Reclassifying Low-Expenditure Consumer Units in the Consumer Expenditure Interview Survey

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One of the primary uses of data from the Consumer Expenditure Survey (CE) is the computation of weights representing the purchases of goods and services in the construction of the Consumer Price Index (CPI), a principal Federal economic indicator. Accurate representation of actual expenditures is thus critically important beyond usual data quality standards. The CE processing system has several screening processes in place to ensure data quality. One such process is the *minimal expenditure edit*, which screens out consumer units (CUs)[1] with unusually low reported total expenditures for further investigation, to determine whether they should be reclassified as noninterviews—that is, whether they should be treated as if they had refused to take part in the survey. Data from noninterviews are not used in the computation of official expenditure estimates from the CE. A minimal expenditure edit has been implemented for the CE Diary Survey since 2002. In April 2006, a minimal expenditure edit was implemented for the CE Interview Survey, to investigate cases with very low expenditures. This article describes the methodology of the minimal expenditure edit for the Interview Survey, as well as the results attained from its first year of implementation.

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[1] See the glossary in Appendix: Description of the Consumer Expenditure Survey for the definition of a *consumer unit*.

Background

Both Interview and Diary Survey data go through a series of edits before publication. Among these edits are consistency checks, outlier review, imputation, and weighting. Minimal expenditure edits for both surveys take place early in the production process, prior to CU weighting and any expenditure or income imputation. Although the minimal expenditure edit process for each survey is essentially the same, a number of differences exist because the Diary Survey is self-administered while the Interview Survey is administered by a field interviewer. For the Diary Survey, respondents record all their expenditures in a diary for two consecutive 1-week periods. It is difficult to ensure that a respondent has completed the Diary form accurately, including all of his or her expenditures, because no one is observing the process. For this reason, the minimal expenditure edit process for the Diary Survey is much more structured than that for the Interview Survey.

The Diary minimal expenditure edit process uses the number of expenditures recorded, the total amount recorded, and CU characteristics (such as the size of the CU) to determine whether a low report for total expenditures by a CU is legitimate. As part of the reclassification algorithm, urban CUs have to meet a higher expenditure threshold than rural CUs, because rural CUs are more likely to do their shop-

ping less often. Students and small CUs also are treated differently because of their lower expected expenditure levels. In 2006, more than 800 of the nearly 20,000 eligible diaries were from CUs that were reclassified as noninterviews. The process is entirely automated, and none of the individual CU reclassifications are manually reviewed.

In contrast to the Diary Survey, which is a self-administered paper survey, the Interview Survey is a computer-assisted personal interview (CAPI). Using a laptop computer, the field interviewer asks the respondent a series of questions about his or her expenditures and records the responses.[2] To reduce respondent burden, most sets of related questions (such as those having to do with telephone expenses) are preceded by a screener question (for example, "Have you received any bills for telephone services?"). If the respondent has not received any telephone bills, the entire section can be skipped by answering "No" to the question. However, although a "No" answer can help avoid unnecessary followup questions, respondents may respond "No" to screener questions (even though they have applicable expenditures) in order to skip over questions and minimize the time it takes to complete the interview. The minimal expenditure edit is meant to screen out such invalid cases of low total expenditures.

The Interview minimal expenditure edit process was intended to screen for three separate potential problems:

- CUs effectively refusing to participate in the survey by answering "No" to all or most of the screener questions or refusing to answer individual questions.
- Field interviewers fraudulently completing the survey without interviewing the CU.
- Field interviewers not asking all of the questions to certain groups of people (for example, skipping questions to students about owned properties).

[2] The Interview Survey moved from a paper form to the CAPI format in April 2003. For more information, see L. Groves, "Computer-Assisted Personal Interviewing for the Consumer Expenditure Interview Survey," *Consumer Expenditure Survey Anthology* (Bureau of Labor Statistics, 2003), p. 18.

Methodology

In the minimal expenditure edit process for the Interview Survey, CUs are selected by an automated procedure and are manually reviewed on an individual basis. Two factors—the length of the interview and the total sum of expenditures reported—are used to determine whether a CU should be investigated. In the computation of total expenditures reported by a CU, "Don't know" or "Refused" responses are treated as zeroes. Although some questions ask for quarterly values while others ask for monthly values, these different reference periods are not standardized to the same period for the purposes of the minimal expenditure edit.

A CU's records are manually reviewed in greater detail if

- The total sum of expenditures is less than $100 or
- The total sum of expenditures is between $100 and $300, and the interview time is less than 15 minutes.

In the manual review of the CUs screened out by the automated process, other variables in addition to total expenditures and interview time are used to evaluate a case. These additional variables are related to expenditure reporting characteristics (such as the number of expenditures recorded and the number of "Don't know" or "Refused" responses), respondent characteristics (such as the respondent's age, the size of the CU, whether the CU is in an urban or a rural location, and whether the CU resides in public housing or student housing), and data collection characteristics (such as whether the interview is a telephone or personal interview and the number of visits to the CU by the field interviewer). A detailed record of all the CU's expenditures and any field interviewer notes are taken into consideration, as is information provided by the CU in previous interviews.

CUs that are manually reviewed in the minimal expenditure edit process are presumptively treated as noninterviews. The review process consists of a search for mitigating factors that would explain the low level of expenditures for the quarter. Elderly respondents, college students, recipients of food stamps, and occupants of public housing are almost always treated as valid low expenditure cases, because they tend to have lower expenditure levels than the general population has. If the respondent has a high number of "Don't know" or "Refused" responses, that is also taken as evidence of a proper interview, because such respondents still provide information on the specific items purchased by a CU. Expenditure amounts for "Don't know" and "Refused" responses are imputed later. Often, field interviewer notes also will provide valuable information, such as expenses that have been paid for by parents or other relatives. If no persuasive reason can be found to explain the low level of expenses for the 3-month recall period, the CU is reclassified as a noninterview and is excluded from the computation of official estimates from the CE.

Results

The Interview Survey minimal expenditure edit was implemented in 2006. For that year, 49 CUs were reclassified as noninterviews, out of a total of 257 flagged by the edit process. These reclassified CUs differed significantly from the general population of CUs. (See table 1.) Specifically, reclassified cases have much lower expenditure totals, interview time, and reported income than the general population has. Although data can be collected either in person or over the phone, in-person interviews generally elicit higher quality data. Reclassified interviews are more likely to have taken place over the phone. Also, respondents are more likely to have been converted refusals, a term used for CUs that initially refuse to participate in the survey. In addition,

the complete absence of any record usage (for example, credit card statements or receipts) shows a low level of diligence on the part of respondents in these CUs.

The differences between the reclassified interviews and those flagged by the process but not reclassified are enlightening. (See table 1.) Although the income level is still low, cases that are flagged but not reclassified have a much higher income level than the reclassified cases. They also have a higher rate of personal interviews and a lower rate of converted refusals. Students and residents of public housing are also among those who are less likely to be reclassified.

Although low annual income would seem to be a reasonable explanation for low expenditure totals, it is likely to be unrepresentative of true income in many cases. The income questions in the Interview Survey are asked at the end of the interview and are part of the Work Experience and Income section. Many respondents choose not to answer these questions fully. In the Interview Survey minimal expenditure edit process, annual income is used mostly as a proxy for respondent diligence. Beginning with 2004 data, the CE implemented an income imputation process to correct for the low response rate of income questions. The Interview Survey minimal expenditure edit is performed at an earlier stage of processing, and only the reported income data are used in the edit.

In addition to reclassifying CUs to noninterview status, the April 2006 minimal expenditure edit revealed that a field interviewer had been systematically falsifying data, and those falsified cases were removed from the database. These cases accounted for 5 of the 49 reclassified CUs. The expenditure data compiled for that edit also have been useful as data quality measures in other analyses. The number of expenditure questions answered, the number of "Don't know" or "Refused" responses to expenditure questions, and the total reported expenditures before processing are variables that were created specifically for the Interview Survey minimal expenditure edit. However, these variables also serve as indicators of data quality and have been used in other recent research on the Interview Survey (such as comparing the quality of reporting between converted refusers and other respondents and comparing the quality of responses among different treatment groups in an incentive experiment). The data compiled by the edit process can be used to examine other issues as well. CUs with high expenditure totals and short interview times could be interpreted as evidence of inaccurate information provided by the respondent or of fraudulent data entered by the field interviewer. In addition, the data can be used to investigate the correlations between expenditures and other variables, such as participation in public housing or in food stamps programs.

Conclusion

Analysis of the effectiveness of the minimal expenditure edit process in the Interview Survey is still ongoing. So far, the low number of reclassified cases has had a negligible effect on the computation of official expenditure estimates from the CE. Further analysis is necessary to determine whether the thresholds used in the edit should be revised to increase the number of cases evaluated.

One consideration for future implementations of the Interview minimal expenditure edit is automation. Currently, cases are selected for manual review on the basis of a fixed set of criteria, but the ultimate decision to reclassify is left to the reviewer. A rule-based approach would increase the consistency of the edit by removing human error, in addition to saving the reviewer time, thereby allowing him or her to consider a larger number of cases. However, this change would come at the expense of flexibility. Experimentation with a more extensive set of criteria, as well as an analysis of the tradeoff between false positives and false negatives, is needed to determine whether the process should be modified to achieve the appropriate balance. ■

Table 1. **Comparison of average expenditures, income, and characteristics, by type of interview, Consumer Expenditure Survey, second quarter 2006 to first quarter 2007**

Item	Good interviews (*n* = 32,554)	Reclassified cases (*n* = 49)	Flagged but not reclassified (*n* = 208)
Expenditure total	$8,542	$44	$42
Necessities total[1]	$2,325	$18	$19
Total time[2]	60 minutes	29 minutes	32 minutes
Annual income[3]	$30,405	$45	$440
CU size	2.4 persons	1.7 persons	1.5 persons
Age of respondent	49	53	53
Other statistics (percent):			
Personal interviews[4]	67.2	55.1	72.6
Converted refusal[5]	11.7	38.8	20.7
Usage of records[6]	47.4	0	3.4
Food stamps	4.7	4.1	4.3
Student housing	1.1	12.2	16.8
Public housing	2.7	4.1	18.8

[1] The necessities *total* statistic is the sum of the amounts spent on groceries, utilities, and housing payments—items for which almost all CUs should report expenditures.

[2] *Total time* is the amount of time spent in the interview process.

[3] Annual income reported here is lower than published income for two reasons. First, respondents who are unwilling to reveal their income levels have the option of selecting an income bracket instead. An income equal to the median of reported incomes inside the bracket selected is then imputed. Second, data are imputed for incomplete income reporters. Income data reported in this table are compiled prior to both bracket and income imputation.

[4] The Interview Survey is conducted either in person or over the phone. In-person interviews are the preferred method, because they generally elicit higher quality data.

[5] The designation *converted refusal* is selected at the discretion of the field representative if the respondent initially refused the survey, but was eventually convinced to participate.

[6] In the survey assessment section, the field interviewer is asked whether the respondent "Always, almost always, mostly, occasionally, almost never, or never" used records (such as receipts or credit card statements) to answer the questions. The entry "usage of records" is the percentage of CUs classified in a category other than "never."