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The Collection of Price Data for the Measurement of Living Standards

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THE LIVING STANDARDS MEASUREMENT STUDY

The Living Standards Measurement Study (LSMS) was established by the World Bank in 1980 to develop improved methods for collecting and analyzing household and community data on living standards. Its ultimate goal is to contribute to the design of improved development policies by providing a richer empirical foundation for policy dialogue. This goal will be met by providing government statistical offices in developing countries with recommendations on ways in which they can improve the quality, timeliness, and information value of their household and community surveys.

The LSMS Working Paper series was started to disseminate intermediate products from the LSMS. Publications in the series include critical surveys covering different aspects of the LSMS data collection program and reports on improved methodologies for using Living Standards Survey (LSS) data. Future publications will recommend specific survey, questionnaire and data processing designs, and demonstrate the breadth of policy analysis that can be carried out using LSS data.

ABSTRACT

This paper considers ways of collecting **price data in a Living** Standards Survey. Its objective is to comment on **the efficacy of collecting** price data through household surveys and to **consider alternative methods** for obtaining such information. The paper provides **a general overview of** problems encountered in the construction of price indices **over time and among** different regions at a point in time and offers practical **solutions to them.**

CONDENSE

Le présent document examine diverses **méthodes de collecte** de données afférentes aux prix dans le cadre d'une **Enquête sur les** niveaux de vie. Son objectif est de présenter des commentaires **sur l'efficacité** de cette collecte lorsqu'elle est réalisée par le **truchement d'enquêtes** sur les ménages et d'envisager d'autres moyens d'obtenir **de tels renseigne-** ments. Il offre une vue d'ensemble des problèmes **rencontrés dans la mise** au point des indices des prix à long terme et **dans la comparaison des** indices des prix de diverses régions à un moment **donné, ainsi que des** solutions pratiques.

EXTRACTO

En el presente documento se examinan los métodos usados para recopilar datos sobre precios en un estudio de medición de los niveles de vida. El objetivo es formular observaciones sobre la eficacia de la recopilación de datos mediante encuestas de unidades familiares y examinar otros posibles medios de obtener esa información. En el documento se presenta un análisis general de los problemas encontrados en el cálculo de índices de precios a través del tiempo y entre diferentes regiones en un momento dado, y se ofrecen soluciones prácticas para resolverlos.

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ACKNOWLEDGMENTS

I. INTRODUCTION

The Living Standards Surveys (LSS), to be conducted in various countries under the auspices of The World Bank, will generate useful data for analytical and policy making purposes. For example, estimates of poverty and of the inequality of income distribution can be constructed. Expenditure patterns and elasticities can be analyzed. The link between households and the labor market can be explored. Human development variables can be analyzed. A social accounting matrix can be constructed and analyzed. For any of these purposes, reliable data on household expenditures and consumption will be required. The World Bank Living Standards Measurement Study (LSMS) includes plans for a comprehensive Household Expenditure Survey (HES). The purpose of this paper is to discuss the collection of prices needed to estimate real consumption from expenditures reported on the LSS household survey.

The prices are not required per se but as data necessary to measure real consumption levels. The required data are therefore determined by the nature and the number of real consumption comparisons wanted. A principal concern of the LSMS is to analyze changes in real consumption over time.

Note: This paper has not been prepared by or under the auspices of the U.S. Bureau of Labor Statistics. The views expressed herein are those of the authors alone and are not necessarily the views of the Bureau of Labor Statistics.

Therefore, price data are needed to deflate the expenditures reported on the HES to estimate the change in real consumption between survey periods. The LSMS analysis will also focus on intergroup variation. If different socioeconomic groups (SEGs) experience different prices, data are also needed to deflate expenditures reported by different SEGs at a point in time. Finally, because of the interviewing time frame and the recall periods for various expenditure items on the HES, reported expenditures may have to be deflated by an appropriate price index to adjust for inflation over the recall/survey period.

This paper will address a number of issues: the nature of prices required, methods for collecting the required price data, and techniques for constructing appropriate indexes for deflation of expenditures to estimate the various measures of real consumption.

II. ESTIMATION OF PRICE INDEXES AND PRICE RATIOS TO CALCULATE CHANGES IN REAL CONSUMPTION

This section discusses the development of the basic structure of price indexes for different SEGs over time and between SEGs at a point in time. The conceptual requirements of the indexes are the same for all countries. The process required to determine how indexes will be estimated to provide conceptually sound measures of price change, as efficiently as possible, will be similar in all countries. The process will lead to: substantially different techniques being adopted in different countries; different configurations of items priced, and the cities and markets visited. The final design will depend on the variance of price movements over time, between cities, between markets, and between SEGs; the cost of visiting more cities, more markets; the supporting data available (such as market listings at which SEGs purchase consumer goods); and the resources available to carry out the program (especially the skilled labor to accurately complete the tasks involved to develop and maintain the program).

Because each country is different, this paper can only discuss the factors which must be taken into account and how to organize data for analysis and decision making. Recommendations cannot be made on specific elements of the program, such as how many items should be priced, how many cities should be included, or how many prices should be collected for each item in each city in a given country.

This section also contains a brief review of the price index requirements to deflate consumption expenditures to obtain measures of real consumption. The review emphasizes the need for market prices, and not average values, provides the background required to understand the operational

requirements, and is particularly important for a discussion of why preparing indexes between SEGs, at a point in time, is much more difficult than preparing indexes for SEGs over time.

The remainder of the section discusses how the number and content of the index weights, the number of price ratios estimated, the number of items priced, the number of prices collected for each item, and the markets in which the prices are collected are determined. The indexes over time are discussed separately from indexes over space.

Conceptual Review

Before the main concerns involved in collecting prices can be addressed, it is necessary to discuss briefly the index number problem, and the distinction between a true consumption index and one that uses observed quantities. In a discussion of these issues, Deaton (1980) started with economic theory, from preferences and utility, and worked towards the practical implication in terms of measurement. This paper will start with the measurement and work back towards the underlying economics. To emphasize the conceptual similarity of indexes over time and over space, this paper will refer to reference and comparison prices, SEGs, and quantities. The reference SEG is a specific SEG at a point in time. The comparison SEG is either the same SEG at a different point in time, or another SEG at the same point in time.

The ratio of the comparison expenditures to the reference expenditures depends on quantities purchased and prices paid by both groups. A method to determine how much of the difference is due to quantities consumed, and how much is due to prices paid, must be developed. The method is to divide the ratio of expenditure by a price index. The price index uses

comparison quantities as weights. The division results in a quantity or consumption index with reference prices as weights, or:

Household Expenditures/Price Index = Consumption Index

$$(1) \qquad \frac{\Sigma \, p_{ir} \, q_{ir}}{\Sigma \, p_{ic} \, q_{ic}} \div \frac{\Sigma \, p_{ir} q_{ic}}{\Sigma \, p_{ic} \, q_{ic}} = \frac{\Sigma \, p_{ir} \, q_{ir}}{\Sigma \, p_{ir} \, q_{ic}}$$

where p_{ic}, q_{ic} are comparison prices and quantities and p_{ir}, q_{ir} are references prices and quantities.

The consumption index has a clear interpretation. This index measures how much more or less it would cost the reference group to purchase given quantities at new reference prices than it cost to purchase those quantities at actual prices. The consumption index is a ratio of a real cost (the cost to purchase the reference quantities) to a hypothetical cost - (what it would cost to purchase the comparison quantities).

The value of the consumption index depends on which group is chosen as the reference group. The index would be different if p_{ic} rather than p_{ir} was used to evaluate the quantities q_{ir} and q_{ic}. This is the index number problem. The index number problem occurs because different household groups place different relative values on different sets of goods. For instance, if in the reference situation a pound of rice of a particular description costs $2 and a shirt of a particular description $4, the shirt then contributes twice as much to the welfare of the group as the rice. If this was not the case, then the households could improve their welfare by purchasing fewer shirts and two pounds of rice for each shirt relinquished.

In the comparison situation, the prices might be $3 for both the pound of rice and the shirt. Then, a pound of rice contributes the same to the group's welfare as a shirt.

If, as in equation (1), the quantities of rice and shirts consumed in both r and c are evaluated using value r one answer is obtained. If the quantities are evaluated using value c, a different answer is obtained. There is no reason to suppose that the two groups would place the same value on the two different sets of goods. Viewed in this way, there is no solution to the index number problem. There are two sensible answers to the same question. Each answer depends on how r and how c value the two consumption sets. The solution is to use p_r if the concern is with how the r group evaluates consumption in relation to the consumption of the comparison group, and to use p_c if the concern is with how the comparison group evaluates consumption in relation to the consumption of the reference group.

The index number problem presents more difficulties in the comparison of real consumption for different SEGs at a point in time than in a comparison of real consumption for a SEG over time. The interest for a single SEG is usually whether real consumption has increased over time under constant preferences. The statistics of interest are those given in equation (1). In the case of two SEGs at a point in time, the issue is not clear. Should real consumption be compared using the evaluation of SEG-1 or SEG-2? If there are only two SEGs, both comparisons can be made, and the difference is of some interest. For three SEGs there are three comparisons: 1 with 2, 1 with 3, and 2 with 3. The direct comparison of 2 with 3 will not give the same relative real consumption as an indirect comparison of 2 with 3, using the comparison

of 1 with 2, and 1 with 3. In each of the three comparisons, two sets of prices can be used; there are six possible measures to be estimated and analyzed. With four SEGs there are ten pairs of comparisons; with five SEGs there are 15 and so on. It can be seen that when the number of SEGs is very large, the system of comparisons becomes very complex and requires special organizational and analytical techniques.

The problems of comparing different SEGs within a country are identical to those of comparing prices and real consumption between different countries at a point in time. The problems involved and alternative solutions are given in Kravis, et al. (1975). The publication describes a number of different ways the problems can be approached and evaluates the advantages and disadvantages. The system adopted for the international comparisons project (ICP) was the best because of the requirements of that project. A country making comparisons between SEGs might find that one of the alternatives discussed by Kravis, et al. meets their requirements better than the one adopted for the ICP.

The difference between the consumption index given in equation (1) and a true measure of relative consumption is more troublesome than the traditional index number problem. Deaton spends most of his time on this question. The index calculated in equation (1) indicates how much more or less it would cost at r prices to purchase c goods rather than r goods. The measure wanted is how much more, or less, it would cost to purchase, at r prices, a set of goods to allow the reference group to reach the welfare level represented by c goods than the cost to reach the welfare level represented by r goods.

The distinction is important. The reference group at p_{ir} and q_{ir} is assumed to be in equilibrium. The ratio of the price of any two items is proportional to how much each item contributes to the living standard of the group. With a fixed expenditure limit, the group cannot improve its living standard by substituting one item for another at the prevailing market prices. If the group was given the income to purchase q_{ic} at p_{ir} prices, it could obtain the welfare level represented by q_{ic} by purchasing q_{ic}. But they will likely not be in equilibrium. The group will be able to obtain a higher welfare level by purchasing more of the goods they value highly relative to the market price p_{ir} and less of the other goods. The cost of purchasing q_{ic} at p_{ir} is greater than the cost of purchasing the set of goods at p_{ir} to allow the reference group to reach the welfare level represented by q_{ic}.

The two sets of market prices measure how the two groups evaluate the same set of goods. The prices in the comparison situation must be for items identical to items priced in the reference situation. This requirement also makes the comparisons of different SEGs at a point in time more difficult, and less certain, than comparisons of a single SEG over time. The consumption pattern of an SEG will be fairly stable over short periods of time, such as five years. The bulk of expenditures in the comparison period will be for the same items purchased in the reference period. However, even for an SEG over time, the disappearance of old and the appearance of new items must be taken into account, and also consumers will no longer purchase certain items but will purchase new items. Techniques developed for the national price index program to treat this problem should, however, be adequate for individual SEG indexes.

The items consumed at a point in time for two different SEGs may differ to a greater extent than items purchased by the same SEG at two points in time. This is particularly true if the SEGs are defined by income level. Both a high income and a low income SEG will purchase household furniture. There is, however, unlikely to be much identical furniture purchased by both these SEGs. The prices (if any) for items both SEGs purchase are unlikely to provide a reasonable estimate of the difference in prices paid for furniture by the two SEGs. In this instance direct price comparisons may not provide acceptable estimates of the relative prices paid. More complex methods, such as the regression of price on characteristics of items across SEGs, may need to be employed.

The index number problem has to do with which set of market prices should be used in evaluating two sets of consumer goods. The substitution problem is what quantities should be used for the comparison period if the market prices of the reference period are used. Decisions on the treatment of the index number problem, or the estimation of quantities for a true cost of living index, will determine how prices will be used, but the prices required are always the same. The theoretical considerations require that the relative prices used provide an estimate of the slope of the preference function at the point on the function identified by the quantities consumed. The slope is equal to the ratio of market prices paid to purchase the quantities. In all analyses market prices must be used when the items are purchased in the market economy.

Indexes for SEGs Over Time

In the discussion of the index number and substitution problems, the consumption indexes and the price index were expressed as ratios of cost. This was convenient because their economic interpretation is in terms of cost ratios. In a discussion of the estimation of the price indexes, it is convenient to consider price indexes as weighted averages of price ratios, or to use the right hand side of equation (2) rather than the left.

$$(2) \qquad \frac{\sum\limits_{i} p_{ic}\, q_{ir}}{\sum\limits_{i} p_{ir}\, q_{ir}} = \sum\limits_{i} \frac{p_{ic}}{p_{ir}} \cdot \frac{p_{ir}\, q_{ir}}{\sum\limits_{i} p_{ir}\, q_{ir}}$$

The form is changed because it is the terms shown in the right hand expression that will be estimated. The price index is not constructed from estimated prices and quantities, but from estimated price ratios (p_{ic}/p_{ir}) and estimated relative expenditures $(p_{ir}\, q_{ir} / \sum\limits_{i} p_{ir} q_{ir})$. The price ratios are estimated from data collected in markets, the relative expenditures from a household expenditures survey (HES).

For practical reasons, prices cannot be collected for every item purchased by households in an SEG. Items are grouped into classes of goods which will be called expenditures classes (ECs). Items are selected to represent all items included in an EC. The selected item prices are collected and used to estimate the price ratio of all items in the EC. The estimate is given in equation (3).

$$(3) \qquad \sum_j \frac{p_c}{p_r} \quad \frac{\sum\limits_{i \epsilon j} p_{ir} \, q_{ir}}{\sum\limits_{j} \sum\limits_{i \epsilon j} p_{ir} q_{ir}}$$

The second term, $\sum\limits_{i \epsilon j} p_{ir} \, q_{ir} / \sum\limits_{j} \sum\limits_{i \epsilon j} p_{ir} \, q_{ir}$, is the weight of the jth EC for the reference group, where i designates a household item on the HES. The numerator is the total expenditure of all household items included in the jth expenditure class. The denominator is the total of all household expenditures. The weight of the jth EC is the proportion of total household expenditures by SEG_r spent on items included in the jth EC. The weight is calculated from the HES data. Although the weight is expressed in prices and quantities, neither prices nor quantities are explicitly known. Only expenditures on the individual items are available from the HES, but expenditures must equal the quantities of the items purchased times the price paid. In any case the individual prices and quantities are not required to form the weights.

The first term, $(p_c/p_r)_j$, is an estimate of the price ratio for the jth EC between c and r.

The price ratios are estimated from prices collected for well specified items in markets where members of the SEG purchase. The prices collected are usually determined by three samples: (1) items included on the HES and included in the jth EC; (2) markets in which the SEGs purchase; and (3) well specified items carried by the market that are included in the household items. A well specified item is one that has a single price within a market at a point in time.

Component Indexes

There are eight main categories of household consumption given in the United Nations System of National Accounts (United Nations, 1968). These are:

01. Food

02. Clothing and footwear

03. Gross rent, fuel and power

04. Furniture, furnishings, household equipment and operations

05. Medical care and health expense

06. Transport and communication

07. Recreation, entertainment, education and cultural service

08. Other goods and services

It is possible to estimate eight individual subindexes, with the index for all consumption being a simple weighted sum of the component indexes. The subindex (designated s) will be a weighted sum of price ratios for ECs included in the subindex, where the weights are the expenditures on the EC relative to all item expenditures covered by the subindex. The subindex is given as equation (4).

$$(4) \quad I_s = \sum_{j \epsilon s} \left(\frac{p_{ic}}{p_{ir}} \right)_j \frac{\sum\limits_{i \epsilon j} p_{ir} q_{ir}}{\sum\limits_{j \epsilon s} \sum\limits_{i \epsilon j} p_{ir} q_{ir}}$$

The aggregate index is a weighted sum of the individual subindexes, where the weights are the item expenditures included in the subindex relative to all consumption expenditures. The aggregate index is given as equation (5).

$$(5) \quad I = \sum_s I_s \frac{\sum\limits_{jes} \sum\limits_{iej} p_{ir} q_{ir}}{\sum\limits_s \sum\limits_{jes} \sum\limits_{iej} p_{ir} q_{ir}}$$

The accuracy of the aggregate index will depend on the accuracy of the subindexes.

If the only concern is the accuracy of the aggregate index, then the sample can be designated to produce the accuracy required at the lowest cost. This will lead usually to a wide variation in the accuracy of the subindexes. Therefore, in addition to specifying the required accuracy of the aggregate index, some minimum level of accuracy is also specified for subindexes. The accuracy specified depends on the requirements of the data users. For instance, an aggregate index that was accurate within 5 percent over a 5 year period, and subindexes that were accurate within 15 percent, might be adequate. Or it might be necessary to have the aggregate index accurate within 1 percent, and the subindex within 5 percent.

Suppose that the accuracy required was specified only for the aggregate index, and the expenditures pattern for a moderate income SEG was as shown in Table 1.

TABLE 1: Household Expenditures for a Moderate
Income SEG

Item	% of Expenditures
Food	45
Clothing and Footwear	5
Gross Rent, Fuel and Power	9
Furniture, Furnishings, etc.	8
Medical Care and Health	7
Transportation and Communications	8
Recreation, Entertainment, etc.	10
Other Goods and Services	8

A higher income SEG would have a lower percentage of expenditures on food and a higher percentage of expenditures on other items, whereas these percentages would be reversed for a lower income SEG.

If the only concern was the aggregate index, then the number of prices collected for each expenditure group would depend on the proportion of total expenditures represented by the group, the variance of price change, and the cost of collecting and processing prices. The number of prices collected for a group would be higher the larger the expenditures, the higher the variance and the lower the cost of collecting and processing the prices. The variances of different expenditure groups and the costs will vary from country to country, and between SEGs in a country.

In most instances the only evidence available will be the estimates of expenditures from the HES. The only information available on relative variances and costs may be the general knowledge of the economists working in the area of prices (for example, the national consumer price index). These judgments should be taken into account when developing the final sample

design. To simplify the discussion, the question of sample allocation will be addressed as if the only factor to be taken into account was the relative importance of expenditures.

Again, if the only concern was the accuracy of the aggregate index, and relative expenditures were the only criteria for sample allocation, then 45 percent of the collected prices shown in Table 1 would be for food, and 5 percent for clothing. This would result in the food price index being considerably more accurate than the clothing index. The accuracy of the clothing index may not meet the minimum standards established by the data users. In this case, an additional clothing sample could be allocated to bring the accuracy of the clothing index up to the minimum standard.

The additional sample could be a net increase in the total sample size, which would increase costs, and result in a more accurate aggregate index than the specifications required. The additional sample could also be taken from some other subindex - such as food - that had an accuracy well above the minimum specified for subindexes. Even if the sample required to improve the accuracy of the clothing index is taken from the food index, the overall sample size will need to be increased to maintain the required aggregate index accuracy. Any cost increase must be attributed to the clothing index and is above that needed to estimate an aggregate index of the required accuracy.

Once the required accuracy of the component indexes is specified, the question becomes - what is the most efficient way to obtain that required precision? The number of prices to be collected will depend on the number of (1) items selected to represent the group; (2) cities in which prices are collected, and (3) markets in each city where prices are to be collected.

One hundred prices could be collected for 25 items in four markets in a single city, or in one market in each of four cities; and so on. Each different combination of items, cities, and markets would cost different amounts and yield indexes with differing accuracy levels. The best combination will depend on the variance of price movements between items, cities, and markets, and on the cost of collecting and processing prices for different items, cities and markets.

Sample Selection

Once the number of items for each component index for each SEG and the number of cities and markets for collection of the selected item prices are determined, the samples must be selected. The number of samples to be selected depends on the number of SEGs. For example, there would be 64 samples if there were eight SEGs with eight component indexes each, and 128 samples if there were 16 SEGs . A discussion on the selection of the sample for a single component index follows.

Item Selection

Suppose the analysis showed that the index for food required 20 items, one item for every 5 percent of food expenditure. It would be possible to select simply 20 of the "households items" (line items for which expenditures are reported separately) from the household questionnaire. Many household expenditures surveys identify 100 or more food items. However, if only 20 items are selected the sample may not include some major food groups. For instance, the sample may not have any vegetables or any meat. The usual procedure to avoid this problem is to group the household items in related strata, with one item to be selected from each strata. These strata

are the expenditures classes (EC). Each item would then have the same weight and contribute equally to the index.

In a review of the household expenditures, although on the average each household item accounts for, say, one percent of food expenditures, there is a great difference in the relative importance of the different items. Some items may account for more than 5 percent (the desired EC size in this example) and others a small fraction of one percent. The differences might vary considerably between SEGs. For one SEG, ordinary rice (a single household item), might account for 20 percent of expenditures, glutinous rice 10 percent, fats 12 percent, evaporated milk 0.03 percent, tomatoes 0.2 percent, salt 0.00+ percent, and so on. The household items that accounted for over five percent of expenditures would become certainty ECs, each containing a single household item. Suppose there were five such items, accounting for 50 percent of the expenditures. If the remaining expenditures were grouped into 15 ECs, each remaining EC would account for an average of 3.3 percent of expenditures rather than the 5 percent initially required.

In a review of expenditures that account for less than five percent, it may be apparent that another 10 ECs, with an average of, say, 5 percent, would be adequate to estimate a food price index. The total of ECs would then be 15 rather than the initial 20 proposed. When the ECs are formed that include more than one household item, it will not be possible to have each EC represent exactly 5 percent of expenditures. Some variability is necessary because of the nature of the data. But the prices collected for ECs with small expenditures will contribute little to the overall index compared to the larger ECs.

Table 2 indicates hypothetical total food expenditures distributed among the main SNA food groups and the number of ECs selected for each major food group, if only an index for total food is required.

TABLE 2: ECs for Major Food Groups

Major Category	% of Food Expenditures	ECs
1. Bread and Cereals	55	10
2. Meat, Fish, Poultry	4	1
3. Milk and Eggs	5	1
4. Fats	12	2
5. Fresh Fruits, Vegetables	4	1
6. Other Fruits, Vegetables	5	1
7. Potatoes and Tubers	2	1
8. Sugar	6	1
9. Coffee, Tea, Cocoa	2	1
10. Other	5	1
Total	100	20

In the above example, an EC is formed for each major food group, even when the group (such as potatoes and tubers) has expenditures well below the desired 5 percent of total food expenditures. To maintain the sample size of 20, bread and cereals - which should be allocated 11 ECs - was only allocated 10.

Table 3 shows the detail for cereal and cereal products from a
hypothetical household questionnaire, and how these might be grouped into ECs.

TABLE 3:   Expenditures and ECs for Cereal Products

Household Items	% of Food Expenditures		EC Expenditure	EC No.
Ordinary Rice	20		20	1
Glutinous Rice	10		10	2
Milled Corn	10		10	3
Other Cereals	10		10	4
Wheat Flour		4.0		
Other Corn		2.0		
Special Rice		1.5		
Fancy Rice		0.5		
Green Corn		–		
Oatmeal		1.0		
Corn Starch, etc.		1.0		
Cereal Products	5		5	5
Bread		1.0		
Native Cakes		0.8		
Other Cakes		0.2		
Noodles, etc.		3.0		

Only 5 ECs rather than the planned 10 are defined. The reason is
that expenditures on three of the items greatly exceed the target of 5 percent
of food expenditures. All "other cereals" are grouped into a single EC with
10 percent of food expenditures. None of the other ECs have less than 5
percent of the expenditures. Another way to form the same ECs is shown in
Table 4; there are seven ECs, three of which have less than 5 percent of food
expenditures.

TABLE 4:   Expenditures and ECs for Cereal Products

Household Items	% of Food Expenditures	EC Expenditure	EC No.
Rice			
Ordinary Rice	20	20	1
Glutinous Rice	10	10	2
Other Rice	2	2	6
Special Rice	1.5		
Fancy Rice	0.5		
Other Cereals			
Milled Corn	10	10	3
Wheat Flour	4	4	4.a
Other Cereals	4	4	4.b
Other Corn	2.0		
Green Corn	-		
Oatmeal	1.0		
Corn Starch, etc.	1.0		
Cereal Products	5	5	5
Bread	1.0		
Native Cakes	0.8		
Other Cakes	0.2		
Noodles, etc.	3.0		

It would not be desirable to define more ECs for bread and cereals. The pricing for cereals could be increased by selecting more markets in which to price the ECs with expenditures greater than 10 percent, or by the selection of more than one variety, for example, of "ordinary rice" in each market visited. Alternatively, if the variability of price movement for the large ECs is not great, it could be decided that although bread and cereals represent 55 percent of food expenditures, it is not necessary to have that percentage of the food prices allocated to that group. In this way, either the total food prices collected could be reduced, or the number of ECs for other food groups could be increased.

For instance, assume that meat, fish and poultry represent only four percent of food expenditures. Normally only one of the items in Table 4 will be selected. However, the variability of price movements might be such that it would be desirable to form two or even three ECs for this group, although for relative expenditures the group should receive only one EC.

TABLE 5: Expenditures and ECs for Meat, Fish and Poultry

Household Items	% of Food Expenditures	EC %	EC No.
Meat, Fish, Poultry	4.0	4.0	1
Fresh Meat	1.5		
Pork		–	
Beef		0.2	
Lamb		0.3	
Other		1.0	
Poultry	0.5		
Chicken		0.4	
Other		0.1	
Fish	2.0		
Fresh		1.5	
Frozen		0.1	
Dried, Smoked		0.2	
Canned		0.2	
Treated Meat			
Canned		–	
Uncanned		–	
Dried		–	

In any country there are items considered to be important although they do not account for an appreciable proportion of expenditures. Such items might include evaporated milk, because of its importance in infant nutrition; or school uniforms, or a ceremonial serving dish. There is always an interest in price collection for such items; if one is a separate household item on the HES questionnaire, a separate EC can be made and the prices collected. It must be understood that the prices thus collected, make no contribution to the overall index or any component thereof.

It is essential that the same ECs be defined for all SEGs. The reason is to keep data requirements as simple as possible. If the ECs are the same for all SEGs, there may be 50 to 100 ECs to trace. If ECs are defined separately, and there are eight SEGs, then from 400 to 800 separate ECs must be defined and maintained. Also, if ECs are uniformly defined across SEGs, it is possible to estimate indexes at the EC level for groups of SEGs.

To assure the uniformity of ECs across the SEGs, the first step is to define a set of ECs on the basis of national expenditures, then to tabulate the expenditures for each SEG from the national ECs. The amount of expenditures accounted for by each EC will vary considerably among the different SEGs. For example, fish – an EC which at the national level accounted for two percent of food expenditure, might account for less than one percent for the rural population in the central highlands, and over ten percent for the rural coast province. It will be possible, using different ways of aggregating household items into ECs, to obtain more equal EC expenditures across the groups, but, if the groups are heterogeneous,

substantial differences will remain. It is also possible to define additional ECs if some SEGs have an unusually large concentration of expenditures on a few items contained in a single national EC.

Selection of Household Items to Price

Where ECs contain a single household item (line item from HES questionnaire), that household item will be the one priced for all SEGs. For ECs with more than one item, say fish, a specific type of fish must be selected to represent the EC. In this process there are basically two choices: (1) to use the national level expenditures and select one item from each EC to price nationwide; (2) to use the expenditures from each SEG and selection one item from each EC to price for each SEG. There are advantages and disadvantages to both methods. The choice would affect:

(1) The number of items that are priced.

(2) The ease of price collection.

(3) The number of indexes that can be estimated at the national level.

(4) The comparison of price indexes and real consumption between SEGs.

If the items are selected at the national level, the number to be priced will equal the number of ECs defined. If a different set of items is selected for each SEG, then almost every household item could be selected for one SEG or another. The selection of different items in different SEGs in some cases will represent real differences; in others the different item selection will be simply a matter of chance. The expenditures on fish in the coastal province may be for fresh fish and that would be the item selected. In the highlands the expenditures may be on canned fish and that would be the

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item selected. On the other hand, in both provinces, the expenditures on fresh meat might be divided evenly between beef and pork. In the highlands pork might be selected, on the coast, beef.

Price collection would be easier if the sample were drawn separately for each SEG. In the above example, if fresh fish was selected at the national level for pricing in all SEGs, then it might be difficult to find prices for this EC in the central highlands; similarly it might be difficult to price canned fish in the coastal province.

On the other hand, the number of indexes that could be estimated at the national level would be greater if a single sample was selected. For instance, an index for fresh fish could be estimated at the national level if this item was selected for each group. If fresh fish was priced in some SEGs, in others canned, and in others dried, then the only price index that could be estimated at the national level would be for fish.

A single national sample would make the price change comparisons between SEGs easier because the prices would reflect a price change for the same item. However, a single national sample would result in one that was less representative for each SEG.

Where to Collect Prices

The prices will need to be collected at the place where the household purchases the items - usually regular retail outlets (see section III). Most countries will not have a list of retail outlets from which to select a sample, even if a national sample was wanted. A frame of outlets is not likely to exist which would indicate the outlets where the different SEGs made their purchases. This lack of a suitable outlet frame results in the breakdown of the statistical framework of the price index. The outlets are

selected on the basis of the best judgment of the statistical office. Consequently the sample becomes only as good as the judgment of the statistical office as to where each SEG purchases each consumer item. One way to resolve this problem is to ask the households in the HES survey sample where they purchased the items they report as expenditures. This information could then be tabulated for each SEG and EC, and used as a frame for selecting outlets. Thus a valid frame of outlets would be provided to used for other statistical surveys concerned with establishments selling to households.

Saunders and Grootaert (1980) suggest collecting prices from a group of housewives. This suggestion for the collection of price data is discussed in section III. With respect to point-of-purchase information, this is an acceptable alternative to asking the households in the survey where they purchased the reported items. A group of housewives would be selected for each SEG, in each area where prices were to be collected, who could be asked where they purchased each of the items (or item categories) selected for pricing. If the housewives selected were representative of all housewives, then the outlet data (points-of-purchase) would be as valid as if it were asked on the questionnaire.

The second approach is used in the United States, where two household samples are selected. One sample provides information needed to estimate household expenditures. The other sample provides the point-of-purchase information about broad categories of items; this information is used to construct a frame from which to select outlets for price collection.

Selection of Detailed Items (Specifications) to Price

When the household items to be priced and the outlets in which the prices are to be collected are selected for each SEG, the outlets are visited and a specified item is selected to represent the household item. During this initial visit, the selected item is described in sufficient detail to ensure that on subsequent visits, the exact same item can be identified and priced.

The description or specification of the item is extremely important. The information is necessary to ensure that the price index measures change in the market price of the same item over time. If, for instance, fresh tuna is more expensive than fresh perch, it is necessary to ensure that either the price for tuna or that for perch is collected in both time periods. If tuna is priced in the first period and perch in the second, the price ratio could be less than 1, implying that prices have declined despite the fact that the price of both tuna and perch had increased between the two periods. Similarly, if cleaned and cut tuna is more expensive than whole tuna, it is important that either one or the other is selected, and then the selected item is priced over time.

There does not need to be coordination of the items priced between outlets, even for a single SEG. The purpose is to estimate the price change for an item such as fresh fish. In one outlet, if perch is priced, in another whole tuna, and in a third fillet of tuna, all three price ratios are an estimate of the price change for fish. In fact, for any given number of prices collected, the estimate of the price change for fish will probably be more accurate (that is, there would be a smaller variance) if the specified item collected is allowed to vary from outlet to outlet than if it were necessary to price perch, for example, in all outlets.

This flexibility makes price collection easier and less expensive, both when initially collecting the price and in collecting the price over time. In the initial visit the data collector can price any fish the outlet sells. If, on the other hand, it was necessary to collect the price of perch in every market, it might be that a given outlet carried a wide range of fish but not perch. In this case, no price could be collected. Because the price collected during the first visit will be representative (or typical) of the outlet's produce, the outlet is more likely to have the same item at subsequent visits.

Cost

The cost of estimating price indexes with the required precision for the specified SEGs can be estimated once the sample size is known. If the cost exceeds the budget, then alternative designs with fewer SEGs, or fewer indexes per SEG, or indexes with less precision can be evaluated.

Household Expenditures Survey Consistency

The primary purpose of the indexes is to deflate household expenditures available from the LSMS every five years. If the detailed indexes are to be of value, it is important that the items on the second household questionnaire be defined to apply to the same ECs used in the construction of the price indexes. The price index for an EC, or set of ECs, can only be used to deflate a set of expenditures if the expenditures during both time periods refer to the same set of items. This does not mean that the household items themselves must be the same. Experience with the first household survey, as well as changing consumption patterns over time, will

make it desirable to change some of the items on the questionnaire. It is only necessary that new items are defined in such a way to apply to the same ECs in the first expenditure survey.

Price Comparisons Over Time

In most cases the change in real consumption, for the components of consumption, would be calculated by dividing the ratio of expenditures by the price index calculated using first year weights. The price index being estimated is given by equation (2). This will give an estimate of the change in real consumption as perceived by the households in the second period. It will compare consumption in the second period to consumption in the first period using second period values or prices. If the comparison of the two consumption periods using first period prices is wanted, then it is necessary to reweight the relative price for each EC, with the weights for the ECs calculated from the second household survey.

If the expenditure ratio is divided by the price index using first year weights, the measure of consumption will be how much it cost to purchase the second period's quantities at second period prices compared to how much it would have cost to purchase the first period's quantities at second period prices. This, as mentioned earlier, will overestimate the true change in welfare. To obtain a true measure, it will be necessary to determine how much the households would have consumed in the first period, given the second period prices, to maintain the same level of welfare as they had with first period prices and first period consumption.

Price indexes are primarily used to analyze change in real consumption of SEGs over time, but serve other purposes as well. For instance, one question of interest to Deaton (1980) is whether an observed

difference in SEG price indexes is due to prices increasing faster for one SEG than another. Or, is the difference due to prices for items one SEG uses heavily, increasing more rapidly for both SEGs, than prices for items the SEG uses lightly. Since the price index for each SEG is calculated by weighting the price changes for each EC with the SEG's expenditure weight for the EC, it is possible to analyze the sources of the differences in the price indexes for the different SEGs.

Price Comparisons between SEGs at a Point in Time

The issues of comparing prices and consumption among SEGs at a point in time are virtually identical to those involved in comparing gross product and purchasing power among countries. These issues are discussed by Kravis, et al. in A System of International Comparisons of Gross Product and Purchasing Power (ICP). The two main issues of the ICP approach are: (1) how will the prices and expenditures for different SEGs be used to make the comparisons, and (2) how will items that are representative of the different SEGs be selected.

Methods of Comparison

The ICP discusses three general methods of comparison: the bridge, the binary and the multi-lateral. In the bridge method, one SEG would be selected as the bridge. The SEG's prices and consumption would be compared with those of every other SEG. Any two SEGs, other than the bridge SEG, would be compared through the bridge. If SEG2's consumption was half that of the bridge, and SEG3's consumption was twice that of the bridge, then SEG3 would have consumption four times that of SEG2. If the bridge SEG's expenditure weights were used in each comparison, then there would be N-1 direct comparisons, where N is the number of SEGs, and (N-1) + (N-2) + (N-3)...

indirect comparisons. There would be another set of comparisons if the weights of the non-bridge SEGs were used in each comparison. The ICP also examines the possibility of taking some average weights, or some average of the comparisons made using both sets of weights, for example, Fisher's "Ideal Index".

In the binary method, each SEG would be compared directly with each other SEG. In this case there would be $(N-1) + (N-2)... + 1$ binary comparisons, if one SEG's weight was chosen in each case, and $2((N-1)... + 1)$ if a comparison was made using each SEG's weights. The binary comparisons will not be consistent. The comparison of A and B may give A's consumption as twice B's, while the A and C comparison may give A and C's consumption as equal. The comparison of B and C may show B and C's consumption also as equal, or:

$$C = A = 2B = 2C$$

The multi-lateral comparisons require the same inputs, quantities and prices as would a set of the binary comparisons. But the multi-lateral method attempts to obtain a single set of comparisons between all the SEGs. The ICP accepts a single multi-lateral methodology, but discusses and evaluates a number of alternatives. One alternative might be better for a country preparing a consistent set of comparisons between SEGs within that country.

Neither the bridge nor the binary comparison method requires that the same ECs be defined for each comparison. The multi-lateral method does, but must accommodate situations where expenditures on some ECs in some SEGs are zero, or where there is no common item in two SEGs that can be priced for an EC. Because the ICP was concerned with the preparation of a set of consistent multi-lateral comparisons, it did not consider using different ECs ("detailed

categories" in ICP nomenclature). If a country was more interested in comparisons between a few key SEGs than in a complete set of comparisons among all SEGs, the use of different ECs for different comparisons could be considered.

Selection of Detailed Items to Price for Inter-SEG Comparisons

The main difference in the construction of indexes for individual SEGs over time, and the comparison of SEGs at a point in time, is in the selection of specifications to price. For the indexes for individual SEGs over time, the goal was to select an item in each EC, representative of the SEG's expenditures, where that item could be priced over time. This selection could be done using information from the outlet where the SEG purchased the good. For comparing SEGs at a point in time, the goal is to select an item which is representative of the two SEGs being compared. It is necessary to collect the price of an identical item at the same time in the respective outlets where the two SEGs purchase. However, before selecting an item, it must be ascertained that the item is sold in each outlet. In some cases this information may be known; in other cases it may involve a visit to both outlets to determine which identical items in an EC are sold.

For consumption goods, the ICP sent a list of detailed item specifications (used in the United States), to all participating countries. The countries were asked to indicate for each category, the items found in their country, and to add important or common items in the EC, found in their country, but which were not on the list.

A parallel procedure in a country would be to have experts develop lists of items they believe would be purchased by households in both of two SEGs. Thus, a number of different items may need to be priced for one SEG in

a single EC. Common items purchased by both rural and urban SEGs within a
province might be different from common items purchased by an urban SEG in one
province and an urban SEG in another province. In the central highlands, the
item priced for the fish EC might be canned fish, because the rural population
only purchases canned fish. The item selected for comparison between the
urban population in the central highlands and the urban population in the
coastal province might be fresh fish, since the latter does not purchase
canned fish.

When the ICP compared initial lists of specifications, it was not
clear in a number of instances, if items defined by different specifications
were identical or equivalent. A number of procedures were then used to
resolve these differences. In some instances, experts in the various
countries were sent to the other countries to determine if the items were
identical or equivalent. In other cases, samples of the products were
distributed among the countries and a determination of comparability made on
this basis.

A similar procedure for SEGs in a country would be for experts to
visit outlets and to determine whether the items sold are identical or
equivalent. For instance, the fresh fish purchased by the urban households in
the central highlands may be caught in a nearby lake, while the fresh fish
purchased in the urban coastal regions would be ocean fish. It might be
necessary for experts to examine the fresh fish in both outlets to determine
which lake fish were equivalent to which ocean fish.

The main effort is obtaining, for each EC, identical or equivalent
items to price for each pair of SEGs, and ensuring that the prices collected
throughout the country (that is, in rural open-air markets and urban

department stores) by different data collectors, are for identical items. The
task to determine the items to price, and to ensure that the right prices are
collected is more difficult than the task to select or collect prices for
estimating price indexes for individual SEGs over time.

Frequently the items priced for a particular comparison will not be
representative of either SEG's expenditure. A bicycle might be selected to
represent transport in a comparison of prices between a low and a high income
SEG, simply because it is the only transport equipment they both purchase.
However, the bicycle may be a luxury item for the former and a child's toy for
the latter. The prices collected for comparing purchasing power between SEGs
would not, in general, be those used to measure price change over time for the
individual SEGs. It would thus be difficult to incorporate any price
information collected for comparisons between SEGs, at a point in time, into
an ongoing consumer price index program, or into price indexes measuring price
changes for SEGs over time.

It is hard to imagine a situation in which a country would want to
carry out a full scale pricing effort to make a complete set of price and
quantity comparisons between all SEGs, because of the difficulties both in
data collection and data processing. However, if there is reason to believe
that, at a point in time, the prices paid by important SEGs vary
substantially, it may be of value to make selected comparisons.[1]

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[1] An important point was made by the World Bank Staff in discussions that
occurred during the preparation of this paper. Unless significant price
differences do exist, it is quite possible that the relative comparisons
of expenditures made using price data collected in the manner discussed
may in fact be further from the actual measure of relative welfare wanted
than the unadjusted data.

III. SOURCE OF PRICES

Construction of a price index, whether an intertemporal index or a spatial index, requires the collection of market prices, that is, prices paid in the market for specified items. As shown in section II, the prices must reflect the relative value of different commodities, and those values are found in market prices. It will be evident that reliable price data can be obtained from retail establishments, but not from individual households.

Household expenditure surveys usually obtain data on expenditures $(p_o q_o)$ for items or classes of items during a specified recall or reference period o. The respondent is asked: "How much did you spend on (item or item category) during (reference or recall period)?" The response is an expenditure total, which may represent any quantity of items, as well as any unique specification(s) in the item class.

In some surveys, the respondent is also questioned about the quantity purchased: "How many (items) did you buy?" At first glance it may then seem possible to derive prices from the expenditure survey data by dividing the reported expenditure for item i by the quantity purchased:

$$\frac{P_{oi} Q_{oi}}{Q_{oi}} = P_{oi}$$

This relationship holds true, however, only when the reported expenditure is for a single item. In most cases the quotient of expenditure divided by quantity is not price, but rather unit value, which is an average rather than a specific market price, or:

$$\frac{\sum_{i} P_{oi} q_{oi}}{\sum_{i} q_{oi}}$$

where i is a detailed specification within a household expenditure item.

Consider the following example:

Interviewer: How much did you spend on men's shirts last month?

Respondent: $15.

Interviewer: How many shirts did you buy?

Respondent: Two.

The unit value per shirt is $7.50. There is no way of knowing, however, other than more detailed questioning, whether the respondent bought two shirts at $7.50 each, or one for $10 and one for $5, or any other combination. One shirt could have been a dress shirt and one a work shirt; one could have been long sleeve and one short sleeve; they could have been different types of fabric and so on. Consequently the market price of each shirt cannot be determined from the data available.

It may appear then that this difficulty could be alleviated by asking HES respondents to report the prices paid for each item in addition to or instead of quantity. However, it is not as simple a task as it may seem. The objective of collecting price data - to estimate an index, either intertemporal or spatial - requires prices to be collected for the same or comparable items at two or more points in time (or space). The additional information, above and beyond mere prices, that must be collected to utilize those price data, would impose a severe burden upon the respondents, who would already be confronted with a lengthy questionnaire.

First, for every reported expenditure and for each individual item, it would be essential to collect the market price paid (not unit value). Second, a specification must be recorded in sufficient detail to enable analysts to determine whether a price collected at one time period is for the

same item as a price collected in another time period, or whether a price paid by one SEG is for the same item as a price collected for another SEG. For example, if one household reported paying $4 for a boy's shirt, and another reported paying $7, it must be ascertained whether the two shirts had different prices but were comparable in quality, or whether the price difference was due to quality difference. Unless detailed specifications are recorded and analyzed, it is not possible to differentiate between the situations. Yet in the construction of a price index to deflate household expenditures in order to calculate real consumption, such differentiation is essential.

In a comparison of clothing consumption between the urban poor and the urban wealthy, for example, the poor purchase a badly made shirt of the cheapest cloth for $4, the rich purchase a tailor made shirt of the highest quality cloth for $7. Each group, however, purchases the same number of shirts. If the expenditures and prices are compared using $4 and $7 then the price relative is 7/4; the expenditure relative is also 7/4. Thus, expenditure divided by relative price is one, making it appear that the rich are no better off than the poor. In this analysis, the high expenditure family is "high expenditure" not because it consumes a larger quantity of goods, but because it pays more for the higher quality of the goods it consumes in equal quantity.

The direct comparison of average prices reported on the HES would convert all differences in the quality of goods purchased by the rich and poor into price differences, so that measured difference in consumption between the two groups would be much less than the true difference. Thus, in order to obtain market price data on the HES for each individual item purchased, the

data collector has to collect a description of the item in sufficient detail to make it possible for an analyst to compare it with the description(s) recorded by another data collector for another household. Also it has to be determined if the description(s) were for the same item (so that any price difference would be one paid for the same item) or whether the price difference was due, at least in part, to differences in the items.

The item descriptions used in expenditure surveys are often inadequate for item specifications in price index construction. Even where one household reported paying 2.0 shillings for a pound of "Fancy" rice, and another reported paying 2.2 shillings for a pound of "Fancy" rice, it is still not certain whether the two households bought the same rice at different prices, or whether one bought a somewhat higher quality of "Fancy" rice. This problem becomes compounded greatly in the area of apparel. (It would appear unreasonable to try to obtain at the household level the degree of detail of item specifications used in the construction of consumer price indexes in most countries).

In addition to the detailed specification, the date of purchase of each item must be recorded. Returning to the example of "Fancy" rice, if one household paid 2.0 shillings a pound in January and another household paid 2.2 shillings in February, does the second household pay more for rice or has the price paid by both families increased over time?

Even if it were possible to obtain market prices, detailed specifications and dates of purchase from HES respondents, the usefulness of such information is determined by the skill of survey personnel. Interviewers would need to be highly skilled in specification writing and would have to be trained to recognize price determining characteristics of all types of

items. Expert analysts would be needed to evaluate the specifications and to determine which ones were comparable. This analytical task would be great because in a sample of 6,000 households, there would be the potential for many thousands of different items to be reported. A practical way of compiling the specifications to make comparisons possible would be formidable.

Although the number of specifications would be large, it is unlikely that the number would be sufficient to allow estimation of price change or levels. Given a sample size of about 6,000 households spread across various SEGs and geographic strata, the number of price observations for a given item specification is probably too few to permit the valid price comparisons needed to construct reliable indexes.

The construction of indexes for SEGs, whether intertemporal indexes for each SEG or intergroup (spatial) indexes among the several SEGs, would require sufficient observations of a specific item within each SEG; for illustration assume ten observations. First, assuming that the sample 6,000 households are divided into 12 panels so that one panel is interviewed each month, the effective sample size is 500, since only prices collected from the same panel could be used. (As indicated earlier, prices collected in January should not be compared with prices collected in February). Next, assume that eight SEGs have been defined and that, on average, about 60 households in each SEG are in the sample in each panel. Continuing with the "Fancy" rice example: how many of the 60 households in each SEG would purchase "Fancy" rice, and, of those, how many would purchase the same grade and quality? There is no guarantee that there would be enough useful observations of comparable prices, even for an item such as rice. When items such as apparel, a stove, a bicycle or cooking utensils are considered, the sample size problem

becomes obvious. To make matters worse, if the household samples by SEGs are not allocated evenly across the 12 panels, but instead one SEG is interviewed one month and another SEG interviewed the next month, and so on, no price comparisons could be made at all.

In summary, collection of market price data from households in the HES sample is inadvisable because of (a) the inordinate burden on the respondents, (b) the high degree of analytical skill needed to write and evaluate specifications, and (c) sample size limitations which restrict the probability of obtaining sufficient price observations for a given specification.

The alternative suggestion (Saunders and Grootaert, 1980) that a group of housewives be interviewed to obtain "normal" prices appears to be a novel but risky idea. It is not known whether this approach has ever been tried, but a number of difficulties could arise. In times of inflation, how could the concept of "normal" prices be defined? What, indeed, is "normal" when prices have been rising steadily over time? How would the secular trend of inflation be separated from the seasonal/irregular fluctuations in price due to time of day variation, difference in level of bargaining skill, and the like? How could such concepts be explained to the respondents? What would be the reference period? How could a representative sample of housewives be selected? In this approach, there appear to be numerous potential sources of bias, with no way of measuring them.

The only practical alternative for the collection of market price data is to obtain prices from retail establishments.[2] This approach is used worldwide for the collection of data for consumer price indexes (CPI). The selection of a representative sample of items to price reduces to a workable number the specifications to be analyzed. The prices collected for those same specifications in each sample outlet (retail establishment) means that the necessary number of observations can be obtained for each item. Finally, the prices collected would be market prices, that is, transaction prices.

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[2] Although it may be advisable to include questions about quantity on an expenditure survey as a probing technique to reduce response bias, quantity data thus obtained should not be relied on to derive "price" information.

IV. DEFLATION OF EXPENDITURE DATA FOR PRICE CHANGE BETWEEN DIFFERENT RECALL PERIODS

In a typical household expenditure survey, recall periods for different categories of expenditures may vary according to the frequency of purchase to assure a sufficient number of expenditure observations for each category. For example, each household might be asked to recall certain types of expenditures: (1) frequently purchased items, such as food, with a one-day (or one-week) recall period; (2) other types of expenditures with a one-month recall period, and (3) other less frequent expenditures with a one-year recall period. The actual time of purchase of monthly items, by a given household, would lag behind the daily items by an average of two weeks. The annual recall items, however, would lag behind the daily/monthly items by approximately six months. In times of inflation, such a lag creates an inflationary bias whereby expenditures for daily and monthly recall items will be overestimated more than annual recall items.

In the HES, if recall periods of varying lengths are used, this inflationary bias would appear to be more serious in the LSS than in conventional expenditure surveys (where the primary use of the data is to provide weights for a CPI), because of the LSS' intent to analyze differences between SEGs. The effect of the inflationary bias, from the perspective of the LSS, is to overestimate expenditures for SEGs which have a higher proportion of daily expenditures and, conversely, to underestimate expenditures for SEGs having a higher proportion of annual recall expenditures. Deaton (1980) shows that there is a strong inverse relationship between the proportion of food expenditures and the level of expenditures. The higher the total expenditures, the lower the proportion spent on food. To

the extent that food items comprise a large share of daily-recall expenditures, it follows that low-income SEGs will have their expenditures overestimated, and expenditures for high-income SEGs will be underestimated. The difference in nominal expenditures among the SEGs would thus appear to be less than the difference in real consumption.

It must be acknowledged that inflation is not the only explanation for increases in expenditures over time; growth in real income, changes in item prices, and changes in taste can all contribute to consumption changes. The inflationary bias may be corrected by adjusting (deflating) the reported expenditures to a common time basis by deflating by an appropriate price index. The appropriate deflation technique will depend on the allocation of the sample households in each SEG to any subsamples to be interviewed at different times (for example, interview panels). For instance, the sample could be divided into twelve monthly subsamples. If, and only if, the sample households in each SEG are allocated evenly across the twelve panels, the only adjustment needed then is to deflate the daily and monthly recall expenditures (or, alternatively, to inflate annual-recall expenditures) by an appropriate six-month price.

Thus, to deflate $p_t q_t$ (a daily or monthly expenditure) to make it comparable to $p_{t-6} q_{t-6}$ (an annual expenditure), it must be divided by the six month price relative p_t / p_{t-6}:

$$(p_t q_t)/(p_t/p_{t-6}) = p_{t-6} q_t$$

Admittedly, there is a possibility that q_t and q_{t-6} may differ due to changes in consumption, but, as indicated above, the assumption that the q's will remain stable in the short run is probably a safe one.

However, if the sample households in each SEG are not allocated across the twelve panels, but, for reasons of economy in interviewer and travel costs instead are concentrated in particular months, the effect of the inflationary bias would be overwhelming. For example, if one SEG is interviewed in month one and another SEG in month 12, the price changes which occurred over the almost one-year period would certainly swamp any real price differences paid by the two SEGs at a point in time, and would cause the latter's expenditures to be overestimated in relation to the former's. All expenditures from all households in all panels would thus have to be deflated to a single predetermined common time basis. For each panel, annual and daily/monthly items would have to be deflated separately, and in greater detail.

To obtain the price ratio by which to accomplish the deflation, appropriate price indexes must be selected. Preferably, the intertemporal price relatives would be provided , at a detailed item level, for each SEG. Few countries, if any, at least at the time of the first LSS, would have CPI's available by SEG or for similarly disaggregated populations.

A practical solution would be to use the national CPI as a proxy for SEG-specific indexes. The existing CPI design should be compared to the LSS design with respect to population and geographic coverage. However, since item price changes over time (as opposed to price levels) will probably be highly collinear among different populations, a country's existing CPI could

be used as an approximation. If the CPI is published for several regions or provinces which correspond to SEG parameters, so much the better.

Even if the only available CPI data are for major cities, or the capital city, a reasonable approximation of price relatives may still be obtained, given the above assumption of collinearity among indexes of price change over time for item i among different populations. Similarly, the absence of price indexes for rural areas is not important; the point of purchase for durable goods in particular is probably located in an urban center, even for rural households. If the existing CPI is published quarterly, for example, instead of monthly, interpolation would be necessary to estimate the specific price relatives needed for deflation. In the absence of any CPI, price data would need to be collected at least six months before the start of the HES.

Whatever index is used as the source of price ratios for deflation, a decision must be made on the degree of item detail at which expenditures will be deflated. At a minimum, deflation will need to be done independently for daily/monthly versus annual items; which would imply, in most indexes, the major group level. If indexes are available at a more disaggregated item level, expenditures could be deflated at the more detailed level. The latter is desirable where the SEG samples are not allocated evenly across the 12 panels.

The analysis of the LSS expenditure data among SEGs would be enhanced by adjustment of any inflationary bias in the survey design. Even a crude approximation of price relatives would be better than no deflation at all.

V. CONSTRUCTION OF AN INTERTEMPORAL PRICE INDEX BY SEGS

The LSS will be repeated in a participating country at regular intervals, thus permitting the analysis of changes in the relative consumption of the various SEGs over time. To analyze _real_ changes in consumption over time for a given SEG, and to analyze differences in consumption over time among SEGs, however, expenditure data collected in later rounds of the LSS should be deflated by appropriate price change indexes over the five year period. Thus, any differences in price movement experienced by different SEGs will be brought out.

In most countries, a CPI is compiled on a regular basis, by which price change over time for a "market basket" of some specified goods and services can be estimated. The CPI usually refers to either a specific component of the population ("the working class") or to a broad spectrum of the population ("all urban consumers"). The official CPI is probably limited to urban areas, but can be useful as a general economic indicator and inflation yardstick in a country, as well as for collective bargaining.

As seen in section IV, the ongoing CPI in some countries could also be used to deflate daily and monthly expenditures reported on the HES. However, the existing CPI would probably not be compatible with the HES design in terms of SEGs and ECs. Thus the CPI would not be an ideal deflator of price change experienced by the various SEGs over the five year intersurvey period. On the other hand, SEG-specific intertemporal price indexes would provide a consistent and comparable measure of price change by which to deflate reported expenditures. The conceptual framework for the construction of such SEG-specific indexes is set forth in section II, including the definition of ECs, the derivation of weights and the selection of items and

outlets. This section will address practical considerations for the collection of price data for such indexes.

As discussed in section II, the universe of all expenditures must be classified into a set of mutually exclusive and exhaustive expenditure classes (ECs). The definition of each EC will be the same across all SEGs; however, the relative importance (weight) of a given EC will probably be different for each SEG. Within each EC, a sample of item(s) is selected. This sample may be selected either at the national level or the SEG level. The advantages and disadvantages of each approach are also discussed in section II.

If the HES expenditure data were tabulated in time, these could be used as a sampling frame for the selection of specific items to be priced within each EC, with a sampling probability proportional to size (PPS), taking expenditures as a measure of size. Even preliminary tabulations of the HES results would provide sufficient information to carry out a PPS sample selection. If, however, the price collection must begin concurrently with the HES, the item selection will have to be based on judgment, or other data (perhaps a previous family budget survey in the country to provide weights for the ongoing CPI).

The final tabulations of the HES expenditure data will be used to estimate the cost weights for each EC in each SEG. First, the expenditure data for items with different reference periods must be put on a common time basis, such as average annual expenditures - daily items must be multiplied by 365 and monthly items by 12. Next, the mean annual expenditures per household are estimated for each EC. The exact formula to be used will depend on the HES design, but in essence the process involves estimating the weighted average expenditure for EC(j) by families in SEG(g).

When specific items have been selected for pricing, a unique specification must be developed to ensure that precisely the same item is priced over time in a given outlet. In the EC "fish", a specific item might be "fresh perch"; a unique specification might be "fresh perch, one kilo, cleaned and scaled but with head and tail left on." The unique specifications could be written in advance by the statistical office and priced in every outlet where the item is purchased. However, the data collection process may be easier and the items more representative of the merchandise sold in the outlet if the data collector is permitted, at the initial pricing visit, to select an appropriate unique specification of the specified item. (For example, the volume seller or "most typical" form in which the specified item is sold in that outlet). The data collector would record the description of the unique item, and at each subsequent visit would price that same item in that outlet. The small initial investment in time taken by the data collector should be offset by eliminating the risk of not finding a pre-assigned unique specification for sale in a sample outlet. For example, although the fish vendor in one village may customarily leave head and tail on fresh perch, the vendor in another village may cut them off.

For the United States CPI, the in-outlet selection of unique specifications is accomplished by a multi-stage probability proportional to size sampling process. This method, although yielding an item sample representative of the entire universe of items and not just of the volume sellers, would be too costly and cumbersome to apply in most developing countries.

As suggested in section II, a reliable sampling frame from which to select representative outlets where members of a given SEG shop, can be

obtained in one of two ways: (1) by asking in the HES the place of purchase of each expenditure, or (2) by separately interviewing a sample of consumers to obtain place of purchase information for each EC or group of ECs. For certain expenditure categories, the place of purchase will be evident, for example, electricity from the local utility company. For other ECs, place of purchase information, such as health care, educational services and so on, might be obtained from other components of the LSS. The surveys planned in the LSMS may be useful sources of point of purchase information for certain ECs, if appropriate questions are included on the survey instruments.

In some countries, the point of purchase for certain items may be self-evident once the SEG and place of residence are known; in such cases the judgment of the statistical office may be sufficient. For example, a price statistician from one small country once remarked to the author that the selection of an outlet sample for footwear was simple. Because there were no shoe stores in the rural areas, everyone bought shoes in the capital city, usually in a store on the side of town nearest to their home. Thus, rural dwellers living north of the capital bought footwear on the north side of town, those living to the west shopped for shoes in the market on the west end of the capital and so on. Where the evidence is clear cut that such patterns exist, a judgment sample might not be excessively biased. In most cases, however, a probability sample of outlets would be more reliable.

Another issue to be addressed is the frequency with which to construct an intertemporal price index for the LSMS. At a bare minimum, prices would have to be collected concurrently with each HES, say every five years. Because of the investment in training data collectors, selecting the outlet and item samples, and initiating price data collection (including

writing specifications) in the selected outlets, it would appear to be cost-effective to continue price data collection on a regular basis (monthly, bi-monthly or quarterly) during the five year period. Over a five year period some unique specifications may change or disappear from the market place. Therefore more frequent data collection would permit the substitution of unique items in the index system. This substitution would be impossible if the price data were limited to two discrete observations with a five year gap in between.

Over a five year span, also, the outlet sample will deteriorate. Price collection on a recurring basis means that outlets which have gone out of business, or must otherwise be dropped, could be replaced by those selected in a shadow or reserve sample. Again, if the outlets are visited only once in five years, shadow sample outlets could not be linked in as only price quotations obtained for the same item in the same outlet can be compared over time when estimating a price relative. In addition, for the sake of consistency, prices for each SEG index should be collected at the same points in time, no matter what the chosen frequency.

The resources required to collect price data for intertemporal indexes for each SEG need not be greater than for a typical CPI. As is the case with CPIs in most countries, the bulk of data collected should be done by personal visit to the outlet, thus ensuring that the unique specification is indeed the item being priced. The cost of collecting the price data will depend on the item sample size, the outlet sample size and the frequency of pricing. (Survey planners may find it useful to consult the statistical

agency responsible for the country's ongoing CPI to obtain estimates of data collection costs. Indeed, it may even be possible for such an agency to do the actual collection to LSMS' specifications).

To a limited extent, prices for certain items (health care service, education and similar costs) could be collected at the community level LSMS surveys. However, to the extent that such surveys are done only every five years, they would be subject to the same substitution problems as mentioned above; in addition, if the remaining prices were collected more frequently, an ongoing "all items" index could not be constructed for intermediate periods. Nevertheless, as stated above, the community level surveys may provide useful point of purchase information.

Saunders and Grootaert (1980) point out that price collection, especially in developing countries, is subject to problems caused by time of day variation in prices, differences in bartering and bargaining skill, and so on. These problems may not affect the HES data, assuming that the sample households are representative of the population for marketing practice and skill. However, such problems must be addressed in collecting prices for index calculation. The prices collected from the sample outlets need to be representative of times of day, negotiating skill and the like. (Again the agency responsible for the ongoing CPI may be able to share its experience in handling such problems in the context of that particular country).

One approach to address the bargaining problem would be to furnish the data collectors with enough money to purchase the items. The items could then either be resold at the statistical office at the end of the day to staff members or retained by the price collectors as wages-in-kind. Another way would be to ask the shopkeeper to report the price of the item at the last

transaction, or even for the data collector to observe such a transaction in progress and to record the price paid.

Once a system of SEG price indexes is created for a country, a logical step would be the integration of such indexes into the country's ongoing CPI. Integration may come sooner or later, fully or partially, CPI.

The LSS price collection program, as outlined here, would have all the characteristics of a regular CPI, and the additional advantage of group-specific index capabilities. The LSS design may well be more representative of the entire country than the existing CPI design which may include only major urban areas. The HES expenditure data would be available for the estimation of CPI weights at the national and SEG levels; moreover, these weights could be revised every five years. Point of purchase information, if obtained on the HES, could provide a frame for the probability selection of retail establishments for the CPI sample. The ongoing data collection and data processing procedures for both the CPI and the LSS will probably be similar.

The development of the LSS price program could be linked to a revision of the ongoing CPI. Once the LSS price program is well established, it could become the country's CPI. Alternatively, the two surveys could be integrated at a future date when the ongoing CPI is considered for revision. Substantial efficiency could result. Of course, integration of the LSMS and CPI would necessitate that the EC structure, item sample size and outlet sample size, be compatible with the CPI publication requirements. However, as

the LSS program would include SEG indexes, while the CPI would cover a broader population, the question of compatible reliability will probably not be a serious one.

VI. OPERATIONAL CONSIDERATIONS FOR A PRICE SURVEY

This section is intended to be a checklist of key decision points and steps to be followed in conducting any survey of consumer prices, rather than a thorough discussion of survey management and operations. The points are covered in more detail in sections II to V. The steps are not necessarily in chronological order; the decision factors are interrelated and interdependent.

1. Definition of SEGs (or index populations):

   (a) What areas or regions will be included in each SEG? How will the areas be delineated?

   (b) What population groups within each area will be included in a given SEG? By what parameters will those groups be defined?

   (c) In what local areas within each SEG will prices be collected (for example, in what villages)? It is recommended that the same area design as that of the HES be used.

2. Design of item sample:

   (a) Define ECs according to the SNA or other logical framework, within constraints imposed by the HES questionnaire format (that is, an EC comprises a household item (line item) or set of household items on the HES form; an EC cannot contain only a portion of a household item). ECs are defined at the national level. ECs should be similar in size in terms of expenditure weight, but this is not critical. Individual items of importance with respect to expenditures are defined as ECs. Reliability of data and cost constraints will also govern the number of ECs to be defined.

(b) Develop specifications of unique items to be priced for each selected household item. The specification must describe the item in detail so that it is clear to both data collector and respondent precisely which item is to be priced. If the item sample is uniform nation-wide, specifications could also be nation-wide, although SEG-specific or even outlet-specific specifications are preferable.

3. Design of outlet sample:

(a) Obtain a sampling frame from which to select a sample of outlets (markets, stores, shops, and so on) representative of the SEG shopping patterns. The frame might come from the HES if questions about point of purchase were asked: "Where did you purchase .....?" "What is the name of the shop?" "In which market is it located?" "Which stall is it?" Otherwise, a separate short survey on points of purchase for broad categories of items could be used to provide such data. In the absence of any point of purchase survey data, the outlet sample will, in most cases, have to be a judgmental one.

(b) Select the sample of outlets in which to price each sample item in each city/village in the sample. The number of outlets in an area will depend on desired reliability, expected non-response rate and cost constraints. That is to say, the higher the desired precision, the greater the sample size (number of observations) required. Similarly, for items that may be less commonly sold or where substitution rates are expected to be

high (for example, for apparel), the sample size should be increased.

4. Collection of Data

(a) Determine staffing needs - how many data collectors, how many supervisors are needed? How many outlets can an interviewer visit per day? How long does it take to travel between outlets? How long will pricing take at each outlet? How many items will be priced in a given outlet? (The statistical agency that produces the national CPI is a good source for this information). How many cities/villages are in the sample? Can one interviewer cover more than one city/village? Can the HES interviewers also collect the price data or will their workload already be full?

(b) Develop price survey questionnaires. Each form should include information needed to identify the outlet (location, name, type of outlet) and the detailed specifications of each item to be priced in the outlet, together with space for the data collector to enter the price, the size or quantity priced, and any other relevant information. A separate form for each outlet is suggested.

(c) Train the data collectors in the use of the forms, importance of locating and pricing the exact item specified, and other survey procedures.

(d) Develop appropriate systems to control the whereabouts of survey questionnaires and to monitor workload.

5. Data processing and index estimation

    (a) Review, edit and code the data. If a computer is used, enter data into data base. If price data are tabulated by hand, transcribe data from outlet-specific collection questionnaires on to SEG-specific, item-specific tabulation sheets, and verify.

    (b) Estimate base cost weights for each item for each SEG, using HES data adjusted and deflated to a common time denominator.

    (c) Estimate price ratios for each item/SEG, over time or between SEGs.

    (d) Estimate indexes, weighting the price ratio by the cost weights according to the appropriate estimating formula. (See section II).

    (e) Analyze and publish the indexes.

6. Cost elements of Price Survey

    (a) Personnel costs - including central office staff (economists, statisticians, computer operators, clerks) as well as data collectors and supervisors.

    (b) Travel costs, particularly for data collectors, but also for other staff as necessary.

    (c) Data processing costs, including computer time (if used).

    (d) Paper, pencils, printing of survey forms, postage or shipping costs, office space (in field as well as central office), printing of reports and data publications, and so on.

The statistical office responsible for the national CPI may be able to provide reasonable cost estimates, as well as information useful in determining sample size and survey procedures. The approach to consultation with that office may depend on the organizational structures and responsibilities of the agency responsible for the LSS in relation to the CPI. However, such consultation may facilitate consideration of the possible integration of the surveys (see section V).

APPENDIX

Incorporation of Price, Quantity and Expenditure Data
for a Country into the International Comparison Project (ICP)

The appendix is concerned only with how the expenditure survey and the price collection can be structured so that the data will be most useful to the ICP; it does not cover the additional data needs of the ICP. For instance, there is no discussion of the collection of data for capital formation and government expenditures, or the collection of data for hedonic analysis of housing, and so forth. Also the problem of the portion of final consumption expenditures not purchased directly by the households is not discussed, although such consumption is included by the ICP. (UNSO, 1980).

The most important consideration is that the items on the Household Expenditures Survey be consistent with the classification system of the ICP. The classification system of the ICP is based on the UN's System of National Accounts, (United Nations, 1968). If the countries involved use the SNA for their National Accounts, they will probably want the HES to be structured along the lines of the SNA. The HES will provide valuable information to the National Accounts. The main difficulties will be found in those countries which do not base their National Accounts on the SNA, and who want the HES data to conform to their own structure of National Accounts.

It is too much to attempt the requirement that all household expenditure items be the same for all countries, as was attempted in the ECIEL (Musgrove, 1982). Nor is this required. But it is important that the household expenditure items on the survey be such that they can be applied to the detailed categories of the ICP.

The ECs for the individual SEGs should also correspond to ICP detailed categories. In general, it would be expected that the number of ECs for a country will be less than the number of detailed consumption categories used by the ICP. Therefore, it is important that ECs, which are more aggregate than the detailed ICP categories, contain a clear subset of the ICP categories. In those cases where an EC contains only part of a detailed category, it is important that an EC be formed for the remainder.

In general, it would not be useful to attempt to impose the specifications used in the ICP on the LSMS project. The prices selected by the LSMS, and used for measuring price change over time for the SEGs, should be selected to represent the expenditures of individual SEGs. Similarly, if LSMS comparisons are to be made between SEGs, at a point in time, the best prices to use for the comparison should be selected. If ICP specifications are used rather than those required to best meet the goals of the LSMS, the LSMS programs could be compromised.

If the expenditures are consistent with the ICP detailed categories, and there is an ongoing pricing program to collect prices that represent national prices, the basis for participation in the ICP exists. For the initial comparison, the set of detailed items for consumption expenditure will need to be determined. To the extent that the selected items are not part of the regular program, prices will need to be collected. These special prices

could be collected during the routine visits to the outlets. The specifications for the ICP could be given to the regular price collectors. The ICP needs national prices which could be collected in any outlet where the specified items are sold. If too many prices are the result, it would always be possible to collect the ICP prices in a subsample of the regular outlets.

The prices collected, together with the HES items tabulated by the ICP detailed categories, would be the basic data input into the ICP process. This input would only be required for a full scale comparison. For interim comparisons, the expenditures could be updated by using the national index for individual components. The updating could be done because there would be a specific correspondence between the indexes and the ICP's detailed categories.

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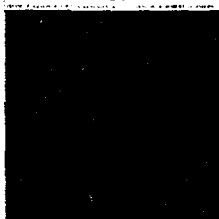
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