

# The Consumer Expenditure Survey: quality control by comparative analysis

*As with any statistical program, assessment of results is an important part of the expenditure survey; a vital component of BLS postsurvey evaluation is comparison with other data on aggregate spending, most notably those from the National Accounts*

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Postsurvey evaluation is an integral part of a program of quality assurance for the ongoing Consumer Expenditure Survey (CE). Comparisons with data from independent sources serve to monitor consistency of results from the survey and help identify areas where survey performance can be improved. This article highlights some of the findings obtained by comparing aggregate consumer expenditures from the CE with data from alternative sources.

## **The expenditure survey described**

The Consumer Expenditure Survey provides a continuous and comprehensive flow of data on the expenditures, income, and other selected characteristics of American consumers. The survey, which is conducted by the Bureau of the Census for the Bureau of Labor Statistics, consists of two components: (1) A Diary, or recordkeeping, survey completed by participating consumer units<sup>1</sup> for two consecutive 1-week periods; and (2) an Interview survey in which the expenditures of consumer units are obtained in five consecutive quarterly interviews.

Each component of the survey addresses an independent sample of consumer units which is representative of the U.S. population. Over 52 weeks of the year, 5,000 consumer units are sampled for the Diary survey. Because each unit keeps a diary for two 1-week periods, approximately 10,000 diaries are obtained each year. The interview sample is selected on a rotating panel basis, targeted at 5,000 consumer units each quarter. The data are collected on an ongoing basis in 101 areas of the country.

The Interview survey is designed to capture expenditures which respondents can recall for a period of 3 months or longer. In general, these include relatively large expenditures, such as those for real property, automobiles, and major appliances, or expenditures which occur on a fairly regular basis, such as rent, utility payments, or insurance premiums. The Interview survey also provides data on expenditures incurred while on overnight trips and vacations. Including "global estimates" of spending for food, about 95 percent of all expenditures are covered in the Interview phase. Excluded are nonprescription drugs, household supplies, and personal care items.

The Diary survey is designed to obtain detailed expenditures on small, frequently purchased items which are normally difficult for respondents to recall. Records of expenses are kept for food and beverages, both at home and in eating places, tobacco, housekeeping supplies, nonprescrip-

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tion drugs, and personal care products and services. This kind of detail is needed for the periodic rebasing of the Consumer Price Index. Expenditures incurred by members of the consumer unit while away from home overnight or longer are not collected in the Diary survey. CE estimates of food expenditures are particularly affected by this feature.

Expenditure estimates from the CE are transaction costs, including excise and sales taxes, for goods and services acquired during the survey reference period. The full cost of each purchase is recorded, even though full payment may not have been made at the time of purchase. Business-related expenditures and reimbursed expenses are excluded.

Even from this limited description, one can discern a number of possible sources of error in the expenditure survey. As in all sample surveys, the results are subject not only to sampling error, but also to many of the same limitations that would apply to a complete census. The time and effort required to keep a diary of purchases, or to complete an interview, are quite likely to have an impact on the completeness with which expenditures are reported by respondents. Aspects of the collection methodology, interviewer quality, environmental conditioning, processing error, and other factors influence the findings.

There can be overreporting or underreporting of the expenditures. For example, in reporting food expenditures, participants in the Diary survey may record purchases from grocery stores, but overlook food items purchased from a convenience store. In the quarterly Interview survey, participants might not recall some items of clothing purchased 2 or 3 months ago, or might report an incorrect transaction amount. The constraints on respondents' time or the lack of participation in the survey by all consumer unit members might cause several purchases to be overlooked.

As we shall see, available evidence suggests possible underreporting for many items in the expenditure survey; overreporting does not appear to be a problem. This article focuses on comparisons of CE data with other, related data, but some of the expenditure survey data themselves also point to sources of underreporting. For example, in the Interview survey, it has been found that expenditures for many items are reported more frequently for the month immediately preceding the interview than for earlier months.<sup>2</sup> In the Diary survey, it has been found that average reported food expenditures tend to decline across days of participation.<sup>3</sup>

### **Overview of postsurvey evaluation**

The primary role of postsurvey evaluation is to assess the cumulative effects of nonsampling errors on the quality of the data obtained from the survey. Comparisons with data from external sources are important in shedding light on the strengths and weaknesses of survey findings. Since the start of the ongoing Consumer Expenditure Survey in 1980, such comparisons have become a regular part of the CE program. What was expected from these comparisons was a sense of

degree and direction of possible survey errors, rather than an exact measure of bias, because the specific estimates from other sources are not necessarily the "true" values.

A principal source of independent data, but not the only source for this purpose, is estimates of expenditures for goods and services from the personal sector of the National Income and Product Accounts. In these accounts, estimates of expenditures are based largely on records of sales by business and government enterprises. While these data are not subject to the same errors inherent in household surveys, they are subject to their own measurement errors and to judgment errors in the estimation and allocation of sales to the personal sector and other sectors of the accounts. Such errors cannot be quantified easily.

*Personal Consumption Expenditures.* The Personal Consumption Expenditures (PCE) component of the National Income and Product Accounts (NIPA), prepared by the Bureau of Economic Analysis of the U.S. Department of Commerce, provides estimates for many types of spending that can be compared with CE expenditure components. The series is derived by complex methods which trace the flow of goods and services through the economy.<sup>4</sup> The procedure requires estimating total production, then allocating production to intermediate users and to final demand. Cost and profit margins are estimated to arrive at final market values. Primary sources of the data are the Census of Manufactures, available once every 5 years, and other economic censuses.

The estimates for a particular year are updated the following year as more current source data are incorporated. They also are subject to periodic revision if additional sources of information become available. Finally, "benchmark estimates" of consumer spending are derived every 5 years as the results of economic censuses become available.

The latest benchmark estimates of consumer spending, released in December 1985, were based on findings from the 1977 economic censuses. One result of the most recent benchmarking was to increase the amount for food in "purchased meals and beverages" in 1984 by 9.2 percent. The estimate of expenditures for kitchen and household appliances for the same year was lowered 10.6 percent. The fact that substantial revisions to PCE take place as much as 5 years after publication reinforces the point that there is no "true" value for consumer expenditure estimates.

Personal Consumption Expenditures represent the market value of goods and services purchased by the entire personal sector of the U.S. economy, including net purchases of used goods. Also included are operating expenses of nonprofit institutions serving individuals, and the value of food, fuel, clothing, rent of dwellings, and financial services received in kind by individuals. The PCE purchasing universe is slightly larger than that covered in the Consumer Expenditure Survey. Included in PCE estimates are purchases by the military and the institutional population not accounted for elsewhere in the government sector of the National Ac-

counts, and purchases of goods and services provided by nonprofit organizations. PCE categories also include expenditures in the United States by foreigners.

In an earlier work, H.S. Houthakker and Lester D. Taylor compared "private consumption expenditures" from the National Accounts with aggregate spending by consumer units from the 1960–61 Survey of Consumer Expenditures, and pointed out some of the differences in the measurement and classification of expenditures that must be addressed when comparing data from the two sources.<sup>5</sup> In an extensive comparison of CE expenditures with data from independent sources, Robert B. Pearl relied heavily upon the National Accounts to assess findings from the 1972–73 survey.<sup>6</sup> Both of these studies provided evidence that, for several categories of goods and services, expenditures were underreported in the Consumer Expenditure Survey.

Unfortunately, a straightforward comparison between CE and PCE components of spending is not possible. For some components of expenditure, differences in concepts are so great as to render the comparison meaningless. For other spending components, there are differences in coverage that must be accounted for before a comparison can be made. A couple of examples illustrate this process.

CE aggregate expenditures for health care cannot be compared with medical care expenditures in PCE. The expenditure survey in general is concerned with direct payments by households for goods or services. Therefore, costs for health care are out-of-pocket expenditures by households for insurance, medical commodities, professional services, and hospital care. Payments for insurance by employers or reimbursements by insurance companies are not included. The PCE on the other hand, is concerned with the total value of private health care, regardless of who is actually incurring the expenditure.

CE and PCE expenditures for owned dwellings also are not comparable. CE expenditures for owned dwellings, as published, are actual outlays reported by all homeowners for mortgage interest, property taxes, and insurance, maintenance, and repairs. PCE published estimates are the space rental value of owned shelter.<sup>7</sup> Other components not compared because of intractable conceptual differences are educational expenses; contributions to religious, political, and charitable organizations; and all insurance.

However, CE and PCE expenditures for rented shelter can be compared after adjustment. In the expenditure survey, rent is based on "contract rent," which includes the implicit cost of utilities paid for by landlords, while PCE rent for tenant-occupied dwellings is space rent excluding any utilities. By adding the two components for both series, an estimate for "rented shelter, fuel, and utilities" can be compared. For the comparative analysis of CE and PCE estimates, almost every expenditure component requires some adjustment.<sup>8</sup>

*Other data sources.* It is possible to compare aggregate

expenditure findings from the survey with national industry and trade statistics, where the transactions refer directly to consumer units. Several independent sources that provide data suitable for this purpose have been identified and are used to evaluate expenditure findings for some of the categories of goods and services included in the CE.

*Method of analysis.* Assessments of findings have been made for both the Interview and the Diary portions of the Consumer Expenditure Survey. Personal Consumption Expenditure estimates were compared to Interview survey results for many categories of household spending, and to food expenditures from the Diary survey. Data on direct costs to consumers for medical care from the National Health Accounts, prepared by the U.S. Department of Health and Human Services, were matched against out-of-pocket medical care costs reported in the Interview Survey.<sup>9</sup> Data on grocery store sales from trade publications also were examined relative to detailed food expenditure estimates from the Diary survey.

To compare the data, CE aggregate expenditure estimates were first developed, based on consumer unit counts and average expenditures per unit for specified groups of goods and services.<sup>10</sup> These estimates were compared with estimates of aggregate spending from independent sources for similar goods and services, and ratios were calculated. Throughout the discussion that follows, it should be kept in mind that because the various data series are used for different purposes, there usually are significant differences in concept, coverage, and classification of expenditures.

### **Interview survey versus PCE**

Results of comparing CE Interview survey data with selected components of PCE for the period 1980–84 are shown in table 1. Although CE aggregate expenditures were lower than those for PCE for all components of spending except personal care services, the relationship over the 5 years was consistent. The components of expenditure for which the two aggregate estimates were closest included rent, fuel and utilities, telephone service charges, furniture, and transportation. These components typically either have regular periodic billing and payment or involve major outlays that may readily be recalled by respondents and substantiated with records.

Except for furniture, Interview survey expenditures for household durables were low relative to PCE. Spending for household appliances was one-third to one-fourth lower than PCE estimates, and that for radio, TV, and musical instruments was also about one-third lower. The inclusion of minor appliances, for which purchases may be more difficult to recall, could partially explain the lower relative CE findings for household appliances. Also, the allocation of major appliance production in the National Accounts between PCE and intermediate purchases by contractors and landlords is particularly uncertain. Among radio, TV, and

musical instruments are a number of small items such as video cassettes and recorders, TV games, records, and tapes. Outlays for these products could have been forgotten by survey participants.

Interview survey expenditures for private transportation were comparable with PCE estimates. However, CE expenditures for public transportation were low, ranging between 56 percent and 63 percent of PCE figures. Public transportation expenditures include airline fares, local and interarea mass transit charges, and taxicab fares. These same components are especially difficult to estimate in PCE because expenditures must be allocated between businesses and households.

The results of the comparisons point to several areas where underreporting of expenditures appears to be a problem in the Interview survey. Among these are alcoholic beverages, some housefurnishings and equipment, apparel, entertainment, reading materials, tobacco, and miscellaneous expenditures. Spending on alcoholic beverages and tobacco traditionally has been underreported in household surveys. Houthakker and Taylor noted a large discrepancy when analyzing 1960-61 expenditures for alcoholic beverages, which they said "...points to a substantial 'Puritan' element in the household data."<sup>11</sup> A similar element probably explains a tendency to underreport tobacco expenditures. However, a number of areas where underreporting exists in the Interview survey may be more responsive to

improved survey methodology.

Year-to-year changes in the ratios of CE aggregate expenditures to Personal Consumption Expenditures provide useful monitors of survey performance. For example, the ratios of CE to PCE for alcoholic beverages and housewares in the 1980-84 data are higher than they were for the 1972-73 data. More recently, components of spending for which the ratios increased over the 5-year period include household operations, telephone service, miscellaneous household equipment, and public transportation. Household operations, as defined for these comparisons, are limited to domestic and other household services, excluding expenditures for day care centers, babysitting, and care for invalid and elderly persons. In this area, there may be circularity between the two statistical programs because PCE uses expenditure survey estimates to establish values for some domestic services. A higher ratio of estimates for miscellaneous household equipment beginning in 1983 may be attributed, at least in part, to the addition of Interview survey questions pertaining to home computers and telephone equipment.

On the negative side, the ratio for food expenditures dropped 8 percentage points between 1981 and 1982, and that for food at home dropped even more, by 11 percentage points. The direction and magnitude of these changes were associated with the rewording of Interview survey questions

**Table 1. Estimated aggregate expenditures for selected categories of consumption from the CE Interview survey compared to Personal Consumption Expenditures (PCE), 1980-84**

Expenditure category	Interview survey aggregate expenditure (in billions)					Ratio of Interview survey aggregate to PCE				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
Food .....	\$253.7	\$266.2	\$256.9	\$274.1	\$293.2	0.85	0.83	0.75	0.76	0.75
Food at home .....	194.9	202.2	186.3	194.9	207.8	.91	.87	.76	.76	.75
Food away from home .....	58.8	64.0	70.6	79.3	85.5	.70	.72	.74	.76	.75
Alcoholic beverages .....	21.5	22.3	23.0	24.0	25.6	.47	.46	.46	.46	.48
Rent, fuel, and utilities <sup>1</sup> .....	141.1	162.5	180.4	193.2	218.1	.89	.91	.92	.91	.96
Telephone .....	25.9	29.3	31.2	35.5	39.3	.93	.94	.88	.94	.99
Household operations <sup>2</sup> .....	10.7	10.7	12.1	13.2	16.2	.68	.63	.71	.74	.79
Housefurnishings and equipment .....	55.1	55.5	56.9	65.3	74.3	.68	.64	.64	.67	.69
Household textiles .....	5.1	5.4	6.0	6.7	7.3	.51	.50	.53	.54	.55
Furniture .....	19.8	19.0	18.3	22.1	24.8	.95	.86	.85	.93	.93
Floor coverings .....	4.3	4.1	4.4	4.6	5.8	.63	.58	.62	.55	.61
Major and minor appliances .....	12.6	13.3	13.0	13.2	15.4	.77	.76	.73	.67	.71
Housewares .....	2.4	2.7	2.7	3.0	3.1	.26	.27	.26	.27	.25
Miscellaneous household equipment .....	10.8	11.0	12.4	15.8	17.9	.60	.56	.61	.72	.75
Apparel .....	69.9	77.4	79.4	90.8	100.5	.53	.53	.53	.55	.56
Transportation .....	222.0	232.9	235.8	274.3	300.1	.97	.93	.92	.97	.95
Private transportation <sup>3</sup> .....	207.5	215.8	219.6	256.8	278.2	1.00	.94	.94	.99	.96
Public transportation .....	14.6	17.0	16.2	17.5	21.9	.70	.76	.71	.75	.84
Entertainment .....	58.0	65.9	68.6	77.2	86.1	.65	.65	.63	.64	.65
Fees and admissions .....	17.9	20.3	20.8	24.8	28.3	.65	.63	.60	.66	.71
Radio, TV, and sound equipment .....	16.3	19.2	22.5	24.6	28.0	.65	.68	.70	.66	.66
Other entertainment .....	23.9	26.3	25.3	27.8	29.7	.64	.65	.60	.62	.59
Personal care services .....	11.4	12.4	13.2	14.8	16.9	1.06	1.09	1.12	1.06	1.18
Reading .....	10.7	11.5	12.1	13.6	15.1	.67	.67	.67	.71	.73
Tobacco .....	14.4	15.0	16.9	19.3	20.5	.69	.66	.69	.69	.66
Miscellaneous <sup>4</sup> .....	10.2	12.2	13.1	15.4	16.2	.42	.42	.39	.40	.38

<sup>1</sup> Includes rent for tenant-occupied dwelling units, lodging away from home and at school, and utility costs of homeowners and renters.

<sup>2</sup> CE amounts for babysitting, day care centers, care of invalid or elderly, and for household laundry and cleaning were deleted from comparison.

<sup>3</sup> PCE concept of dealer margin as the value of used vehicles was approximated in the CE. Excluded were amounts for vehicle insurance, finance charges, and license, registration, and

inspection fees.

<sup>4</sup> Includes bank service charges and box rental, legal and accounting fees, and funeral and burial expenses.

NOTE: CE survey aggregate expenditure for the total population for 1981 through 1983 are special constructions for this comparison. CE data were collected only for the urban population in those years.

on shopping and purchase patterns at grocery stores, convenience stores, and food specialty stores. (Detailed food expenditures are not collected in the Interview survey.)

### Diary survey food expenditures

The Diary survey is the primary source of detailed food expenditure estimates from the Consumer Expenditure Survey. For this analysis, the Diary estimates were compared with food expenditures from the National Accounts. Because the Dairy survey excludes expenditures while out of town overnight or longer, trip food expenditures from the Interview survey have been added to Diary food-away-from-home amounts for the comparison.

Total food expenditures tabulated from the Diary survey (and supplemented with Interview data for food on trips) were about 75 percent of PCE food expenditures. (See table 2.) Food-at-home expenditures in the Diary survey were low relative to PCE, and declined from 69 percent of PCE levels in 1980 to 63 percent in 1984. Diary survey and PCE expenditures for food away from home (including food on trips) were very close over the comparison period.

There appears to be substantial underreporting of food-at-home expenditures in the Diary survey. However, at least one source has suggested that PCE estimates for the same category are too high. Alexander C. Manchester and Richard A. King, who developed a new series of U.S. food expenditure estimates for the U.S. Department of Agriculture in the late 1970's, felt that census figures used as a basis for allocating food expenditures in PCE were questionable.<sup>12</sup> The Department of Agriculture estimates of food consumption at home for the years 1980-84 are about 20 percent lower than PCE estimates. The CE Diary survey figures are 82 percent of the Department of Agriculture estimates (excluding home production and donations).<sup>13</sup>

A comparison of CE and PCE detailed food expenditures also reveals wide disparities in the way expenditures are

allocated among the various food categories. The PCE food-at-home aggregate is allocated among detailed components based in part on data from the U.S. Department of Agriculture's marketing bill for domestically produced farm food products, to which are added amounts for imported foods and for fish and seafood. Compared to PCE estimates, Diary expenditures were particularly low for fish and seafood and for fruits and vegetables. However, they were higher than PCE for miscellaneous prepared food and much higher for nonalcoholic beverages.

To examine further the detailed food expenditures from the Diary survey, comparisons were made with data from studies conducted by trade publications, particularly the detailed reports prepared annually by *Supermarket Business*<sup>14</sup> and *Progressive Grocer*.<sup>15</sup>

*Supermarket Business* conducts a comprehensive annual survey of food manufacturers, packers, wholesalers, and retailers to construct a detailed picture of grocery store sales by product line. Total grocery store sales for the study are based on U.S. Bureau of the Census estimates, and include sales of specialty food stores.<sup>16</sup> Results of a similar study by *Progressive Grocer*, also available annually, but the universe, limited to stores with annual food sales of \$2 million or more, accounts for only 75 to 80 percent of grocery store food sales. The sales estimates by product line from *Supermarket Business* and from *Progressive Grocer* were matched to Diary food components as closely as possible for the comparisons presented in table 3.

Diary food expenditures more closely matched grocery store sales than did PCE estimates, both in weekly totals and in distribution of expenditures among several food-at-home categories. Total food sales of grocery stores as described in the *Supermarket Business* "Consumer Expenditure Study" were very close to total food-at-home expenditures from the Diary survey. Diary aggregate expenditures were substantially higher than the *Supermarket Business* sales estimates

**Table 2. Estimates of aggregate expenditures for food-at-home categories, CE Diary survey compared to PCE, 1980-84**

Food category	Diary survey aggregate expenditures (in billions)					Ratio of Diary survey aggregate to PCE				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
Total food .....	\$222.74	\$242.52	\$263.90	\$268.39	\$280.93	0.75	0.76	0.77	0.74	0.72
Food at home .....	146.10	158.40	166.56	166.57	173.06	.69	.68	.68	.64	.63
Cereals and cereal products .....	6.05	6.87	7.57	7.14	7.49	.85	.87	.98	.93	.92
Bakery products .....	12.63	13.48	15.07	14.60	15.94	.74	.73	.74	.73	.76
Meat .....	43.51	44.87	45.13	43.67	42.93	.69	.66	.63	.57	.51
Fish and seafood .....	4.17	4.63	4.78	5.27	5.65	.48	.49	.50	.51	.52
Eggs .....	2.76	3.15	3.23	3.03	3.17	.64	.69	.65	.59	.57
Fresh milk and cream .....	10.31	11.35	11.98	11.18	11.35	.70	.74	.70	.63	.61
Other dairy products .....	9.21	10.12	11.13	11.15	11.26	.74	.78	.77	.75	.71
Fresh fruits and vegetables .....	12.46	14.77	15.88	15.82	16.56	.47	.51	.52	.50	.48
Processed fruits and vegetables .....	9.04	10.03	10.65	10.68	11.48	.32	.33	.33	.32	.31
Sugar and other sweets .....	5.57	5.72	5.81	6.16	6.61	.64	.56	.55	.57	.59
Fats and oils .....	4.25	4.73	4.74	4.50	4.95	.68	.66	.63	.58	.60
Nonalcoholic beverages .....	13.42	13.93	14.23	14.90	15.92	2.15	1.92	1.89	1.92	1.98
Miscellaneous prepared foods .....	12.72	14.75	16.36	16.93	19.55	1.28	1.27	1.35	1.36	1.52
Food away from home <sup>1</sup> .....	76.64	84.12	97.34	103.36	107.87	.92	.94	1.02	.99	.95

<sup>1</sup> Includes expenditures for food away from home on trips collected in the Interview survey.

NOTE: See note, table 1.

**Table 3. Ratios of aggregate expenditures to store sales for food-at-home categories, Diary survey compared to alternative sources, 1980-84**

Food category	Diary survey compared with <i>Supermarket Business</i>					Diary survey compared with <i>Progressive Grocer</i> <sup>1</sup>				
	1980	1981	1982	1983	1984	1980	1981	1982	1983	1984
Total food at home .....	1.01	0.96	1.03	0.99	0.99	1.04	1.19	1.15	1.19	1.17
Cereals and cereal products .....	1.08	1.10	1.14	.99	.98	1.25	1.39	1.41	1.23	1.25
Bakery products .....	1.13	1.12	1.05	.95	.99	1.07	1.25	1.23	1.21	1.21
Meat .....	.98	.92	.99	.92	.89	1.16	1.27	1.15	1.17	1.11
Fish and seafood .....	1.07	1.05	1.05	1.10	1.17	1.54	1.74	1.72	2.08	2.30
Eggs .....	2.53	2.67	2.82	2.58	2.08	.96	1.28	1.16	1.53	1.55
Fresh milk and cream .....	1.85	1.81	1.93	1.82	1.83	1.85	2.05	1.92	2.01	1.96
Other dairy products .....	1.21	1.16	1.41	1.37	1.34	.95	.96	1.03	1.25	1.19
Fresh fruits and vegetables .....	.60	.64	.74	.72	.85	1.02	1.06	1.92	1.02	1.00
Processed fruits and vegetables .....	1.05	.99	.96	.93	.97	.80	.94	1.07	1.12	1.14
Sugar and other sweets .....	.97	1.04	1.02	1.04	1.08	1.38	1.53	1.56	1.74	1.75
Fats and oils .....	1.01	1.03	.88	.89	.86	1.09	1.34	1.29	1.21	1.24
Nonalcoholic beverages .....	1.06	1.09	1.02	1.01	1.05	1.12	1.28	1.12	1.18	1.15
Miscellaneous prepared foods .....	.99	1.02	.96	.93	.98	.64	.80	.80	.85	.89

<sup>1</sup> Universe represented in stores with food sales of \$2 million or more annually. *Progressive Grocer* assumed rights to data from *Chain Store Age* in 1982. See source note for further information.

SOURCE: BLS Consumer Expenditure Survey; *Supermarket Business* (September issue annually); *Chain Store Age* (July issue annually through 1982); and *Progressive Grocer* (July issue, 1983 and 1984).

NOTE: See note, table 1.

for eggs and for dairy products, but were lower for fresh fruits and vegetables. As expected, Diary expenditures for food at home were higher—by as much as 19 percent—than total food sales in the *Progressive Grocer* study. Expenditures from the Diary survey for fish and seafood, fresh milk and cream, and sugar and other sweets were especially high relative to the *Progressive Grocer* sales estimates, but were low relative to sales for miscellaneous prepared foods.

The very different results from the comparisons of CE food-at-home estimates with data from the three alternative sources illustrate the difficulties associated with assessing any biases. For example, while the fish and seafood category produced one of the smallest comparison ratios between the CE and PCE, it had a larger than average ratio for the *Supermarket Business* comparison and by far the largest ratio when data from *Progressive Grocer* were used. Conversely, miscellaneous prepared foods was one of two categories in which CE expenditures exceeded those for PCE, but it was the only category for which CE expenditures were consistently lower than the *Progressive Grocer* estimates.

### Summary

Interview survey expenditures for rent, fuel, and utilities, telephone service, furniture, transportation, and personal care services were comparable in level with Personal Consumption Expenditure estimates. However, for all other expenditure components studied, Interview survey estimates were lower. These findings were generally consistent over the 5 years for which the data were compared. Food expenditures as reported in the Diary survey were low relative to PCE, primarily due to lower food-at-home expenditures in the Diary survey. Substantial differences were also noted between the Diary survey and PCE in the allocation of food-at-home expenditures by food type. However, expenditure

totals and allocations by food type reported in the Diary survey were much more consistent with sales by food line reported in food industry publications.

Results obtained from these comparisons have been used to monitor the performance of the current Consumer Expenditure Survey since it was begun in 1980. The comparisons have helped to establish food at home and apparel as two categories that require fuller investigation. Two methodological studies have been conducted to examine the processes that might lead to response error in the Diary survey. The first of these used data from a supplemental survey administered to Diary Survey respondents and interviewers in the second quarter of 1984, at the conclusion of the second diary week. The supplement questionnaire was specifically designed to measure the attitudes and behaviors associated with keeping the diary.<sup>17</sup>

The other study, the Diary Operational Test, attempted to evaluate the influence which survey procedures have on response error. Field tests were conducted in 1985 to evaluate the effects of different Diary Formats. One format provided more explicit instructions concerning the commodities to be reported, and the other was a preprinted, product-specific diary. The study also provided a basis for testing for differences between the results obtained from the current practice of having the Diary and quarterly Interview surveys conducted by the same interviewer and results obtained when interviewers work only on the Diary survey. The results of this experiment have not yet been analyzed, but the findings could suggest redesign possibilities that would lead to better reporting of food-at-home expenditures.

For the Interview survey, plans are now underway to test the effect on the incidence of reporting of varying the length of the survey reference period, length of interview, style of survey instrument, and sequence or positioning of questionnaire parts. □

## — FOOTNOTES —

<sup>1</sup> A consumer unit comprises either: (1) all members of a particular household who are related by blood, marriage, adoption, or other legal arrangements; (2) a person living alone or sharing a household with others or living as a roomer in a private home or lodging house or in permanent living quarters in a hotel or motel, but who is financially independent; or (3) two or more persons living together who pool their income to make joint expenditure decisions. Financial independence is determined by the three major expense categories: housing, food, and other living expenses. To be considered financially independent, the respondent must provide at least two of the three major expense categories.

<sup>2</sup> Adriana R. Silberstein and Curtis A. Jacobs, "Symptoms of Repeated Interview Effects in the Consumer Expenditure Interview Survey," paper presented at the Symposium on Panel Surveys, American Statistical Association on Survey Research Methods, Nov. 19–22, 1986, Washington, DC.

<sup>3</sup> U.S. Department of Labor, *Consumer Expenditure Survey: Diary Survey, 1980–81*, Bulletin 2173 (Bureau of Labor Statistics, September 1983).

<sup>4</sup> A detailed description of the derivation of Personal Consumption Expenditures, as well as the other components of the National Income and Product Accounts, is found in *National Income: 1954 Edition, A Supplement to the Survey of Current Business* (Bureau of Economic Analysis, 1954).

<sup>5</sup> H.S. Houthakker and Lester D. Taylor, *Consumer Demand in the United States: Analysis and Projections*, 2d. ed. (Cambridge, MA, Harvard University Press, 1971).

<sup>6</sup> Robert B. Pearl, *Reevaluation of the 1972–73 U.S. Consumer Expenditure Survey: A Further Examination Based on Revised Estimates of Personal Consumption Expenditures*, (Bureau of the Census, July 1979) (Technical Paper, 46).

<sup>7</sup> The concept of homeowner costs in the Consumer Price Index is also based on rental equivalence. See R. Gillingham and W. Lane, "Changing the treatment of shelter costs for homeowners in the CPI," *Monthly Labor Review*, June 1982, pp. 9–14. Other CE components may also differ from CPI definitions.

<sup>8</sup> Complete documentation of the adjustments made for this article is available from BLS.

<sup>9</sup> Raphael Branch, "Comparing medical care expenditures of two diverse data sources," *Monthly Labor Review*, March 1987, pp. 15–18.

<sup>10</sup> The eligible population covered by the Consumer Expenditure Survey is the total civilian noninstitutional population of the United States. However, due to budget constraints in the fourth quarter of 1981, rural portions of the survey coverage were temporarily discontinued until 1984, when full coverage was again restored. For the fourth quarter of 1981 through 1983, it was necessary to translate expenditure results for the urban population into aggregate expenditures for the total population to compare results with data from other sources. The adjustment was made by assuming the same relationships of total to urban population and of total to urban mean expenditures as were found to prevail during the seven quarters of 1980–81, when the total population was covered in the survey. The rural population as defined for this exercise was about 17 percent of the total.

<sup>11</sup> Houthakker and Taylor, *Consumer Demand*, p. 252.

<sup>12</sup> Alden C. Manchester and Richard A. King, *U.S. Food Expenditures, 1954–78*, Agricultural Economic Report, 431 (U.S. Department of Agriculture, August 1979).

<sup>13</sup> *Food Consumption, Prices, and Expenditures, 1964–84*, Statistical Bulletin, 736 (U.S. Department of Agriculture, December 1985), table 93b.

<sup>14</sup> See, for example, Fieldmark Media, Inc., "38th Annual Consumer Expenditure Survey," *Supermarket Business*, September 1985.

<sup>15</sup> See, for example, Maclean Hunter Media, Inc., "1985 Supermarket Sales Manual," *Progressive Grocer*, July 1985.

<sup>16</sup> Includes meat, seafood, fruit, and vegetable markets, and confectionery, bakery, dairy, and other food stores.

<sup>17</sup> See, for example, Clyde Tucker, "An Analysis of the Dynamics in the CE Diary Survey," *Journal of the American Statistical Association*, 1986 Proceedings issue (forthcoming).