the 1996 ICP.

Problems are encountered when comparing expenditures across countries since the expenditures are expressed in different currencies. Using exchange rates to convert the expenditures to a single currency may not always be desirable since exchange rates fail to account for the fact that services are cheaper in developing countries. The creators of the ICP data developed a special, country-product-dummy (CPD) approach to consider this problem. This method begins at a highly disaggregated level, with a country's gross domestic product divided into a large number of detailed consumption categories. For example, the fresh vegetables category consisted of 20 individual items in Phase I (Theil, Chung, and Seale, 1989). Using the CPD approach, the natural logarithm of the price of item i is the sum of the item effect (A_i) and the country effect (B_c). If there are no missing observations and if this relation is fitted by least squares, the coefficient B_c is the mean over all items of the log price of item i in country c . Then the

Figure 2

Countries covered by the 1996 International Comparison Project

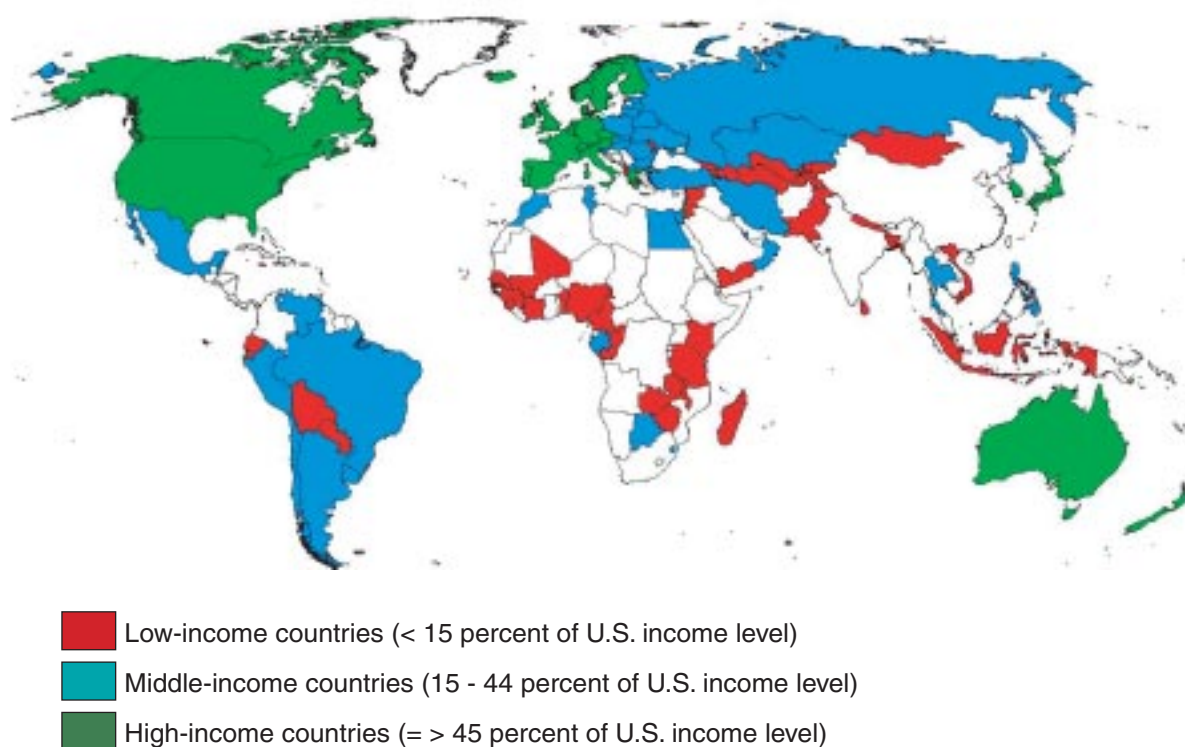


Table 1—Countries represented in the International Comparison Project

Africa	America	Asia	Europe	Africa	America	Asia/Oceania	Europe
<i>Countries represented in Phase I</i>				<i>Additional countries in 1996</i>			
Kenya	Colombia United States	India Japan	France Germany Hungary Italy United Kingdom	Benin Congo Egypt Gabon Guinea Mauritius Sierra Leone Swaziland	Antigua and Barbuda Bahamas Barbados Belize Bermuda Dominica Grenada Jamaica Mexico Trinidad and Tobago	Armenia Australia Azerbaijan Bahrain Bangladesh Fiji Georgia Iran Jordan Kazakhstan Kyrgyzstan Lebanon Mongolia Nepal New Zealand Oman Qatar Singapore Syria Tajikistan Thailand Turkmenistan Uzbekistan Vietnam Yemen	Albania Belarus Bulgaria Czech Repub Estonia Herzegovina Hungary Iceland Latvia Lithuania Macedonia Moldova Romaina Russia Slovakia Slovenia Sweden Switzerland Turkey Ukraine
<i>Countries added in Phase II</i>							
		Iran South Korea Malaysia Philippines	Belgium Netherlands				
<i>Countries added in Phase III</i>							
Malawi Zambia	Brazil Jamaica Mexico Uruguay	Pakistan Sri Lanka Syria Thailand	Austria Denmark Ireland Luxembourg Poland Romania Spain Yugoslavia				
<i>Countries added in Phase IV</i>							
Botswana Cameroon Ethiopia Cote d'Ivoire Madagascar Mali Morocco Nigeria Senegal Tanzania Tunisia Zimbabwe	Argentina Bolivia Canada Chile Costa Rica Dominican Rep. Ecuador El Salvador Guatemala Honduras Panama Paraguay Peru Venezuela	Hong Kong Indonesia Israel	Finland Greece Norway Portugal				
<i>Countries excluded in Phase IV</i>							
	Jamaica Mexico	Iran Malaysia Syria Thailand	Romania				
				<i>Countries excluded in 1996</i>			
				Ethiopia	Colombia Costa Rica Dominican Republic El Salvador Guatemala Honduras Panama	India	Yugoslavia

antilog of B_c equals the geometric mean price (say for vegetables in Phase I) over the $i=1, \dots, 20$ items in country c . In the case of missing observations, a weighted least squares approach is used, where the weight of each country is selected so as to correct for the number of items with missing price data in each country. The antilog of the calculated B_c is essentially estimated purchasing power parity (PPP). For example, in the case of fresh vegetables, when the parities are calculated using the United States as the base country, the estimated PPPs reflect the values for each country in national currencies required to purchase the same amount of fresh vegetables as purchased with \$1 in the United States. For example, the same amount of vegetables may be purchased by 1.5 Euros in France, or 80 rupees in Pakistan.

Aggregating Data at National Levels

As mentioned earlier, difficulties are encountered when trying to incorporate raw price data from cross-country surveys into demand models. Prices that maintain additivity⁵ of the data at various levels of aggregation need to be calculated for each consumption category in the model. Prices denominated in national currencies cannot be used since this compares two different units of measure, such as the Japanese yen and the U.S. dollar. One solution to convert expenditures into a single currency would be to use official exchange rates. Again, exchange rates do not account for the fact that services are cheaper in less developed countries, and these tend to overstate the poverty of poorer countries. Another solution is to use an appropriate purchasing power parity (PPP) measure to convert the prices to a single currency. However, mere conversion of the prices may not maintain additivity across different levels of aggregation of the data. The Geary-Khamis procedure addresses both problems by expressing expenditures in international dollars, which can be added across categories (World Bank, 1993). This method involves two steps. The first is to express expenditures in international dollars by dividing countries into specific regions and then distributing regional income among such countries according to the regional price structure. The overall purchasing power parity for a country c (π_c), is defined as:

$$\pi_c = \frac{\sum_{i=1}^n E_{ic}}{\sum_{i=1}^n P_c V_{ic}}, \quad (16)$$

where E_{ic} is the per capita expenditure in national currency on category i in country c and V_{ic} is the per capita expenditures expressed in U.S. dollars. Then, prices for each country c are obtained by dividing expenditures in national currencies by those in international dollars or,

$$P_c = \frac{\sum_{i=1}^n (E_{ic} / \pi_c)}{\sum_{i=1}^n V_{ic}}. \quad (17)$$

In our analysis, the program ICP ToolPak developed by Yuri Dikhanov of the World Bank is used to obtain Geary-Khamis estimates of prices and expenditures.

Scaling Problems

The 1996 ICP data were collected between 1993 and 1996 by six different agencies contracted by the United Nations for countries in Asia, Africa, the Middle East, the Caribbean, Latin America, the Organization of Economic Cooperation and Development (OECD), and the Commonwealth of Independent States (CIS) region. Each of the agencies was responsible for collecting data for a particular region, for which the data were collected at a very disaggregate level and then aggregated upward using the Geary-Khamis methodology to express PPPs in terms of base country currency, which in most cases was the 1996 U.S. dollars. However, not all PPPs were expressed relative to the United States. Data for Asia were expressed relative to Hong Kong, and data for Latin America were expressed relative to Mexico. Since Mexico was also represented in the OECD data, merging Latin America with the rest of the data was relatively easy. Merging the data from Asia was more challenging. The Asian data were first transformed to the U.S. base by making Japan, which was represented in the OECD data, the base country instead of Hong Kong. However, the transformed Asian data had scaling problems. For example, Singapore appeared to be poorer than most sub-Saharan African countries (fig. 3).

⁵ Additivity implies that expenditures of individual items in a consumption group add to the total group expenditure.

By comparing the PPPs from our data with those from the World Bank's World Development Indicators (WDI), we noticed a close match for all countries except for those from Asia. Therefore, we used the WDI rankings as a new scale for the Asian data. For example, Hong Kong's PPP in 1996, according to the WDI, was about 79.8 percent of the U.S. level. Therefore, for Asian countries, per capita expenditures of broad consumption categories were multiplied by 0.798 to get expenditures relative to the U.S. level, which was normalized to equal one. Figure 4 shows the effects of the re-scaling of the Asian data. A similar exercise was done for expenditure data for each of the food sub-groups. Total food sub-group expenditures were multiplied by the newly re-scaled PPPs for Asia to get relative expenditures in real terms.

Figure 3

Scatter of log of income and food, beverage, and tobacco budget share

Budget share

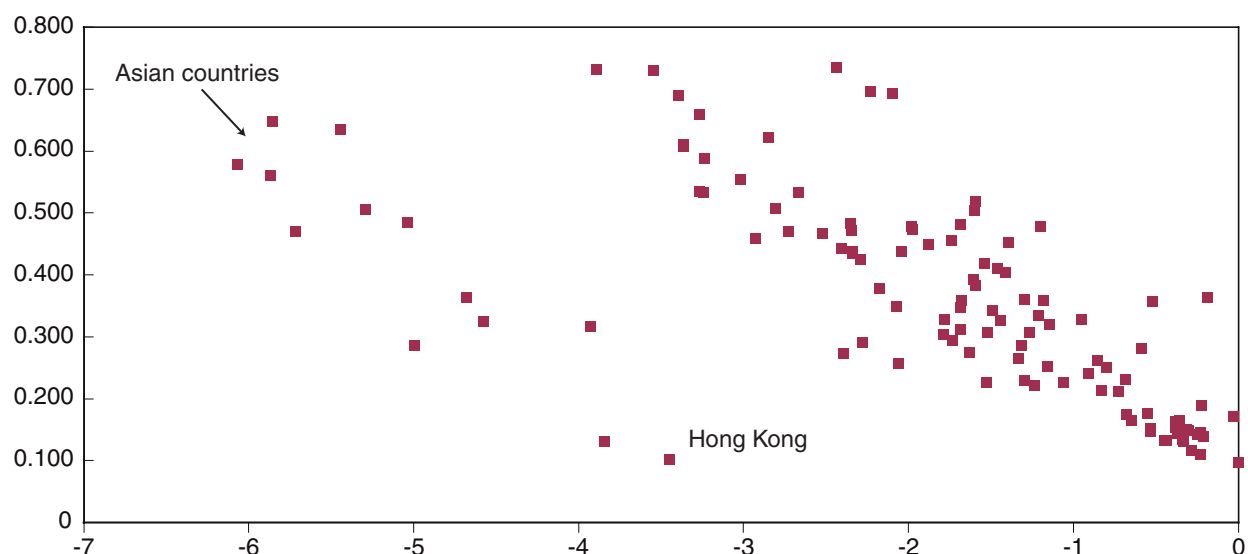
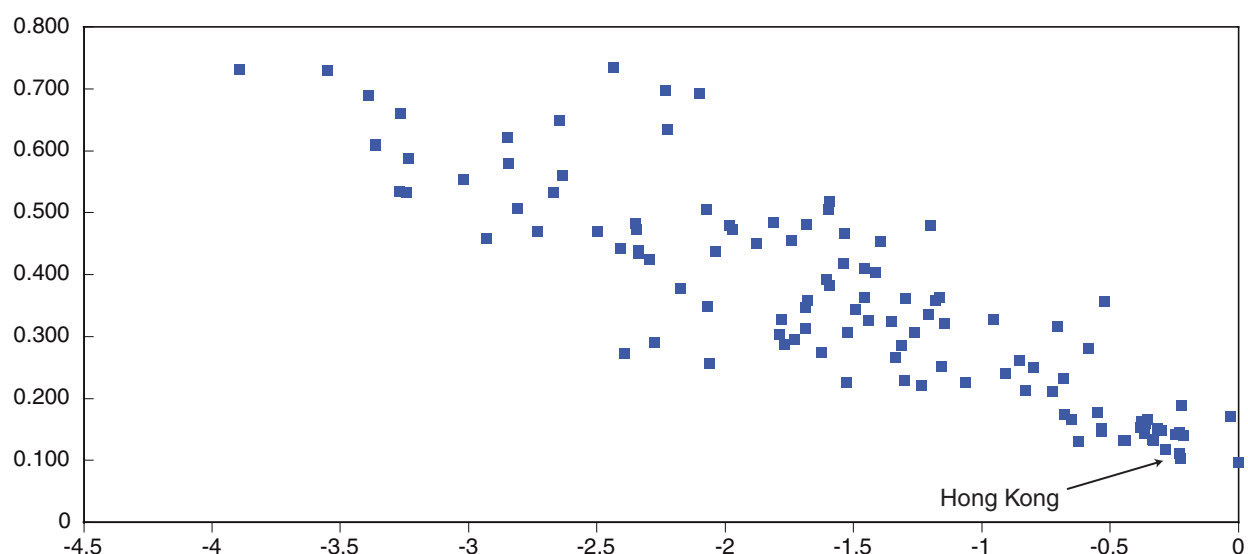


Figure 4

Scatter of income and food budget share, with Asia re-scaled

Budget share



Budget Shares and Volumes of Aggregate Categories and Food Sub-Categories⁶

To facilitate analysis, the 114 countries covered by the 1996 ICP are divided into low-, middle-, and high-income countries, based on their income relative to that of the United States.⁷ Low-income countries represent those with real per capita income less than 15 percent of the U.S. level, middle-income countries with real per capita income between 15 and 45 percent of the U.S. level, and high-income countries with per capita income equal to or greater than 45 percent of the U.S. level. This criterion for grouping indicates that the majority of Sub-Saharan African countries, poor transition economies such as Mongolia and Turkmenistan, and low-income Middle Eastern and Asian countries such as Yemen and Nepal fall within the first group. High-income countries include most Western European countries, and others such as Australia, New Zealand, Canada and the United States; while the middle-income countries include better-off transition economies such as Estonia, Hungary, Slovenia, North African countries, and many Latin American countries.

The simple average budget shares for the nine aggregate consumption categories for each of the three country groups are presented in table 2. It should be noted that the food grouping includes food prepared and consumed at home plus beverage and tobacco. It does not include food consumed away from home. As expected, the budget shares for food tend to decrease as income rises, ranging from over 73 percent of the total budget in Tanzania to just below 10 percent in the United States. Although the range for clothing and footwear is not as large as in the case of food, the simple average budget shares are also higher for low-income countries compared with the other two groups. The budget share for education is higher for high-income countries compared with the middle-income and low-income countries. This could be due to the fact that education is not homogeneous and quality variations may exist across countries, causing expenditures to rise in wealthier countries. Similarly, the budget shares for gross-rent, fuel and power; house furnishings and operations; medical care; transport and communication; and other items generally increase as income levels increase. On average, consumers in low-income countries spend less than 4 percent of their total budget on medical care, while consumers in high-income countries spend over 10 percent. As income increases, budget shares for recreation, a clear luxury item, also tend to increase. On average, low-income countries spend less than 2 percent of their total budget on recreation while high-income countries spend up to 8 percent of their total budget on recreation.

The conditional budget shares for the eight food sub-categories are presented in table 3. Cereals, fats and oils, and fruits and vegetables account for a larger share of the total food budget in low-income countries compared with high-income countries. The fruits and vegetable category also includes data on roots and

⁶ For detailed data on volume of consumption, nominal expenditures and budget shares for each country, contact Yonas Biru, International Comparison Program Development Data Group, World Bank, (202) 473-1268.

⁷ Note that this classification is merely done to facilitate analysis in this publication and is not based on any generally accepted criteria for classification. Since the classification is based on the ICP data used in this analysis, some countries may be in a group with which they normally would not be associated.

Table 2—Average budget shares for aggregate consumption categories, 114 countries in 1996¹

Country groups	Food beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Education	Transport & communica- tion	Recreation	Other
<i>Percent of total expenditures</i>									
Low-income	52.58	7.67	9.65	4.99	3.80	5.40	7.94	1.67	6.30
Middle-income	34.69	7.01	14.55	6.70	7.36	6.88	10.72	3.91	8.18
High-income	16.97	5.65	17.37	6.60	10.16	7.72	12.36	7.84	15.32

¹For detailed data on volume of consumption, nominal expenditures and the budget shares for each country, please contact Yonas Biru, International Comparison Program Development Data Group, World Bank, (202) 473-1268.

Table 3—Conditional budget shares for food sub-categories, 114 countries in 1996

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods	Total food expenditure	Total expenditures (US =1)
Percent of total food expenditures									% total expenditures	
Low-income countries										
Tanzania	4.74	39.55	9.60	6.38	3.56	3.30	24.22	8.65	73.24	0.020
Nigeria	2.73	34.08	12.88	15.22	5.61	5.15	15.44	8.89	72.97	0.029
Tajikistan	1.19	46.89	5.25	0.37	1.75	10.80	31.62	2.14	68.94	0.034
Zambia	12.98	18.45	24.38	12.28	6.02	6.55	13.12	6.22	60.81	0.035
Yemen	22.89	26.11	11.83	6.13	5.70	5.53	10.75	11.06	61.13	0.035
Malawi	4.86	40.44	17.48	12.84	3.23	3.11	13.21	4.83	53.35	0.038
Madagascar	5.92	44.47	9.65	3.79	2.09	2.35	26.18	5.56	65.88	0.038
Mali	6.76	34.39	14.10	3.01	3.81	8.11	9.89	19.93	53.27	0.039
Mongolia	6.13	30.38	31.21	0.03	18.11	3.46	3.78	6.91	58.74	0.039
Benin	9.45	23.57	14.27	7.56	4.13	4.48	33.24	3.29	55.40	0.049
Kenya	15.49	32.49	5.13	0.43	15.08	2.64	17.57	11.17	45.82	0.053
Sierra Leone	5.29	34.94	4.38	12.73	1.13	12.24	16.47	12.82	62.09	0.058
Nepal	9.79	57.61	3.29	0.63	5.36	4.33	14.58	4.41	57.88	0.058
Turkmenistan	6.45	24.81	23.12	1.04	9.91	6.19	20.23	8.25	50.82	0.060
Congo	9.53	10.67	9.23	14.50	3.86	2.50	44.85	4.87	46.92	0.065
Senegal	6.54	26.51	13.93	13.12	4.40	13.95	13.08	8.47	53.35	0.069
Vietnam	7.85	35.65	21.93	10.34	2.81	1.51	9.44	10.48	64.75	0.071
Bangladesh	4.12	50.17	4.38	9.21	3.21	3.88	9.58	15.46	56.05	0.072
Pakistan	4.38	21.20	7.68	0.71	26.84	10.06	17.32	11.80	46.99	0.082
Azerbaijan	2.89	39.02	14.40	1.07	5.64	10.22	13.04	13.72	73.51	0.088
Cote d'Ivoire	19.52	19.60	14.38	2.16	4.42	1.49	23.26	15.18	44.32	0.090
Paraguay	11.05	15.45	33.66	3.09	9.96	4.12	12.71	9.96	27.27	0.091
Uzbekistan	4.80	27.32	10.67	0.15	12.00	5.05	19.30	20.71	48.33	0.095
Kyrgyzstan	10.84	21.08	9.64	0.35	8.11	6.10	33.86	10.01	47.15	0.096
Cameroon	19.14	16.07	16.22	4.66	1.25	3.79	31.21	7.65	43.80	0.096
Moldova	7.06	19.78	15.86	1.69	16.96	6.05	24.04	8.57	43.45	0.096
Bolivia	13.40	21.91	23.90	0.89	5.95	3.16	22.17	8.62	42.52	0.101
Ecuador	9.78	14.80	19.51	5.48	12.92	5.90	21.09	10.52	29.09	0.103
Armenia	5.20	18.86	8.18	1.57	6.23	9.58	34.36	16.02	69.66	0.107
Sri Lanka	14.93	21.81	1.78	12.45	6.67	1.44	26.42	14.51	63.55	0.108
Jordan	10.05	8.42	27.56	1.68	11.33	9.04	15.47	16.44	37.67	0.114
Albania	5.13	20.64	18.99	0.31	17.37	9.54	22.64	5.39	69.26	0.123
Indonesia	11.32	33.47	5.13	8.70	5.70	4.74	23.73	7.20	50.62	0.126
Jamaica	11.50	18.92	24.72	6.81	11.87	3.16	14.12	8.90	34.78	0.126
Zimbabwe	13.91	23.70	22.04	2.61	8.99	6.68	10.02	12.04	25.58	0.127
Guinea	19.14	16.07	16.22	4.66	1.25	3.79	31.21	7.65	43.69	0.130
Syria	10.32	8.50	16.01	0.99	12.25	13.02	27.85	11.07	47.92	0.138
Georgia	4.39	27.10	12.86	1.52	14.45	6.99	21.99	10.70	47.39	0.139
Middle-income countries										
Ukraine	9.38	17.82	21.63	2.50	13.99	4.21	19.87	10.60	45.03	0.153
Philippines	11.91	29.73	14.49	14.50	6.71	1.76	11.10	9.81	48.35	0.163
Peru	9.23	21.30	22.18	4.65	9.62	3.70	21.37	7.95	30.31	0.168
Botswana	36.43	24.23	11.86	0.73	4.70	2.25	6.23	13.58	32.80	0.168
Thailand	28.57	16.11	18.64	3.31	5.23	2.76	16.38	8.99	28.56	0.170
Morocco	11.85	20.15	19.91	1.92	6.55	8.60	18.41	12.60	45.61	0.176
Venezuela	7.18	26.93	22.37	3.77	10.04	3.87	17.08	8.76	29.47	0.177
Macedonia	15.61	18.10	19.35	2.11	12.36	5.31	18.45	8.70	34.73	0.185

Continued--

Table 3—Conditional budget shares for food sub-categories, 114 countries in 1996--Continued

Table 6 Conditional budget shares for food sub-categories, 1971 countries in 1980 - continued									Total food expenditure	Total expenditures (US =1)
Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods		
Percent of total food expenditures									% total expenditures	
Middle-income countries--continued										
Belize	15.00	10.89	6.47	0.88	10.29	4.41	7.35	44.70	31.17	0.185
Egypt	9.25	24.65	23.62	4.56	10.10	8.36	12.53	6.92	48.08	0.186
St. Vincent & Grenadines	8.73	25.78	7.63	10.36	11.05	4.68	16.62	15.15	35.87	0.187
Swaziland	11.95	25.25	22.87	2.28	9.42	4.36	11.33	12.53	27.48	0.197
Lebanon	13.33	10.47	18.84	1.68	9.45	4.21	35.14	6.89	39.33	0.201
Belarus	13.00	14.98	21.67	4.09	18.06	6.31	14.79	7.10	50.45	0.203
Kazakhstan	11.17	30.77	17.76	1.61	9.20	7.12	9.32	13.05	51.82	0.203
Dominica	6.01	16.86	11.52	9.57	8.75	2.15	29.69	15.46	38.27	0.203
Latvia	18.92	12.89	18.87	3.05	14.89	4.29	17.80	9.30	41.76	0.214
St. Lucia	7.62	14.39	21.23	7.38	11.50	2.84	30.32	4.71	46.62	0.216
Brazil	12.32	16.80	24.54	2.31	14.04	3.62	14.83	11.55	22.71	0.217
Bulgaria	12.35	17.07	19.68	0.81	13.94	3.49	24.78	7.89	30.70	0.218
Russia	15.46	14.26	22.92	4.13	13.27	4.26	16.24	9.47	34.35	0.225
Fiji	18.20	15.72	12.75	11.85	6.99	3.96	21.16	9.37	36.28	0.232
Grenada	8.73	25.78	7.63	10.36	11.05	4.68	16.62	15.15	40.99	0.233
Turkey	9.47	20.34	13.55	1.01	12.84	8.42	23.23	11.14	32.60	0.236
Lithuania	19.88	12.92	20.67	3.47	14.10	4.83	11.98	12.15	40.42	0.243
Romania	13.47	14.62	24.34	0.80	12.82	5.71	20.61	7.63	45.26	0.248
Iran	4.79	24.80	23.88	1.66	11.17	6.96	18.62	8.12	32.55	0.258
Mexico	18.88	21.67	17.33	3.12	10.88	2.30	13.00	12.82	26.63	0.263
Bahrain	7.91	13.13	13.46	9.45	10.38	3.13	25.55	16.98	28.55	0.269
Chile	13.41	21.48	21.79	2.06	11.19	4.60	17.33	8.13	22.96	0.273
Antigua & Barbuda	8.73	25.78	7.63	10.36	11.05	4.68	16.62	15.15	36.12	0.273
Poland	26.53	10.33	21.24	1.55	8.35	3.44	14.49	14.07	30.65	0.283
Trinidad & Tobago	17.00	14.22	16.00	5.73	9.36	5.14	14.64	17.91	22.06	0.291
Estonia	21.39	16.08	20.26	2.97	13.17	4.73	10.18	11.21	33.45	0.299
Gabon	9.53	10.67	9.23	14.50	3.86	2.50	44.85	4.87	47.94	0.301
Tunisia	13.66	13.83	13.56	5.02	10.58	4.32	28.19	10.84	35.95	0.307
St. Kitts & Nevis	8.73	25.78	7.63	10.36	11.05	4.68	16.62	15.15	36.33	0.311
Uruguay	19.90	21.46	20.14	1.69	10.17	1.97	15.25	9.43	25.25	0.314
Slovakia	25.44	10.04	20.56	1.68	13.86	4.57	13.43	10.40	32.06	0.319
Hungary	23.58	10.91	20.48	0.77	12.76	4.73	12.67	14.09	22.54	0.346
Argentina	15.02	14.59	26.13	1.39	12.67	3.46	17.22	9.51	32.79	0.385
Oman	4.65	16.84	16.38	7.72	11.21	4.64	22.25	16.31	24.14	0.403
Qatar	7.32	10.63	23.15	5.61	10.36	2.72	20.99	19.21	26.22	0.426
Slovenia	24.13	10.08	22.13	1.90	11.41	2.98	17.21	10.16	21.34	0.437
High-income countries										
Czech Republic	28.09	10.25	21.27	1.76	11.63	4.03	12.38	10.59	25.00	0.451
Greece	24.56	7.25	16.03	4.53	13.58	5.37	17.27	11.40	21.17	0.485
Korea	17.82	20.70	12.69	11.69	5.02	0.88	21.23	9.97	31.64	0.494
Portugal	21.49	13.06	22.40	12.18	8.53	3.65	14.50	4.18	23.23	0.505
Spain	17.70	12.47	23.98	10.32	11.60	4.77	13.82	5.35	17.52	0.508
Ireland	37.33	9.51	16.38	1.97	10.09	2.74	13.42	8.56	16.59	0.522

Continued--

Table 3—Conditional budget shares for food sub-categories, 114 countries in 1996--Continued

Country	Beverages, Breads, tobacco	cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods	Total food expenditure	Total expenditures (US =1)
Percent of total food expenditures									% total expenditures	
High-income countries--continued										
Singapore	25.21	10.29	13.29	14.99	4.97	1.82	18.14	11.28	13.04	0.536
Mauritius	24.69	10.06	15.55	8.36	10.47	5.22	17.86	7.79	28.12	0.558
Israel	18.59	14.45	14.11	2.51	12.97	1.86	19.37	16.15	17.70	0.577
New Zealand	32.93	12.62	13.87	1.74	9.20	2.28	16.85	10.51	15.19	0.585
Finland	31.45	11.44	15.16	2.85	12.57	1.96	13.45	11.12	14.67	0.587
Bahamas	21.89	14.06	23.27	6.22	11.06	5.53	11.29	6.68	35.73	0.593
Sweden	27.47	11.42	15.18	4.37	11.71	2.29	14.44	13.12	13.26	0.638
Netherlands	24.00	12.36	18.67	2.16	12.61	2.21	15.72	12.27	13.29	0.646
France	21.36	10.89	24.92	4.75	11.80	2.85	12.39	11.05	15.34	0.682
United Kingdom	47.53	8.31	12.57	2.25	6.88	1.27	12.02	9.16	16.37	0.686
Belgium	21.06	10.78	24.72	6.06	10.96	3.87	12.38	10.16	14.36	0.693
Norway	29.99	7.70	16.35	4.85	12.79	1.52	11.06	15.73	15.98	0.695
Italy	16.18	11.32	23.58	5.40	13.90	3.86	19.14	6.61	16.59	0.701
Austria	23.72	13.45	20.98	1.64	11.29	3.80	14.10	11.01	13.53	0.715
Germany	28.25	14.87	20.30	1.87	7.11	2.27	8.28	17.05	13.09	0.718
Australia	25.24	13.50	16.91	3.11	9.67	1.65	18.34	11.56	15.07	0.732
Japan	23.15	22.28	7.82	17.02	4.79	0.66	12.79	11.49	14.88	0.741
Canada	29.48	11.43	16.46	2.65	11.19	2.11	18.12	8.57	11.68	0.754
Bermuda	20.28	10.06	11.55	2.97	7.84	4.34	13.52	29.43	14.23	0.782
Switzerland	26.18	10.73	16.52	1.81	15.16	1.97	17.02	10.60	14.57	0.794
Barbados	18.00	13.12	22.14	4.92	9.02	3.28	18.04	11.48	11.10	0.796
Hong Kong	17.87	9.04	22.67	19.66	3.44	3.33	11.81	12.19	10.28	0.799
Iceland	27.41	11.87	16.45	5.05	11.56	1.62	10.83	15.23	18.90	0.801
Denmark	28.81	8.93	20.38	2.04	11.12	2.16	11.93	14.65	14.02	0.808
Luxembourg	43.12	8.88	18.30	2.26	7.83	1.88	11.64	6.09	17.08	0.972
United States	28.71	11.39	19.58	1.19	8.59	1.77	14.66	14.11	9.73	1.000
Low-income average	9.25	26.97	14.62	5.03	7.89	5.90	20.34	10.00	52.58	0.080
Middle-income average	14.22	17.98	17.91	4.57	10.78	4.36	18.24	11.94	34.69	0.249
High-income average	25.92	11.83	17.94	5.47	10.03	2.78	14.62	11.41	16.97	0.674

tubers, a cheap source of calories in many poor countries.⁸ Therefore, a large portion of the food budget in Sub-Saharan countries is spent on fruits and vegetables, for example, 45 percent in Congo and 33 percent in Benin. On the other hand, the budget shares of meat, dairy, and beverages and tobacco are greater for high-income countries compared with both low- and middle-income countries.

The total food expenditures column in table 3 presents the food share of total household budget. The nominal expenditures in national currency for each food sub-category can be obtained by multiplying total food expenditures in national currencies by the respective budget shares. Per capita real volume of consumption of the aggregate and food sub-categories is given by the per capita expenditure in international dollars obtained from the Geary-Khamis procedure. Prices for each country are, as earlier explained, obtained by dividing the expenditures in national currencies by these volumes (equation 17). The value of total volumes consumed is the total real expenditure in international dollars and can be used as an income proxy. The final column in table 3 provides per capita national income (total real expenditure in international dollars) relative to that of the United States, which is normalized to one. The normalized total expenditure values indicate the wealth of a country relative to the United States.

⁸ Ideally, one would prefer to disaggregate roots and tubers for the fruits and vegetables category; however, the 1996 ICP data do not allow for this possibility.

Two-Stage Cross-Country Demand Model

As explained in chapter 1, our analysis of international food consumption patterns is conducted in two stages (fig. 1). The first stage involves estimating an aggregate demand system using the Florida-PI model across nine broad consumption categories: food—which includes food prepared and consumed at home plus beverages and tobacco—clothing and footwear, education, gross rent and fuel, house furnishings and operations, medical care, transport and communications, recreation, and other expenditures. The second stage of the analysis involves a second demand system using the Florida-Slutsky model across eight food sub-categories: bread and cereals, meat, fish, dairy products, oils and fats, fruits and vegetables, beverages and tobacco, and other food products. This section will discuss the actual models estimated in each stage and their results.

Florida-Preference Independence (PI) Model

The Working-Preference Independence model (PI) or the Florida-PI model, used in the first stage of our analysis, is an extension of Working's original 1948 model, which was briefly described in chapter 1. Using the differential approach of consumer demand, Theil, Chung, and Seale (1989) incorporated prices into Working's model. The resulting model can be divided into a linear, quadratic, and a cubic component as indicated below:

$$w_i = \text{LINEAR} + \text{QUADRATIC} + \text{CUBIC} + \varepsilon_{ic} . \quad (18)$$

LINEAR = Real-income term

$$= \alpha_i + \beta_i q_c . \quad (18a)$$

QUADRATIC = Pure price term

$$= (\alpha_i + \beta_i q_{ic}) \left[\log \frac{P_{ic}}{\bar{P}_i} - \sum_{j=1}^n (\alpha_j + \beta_j q_c) \log \frac{P_{jc}}{\bar{P}_j} \right] . \quad (18b)$$

CUBIC = Substitution term

$$= \phi (\alpha_i + \beta_i q_c^*) \left[\log \frac{P_{ic}}{\bar{P}_i} - \sum_{j=1}^n (\alpha_j + \beta_j q_c^*) \log \frac{P_{jc}}{\bar{P}_j} \right] . \quad (18c)$$

where q_c is the natural logarithm of Q_c , the measure of total real per capita income, $q_c^* = (1 + q_c)$, $\bar{P}_i$ is the geometric mean price of P_i over all countries, and ϕ represents the income flexibility—the inverse of the income elasticity of the marginal utility of income—which is assumed constant in the model.

The linear term in the model represents the effect of a change in real income—that is, the volume of total expenditure—on budget share. Since the quadratic and cubic terms vanish at geometric mean prices, the linear term is also the budget share at geometric mean prices. The quadratic term—quadratic because it contains products of the α s and the β s—is the pure price term showing how the increase in price results in a higher budget share on good i , even if the volume of expenditures goes down or stays the same. The cubic term—cubic because it involves ϕ —is a substitution term reflecting how higher prices may cause lower budget shares for good i due to substitution of good i for other goods.

The expenditure elasticity for the Florida-PI model is calculated by the ratio of the marginal share to the budget share as follows (Theil, Chung, and Seale, 1989, pp. 110-111 for derivation):

$$\frac{\theta_{ic}}{\bar{w}_{ic}} = 1 + \frac{\beta_i}{\bar{w}_{ic}}, \quad (19)$$

where, in this case, $\bar{w}_i$ represents the budget share of good i at geometric mean prices, c represents the country, θ_{ic} is the marginal share of good i in c , and β_i is the estimated coefficient on q_c in the i th good equation. Three types of own-price elasticities of demand can be calculated from the parameter estimates. The first of these, the Frisch-deflated own-price elasticity of good i , is the own-price elasticity when own-price changes and income is compensated to keep the marginal utility of income constant. It is given by:

$$F = \phi \frac{\bar{w}_{ic} + \beta_i}{\bar{w}_{ic}}, \quad (20)$$

where ϕ is the money flexibility and is estimated from the model. The Slutsky (compensated) own-price elasticity measures the change in demand for good i when the price of i changes, while real income remains unchanged. It is calculated from the following:

$$S = \phi \frac{(\bar{w}_{ic} + \beta_i)(1 - \bar{w}_{ic} - \beta_i)}{\bar{w}_{ic}} = F(1 - \bar{w}_{ic} - \beta_i). \quad (21)$$

The Cournot (uncompensated) own-price elasticity refers to the situation when own-price changes while nominal income remains constant but real income changes, and is calculated from:

$$C = \phi \frac{(\bar{w}_{ic} + \beta_i)(1 - \bar{w}_{ic} - \beta_i)}{\bar{w}_{ic}} - (\bar{w}_{ic} + \beta_i) = S - (\bar{w}_{ic} + \beta_i). \quad (22)$$

Florida-Slutsky Model

The Florida-Slutsky model, which assumes weak separability, is used to estimate the second stage of the model, the food subcategories. Similar to the Florida-PI model, the Florida-Slutsky model has three components: a linear real-income term; a quadratic pure-price term; and a linear substitution term replacing the cubic term in the former model, that is,

$$w_{ic} = (\alpha_i + \beta_i q_c) \quad (23a)$$

$$+ (\alpha_i + \beta_i q_{ic}) \left[\log \frac{P_{ic}}{P_i} - \sum_{j=1}^n (\alpha_j + \beta_j q_c) \log \frac{P_{jc}}{P_j} \right] \quad (23b)$$

$$+ \sum_{j=1}^n \pi_{ij} \left[\log \frac{P_{jc}}{P_j} \right]. \quad (23c)$$

The π_{ij} s represent Slutsky price coefficients, a matrix of compensated price responses. The compensated (Slutsky) price elasticities may be estimated by the ratio, $\pi_{ij} / \bar{w}_{ic}$ while the uncompensated (Cournot) own-price elasticity is given by the difference between the compensated elasticity and the income effect, that is $\pi_{ij} / \bar{w}_{ic} - (\bar{w}_{ic} + \beta_i)$. Similar to the Florida-PI model, the expenditure elasticity for the Florida-Slutsky model can be calculated at geometric mean prices using the formula given by equation 19.

Conditional Florida-Slutsky Model

The Florida Slutsky model can be written in terms of a conditional demand system. That is, the demand for good i contained in group S_g is conditional on group expenditure. The conditional Florida-Slutsky model is,

$$w_{ic}^* = \alpha_i^* + \beta_i^* q_{gc} \quad (24a)$$

$$+ (\alpha_i^* + \beta_i^* q_{gc}) \left[\log \frac{P_{i \in S_g, c}}{\bar{P}_{i \in S_g}} - \sum_{j \in S_g} (\alpha_j^* + \beta_j^* q_{gc}) \log \frac{P_{jc}}{\bar{P}_j} \right] \quad (24b)$$

$$+ \sum_{j \in S_g} \pi_{ij}^* \log \frac{P_{jc}}{\bar{P}_j} , \quad (24c)$$

where, $w_{ic}^* = \frac{w_{ic}}{W_{gc}}$, w_{ic} is the (unconditional) budget share of good $i \in S_g$, W_{gc} is the budget share of group S_g in country c , $\bar{P}_i$ is the geometric mean price of good $i \in S_g$, q_{gc} is the log of real expenditures on group S_g , and the α_i^* , β_i^* and π_{ij}^* s are conditional parameters to be estimated. In particular, the π_{ij}^* s are the conditional Slutsky (compensated) price parameters.

Income and price elasticities estimated from the conditional Florida - Slutsky model are conditional on given food expenditures. The unconditional demand elasticities can then be obtained using the parameters estimated in the first stage of the analysis. For example, the unconditional expenditure elasticity (η_{ic}^U) is simply the conditional expenditure elasticity ($\eta_{ic}^* = 1 + \beta_i^* / \bar{w}_{ic}^*$ where $\bar{w}_{ic}^* = \alpha_i^* + \beta_i^* q_{gc}$) multiplied by the income elasticity of demand for food as a group (η_{Fc}) obtained from the Florida - PI model (equation 19), or:

$$\eta_{ic}^U = \eta_{Fc} \eta_{ic}^* \quad i \in S_g . \quad (25)$$

The unconditional Frisch own-price elasticity is given by:

$$F_i^u = \frac{\phi \Theta_{gc}}{\bar{W}_{gc}} \frac{\theta_{ic}^*}{w_{ic}^*} = \phi \eta_{gc} \eta_i^* , \quad (26)$$

where Θ_{gc} is the marginal share for group S_g in country c , $\theta_{ic}^* = \frac{\theta_i}{\Theta_g}$ is the conditional marginal share of good $i \in S_g$, θ_i is the unconditional marginal share of good i , and ϕ is the income flexibility parameter estimated in stage one by the Florida - PI model.

The unconditional Slutsky price elasticity is given by:

$$\varepsilon_{ijc} = \frac{\pi_{ij}}{\bar{w}_{ic}} = \varepsilon_{ijc}^* + \Phi_{gc} \eta_{ic}^* \eta_{jc}^* \bar{w}_{jc}^* (1 - \bar{W}_{gc} \eta_{gc}) , \quad (27)$$

where $\varepsilon_{ijc}^* = \frac{\pi_{ij}^*}{\bar{w}_{ic}^*}$ is the conditional Slutsky price elasticity in country c for good i with regard to good j , π_{ij}^* is the conditional Slutsky price parameter, $\bar{w}_{ic}^*$ is the conditional fitted budget share of $i \in S_g$ in country c , $\Phi_{gc} = \frac{\phi \Theta_{gc}}{\bar{W}_{gc}}$, Θ_{gc} is the marginal share of group S_g in country c , ϕ is the income flexibility term estimated from the first stage, $\bar{W}_{gc}$ is the share of group S_g in country c at geometric mean (group) prices, η_{ic}^* and η_{jc}^* are conditional expenditure elasticities of i and j , respectively, in country c , and η_{gc} is the unconditional expenditure elasticity of group g (food in our case) in country c . The unconditional Cournot price elasticity can be estimated using the unconditional Slutsky elasticity as given by equation 28.

$$C_{ijc} = \varepsilon_{ijc} - \eta_{ic}^* \bar{w}_{ic}^* \times \eta_{gc} \bar{W}_{gc} . \quad (28)$$

All parameters of the Florida-PI and the Florida-Slutsky model were estimated by maximum likelihood (ML) using the scoring method (Harvey, 1990, pp. 133-135) and the GAUSS software.

Maximum Likelihood Estimation

The Florida-PI and Florida-Slutsky models can be estimated with maximum likelihood (ML). If all countries or groups of countries have identical covariance matrices, the model can be estimated under the condition of homoskedasticity. If countries or groups of countries have covariance matrices of differing magnitudes, the system exhibits heteroskedasticity. If so, the ML estimator should explicitly take heteroskedasticity into account. In the two sections that follow, we describe the ML estimator under the conditions of both homoskedasticity and group heteroskedasticity.

Homoskedasticity

Let a system of demand equations be given by:

$$w_{ic} = f_{ic}(\theta_i) + \varepsilon_{ic}, \quad (29)$$

where $\varepsilon_{ic} \sim N(0, \Sigma^*)$, $i (=1, \dots, n)$ represents good i , n being the total number of goods, $c (=1, \dots, N)$ represents country c , and N is the total number of countries. Because of adding-up restrictions, Σ^* is an $n \times n$ singular covariance matrix. Accordingly, we drop one equation for estimation purposes (Barten, 1969). Barten (1969) shows that parameter estimates are invariant to the equation dropped and the dropped parameters can be calculated from the adding-up restrictions of the model.

Define Σ to be the $(n-1) \times (n-1)$ resulting covariance matrix of the $n-1$ equations. Rewriting equation 29 in vector and matrix notation where w_c and ε_c are $n-1$ vectors, and w_{ic} and ε_{ic} are the i^{th} elements, respectively, such that:

$$w_c = f_c(\theta) + \varepsilon_c, \quad (30)$$

and θ is a parameter vector to be estimated. For the Florida-PI, define $f_c(\theta)$ to be:

$$\begin{aligned} f_c(\theta) = & \alpha + q_c \beta + X_c(\alpha + q_c \beta) - (\alpha + q_c \beta) x_c^T (\alpha + q_c \beta) \\ & + \phi X_c (\alpha + q_c^* \beta) - \phi (\alpha + q_c^* \beta) x_c^T (\alpha + q_c^* \beta), \end{aligned} \quad (31a)$$

where $\alpha = [\alpha_i]$ and $\beta = [\beta_i]$ are $n-1$ vectors of parameters, X_c is a diagonal matrix of order $n-1$ with x_{ic} as the i^{th} diagonal element, x_c is a column vector (x_c^T is its transpose) with x_{ic} as its i^{th} element ($i = 1, \dots, n-1$), and $x_{ic} = \log\left(\frac{P_{ic}}{\bar{P}_i}\right) - \log\left(\frac{P_{nc}}{\bar{P}_i}\right)$ where $\bar{P}_i = \sum_c \log P_{ic} / N$ is the geometric mean price of good i over all N countries. For the conditional Florida-Slutsky model, define $f_c(\theta)$ to be:

$$f_c(\theta) = \alpha^* + q_{gc} \beta^* + X_c(\alpha^* + q_{gc} \beta^*) - (\alpha^* + q_{gc} \beta^*) x_c^T (\alpha^* + q_{gc} \beta^*) + \pi^* x_c. \quad (31b)$$

where $\alpha^* = [\alpha_i^*]$ and $\beta^* = [\beta_i^*]$ are $n-1$ vectors of parameters ($i \in S_g$), π^* is an $n-1 \times n-1$ symmetric matrix of π_{ij}^* s (homogeneity and symmetry imposed), X_c is a diagonal matrix of order $n-1$ with x_{ic} as the i^{th} diagonal element ($i \in S_g$), x_c is a column vector (x_c^T is its transpose) with x_{ic} as its i^{th} element ($i = 1, \dots, n-1$ and $i \in S_g$), and $x_{ic} = \log\left(\frac{P_{ic}}{\bar{P}_i}\right) - \log\left(\frac{P_{nc}}{\bar{P}_i}\right)$ where $\bar{P}_i = \sum_c \log P_{ic} / N$ is the geometric mean price of good $i \in S_g$ over all N countries.

The log-likelihood function of equation 31a or 31b is:

$$L = \text{constant} + \frac{1}{2} N \log |\Sigma^{-1}| - \frac{1}{2} \sum_{c=1}^N [w_c - f_c(\theta)]^T \Sigma^{-1} [w_c - f_c(\theta)], \quad (32)$$

and must be maximized with respect to both unknown parameter matrices, Σ^{-1} and θ . Maximizing L with respect to Σ^{-1} yields:

$$R(\theta) = \frac{1}{N} \sum_{c=1}^N [w_c - f_c(\theta)] [w_c - f_c(\theta)]^T. \quad (33)$$

Substituting R for Σ into equation 32 yields the concentrated log-likelihood function,

$$L^* = \text{constant} + \frac{1}{2} N \log |R^{-1}|. \quad (34)$$

For the Florida-PI model, the first-order derivatives of L^* with respect to $\theta (= \alpha, \beta, \phi)$ is:

$$\frac{dL^*}{d\theta} = \sum_{c=1}^N \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R^{-1} [w_c - f_c(\theta)], \quad (35a)$$

where $df_c(\theta)/d\theta^T$ consists of three submatrices: $df_c(\theta)/d\alpha^T = A + B$ (square of order $n - 1$), $df_c(\theta)/d\beta^T = q_c A + q_c B$ (same order), $df_c(\theta)/d\phi = X_c(\alpha + q_c^* \beta) - (\alpha + q_c^* \beta) x_c^T (\alpha + q_c^* \beta)$ (a column vector of $n - 1$ elements), $A = X_c - (\alpha + q_c \beta) x_c^T + [1 - (\alpha + q_c \beta)^T x_c] I_{n-1}$, $B = \phi X_c - \phi(\alpha + q_c^* \beta) x_c^T - [\phi(\alpha + q_c^* \beta)^T x_c] I_{n-1}$, and I_{n-1} are the identity matrix of dimension $n - 1$ (Theil, Chung, and Seale, p. 46 - 47).

For the Florida-Slutsky model, the first-order derivatives of L^* with respect to $\theta (= \alpha^*, \beta^*, \pi^*)$ is:

$$\frac{dL^*}{d\theta} = \sum_{c=1}^N \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R^{-1} [w_c - f_c(\theta)], \quad (35b)$$

where $df_c(\theta)/d\theta^T$ consists of three submatrices: $df_c(\theta)/d\alpha^{*T} = A^*$ (square of order $n - 1$), $df_c(\theta)/d\beta^{*T} = q_{gc} A^*$ (same order), $df_c(\theta)/d\pi^* = X$ (an $n - 1 \times n - 1$ matrix with each row equal to x_c^T), $A^* = X_c - (\alpha^* + q_{gc} \beta^*) x_c^T + [1 - (\alpha^* + q_{gc} \beta^*)^T x_c] I_{n-1}$, and I_{n-1} is the identity matrix of dimension $n - 1$.

The expectation of the second-order derivatives of L^* (or the expectation of the Hessian) with respect to $\theta (= \alpha, \beta, \phi)$ or to $\theta (= \alpha^*, \beta^*, \pi^*)$ is:

$$M = E \left[\frac{d^2 L^*}{d\theta d\theta^T} \right] = - \sum_{c=1}^N \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R(\theta)^{-1} \left[\frac{df_c(\theta)}{d\theta^T} \right], \quad (36)$$

where $E(\cdot)$ is the expectations operator. The asymptotic covariance matrix of the ML estimator of θ is $-M^{-1}$ (Theil, Chung, and Seale, 1989, p. 47). The maximum likelihood estimates of θ can be obtained through the method of scoring (Harvey, 1990, pp. 133-135), and the asymptotic standard errors are computed from the square root of the diagonal of $-M^{-1}$ where M is defined above.

Group Heteroskedasticity

Let there be G groups of countries and assume heteroskedasticity across the covariance matrices of the individual groups such that the covariance matrix of g ($=1, \dots, G$) is $K_g \Sigma$ and K_g is a scalar. In this case, the log-likelihood function is:

$$L = \text{constant} - \frac{n-1}{2} \sum_g N_g \log K_g + \frac{N}{2} \log |\Sigma^{-1}| - \sum_g \frac{1}{2K_g} \sum_{c \in N_g} [w_c - f_c(\theta)]^T \Sigma^{-1} [w_c - f_c(\theta)], \quad (37)$$

where $N = \sum_g N_g$, and the concentrated log-likelihood function is:

$$L^* = \text{constant} - \frac{n-1}{2} \sum_g N_g \log K_g + \frac{N}{2} \log |R(\theta, K)|, \quad (38)$$

and $R(\theta, K) = \frac{1}{N} \sum_g \frac{1}{K_g} \sum_{c \in N_g} [w_c - f_c(\theta)][w_c - f_c(\theta)]^T$, and K is defined as a vector of all K_g .

First - order derivatives of L^* with respect to θ ($= \alpha, \beta, \phi$) or θ ($= \alpha^*, \beta^*, \pi^*$) are:

$$\frac{dL^*}{d\theta^T} = \sum_g \frac{1}{K_g} \sum_{c \in N_g} \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R^{-1} [w_c - f_c(\theta)], \quad (39)$$

with $df_c(\theta)/d\theta^T$ defined in equations 35a and 35b for the Florida - PI and Florida - Slutsky models, respectively. The first - order derivative of L^* with respect to K_g is:

$$\frac{dL^*}{dK_g} = -\frac{(n-1)N_g}{2K_g} - \frac{1}{2K_g} \sum_{c \in N_g} [w_c - f_c(\theta)]^T R^{-1} [w_c - f_c(\theta)]. \quad (40)$$

The second-order derivatives of L^* with respect to θ and K_g have zero expectations. Define M to be the matrix of the expectations of the second-order derivatives of L^* with respect to all θ and K_g . Thus,

$$M = \begin{bmatrix} \frac{d^2 L^*}{d\theta d\theta^T} & 0 \\ 0 & \frac{d^2 L^*}{dK dK^T} \end{bmatrix} \quad (41)$$

where

$$\frac{d^2 L^*}{d\theta d\theta^T} = \sum_g \frac{1}{K_g} \sum_{c \in N_g} \left[\frac{df_c(\theta)}{d\theta^T} \right]^T R^{-1} \left[\frac{df_c(\theta)}{d\theta^T} \right], \quad (42)$$

and $d^2 L^*/dK dK^T$ is a $G \times G$ diagonal matrix with the g^{th} diagonal element equal to:

$$\frac{d^2 L^*}{dK_g^2} = -\frac{(n-1)N_g}{2K_g^2} - \frac{1}{K_g^3} \sum_{c \in N_g} [w_c - f_c(\theta)]^T R^{-1} [w_c - f_c(\theta)], \quad (43)$$

and all off - diagonal elements equal zero (i.e., $d^2 L^*/dK_g dK_h = 0$ for $g \neq h$). The method of scoring (Harvey, 1990, pp. 133-135) is used to estimate all θ and all elements of K . Asymptotic standard errors are calculated from the square root of the diagonal of $-M^{-1}$.

Parameter Estimates

Theil, Chung, and Seale (1989) divide the Phase IV data into two groups, countries in either Phases II or III and those not in either. Fitting the Florida-PI model to the group data individually, they find that the group covariance matrices are not equal; the covariance matrix of the group of newly added countries is almost twice as large as that of the group of countries in Phases II or III (Theil, Chung, and Seale, 1989, pp. 74-75). Given this difference, they infer that the covariance matrices of these two groups are heteroskedastic.

We extend this approach and allow for heteroskedasticity among three separate groups of countries: Group 1, those included in Theil, Chung, and Seale's (1989) estimation from the first three phases of the ICP; Group 2, those added in Phase IV; and Group 3, those countries first appearing in the 1996 ICP data (and not in the first four phases). Group 1 has 26 countries, Group 2 has 23 countries, and Group 3 has 65 countries (table 4).

We normalize $K_g = 1$ for Group 1 countries (equation 37). As such, we estimate two heteroskedastic parameters. Income is normalized so that the per capita real income of the United States equals one, and all other country per capita real incomes are relative to that of the United States. These and other parameters and their associated asymptotic standard errors are estimated with the heteroskedastic - corrected ML procedure for the 114 countries. Additionally, symmetry is imposed in the Florida - Slutsky model (i.e., $\pi_{ij}^* = \pi_{ji}^* \forall i, j \in S_g$).

Table 4—Classification of 114 countries for correction for heteroskedasticity

Africa	America	Asia	Europe	Africa	America	Asia/Oceania	Europe
<i>Group 1. Countries included from the first 3 phases</i>				<i>Group 3. Additional countries in 1996</i>			
Malawi	Brazil	Japan	Austria	Benin	Antigua &	Armenia	Albania
Zambia	United States	Pakistan	Belgium	Cameroon	Barbuda	Australia	Belarus
	Uruguay	Philippines	Denmark	Congo	Bahamas	Azerbaijan	Bulgaria
		South Korea	France	Cote d'Ivoire	Barbados	Bahrain	Czech Republic
		Sri Lanka	Germany	Egypt	Belize	Bangladesh	Estonia
		Syria	Hungary	Gabon	Bermuda	Fiji	Iceland
		Thailand	Ireland	Guinea	Dominica	Georgia	Latvia
			Italy	Kenya	Grenada	Iran	Lithuania
			Luxembourg	Mali	Jamaica	Jordan	Macedonia
			Netherlands	Mauritius	Mexico	Kazakhstan	Moldova
			Poland	Sierra Leone	Trinidad &	Kyrgyzstan	Russia
			Romania	Swaziland	Tobago	Lebanon	Slovakia
			Spain		St. Kitts &	Mongolia	Slovenia
			United		Nevis	Nepal	Sweden
			Kingdom		St. Lucia	New Zealand	Switzerland
					St. Vincent &	Oman	Turkey
					the Grenadines	Qatar	Ukraine
						Singapore	
						Tajikistan	
						Turkmenistan	
						Uzbekistan	
						Vietnam	
						Yemen	
<i>Group 2. Countries added in Phase IV</i>							
Botswana	Argentina	Hong Kong	Finland				
Madagascar	Bolivia	Indonesia	Greece				
Morocco	Canada	Israel	Norway				
Nigeria	Chile		Portugal				
Senegal	Ecuador						
Tanzania	Paraguay						
Tunisia	Peru						
Zimbabwe	Venezuela						

Table 5 presents the estimated parameters for the first stage, the aggregate model. The estimated two K_g s exceed 1 confirming the presence of heteroskedasticity. As indicated by the negative β s, only food, beverage and tobacco, and clothing and footwear are necessities; all other consumption categories except education are luxuries. The categories clothing and footwear and education have near zero β_i and, hence, have near-unitary income elasticity. The β parameter for food, beverages, and tobacco is by far the largest β in absolute value. Its estimate of -0.135 (with an asymptotic standard error of 0.006) is comparable to the value, -0.134, obtained by Theil, Chung, and Seale (1989, table 5-4, p. 105) for the 1980 normalization of their extended and pooled data.⁹ This parameter estimate retains the property of the strong version of Engel's law: when income doubles, the budget share of food declines by approximately 0.1 (Theil, Chung, and Seale, 1989, p. 44). The α s from this study and those of Theil, Chung, and Seale (1989) are not comparable since their data are normalized on 1980 geometric-mean prices while the current data are in 1996 prices.

Table 6 presents the estimated parameters for the second-stage model, the food subgroups. Similar to the aggregate model, the estimated two K_g s exceed 1 confirming the presence of heteroskedasticity. As indicated by the negative sign of β^* s, bread and cereals, fats, and oils, and fruits and vegetables are (conditionally) inelastic food items, while the remaining five are conditionally elastic items.¹⁰ The negative β^* for fruits and vegetables can be explained by the fact that the data for this food subcategory also include expenditures on roots and tubers, a staple among poor consumers. The π_{ij}^* s in the table present the compensated own-price effects, the diagonal of the Slutsky matrix.

The most prominent measures of income and price sensitivities for a good are income and own-price elasticities. These measures are not constant but should vary with different levels of affluence. For example, the income elasticity of demand for a necessity such as food, beverage, and tobacco should be larger for a low-income country than for a high-income country. Own-price elasticities of demand should also be larger in absolute value for low-income countries than for high-income countries (Timmer, 1981).

Table 5—Maximum likelihood estimates of the aggregate model, 114 countries in 1996

	<i>Parameter</i>	<i>Standard error</i>
Income flexibility	-0.809	0.021
Beta:		
Food, beverages & tobacco	-0.135	0.006
Clothing and footwear	-0.006	0.002
Gross rent, fuel & power	0.027	0.004
House operations	0.012	0.002
Medical care	0.024	0.003
Education	0.005	0.002
Transport & communication	0.021	0.003
Recreation	0.020	0.002
Other	0.032	0.003
Alpha:		
Food, beverages & tobacco	0.151	0.011
Clothing and footwear	0.059	0.004
Gross rent, fuel & power	0.179	0.008
House operations	0.077	0.004
Medical care	0.106	0.004
Education	0.074	0.004
Transport	0.133	0.006
Recreation	0.074	0.004
Other	0.147	0.006
K:		
K1	1.089	0.114
K2	1.294	0.080

⁹ The estimate of -0.134 for food, beverages, and tobacco is obtained by simply adding the parameter estimate of food, -.135, to that of beverages and tobacco, 0.001.

¹⁰ Remember the parameter estimates are conditional on total per capita food expenditures, not total per capita expenditures.

Table 6—Maximum likelihood estimates of the food sub-group model, 114 countries in 1996

	Parameter	Standard error		Parameter	Standard error
Beta:			Diagonal of the Slutsky Matrix:		
Beverages and tobacco	0.065	0.007	π_{11}	-0.037	0.016
Breads and cereals	-0.068	0.008	π_{22}	-0.145	0.019
Meat	0.011	0.007	π_{33}	-0.198	0.012
Fish	0.010	0.005	π_{44}	-0.067	0.011
Dairy	0.015	0.004	π_{55}	-0.081	0.009
Fats & oils	-0.014	0.003	π_{66}	-0.031	0.013
Fruits & vegetables	-0.025	0.008	π_{77}	-0.183	0.005
Other foods	0.007	0.006	π_{88}	-0.135	0.024
Alpha:			K:		
Beverages and tobacco	0.217	0.009	K1	1.294	0.010
Breads and cereals	0.133	0.009	K2	1.373	0.011
Meat	0.178	0.008			
Fish	0.057	0.005			
Dairy	0.111	0.005			
Fats & oils	0.031	0.003			
Fruits & vegetables	0.155	0.009			
Other foods	0.118	0.007			

Aggregate Model

The expenditure and own-price elasticities based on the aggregate Florida-PI model have the desired properties discussed earlier (tables 7-10). From equation 19, we note that a luxury good (with an income elasticity greater than 1) is associated with a positive β_i , while β_i is negative for a necessity (income elasticity less than 1). If β_i equals zero, the good has unitary elasticity. Table 7 presents the expenditure elasticities calculated at geometric mean prices for the 114 countries. These country-specific income-elasticity values represent the estimated percentage change in demand for a particular good if total income increases by 1 percent. As the estimated budget shares for recreation in Tanzania, Nigeria, Yemen, and Malawi (countries with very small actual budget shares ranging from 0.64 to 0.72 percent) were negative, the elasticities for recreation in these countries are estimated using their actual budget shares.

The income (expenditure) elasticity of demand for food, beverages, and tobacco varies greatly among countries and is highest among low-income countries; it varies from 0.80 for Tanzania to 0.68 for Georgia. It ranges between 0.67 to 0.49 for middle-income countries and from 0.48 to 0.10 for high-income countries. The average income elasticity for the low-income group of countries is 0.73, and it is over twice the size of the average, 0.34, of high-income countries. Another feature to note is that, for high-income countries, the income elasticity of demand for food, beverages, and tobacco gradually decreases from 0.48 for the Czech Republic, with an income level 45 percent that of the United States, to 0.25 for Denmark whose income level is 81 percent that of the United States. Thereafter, the elasticity measure decreases rapidly to 0.13 for Luxembourg and 0.10 for the United States.

The income elasticity for clothing and footwear, another necessity, also decreases in value from low-income to high-income countries. However, given the estimated absolute β_i value is close to zero, the elasticity values are close to one for all countries. The income elasticities for clothing and footwear range in the low-income countries from 0.93 in Tanzania to 0.92 in Georgia, in the middle-income countries from 0.92 in Ukraine to 0.91 in Slovenia, and in the high-income countries from 0.91 in the Czech Republic to 0.90 in the United States.

Table 7—Income elasticity for aggregate consumption categories, 114 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Low-income countries:</i>									
Tanzania	0.800	0.929	1.370	1.358	2.949	1.091	1.415	3.778 ²	2.618
Nigeria	0.786	0.927	1.328	1.319	2.166	1.088	1.363	4.030 ²	2.038
Tajikistan	0.778	0.927	1.312	1.304	1.986	1.087	1.344	3.969	1.893
Zambia	0.777	0.926	1.309	1.301	1.960	1.087	1.341	3.746	1.872
Yemen	0.777	0.926	1.309	1.301	1.958	1.087	1.340	4.077 ²	1.871
Malawi	0.772	0.926	1.300	1.293	1.879	1.086	1.330	4.125 ²	1.805
Madagascar	0.772	0.926	1.300	1.293	1.878	1.086	1.330	3.166	1.804
Mali	0.770	0.926	1.298	1.290	1.858	1.086	1.327	3.052	1.787
Mongolia	0.770	0.926	1.297	1.290	1.854	1.086	1.326	3.024	1.783
Benin	0.758	0.925	1.280	1.273	1.722	1.084	1.305	2.412	1.671
Kenya	0.753	0.924	1.273	1.266	1.677	1.084	1.297	2.250	1.632
Sierra Leone	0.748	0.924	1.267	1.261	1.641	1.083	1.290	2.134	1.601
Nepal	0.747	0.924	1.266	1.260	1.641	1.083	1.289	2.131	1.600
Turkmenistan	0.745	0.923	1.264	1.258	1.625	1.083	1.286	2.085	1.587
Congo	0.740	0.923	1.259	1.253	1.597	1.082	1.280	2.003	1.562
Senegal	0.736	0.922	1.254	1.249	1.575	1.082	1.275	1.943	1.542
Vietnam	0.734	0.922	1.253	1.248	1.568	1.082	1.274	1.923	1.536
Bangladesh	0.733	0.922	1.252	1.247	1.565	1.082	1.273	1.916	1.533
Pakistan	0.723	0.921	1.244	1.239	1.524	1.081	1.263	1.812	1.497
Azerbaijan	0.718	0.921	1.240	1.235	1.507	1.080	1.259	1.773	1.482
Cote d'Ivoire	0.716	0.921	1.239	1.234	1.501	1.080	1.257	1.758	1.476
Paraguay	0.715	0.921	1.238	1.233	1.497	1.080	1.256	1.748	1.472
Uzbekistan	0.711	0.921	1.235	1.231	1.486	1.080	1.253	1.725	1.463
Kyrgyzstan	0.711	0.921	1.235	1.231	1.486	1.080	1.253	1.724	1.462
Cameroon	0.711	0.920	1.235	1.230	1.484	1.080	1.252	1.720	1.460
Moldova	0.710	0.920	1.235	1.230	1.484	1.080	1.252	1.719	1.460
Bolivia	0.707	0.920	1.232	1.228	1.473	1.080	1.250	1.697	1.451
Ecuador	0.705	0.920	1.231	1.227	1.470	1.079	1.248	1.689	1.447
Armenia	0.701	0.920	1.229	1.225	1.460	1.079	1.246	1.668	1.439
Sri Lanka	0.701	0.920	1.229	1.224	1.459	1.079	1.245	1.666	1.438
Jordan	0.696	0.919	1.226	1.222	1.448	1.079	1.242	1.643	1.428
Albania	0.689	0.919	1.222	1.218	1.434	1.078	1.238	1.614	1.415
Indonesia	0.686	0.919	1.221	1.217	1.429	1.078	1.237	1.605	1.410
Jamaica	0.686	0.919	1.221	1.217	1.428	1.078	1.236	1.603	1.409
Zimbabwe	0.685	0.919	1.221	1.216	1.427	1.078	1.236	1.600	1.408
Guinea	0.683	0.919	1.219	1.215	1.422	1.078	1.235	1.591	1.404
Syria	0.677	0.918	1.217	1.213	1.412	1.078	1.232	1.572	1.395
Georgia	0.676	0.918	1.216	1.212	1.411	1.078	1.231	1.569	1.394
<i>Middle-income countries:</i>									
Ukraine	0.666	0.917	1.212	1.208	1.396	1.077	1.226	1.541	1.380
Philippines	0.658	0.917	1.209	1.205	1.386	1.077	1.223	1.522	1.371
Peru	0.655	0.917	1.208	1.204	1.382	1.076	1.222	1.515	1.367
Botswana	0.655	0.917	1.208	1.204	1.381	1.076	1.221	1.514	1.367
Thailand	0.653	0.917	1.207	1.203	1.379	1.076	1.221	1.511	1.365
Morocco	0.650	0.916	1.206	1.202	1.375	1.076	1.219	1.503	1.361
Venezuela	0.649	0.916	1.206	1.202	1.374	1.076	1.219	1.501	1.360

See notes at end of page.

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**Table 7—Income elasticity for aggregate consumption categories, 114 countries
in 1996¹--Continued**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Macedonia	0.643	0.916	1.204	1.200	1.368	1.076	1.217	1.490	1.354
Belize	0.643	0.916	1.204	1.200	1.367	1.076	1.217	1.489	1.354
Egypt	0.643	0.916	1.203	1.200	1.367	1.076	1.217	1.489	1.354
St. Vincent & Grenadines	0.642	0.916	1.203	1.200	1.366	1.076	1.216	1.487	1.353
Swaziland	0.635	0.916	1.201	1.198	1.360	1.076	1.214	1.476	1.347
Lebanon	0.632	0.916	1.200	1.197	1.357	1.075	1.213	1.471	1.344
Belarus	0.631	0.915	1.200	1.197	1.356	1.075	1.213	1.469	1.343
Kazakhstan	0.631	0.915	1.200	1.196	1.356	1.075	1.212	1.468	1.343
Dominica	0.631	0.915	1.200	1.196	1.356	1.075	1.212	1.468	1.343
Latvia	0.623	0.915	1.198	1.194	1.349	1.075	1.210	1.457	1.337
St. Lucia	0.623	0.915	1.198	1.194	1.348	1.075	1.210	1.456	1.336
Brazil	0.622	0.915	1.197	1.194	1.348	1.075	1.210	1.455	1.335
Bulgaria	0.621	0.915	1.197	1.194	1.347	1.075	1.209	1.453	1.335
Russia	0.617	0.915	1.196	1.193	1.343	1.075	1.208	1.447	1.331
Fiji	0.612	0.914	1.195	1.191	1.339	1.075	1.207	1.441	1.328
Grenada	0.611	0.914	1.195	1.191	1.339	1.075	1.207	1.440	1.328
Turkey	0.609	0.914	1.194	1.191	1.337	1.075	1.206	1.437	1.326
Lithuania	0.605	0.914	1.193	1.190	1.334	1.074	1.205	1.432	1.323
Romania	0.602	0.914	1.192	1.189	1.332	1.074	1.204	1.428	1.321
Iran	0.595	0.914	1.191	1.188	1.328	1.074	1.202	1.421	1.317
Mexico	0.592	0.914	1.190	1.187	1.326	1.074	1.201	1.418	1.315
Bahrain	0.588	0.913	1.189	1.186	1.323	1.074	1.200	1.414	1.313
Chile	0.586	0.913	1.189	1.186	1.322	1.074	1.200	1.412	1.311
Antigua & Barbuda	0.585	0.913	1.189	1.186	1.322	1.074	1.200	1.411	1.311
Poland	0.580	0.913	1.187	1.184	1.318	1.074	1.199	1.406	1.308
Trinidad & Tobago	0.575	0.913	1.187	1.184	1.315	1.073	1.197	1.401	1.305
Estonia	0.570	0.913	1.186	1.183	1.313	1.073	1.196	1.397	1.303
Gabon	0.568	0.913	1.185	1.182	1.312	1.073	1.196	1.396	1.302
Tunisia	0.564	0.912	1.185	1.182	1.310	1.073	1.195	1.392	1.300
St. Kitts & Nevis	0.562	0.912	1.184	1.181	1.309	1.073	1.195	1.390	1.299
Uruguay	0.560	0.912	1.184	1.181	1.308	1.073	1.194	1.389	1.298
Slovakia	0.557	0.912	1.183	1.180	1.307	1.073	1.194	1.387	1.297
Hungary	0.541	0.911	1.181	1.178	1.299	1.072	1.191	1.375	1.290
Argentina	0.517	0.911	1.177	1.175	1.290	1.072	1.187	1.361	1.281
Oman	0.506	0.910	1.176	1.173	1.286	1.072	1.186	1.355	1.278
Qatar	0.492	0.910	1.174	1.171	1.282	1.071	1.184	1.348	1.273
Slovenia	0.486	0.910	1.173	1.171	1.280	1.071	1.183	1.345	1.272
<i>High-income countries:</i>									
Czech Republic	0.477	0.909	1.172	1.170	1.277	1.071	1.182	1.341	1.269
Greece	0.456	0.909	1.170	1.168	1.272	1.071	1.179	1.333	1.264
Korea	0.450	0.909	1.170	1.167	1.270	1.071	1.179	1.331	1.263
Portugal	0.444	0.908	1.169	1.167	1.269	1.071	1.178	1.328	1.261
Spain	0.442	0.908	1.169	1.166	1.268	1.071	1.178	1.328	1.261
Ireland	0.434	0.908	1.168	1.166	1.266	1.070	1.177	1.325	1.259
Singapore	0.425	0.908	1.167	1.165	1.264	1.070	1.176	1.322	1.257
Mauritius	0.411	0.908	1.166	1.164	1.262	1.070	1.175	1.318	1.255

See notes at end of page.

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**Table 7—Income elasticity for aggregate consumption categories, 114 countries
in 1996¹--Continued**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>High-income countries--continued:</i>									
Israel	0.399	0.907	1.165	1.163	1.259	1.070	1.174	1.315	1.252
New Zealand	0.394	0.907	1.165	1.163	1.258	1.070	1.173	1.313	1.252
Finland	0.393	0.907	1.165	1.163	1.258	1.070	1.173	1.313	1.251
Bahamas	0.389	0.907	1.165	1.162	1.257	1.070	1.173	1.312	1.251
Sweden	0.361	0.906	1.163	1.160	1.253	1.069	1.171	1.305	1.246
Netherlands	0.356	0.906	1.162	1.160	1.252	1.069	1.171	1.304	1.245
France	0.332	0.906	1.161	1.159	1.249	1.069	1.169	1.299	1.242
United Kingdom	0.330	0.906	1.161	1.159	1.248	1.069	1.169	1.298	1.242
Belgium	0.325	0.906	1.160	1.158	1.248	1.069	1.169	1.297	1.241
Norway	0.324	0.906	1.160	1.158	1.247	1.069	1.168	1.297	1.241
Italy	0.320	0.906	1.160	1.158	1.247	1.069	1.168	1.296	1.241
Austria	0.311	0.905	1.160	1.157	1.246	1.069	1.168	1.295	1.239
Germany	0.309	0.905	1.160	1.157	1.245	1.069	1.168	1.294	1.239
Australia	0.300	0.905	1.159	1.157	1.244	1.069	1.167	1.293	1.238
Japan	0.293	0.905	1.159	1.157	1.244	1.069	1.167	1.292	1.237
Canada	0.284	0.905	1.158	1.156	1.243	1.069	1.166	1.290	1.236
Bermuda	0.265	0.905	1.157	1.155	1.240	1.068	1.165	1.287	1.234
Switzerland	0.257	0.904	1.157	1.155	1.240	1.068	1.165	1.286	1.234
Barbados	0.256	0.904	1.157	1.155	1.239	1.068	1.165	1.286	1.234
Hong Kong	0.254	0.904	1.157	1.155	1.239	1.068	1.165	1.285	1.233
Iceland	0.252	0.904	1.157	1.155	1.239	1.068	1.165	1.285	1.233
Denmark	0.247	0.904	1.157	1.155	1.238	1.068	1.164	1.284	1.233
Luxembourg	0.126	0.903	1.152	1.150	1.228	1.067	1.159	1.270	1.223
United States	0.103	0.902	1.152	1.150	1.227	1.067	1.159	1.268	1.222
<i>Low-income average</i>	0.729	0.922	1.257	1.252	1.641	1.082	1.279	2.042	1.593
<i>Middle-income average</i>	0.602	0.914	1.194	1.191	1.338	1.074	1.206	1.440	1.327
<i>High-income average</i>	0.335	0.906	1.162	1.160	1.251	1.069	1.170	1.303	1.245

¹Countries are reported based on ascending per capita real income levels.

²As the estimated budget shares for recreation were negative, these values are calculated using the actual budget shares.

All other consumption categories are luxuries with expenditure elasticities greater than 1. The elasticity values are higher for less affluent countries and span a wide range. Recreation is by far the most luxurious good with an income elasticity of demand ranging from 4.12 for Malawi to 1.27 for the United States. The goods, medical care and other items, are the next most luxurious goods followed by transportation and communication, gross rent, fuel and power, and home furnishings and operations. Although education is a luxury good, it is the least luxurious. With the estimated absolute β_i value close to zero, the estimated elasticities for education are close to 1 and range from 1.09 in Tanzania to 1.07 in the United States.

As presented by equations 20 to 22 in chapter 3, three types of own-price elasticities of demand for a good can be calculated from the parameter estimates of the Florida-PI model. Tables 8-10 present the estimated Frisch, Slutsky, and Cournot own-price elasticity for the nine aggregate commodity groups, across 114 countries. In the tables, countries are listed in ascending order of affluence. The elasticity measures perform in accordance with Timmer's proposition: own-price elasticities of demand are larger in absolute values for low-income countries than for high-income ones. The values of the Cournot and Frisch own-price elasticities decline monotonically in absolute value when traveling from poor to rich countries.

The Slutsky own-price elasticity of demand for food, beverages, and tobacco begins at -0.30 for Tanzania, increases (absolutely) to -0.39 for Thailand, and declines thereafter (absolutely) to -0.08 for the United States. To clarify the reason for this, take the logarithmic derivative of equation 21, using equation 11 and suppressing the error term:

$$\frac{d \log(S/\phi)}{Q_c} = \frac{-\beta_i[\bar{w}_{ic}^2 + \beta_i(1 - \beta_i)]}{\bar{w}_{ic}(\bar{w}_{ic} + \beta_i)(1 - \bar{w}_{ic} - \beta_i)} \quad (44)$$

If good i is a luxury, $\beta_i > 0$, and the derivative is negative; as real per capita income increases, the Slutsky own-price elasticity of the good decreases. If good i is a necessity, $\beta_i < 0$ so that $-\beta_i > 0$. If the term in brackets on the right side of equation 44 is positive, then both the numerator and the derivative are positive. This is the case for food, beverages, and tobacco. When $\bar{w}_{ic}$ is sufficiently large, that is, when Q_c is sufficiently small, the derivative for this good is positive for the poorest countries. Eventually, however, $\bar{w}_{ic}$ becomes sufficiently small so that the derivative becomes negative. In this case, the Slutsky own-price elasticity becomes smaller in absolute value. The turning point, when the Slutsky own-price elasticity starts declining with increasing per capita income, is at the per capita income level of Lithuania or at 25 percent of the per capita income level of the United States.

The Cournot and Frisch elasticity values are all larger than the corresponding Slutsky elasticities. The Frisch values are between the corresponding Cournot and Slutsky ones for food, beverage and tobacco clothing and footwear, and education, while they are larger than both the corresponding Cournot and Slutsky elasticities for the other three goods. To see the reason for this result, recall that in equation 21 and 22, $C = S - (\bar{w}_{ic} + \beta_i)$ and $S = F(1 - \bar{w}_{ic} - \beta_i)$. By manipulation, $C = F - F(\bar{w}_{ic} + \beta_i) - (\bar{w}_{ic} + \beta_i)$. Noting that in all the cases, $F < 0$ and $(\bar{w}_{ic} + \beta_i) > 0$, if $|F| < |-1.00|$ then $|C| > |F|$, if $|F| > |-1.00|$, then $|C| < |F|$, and if $|F| \approx |-1.00|$, then $C = F$.

House furnishings and operations and transport and communications have Slutsky own-price elasticity values greater than unity in absolute values for a few of the countries with the lowest income levels. Recreation, medical care and other goods have Slutsky own-price elasticity measures greater than unity in absolute values for all or most of the low-income countries and many of the middle-income countries. For Tanzania, the Slutsky own-price elasticities of demand for recreation, medical care, and other items are -3.05, -2.39, and -2.12, respectively. For the United States, they are -0.93, -0.86, and -0.81, respectively.

Table 8—Frisch own-price elasticity for aggregate consumption categories, 114 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Edu- cation	Transport & commun- ication	Rec- reation	Other
<i>Low-income countries:</i>									
Tanzania	-0.647	-0.751	-1.108	-1.098	-2.385	-0.882	-1.145	-3.056 ²	-2.117
Nigeria	-0.635	-0.750	-1.074	-1.066	-1.751	-0.880	-1.102	-3.261 ²	-1.648
Tajikistan	-0.629	-0.749	-1.061	-1.054	-1.606	-0.879	-1.087	-3.209	-1.531
Zambia	-0.628	-0.749	-1.059	-1.052	-1.585	-0.879	-1.084	-3.030	-1.514
Yemen	-0.628	-0.749	-1.059	-1.052	-1.584	-0.879	-1.084	-3.298 ²	-1.513
Malawi	-0.624	-0.749	-1.052	-1.045	-1.520	-0.878	-1.075	-3.337 ²	-1.460
Madagascar	-0.624	-0.749	-1.052	-1.045	-1.519	-0.878	-1.075	-2.560	-1.459
Mali	-0.623	-0.749	-1.050	-1.044	-1.503	-0.878	-1.073	-2.468	-1.445
Mongolia	-0.623	-0.749	-1.049	-1.043	-1.499	-0.878	-1.072	-2.445	-1.442
Benin	-0.613	-0.748	-1.035	-1.029	-1.392	-0.877	-1.055	-1.951	-1.351
Kenya	-0.609	-0.747	-1.029	-1.024	-1.356	-0.876	-1.049	-1.820	-1.320
Sierra Leone	-0.605	-0.747	-1.024	-1.019	-1.327	-0.876	-1.043	-1.726	-1.295
Nepal	-0.604	-0.747	-1.024	-1.019	-1.327	-0.876	-1.043	-1.724	-1.294
Turkmenistan	-0.602	-0.747	-1.022	-1.017	-1.314	-0.876	-1.040	-1.686	-1.283
Congo	-0.598	-0.746	-1.018	-1.013	-1.292	-0.875	-1.035	-1.620	-1.263
Senegal	-0.595	-0.746	-1.015	-1.010	-1.274	-0.875	-1.031	-1.571	-1.247
Vietnam	-0.594	-0.746	-1.013	-1.009	-1.268	-0.875	-1.030	-1.555	-1.242
Bangladesh	-0.593	-0.746	-1.013	-1.008	-1.266	-0.875	-1.029	-1.549	-1.240
Pakistan	-0.585	-0.745	-1.006	-1.002	-1.232	-0.874	-1.021	-1.466	-1.210
Azerbaijan	-0.581	-0.745	-1.003	-0.999	-1.219	-0.874	-1.018	-1.434	-1.198
Cote d'Ivoire	-0.579	-0.745	-1.002	-0.998	-1.214	-0.874	-1.017	-1.422	-1.194
Paraguay	-0.578	-0.745	-1.001	-0.997	-1.210	-0.874	-1.016	-1.414	-1.190
Uzbekistan	-0.575	-0.744	-0.999	-0.995	-1.202	-0.873	-1.013	-1.395	-1.183
Kyrgyzstan	-0.575	-0.744	-0.999	-0.995	-1.201	-0.873	-1.013	-1.394	-1.182
Cameroon	-0.575	-0.744	-0.999	-0.995	-1.200	-0.873	-1.013	-1.391	-1.181
Moldova	-0.575	-0.744	-0.999	-0.995	-1.200	-0.873	-1.013	-1.390	-1.181
Bolivia	-0.571	-0.744	-0.997	-0.993	-1.191	-0.873	-1.010	-1.372	-1.173
Ecuador	-0.570	-0.744	-0.996	-0.992	-1.188	-0.873	-1.010	-1.366	-1.171
Armenia	-0.567	-0.744	-0.994	-0.990	-1.180	-0.873	-1.007	-1.349	-1.163
Sri Lanka	-0.567	-0.744	-0.994	-0.990	-1.180	-0.873	-1.007	-1.347	-1.163
Jordan	-0.563	-0.744	-0.992	-0.988	-1.171	-0.872	-1.005	-1.329	-1.155
Albania	-0.557	-0.743	-0.989	-0.985	-1.159	-0.872	-1.001	-1.305	-1.144
Indonesia	-0.555	-0.743	-0.988	-0.984	-1.156	-0.872	-1.000	-1.298	-1.141
Jamaica	-0.555	-0.743	-0.987	-0.984	-1.155	-0.872	-1.000	-1.296	-1.140
Zimbabwe	-0.554	-0.743	-0.987	-0.984	-1.154	-0.872	-1.000	-1.294	-1.139
Guinea	-0.552	-0.743	-0.986	-0.983	-1.150	-0.872	-0.998	-1.287	-1.136
Syria	-0.548	-0.742	-0.984	-0.981	-1.142	-0.872	-0.996	-1.272	-1.128
Georgia	-0.547	-0.742	-0.984	-0.980	-1.141	-0.871	-0.996	-1.269	-1.127
<i>Middle-income countries:</i>									
Ukraine	-0.539	-0.742	-0.980	-0.977	-1.129	-0.871	-0.992	-1.246	-1.116
Philippines	-0.533	-0.742	-0.978	-0.975	-1.121	-0.871	-0.989	-1.231	-1.108
Peru	-0.530	-0.741	-0.977	-0.974	-1.117	-0.871	-0.988	-1.225	-1.105
Botswana	-0.530	-0.741	-0.977	-0.974	-1.117	-0.871	-0.988	-1.224	-1.105
Thailand	-0.528	-0.741	-0.976	-0.973	-1.116	-0.870	-0.987	-1.222	-1.104

See notes at end of page.

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Table 8—Frisch own-price elasticity for aggregate consumption categories, 114 countries in 1996¹--Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Morocco	-0.525	-0.741	-0.975	-0.972	-1.112	-0.870	-0.986	-1.215	-1.101
Venezuela	-0.525	-0.741	-0.975	-0.972	-1.111	-0.870	-0.986	-1.214	-1.100
Macedonia	-0.520	-0.741	-0.973	-0.970	-1.106	-0.870	-0.984	-1.205	-1.095
Belize	-0.520	-0.741	-0.973	-0.970	-1.106	-0.870	-0.984	-1.204	-1.095
Egypt	-0.520	-0.741	-0.973	-0.970	-1.106	-0.870	-0.984	-1.204	-1.095
St. Vincent & Grenadines	-0.519	-0.741	-0.973	-0.970	-1.105	-0.870	-0.984	-1.203	-1.094
Swaziland	-0.514	-0.741	-0.971	-0.969	-1.100	-0.870	-0.982	-1.193	-1.089
Lebanon	-0.511	-0.740	-0.971	-0.968	-1.098	-0.870	-0.981	-1.190	-1.087
Belarus	-0.511	-0.740	-0.970	-0.968	-1.097	-0.870	-0.981	-1.188	-1.086
Kazakhstan	-0.510	-0.740	-0.970	-0.968	-1.096	-0.870	-0.981	-1.187	-1.086
Dominica	-0.510	-0.740	-0.970	-0.968	-1.096	-0.870	-0.980	-1.187	-1.086
Latvia	-0.504	-0.740	-0.969	-0.966	-1.091	-0.869	-0.979	-1.178	-1.081
St. Lucia	-0.504	-0.740	-0.968	-0.966	-1.090	-0.869	-0.978	-1.177	-1.080
Brazil	-0.503	-0.740	-0.968	-0.966	-1.090	-0.869	-0.978	-1.176	-1.080
Bulgaria	-0.502	-0.740	-0.968	-0.965	-1.089	-0.869	-0.978	-1.175	-1.079
Russia	-0.499	-0.740	-0.967	-0.964	-1.086	-0.869	-0.977	-1.170	-1.077
Fiji	-0.495	-0.740	-0.966	-0.963	-1.083	-0.869	-0.976	-1.165	-1.074
Grenada	-0.494	-0.740	-0.966	-0.963	-1.083	-0.869	-0.976	-1.165	-1.074
Turkey	-0.492	-0.739	-0.966	-0.963	-1.082	-0.869	-0.975	-1.162	-1.072
Lithuania	-0.489	-0.739	-0.965	-0.962	-1.079	-0.869	-0.974	-1.158	-1.070
Romania	-0.486	-0.739	-0.964	-0.962	-1.077	-0.869	-0.974	-1.155	-1.068
Iran	-0.481	-0.739	-0.963	-0.960	-1.074	-0.869	-0.972	-1.149	-1.065
Mexico	-0.479	-0.739	-0.962	-0.960	-1.072	-0.869	-0.972	-1.147	-1.063
Bahrain	-0.476	-0.739	-0.962	-0.959	-1.070	-0.868	-0.971	-1.143	-1.062
Chile	-0.474	-0.739	-0.961	-0.959	-1.069	-0.868	-0.970	-1.142	-1.061
Antigua & Barbuda	-0.473	-0.739	-0.961	-0.959	-1.069	-0.868	-0.970	-1.141	-1.060
Poland	-0.469	-0.738	-0.960	-0.958	-1.066	-0.868	-0.969	-1.137	-1.058
Trinidad & Tobago	-0.465	-0.738	-0.960	-0.957	-1.064	-0.868	-0.968	-1.133	-1.056
Estonia	-0.461	-0.738	-0.959	-0.956	-1.062	-0.868	-0.968	-1.130	-1.054
Gabon	-0.460	-0.738	-0.959	-0.956	-1.061	-0.868	-0.967	-1.129	-1.053
Tunisia	-0.456	-0.738	-0.958	-0.956	-1.059	-0.868	-0.967	-1.126	-1.052
St. Kitts & Nevis	-0.454	-0.738	-0.958	-0.955	-1.058	-0.868	-0.966	-1.124	-1.051
Uruguay	-0.453	-0.738	-0.957	-0.955	-1.058	-0.868	-0.966	-1.123	-1.050
Slovakia	-0.451	-0.738	-0.957	-0.955	-1.057	-0.868	-0.966	-1.122	-1.049
Hungary	-0.437	-0.737	-0.955	-0.953	-1.051	-0.867	-0.963	-1.112	-1.043
Argentina	-0.418	-0.736	-0.952	-0.950	-1.043	-0.867	-0.960	-1.100	-1.036
Oman	-0.409	-0.736	-0.951	-0.949	-1.040	-0.867	-0.959	-1.096	-1.033
Qatar	-0.398	-0.736	-0.950	-0.947	-1.036	-0.866	-0.957	-1.090	-1.030
Slovenia	-0.393	-0.736	-0.949	-0.947	-1.035	-0.866	-0.956	-1.088	-1.028
<i>High-income countries:</i>									
Czech Republic	-0.386	-0.735	-0.948	-0.946	-1.033	-0.866	-0.956	-1.085	-1.026
Greece	-0.369	-0.735	-0.946	-0.944	-1.028	-0.866	-0.954	-1.078	-1.022
Korea	-0.364	-0.735	-0.946	-0.944	-1.027	-0.866	-0.953	-1.076	-1.021
Portugal	-0.359	-0.735	-0.945	-0.943	-1.026	-0.866	-0.953	-1.074	-1.020
Spain	-0.357	-0.735	-0.945	-0.943	-1.026	-0.866	-0.952	-1.074	-1.020

See notes at end of page.

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Table 8—Frisch own-price elasticity for aggregate consumption categories, 114 countries in 1996¹--Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>High-income countries--continued:</i>									
Ireland	-0.351	-0.734	-0.945	-0.943	-1.024	-0.866	-0.952	-1.071	-1.018
Singapore	-0.343	-0.734	-0.944	-0.942	-1.022	-0.866	-0.951	-1.069	-1.017
Mauritius	-0.333	-0.734	-0.943	-0.941	-1.020	-0.865	-0.950	-1.066	-1.015
Israel	-0.323	-0.734	-0.942	-0.941	-1.018	-0.865	-0.949	-1.063	-1.013
New Zealand	-0.319	-0.734	-0.942	-0.940	-1.018	-0.865	-0.949	-1.062	-1.012
Finland	-0.318	-0.734	-0.942	-0.940	-1.017	-0.865	-0.949	-1.062	-1.012
Bahamas	-0.315	-0.734	-0.942	-0.940	-1.017	-0.865	-0.949	-1.061	-1.011
Sweden	-0.292	-0.733	-0.940	-0.938	-1.013	-0.865	-0.947	-1.055	-1.008
Netherlands	-0.288	-0.733	-0.940	-0.938	-1.012	-0.865	-0.947	-1.054	-1.007
France	-0.269	-0.733	-0.939	-0.937	-1.010	-0.865	-0.945	-1.050	-1.005
United Kingdom	-0.267	-0.732	-0.939	-0.937	-1.009	-0.865	-0.945	-1.050	-1.004
Belgium	-0.263	-0.732	-0.938	-0.937	-1.009	-0.865	-0.945	-1.049	-1.004
Norway	-0.262	-0.732	-0.938	-0.937	-1.009	-0.864	-0.945	-1.049	-1.004
Italy	-0.259	-0.732	-0.938	-0.936	-1.008	-0.864	-0.945	-1.048	-1.003
Austria	-0.251	-0.732	-0.938	-0.936	-1.007	-0.864	-0.944	-1.047	-1.002
Germany	-0.250	-0.732	-0.938	-0.936	-1.007	-0.864	-0.944	-1.047	-1.002
Australia	-0.242	-0.732	-0.937	-0.936	-1.006	-0.864	-0.944	-1.045	-1.001
Japan	-0.237	-0.732	-0.937	-0.935	-1.006	-0.864	-0.943	-1.045	-1.001
Canada	-0.230	-0.732	-0.937	-0.935	-1.005	-0.864	-0.943	-1.043	-1.000
Bermuda	-0.214	-0.732	-0.936	-0.934	-1.003	-0.864	-0.942	-1.041	-0.998
Switzerland	-0.208	-0.731	-0.936	-0.934	-1.002	-0.864	-0.942	-1.040	-0.998
Barbados	-0.207	-0.731	-0.936	-0.934	-1.002	-0.864	-0.942	-1.040	-0.998
Hong Kong	-0.205	-0.731	-0.936	-0.934	-1.002	-0.864	-0.942	-1.040	-0.997
Iceland	-0.204	-0.731	-0.936	-0.934	-1.002	-0.864	-0.942	-1.039	-0.997
Denmark	-0.200	-0.731	-0.935	-0.934	-1.002	-0.864	-0.942	-1.039	-0.997
Luxembourg	-0.102	-0.730	-0.932	-0.930	-0.993	-0.863	-0.938	-1.027	-0.989
United States	-0.084	-0.730	-0.931	-0.930	-0.992	-0.863	-0.937	-1.026	-0.988
<i>Low-income average</i>	-0.590	-0.746	-1.017	-1.012	-1.327	-0.875	-1.034	-1.652	-1.288
<i>Middle-income average</i>	-0.487	-0.739	-0.966	-0.963	-1.082	-0.869	-0.975	-1.165	-1.073
<i>High-income average</i>	-0.271	-0.733	-0.940	-0.938	-1.012	-0.865	-0.946	-1.054	-1.007

¹Countries are reported based on ascending per capita real income levels.

²As the estimated budget shares for recreation were negative, these values are calculated using the actual budget shares.

**Table 9—Slutsky own-price elasticity for aggregate consumption categories,
114 countries in 1996¹**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Low-income countries:</i>									
Tanzania	-0.296	-0.694	-0.996	-1.050	-2.298	-0.830	-1.062	-2.973 ²	-2.006
Nigeria	-0.320	-0.694	-0.956	-1.016	-1.673	-0.826	-1.015	-3.174 ²	-1.543
Tajikistan	-0.330	-0.695	-0.940	-1.002	-1.528	-0.825	-0.997	-3.124	-1.426
Zambia	-0.332	-0.695	-0.937	-1.000	-1.507	-0.825	-0.994	-2.947	-1.408
Yemen	-0.332	-0.695	-0.937	-1.000	-1.506	-0.825	-0.994	-3.211 ²	-1.407
Malawi	-0.338	-0.695	-0.928	-0.992	-1.442	-0.824	-0.984	-3.249 ²	-1.353
Madagascar	-0.338	-0.695	-0.928	-0.992	-1.440	-0.824	-0.984	-2.485	-1.352
Mali	-0.340	-0.695	-0.926	-0.990	-1.425	-0.823	-0.981	-2.395	-1.339
Mongolia	-0.340	-0.695	-0.925	-0.989	-1.421	-0.823	-0.980	-2.373	-1.336
Benin	-0.353	-0.695	-0.906	-0.974	-1.312	-0.821	-0.960	-1.884	-1.242
Kenya	-0.358	-0.695	-0.899	-0.968	-1.275	-0.820	-0.952	-1.754	-1.209
Sierra Leone	-0.362	-0.695	-0.892	-0.962	-1.246	-0.819	-0.945	-1.661	-1.183
Nepal	-0.362	-0.695	-0.892	-0.962	-1.245	-0.819	-0.945	-1.659	-1.182
Turkmenistan	-0.364	-0.695	-0.889	-0.960	-1.232	-0.819	-0.941	-1.621	-1.170
Congo	-0.368	-0.695	-0.884	-0.955	-1.209	-0.818	-0.935	-1.555	-1.149
Senegal	-0.371	-0.695	-0.879	-0.952	-1.190	-0.818	-0.930	-1.507	-1.132
Vietnam	-0.372	-0.695	-0.877	-0.950	-1.184	-0.818	-0.929	-1.490	-1.126
Bangladesh	-0.372	-0.695	-0.877	-0.950	-1.181	-0.817	-0.928	-1.485	-1.124
Pakistan	-0.378	-0.695	-0.867	-0.942	-1.146	-0.816	-0.918	-1.401	-1.092
Azerbaijan	-0.380	-0.694	-0.863	-0.938	-1.132	-0.816	-0.913	-1.368	-1.078
Cote d'Ivoire	-0.381	-0.694	-0.861	-0.937	-1.126	-0.815	-0.911	-1.356	-1.073
Paraguay	-0.382	-0.694	-0.860	-0.936	-1.123	-0.815	-0.910	-1.348	-1.070
Uzbekistan	-0.383	-0.694	-0.857	-0.934	-1.114	-0.815	-0.907	-1.329	-1.061
Kyrgyzstan	-0.383	-0.694	-0.857	-0.934	-1.113	-0.815	-0.907	-1.328	-1.061
Cameroon	-0.384	-0.694	-0.856	-0.933	-1.111	-0.815	-0.907	-1.325	-1.059
Moldova	-0.384	-0.694	-0.856	-0.933	-1.111	-0.815	-0.907	-1.324	-1.059
Bolivia	-0.385	-0.694	-0.853	-0.931	-1.102	-0.814	-0.904	-1.306	-1.051
Ecuador	-0.386	-0.694	-0.852	-0.930	-1.099	-0.814	-0.902	-1.299	-1.048
Armenia	-0.387	-0.694	-0.849	-0.928	-1.090	-0.814	-0.899	-1.282	-1.039
Sri Lanka	-0.387	-0.694	-0.849	-0.928	-1.089	-0.814	-0.899	-1.280	-1.039
Jordan	-0.388	-0.694	-0.846	-0.925	-1.080	-0.813	-0.896	-1.261	-1.030
Albania	-0.390	-0.694	-0.841	-0.922	-1.067	-0.813	-0.891	-1.237	-1.017
Indonesia	-0.391	-0.694	-0.840	-0.920	-1.063	-0.812	-0.890	-1.229	-1.013
Jamaica	-0.391	-0.694	-0.839	-0.920	-1.062	-0.812	-0.889	-1.227	-1.012
Zimbabwe	-0.391	-0.694	-0.839	-0.920	-1.061	-0.812	-0.889	-1.225	-1.011
Guinea	-0.391	-0.694	-0.837	-0.919	-1.057	-0.812	-0.887	-1.218	-1.008
Syria	-0.392	-0.694	-0.834	-0.916	-1.048	-0.811	-0.884	-1.202	-0.999
Georgia	-0.392	-0.694	-0.834	-0.916	-1.047	-0.811	-0.883	-1.199	-0.998
<i>Middle-income countries:</i>									
Ukraine	-0.393	-0.694	-0.828	-0.911	-1.033	-0.811	-0.878	-1.175	-0.984
Philippines	-0.394	-0.694	-0.824	-0.909	-1.024	-0.810	-0.874	-1.159	-0.975
Peru	-0.394	-0.694	-0.823	-0.907	-1.020	-0.810	-0.873	-1.153	-0.972
Botswana	-0.394	-0.694	-0.823	-0.907	-1.020	-0.810	-0.873	-1.153	-0.971
Thailand	-0.394	-0.694	-0.822	-0.907	-1.018	-0.810	-0.872	-1.150	-0.970

See notes at end of table.

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**Table 9—Slutsky own-price elasticity for aggregate consumption categories,
114 countries in 1996¹--Continued**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Morocco	-0.393	-0.694	-0.820	-0.906	-1.014	-0.809	-0.870	-1.143	-0.966
Venezuela	-0.393	-0.694	-0.820	-0.905	-1.013	-0.809	-0.870	-1.141	-0.965
Macedonia	-0.393	-0.694	-0.817	-0.903	-1.007	-0.809	-0.867	-1.132	-0.959
Belize	-0.393	-0.694	-0.817	-0.903	-1.007	-0.809	-0.867	-1.131	-0.959
Egypt	-0.393	-0.694	-0.817	-0.903	-1.007	-0.809	-0.867	-1.131	-0.959
St. Vincent & Grenadines	-0.393	-0.694	-0.817	-0.903	-1.006	-0.809	-0.867	-1.130	-0.958
Swaziland	-0.393	-0.694	-0.814	-0.901	-1.000	-0.808	-0.864	-1.120	-0.952
Lebanon	-0.392	-0.694	-0.813	-0.900	-0.997	-0.808	-0.863	-1.116	-0.949
Belarus	-0.392	-0.694	-0.813	-0.900	-0.996	-0.808	-0.862	-1.114	-0.948
Kazakhstan	-0.392	-0.694	-0.812	-0.899	-0.996	-0.808	-0.862	-1.113	-0.948
Dominica	-0.392	-0.694	-0.812	-0.899	-0.996	-0.808	-0.862	-1.113	-0.948
Latvia	-0.391	-0.694	-0.810	-0.897	-0.989	-0.808	-0.859	-1.104	-0.942
St. Lucia	-0.391	-0.694	-0.809	-0.897	-0.989	-0.808	-0.859	-1.102	-0.941
Brazil	-0.391	-0.694	-0.809	-0.897	-0.988	-0.808	-0.859	-1.101	-0.940
Bulgaria	-0.391	-0.694	-0.809	-0.897	-0.988	-0.807	-0.859	-1.100	-0.940
Russia	-0.390	-0.694	-0.807	-0.896	-0.984	-0.807	-0.857	-1.095	-0.936
Fiji	-0.389	-0.694	-0.805	-0.894	-0.980	-0.807	-0.855	-1.089	-0.932
Grenada	-0.389	-0.694	-0.805	-0.894	-0.980	-0.807	-0.855	-1.089	-0.932
Turkey	-0.389	-0.694	-0.804	-0.894	-0.978	-0.807	-0.854	-1.086	-0.931
Lithuania	-0.388	-0.694	-0.803	-0.893	-0.975	-0.807	-0.853	-1.082	-0.928
Romania	-0.387	-0.694	-0.802	-0.892	-0.973	-0.806	-0.852	-1.078	-0.925
Iran	-0.385	-0.694	-0.800	-0.890	-0.969	-0.806	-0.850	-1.072	-0.921
Mexico	-0.385	-0.694	-0.799	-0.890	-0.967	-0.806	-0.849	-1.069	-0.919
Bahrain	-0.384	-0.693	-0.798	-0.889	-0.965	-0.806	-0.848	-1.066	-0.917
Chile	-0.383	-0.693	-0.797	-0.888	-0.963	-0.806	-0.847	-1.064	-0.916
Antigua & Barbuda	-0.383	-0.693	-0.797	-0.888	-0.963	-0.806	-0.847	-1.063	-0.915
Poland	-0.381	-0.693	-0.795	-0.887	-0.960	-0.805	-0.846	-1.058	-0.912
Trinidad & Tobago	-0.380	-0.693	-0.794	-0.886	-0.957	-0.805	-0.844	-1.054	-0.909
Estonia	-0.378	-0.693	-0.793	-0.885	-0.954	-0.805	-0.843	-1.050	-0.906
Gabon	-0.378	-0.693	-0.792	-0.885	-0.954	-0.805	-0.843	-1.049	-0.906
Tunisia	-0.376	-0.693	-0.791	-0.884	-0.952	-0.805	-0.842	-1.047	-0.904
St. Kitts & Nevis	-0.376	-0.693	-0.791	-0.883	-0.951	-0.804	-0.841	-1.045	-0.902
Uruguay	-0.375	-0.693	-0.790	-0.883	-0.950	-0.804	-0.841	-1.044	-0.902
Slovakia	-0.374	-0.693	-0.790	-0.883	-0.948	-0.804	-0.840	-1.042	-0.900
Hungary	-0.368	-0.693	-0.786	-0.880	-0.941	-0.804	-0.836	-1.031	-0.892
Argentina	-0.357	-0.693	-0.781	-0.876	-0.931	-0.803	-0.831	-1.018	-0.883
Oman	-0.353	-0.693	-0.778	-0.875	-0.928	-0.802	-0.829	-1.012	-0.879
Qatar	-0.346	-0.693	-0.776	-0.873	-0.923	-0.802	-0.827	-1.006	-0.874
Slovenia	-0.342	-0.693	-0.775	-0.872	-0.921	-0.802	-0.826	-1.003	-0.872
<i>High-income countries:</i>									
Czech Republic	-0.338	-0.693	-0.773	-0.871	-0.918	-0.801	-0.824	-1.000	-0.869
Greece	-0.327	-0.692	-0.770	-0.868	-0.913	-0.801	-0.821	-0.992	-0.863
Korea	-0.324	-0.692	-0.769	-0.868	-0.911	-0.801	-0.820	-0.990	-0.862
Portugal	-0.320	-0.692	-0.768	-0.867	-0.909	-0.801	-0.819	-0.988	-0.860
Spain	-0.319	-0.692	-0.768	-0.867	-0.909	-0.800	-0.819	-0.987	-0.860
Ireland	-0.314	-0.692	-0.767	-0.866	-0.907	-0.800	-0.818	-0.984	-0.857

See notes at end of table.

Continued--

**Table 9—Slutsky own-price elasticity for aggregate consumption categories,
114 countries in 1996¹--Continued**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>High-income countries--continued:</i>									
Singapore	-0.309	-0.692	-0.766	-0.865	-0.905	-0.800	-0.817	-0.982	-0.855
Mauritius	-0.301	-0.692	-0.764	-0.864	-0.902	-0.800	-0.815	-0.978	-0.852
Israel	-0.294	-0.692	-0.762	-0.863	-0.899	-0.799	-0.814	-0.975	-0.850
New Zealand	-0.291	-0.692	-0.762	-0.863	-0.898	-0.799	-0.813	-0.973	-0.849
Finland	-0.290	-0.692	-0.762	-0.863	-0.898	-0.799	-0.813	-0.973	-0.848
Bahamas	-0.288	-0.692	-0.761	-0.862	-0.897	-0.799	-0.813	-0.972	-0.848
Sweden	-0.269	-0.692	-0.758	-0.860	-0.892	-0.799	-0.810	-0.965	-0.842
Netherlands	-0.266	-0.692	-0.758	-0.860	-0.891	-0.799	-0.809	-0.964	-0.841
France	-0.251	-0.692	-0.755	-0.858	-0.888	-0.798	-0.807	-0.960	-0.837
United Kingdom	-0.249	-0.692	-0.755	-0.858	-0.887	-0.798	-0.807	-0.959	-0.837
Belgium	-0.246	-0.692	-0.755	-0.858	-0.887	-0.798	-0.807	-0.958	-0.836
Norway	-0.245	-0.692	-0.754	-0.857	-0.886	-0.798	-0.806	-0.958	-0.836
Italy	-0.242	-0.692	-0.754	-0.857	-0.886	-0.798	-0.806	-0.957	-0.835
Austria	-0.236	-0.692	-0.753	-0.857	-0.884	-0.798	-0.805	-0.955	-0.834
Germany	-0.235	-0.692	-0.753	-0.857	-0.884	-0.798	-0.805	-0.955	-0.834
Australia	-0.228	-0.692	-0.752	-0.856	-0.883	-0.798	-0.804	-0.954	-0.832
Japan	-0.224	-0.691	-0.752	-0.856	-0.882	-0.797	-0.804	-0.952	-0.831
Canada	-0.218	-0.691	-0.751	-0.855	-0.881	-0.797	-0.803	-0.951	-0.830
Bermuda	-0.204	-0.691	-0.749	-0.854	-0.879	-0.797	-0.802	-0.948	-0.828
Switzerland	-0.198	-0.691	-0.749	-0.854	-0.878	-0.797	-0.801	-0.947	-0.827
Barbados	-0.197	-0.691	-0.749	-0.854	-0.877	-0.797	-0.801	-0.947	-0.826
Hong Kong	-0.196	-0.691	-0.749	-0.853	-0.877	-0.797	-0.801	-0.946	-0.826
Iceland	-0.194	-0.691	-0.748	-0.853	-0.877	-0.797	-0.801	-0.946	-0.826
Denmark	-0.191	-0.691	-0.748	-0.853	-0.876	-0.797	-0.801	-0.945	-0.825
Luxembourg	-0.100	-0.691	-0.741	-0.848	-0.865	-0.795	-0.794	-0.931	-0.813
United States	-0.082	-0.691	-0.739	-0.847	-0.863	-0.795	-0.792	-0.929	-0.811
<i>Low-income average</i>	-0.368	-0.694	-0.881	-0.953	-1.241	-0.818	-0.933	-1.585	-1.171
<i>Middle-income average</i>	-0.384	-0.694	-0.804	-0.893	-0.979	-0.807	-0.854	-1.089	-0.931
<i>High-income average</i>	-0.250	-0.692	-0.757	-0.859	-0.890	-0.798	-0.809	-0.963	-0.840

¹Countries are reported based on ascending per capita real income levels.

²As the estimated budget shares for recreation were negative, these values are calculated using the actual budget shares.

**Table 10—Cournot own-price elasticity for aggregate consumption categories,
114 countries in 1996¹**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Low-income countries:</i>									
Tanzania	-0.839	-0.770	-1.097	-1.094	-2.335	-0.889	-1.134	-3.000 ²	-2.058
Nigeria	-0.816	-0.769	-1.066	-1.063	-1.718	-0.888	-1.094	-3.200 ²	-1.607
Tajikistan	-0.805	-0.768	-1.054	-1.052	-1.577	-0.887	-1.080	-3.151	-1.495
Zambia	-0.803	-0.768	-1.052	-1.050	-1.556	-0.887	-1.077	-2.975	-1.478
Yemen	-0.803	-0.768	-1.052	-1.049	-1.555	-0.887	-1.077	-3.237 ²	-1.477
Malawi	-0.796	-0.767	-1.046	-1.043	-1.493	-0.886	-1.069	-3.275 ²	-1.426
Madagascar	-0.796	-0.767	-1.045	-1.043	-1.492	-0.886	-1.069	-2.515	-1.425
Mali	-0.794	-0.767	-1.044	-1.041	-1.477	-0.886	-1.067	-2.424	-1.413
Mongolia	-0.794	-0.767	-1.043	-1.041	-1.473	-0.886	-1.066	-2.402	-1.409
Benin	-0.777	-0.766	-1.030	-1.028	-1.370	-0.885	-1.050	-1.918	-1.323
Kenya	-0.770	-0.765	-1.025	-1.023	-1.335	-0.884	-1.044	-1.790	-1.293
Sierra Leone	-0.763	-0.765	-1.021	-1.018	-1.307	-0.884	-1.039	-1.698	-1.269
Nepal	-0.763	-0.765	-1.021	-1.018	-1.307	-0.884	-1.039	-1.697	-1.269
Turkmenistan	-0.760	-0.764	-1.019	-1.016	-1.295	-0.884	-1.036	-1.660	-1.258
Congo	-0.753	-0.764	-1.016	-1.013	-1.273	-0.884	-1.032	-1.595	-1.239
Senegal	-0.748	-0.764	-1.013	-1.009	-1.256	-0.883	-1.028	-1.548	-1.225
Vietnam	-0.745	-0.763	-1.012	-1.008	-1.250	-0.883	-1.027	-1.532	-1.219
Bangladesh	-0.745	-0.763	-1.011	-1.008	-1.248	-0.883	-1.027	-1.526	-1.218
Pakistan	-0.732	-0.763	-1.005	-1.002	-1.216	-0.882	-1.019	-1.445	-1.190
Azerbaijan	-0.726	-0.762	-1.003	-0.999	-1.203	-0.882	-1.016	-1.414	-1.178
Cote d'Ivoire	-0.723	-0.762	-1.002	-0.998	-1.198	-0.882	-1.015	-1.402	-1.174
Paraguay	-0.721	-0.762	-1.001	-0.997	-1.195	-0.882	-1.014	-1.395	-1.171
Uzbekistan	-0.717	-0.762	-0.999	-0.996	-1.187	-0.882	-1.012	-1.376	-1.164
Kyrgyzstan	-0.717	-0.762	-0.999	-0.995	-1.187	-0.882	-1.012	-1.375	-1.164
Cameroon	-0.716	-0.762	-0.999	-0.995	-1.185	-0.882	-1.012	-1.372	-1.162
Moldova	-0.716	-0.762	-0.999	-0.995	-1.185	-0.882	-1.011	-1.372	-1.162
Bolivia	-0.711	-0.761	-0.997	-0.993	-1.177	-0.882	-1.009	-1.354	-1.155
Ecuador	-0.709	-0.761	-0.996	-0.993	-1.174	-0.882	-1.009	-1.348	-1.153
Armenia	-0.705	-0.761	-0.995	-0.991	-1.167	-0.881	-1.007	-1.331	-1.146
Sri Lanka	-0.704	-0.761	-0.995	-0.991	-1.166	-0.881	-1.006	-1.330	-1.145
Jordan	-0.698	-0.760	-0.993	-0.989	-1.158	-0.881	-1.004	-1.312	-1.138
Albania	-0.690	-0.760	-0.990	-0.986	-1.147	-0.881	-1.001	-1.289	-1.128
Indonesia	-0.687	-0.760	-0.989	-0.985	-1.143	-0.881	-1.000	-1.282	-1.125
Jamaica	-0.686	-0.760	-0.989	-0.985	-1.142	-0.881	-1.000	-1.280	-1.124
Zimbabwe	-0.686	-0.760	-0.989	-0.985	-1.141	-0.881	-1.000	-1.278	-1.123
Guinea	-0.683	-0.760	-0.988	-0.984	-1.138	-0.881	-0.999	-1.272	-1.120
Syria	-0.676	-0.759	-0.986	-0.982	-1.131	-0.880	-0.996	-1.257	-1.114
Georgia	-0.675	-0.759	-0.986	-0.982	-1.129	-0.880	-0.996	-1.254	-1.113
<i>Middle-income countries:</i>									
Ukraine	-0.663	-0.759	-0.983	-0.979	-1.118	-0.880	-0.993	-1.232	-1.102
Philippines	-0.655	-0.758	-0.981	-0.976	-1.110	-0.880	-0.990	-1.217	-1.095
Peru	-0.651	-0.758	-0.980	-0.976	-1.107	-0.880	-0.989	-1.212	-1.093
Botswana	-0.651	-0.758	-0.980	-0.975	-1.107	-0.880	-0.989	-1.211	-1.092
Thailand	-0.649	-0.758	-0.980	-0.975	-1.105	-0.880	-0.989	-1.209	-1.091

See notes at end of table.

Continued--

**Table 10—Cournot own-price elasticity for aggregate consumption categories,
114 countries in 1996¹--Continued**

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communica- tion	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Morocco	-0.645	-0.758	-0.979	-0.974	-1.102	-0.879	-0.988	-1.203	-1.088
Venezuela	-0.643	-0.758	-0.979	-0.974	-1.101	-0.879	-0.987	-1.201	-1.087
Macedonia	-0.637	-0.757	-0.978	-0.973	-1.097	-0.879	-0.986	-1.192	-1.083
Belize	-0.637	-0.757	-0.978	-0.972	-1.096	-0.879	-0.986	-1.192	-1.083
Egypt	-0.637	-0.757	-0.978	-0.972	-1.096	-0.879	-0.986	-1.192	-1.083
St. Vincent & Grenadines	-0.636	-0.757	-0.977	-0.972	-1.096	-0.879	-0.986	-1.191	-1.082
Swaziland	-0.628	-0.757	-0.976	-0.971	-1.091	-0.879	-0.984	-1.181	-1.078
Lebanon	-0.625	-0.757	-0.975	-0.970	-1.089	-0.879	-0.983	-1.178	-1.076
Belarus	-0.624	-0.757	-0.975	-0.970	-1.088	-0.879	-0.983	-1.176	-1.075
Kazakhstan	-0.623	-0.757	-0.975	-0.970	-1.087	-0.879	-0.983	-1.176	-1.075
Dominica	-0.623	-0.757	-0.975	-0.970	-1.087	-0.879	-0.983	-1.176	-1.075
Latvia	-0.615	-0.756	-0.974	-0.968	-1.082	-0.879	-0.981	-1.167	-1.070
St. Lucia	-0.614	-0.756	-0.974	-0.968	-1.082	-0.879	-0.981	-1.166	-1.070
Brazil	-0.613	-0.756	-0.973	-0.968	-1.081	-0.879	-0.981	-1.165	-1.070
Bulgaria	-0.613	-0.756	-0.973	-0.968	-1.081	-0.879	-0.981	-1.164	-1.069
Russia	-0.608	-0.756	-0.973	-0.967	-1.078	-0.879	-0.980	-1.159	-1.067
Fiji	-0.602	-0.756	-0.972	-0.966	-1.075	-0.878	-0.979	-1.154	-1.064
Grenada	-0.602	-0.756	-0.972	-0.966	-1.075	-0.878	-0.979	-1.154	-1.064
Turkey	-0.599	-0.756	-0.971	-0.966	-1.074	-0.878	-0.978	-1.152	-1.063
Lithuania	-0.595	-0.755	-0.971	-0.965	-1.071	-0.878	-0.977	-1.148	-1.061
Romania	-0.591	-0.755	-0.970	-0.964	-1.070	-0.878	-0.977	-1.145	-1.059
Iran	-0.585	-0.755	-0.969	-0.963	-1.067	-0.878	-0.976	-1.139	-1.056
Mexico	-0.581	-0.755	-0.969	-0.963	-1.065	-0.878	-0.975	-1.137	-1.055
Bahrain	-0.577	-0.755	-0.968	-0.962	-1.063	-0.878	-0.975	-1.134	-1.053
Chile	-0.575	-0.755	-0.968	-0.962	-1.062	-0.878	-0.974	-1.132	-1.052
Antigua & Barbuda	-0.574	-0.755	-0.968	-0.962	-1.062	-0.878	-0.974	-1.132	-1.052
Poland	-0.568	-0.754	-0.967	-0.961	-1.059	-0.878	-0.973	-1.127	-1.050
Trinidad & Tobago	-0.563	-0.754	-0.967	-0.960	-1.057	-0.878	-0.972	-1.124	-1.048
Estonia	-0.557	-0.754	-0.966	-0.960	-1.055	-0.878	-0.972	-1.121	-1.046
Gabon	-0.556	-0.754	-0.966	-0.959	-1.055	-0.878	-0.972	-1.120	-1.046
Tunisia	-0.552	-0.754	-0.965	-0.959	-1.053	-0.877	-0.971	-1.117	-1.044
St. Kitts & Nevis	-0.549	-0.754	-0.965	-0.959	-1.052	-0.877	-0.971	-1.116	-1.043
Uruguay	-0.547	-0.754	-0.965	-0.958	-1.052	-0.877	-0.970	-1.115	-1.043
Slovakia	-0.544	-0.753	-0.965	-0.958	-1.051	-0.877	-0.970	-1.113	-1.042
Hungary	-0.527	-0.753	-0.963	-0.956	-1.045	-0.877	-0.968	-1.104	-1.037
Argentina	-0.502	-0.752	-0.961	-0.954	-1.038	-0.877	-0.965	-1.093	-1.031
Oman	-0.491	-0.752	-0.960	-0.953	-1.036	-0.877	-0.964	-1.088	-1.028
Qatar	-0.477	-0.751	-0.959	-0.952	-1.032	-0.876	-0.963	-1.083	-1.025
Slovenia	-0.470	-0.751	-0.958	-0.951	-1.031	-0.876	-0.962	-1.081	-1.024
<i>High-income countries:</i>									
Czech Republic	-0.462	-0.751	-0.958	-0.950	-1.029	-0.876	-0.962	-1.078	-1.022
Greece	-0.441	-0.750	-0.956	-0.949	-1.025	-0.876	-0.960	-1.072	-1.019
Korea	-0.435	-0.750	-0.956	-0.948	-1.024	-0.876	-0.960	-1.070	-1.018
Portugal	-0.428	-0.750	-0.956	-0.948	-1.023	-0.876	-0.959	-1.068	-1.017
Spain	-0.426	-0.750	-0.956	-0.948	-1.023	-0.876	-0.959	-1.068	-1.017
Ireland	-0.418	-0.750	-0.955	-0.947	-1.021	-0.876	-0.959	-1.066	-1.015

See notes at end of table.

Continued--

**Table 10—Cournot own-price elasticity for aggregate consumption categories,
114 countries in 1996¹--Continued**

Country	Food, beverage & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communi- cation	Rec- reation	Other
<i>High-income countries--continued:</i>									
Singapore	-0.409	-0.749	-0.955	-0.947	-1.020	-0.876	-0.958	-1.063	-1.014
Mauritius	-0.396	-0.749	-0.954	-0.946	-1.018	-0.876	-0.957	-1.060	-1.012
Israel	-0.384	-0.749	-0.953	-0.945	-1.016	-0.875	-0.957	-1.058	-1.011
New Zealand	-0.379	-0.749	-0.953	-0.945	-1.016	-0.875	-0.956	-1.057	-1.010
Finland	-0.378	-0.749	-0.953	-0.945	-1.015	-0.875	-0.956	-1.057	-1.010
Bahamas	-0.374	-0.749	-0.953	-0.945	-1.015	-0.875	-0.956	-1.056	-1.010
Sweden	-0.346	-0.748	-0.952	-0.944	-1.012	-0.875	-0.955	-1.051	-1.007
Netherlands	-0.341	-0.748	-0.952	-0.943	-1.011	-0.875	-0.954	-1.050	-1.006
France	-0.318	-0.747	-0.951	-0.942	-1.009	-0.875	-0.953	-1.046	-1.004
United Kingdom	-0.316	-0.747	-0.951	-0.942	-1.008	-0.875	-0.953	-1.046	-1.004
Belgium	-0.311	-0.747	-0.951	-0.942	-1.008	-0.875	-0.953	-1.045	-1.003
Norway	-0.310	-0.747	-0.951	-0.942	-1.008	-0.875	-0.953	-1.045	-1.003
Italy	-0.306	-0.747	-0.950	-0.942	-1.007	-0.875	-0.953	-1.044	-1.003
Austria	-0.297	-0.747	-0.950	-0.941	-1.006	-0.875	-0.952	-1.043	-1.002
Germany	-0.295	-0.747	-0.950	-0.941	-1.006	-0.875	-0.952	-1.043	-1.002
Australia	-0.286	-0.747	-0.950	-0.941	-1.005	-0.875	-0.952	-1.041	-1.001
Japan	-0.280	-0.747	-0.950	-0.941	-1.005	-0.875	-0.952	-1.041	-1.001
Canada	-0.271	-0.747	-0.949	-0.941	-1.004	-0.875	-0.952	-1.040	-1.000
Bermuda	-0.253	-0.746	-0.949	-0.940	-1.003	-0.875	-0.951	-1.037	-0.999
Switzerland	-0.245	-0.746	-0.949	-0.940	-1.002	-0.875	-0.951	-1.036	-0.998
Barbados	-0.244	-0.746	-0.949	-0.940	-1.002	-0.875	-0.951	-1.036	-0.998
Hong Kong	-0.242	-0.746	-0.948	-0.940	-1.002	-0.875	-0.951	-1.036	-0.998
Iceland	-0.240	-0.746	-0.948	-0.940	-1.002	-0.875	-0.950	-1.036	-0.998
Denmark	-0.235	-0.746	-0.948	-0.939	-1.001	-0.874	-0.950	-1.035	-0.997
Luxembourg	-0.119	-0.744	-0.946	-0.936	-0.994	-0.874	-0.947	-1.025	-0.991
United States	-0.098	-0.744	-0.945	-0.936	-0.993	-0.874	-0.947	-1.023	-0.990
<i>Low-income average</i>	-0.741	-0.763	-1.015	-1.012	-1.308	-0.883	-1.031	-1.627	-1.264
<i>Middle-income average</i>	-0.593	-0.755	-0.971	-0.966	-1.075	-0.878	-0.978	-1.154	-1.063
<i>High-income average</i>	-0.321	-0.748	-0.951	-0.943	-1.010	-0.875	-0.954	-1.049	-1.006

¹Countries are reported based on ascending per capita real income levels.

²As the estimated budget shares for recreation were negative, these values are calculated using the actual budget shares.

Food Subgroup Elasticities

The expenditure and price elasticities calculated using the Florida-Slutsky model are conditional on a given food budget. In other words, the expenditure elasticity measures the percentage change in demand for a 1-percent change in food budget, while the price elasticity measures the percentage response to a 1-percent change in price assuming a given food budget. However, the conditional elasticities can be converted to unconditional elasticities using the parameters estimated from the Florida-PI model in the first stage. The unconditional elasticities measure percentage change in demand from a 1-percent change in overall income.

With $\beta_i^* > 0$ for five of the eight food subcategories, the estimated conditional income elasticities are greater than 1 for these five food groups, indicating these to be (conditionally) elastic food items. However, using equation 25 the conditional income elasticity is converted to the unconditional income elasticity. The estimated income (expenditure) elasticities presented in table 11 are all less than 1, excepting for beverage and tobacco in low-income countries. This is consistent with conventional theory that food is a necessity and not a luxury item in household expenditures. Given the relatively low food budget share of beverage and tobacco in many low-income countries, this category can be considered a luxury item among consumers in some poorer countries.

Similar to the estimated income elasticity for aggregate consumption categories, the income elasticities for food sub-categories are the largest for the poorest country (Tanzania) and decline in magnitude with affluence, with the smallest elasticities for the United States. Across each country, staple food items (with negative β_i^*) have smaller elasticities than the more conditionally elastic food items such as beverages and tobacco, and meat and dairy. For example, the income elasticity for cereals ranges from 0.62 in Tanzania to 0.47 in Georgia, 0.28 in Slovenia, and 0.05 in the United States. In contrast, the elasticity for beverages and tobacco are higher across all countries, ranging from 1.70 in Tanzania, 1.00 in Georgia, 0.65 in Slovenia, and 0.13 in the United States.

As discussed in earlier sections, the conditional Slutsky elasticity is given by $\varepsilon_{ijc}^* = \frac{\pi_{ij}^*}{\bar{w}_i^* c}$, where π_{ij}^* is the conditional Slutsky price parameter in country c for good i with respect to good j , and $\bar{w}_i^*$ is the conditional fitted budget share (at geometric mean prices) of food sub-group $i \in S_g$ in country c . Since for a given food sub-group i , π_{ij}^* is invariant across countries, the conditional Slutsky elasticity for food sub-group i will be greater for smaller budget shares. Poorer countries typically have larger budget shares for staple items such as breads and cereals, which form a smaller share of food budget among wealthier countries. Therefore, contrary to theory, the estimated conditional Slutsky own-price elasticities for cereals may be larger for wealthier countries. This problem of a constant π_{ij}^* continues

The unconditional Frisch own-price elasticities are not a function of π_{ij}^* and do not suffer the problem encountered in calculating the unconditional Slutsky elasticities. Using the estimated parameters from stages one and two and using equation 26, Frisch own-price elasticities are calculated. These unconditional own-price elasticities (table 12) represent elasticities estimated at a point when the marginal utility of income is held constant. The values of the Frisch own-price elasticities lie between the values of the Slutsky own-price elasticities (when real income is held constant) and the Cournot own-price elasticities (when nominal income is held constant) for necessities and can be considered as a reasonable estimate of the average own-price elasticities for the food sub-categories.

**Table 11—Unconditional expenditure elasticity for food sub-categories,
114 countries in 1996¹**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>Low-income countries:</i>								
Tanzania	1.700	0.619	0.859	1.035	0.963	0.633	0.707	0.856
Nigeria	1.693	0.608	0.843	1.018	0.946	0.622	0.694	0.840
Tajikistan	1.675	0.602	0.835	1.008	0.937	0.616	0.688	0.832
Zambia	1.513	0.594	0.833	0.994	0.930	0.608	0.685	0.830
Yemen	1.522	0.594	0.833	0.995	0.930	0.609	0.685	0.830
Malawi	1.538	0.592	0.828	0.991	0.925	0.606	0.681	0.825
Madagascar	1.372	0.579	0.827	0.975	0.917	0.596	0.678	0.824
Mali	1.656	0.596	0.827	0.998	0.928	0.610	0.681	0.824
Mongolia	1.273	0.565	0.824	0.960	0.909	0.584	0.673	0.821
Benin	1.336	0.568	0.812	0.956	0.900	0.584	0.665	0.809
Kenya	1.618	0.583	0.808	0.975	0.906	0.596	0.665	0.805
Sierra Leone	1.459	0.571	0.802	0.957	0.895	0.586	0.659	0.799
Nepal	1.102	0.513	0.798	0.909	0.869	0.537	0.646	0.795
Turkmenistan	1.414	0.567	0.799	0.950	0.890	0.581	0.656	0.796
Congo	1.466	0.567	0.794	0.949	0.887	0.581	0.653	0.791
Senegal	1.194	0.536	0.787	0.914	0.866	0.554	0.642	0.784
Vietnam	1.103	0.512	0.784	0.897	0.856	0.534	0.636	0.781
Bangladesh	1.139	0.523	0.784	0.903	0.859	0.543	0.638	0.781
Pakistan	1.084	0.504	0.772	0.883	0.843	0.526	0.626	0.770
Azerbaijan	1.059	0.493	0.767	0.874	0.835	0.517	0.621	0.764
Cote d'Ivoire	1.250	0.535	0.767	0.902	0.850	0.551	0.628	0.764
Paraguay	1.172	0.523	0.765	0.890	0.843	0.541	0.625	0.762
Uzbekistan	1.172	0.522	0.761	0.886	0.839	0.539	0.622	0.758
Kyrgyzstan	1.145	0.517	0.761	0.882	0.837	0.535	0.620	0.758
Cameroon	1.227	0.529	0.761	0.893	0.842	0.545	0.623	0.758
Moldova	1.187	0.524	0.760	0.888	0.839	0.540	0.621	0.758
Bolivia	1.031	0.480	0.754	0.857	0.820	0.504	0.610	0.751
Ecuador	1.089	0.501	0.754	0.867	0.825	0.521	0.613	0.751
Armenia	1.023	0.476	0.748	0.850	0.814	0.500	0.605	0.746
Sri Lanka	0.963	0.433	0.746	0.836	0.805	0.466	0.598	0.744
Jordan	1.024	0.477	0.743	0.846	0.809	0.500	0.601	0.740
Albania	0.951	0.431	0.734	0.823	0.792	0.462	0.588	0.731
Indonesia	0.909	0.376	0.730	0.809	0.783	0.421	0.579	0.728
Jamaica	1.009	0.470	0.732	0.834	0.797	0.492	0.593	0.730
Zimbabwe	1.217	0.514	0.734	0.865	0.814	0.529	0.602	0.731
Guinea	1.084	0.493	0.730	0.845	0.802	0.511	0.595	0.727
Syria	1.028	0.476	0.723	0.829	0.791	0.496	0.587	0.721
Georgia	1.003	0.467	0.722	0.823	0.787	0.488	0.585	0.719
<i>Middle-income countries:</i>								
Ukraine	0.983	0.458	0.711	0.810	0.775	0.479	0.576	0.708
Philippines	0.888	0.387	0.701	0.781	0.754	0.423	0.559	0.698
Peru	0.944	0.439	0.699	0.792	0.759	0.462	0.564	0.697
Botswana	0.989	0.458	0.700	0.801	0.764	0.478	0.568	0.697
Thailand	0.922	0.425	0.697	0.785	0.755	0.451	0.561	0.694

See notes at end of table.

Continued--

**Table 11—Unconditional expenditure elasticity for food sub-categories,
114 countries in 1996¹--Continued**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>Middle-income countries--continued:</i>								
Morocco	0.974	0.452	0.694	0.793	0.757	0.472	0.563	0.691
Venezuela	0.905	0.414	0.691	0.777	0.748	0.442	0.555	0.689
Macedonia	0.906	0.417	0.685	0.773	0.742	0.443	0.552	0.683
Belize	0.899	0.412	0.685	0.771	0.741	0.439	0.551	0.683
Egypt	0.898	0.411	0.685	0.770	0.741	0.438	0.550	0.683
St. Vincent & Grenadines	0.889	0.404	0.684	0.767	0.739	0.433	0.549	0.681
Swaziland	1.022	0.461	0.679	0.788	0.747	0.477	0.554	0.677
Lebanon	0.859	0.380	0.673	0.752	0.725	0.413	0.538	0.671
Belarus	0.891	0.411	0.673	0.759	0.729	0.436	0.542	0.671
Kazakhstan	0.878	0.401	0.672	0.755	0.727	0.428	0.540	0.670
Dominica	0.859	0.382	0.671	0.750	0.724	0.413	0.537	0.669
Latvia	0.878	0.404	0.665	0.749	0.720	0.430	0.535	0.662
St. Lucia	0.831	0.352	0.662	0.736	0.711	0.390	0.527	0.660
Brazil	0.877	0.404	0.663	0.747	0.718	0.429	0.533	0.661
Bulgaria	0.872	0.401	0.662	0.745	0.716	0.426	0.532	0.660
Russia	0.873	0.403	0.657	0.742	0.712	0.428	0.529	0.655
Fiji	0.830	0.367	0.651	0.727	0.701	0.398	0.520	0.649
Grenada	0.825	0.360	0.651	0.725	0.700	0.393	0.519	0.649
Turkey	0.826	0.364	0.648	0.723	0.698	0.396	0.518	0.646
Lithuania	0.829	0.373	0.644	0.721	0.695	0.401	0.516	0.642
Romania	0.812	0.355	0.640	0.714	0.689	0.388	0.511	0.638
Iran	0.869	0.404	0.635	0.722	0.691	0.425	0.514	0.633
Mexico	0.807	0.360	0.630	0.704	0.679	0.389	0.504	0.628
Bahrain	0.772	0.309	0.625	0.691	0.670	0.351	0.495	0.623
Chile	0.824	0.379	0.625	0.704	0.676	0.403	0.502	0.622
Antigua & Barbuda	0.770	0.310	0.622	0.688	0.667	0.351	0.493	0.620
Poland	0.798	0.361	0.617	0.692	0.666	0.388	0.495	0.615
Trinidad & Tobago	0.778	0.342	0.612	0.682	0.658	0.372	0.488	0.610
Estonia	0.776	0.345	0.606	0.678	0.654	0.374	0.485	0.604
Gabon	0.788	0.358	0.605	0.680	0.654	0.384	0.486	0.603
Tunisia	0.816	0.379	0.602	0.683	0.654	0.399	0.486	0.600
St. Kitts & Nevis	0.734	0.286	0.597	0.659	0.639	0.328	0.472	0.595
Uruguay	0.759	0.335	0.596	0.665	0.642	0.364	0.476	0.594
Slovakia	0.759	0.338	0.593	0.663	0.639	0.366	0.474	0.591
Hungary	0.745	0.337	0.576	0.645	0.622	0.362	0.462	0.574
Argentina	0.670	0.246	0.549	0.604	0.587	0.290	0.432	0.547
Oman	0.676	0.288	0.538	0.598	0.578	0.318	0.428	0.537
Qatar	0.648	0.261	0.523	0.579	0.561	0.295	0.414	0.522
Slovenia	0.649	0.277	0.516	0.574	0.555	0.305	0.411	0.515
<i>High-income countries:</i>								
Czech Republic	0.638	0.272	0.507	0.564	0.545	0.300	0.404	0.506
Greece	0.597	0.233	0.485	0.535	0.519	0.267	0.383	0.483
Korea	0.576	0.187	0.478	0.524	0.510	0.234	0.374	0.477
Portugal	0.577	0.217	0.471	0.519	0.504	0.253	0.371	0.470
Spain	0.580	0.232	0.470	0.519	0.503	0.263	0.372	0.468
Ireland	0.578	0.245	0.461	0.512	0.495	0.271	0.367	0.460

See notes at end of table.

Continued--

**Table 11—Unconditional expenditure elasticity for food sub-categories,
114 countries in 1996¹--Continued**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>High-income countries--continued:</i>								
Singapore	0.556	0.218	0.451	0.498	0.483	0.249	0.356	0.450
Mauritius	0.565	0.254	0.438	0.491	0.473	0.274	0.351	0.437
Israel	0.525	0.211	0.424	0.469	0.455	0.239	0.336	0.423
New Zealand	0.523	0.217	0.419	0.465	0.450	0.242	0.333	0.418
Finland	0.521	0.217	0.418	0.464	0.448	0.242	0.332	0.417
Bahamas	0.489	0.113	0.413	0.450	0.438	0.171	0.320	0.411
Sweden	0.477	0.197	0.384	0.425	0.411	0.221	0.304	0.382
Netherlands	0.466	0.185	0.378	0.418	0.405	0.211	0.299	0.377
France	0.431	0.159	0.353	0.389	0.377	0.187	0.278	0.352
United Kingdom	0.432	0.169	0.351	0.387	0.375	0.194	0.277	0.350
Belgium	0.424	0.163	0.345	0.381	0.369	0.188	0.273	0.344
Norway	0.426	0.170	0.344	0.381	0.369	0.193	0.272	0.343
Italy	0.417	0.160	0.340	0.375	0.364	0.185	0.268	0.339
Austria	0.404	0.153	0.330	0.364	0.353	0.178	0.260	0.329
Germany	0.402	0.153	0.328	0.362	0.351	0.177	0.259	0.327
Australia	0.388	0.143	0.318	0.350	0.340	0.168	0.250	0.317
Japan	0.388	0.160	0.312	0.345	0.334	0.179	0.247	0.311
Canada	0.376	0.155	0.302	0.335	0.324	0.174	0.240	0.301
Bermuda	0.338	0.104	0.281	0.308	0.300	0.133	0.220	0.281
Switzerland	0.330	0.112	0.273	0.300	0.291	0.137	0.214	0.272
Barbados	0.375	0.175	0.273	0.311	0.297	0.183	0.221	0.272
Hong Kong	0.335	0.137	0.270	0.299	0.289	0.154	0.214	0.269
Iceland	0.326	0.118	0.268	0.294	0.286	0.140	0.210	0.267
Denmark	0.322	0.124	0.262	0.289	0.281	0.143	0.207	0.261
Luxembourg	0.159	0.040	0.133	0.146	0.142	0.057	0.104	0.133
United States	0.134	0.050	0.110	0.121	0.117	0.059	0.086	0.109
Low-income average	1.247	0.527	0.780	0.910	0.860	0.546	0.636	0.777
Middle-income average	0.836	0.373	0.641	0.720	0.693	0.402	0.514	0.639
High-income average	0.440	0.170	0.356	0.393	0.381	0.196	0.281	0.355

¹Countries are reported based on ascending per capita real income levels.

**Table 12—Unconditional Frisch own-price elasticity for food sub-categories,
114 countries in 1996¹**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>Low-income countries:</i>								
Tanzania	-1.375	-0.500	-0.695	-0.837	-0.779	-0.512	-0.572	-0.692
Nigeria	-1.369	-0.492	-0.682	-0.823	-0.765	-0.503	-0.562	-0.679
Tajikistan	-1.355	-0.487	-0.676	-0.815	-0.758	-0.498	-0.556	-0.673
Zambia	-1.223	-0.480	-0.674	-0.804	-0.752	-0.492	-0.554	-0.671
Yemen	-1.231	-0.480	-0.674	-0.805	-0.752	-0.492	-0.554	-0.671
Malawi	-1.243	-0.479	-0.670	-0.801	-0.748	-0.490	-0.551	-0.667
Madagascar	-1.110	-0.469	-0.669	-0.788	-0.742	-0.482	-0.548	-0.666
Mali	-1.339	-0.482	-0.669	-0.807	-0.750	-0.493	-0.551	-0.666
Mongolia	-1.029	-0.457	-0.666	-0.777	-0.735	-0.472	-0.544	-0.664
Benin	-1.080	-0.459	-0.657	-0.773	-0.728	-0.472	-0.538	-0.654
Kenya	-1.309	-0.471	-0.654	-0.788	-0.733	-0.482	-0.538	-0.651
Sierra Leone	-1.180	-0.462	-0.648	-0.774	-0.724	-0.474	-0.533	-0.646
Nepal	-0.891	-0.415	-0.645	-0.735	-0.703	-0.435	-0.522	-0.643
Turkmenistan	-1.143	-0.458	-0.646	-0.768	-0.720	-0.470	-0.530	-0.643
Congo	-1.186	-0.459	-0.642	-0.768	-0.717	-0.470	-0.528	-0.639
Senegal	-0.965	-0.434	-0.636	-0.739	-0.701	-0.448	-0.519	-0.634
Vietnam	-0.891	-0.414	-0.633	-0.725	-0.692	-0.432	-0.514	-0.631
Bangladesh	-0.922	-0.423	-0.634	-0.731	-0.695	-0.440	-0.516	-0.632
Pakistan	-0.877	-0.407	-0.625	-0.714	-0.682	-0.425	-0.507	-0.622
Azerbaijan	-0.857	-0.399	-0.620	-0.706	-0.676	-0.418	-0.502	-0.618
Cote d'Ivoire	-1.011	-0.433	-0.620	-0.729	-0.687	-0.445	-0.508	-0.618
Paraguay	-0.948	-0.423	-0.619	-0.720	-0.682	-0.437	-0.505	-0.616
Uzbekistan	-0.948	-0.422	-0.616	-0.717	-0.679	-0.436	-0.503	-0.613
Kyrgyzstan	-0.926	-0.418	-0.615	-0.713	-0.677	-0.432	-0.502	-0.613
Cameroon	-0.993	-0.428	-0.615	-0.722	-0.681	-0.441	-0.504	-0.613
Moldova	-0.960	-0.423	-0.615	-0.718	-0.679	-0.437	-0.503	-0.613
Bolivia	-0.834	-0.388	-0.610	-0.693	-0.663	-0.408	-0.493	-0.608
Ecuador	-0.881	-0.405	-0.609	-0.701	-0.667	-0.421	-0.496	-0.607
Armenia	-0.827	-0.385	-0.605	-0.688	-0.658	-0.404	-0.489	-0.603
Sri Lanka	-0.778	-0.350	-0.603	-0.676	-0.651	-0.377	-0.483	-0.602
Jordan	-0.828	-0.385	-0.601	-0.684	-0.654	-0.404	-0.486	-0.599
Albania	-0.769	-0.348	-0.593	-0.665	-0.641	-0.374	-0.476	-0.591
Indonesia	-0.735	-0.304	-0.590	-0.654	-0.633	-0.340	-0.468	-0.588
Jamaica	-0.816	-0.380	-0.592	-0.674	-0.645	-0.398	-0.479	-0.590
Zimbabwe	-0.984	-0.416	-0.594	-0.700	-0.658	-0.428	-0.487	-0.591
Guinea	-0.876	-0.398	-0.591	-0.683	-0.649	-0.413	-0.481	-0.588
Syria	-0.831	-0.385	-0.585	-0.671	-0.639	-0.401	-0.475	-0.583
Georgia	-0.811	-0.377	-0.584	-0.666	-0.636	-0.395	-0.473	-0.582
<i>Middle-income countries:</i>								
Ukraine	-0.795	-0.370	-0.575	-0.655	-0.626	-0.388	-0.466	-0.573
Philippines	-0.718	-0.313	-0.567	-0.631	-0.610	-0.342	-0.452	-0.565
Peru	-0.764	-0.355	-0.565	-0.641	-0.614	-0.374	-0.456	-0.563
Botswana	-0.799	-0.371	-0.566	-0.648	-0.618	-0.387	-0.459	-0.564
Thailand	-0.746	-0.344	-0.563	-0.635	-0.610	-0.365	-0.453	-0.561

See notes at end of table.

Continued--

**Table 12—Unconditional Frisch own-price elasticity for food sub-categories,
114 countries in 1996¹--Continued**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>Middle-income countries--continued:</i>								
Morocco	-0.787	-0.366	-0.561	-0.642	-0.613	-0.382	-0.455	-0.559
Venezuela	-0.732	-0.335	-0.559	-0.628	-0.605	-0.357	-0.449	-0.557
Macedonia	-0.733	-0.338	-0.554	-0.625	-0.600	-0.359	-0.446	-0.553
Belize	-0.727	-0.333	-0.554	-0.623	-0.599	-0.355	-0.445	-0.552
Egypt	-0.726	-0.332	-0.554	-0.623	-0.599	-0.354	-0.445	-0.552
St. Vincent & Grenadines	-0.719	-0.327	-0.553	-0.620	-0.597	-0.350	-0.444	-0.551
Swaziland	-0.826	-0.373	-0.549	-0.637	-0.604	-0.386	-0.448	-0.547
Lebanon	-0.695	-0.307	-0.544	-0.608	-0.586	-0.334	-0.435	-0.543
Belarus	-0.721	-0.332	-0.544	-0.614	-0.590	-0.353	-0.438	-0.542
Kazakhstan	-0.710	-0.324	-0.544	-0.611	-0.588	-0.346	-0.436	-0.542
Dominica	-0.695	-0.309	-0.543	-0.607	-0.585	-0.334	-0.434	-0.541
Latvia	-0.710	-0.327	-0.537	-0.606	-0.582	-0.348	-0.432	-0.536
St. Lucia	-0.672	-0.285	-0.536	-0.595	-0.575	-0.315	-0.426	-0.534
Brazil	-0.709	-0.327	-0.536	-0.604	-0.581	-0.347	-0.431	-0.534
Bulgaria	-0.705	-0.324	-0.535	-0.603	-0.579	-0.345	-0.430	-0.533
Russia	-0.706	-0.326	-0.532	-0.600	-0.576	-0.346	-0.428	-0.530
Fiji	-0.671	-0.297	-0.526	-0.587	-0.567	-0.322	-0.420	-0.525
Grenada	-0.667	-0.291	-0.526	-0.586	-0.566	-0.318	-0.420	-0.525
Turkey	-0.668	-0.294	-0.524	-0.585	-0.564	-0.320	-0.419	-0.522
Lithuania	-0.671	-0.301	-0.521	-0.583	-0.562	-0.325	-0.417	-0.519
Romania	-0.657	-0.287	-0.518	-0.577	-0.557	-0.314	-0.413	-0.516
Iran	-0.702	-0.327	-0.514	-0.584	-0.559	-0.343	-0.415	-0.512
Mexico	-0.653	-0.291	-0.510	-0.570	-0.549	-0.315	-0.408	-0.508
Bahrain	-0.625	-0.250	-0.505	-0.559	-0.541	-0.284	-0.400	-0.504
Chile	-0.666	-0.307	-0.505	-0.569	-0.547	-0.326	-0.406	-0.503
Antigua & Barbuda	-0.623	-0.251	-0.503	-0.557	-0.539	-0.284	-0.398	-0.502
Poland	-0.646	-0.292	-0.499	-0.559	-0.539	-0.313	-0.400	-0.498
Trinidad & Tobago	-0.629	-0.276	-0.495	-0.552	-0.532	-0.301	-0.395	-0.493
Estonia	-0.628	-0.279	-0.490	-0.548	-0.529	-0.302	-0.392	-0.489
Gabon	-0.637	-0.290	-0.490	-0.550	-0.529	-0.310	-0.393	-0.488
Tunisia	-0.660	-0.307	-0.487	-0.552	-0.529	-0.323	-0.393	-0.485
St. Kitts & Nevis	-0.594	-0.231	-0.483	-0.533	-0.517	-0.266	-0.381	-0.481
Uruguay	-0.614	-0.271	-0.482	-0.538	-0.519	-0.294	-0.385	-0.481
Slovakia	-0.614	-0.273	-0.480	-0.536	-0.517	-0.296	-0.384	-0.478
Hungary	-0.603	-0.272	-0.466	-0.522	-0.503	-0.293	-0.373	-0.464
Argentina	-0.542	-0.199	-0.444	-0.489	-0.474	-0.235	-0.349	-0.443
Oman	-0.547	-0.233	-0.435	-0.484	-0.468	-0.257	-0.346	-0.434
Qatar	-0.524	-0.211	-0.423	-0.468	-0.453	-0.239	-0.335	-0.422
Slovenia	-0.525	-0.224	-0.418	-0.464	-0.449	-0.247	-0.332	-0.416
<i>High-income countries:</i>								
Czech Republic	-0.516	-0.220	-0.410	-0.456	-0.441	-0.243	-0.326	-0.409
Greece	-0.482	-0.188	-0.392	-0.433	-0.420	-0.216	-0.310	-0.391
Korea	-0.466	-0.151	-0.387	-0.424	-0.412	-0.189	-0.302	-0.385
Portugal	-0.466	-0.176	-0.381	-0.420	-0.408	-0.205	-0.300	-0.380
Spain	-0.469	-0.187	-0.380	-0.420	-0.407	-0.213	-0.300	-0.379
Ireland	-0.468	-0.198	-0.373	-0.414	-0.401	-0.219	-0.297	-0.372

See notes at end of table.

Continued--

**Table 12—Unconditional Frisch own-price elasticity for food sub-categories,
114 countries in 1996¹--Continued**

Country	Beverages, tobacco	Breads, cereals	Meat	Fish	Dairy	Fats, oils	Fruits, vegetables	Other foods
<i>High-income countries--continued:</i>								
Singapore	-0.449	-0.176	-0.365	-0.403	-0.391	-0.202	-0.288	-0.364
Mauritius	-0.457	-0.206	-0.354	-0.397	-0.382	-0.221	-0.284	-0.353
Israel	-0.424	-0.170	-0.343	-0.380	-0.368	-0.193	-0.272	-0.342
New Zealand	-0.423	-0.176	-0.339	-0.376	-0.364	-0.196	-0.269	-0.338
Finland	-0.422	-0.176	-0.338	-0.375	-0.363	-0.196	-0.268	-0.337
Bahamas	-0.396	-0.092	-0.334	-0.364	-0.354	-0.138	-0.258	-0.333
Sweden	-0.386	-0.159	-0.310	-0.344	-0.333	-0.178	-0.246	-0.309
Netherlands	-0.377	-0.149	-0.306	-0.338	-0.327	-0.170	-0.242	-0.305
France	-0.348	-0.129	-0.286	-0.314	-0.305	-0.152	-0.225	-0.285
United Kingdom	-0.349	-0.137	-0.284	-0.313	-0.304	-0.157	-0.224	-0.283
Belgium	-0.343	-0.132	-0.279	-0.308	-0.299	-0.152	-0.220	-0.278
Norway	-0.344	-0.138	-0.278	-0.308	-0.298	-0.156	-0.220	-0.277
Italy	-0.337	-0.129	-0.275	-0.303	-0.294	-0.150	-0.217	-0.274
Austria	-0.327	-0.124	-0.267	-0.294	-0.285	-0.144	-0.210	-0.266
Germany	-0.325	-0.124	-0.265	-0.292	-0.284	-0.143	-0.209	-0.264
Australia	-0.314	-0.115	-0.257	-0.283	-0.275	-0.136	-0.202	-0.256
Japan	-0.314	-0.129	-0.252	-0.279	-0.270	-0.145	-0.200	-0.251
Canada	-0.304	-0.125	-0.245	-0.271	-0.262	-0.140	-0.194	-0.244
Bermuda	-0.273	-0.084	-0.228	-0.249	-0.242	-0.108	-0.178	-0.227
Switzerland	-0.267	-0.091	-0.221	-0.242	-0.236	-0.111	-0.173	-0.220
Barbados	-0.303	-0.141	-0.221	-0.251	-0.240	-0.148	-0.179	-0.220
Hong Kong	-0.271	-0.110	-0.218	-0.242	-0.234	-0.124	-0.173	-0.218
Iceland	-0.264	-0.096	-0.216	-0.238	-0.231	-0.114	-0.170	-0.216
Denmark	-0.260	-0.100	-0.212	-0.234	-0.227	-0.116	-0.167	-0.211
Luxembourg	-0.128	-0.032	-0.108	-0.118	-0.115	-0.046	-0.084	-0.108
United States	-0.108	-0.040	-0.089	-0.098	-0.095	-0.047	-0.070	-0.088
<i>Low-income average</i>	-1.009	-0.426	-0.631	-0.736	-0.695	-0.442	-0.514	-0.628
<i>Middle-income average</i>	-0.676	-0.302	-0.519	-0.582	-0.560	-0.325	-0.416	-0.517
<i>High-income average</i>	-0.356	-0.138	-0.288	-0.318	-0.308	-0.158	-0.227	-0.287

¹Countries are reported based on ascending per capita real income levels.

The Frisch own-price elasticities for the food sub-categories vary by affluence according to economic theory; low-income countries are more responsive to price changes compared with higher-income countries (table 12). The absolute values of the own-price elasticities are also less for the conditionally inelastic food groups, such as breads and cereals, fats and oils, and fruits and vegetables. These values for breads and cereals are -0.50 for Tanzania, -0.38 for Georgia, -0.22 for Slovenia, and -0.04 for the United States. Similarly, the Frisch own-price elasticities for fats and oils, and for fruits and vegetables range from -0.51 and -0.57, respectively, for Tanzania, to -0.05 and -0.07, respectively, for the United States. The absolute values of the Frisch own-price elasticities for the conditionally elastic food items are higher, and for the poorest country, Tanzania, these range from -1.37 for beverage and tobacco, to -0.70 for meat, -0.83 for fish, -0.78 for dairy, and -0.69 for other food products. The values of these elasticities decline in absolute terms with affluence and are -0.11 for beverage and tobacco, -0.09 for meat, -0.10 for fish, -0.10 for dairy, and -0.09 for other food products for the wealthiest country, the United States.

Concluding Remarks

This report accomplishes two major goals. The first is presenting a two-stage cross-country demand model that enables estimating unconditional income and price elasticities for disaggregate consumption sub-groups, while the second is providing income and price elasticities across 114 countries for nine aggregate consumption categories and eight food sub-categories. While previous research presented multi-stage demand estimation models, there have been no empirical works conducted across as many countries and consumption categories. Additionally, this report also presents a new methodology for calculating unconditional price elasticities in a two-stage demand model.

The results of this research confirm many of the results obtained and established by earlier studies. Low-income countries spend a greater portion of their budget on necessities, such as food, while richer countries spend a greater proportion of their income on luxuries, such as recreation. Low-value staples, such as cereals, account for a larger share of the food budget in poorer countries, while high-value food items, such as dairy and meat, are a larger share of the food budget in richer countries. Low-income countries are also more responsive to changes in income and food prices and, therefore, make larger adjustments to their food consumption pattern when incomes and prices change. However, our study illustrates that adjustments to price and income changes are not made uniformly across all food categories. Staple food consumption changes the least, while consumption of higher-value food items such as dairy and meat changes the most. Additionally, our results indicate that when price changes are accompanied by equivalent income changes, wealthier low-income countries and middle-income countries make the most adjustments to their food demand.

Finally, this research provides estimates for income and own-price elasticities for nine aggregate consumption groups and eight food subgroups across 114 countries. These elasticities can be used as inputs in future work designed to forecast future food demand and supply and in projects designed to simulate the effects of different government policy options. In addition to the actual elasticity estimates, parameters estimated from our models can be used (with the latest expenditure data) to estimate new elasticities for recent years for the countries included in our analysis as well as for other countries.

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Appendix: Goodness-of-Fit and Outliers

In figure 4, the budget shares of food, beverages, and tobacco for each of the 114 countries is plotted against the natural log of per capita income. Obviously, the budget shares decline as per capita income increases, and the relationship behaves according to Engel's law. Evident from figure 4, the 1996 ICP data contain several outlying observations. As discussed by Theil, Chung, and Seale (1989), the earlier phases of the ICP data also contained several outliers, especially African countries where the data are quite unreliable.¹

To identify the outliers, we follow Theil, Chung, and Seale and calculate the information inaccuracy measure from statistical information theory. Specifically, the information inaccuracy measure is:

$$I_c = \sum_{i=1}^n w_{ic} \log \frac{w_{ic}}{\hat{w}_{ic}}, \quad (\text{A.1})$$

where w_{ic} is the observed budget share of good i in country c , and $\hat{w}_{ic}$ is the fitted budget share of good i in country c based on equation 29 in chapter 4.² When the model fits perfectly, $\hat{w}_{ic} = w_{ic} \forall i, c$, and the value of I_c is zero. The value is positive when, for some i or c , $\hat{w}_{ic} - w_{ic}$ is non-zero. Let the difference equal the residual e_{ic} . A Taylor expansion shows that when these residuals are sufficiently small,

$$I_c \approx \frac{1}{2} \sum_{i=1}^n \frac{e_{ic}^2}{w_{ic}}. \text{ This illustrates how } I_c \text{ increases when the residuals become larger in absolute values.}$$

Information inaccuracy measures can be decomposed into Strobel (1982) measures, an indication of the goodness-of-fit of the model for each good in the Florida system. The Strobel measure is defined as:

$$I_{ic} = \hat{w}_{ic} - w_{ic} + w_{ic} \log \frac{w_{ic}}{\hat{w}_{ic}}, \quad (\text{A.2})$$

and $I_c = \sum_i I_{ic}$. Strobel measures, like the I_c , have a lower bound of zero and no upper bound. If $\hat{w}_{ic} = w_{ic}$, then $I_{ic} = 0$; otherwise, the measure is positive.

Information inaccuracies and Strobel measures for the Florida-PI model are calculated for all 114 countries based on the parameters estimated using 114 countries as reported in table 5 in chapter 5 and the predicted budget shares from equation 18. These measures are reported in table A1 for all countries as well as the overall group averages for low-, middle-, and high-income countries.

The high-income countries have the smallest average value of information inaccuracy measures (second column in table A1). Its average information inaccuracy measure, 0.038, is only 66 percent the size of the middle-income country group's average of 0.058 and 44 percent of the low-income country's average of 0.086. Average Strobel measures (columns 3-11 in table A1) are also the smallest for the high-income group, and range from 0.002 to 0.006, compared with a higher range from 0.004 to 0.010 for middle-income countries and from 0.006 to 0.011 for low-income countries.

¹ This is true even for population data. Seale and Theil (1986) note that, according to *The Economist*, July 20, 1985:30, the 1984 population estimate of the Ethiopian government based on prior censuses differed from the actual mid - 1984 census by no less than 9 million out of a population of 43 million.

² Note that $\hat{w}_{ic}$ is not the same as $\bar{w}_{ic}$, $\hat{w}_{ic}$ is the fitted budget share based on country c 's observed prices, while $\bar{w}_{ic}$ is the fitted budget share at geometric mean prices.

Gross rent, fuel, and power has the highest Strobel measures across all three country groups. Food, beverages, and tobacco and recreation have the next highest Strobel measures for the middle-income and high-income country groups. For the low-income country group, although the average Strobel measure on recreation is smaller compared with other consumption categories, the actual goodness-of-fit was particularly bad. The average Strobel measure presented in table A1 excludes the undefined values for the four countries whose predicted budget shares for recreation were negative.

Smaller inaccuracy and Strobel measures indicate a better goodness-of-fit. Following Theil, Chung, and Seale, countries with $I_c > 0.10$ (at two decimal places) are declared to be outliers. Of the original 114 countries, 23 countries are identified as outliers by this criterion. Of the 23 countries, 17 fall within the low-income country group, 4 within the middle-income country group, and only two (Bahamas and Hong Kong) within the high-income country group. The large number of outliers identified within the low-income country group explains the observed poorer average goodness-of-fit for this group.

Seven of the identified outliers are from Africa (Cote d'Ivoire, Egypt, Madagascar, Malawi, Nigeria, Tanzania, and Zimbabwe), three from America (Bahamas, Ecuador, and Paraguay), one (Albania) from Europe, six from Central-Asian-Transition countries (Armenia, Azerbaijan, Georgia, Mongolia, Tajikistan, and Turkmenistan), and six others from Asia (Bahrain, Hong Kong, Iran, Philippines, Sri Lanka, and Yemen).³ It is also of interest to note that the number of outliers appears to be related with when the countries first appeared in the ICP study. For example, there are only three outliers among the countries in the first three ICP phases. Of the 33 countries introduced in Phase IV, eight are outliers, five of which are poor African countries. Of the 60 countries introduced in 1996, 12 are outliers, seven of which are transitional economies, four of which are Middle Eastern, and the last of which is the Bahamas.

Having deleted these outliers, the model was re-estimated with 91 countries. As it turns out, the parameters were hardly changed by the deletion of the outliers from the sample. This was not the case in the earlier phases of the ICP when the total number of countries was much lower than in the 1996 sample. Based on our finding, we calculated all elasticities from the 114 country parameter estimates. We do, however, report the 91 country parameter estimates and elasticities here in the appendix (app. tables A2-A9).

³ Theil, Chung, and Seale provide some rationale as to why many poorer countries tend to be outliers. These include under-reporting of home-produced food, and distortions of consumption data due to a large presence of tourists in the country (Bahamas in our case and Jamaica in the earlier study).

Table A-1—Information Inaccuracies and Strobel measures, 114 countries in 1996¹

Country	I _c	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Low-income countries:</i>										
Tanzania	i	0.003	0.001	0.001	0.003	0.003	0.011	0.018	i	0.002
Nigeria	i	0.004	0.005	0.008	0.000	0.001	0.022	0.017	i	0.003
Tajikistan	0.078	0.001	0.001	0.047	0.001	0.000	0.000	0.001	0.002	0.025
Zambia	0.039	0.000	0.000	0.001	0.009	0.019	0.002	0.002	0.003	0.002
Yemen	i	0.001	0.003	0.002	0.004	0.003	0.000	0.006	i	0.011
Malawi	i	0.003	0.009	0.000	0.010	0.002	0.002	0.000	i	0.000
Madagascar	0.073	0.002	0.000	0.005	0.000	0.000	0.006	0.006	0.052	0.001
Mali	0.072	0.003	0.014	0.000	0.000	0.006	0.017	0.030	0.000	0.000
Mongolia	0.143	0.000	0.012	0.001	0.007	0.017	0.029	0.015	0.021	0.042
Benin	0.049	0.000	0.002	0.025	0.002	0.000	0.007	0.003	0.004	0.007
Kenya	0.058	0.014	0.000	0.004	0.021	0.001	0.011	0.001	0.004	0.002
Sierra Leone	0.032	0.003	0.008	0.004	0.000	0.000	0.003	0.003	0.005	0.006
Nepal	0.060	0.003	0.002	0.002	0.000	0.000	0.001	0.042	0.005	0.004
Turkmenistan	0.095	0.004	0.004	0.038	0.002	0.034	0.002	0.005	0.001	0.004
Congo	0.071	0.005	0.018	0.000	0.005	0.004	0.003	0.014	0.002	0.021
Senegal	0.022	0.000	0.009	0.001	0.000	0.006	0.001	0.004	0.001	0.000
Vietnam	0.037	0.001	0.002	0.004	0.002	0.000	0.000	0.004	0.011	0.013
Bangladesh	0.093	0.006	0.005	0.023	0.010	0.005	0.000	0.028	0.010	0.005
Pakistan	0.059	0.001	0.000	0.038	0.002	0.001	0.001	0.011	0.004	0.001
Azerbaijan	0.115	0.034	0.003	0.046	0.013	0.012	0.003	0.000	0.001	0.003
Cote d'Ivoire	0.127	0.004	0.001	0.024	0.013	0.010	0.044	0.000	0.012	0.019
Paraguay	0.125	0.052	0.004	0.018	0.006	0.000	0.014	0.011	0.008	0.012
Uzbekistan	0.077	0.001	0.015	0.006	0.010	0.002	0.026	0.000	0.001	0.016
Kyrgyzstan	0.065	0.002	0.003	0.008	0.001	0.001	0.000	0.043	0.005	0.001
Cameroon	0.041	0.003	0.030	0.004	0.002	0.000	0.000	0.000	0.001	0.000
Moldova	0.090	0.005	0.000	0.019	0.004	0.019	0.038	0.002	0.000	0.001
Bolivia	0.032	0.001	0.000	0.001	0.000	0.003	0.008	0.002	0.001	0.015
Ecuador	0.113	0.034	0.004	0.000	0.010	0.004	0.007	0.004	0.031	0.020
Armenia	0.104	0.036	0.008	0.010	0.014	0.013	0.007	0.016	0.000	0.001
Sri Lanka	0.170	0.019	0.060	0.023	0.002	0.011	0.007	0.040	0.004	0.004
Jordan	0.036	0.005	0.000	0.018	0.000	0.003	0.002	0.001	0.001	0.005
Albania	0.172	0.052	0.020	0.010	0.005	0.009	0.017	0.019	0.003	0.037
Indonesia	0.090	0.012	0.014	0.007	0.000	0.013	0.027	0.012	0.003	0.002
Jamaica	0.104	0.006	0.004	0.027	0.004	0.000	0.001	0.046	0.013	0.003
Zimbabwe	0.145	0.052	0.006	0.018	0.014	0.001	0.049	0.000	0.000	0.005
Guinea	0.058	0.000	0.042	0.007	0.001	0.001	0.000	0.000	0.005	0.001
Syria	0.075	0.000	0.000	0.011	0.023	0.004	0.000	0.023	0.003	0.011
Georgia	0.150	0.000	0.003	0.027	0.011	0.001	0.008	0.000	0.001	0.098
<i>Middle-income countries:</i>										
Ukraine	0.018	0.000	0.001	0.001	0.004	0.001	0.001	0.000	0.001	0.010
Philippines	0.133	0.005	0.008	0.023	0.020	0.030	0.024	0.013	0.008	0.003
Peru	0.065	0.010	0.000	0.001	0.003	0.000	0.000	0.001	0.044	0.005
Botswana	0.108	0.006	0.003	0.005	0.025	0.000	0.047	0.001	0.001	0.019
Thailand	0.059	0.018	0.007	0.008	0.001	0.000	0.000	0.011	0.009	0.004
Morocco	0.020	0.001	0.001	0.001	0.000	0.001	0.002	0.000	0.001	0.014
Venezuela	0.051	0.006	0.000	0.006	0.000	0.000	0.019	0.013	0.002	0.003

See notes at end of page.

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Table A-1—Information Inaccuracies and Strobel measures, 114 countries in 1996 ¹--Continued

Country	I _c	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House operations	Medical care	Edu-cation	Transport & communication	Rec-reation	Other
<i>Middle-income countries--continued:</i>										
Macedonia	0.022	0.001	0.003	0.002	0.008	0.005	0.000	0.002	0.000	0.000
Belize	0.037	0.003	0.002	0.008	0.000	0.005	0.001	0.006	0.001	0.011
Egypt	0.114	0.013	0.005	0.019	0.036	0.002	0.008	0.012	0.017	0.001
St. Vincent & Grenadines	0.038	0.000	0.003	0.000	0.001	0.019	0.002	0.002	0.006	0.005
Swaziland	0.095	0.018	0.002	0.001	0.049	0.000	0.016	0.001	0.000	0.007
Lebanon	0.079	0.003	0.023	0.003	0.005	0.000	0.013	0.001	0.025	0.006
Belarus	0.048	0.011	0.000	0.008	0.008	0.002	0.006	0.008	0.002	0.003
Kazakhstan	0.080	0.017	0.010	0.003	0.013	0.002	0.003	0.011	0.004	0.017
Dominica	0.049	0.001	0.000	0.001	0.001	0.003	0.006	0.012	0.001	0.025
Latvia	0.023	0.002	0.000	0.001	0.011	0.002	0.005	0.001	0.000	0.001
St. Lucia	0.055	0.017	0.000	0.004	0.001	0.000	0.003	0.006	0.012	0.010
Brazil	0.067	0.020	0.013	0.010	0.003	0.001	0.016	0.002	0.001	0.001
Bulgaria	0.053	0.004	0.001	0.029	0.006	0.006	0.004	0.002	0.000	0.001
Russia	0.027	0.001	0.014	0.008	0.001	0.001	0.002	0.000	0.000	0.000
Fiji	0.040	0.002	0.001	0.000	0.005	0.002	0.005	0.000	0.007	0.018
Grenada	0.037	0.003	0.003	0.000	0.001	0.012	0.001	0.004	0.007	0.007
Turkey	0.057	0.000	0.000	0.013	0.013	0.012	0.004	0.000	0.009	0.006
Lithuania	0.013	0.004	0.002	0.000	0.004	0.000	0.001	0.001	0.000	0.001
Romania	0.053	0.008	0.001	0.032	0.001	0.000	0.001	0.001	0.008	0.000
Iran	0.184	0.010	0.009	0.096	0.000	0.001	0.001	0.009	0.013	0.045
Mexico	0.036	0.002	0.006	0.002	0.001	0.001	0.001	0.006	0.005	0.013
Bahrain	0.124	0.003	0.001	0.003	0.001	0.000	0.013	0.010	0.007	0.086
Chile	0.064	0.016	0.007	0.004	0.005	0.000	0.023	0.001	0.000	0.007
Antigua & Barbuda	0.061	0.013	0.006	0.001	0.000	0.015	0.000	0.006	0.011	0.010
Poland	0.014	0.000	0.004	0.001	0.003	0.003	0.002	0.000	0.001	0.000
Trinidad & Tobago	0.100	0.004	0.005	0.016	0.000	0.002	0.000	0.009	0.009	0.055
Estonia	0.022	0.000	0.003	0.002	0.003	0.002	0.003	0.000	0.006	0.004
Gabon	0.093	0.029	0.013	0.008	0.012	0.002	0.000	0.004	0.026	0.000
Tunisia	0.059	0.000	0.005	0.022	0.015	0.005	0.000	0.006	0.000	0.005
St. Kitts & Nevis	0.052	0.015	0.003	0.001	0.000	0.007	0.000	0.006	0.011	0.010
Uruguay	0.034	0.002	0.000	0.002	0.000	0.019	0.006	0.003	0.000	0.000
Slovakia	0.024	0.000	0.001	0.004	0.005	0.007	0.002	0.003	0.002	0.000
Hungary	0.030	0.007	0.005	0.001	0.002	0.000	0.000	0.000	0.014	0.001
Argentina	0.049	0.011	0.004	0.000	0.001	0.003	0.027	0.001	0.002	0.001
Oman	0.091	0.000	0.001	0.024	0.001	0.014	0.000	0.013	0.018	0.019
Qatar	0.075	0.001	0.012	0.008	0.012	0.001	0.001	0.012	0.015	0.015
Slovenia	0.018	0.002	0.001	0.001	0.005	0.000	0.001	0.006	0.001	0.001
<i>High-income countries:</i>										
Czech Republic	0.017	0.000	0.001	0.000	0.001	0.001	0.000	0.003	0.010	0.000
Greece	0.051	0.000	0.004	0.002	0.001	0.003	0.006	0.012	0.004	0.019
Korea	0.040	0.009	0.005	0.002	0.000	0.002	0.009	0.005	0.003	0.005
Portugal	0.029	0.002	0.000	0.019	0.001	0.000	0.002	0.001	0.001	0.003
Spain	0.051	0.001	0.000	0.008	0.002	0.000	0.001	0.001	0.004	0.034
Ireland	0.034	0.005	0.000	0.005	0.003	0.002	0.001	0.000	0.002	0.016
Singapore	0.082	0.011	0.000	0.007	0.000	0.013	0.001	0.012	0.036	0.002
Mauritius	0.055	0.001	0.000	0.005	0.021	0.005	0.007	0.004	0.003	0.008

See notes at end of page.

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Table A-1—Information Inaccuracies and Strobel measures, 114 countries in 1996¹--Continued

Country	I _c	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communicati on	Rec- reation	Other
<i>High-income countries--continued:</i>										
Israel	0.021	0.001	0.004	0.002	0.000	0.000	0.008	0.001	0.000	0.004
New Zealand	0.016	0.003	0.005	0.003	0.000	0.000	0.001	0.001	0.002	0.000
Finland	0.030	0.004	0.008	0.001	0.008	0.001	0.001	0.000	0.002	0.006
Bahamas	0.166	0.068	0.003	0.043	0.000	0.001	0.006	0.003	0.042	0.000
Sweden	0.027	0.003	0.005	0.010	0.006	0.000	0.000	0.000	0.001	0.001
Netherlands	0.010	0.001	0.000	0.000	0.002	0.001	0.000	0.001	0.001	0.003
France	0.013	0.000	0.002	0.000	0.001	0.008	0.000	0.000	0.000	0.001
United Kingdom	0.055	0.000	0.003	0.001	0.006	0.017	0.013	0.008	0.001	0.007
Belgium	0.005	0.000	0.000	0.000	0.001	0.001	0.000	0.001	0.002	0.000
Norway	0.011	0.001	0.001	0.000	0.003	0.000	0.000	0.000	0.001	0.004
Italy	0.009	0.000	0.002	0.001	0.000	0.000	0.001	0.002	0.000	0.003
Austria	0.008	0.000	0.000	0.001	0.001	0.001	0.000	0.000	0.001	0.004
Germany	0.008	0.000	0.000	0.001	0.001	0.003	0.003	0.000	0.000	0.000
Australia	0.019	0.000	0.006	0.000	0.001	0.000	0.001	0.000	0.010	0.000
Japan	0.025	0.002	0.000	0.001	0.004	0.008	0.001	0.004	0.005	0.000
Canada	0.014	0.003	0.003	0.002	0.003	0.001	0.001	0.000	0.002	0.000
Bermuda	0.089	0.008	0.001	0.014	0.025	0.005	0.015	0.001	0.006	0.015
Switzerland	0.031	0.003	0.003	0.001	0.011	0.002	0.001	0.006	0.000	0.004
Barbados	0.090	0.019	0.000	0.053	0.000	0.005	0.002	0.000	0.005	0.005
Hong Kong	0.123	0.015	0.049	0.005	0.004	0.006	0.001	0.006	0.031	0.007
Iceland	0.011	0.001	0.000	0.003	0.001	0.000	0.000	0.000	0.004	0.000
Denmark	0.027	0.000	0.004	0.000	0.009	0.003	0.001	0.000	0.006	0.004
Luxembourg	0.038	0.025	0.001	0.005	0.000	0.006	0.000	0.000	0.001	0.000
United States	0.024	0.001	0.000	0.002	0.007	0.014	0.000	0.000	0.000	0.000
<i>Low-income average</i>	0.086	0.011	0.009	0.013	0.006	0.006	0.011	0.012	0.007	0.011
<i>Middle-income average</i>	0.058	0.007	0.004	0.009	0.007	0.004	0.006	0.005	0.007	0.010
<i>High-income average</i>	0.038	0.006	0.003	0.006	0.004	0.003	0.003	0.002	0.006	0.005

¹Countries are reported based on ascending per capita real income levels.

Note: i = imaginary number resulting from negative predicted budget shares.

Low-income average Strobel measures exclude imaginary values.

Table A-2—Maximum likelihood estimates of the aggregate model, 91 countries in 1996

	Parameter	Standard error
Income flexibility	-0.839	0.022
Beta:		
Food, beverages & tobacco	-0.132	0.006
Clothing and footwear	-0.010	0.003
Education	0.001	0.003
Gross rent, fuel & power	0.027	0.005
House operations	0.009	0.003
Medical care	0.027	0.003
Other	0.038	0.004
Recreation	0.022	0.002
Transport	0.019	0.004
Alpha:		
Food, beverages & tobacco	0.145	0.009
Clothing and footwear	0.054	0.004
Education	0.071	0.004
Gross rent, fuel & power	0.181	0.008
House operations	0.073	0.004
Medical care	0.112	0.005
Other	0.154	0.006
Recreation	0.076	0.004
Transport	0.134	0.006
K:		
K1	1.310	0.159
K2	1.540	0.108

Table A-3—Maximum likelihood estimates of the food sub-group model, 91 countries in 1996

	Parameter	Standard error		Parameter	Standard error
Beta:			Diagonal of the Slutsky Matrix:		
Beverages and tobacco	0.067	0.010	π_{11}	-0.069	0.015
Breads and cereals	-0.054	0.009	π_{22}	-0.153	0.024
Meat	0.011	0.007	π_{33}	-0.178	0.026
Fish	0.007	0.005	π_{44}	-0.068	0.009
Dairy	0.010	0.006	π_{55}	-0.086	0.013
Fats & oils	-0.017	0.004	π_{66}	-0.032	0.008
Fruits & vegetables	-0.030	0.010	π_{77}	-0.152	0.031
Other foods	0.007	0.008	π_{88}	-0.175	0.025
Alpha:			K:		
Beverages and tobacco	0.227	0.010	K1	1.359	0.176
Breads and cereals	0.134	0.009	K2	1.533	0.115
Meat	0.177	0.007			
Fish	0.052	0.005			
Dairy	0.108	0.006			
Fats & oils	0.028	0.004			
Fruits & vegetables	0.153	0.010			
Other foods	0.120	0.007			

Table A-4—Expenditure elasticity for aggregate consumption categories, 91 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Low-income countries:</i>									
Zambia	0.775	0.887	1.304	1.201	2.185	1.014	1.257	6.348	2.380
Mali	0.769	0.885	1.294	1.196	2.040	1.014	1.249	4.283	2.187
Benin	0.756	0.882	1.275	1.188	1.840	1.014	1.236	2.874	1.933
Kenya	0.747	0.880	1.264	1.183	1.747	1.014	1.228	2.466	1.820
Sierra Leone	0.745	0.880	1.262	1.182	1.727	1.014	1.226	2.391	1.796
Nepal	0.750	0.881	1.268	1.185	1.776	1.014	1.230	2.586	1.856
Congo	0.733	0.877	1.250	1.176	1.646	1.014	1.217	2.122	1.700
Senegal	0.733	0.877	1.250	1.176	1.643	1.014	1.217	2.115	1.697
Vietnam	0.737	0.878	1.254	1.178	1.670	1.014	1.220	2.197	1.728
Bangladesh	0.733	0.877	1.251	1.176	1.647	1.014	1.217	2.127	1.702
Pakistan	0.722	0.875	1.242	1.172	1.590	1.014	1.211	1.963	1.635
Uzbekistan	0.711	0.873	1.233	1.167	1.543	1.014	1.204	1.845	1.581
Kyrgyzstan	0.710	0.873	1.233	1.167	1.542	1.014	1.204	1.841	1.579
Cameroon	0.709	0.872	1.233	1.167	1.539	1.014	1.204	1.835	1.576
Moldova	0.707	0.872	1.231	1.166	1.531	1.014	1.203	1.817	1.567
Bolivia	0.706	0.872	1.230	1.166	1.527	1.014	1.202	1.805	1.562
Jordan	0.686	0.868	1.219	1.160	1.473	1.014	1.193	1.686	1.501
Indonesia	0.695	0.870	1.224	1.163	1.496	1.014	1.197	1.735	1.527
Jamaica	0.684	0.868	1.218	1.160	1.469	1.014	1.193	1.678	1.497
Guinea	0.679	0.867	1.216	1.158	1.459	1.014	1.191	1.656	1.485
Syria	0.676	0.866	1.215	1.158	1.452	1.014	1.190	1.643	1.478
<i>Middle-income countries:</i>									
Ukraine	0.654	0.863	1.206	1.153	1.416	1.014	1.183	1.572	1.437
Peru	0.651	0.862	1.205	1.152	1.412	1.014	1.182	1.565	1.433
Botswana	0.651	0.862	1.205	1.152	1.411	1.014	1.182	1.563	1.432
Thailand	0.665	0.864	1.210	1.155	1.432	1.014	1.186	1.604	1.456
Morocco	0.648	0.862	1.204	1.152	1.407	1.014	1.181	1.555	1.428
Venezuela	0.645	0.861	1.203	1.151	1.404	1.014	1.181	1.550	1.424
Macedonia	0.642	0.861	1.202	1.151	1.399	1.014	1.180	1.541	1.419
Belize	0.641	0.861	1.202	1.151	1.398	1.014	1.180	1.539	1.418
St. Vincent & Grenadines	0.640	0.861	1.202	1.150	1.397	1.014	1.180	1.538	1.417
Swaziland	0.631	0.859	1.199	1.149	1.387	1.014	1.177	1.518	1.405
Lebanon	0.630	0.859	1.198	1.149	1.386	1.014	1.177	1.516	1.404
Belarus	0.630	0.859	1.198	1.149	1.385	1.014	1.177	1.516	1.404
Kazakhstan	0.629	0.859	1.198	1.149	1.385	1.014	1.177	1.515	1.403
Dominica	0.629	0.859	1.198	1.149	1.384	1.014	1.177	1.514	1.403
Latvia	0.621	0.858	1.196	1.147	1.376	1.014	1.175	1.500	1.394
St. Lucia	0.620	0.858	1.196	1.147	1.375	1.014	1.175	1.498	1.393
Brazil	0.619	0.858	1.195	1.147	1.374	1.014	1.175	1.497	1.392
Bulgaria	0.615	0.857	1.194	1.146	1.370	1.014	1.174	1.490	1.388
Russia	0.610	0.856	1.193	1.146	1.366	1.014	1.173	1.482	1.382
Fiji	0.622	0.858	1.196	1.147	1.377	1.014	1.175	1.501	1.395
Grenada	0.608	0.856	1.193	1.145	1.365	1.014	1.173	1.480	1.381
Turkey	0.607	0.856	1.192	1.145	1.363	1.014	1.172	1.477	1.380
Lithuania	0.603	0.855	1.191	1.145	1.360	1.014	1.171	1.472	1.376
Romania	0.600	0.855	1.191	1.144	1.358	1.014	1.171	1.467	1.374
Mexico	0.589	0.854	1.188	1.143	1.349	1.014	1.169	1.453	1.364
Chile	0.583	0.853	1.187	1.142	1.345	1.014	1.168	1.447	1.360
Antigua & Barbuda	0.583	0.853	1.187	1.142	1.345	1.014	1.168	1.447	1.360
Poland	0.577	0.852	1.186	1.142	1.341	1.014	1.167	1.439	1.355
Trinidad & Tobago	0.571	0.851	1.185	1.141	1.337	1.014	1.166	1.433	1.351

*See notes at end of table.**Continued--*

Table A-4—Expenditure elasticity for aggregate consumption categories, 91 countries in 1996¹--Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Estonia	0.567	0.851	1.184	1.141	1.335	1.014	1.166	1.429	1.349
Gabon	0.560	0.850	1.183	1.140	1.331	1.014	1.165	1.422	1.344
Tunisia	0.559	0.850	1.183	1.140	1.330	1.014	1.164	1.422	1.344
St. Kitts & Nevis	0.558	0.850	1.182	1.140	1.329	1.014	1.164	1.421	1.343
Uruguay	0.555	0.850	1.182	1.139	1.328	1.014	1.164	1.419	1.342
Slovakia	0.555	0.849	1.182	1.139	1.328	1.014	1.164	1.418	1.341
Hungary	0.538	0.848	1.179	1.138	1.319	1.013	1.162	1.404	1.332
Argentina	0.515	0.845	1.176	1.136	1.309	1.013	1.159	1.388	1.321
Oman	0.502	0.844	1.174	1.135	1.304	1.013	1.158	1.380	1.315
Qatar	0.486	0.842	1.173	1.134	1.299	1.013	1.156	1.371	1.310
Slovenia	0.481	0.842	1.172	1.133	1.297	1.013	1.156	1.369	1.308
<i>High-income countries:</i>									
Czech Republic	0.451	0.839	1.169	1.131	1.288	1.013	1.153	1.355	1.298
Greece	0.439	0.838	1.168	1.131	1.285	1.013	1.152	1.350	1.295
Korea	0.473	0.841	1.171	1.133	1.294	1.013	1.155	1.365	1.305
Portugal	0.437	0.838	1.168	1.131	1.284	1.013	1.152	1.349	1.294
Spain	0.428	0.837	1.167	1.130	1.282	1.013	1.152	1.346	1.292
Ireland	0.418	0.836	1.166	1.130	1.280	1.013	1.151	1.342	1.289
Singapore	0.446	0.839	1.168	1.131	1.286	1.013	1.153	1.353	1.297
Mauritius	0.395	0.835	1.164	1.129	1.274	1.013	1.149	1.335	1.284
Israel	0.392	0.834	1.164	1.129	1.274	1.013	1.149	1.334	1.283
New Zealand	0.387	0.834	1.164	1.128	1.273	1.013	1.149	1.333	1.282
Finland	0.387	0.834	1.164	1.128	1.273	1.013	1.149	1.332	1.282
Sweden	0.354	0.832	1.161	1.127	1.267	1.013	1.147	1.323	1.276
Netherlands	0.349	0.831	1.161	1.127	1.266	1.013	1.147	1.322	1.275
France	0.324	0.830	1.160	1.126	1.262	1.013	1.146	1.317	1.271
United Kingdom	0.322	0.830	1.160	1.126	1.262	1.013	1.145	1.316	1.270
Belgium	0.317	0.829	1.159	1.126	1.261	1.013	1.145	1.315	1.269
Norway	0.316	0.829	1.159	1.126	1.261	1.013	1.145	1.315	1.269
Italy	0.312	0.829	1.159	1.125	1.260	1.013	1.145	1.314	1.269
Austria	0.302	0.828	1.159	1.125	1.259	1.013	1.145	1.312	1.267
Germany	0.300	0.828	1.158	1.125	1.259	1.013	1.145	1.312	1.267
Australia	0.291	0.828	1.158	1.125	1.257	1.013	1.144	1.310	1.266
Japan	0.284	0.827	1.158	1.125	1.257	1.013	1.144	1.309	1.265
Canada	0.275	0.827	1.157	1.124	1.255	1.013	1.143	1.307	1.263
Bermuda	0.252	0.826	1.156	1.124	1.253	1.013	1.143	1.303	1.260
Switzerland	0.248	0.825	1.156	1.123	1.252	1.013	1.142	1.302	1.260
Barbados	0.243	0.825	1.156	1.123	1.252	1.013	1.142	1.301	1.259
Iceland	0.242	0.825	1.156	1.123	1.251	1.013	1.142	1.301	1.259
Denmark	0.237	0.825	1.156	1.123	1.251	1.013	1.142	1.300	1.259
Luxembourg	0.112	0.819	1.151	1.120	1.240	1.013	1.138	1.285	1.247
United States	0.089	0.818	1.151	1.120	1.238	1.013	1.138	1.282	1.245
<i>Low-income average</i>	0.722	0.875	1.246	1.174	1.645	1.014	1.214	2.334	1.704
<i>Middle-income average</i>	0.597	0.855	1.192	1.145	1.363	1.014	1.172	1.478	1.379
<i>High-income average</i>	0.327	0.831	1.161	1.126	1.265	1.013	1.146	1.321	1.274

¹Countries are reported based on ascending per capita real income levels.

Table A-5—Frisch own-price elasticity for aggregate consumption categories, 91 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Low-income countries:</i>									
Zambia	-0.650	-0.744	-1.094	-1.008	-1.833	-0.851	-1.054	-5.325	-1.996
Mali	-0.645	-0.743	-1.085	-1.004	-1.711	-0.851	-1.048	-3.593	-1.835
Benin	-0.635	-0.740	-1.070	-0.997	-1.543	-0.851	-1.037	-2.411	-1.622
Kenya	-0.627	-0.738	-1.061	-0.992	-1.465	-0.851	-1.030	-2.069	-1.527
Sierra Leone	-0.625	-0.738	-1.058	-0.991	-1.449	-0.851	-1.028	-2.006	-1.506
Nepal	-0.630	-0.739	-1.064	-0.994	-1.490	-0.851	-1.032	-2.169	-1.557
Congo	-0.615	-0.736	-1.049	-0.987	-1.381	-0.850	-1.021	-1.780	-1.426
Senegal	-0.615	-0.736	-1.049	-0.986	-1.379	-0.850	-1.021	-1.774	-1.424
Vietnam	-0.618	-0.737	-1.052	-0.988	-1.401	-0.850	-1.023	-1.843	-1.450
Bangladesh	-0.615	-0.736	-1.049	-0.987	-1.382	-0.850	-1.021	-1.784	-1.427
Pakistan	-0.606	-0.734	-1.042	-0.983	-1.334	-0.850	-1.016	-1.647	-1.371
Uzbekistan	-0.596	-0.732	-1.035	-0.979	-1.295	-0.850	-1.010	-1.547	-1.326
Kyrgyzstan	-0.596	-0.732	-1.034	-0.979	-1.293	-0.850	-1.010	-1.545	-1.325
Cameroon	-0.595	-0.732	-1.034	-0.979	-1.291	-0.850	-1.010	-1.539	-1.322
Moldova	-0.593	-0.731	-1.033	-0.978	-1.285	-0.850	-1.009	-1.524	-1.315
Bolivia	-0.592	-0.731	-1.032	-0.978	-1.281	-0.850	-1.008	-1.515	-1.310
Jordan	-0.575	-0.728	-1.023	-0.973	-1.236	-0.850	-1.001	-1.415	-1.259
Indonesia	-0.583	-0.730	-1.027	-0.975	-1.255	-0.850	-1.004	-1.456	-1.281
Jamaica	-0.574	-0.728	-1.022	-0.973	-1.232	-0.850	-1.001	-1.407	-1.256
Guinea	-0.570	-0.727	-1.020	-0.972	-1.224	-0.850	-0.999	-1.390	-1.246
Syria	-0.567	-0.727	-1.019	-0.971	-1.218	-0.850	-0.998	-1.378	-1.240
<i>Middle-income countries:</i>									
Ukraine	-0.549	-0.724	-1.012	-0.967	-1.188	-0.850	-0.993	-1.318	-1.206
Peru	-0.546	-0.723	-1.011	-0.967	-1.184	-0.850	-0.992	-1.313	-1.202
Botswana	-0.546	-0.723	-1.011	-0.967	-1.184	-0.850	-0.992	-1.312	-1.202
Thailand	-0.558	-0.725	-1.015	-0.969	-1.202	-0.850	-0.995	-1.346	-1.221
Morocco	-0.543	-0.723	-1.010	-0.966	-1.180	-0.850	-0.991	-1.305	-1.198
Venezuela	-0.541	-0.723	-1.009	-0.966	-1.178	-0.850	-0.991	-1.300	-1.195
Macedonia	-0.538	-0.722	-1.008	-0.965	-1.174	-0.850	-0.990	-1.293	-1.191
Belize	-0.538	-0.722	-1.008	-0.965	-1.173	-0.850	-0.990	-1.292	-1.190
St. Vincent & Grenadines	-0.537	-0.722	-1.008	-0.965	-1.172	-0.850	-0.990	-1.290	-1.189
Swaziland	-0.529	-0.721	-1.006	-0.964	-1.163	-0.850	-0.988	-1.274	-1.179
Lebanon	-0.528	-0.721	-1.005	-0.964	-1.162	-0.850	-0.987	-1.272	-1.178
Belarus	-0.528	-0.721	-1.005	-0.964	-1.162	-0.850	-0.987	-1.272	-1.178
Kazakhstan	-0.528	-0.721	-1.005	-0.964	-1.162	-0.850	-0.987	-1.271	-1.177
Dominica	-0.528	-0.721	-1.005	-0.964	-1.161	-0.850	-0.987	-1.270	-1.177
Latvia	-0.521	-0.720	-1.003	-0.962	-1.155	-0.850	-0.986	-1.258	-1.169
St. Lucia	-0.520	-0.719	-1.003	-0.962	-1.154	-0.850	-0.986	-1.256	-1.168
Brazil	-0.519	-0.719	-1.003	-0.962	-1.153	-0.850	-0.985	-1.256	-1.168
Bulgaria	-0.516	-0.719	-1.002	-0.962	-1.150	-0.850	-0.985	-1.250	-1.164
Russia	-0.511	-0.718	-1.001	-0.961	-1.146	-0.850	-0.984	-1.243	-1.160
Fiji	-0.522	-0.720	-1.004	-0.963	-1.155	-0.850	-0.986	-1.259	-1.170
Grenada	-0.510	-0.718	-1.001	-0.961	-1.145	-0.850	-0.984	-1.241	-1.159
Turkey	-0.509	-0.718	-1.000	-0.961	-1.144	-0.850	-0.983	-1.239	-1.158
Lithuania	-0.506	-0.718	-1.000	-0.960	-1.141	-0.850	-0.983	-1.235	-1.154
Romania	-0.503	-0.717	-0.999	-0.960	-1.139	-0.850	-0.982	-1.231	-1.152
Mexico	-0.494	-0.716	-0.997	-0.959	-1.132	-0.850	-0.981	-1.219	-1.145
Chile	-0.489	-0.715	-0.996	-0.958	-1.129	-0.850	-0.980	-1.214	-1.141
Antigua & Barbuda	-0.489	-0.715	-0.996	-0.958	-1.129	-0.850	-0.980	-1.214	-1.141
Poland	-0.484	-0.715	-0.995	-0.958	-1.125	-0.850	-0.979	-1.208	-1.137
Trinidad & Tobago	-0.479	-0.714	-0.994	-0.957	-1.122	-0.850	-0.978	-1.202	-1.134

*See notes at end of table.**Continued--*

Table A-5—Frisch own-price elasticity for aggregate consumption categories, 91 countries in 1996¹--Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Estonia	-0.476	-0.714	-0.993	-0.957	-1.120	-0.850	-0.978	-1.199	-1.132
Gabon	-0.470	-0.713	-0.992	-0.956	-1.116	-0.850	-0.977	-1.193	-1.128
Tunisia	-0.469	-0.713	-0.992	-0.956	-1.116	-0.850	-0.977	-1.193	-1.127
St. Kitts & Nevis	-0.468	-0.713	-0.992	-0.956	-1.115	-0.850	-0.977	-1.192	-1.127
Uruguay	-0.466	-0.713	-0.992	-0.956	-1.114	-0.850	-0.976	-1.190	-1.126
Slovakia	-0.465	-0.713	-0.992	-0.956	-1.114	-0.850	-0.976	-1.189	-1.125
Hungary	-0.451	-0.711	-0.989	-0.954	-1.107	-0.850	-0.975	-1.178	-1.117
Argentina	-0.432	-0.709	-0.987	-0.953	-1.098	-0.850	-0.972	-1.164	-1.108
Oman	-0.421	-0.708	-0.985	-0.952	-1.094	-0.850	-0.971	-1.158	-1.104
Qatar	-0.408	-0.707	-0.984	-0.951	-1.089	-0.850	-0.970	-1.150	-1.099
Slovenia	-0.404	-0.706	-0.983	-0.951	-1.088	-0.850	-0.970	-1.148	-1.097
<i>High-income countries:</i>									
Czech Republic	-0.379	-0.704	-0.981	-0.949	-1.080	-0.850	-0.967	-1.137	-1.089
Greece	-0.368	-0.703	-0.980	-0.949	-1.078	-0.850	-0.967	-1.133	-1.086
Korea	-0.397	-0.706	-0.983	-0.950	-1.086	-0.850	-0.969	-1.145	-1.095
Portugal	-0.367	-0.703	-0.980	-0.949	-1.077	-0.850	-0.967	-1.132	-1.086
Spain	-0.359	-0.702	-0.979	-0.948	-1.075	-0.850	-0.966	-1.129	-1.084
Ireland	-0.351	-0.702	-0.978	-0.948	-1.073	-0.850	-0.965	-1.126	-1.082
Singapore	-0.374	-0.704	-0.980	-0.949	-1.079	-0.850	-0.967	-1.135	-1.088
Mauritius	-0.331	-0.700	-0.977	-0.947	-1.069	-0.850	-0.964	-1.120	-1.077
Israel	-0.329	-0.700	-0.977	-0.947	-1.069	-0.850	-0.964	-1.119	-1.077
New Zealand	-0.325	-0.700	-0.976	-0.947	-1.068	-0.850	-0.964	-1.118	-1.076
Finland	-0.324	-0.700	-0.976	-0.947	-1.068	-0.850	-0.964	-1.118	-1.076
Sweden	-0.297	-0.698	-0.974	-0.945	-1.063	-0.850	-0.962	-1.110	-1.070
Netherlands	-0.293	-0.697	-0.974	-0.945	-1.062	-0.850	-0.962	-1.109	-1.069
France	-0.272	-0.696	-0.973	-0.944	-1.059	-0.850	-0.961	-1.105	-1.066
United Kingdom	-0.270	-0.696	-0.973	-0.944	-1.058	-0.850	-0.961	-1.104	-1.066
Belgium	-0.266	-0.696	-0.973	-0.944	-1.058	-0.850	-0.961	-1.103	-1.065
Norway	-0.265	-0.696	-0.973	-0.944	-1.058	-0.850	-0.961	-1.103	-1.065
Italy	-0.262	-0.695	-0.972	-0.944	-1.057	-0.850	-0.961	-1.102	-1.064
Austria	-0.253	-0.695	-0.972	-0.944	-1.056	-0.850	-0.960	-1.101	-1.063
Germany	-0.252	-0.695	-0.972	-0.944	-1.056	-0.850	-0.960	-1.100	-1.063
Australia	-0.244	-0.694	-0.971	-0.944	-1.055	-0.850	-0.960	-1.099	-1.062
Japan	-0.238	-0.694	-0.971	-0.943	-1.054	-0.850	-0.960	-1.098	-1.061
Canada	-0.231	-0.694	-0.971	-0.943	-1.053	-0.850	-0.959	-1.096	-1.060
Bermuda	-0.211	-0.693	-0.970	-0.943	-1.051	-0.850	-0.959	-1.093	-1.057
Switzerland	-0.208	-0.692	-0.970	-0.943	-1.050	-0.850	-0.958	-1.092	-1.057
Barbados	-0.204	-0.692	-0.970	-0.942	-1.050	-0.850	-0.958	-1.092	-1.056
Iceland	-0.203	-0.692	-0.970	-0.942	-1.050	-0.850	-0.958	-1.092	-1.056
Denmark	-0.199	-0.692	-0.969	-0.942	-1.049	-0.850	-0.958	-1.091	-1.056
Luxembourg	-0.094	-0.687	-0.966	-0.940	-1.040	-0.850	-0.955	-1.078	-1.046
United States	-0.075	-0.686	-0.965	-0.940	-1.039	-0.850	-0.955	-1.076	-1.045
<i>Low-income average</i>	-0.606	-0.734	-1.045	-0.984	-1.380	-0.850	-1.018	-1.958	-1.430
<i>Middle-income average</i>	-0.501	-0.717	-1.000	-0.960	-1.143	-0.850	-0.983	-1.240	-1.157
<i>High-income average</i>	-0.275	-0.697	-0.974	-0.945	-1.061	-0.850	-0.962	-1.109	-1.069

¹Countries are reported based on ascending per capita real income levels.

Table A-6—Slutsky own-price elasticity for aggregate consumption categories, 91 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Low-income countries:</i>									
Zambia	-0.355	-0.687	-0.966	-0.955	-1.743	-0.792	-0.959	-5.189	-1.866
Mali	-0.362	-0.686	-0.955	-0.950	-1.622	-0.792	-0.951	-3.492	-1.707
Benin	-0.375	-0.686	-0.934	-0.942	-1.453	-0.792	-0.936	-2.331	-1.495
Kenya	-0.383	-0.685	-0.922	-0.936	-1.374	-0.792	-0.927	-1.993	-1.398
Sierra Leone	-0.385	-0.685	-0.919	-0.935	-1.357	-0.792	-0.925	-1.931	-1.378
Nepal	-0.380	-0.685	-0.926	-0.938	-1.399	-0.792	-0.930	-2.093	-1.429
Congo	-0.393	-0.684	-0.906	-0.929	-1.287	-0.792	-0.915	-1.708	-1.295
Senegal	-0.393	-0.684	-0.905	-0.929	-1.285	-0.792	-0.915	-1.702	-1.293
Vietnam	-0.390	-0.684	-0.910	-0.931	-1.308	-0.792	-0.918	-1.770	-1.320
Bangladesh	-0.392	-0.684	-0.906	-0.929	-1.288	-0.792	-0.916	-1.711	-1.297
Pakistan	-0.398	-0.684	-0.895	-0.924	-1.238	-0.792	-0.908	-1.575	-1.238
Uzbekistan	-0.403	-0.683	-0.885	-0.920	-1.197	-0.791	-0.900	-1.474	-1.190
Kyrgyzstan	-0.404	-0.683	-0.885	-0.920	-1.195	-0.791	-0.900	-1.472	-1.188
Cameroon	-0.404	-0.683	-0.884	-0.919	-1.193	-0.791	-0.899	-1.466	-1.185
Moldova	-0.405	-0.683	-0.883	-0.919	-1.186	-0.791	-0.898	-1.451	-1.178
Bolivia	-0.405	-0.682	-0.881	-0.918	-1.182	-0.791	-0.897	-1.441	-1.173
Jordan	-0.410	-0.681	-0.868	-0.912	-1.133	-0.791	-0.887	-1.340	-1.117
Indonesia	-0.408	-0.682	-0.874	-0.914	-1.154	-0.791	-0.892	-1.381	-1.141
Jamaica	-0.410	-0.681	-0.866	-0.911	-1.129	-0.791	-0.886	-1.332	-1.113
Guinea	-0.411	-0.681	-0.863	-0.910	-1.120	-0.791	-0.884	-1.314	-1.102
Syria	-0.411	-0.680	-0.862	-0.909	-1.114	-0.791	-0.882	-1.302	-1.095
<i>Middle-income countries:</i>									
Ukraine	-0.412	-0.679	-0.850	-0.904	-1.080	-0.791	-0.874	-1.240	-1.056
Peru	-0.412	-0.679	-0.849	-0.903	-1.076	-0.791	-0.873	-1.234	-1.052
Botswana	-0.412	-0.679	-0.849	-0.903	-1.076	-0.791	-0.873	-1.233	-1.051
Thailand	-0.412	-0.680	-0.856	-0.906	-1.096	-0.791	-0.878	-1.269	-1.074
Morocco	-0.412	-0.679	-0.847	-0.902	-1.071	-0.791	-0.872	-1.226	-1.046
Venezuela	-0.412	-0.679	-0.846	-0.902	-1.069	-0.791	-0.871	-1.221	-1.043
Macedonia	-0.411	-0.678	-0.844	-0.901	-1.064	-0.791	-0.870	-1.213	-1.038
Belize	-0.411	-0.678	-0.844	-0.901	-1.063	-0.791	-0.869	-1.212	-1.037
St. Vincent & Grenadines	-0.411	-0.678	-0.844	-0.901	-1.063	-0.791	-0.869	-1.211	-1.036
Swaziland	-0.410	-0.678	-0.840	-0.899	-1.052	-0.791	-0.866	-1.193	-1.024
Lebanon	-0.410	-0.678	-0.840	-0.899	-1.051	-0.791	-0.866	-1.191	-1.023
Belarus	-0.410	-0.678	-0.839	-0.899	-1.051	-0.791	-0.866	-1.191	-1.023
Kazakhstan	-0.410	-0.677	-0.839	-0.899	-1.050	-0.791	-0.866	-1.190	-1.022
Dominica	-0.410	-0.677	-0.839	-0.899	-1.050	-0.791	-0.866	-1.190	-1.022
Latvia	-0.409	-0.677	-0.836	-0.897	-1.042	-0.791	-0.863	-1.177	-1.013
St. Lucia	-0.408	-0.677	-0.836	-0.897	-1.041	-0.791	-0.863	-1.175	-1.012
Brazil	-0.408	-0.677	-0.835	-0.897	-1.040	-0.791	-0.863	-1.174	-1.011
Bulgaria	-0.407	-0.677	-0.834	-0.896	-1.036	-0.791	-0.862	-1.168	-1.006
Russia	-0.406	-0.676	-0.832	-0.895	-1.032	-0.791	-0.860	-1.160	-1.001
Fiji	-0.409	-0.677	-0.836	-0.897	-1.043	-0.791	-0.864	-1.178	-1.014
Grenada	-0.406	-0.676	-0.832	-0.895	-1.031	-0.791	-0.860	-1.159	-1.000
Turkey	-0.406	-0.676	-0.831	-0.895	-1.030	-0.791	-0.860	-1.157	-0.999
Lithuania	-0.405	-0.676	-0.830	-0.894	-1.026	-0.791	-0.859	-1.151	-0.995
Romania	-0.404	-0.676	-0.829	-0.894	-1.024	-0.791	-0.858	-1.148	-0.992
Mexico	-0.401	-0.675	-0.825	-0.892	-1.015	-0.790	-0.855	-1.135	-0.983
Chile	-0.399	-0.675	-0.824	-0.891	-1.012	-0.790	-0.854	-1.129	-0.978
Antigua & Barbuda	-0.399	-0.675	-0.823	-0.891	-1.011	-0.790	-0.854	-1.129	-0.978
Poland	-0.397	-0.674	-0.822	-0.890	-1.007	-0.790	-0.852	-1.122	-0.973
Trinidad & Tobago	-0.395	-0.674	-0.820	-0.889	-1.003	-0.790	-0.851	-1.116	-0.969

*See notes at end of table.**Continued--*

Table A-6—Slutsky own-price elasticity for aggregate consumption categories, 91 countries in 1996¹--Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communi- cation	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Estonia	-0.394	-0.674	-0.819	-0.889	-1.001	-0.790	-0.850	-1.113	-0.966
Gabon	-0.391	-0.673	-0.817	-0.888	-0.997	-0.790	-0.849	-1.107	-0.961
Tunisia	-0.391	-0.673	-0.817	-0.888	-0.996	-0.790	-0.849	-1.106	-0.961
St. Kitts & Nevis	-0.390	-0.673	-0.816	-0.888	-0.995	-0.790	-0.849	-1.105	-0.960
Uruguay	-0.389	-0.673	-0.816	-0.888	-0.994	-0.790	-0.848	-1.103	-0.958
Slovakia	-0.389	-0.673	-0.816	-0.887	-0.994	-0.790	-0.848	-1.102	-0.958
Hungary	-0.382	-0.672	-0.812	-0.886	-0.985	-0.790	-0.845	-1.089	-0.948
Argentina	-0.371	-0.671	-0.807	-0.883	-0.974	-0.790	-0.841	-1.074	-0.936
Oman	-0.365	-0.670	-0.804	-0.882	-0.969	-0.790	-0.839	-1.067	-0.930
Qatar	-0.357	-0.670	-0.801	-0.881	-0.963	-0.790	-0.837	-1.059	-0.923
Slovenia	-0.354	-0.669	-0.800	-0.880	-0.961	-0.790	-0.836	-1.056	-0.921
<i>High-income countries:</i>									
Czech Republic	-0.338	-0.668	-0.795	-0.878	-0.952	-0.790	-0.833	-1.043	-0.910
Greece	-0.330	-0.667	-0.794	-0.877	-0.948	-0.790	-0.831	-1.038	-0.906
Korea	-0.350	-0.669	-0.799	-0.880	-0.959	-0.790	-0.835	-1.053	-0.918
Portugal	-0.329	-0.667	-0.793	-0.877	-0.948	-0.790	-0.831	-1.038	-0.905
Spain	-0.324	-0.667	-0.792	-0.876	-0.945	-0.790	-0.830	-1.034	-0.902
Ireland	-0.318	-0.666	-0.791	-0.876	-0.943	-0.790	-0.829	-1.031	-0.899
Singapore	-0.335	-0.668	-0.795	-0.878	-0.950	-0.790	-0.832	-1.041	-0.908
Mauritius	-0.303	-0.665	-0.788	-0.874	-0.937	-0.790	-0.827	-1.023	-0.893
Israel	-0.301	-0.665	-0.787	-0.874	-0.936	-0.790	-0.827	-1.023	-0.892
New Zealand	-0.298	-0.665	-0.787	-0.874	-0.935	-0.790	-0.826	-1.021	-0.891
Finland	-0.297	-0.665	-0.787	-0.874	-0.935	-0.790	-0.826	-1.021	-0.891
Sweden	-0.275	-0.664	-0.783	-0.872	-0.928	-0.790	-0.823	-1.012	-0.883
Netherlands	-0.272	-0.664	-0.782	-0.872	-0.927	-0.790	-0.823	-1.011	-0.882
France	-0.255	-0.663	-0.780	-0.871	-0.923	-0.790	-0.821	-1.005	-0.877
United Kingdom	-0.253	-0.663	-0.780	-0.871	-0.923	-0.790	-0.821	-1.005	-0.876
Belgium	-0.249	-0.663	-0.779	-0.870	-0.922	-0.790	-0.821	-1.004	-0.875
Norway	-0.249	-0.662	-0.779	-0.870	-0.922	-0.790	-0.820	-1.004	-0.875
Italy	-0.246	-0.662	-0.779	-0.870	-0.921	-0.790	-0.820	-1.003	-0.874
Austria	-0.239	-0.662	-0.778	-0.870	-0.919	-0.790	-0.820	-1.001	-0.872
Germany	-0.238	-0.662	-0.778	-0.870	-0.919	-0.790	-0.819	-1.000	-0.872
Australia	-0.231	-0.662	-0.777	-0.869	-0.918	-0.789	-0.819	-0.998	-0.870
Japan	-0.226	-0.661	-0.776	-0.869	-0.917	-0.789	-0.818	-0.997	-0.869
Canada	-0.219	-0.661	-0.776	-0.869	-0.915	-0.789	-0.818	-0.996	-0.868
Bermuda	-0.202	-0.660	-0.774	-0.868	-0.912	-0.789	-0.816	-0.992	-0.864
Switzerland	-0.199	-0.660	-0.773	-0.868	-0.912	-0.789	-0.816	-0.991	-0.863
Barbados	-0.195	-0.660	-0.773	-0.868	-0.911	-0.789	-0.816	-0.990	-0.863
Iceland	-0.194	-0.660	-0.773	-0.867	-0.911	-0.789	-0.816	-0.990	-0.862
Denmark	-0.191	-0.660	-0.773	-0.867	-0.910	-0.789	-0.816	-0.989	-0.862
Luxembourg	-0.093	-0.656	-0.765	-0.864	-0.897	-0.789	-0.810	-0.973	-0.846
United States	-0.074	-0.656	-0.764	-0.863	-0.895	-0.789	-0.809	-0.970	-0.844
<i>Low-income average</i>	-0.394	-0.683	-0.900	-0.926	-1.284	-0.792	-0.911	-1.879	-1.295
<i>Middle-income average</i>	-0.400	-0.676	-0.830	-0.894	-1.028	-0.791	-0.859	-1.157	-0.997
<i>High-income average</i>	-0.254	-0.663	-0.782	-0.871	-0.926	-0.790	-0.822	-1.010	-0.880

¹Countries are reported based on ascending per capita real income levels.

Table A-7—Cournot own-price elasticity for aggregate consumption categories, 91 countries in 1996¹

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Low-income countries:</i>									
Zambia	-0.809	-0.764	-1.083	-1.007	-1.792	-0.861	-1.049	-5.214	-1.931
Mali	-0.801	-0.762	-1.075	-1.003	-1.674	-0.861	-1.043	-3.520	-1.777
Benin	-0.784	-0.759	-1.061	-0.997	-1.512	-0.861	-1.033	-2.364	-1.573
Kenya	-0.772	-0.757	-1.053	-0.993	-1.436	-0.861	-1.027	-2.030	-1.482
Sierra Leone	-0.769	-0.757	-1.051	-0.992	-1.420	-0.861	-1.025	-1.968	-1.463
Nepal	-0.776	-0.758	-1.055	-0.994	-1.460	-0.861	-1.029	-2.128	-1.511
Congo	-0.754	-0.754	-1.042	-0.987	-1.355	-0.861	-1.019	-1.748	-1.387
Senegal	-0.754	-0.754	-1.042	-0.987	-1.353	-0.861	-1.019	-1.743	-1.385
Vietnam	-0.759	-0.755	-1.045	-0.989	-1.374	-0.861	-1.021	-1.809	-1.409
Bangladesh	-0.755	-0.754	-1.042	-0.987	-1.356	-0.861	-1.019	-1.752	-1.388
Pakistan	-0.741	-0.752	-1.036	-0.984	-1.310	-0.861	-1.014	-1.619	-1.335
Uzbekistan	-0.727	-0.750	-1.030	-0.981	-1.272	-0.861	-1.009	-1.522	-1.293
Kyrgyzstan	-0.726	-0.750	-1.029	-0.981	-1.271	-0.861	-1.009	-1.519	-1.291
Cameroon	-0.725	-0.750	-1.029	-0.980	-1.269	-0.861	-1.009	-1.514	-1.289
Moldova	-0.723	-0.749	-1.028	-0.980	-1.263	-0.861	-1.008	-1.499	-1.282
Bolivia	-0.721	-0.749	-1.027	-0.979	-1.259	-0.861	-1.007	-1.490	-1.278
Jordan	-0.697	-0.746	-1.019	-0.975	-1.216	-0.861	-1.001	-1.393	-1.230
Indonesia	-0.708	-0.747	-1.023	-0.977	-1.234	-0.861	-1.004	-1.432	-1.250
Jamaica	-0.695	-0.745	-1.019	-0.975	-1.213	-0.861	-1.001	-1.386	-1.226
Guinea	-0.690	-0.745	-1.017	-0.974	-1.205	-0.861	-0.999	-1.368	-1.217
Syria	-0.686	-0.744	-1.016	-0.973	-1.199	-0.861	-0.998	-1.357	-1.212
<i>Middle-income countries:</i>									
Ukraine	-0.661	-0.741	-1.010	-0.969	-1.170	-0.861	-0.993	-1.300	-1.180
Peru	-0.658	-0.740	-1.009	-0.969	-1.168	-0.861	-0.993	-1.294	-1.177
Botswana	-0.657	-0.740	-1.009	-0.969	-1.167	-0.861	-0.993	-1.293	-1.176
Thailand	-0.673	-0.742	-1.013	-0.971	-1.184	-0.861	-0.996	-1.326	-1.195
Morocco	-0.654	-0.740	-1.008	-0.968	-1.164	-0.861	-0.992	-1.286	-1.173
Venezuela	-0.651	-0.740	-1.008	-0.968	-1.161	-0.861	-0.992	-1.282	-1.170
Macedonia	-0.647	-0.739	-1.007	-0.968	-1.158	-0.861	-0.991	-1.275	-1.166
Belize	-0.646	-0.739	-1.007	-0.968	-1.157	-0.861	-0.991	-1.274	-1.165
St. Vincent & Grenadines	-0.646	-0.739	-1.007	-0.967	-1.156	-0.861	-0.991	-1.272	-1.165
Swaziland	-0.635	-0.738	-1.005	-0.966	-1.148	-0.861	-0.989	-1.257	-1.156
Lebanon	-0.634	-0.737	-1.005	-0.966	-1.147	-0.861	-0.989	-1.255	-1.155
Belarus	-0.634	-0.737	-1.004	-0.966	-1.147	-0.861	-0.989	-1.255	-1.154
Kazakhstan	-0.633	-0.737	-1.004	-0.966	-1.146	-0.861	-0.989	-1.254	-1.154
Dominica	-0.633	-0.737	-1.004	-0.966	-1.146	-0.861	-0.989	-1.253	-1.154
Latvia	-0.624	-0.736	-1.003	-0.965	-1.140	-0.861	-0.988	-1.242	-1.147
St. Lucia	-0.623	-0.736	-1.003	-0.965	-1.139	-0.861	-0.987	-1.240	-1.146
Brazil	-0.622	-0.736	-1.002	-0.965	-1.138	-0.861	-0.987	-1.239	-1.145
Bulgaria	-0.618	-0.735	-1.002	-0.964	-1.135	-0.861	-0.987	-1.233	-1.142
Russia	-0.612	-0.735	-1.001	-0.964	-1.131	-0.861	-0.986	-1.227	-1.138
Fiji	-0.625	-0.736	-1.003	-0.965	-1.140	-0.861	-0.988	-1.243	-1.147
Grenada	-0.611	-0.735	-1.001	-0.964	-1.130	-0.861	-0.986	-1.225	-1.137
Turkey	-0.609	-0.734	-1.000	-0.963	-1.129	-0.861	-0.986	-1.223	-1.136
Lithuania	-0.605	-0.734	-1.000	-0.963	-1.127	-0.861	-0.985	-1.219	-1.133
Romania	-0.601	-0.734	-0.999	-0.963	-1.125	-0.861	-0.985	-1.215	-1.131
Mexico	-0.590	-0.732	-0.997	-0.962	-1.118	-0.861	-0.983	-1.204	-1.124
Chile	-0.584	-0.732	-0.997	-0.961	-1.115	-0.861	-0.983	-1.199	-1.121
Antigua & Barbuda	-0.583	-0.732	-0.997	-0.961	-1.115	-0.861	-0.982	-1.199	-1.121
Poland	-0.577	-0.731	-0.996	-0.961	-1.112	-0.861	-0.982	-1.193	-1.117
Trinidad & Tobago	-0.570	-0.730	-0.995	-0.960	-1.109	-0.861	-0.981	-1.188	-1.114

*See notes at end of table.**Continued--*

Table A-7—Cournot own-price elasticity for aggregate consumption categories, 91 countries in 1996¹—Continued

Country	Food, beverages & tobacco	Clothing & footwear	Gross rent, fuel & power	House oper- ations	Medical care	Edu- cation	Transport & communic- ation	Rec- reation	Other
<i>Middle-income countries--continued:</i>									
Estonia	-0.566	-0.730	-0.995	-0.960	-1.107	-0.861	-0.981	-1.185	-1.112
Gabon	-0.558	-0.729	-0.994	-0.959	-1.104	-0.861	-0.980	-1.179	-1.109
Tunisia	-0.558	-0.729	-0.994	-0.959	-1.104	-0.861	-0.980	-1.179	-1.109
St. Kitts & Nevis	-0.556	-0.729	-0.993	-0.959	-1.103	-0.861	-0.980	-1.178	-1.108
Uruguay	-0.554	-0.729	-0.993	-0.959	-1.102	-0.861	-0.980	-1.176	-1.107
Slovakia	-0.553	-0.729	-0.993	-0.959	-1.102	-0.861	-0.979	-1.176	-1.107
Hungary	-0.535	-0.727	-0.991	-0.958	-1.095	-0.861	-0.978	-1.164	-1.099
Argentina	-0.511	-0.725	-0.989	-0.956	-1.087	-0.861	-0.976	-1.152	-1.091
Oman	-0.498	-0.723	-0.988	-0.955	-1.083	-0.861	-0.975	-1.145	-1.087
Qatar	-0.482	-0.722	-0.987	-0.955	-1.079	-0.861	-0.974	-1.138	-1.083
Slovenia	-0.477	-0.722	-0.986	-0.954	-1.078	-0.861	-0.974	-1.137	-1.082
<i>High-income countries:</i>									
Czech Republic	-0.446	-0.719	-0.984	-0.953	-1.071	-0.861	-0.972	-1.126	-1.074
Greece	-0.434	-0.718	-0.984	-0.953	-1.068	-0.861	-0.971	-1.122	-1.072
Korea	-0.468	-0.721	-0.986	-0.954	-1.076	-0.861	-0.973	-1.133	-1.079
Portugal	-0.431	-0.718	-0.983	-0.952	-1.068	-0.861	-0.971	-1.121	-1.071
Spain	-0.422	-0.717	-0.983	-0.952	-1.066	-0.861	-0.971	-1.118	-1.070
Ireland	-0.412	-0.717	-0.982	-0.952	-1.064	-0.861	-0.970	-1.116	-1.068
Singapore	-0.441	-0.719	-0.984	-0.953	-1.070	-0.861	-0.972	-1.124	-1.073
Mauritius	-0.389	-0.715	-0.981	-0.951	-1.061	-0.861	-0.969	-1.110	-1.064
Israel	-0.386	-0.715	-0.981	-0.951	-1.060	-0.861	-0.969	-1.109	-1.063
New Zealand	-0.381	-0.715	-0.981	-0.951	-1.059	-0.861	-0.969	-1.108	-1.063
Finland	-0.381	-0.715	-0.981	-0.951	-1.059	-0.861	-0.969	-1.108	-1.063
Sweden	-0.347	-0.712	-0.979	-0.950	-1.055	-0.861	-0.968	-1.101	-1.058
Netherlands	-0.343	-0.712	-0.979	-0.949	-1.054	-0.861	-0.968	-1.100	-1.057
France	-0.318	-0.711	-0.978	-0.949	-1.051	-0.861	-0.967	-1.095	-1.054
United Kingdom	-0.316	-0.711	-0.978	-0.949	-1.051	-0.861	-0.967	-1.095	-1.054
Belgium	-0.310	-0.710	-0.978	-0.949	-1.050	-0.861	-0.966	-1.094	-1.053
Norway	-0.309	-0.710	-0.978	-0.949	-1.050	-0.861	-0.966	-1.094	-1.053
Italy	-0.306	-0.710	-0.978	-0.949	-1.050	-0.861	-0.966	-1.093	-1.053
Austria	-0.296	-0.709	-0.978	-0.948	-1.049	-0.861	-0.966	-1.091	-1.052
Germany	-0.294	-0.709	-0.977	-0.948	-1.049	-0.861	-0.966	-1.091	-1.052
Australia	-0.285	-0.709	-0.977	-0.948	-1.048	-0.861	-0.966	-1.090	-1.051
Japan	-0.278	-0.708	-0.977	-0.948	-1.047	-0.861	-0.966	-1.089	-1.050
Canada	-0.269	-0.708	-0.977	-0.948	-1.046	-0.861	-0.965	-1.087	-1.049
Bermuda	-0.246	-0.707	-0.976	-0.947	-1.044	-0.861	-0.965	-1.084	-1.047
Switzerland	-0.243	-0.707	-0.976	-0.947	-1.044	-0.861	-0.965	-1.084	-1.047
Barbados	-0.237	-0.706	-0.976	-0.947	-1.043	-0.861	-0.964	-1.083	-1.046
Iceland	-0.236	-0.706	-0.976	-0.947	-1.043	-0.861	-0.964	-1.083	-1.046
Denmark	-0.232	-0.706	-0.976	-0.947	-1.043	-0.861	-0.964	-1.083	-1.046
Luxembourg	-0.109	-0.701	-0.973	-0.945	-1.035	-0.861	-0.962	-1.070	-1.037
United States	-0.087	-0.700	-0.972	-0.945	-1.033	-0.861	-0.962	-1.068	-1.036
<i>Low-income average</i>	-0.742	-0.753	-1.039	-0.985	-1.354	-0.861	-1.016	-1.923	-1.391
<i>Middle-income average</i>	-0.599	-0.734	-1.000	-0.963	-1.129	-0.861	-0.985	-1.224	-1.136
<i>High-income average</i>	-0.322	-0.711	-0.979	-0.949	-1.054	-0.861	-0.967	-1.099	-1.057

¹Countries are reported based on ascending per capita real income levels.

Table A-8—Unconditional expenditure elasticity for food sub-categories, 91 countries in 1996¹

Country	Beverages & tobacco	Cereal	Meat	Fish	Dairy	Oils & Fats	Fruits & vegetables	Other food
<i>Low-income countries:</i>								
Zambia	1.483	0.618	0.835	0.927	0.874	0.581	0.674	0.832
Mali	1.610	0.616	0.825	0.920	0.865	0.582	0.668	0.822
Benin	1.317	0.593	0.813	0.896	0.848	0.552	0.653	0.810
Kenya	1.097	0.550	0.800	0.868	0.830	0.488	0.631	0.797
Sierra Leone	1.411	0.586	0.793	0.879	0.829	0.551	0.640	0.790
Nepal	1.568	0.600	0.804	0.896	0.842	0.567	0.651	0.801
Congo	1.169	0.558	0.780	0.854	0.812	0.513	0.623	0.777
Senegal	1.087	0.542	0.779	0.847	0.809	0.485	0.616	0.776
Vietnam	1.425	0.587	0.793	0.880	0.829	0.552	0.640	0.790
Bangladesh	1.124	0.550	0.779	0.850	0.810	0.499	0.620	0.777
Pakistan	1.071	0.534	0.768	0.835	0.798	0.478	0.608	0.766
Uzbekistan	1.157	0.546	0.759	0.832	0.791	0.503	0.607	0.756
Kyrgyzstan	1.132	0.542	0.758	0.831	0.790	0.497	0.605	0.756
Cameroon	1.172	0.548	0.759	0.834	0.791	0.506	0.608	0.756
Moldova	1.207	0.552	0.759	0.836	0.792	0.512	0.609	0.757
Bolivia	1.030	0.518	0.757	0.820	0.785	0.456	0.596	0.754
Jordan	0.910	0.442	0.733	0.784	0.757	0.323	0.560	0.731
Indonesia	1.007	0.506	0.736	0.798	0.763	0.447	0.580	0.733
Jamaica	0.992	0.498	0.725	0.786	0.752	0.441	0.572	0.723
Guinea	1.067	0.517	0.726	0.794	0.756	0.472	0.579	0.724
Syria	1.023	0.507	0.725	0.790	0.754	0.456	0.575	0.723
<i>Middle-income countries:</i>								
Ukraine	0.931	0.470	0.693	0.750	0.718	0.410	0.544	0.690
Peru	0.911	0.460	0.692	0.747	0.717	0.393	0.541	0.690
Botswana	0.971	0.483	0.693	0.754	0.720	0.433	0.549	0.691
Thailand	0.968	0.485	0.704	0.764	0.730	0.431	0.556	0.701
Morocco	0.902	0.455	0.692	0.746	0.716	0.384	0.540	0.690
Venezuela	0.966	0.482	0.693	0.754	0.720	0.431	0.549	0.691
Macedonia	0.897	0.453	0.681	0.735	0.706	0.387	0.533	0.679
Belize	0.889	0.449	0.681	0.734	0.705	0.379	0.531	0.679
St. Vincent, Grenadines	0.881	0.444	0.681	0.733	0.705	0.369	0.530	0.679
Swaziland	0.852	0.425	0.670	0.719	0.693	0.341	0.518	0.668
Lebanon	0.884	0.447	0.671	0.724	0.695	0.382	0.525	0.669
Belarus	0.873	0.440	0.670	0.723	0.694	0.370	0.523	0.669
Kazakhstan	1.002	0.481	0.673	0.737	0.701	0.441	0.537	0.671
Dominica	0.853	0.426	0.670	0.720	0.693	0.343	0.518	0.668
Latvia	0.823	0.404	0.659	0.705	0.680	0.306	0.506	0.657
St. Lucia	0.870	0.439	0.660	0.713	0.684	0.376	0.516	0.658
Brazil	0.866	0.437	0.660	0.712	0.684	0.372	0.516	0.658
Bulgaria	0.859	0.434	0.650	0.702	0.673	0.372	0.509	0.648
Russia	0.819	0.406	0.648	0.696	0.670	0.319	0.500	0.647
Fiji	0.868	0.439	0.660	0.712	0.684	0.374	0.516	0.658
Grenada	0.824	0.411	0.649	0.696	0.670	0.328	0.501	0.647
Turkey	0.824	0.411	0.649	0.696	0.670	0.328	0.501	0.647
Lithuania	0.819	0.411	0.638	0.686	0.660	0.337	0.495	0.636
Romania	0.807	0.401	0.638	0.684	0.659	0.317	0.492	0.636
Mexico	0.801	0.401	0.627	0.674	0.649	0.325	0.486	0.626
Chile	0.759	0.364	0.616	0.658	0.635	0.256	0.469	0.614
Antigua & Barbuda	0.811	0.410	0.617	0.666	0.640	0.349	0.483	0.616
Poland	0.795	0.400	0.617	0.664	0.638	0.330	0.479	0.615
Trinidad & Tobago	0.767	0.381	0.606	0.650	0.626	0.302	0.468	0.604

See notes at end of table.

Continued--

Table A-8—Unconditional expenditure elasticity for food sub-categories, 91 countries in 1996¹--Continued

Country	Beverages & tobacco	Cereal	Meat	Fish	Dairy	Oils & Fats	Fruits & vegetables	Other food
<i>Middle-income countries--continued:</i>								
Estonia	0.773	0.387	0.606	0.651	0.627	0.312	0.469	0.604
Gabon	0.729	0.344	0.594	0.634	0.613	0.230	0.451	0.593
Tunisia	0.771	0.388	0.596	0.642	0.617	0.323	0.464	0.594
St. Kitts & Nevis	0.756	0.377	0.595	0.639	0.616	0.301	0.460	0.594
Uruguay	0.804	0.405	0.597	0.646	0.619	0.355	0.469	0.595
Slovakia	0.746	0.373	0.585	0.628	0.605	0.301	0.453	0.583
Hungary	0.740	0.372	0.574	0.618	0.594	0.308	0.446	0.573
Argentina	0.659	0.305	0.541	0.577	0.558	0.189	0.409	0.540
Oman	0.665	0.327	0.531	0.569	0.549	0.248	0.408	0.530
Qatar	0.642	0.308	0.520	0.556	0.537	0.218	0.397	0.519
Slovenia	0.639	0.314	0.510	0.546	0.527	0.239	0.392	0.509
<i>High-income countries:</i>								
Czech Republic	0.586	0.278	0.478	0.510	0.493	0.188	0.363	0.476
Greece	0.570	0.266	0.467	0.498	0.481	0.170	0.353	0.466
Korea	0.626	0.308	0.499	0.535	0.516	0.235	0.384	0.498
Portugal	0.575	0.275	0.467	0.499	0.482	0.192	0.356	0.466
Spain	0.571	0.280	0.457	0.489	0.472	0.212	0.351	0.456
Ireland	0.547	0.259	0.446	0.476	0.460	0.175	0.339	0.445
Singapore	0.573	0.252	0.477	0.507	0.491	0.123	0.357	0.476
Mauritius	0.532	0.267	0.415	0.446	0.429	0.219	0.322	0.414
Israel	0.511	0.245	0.414	0.442	0.427	0.172	0.316	0.413
New Zealand	0.515	0.250	0.414	0.443	0.428	0.185	0.317	0.413
Finland	0.515	0.251	0.414	0.443	0.428	0.185	0.317	0.413
Sweden	0.461	0.224	0.372	0.398	0.384	0.163	0.284	0.371
Netherlands	0.457	0.218	0.372	0.397	0.383	0.150	0.283	0.371
France	0.413	0.191	0.340	0.362	0.350	0.119	0.256	0.339
United Kingdom	0.417	0.197	0.340	0.363	0.350	0.133	0.258	0.339
Belgium	0.416	0.196	0.340	0.362	0.350	0.129	0.258	0.339
Norway	0.419	0.200	0.340	0.363	0.351	0.140	0.259	0.339
Italy	0.403	0.189	0.329	0.351	0.339	0.125	0.249	0.328
Austria	0.389	0.182	0.318	0.340	0.328	0.118	0.241	0.318
Germany	0.389	0.182	0.318	0.340	0.328	0.118	0.241	0.318
Australia	0.374	0.173	0.308	0.328	0.317	0.107	0.232	0.307
Japan	0.369	0.179	0.297	0.318	0.307	0.130	0.227	0.297
Canada	0.356	0.172	0.287	0.307	0.296	0.126	0.219	0.286
Bermuda	0.317	0.136	0.265	0.282	0.273	0.059	0.197	0.264
Switzerland	0.320	0.143	0.265	0.282	0.273	0.077	0.199	0.264
Barbados	0.349	0.175	0.256	0.277	0.265	0.155	0.202	0.255
Iceland	0.309	0.142	0.255	0.271	0.262	0.086	0.192	0.254
Denmark	0.312	0.147	0.255	0.272	0.263	0.097	0.193	0.254
Luxembourg	0.138	0.056	0.117	0.124	0.120	0.013	0.086	0.116
United States	0.116	0.054	0.095	0.102	0.098	0.034	0.072	0.095
<i>Low-income average</i>	1.193	0.548	0.772	0.846	0.804	0.498	0.615	0.769
<i>Middle-income average</i>	0.825	0.411	0.635	0.684	0.657	0.338	0.494	0.633
<i>High-income average</i>	0.428	0.203	0.347	0.371	0.358	0.138	0.264	0.346

¹Countries are reported based on ascending per capita real income levels.

Table A-9—Unconditional Frisch own-price elasticity for food sub-categories, 91 countries in 1996¹

Country	Beverages & tobacco	Cereal	Meat	Fish	Dairy	Oils & Fats	Fruits & vegetables	Other food
<i>Low-income countries:</i>								
Zambia	-1.236	-0.515	-0.696	-0.772	-0.728	-0.484	-0.562	-0.694
Mali	-1.359	-0.520	-0.697	-0.777	-0.730	-0.492	-0.564	-0.694
Benin	-1.092	-0.492	-0.674	-0.743	-0.703	-0.458	-0.541	-0.672
Kenya	-0.921	-0.462	-0.672	-0.729	-0.697	-0.410	-0.530	-0.670
Sierra Leone	-1.182	-0.491	-0.664	-0.737	-0.694	-0.462	-0.536	-0.662
Nepal	-1.317	-0.504	-0.675	-0.753	-0.707	-0.477	-0.547	-0.673
Congo	-0.993	-0.474	-0.662	-0.726	-0.690	-0.435	-0.529	-0.660
Senegal	-0.909	-0.453	-0.651	-0.708	-0.676	-0.405	-0.515	-0.649
Vietnam	-1.194	-0.492	-0.664	-0.737	-0.695	-0.463	-0.536	-0.662
Bangladesh	-0.954	-0.467	-0.662	-0.722	-0.688	-0.424	-0.526	-0.660
Pakistan	-0.907	-0.452	-0.651	-0.707	-0.676	-0.405	-0.515	-0.649
Uzbekistan	-0.978	-0.461	-0.641	-0.704	-0.668	-0.425	-0.513	-0.639
Kyrgyzstan	-0.957	-0.458	-0.641	-0.702	-0.667	-0.420	-0.512	-0.639
Cameroon	-0.990	-0.463	-0.641	-0.704	-0.668	-0.428	-0.513	-0.639
Moldova	-1.003	-0.459	-0.631	-0.695	-0.658	-0.426	-0.506	-0.629
Bolivia	-0.856	-0.430	-0.629	-0.682	-0.652	-0.379	-0.496	-0.627
Jordan	-0.765	-0.371	-0.616	-0.659	-0.636	-0.272	-0.471	-0.614
Indonesia	-0.847	-0.425	-0.618	-0.671	-0.642	-0.376	-0.488	-0.616
Jamaica	-0.831	-0.417	-0.608	-0.659	-0.631	-0.369	-0.479	-0.606
Guinea	-0.894	-0.433	-0.609	-0.666	-0.633	-0.395	-0.485	-0.607
Syria	-0.858	-0.425	-0.608	-0.662	-0.632	-0.383	-0.482	-0.606
<i>Middle-income countries:</i>								
Ukraine	-0.788	-0.397	-0.586	-0.634	-0.608	-0.347	-0.461	-0.584
Peru	-0.771	-0.390	-0.586	-0.632	-0.607	-0.333	-0.458	-0.584
Botswana	-0.822	-0.409	-0.587	-0.638	-0.609	-0.367	-0.465	-0.585
Thailand	-0.821	-0.412	-0.597	-0.648	-0.620	-0.365	-0.471	-0.595
Morocco	-0.750	-0.378	-0.575	-0.620	-0.595	-0.319	-0.448	-0.573
Venezuela	-0.803	-0.400	-0.576	-0.626	-0.598	-0.358	-0.456	-0.574
Macedonia	-0.757	-0.382	-0.575	-0.621	-0.596	-0.326	-0.450	-0.573
Belize	-0.750	-0.379	-0.575	-0.620	-0.595	-0.320	-0.448	-0.573
St. Vincent, Grenadines	-0.743	-0.374	-0.575	-0.619	-0.595	-0.311	-0.447	-0.573
Swaziland	-0.716	-0.358	-0.564	-0.605	-0.583	-0.287	-0.436	-0.562
Lebanon	-0.744	-0.376	-0.564	-0.609	-0.585	-0.322	-0.441	-0.563
Belarus	-0.734	-0.370	-0.564	-0.608	-0.584	-0.311	-0.440	-0.562
Kazakhstan	-0.843	-0.405	-0.566	-0.620	-0.589	-0.371	-0.452	-0.564
Dominica	-0.718	-0.359	-0.564	-0.605	-0.583	-0.289	-0.436	-0.562
Latvia	-0.691	-0.339	-0.552	-0.592	-0.571	-0.256	-0.424	-0.551
St. Lucia	-0.729	-0.369	-0.554	-0.598	-0.574	-0.315	-0.433	-0.552
Brazil	-0.726	-0.367	-0.554	-0.597	-0.573	-0.312	-0.433	-0.552
Bulgaria	-0.732	-0.370	-0.554	-0.598	-0.574	-0.317	-0.434	-0.552
Russia	-0.684	-0.340	-0.542	-0.582	-0.560	-0.267	-0.418	-0.541
Fiji	-0.728	-0.368	-0.554	-0.598	-0.573	-0.314	-0.433	-0.552
Grenada	-0.689	-0.343	-0.542	-0.582	-0.561	-0.274	-0.419	-0.541
Turkey	-0.689	-0.344	-0.542	-0.582	-0.561	-0.275	-0.419	-0.541
Lithuania	-0.696	-0.349	-0.542	-0.583	-0.561	-0.286	-0.421	-0.541
Romania	-0.672	-0.334	-0.531	-0.570	-0.549	-0.264	-0.410	-0.530
Mexico	-0.665	-0.333	-0.521	-0.560	-0.539	-0.270	-0.404	-0.520
Chile	-0.642	-0.307	-0.520	-0.556	-0.537	-0.216	-0.396	-0.519
Antigua & Barbuda	-0.685	-0.346	-0.522	-0.563	-0.540	-0.295	-0.408	-0.520
Poland	-0.658	-0.331	-0.511	-0.549	-0.528	-0.273	-0.397	-0.509
Trinidad & Tobago	-0.646	-0.321	-0.510	-0.548	-0.527	-0.254	-0.394	-0.509

*See notes at end of table.**Continued--*

Table A-9—Unconditional Frisch own-price elasticity for food sub-categories, 91 countries in 1996¹--Continued

Country	Beverages & tobacco	Cereal	Meat	Fish	Dairy	Oils & Fats	Fruits & vegetables	Other food
<i>Middle-income countries--continued:</i>								
Estonia	-0.651	-0.326	-0.510	-0.548	-0.528	-0.263	-0.395	-0.509
Gabon	-0.612	-0.289	-0.499	-0.532	-0.515	-0.193	-0.379	-0.498
Tunisia	-0.647	-0.326	-0.500	-0.538	-0.518	-0.271	-0.389	-0.499
St. Kitts & Nevis	-0.634	-0.316	-0.500	-0.536	-0.517	-0.252	-0.386	-0.498
Uruguay	-0.675	-0.340	-0.501	-0.542	-0.519	-0.298	-0.394	-0.499
Slovakia	-0.637	-0.319	-0.500	-0.537	-0.517	-0.257	-0.387	-0.498
Hungary	-0.617	-0.310	-0.479	-0.515	-0.495	-0.256	-0.372	-0.477
Argentina	-0.555	-0.257	-0.456	-0.486	-0.470	-0.159	-0.345	-0.455
Oman	-0.558	-0.274	-0.446	-0.478	-0.461	-0.208	-0.343	-0.445
Qatar	-0.537	-0.258	-0.435	-0.465	-0.449	-0.182	-0.332	-0.434
Slovenia	-0.532	-0.262	-0.425	-0.455	-0.439	-0.199	-0.326	-0.424
<i>High-income countries:</i>								
Czech Republic	-0.495	-0.235	-0.403	-0.431	-0.416	-0.158	-0.306	-0.402
Greece	-0.479	-0.224	-0.393	-0.419	-0.405	-0.143	-0.297	-0.392
Korea	-0.533	-0.262	-0.425	-0.455	-0.439	-0.200	-0.327	-0.424
Portugal	-0.484	-0.231	-0.393	-0.420	-0.405	-0.161	-0.299	-0.392
Spain	-0.478	-0.235	-0.382	-0.410	-0.395	-0.178	-0.294	-0.381
Ireland	-0.456	-0.216	-0.372	-0.397	-0.383	-0.146	-0.282	-0.371
Singapore	-0.471	-0.207	-0.392	-0.417	-0.404	-0.101	-0.293	-0.391
Mauritius	-0.451	-0.226	-0.351	-0.378	-0.363	-0.185	-0.272	-0.350
Israel	-0.432	-0.207	-0.350	-0.374	-0.362	-0.146	-0.267	-0.349
New Zealand	-0.422	-0.205	-0.340	-0.364	-0.351	-0.151	-0.260	-0.339
Finland	-0.423	-0.206	-0.340	-0.364	-0.351	-0.152	-0.260	-0.339
Sweden	-0.395	-0.192	-0.319	-0.341	-0.329	-0.140	-0.244	-0.318
Netherlands	-0.379	-0.181	-0.308	-0.329	-0.318	-0.125	-0.234	-0.307
France	-0.349	-0.161	-0.286	-0.305	-0.295	-0.100	-0.216	-0.286
United Kingdom	-0.352	-0.167	-0.287	-0.306	-0.296	-0.113	-0.218	-0.286
Belgium	-0.351	-0.165	-0.287	-0.306	-0.296	-0.109	-0.217	-0.286
Norway	-0.340	-0.163	-0.276	-0.295	-0.285	-0.114	-0.210	-0.275
Italy	-0.338	-0.159	-0.276	-0.294	-0.285	-0.105	-0.209	-0.275
Austria	-0.324	-0.152	-0.265	-0.283	-0.274	-0.098	-0.201	-0.265
Germany	-0.324	-0.152	-0.265	-0.283	-0.274	-0.098	-0.201	-0.265
Australia	-0.310	-0.143	-0.255	-0.271	-0.263	-0.089	-0.192	-0.254
Japan	-0.316	-0.153	-0.255	-0.273	-0.263	-0.112	-0.195	-0.254
Canada	-0.303	-0.147	-0.244	-0.261	-0.252	-0.107	-0.187	-0.244
Bermuda	-0.267	-0.115	-0.223	-0.237	-0.229	-0.049	-0.166	-0.222
Switzerland	-0.269	-0.120	-0.223	-0.237	-0.229	-0.065	-0.167	-0.222
Barbados	-0.290	-0.146	-0.213	-0.231	-0.221	-0.129	-0.168	-0.213
Iceland	-0.258	-0.118	-0.212	-0.226	-0.219	-0.072	-0.160	-0.212
Denmark	-0.260	-0.122	-0.212	-0.227	-0.219	-0.081	-0.161	-0.212
Luxembourg	-0.113	-0.046	-0.095	-0.101	-0.098	-0.011	-0.070	-0.095
United States	-0.091	-0.042	-0.074	-0.079	-0.077	-0.027	-0.056	-0.074
<i>Low-income average</i>	-1.002	-0.460	-0.648	-0.710	-0.675	-0.418	-0.516	-0.646
<i>Middle-income average</i>	-0.694	-0.346	-0.534	-0.575	-0.553	-0.284	-0.415	-0.532
<i>High-income average</i>	-0.358	-0.170	-0.291	-0.310	-0.300	-0.115	-0.221	-0.290

¹Countries are reported based on ascending per capita real income levels.