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A large-scale national survey of consumer expenditures was conducted in 1972-73 by the Bureau of the Census on behalf of the Bureau of Labor Statistics (BLS), primarily for the purpose of updating the weights and the selection of items for the Consumer Price Index. An entirely different methodology was used in the 1972-73 survey from that employed in previous BLS undertakings in this field. In the prior surveys, the most recent in 1960-61, the procedure followed was the so-called "annual recall" method. In extremely lengthy interviews, lasting up to 8 to 12 hours although obviously completed in more than one visit, an effort was made to determine the expenditures of the family, large and small, for the entire preceding calendar year. A modified procedure was followed to obtain details about food expenditures and a few other categories by inquiring about such outlays in the week preceding the interview.

The new approach used in the 1972-73 survey attempted to take account of the experience in other survey undertakings aimed at controlling response errors. A number of the techniques were borrowed from the methodologies in use in expenditure surveys in other countries and in university and market research in the U. S.

The survey comprised two major components:

(1) An interview panel consisting of about 10,000 households each year which was visited on a quarterly basis primarily to obtain the larger items of expenditure and certain repetitive items (rent, utilities, etc.) Particular categories were covered either quarterly or on a semi-annual or annual basis, depending primarily on expenditure size.

(2) A diary operation consisting of about 200-250 households per week asked to keep a diary or record of all expenditures for the subsequent two-week period. Although the main focus of the diary was the smaller items of expenditure, the fact that all categories were covered provided various options in compiling estimates as well as many research opportunities.

Because of the critical uses which will be made of the data and the marked change in methodology, an evaluation of the results is clearly in order. This may be especially important in view of current plans to institute a continuing survey of consumer expenditures using a similar methodology, in place of the intermittent efforts which have characterized this field in the past. The purpose of this paper is to present the preliminary results of such an evaluation, which should also be relevant for other survey endeavors which use or could use similar techniques. ^{1/}

^{1/} A detailed report on the evaluation will be issued in the Census Bureau's Working Paper series. The research has been performed under a joint statistical agreement between the University of Illinois and the Census Research Center for Measurement Methods.

Description of survey procedures

Some additional details about the survey procedures may be useful in following the discussion in the remainder of this report. In the diary operation, a given record book contained space for recording expenditures for 7 consecutive days. A diary was placed by means of a personal visit by an interviewer who returned 7 days later to pick up the first book and leave a second, which was collected the following week. Each diary contained a set of two facing pages for each day of the 7-day period. The left-hand page was devoted entirely to food and beverage purchases for home use and was subdivided into several sections with general product headings (dairy and bakery products; meat, fish, and poultry; fruits and vegetables, etc.). A section was provided at the top of the right-hand page for recording expenditures for meals and snacks purchased in restaurants and other eating places. The remainder of the right-hand page was divided into small sections for various non-food categories, with principal emphasis to the kinds of small, every-day expenditures for which the diary procedure was primarily intended. Obviously, not all products and services could be specifically mentioned, so that a good many were relegated to a catch-all section. Since only one record book was provided for a given 7-day period, it is likely that a single respondent (usually the homemaker) kept the diary for the entire family.

The quarterly panel questionnaire was a document of imposing, if not overwhelming size, although not all items, fortunately, were asked each quarter. The information was collected by personal interview, usually with a single household respondent. The subjects covered each quarter included home repairs and alterations, utility and fuel costs, clothing and household linens, equipment repairs, vehicle repair and maintenance, and trips and vacations, among others. The questioning was conducted on a semi-annual basis for small household appliances and equipment, furniture and other home furnishings, health expenditures, education, and a few miscellaneous items such as catered affairs, funerals, and moving expenses. The topics covered on an annual basis included rent, mortgage payments and other housing costs, major appliances, vehicle purchases, insurance premiums, subscriptions and memberships, and a few others.

A number of special techniques were employed for various expenditure categories in the quarterly panel. One which is relevant to the discussion in this report is the so-called "inventory" approach used for household appliances and vehicles. Instead of inquiring directly about expenditures for a given period, respondents were asked at the first interview about possession of the articles in question. If any such items were present, the date of acquisition was determined and, if within the previous year, the cost and a variety of other characteristics were recorded. The items in the inventory were

differentiated between those purchased by the family for its own use and those it had received as gifts from persons outside the household. This inventory was updated at specified subsequent visits with inquiries about any new acquisitions, differentiated into the same two classes. Questions were also asked at these updatings about items purchased by the family as gifts to be given to persons outside the household. Thus, there were two measures of expenditures for gifts (the reported value of those received and the reported cost of those given), either of which could be used as part of the total expenditure estimate.

Aside from the manner of estimating gifts, another feature of the inventory approach is the possibility of deriving two separate expenditure estimates for each year. The first, which is the one ordinarily used, is a direct estimate of acquisitions in that year derived by updating the inventory in the course of the survey for that year. The second is an indirect measure obtainable from the initial inventory in the survey for the following year, whereby items secured during the previous year can be identified from the reported date of acquisition.

Summary of findings for expenditure categories

In the remainder of this paper, an assessment is attempted of the adequacy of the expenditures data obtained in the 1972-73 survey for the various categories of goods and services. The general approach used in this appraisal has been to compare the estimates from the quarterly panel with those from the diary operation, where the same subject was covered in both, and to relate either or both to various independent sources of expenditure data. The principal objectives are to assess which of the survey procedures appeared to be more effective for particular categories of expenditures and to determine what types of improvements and modifications may be suggested by the results. The conclusions can only be tentative because of major uncertainties about the validity and comparability of the independent data used as a standard and because adequate detail was often unavailable to explore the subject in sufficient depth. Nevertheless, in a substantial number of cases, persistent patterns emerged across category lines which pointed in rather specific directions.

The most frequently used of the independent data sources are the Personal Consumption Expenditure (PCE) estimates prepared by the Department of Commerce in conjunction with the Gross National Product Accounts. These represent, essentially, the market value of goods and services purchased by persons and nonprofit institutions in the U. S. The estimates are developed from a variety of primary data sources by means of a complex series of transformations, the reliability of which is indeterminate. Moreover, the PCE data are compiled only in summary form on a current basis. Detailed estimates are provided only for benchmark (quinquennial economic census) years with the most recent available at this writing relating to 1967. In order to derive the necessary level of disaggregation for these comparisons, it was necessary for the author to update the detailed PCE estimates from 1967 to 1972

using appropriate Census of Manufactures and Census foreign trade data, a step which of course adds to the uncertainty. The other independent data derive mainly from Government administrative census, or survey sources although some private sources are also used.

It should be noted that the survey results used in this evaluation are derived from special tabulations of re-weighted original data tapes. They do not reflect editing changes which may have been made at later stages of processing by BIS. As a result, the figures may differ somewhat from those already published or to be published by that Agency or which may be compiled from the public-use data tapes recently issued. Certain differences in time reference and conceptual approach would also contribute to the disparities.

Table 1 presents a summary of the findings for the various expenditure categories. For purposes of summarization, a number of the detailed categories have been combined and averaged. The table designates the "best" survey source, that is, the one generally closest to the independent data, in cases where the two survey estimates are significantly different. The ratios of the "best" survey estimates to the independent estimates are indicated in terms of broad class intervals, allowing insofar as possible for conceptual differences between the sources, but the actual computed values are also provided.

1. Food and beverage expenditures--After allowance insofar as possible for various conceptual incomparabilities, there appeared to be a reasonably close correspondence between the diary estimates of food purchases for home use and the independent sources. The fact that the homemaker--the usual diary keeper for the family--is ordinarily responsible for most of the purchases was undoubtedly a positive factor. The allocation of maximum space on the diary record to this expenditure class probably contributed as well.

There were considerable disparities, however, in the precision with which various food categories were reported. The reporting was apparently most complete for relatively costly items, such as meat and poultry, and for those used promptly and on a daily basis, such as milk and other dairy products and bread and fresh-baked items. The coverage seemed to be considerably less complete for food staples such as flour, shortening, and sugar which are bought less frequently, with each purchase used over a considerable period of time. One of various possible explanations for these differences is that many respondents may not start keeping their diaries promptly--or do not make entries, as requested, on a daily basis--but later attempt to reconstruct the omitted periods by memory. In doing so, items which represent the main course in a meal or which are purchased and used relatively frequently might be more readily recalled.

A less anticipated finding was the close correspondence between the survey and independent estimates for meals in restaurants or other eating places, where a substantial proportion of

the outlays would be made by individual family members other than the homemaker. The prominent positioning of the section for reporting purchased meals on the diary record and some emphasis to this subject at the time of the diary checking procedure might have contributed to this outcome. At the same time, the marked deficiency for alcoholic beverages confirms the continued failure of household surveys to measure a sector where there is considerable sensitivity about reporting.

2. Small expenditures other than food--For various small expenditure items other than food, for which the diary was the principal if not only source, a predominant factor appeared to be the role of the various family members in making purchases. Where the responsibility was principally that of the homemaker, such as for laundry or cleaning products or household services, the reporting appeared to be considerably more complete than in cases where other members were substantially involved, as for toiletries or hair care. Even for those expenditures where the homemaker predominated, however, the reporting appeared to be generally less adequate than for food purchases, probably partly a reflection of the much smaller amount of space and attention given to non-food items on the diary record.

3. Clothing expenditures--As was anticipated to some extent, this expenditure category represented one of more troublesome sectors, with neither survey source exhibiting any clear cut overall advantage and neither corresponding very closely with the independent data. Following the pattern observed throughout the analysis--and expected from previous experience--the larger items (suits, coats, etc.) were apparently more adequately reported and the quarterly panel emerged as the superior source in this case. Also not surprisingly, the diary procedure represented the "best" source for a diversified category such as accessories, where it was probably difficult to communicate the full range of items in an interview procedure. For no apparent reason, the diary estimates also provided the closer correspondence with the independent data for footwear, although this subject was probed in much greater detail in the quarterly panel.

For the broad range of middle and lower priced clothing products, the advantage seemed to alternate between the two survey sources, without any consistent relationship to the importance of the item. One problem which complicated the appraisal--and which extended to most other expenditure classes as well--was the existence of a large residual clothing group in the diary estimates, consisting mainly of incomplete or inadequate entries which could not be assigned to specific categories.

4. Household appliances--The results for both major and minor household appliances, for which the quarterly panel was the rather evident source, represented one of the more successful outcomes of the survey. The "inventory" approach, described earlier, was evidently an important factor in this showing and it appeared that the benefits could be maximized when the technique

was used to its fullest extent. For categories where gifts are significant (e.g., small kitchen appliances and sound equipment), this appeared to suggest using, for purposes of estimation, the estimated value of gifts received by the family from others (which derived directly from the inventory of items on hand) as opposed to the reported cost of gifts given by the family to persons outside the household, which was based on a recollection of previous purchases. Also, there was some evidence in favor of pooling the two estimates obtainable for a given year under the inventory approach, the one based directly on the survey for that year and the other derived indirectly from the initial inventory in the survey for the following year. Comparisons between those two sets of estimates indicated no evident superiority of either over the other in relation to the independent sources. Pooling of the estimates would have roughly the effect of doubling the sample size, a considerable advantage for items with especially large variances.

5. Household furnishings--This broad category provided a rather clear-cut demonstration of the relationship between the size of an expenditure and the likelihood of its being reported. The closest correspondence with the independent estimates was found for furniture, the most costly class, followed by the next most significant group--floor, window, and furniture coverings. In both cases, the quarterly panel appeared to be the superior source, partly on the basis of sampling variances. The survey estimates fell considerably short for household linens and especially for smaller products such as dinnerware and cookware, luggage, and decorative items. In these latter instances, the diary estimates, although themselves deficient, appeared to be at least equivalent in coverage to those from the interview panel.

6. Automobile and vehicle expenses--In nearly all cases, except for the diversified accessories group, the survey data corresponded rather closely with the independent estimates. Moreover, although the homemaker would normally have less responsibility for this sector than most others, the diary estimates were not significantly different from those from the interview panel for some of the smaller categories, particularly gasoline and accessories. The quarterly panel was, as usual, clearly more effective for the larger items--vehicle purchase, tires, and insurance--and also appeared to provide somewhat more complete results for maintenance and repair expenditures.

7. Housing expenditures--Once again, with the exception of one rather diffuse category (fuel purchases), the survey and independent estimates corresponded rather closely. Also, in the main, the diary-based data, again unexpectedly, matched those from the interview panel.

8. Health expenditures--One of the more pleasant surprises was the relatively close correspondence between the survey and independent estimates for most health expenditures, usually considered to be one of the more treacherous

areas in this kind of undertaking. A less optimistic reading might be that the survey results were at least as good as most previous endeavors of a similar nature, without attempting to categorize their accuracy in an absolute sense. In any event, the diary procedure once more provided the most unexpected outcome, in that not only for small items such as drugs and medicines, but also for most professional health services, the data seemed to hold up surprisingly well. An exception was for hospital services but even the quarterly panel data in that instance seemed somewhat deficient, possibly because of complications introduced by the pervasive role of health insurance and other third-party payors.

Conclusions and Recommendations for Diary Procedure

Many of the survey findings were predictable on the basis of previous experience in this field, but a rather unexpected outcome was the relatively effective performance of the diary operation in some sectors, such as housing and health, where the quarterly panel had been assumed to be the only realistic option. At the same time, a number of deficiencies were observed in the diary results even in categories where that procedure was deemed to be the more appropriate source. In addition to the specific comments made earlier for particular expenditure categories, the general conclusions affecting the operation are as follows:

1. Use diary procedure as primary source unless evidence clearly dictates otherwise--A general rule of thumb suggested by the findings is that, unless a clear-cut reason exists for using an interview procedure such as the quarterly panel, dependence might better be placed on the diary approach for a given expenditure category. The diary would be a dubious source for items with exceptionally large variances (vehicles, appliances, furniture, etc.) or where unusual payment arrangements might require special questioning (insurance paid through payroll deductions, mortgage payments made automatically through bank accounts, hospital bills paid largely but belatedly by insurance, etc.). In most other instances, the diary procedure appears to be at least as good a risk as the interview approach, and probably a less costly one as well. A number of modifications and improvements in the diary procedure are clearly necessary, however, in order to overcome some rather evident deficiencies.

2. Limit the range of items any one family would be asked to report--The use of a diary covering all items of expenditure, as was done in the 1972-73 survey, may have certain theoretical benefits, but considerably proscribes the ability to improve the overall process sufficiently to satisfy the expanded requirements just cited. Evidently, as stated earlier, one of the reasons for the more successful coverage of food purchases than other small items in the 1972-73 diary was the much greater amount of space and attention accorded the former. Moreover, for all categories including food, there was a considerable undifferentiated residual group, resulting mainly from incomplete or inadequate entries which could

not be classified in detail, which detracted materially from the usefulness of the results. The general lack of space and the inability of interviewers to focus on so wide a range of items in reviewing the diaries probably largely accounted for this latter deficiency.

Since it would be impracticable to provide adequate space and annotation for all categories on a single form, one rather evident solution would be to limit the range of items which any one family would be asked to report. For example, one subsample might be asked to report only on food and other supermarket products, a second on clothing and household linens, a third on health-related expenditures, etc. There is obviously some practical limit to the number of subsamples that could be simultaneously operated and a good deal of thought and some experimentation would be necessary to devise a workable plan.

Probably even more important than space considerations, the use of this kind of specialized approach would make it feasible to provide for a more focused set of check questions and procedures at the time of diary pickup to overcome some of the disparities noted in the present survey (such as underreporting of certain food items relative to others). In fact, a modified procedure would likely entail much more of a combination of interviewing and record keeping than is now the case.

3. Vary length of record-keeping periods--As previously noted, the 1972-73 survey provided for two weeks of record keeping for each sample family, covering all items of expenditure. If specialized subsamples are developed as proposed above, it is obvious that either a larger overall sample would be needed or much higher sampling variances would have to be accepted. One way out of this dilemma would be to vary the length of the record-keeping period depending on the variances of the subjects covered for a given subsample. For example, for a low variance category such as food, it might even be possible to reduce the record-keeping period to one week or 10 days. For most categories, however, such as clothing expenditures or health costs, an increase in the period of record keeping to up to 3 months or longer might be considered. The fact that only a limited set of items is covered might reduce the reporting burden sufficiently to secure extended cooperation of this kind. In such a system, use of less costly collection methods such as having respondents mail in completed diaries on a periodic basis (monthly, semi-monthly, etc.) would be more practicable.

4. Provide separate diaries, where indicated, for individual members--As noted, only one person, usually the homemaker, probably maintained the diary for the entire family in the 1972-73 survey. Not surprisingly, the results were clearly more favorable for the kinds of expenditures for which the homemaker was mainly responsible than for those likely to be made by other members. One possible way of obtaining more consistent results, where the expenditures to be

reported are of a more dispersed nature, would be to provide separate diaries for all family members above a certain age (perhaps 12 and over) on which to record their individual disbursements. For this purpose, the diaries could be briefer and less formal than the main record for the family.

5. Reconsider matter of providing monetary or other incentives for cooperation--An experiment was conducted in the early stages of the 1972-73 survey on whether an offer of cash payments would materially improve cooperation in maintaining diaries. The results were inconclusive in this regard and the incentives were dropped from the procedure. However, most previous experience supports the notion that both cooperation and adequacy of reporting are benefited by some inducements of this kind. If greater dependence is to be placed on diaries in a continuing operation, as is being proposed, it would seem especially important to reconsider this matter of offering incentives and to experiment with alternative approaches.

6. Continue exploration of timing biases--Although not mentioned up to this point, perhaps the most conclusive survey finding was affirmation of the traditional bias found in diary operations, whereby a higher level of expenditures is reported in the earlier as opposed to the latter stages of the record keeping period. In a 2-week diary procedure, for example, the estimates for the first week are almost invariably higher than those for the second week. Differences of this nature were found for virtually every expenditure category in the 1972-73 survey. The margins of difference varied a good deal, however, and seemed to be almost random in nature. There was no evident relationship of the weekly differences for a category to other survey measures, such as the completeness of reporting

relative to the independent estimates.

Many explanations have been offered for this phenomenon. One theory suggests that expenditures are exaggerated in the early stages because of "telescoping," that is, inclusion of some purchases made prior to the record-keeping period. Another is that reporting tapers off toward the end because of fatigue. Temporary alteration of buying habits because a diary is being kept has even been suggested. More detailed information on this subject, which will be presented later, will hopefully shed further light on this matter, although it is unlikely that the issue will be fully resolved. It is possible that some changes in survey procedures will be suggested by these findings, but the scope and nature of these are still uncertain.

7. Explore use of universal product codes--A promising technological development that could affect future survey work in this field is the inclusion of "universal product codes" on most canned and packaged supermarket and drug store items (and likely to extend to many others). A useful experiment would be to ask respondents to record these codes in their diaries where available, as well as brief product descriptions, to assess how accurately this information is reported. If the effort is sufficiently productive, respondents might be relieved of the necessity of describing products in any detail where code numbers are available. More importantly, this step could result in far more accurate and consistent classification of products reported in surveys and a major reduction in the coding effort required at the data processing stage.

**Table 1 -- Summary of Findings for Expenditure Categories:
1972-73 Expenditure Survey Data Compared to Independent Sources**

(Table condensed because of space limitations; full detail in forthcoming report, see text footnote 1)

Category	"Best" Survey Source 1/ QP= Quarterly Panel D= Diary Operation N= No Significant Difference	Ratio of "Best" Survey Estimate to Independent Estimates			Principal Independent Sources Used (PCE= Personal Consumption Expenditures, GNP Accounts) 3/
		Best Judgment as to Range of Ratios (allowing for conceptual and other differences between sources) 2/	Survey Results		
			Actual Ratio of Survey to Independent Estimates	Estimated Standard Error of Ratios	
<u>Food Purchases for Home Use*</u>	D**	A,B	.86	< .01	PCE, Dept. of Agriculture
Meat, Milk, Bread, etc.		A	.96	.02	
Food Staples (Flour, Sugar, Oil)		D	.65	.02	
<u>Purchased Meals and Snacks*</u>	D	A	1.10	.02	PCE, Census of Business
<u>Alcoholic Beverages*</u>	D	E	.38	.03	
<u>Small Non-Food Expenditures</u>	D**				PCE, Census of Selected Service Industries
Mainly Responsibility of Homemaker Goods (Laundry-Cleaning Products)		C	.72	.02	
Services (Laundering, Domestic Help)		A	1.04	.02	
Dispersed Responsibility Goods (Toiletries, Film, etc.)		D,E	.57	.02	
Services (Hair Care, Sports, etc.)		C	.68	.02	
<u>Clothing Expenditures*</u>	N	C	.73	.01	PCE, Market Res. Corp. of America (MRCA)
Larger Items (Coats, Suits)	QP	A	1.11	.03	
Medium and Smaller Articles	N	C	.76	.01	
Accessories (Hats, Ties, etc.)	D	C	.72	.03	
Footwear*	D	B,C	.79	.01	Cens. of Bus.
<u>Household Appliances</u>	QP**				PCE
Major Appliances		A	1.00	.02	
Minor Appliances		A	1.01	.03	
<u>Home Furnishings</u>					
Furniture*	QP	A,B	.91	.03	PCE, Census of Bus., MRCA
Floor Coverings, Drapes, etc.	QP	B,C	.75	.03	
Dinnerware, Luggage, Tools, etc.	N	E	.48	.02	
<u>Vehicle Expenses</u>					
Vehicle Purchase*	QP**	A	1.01	.03	PCE, Annual Housing Survey, Cens. of Bus.
Gasoline and Oil*	N	A	.98	.01	
Accessories, exc. Tires*	N	D	.67	.02	
Repairs and Maintenance*	QP	A,B	.88	.02	
<u>Housing Expenditures</u>					PCE, Annual Housing Surv., Survey of Alterations and Repairs
Rent*	N	A	1.03	.02	
Mortgage Payments, Taxes*	QP	A	1.02	.04	
Home Repairs and Alterations	N	A	1.04	.06	
Utility Bills	N	A	1.02	.02	
Fuel Costs (Fuel Oil, Coal)	N	C,D	.61	.02	
<u>Health Expenditures</u>					Soc. Security Adm., Center for Health Studies, PCE
Hospital Services*	QP	C	.76	.04	
Professional Services*	N	A	.98	.02	
Drugs and Sundries	D	A	1.02	.05	

* Signifies comparisons based on two years of data; other comparisons based on 1972 only.

1/ The "Best" survey estimate is defined as the one--quarterly panel or diary--closest to the independent figures. Where a double asterisk (**) is appended to the code, this indicates the specified source was the only one for which comparisons with the independent data could be made in the required detail.

2/ The ranges in this column are not always entirely consistent with the computed ratios in the next column, but make allowances for conceptual differences between survey and independent sources, disparities among the independent sources, and other factors for which numerical adjustments cannot be made.

3/ Detailed description of sources in forthcoming report, see text footnote 1.