

# The Effect of Refusal Conversion on Data Quality in the Consumer Expenditure Interview Survey

Nathan McDermott  
Lucilla Tan

Achieving and maintaining high response rates are important goals of the Consumer Expenditure (CE) Survey program. However, as with other Federal Government surveys, response rates for the Interview Survey component of the CE have been declining in recent years. Between 1998 and 2002, the response rate for the Interview Survey was about 79 percent, and it fell to about 76 percent between 2003 and 2006.<sup>1</sup> In an attempt to stem the decline in response rates and minimize nonresponse bias, guidelines for refusal conversion were established. Refusal conversion is a process by which the interviewer makes additional efforts to persuade an initial refuser to become a survey participant. In order to offset the decline in response rates, interviewers have increased their efforts to encourage survey participation. This is evidenced by the proportion of completed interviews accounted for by converted refusals, which rose from 9 percent in 2003 to 12 percent in 2006.

The level of effort required to convert an initial refusal raises issues of higher-than-anticipated field costs, as well as concerns over the quality of data provided by such respondents, compared with respondents who were cooperative throughout the interview

experience. Converted refusers may exert less cognitive effort to respond, or interviewers may be more willing to accept ‘satisficing’ responses from reluctant respondents to obtain a completed interview (Triplett et al., 1996). Satisficing occurs when respondents exert minimal effort when answering survey questions in order to hurry through the interview.

Findings about the effect of converted refusers on data quality have been inconclusive. Burton et al. (2006) cited various studies that compared survey estimates with and without converted refusers. They reported that significant differences between these two groups were found in fewer than half of the survey measures, and some of these differences disappeared after controlling for demographics. While some of these studies found consistent differences in demographics between converted refusers and respondents, others did not.

In this study, we compare measures of data quality for the survey estimates between converted refusers and other respondents in the Interview Survey, describe their demographic characteristics, and summarize the nature of interviewer contact attempts. By treating the group of converted refusers as proxy nonrespondents, we estimate the nonresponse bias in major expenditure categories.

Nathan McDermott is an economist formerly working in the Branch of Production and Control, Division of Consumer Expenditure Surveys, U.S. Bureau of Labor Statistics.

Lucilla Tan is an economist working in the Branch of Research and Program Development, Division of Consumer Expenditure Surveys, U.S. Bureau of Labor Statistics.

<sup>1</sup> Response rate calculation is based on The American Association of Public Opinion Research (AAPOR) Response Rate 1 definition (2006).

## Methods

We began with all respondents to the survey and divided them into two groups, *converted refusers*, and other respondents (henceforth, referred to as *respondents*). We differentiated converted refusers from respondents on the basis of the interviewer's response to the question "Was this a converted refusal?" at the end of the interview. If the interviewer responded, "Yes," we classified the case as a *converted refuser*; if "No," the case was classified as a respondent. The identification of converted refusers in this analysis is not rigorous: For completed interviews, we rely only on the interviewer's response to the converted refusal question; for noninterviews, there is no question asking if the interviewer attempted to convert the refusal. Thus, the universe of cases subject to refusal conversion is unknown. Although there are prescribed criteria for identifying initial refusals for possible refusal conversion, there is anecdotal evidence that these criteria may not be uniformly applied in the field.

Since April 2005, interviewers have been able to maintain detailed information about contact attempts for each assigned case using the Contact History Instrument (CHI). The information includes day and time of the contact attempt, outcome of the attempt, strategies used to attempt contact, and perceived concerns of respondents.

During the interview, expenditure information is collected by describing a category of goods or services (for example, home furnishings, healthcare) and asking if anyone in the consumer unit (CU) either had expenditures in the general category or had expenditures for specific items that fall into that category. If they did, then the respondents are probed for details about their spending, such as a description of the product or service, cost, quantity, and month purchased. Most information about goods and services is collected using detailed lists of goods and services, rather than general categories.

Better data quality is expected from respondents who are more willing to

complete the interview and are thorough in their reporting. Poorer quality data are expected from reluctant respondents, as they are more likely to give "satisficing" responses. For the Interview Survey, the following measures taken together suggest poorer data quality:

- lower levels of reported expenditures
- fewer responses to expenditure questions
- more "don't know/refused" responses to the expenditure questions
- more expenditure and income reports requiring editing due to incomplete reporting

In addition, interview characteristics, such as the following, support the hypothesis of poorer data quality:

- the respondent took less time to answer the expenditure questions
- there was less use made of the information booklet and records of purchases to answer questions during the interview.

The *information booklet* is a document that lists examples of different categories of products and services. Interviewers are supposed to show it to respondents to help respondents understand and recall purchases in different expenditure categories. *Records* refer to receipts, bank statements, and other documentation of purchases. These aids to better reporting may not be used or may be used less in interviews where the interviewer perceives that the respondent is anxious to hurry through the interview.

The *category of total expenditures* is regarded as the most direct measure of data quality for the Interview Survey. For the data quality measures, we used 1-sided t-tests to test the alternative hy-

pothesis that converted refusers provide poorer quality data than respondents to the null hypothesis of no difference between converted refusers and respondents. The alternative hypothesis reflects the belief that converted refusers are more likely to exhibit satisficing behavior and provide poorer quality data. For comparisons on demographic characteristics, and characteristics of contact attempts and interviews, we tested the alternative hypothesis that there is a difference between converted refusers and respondents. We used 2-sided t-tests on the means of characteristics that are continuous variables and the Chi-square test of association between type of respondent and characteristics that are categorical variables. Following these bivariate comparisons, we fitted multiple regressions with controls for demographic characteristics and interview characteristics to assess the effect of converted refusers on reported total expenditures. All analyses were performed on unweighted data.

We used completed interviews with known converted refusal status in waves two through five from April 2005 through September 2006 in our analysis.<sup>2</sup> Since the Interview Survey is a panel survey, a household can be represented multiple times in the analysis data. However, we treated each completed interview as an independent case. There were 43,395 completed interviews in the sample for this study, of which 11.8 percent were converted refusers.

## Findings

### *Data quality measures*

Every measure supported the alternative hypothesis that converted refusers provide poorer quality data than respondents. (See table 1.) Converted refusers reported lower total expenditures (\$10,499 v. \$11,302); they answered fewer expenditure questions (37.3 v. 46.1 questions); they had a

<sup>2</sup> The Contact History Instrument was introduced for the Interview Survey in April 2005. The latest data available at the time of analysis was September 2006.

Table 1. Mean estimates of data quality measures for converted refusers and respondents, Consumer Expenditure Interview Survey, April 2005–September 2006

Data quality measure	Converted refusers (N = 5,314)	Respondents (N = 38,081)	Difference	95 percent confidence interval	t-stat	1-sided p-value <sup>1</sup>
Quarterly total expenditures after editing.....	\$10,449	\$11,302	-854	(-1,104,-604)	-5.62	<0.001
Number of expenditure questions answered.....	37.3	46.1	-8.8	(-9.3, -8.4)	-30.4	<0.001
Percent of expenditure questions answered "don't know/refused" <sup>2</sup> .....	6.0	2.7	3.3	(3.0, 3.6)	20.92	<0.001
Percent of complete expenditure reports <sup>2</sup> .....	80.6	85.8	-5.1	(-5.6, -4.7)	-23.2	<0.001
Percent of income reports not requiring imputation.....	39.7	55.2	-15.5	(-16.9, -14.1)	-21.2	<0.001

<sup>1</sup> The null hypothesis of no difference between converted refusers and respondents was tested against the alternative 1-sided hypothesis of poorer quality measures from converted refusers.

<sup>2</sup> Complete reports are reports that do not require editing. Standard t-test for ratio of variable means was used to test this difference.

<sup>3</sup> Standard t-test of proportions was used to test this difference.

Table 2. Characteristics of Contact Attempts and Interviews, Consumer Expenditure Interview Survey, April 2005–September 2006

Characteristic	Converted refusers (N = 5,314)	Respondents (N = 38,081)	Difference	95 percent confidence interval	t-stat	2-sided p-value <sup>1</sup>
Number of contact attempts.....	4.2	3.4	0.88	(0.79, 0.97)	15.9	<0.001
Percent of noncontacts.....	39.3	33.3	6.1	(4.8, 7.3)	9.3	<0.001
Mode of data collection: Percent by personal visit <sup>2</sup> .....	52.1	66.5	-14.3	(-15.7, -12.9)	-20.5	<0.001
Number of days between first and last attempt.....	10.7	8.1	2.57	(2.3, 2.8)	17.9	<0.001
Percent use of records <sup>3, 4</sup> .....	20.1	37.3	-17.2	(-18.5, -15.8)	-24.6	<0.001
Percent use of information booklet <sup>4</sup> .....	37.5	51.0	-13.5	(-14.9, -12.0)	-18.4	<0.001
Time to complete interview (minutes).....	57.1	64.0	-6.9	(-7.7, -6.1)	-14.7	<0.001
Time spent on expenditure questions (minutes)						
25th percentile.....	23.1	28.8	-5.8			
50th percentile.....	34.4	42.2	-7.9			
75th percentile.....	49.0	60.4	-11.3			

<sup>1</sup> The null hypothesis of no difference between converted refusers and respondents was tested against the alternative 2-sided hypothesis of a difference between the two groups.

<sup>2</sup> This was based on the interviewer's report of the mode, either in-person or by telephone, in which most of the data was collected.

<sup>3</sup> Use of records is originally a 6-level categorical variable; for this study, we indicated "record used" when the response was "mostly" through "always."

<sup>4</sup> Standard t-test of proportions was used to test this difference.

higher percentage of "don't know/refused" responses (6.0 v. 2.7 percent); and they were less likely to provide complete reports for expenditures (80.6 v. 85.8 percent) and income (39.7 v. 55.2 percent).

These bivariate comparisons together reflect satisficing by converted refusers and indicate poorer quality responses from them. However, there may be additional characteristics of converted refusers, when compared to respondents, which could account for these differences in the measures of data quality.

### Interview characteristics of converted refusers and respondents

#### Contact attempts and interview

CHI data showed that more effort was

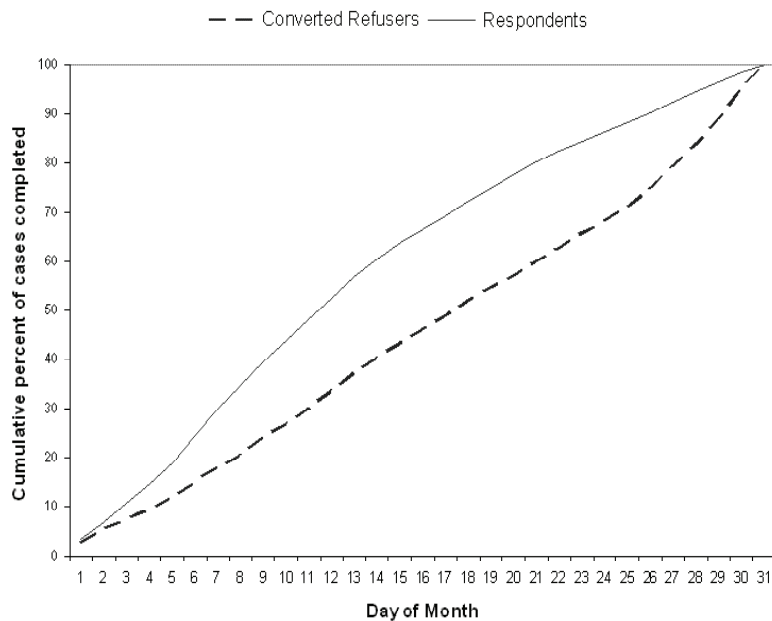
required to reach and complete an interview with converted refusers. It was more difficult to contact converted refusers than respondents: 39.3 percent of contact attempts resulted in noncontact for converted refusers compared with 33.3 percent for respondents. (See table 2.) A smaller percent of interviews was completed by personal visit, the preferred method, for converted refusers, compared with respondents (about half versus two-thirds). Converted refusal cases are active in the field for a longer time period (10.7 v. 8.1 days for respondents). By day 15 of the month, 63.9 percent of respondents have completed their interviews, compared with 43.2 percent of converted refusers. (See chart 1.) Interviews with

converted refusers involve less use of records (20.1 v. 37.3 percent), less use of the information booklet (37.7 v. 51.0 percent), and less time on the expenditure questions (34.4 v. 42.2 minutes at the median of the distributions).

#### Respondent concerns

In the CHI, interviewers can record their perceptions of respondent concerns for each contact made. For each case, we summed up the number of times a specific concern was cited, then computed the average number of times each concern was reported for respondents, converted refusers, and refusers (those eligible respondents who refused to participate in the survey). We compared the differences in

Chart 1. Rate of cases reaching final disposition



the reporting rates between converted refusers and respondents, and between converted refusers and refusers. (See charts 2a and 2b.)

Interviewers reported higher incidences of time-related concerns (too busy, interview too time-consuming, scheduling difficulty) for converted refusers, compared with respondents and refusers. In contrast, higher incidences of hostile behavior, lack of interest, and anti-Government concerns were reported for final refusers compared with converted refusers. Differences suggest that initial refusals are more likely to be converted if the perceived respondent concerns are of a temporary, circumstantial nature (such as time-related concerns), than if the concerns were attitudinal in nature. This finding is consistent with Burton et al.'s (2006, page 467) analysis of reasons for refusal and interview outcome in subsequent waves; they found that "...refusals are indeed more likely to be temporary if the reason for refusal is situational or due to a short-term circumstance."

#### Demographics

We examined associations between categorical characteristics and the type of respondent (converted refuser v. respondent) using a Chi-squared test of independence. Income was divided into five categories: Negative income (less than zero) and the four quartiles for income greater than or equal to zero. Converted refusers differed from respondents in household composition, in addition to respondent characteristics of age, race, educational attainment, and income before tax. (See table 3.) Differences were significant statistically, but not substantively. For continuous characteristics, we used the *t*-test to compare the mean characteristic for converted refusers to respondents. We found that converted refusers were more likely to live in Metropolitan Statistical Areas, and were less likely to be homeowners. (See table 4.) Converted refusers were not significantly different from respondents in income, average number of members in the consumer unit (CU), average number of mem-

bers under age 18 and over age 64, and number of earners in the CU.

#### Regression analysis

Since the bivariate comparisons showed that converted refusers differed from respondents in some demographic and interview characteristics, we used linear models to examine the effect of converted refusers on reported total expenditures, controlling for these characteristics. The first regression model includes only demographic characteristics for the respondent and household. The second regression model includes covariates for interview attributes in addition to the demographic covariates. Converted refusers spend less time answering expenditure questions, are less likely to use records, and are more likely to have telephone interviews. Using the distribution of time spent on answering expenditure questions, we created time categories of "shorter than average" (less than 25th percentile, 28 minutes), "average" (25th to 75th percentile), and "longer than average" (greater than 75th percentile, 59.1 minutes).

From the first model with only demographic covariates, the coefficient for converted refusals is negative as expected, and significant ( $-606.56, p = <.001$ ). (See table 5.) While the coefficients for the positive income percentiles exhibited the expected "staircase" pattern (reported expenditures increased with higher income percentiles), the large positive coefficient for negative income was unexpected ( $6,135.78, p <.001$ ). This could be due to under-reporting of income, the reporting of large short-term losses, or reporting by those with low income but large savings (such as retirees). Besides the coefficients for income, most other demographic coefficients had the expected directions and most were found to be significant ( $p <.05$ ). This suggests there are characteristics about converted refusers—other than these demographic characteristics—that are associated with their reporting lower expenditures.

Chart 2a. Perceived respondent concerns among converted refusers and respondents

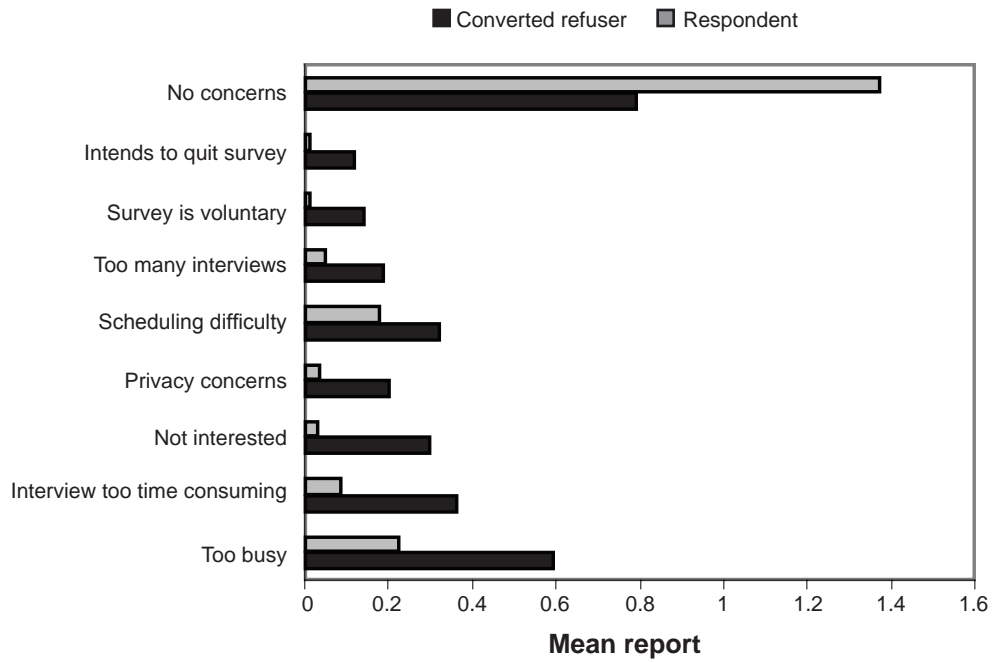


Chart 2b. Perceived respondent concerns among converted refusers and final refusers

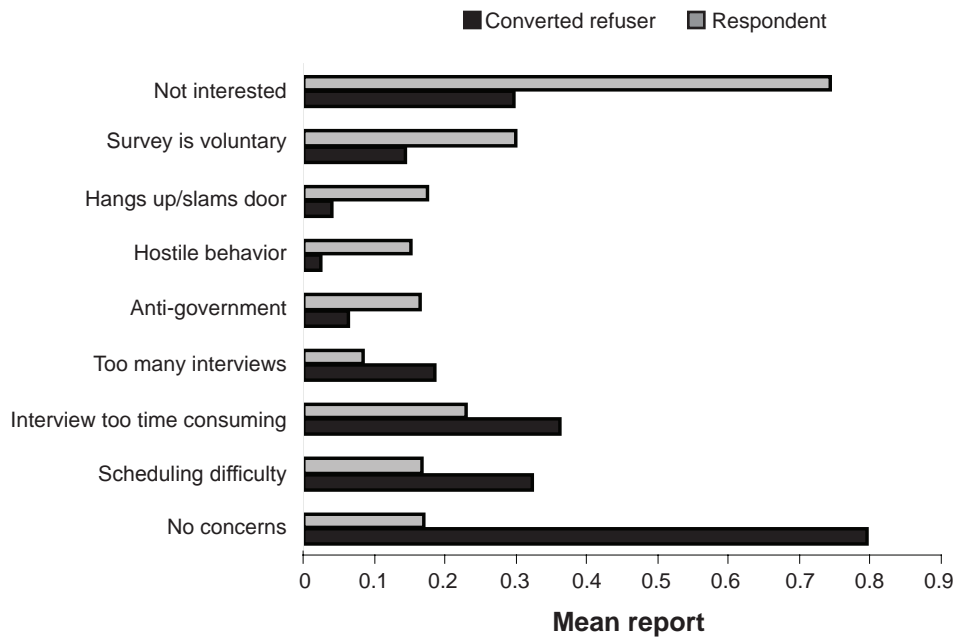


Table 3. Frequency distribution of demographic characteristics for converted refusers and respondents, Consumer Expenditure Interview Survey, April 2005–September 2006

Characteristic	Converted refusers (N=5,314)	Respondent N=38,081	Chi-square	P-value
CU size .....			7.59	.0553
1.....	27.1	28.1		
2.....	31.0	31.4		
3-4 .....	31.5	29.7		
5+ .....	10.4	10.9		
CU composition .....			21.45	.0003
Husband-wife only .....	20.8	21.7		
Husband-wife families .....	30.3	30.5		
Single parent .....	7.4	5.9		
Singles.....	27.1	28.1		
Other.....	14.4	14.0		
CU tenure .....			18.31	.0001
Owner.....	66.1	67.9		
Renter.....	33.3	31.0		
Other.....	0.6	1.1		
CU area type .....			89.9	<.001
In MSA.....	91.7	87.1		
Outside MSA.....	8.3	12.9		
Respondent gender .....			.27	.6040
Male .....	39.5	39.8		
Female.....	60.5	60.2		
Respondent age .....			23.62	<.001
<21 .....	1.8	2.3		
21-34 .....	22.1	20.7		
35-49 .....	33.4	31.5		
50-64 .....	23.8	25.8		
65+ .....	18.9	19.7		
Respondent race .....			31.84	<.001
White .....	79.3	82.3		
Black.....	13.6	11.5		
Native American .....	.6	.5		
Asian.....	4.8	4.0		
Pacific Islander .....	0.3	0.4		
Multi-race.....	1.3	1.4		
Respondent's education level .....			32.71	<.001
Less than high school.....	16.6	14.9		
High school graduate.....	27.6	25.6		
Some college.....	29.6	31.3		
College graduate .....	26.2	28.2		
Income before tax distribution after imputation.....			15.16	.0044
Negative income.....	23	.14		
Less than 25th percentile .....	24.9	25.0		
25th-50th percentile .....	26.2	24.8		
50th-75th percentile.....	25.5	24.9		
Greater than 75th percentile .....	23.1	25.2		

The second regression model includes interview characteristics as additional covariates. Coefficients of the demographic covariates remain significant and with expected signs, as in the first regression model. The coefficients for the interview characteristics are significant, but the coefficient for converted refusers is no longer significant. On the length of time spent answering expenditure questions, the coefficient for “greater than 59 minutes spent answering expenditure questions” was signifi-

cantly large and positive (3,124.71,  $p = <.001$ ), while the coefficient for “shorter than 28 minutes” was significantly negative (-1,634.61,  $p = <.001$ ). This is consistent with expectations that more expenditures are reported when more time is spent on answering expenditure questions. The coefficient for “no records used” is negative and significant (-444.80,  $p = <.001$ ). The coefficient for “interview by telephone” is positive (273.06,  $p = .002$ ); this is consistent with other research which found phone

respondents to report higher expenditures and income (McGrath 2005).

The regression results suggest that differences in interview characteristics—not differences in demographics—explain converted refusers’ lower reporting of expenditures compared to respondents.

### Effect of converted refusers on expenditure estimates

The quarterly mean of overall expenditures is lower for converted refusers than it is for respondents. One way to estimate the effect that data collected from converted refusers have on the mean expenditure estimates is to treat converted refusers as proxy nonrespondents, and compute the bias of nonresponse in the respondent mean as shown in Groves (2006):

$$\text{Bias}(\hat{Z}_{jR}) = \frac{n_N}{n_T} (\hat{Z}_{jR} - \hat{Z}_{jN}).$$

Here

$\hat{Z}_{jR}$  = mean expenditure estimate for expenditure category  $j$  from respondent  $R$ ,

$\hat{Z}_{jN}$  = mean expenditure estimate for expenditure category  $j$  from converted refusers, who are proxy nonrespondents,

$n_N$  = number of converted refusers, who are proxy nonresponders, and

$n_T$  = total sample (converted refusers plus respondents).

The relative nonresponse bias estimate for expenditure category  $j$  is computed as

$$\hat{\theta}_j = \frac{\text{Bias}(\hat{Z}_{jR})}{\hat{Z}_{jT}} = \frac{\hat{Z}_{R,j} - \hat{Z}_{T,j}}{\hat{Z}_{T,j}},$$

where

$\hat{Z}_{jT}$  = mean expenditure estimate for expenditure category  $j$  from the total sample.

Table 4. Means of demographic characteristics for converted refusers and respondents, Consumer Expenditure Interview Survey, April 2005–September 2006

Characteristic of the CU	Converted refusers (N = 5,314)	Respondent (N = 38,081)	Difference	95 percent confidence interval	t-stat	2-tailed p-value
Number of members.....	2.59	2.55	0.03	(0.00, 0.07)	1.51	.1321
Number of earners.....	1.37	1.35	.02	(.00, .04)	1.39	.1632
Number of members under age 18.....	.70	.67	.03	(.00, .05)	1.57	.1164
Number of members over age 64.....	.31	.32	-.01	(-.02, .01)	-1.07	.2824

The variance for relative nonresponse bias does not have a closed-form solution. An estimate of the variance for the relative nonresponse bias for each expenditure category was calculated using random groups (Wolter 1985). With the number of random groups equal to 10, the variance formula is as follows:<sup>3</sup>

$$\text{var}_{rg}(\tilde{\theta}_j) = \frac{\sum_{k=1}^{10} (\hat{\theta}_{k,j} - \tilde{\theta}_j)^2}{10(10-1)},$$

where

$\hat{Z}_{R,k,j}$  is the respondent sample mean on expenditure category  $j$  for random group  $k$ ,

$\hat{Z}_{T,k,j}$  is the total sample mean on expenditure category  $j$  for random group  $k$

$\hat{\theta}_{k,j} = \frac{\hat{Z}_{R,k,j} - \hat{Z}_{T,k,j}}{\hat{Z}_{T,k,j}}$  is the relative bias on expenditure category  $j$  for random group  $k$ , and

$\tilde{\theta}_j = \frac{1}{10} \sum_{k=1}^{10} \hat{\theta}_{k,j}$  is the average of the relative bias on expenditure category  $j$  over all 10 random groups.

We used the variance formula provided above to calculate 95 percent confidence intervals for the relative nonresponse bias for each expenditure

<sup>3</sup>This random group's variance for the relative bias was first implemented in a nonresponse bias study for the Interview Survey, CE Nonresponse Bias Team (2007a). Nonresponse Bias: Using Harder-to-Contact Respondents as Proxies for Nonrespondents.

category. The general formula for the 95 percent confidence interval is

$$\hat{\theta}_j \pm t_{9,0.975} * \sqrt{\text{var}_{rg}(\tilde{\theta}_j)},$$

where

$\tilde{\theta}_j = \frac{1}{10} \sum_{k=1}^{10} \hat{\theta}_{k,j}$  is the full sample estimate of the relative nonresponse bias on expenditure category  $j$ .

The sign of the relative bias measure indicates if converted refusers lowered (positive relative bias) or raised (negative relative bias) the expenditure estimate for a category, while the magnitude of the relative bias indicates the extent to which the expenditure estimate is changed by including the expenditures of converted refusers in computing the mean expenditure estimate. Where the 95 percent confidence interval of the relative bias includes zero, it indicates that the relative bias reflects sampling variability and that the expenditure estimate is not subject to nonresponse bias. The underlying assumption behind these computations is that nonresponse is the only source of bias.

The estimated relative bias for average quarterly total expenditures is 0.86 (.64, 1.08) percent. (See table 6.) The survey estimate of expenditures on reading materials has the largest relative bias (3.6 percent), followed by personal insurance and pensions (3.5 percent), tobacco (2.7 percent), alcoholic beverages (2.5 percent), cash contributions (2.0 percent), entertainment (1.9 percent), apparel (1.3 percent), health

care (1.2 percent), and personal care (1.2 percent). The 95 percent confidence interval for the estimated relative bias for quarterly expenditure estimates of transportation, housing, education, and food include zero, indicating that nonresponse bias is not affecting these expenditure estimates.

Other recent studies of potential nonresponse bias in the Interview Survey used other definitions of proxy nonrespondents, and their estimates of relative bias of quarterly total expenditures ranged from -0.14 (-1.4, 1.1) percent to 5.8 (2.0, 9.6) percent (CE Nonresponse Team, 2007a, 2007b, Reyes-Morales 2007). These estimates of potential nonresponse bias are limited by how closely these various proxy nonrespondents represent nonrespondents.

A pattern emerges when the expenditure categories are listed in decreasing magnitude of the relative bias. Categories with large relative bias are reading materials, personal insurance and pensions, tobacco, alcoholic beverages, cash contributions, entertainment, apparel, health care, and personal care. Expenditure categories with small nonresponse bias (and not statistically different from 0 at the 5 percent level) are transportation, educational expenses, and housing. The categories with large relative bias represent more discretionary types of expenditures, while the categories with smaller relative bias are more likely to be "necessities." This difference in relative bias between expenditure categories may partly be explained by recognizing that "necessity" goods and services are less dependent on personal characteristics and preferences, and these regular expenditures require less respondent effort to

Table 5. Multiple regressions with quarterly total expenditures as the dependent variable, Consumer Expenditure Interview Survey, April 2005–September 2006

Explanatory variable <sup>1</sup>	Model with only demographic characteristics			Model with demographic and interview characteristics		
	Parameter estimate	Standard error (SE)	P-value	Parameter estimate	Standard error (SE)	P-value
Intercept.....	8,500.68	268.50	<.001	8,278.29	273.87	<.001
Converted refuser <sup>2</sup> .....	-606.56	122.72	<.001	-85.62	121.90	.4825
Respondent characteristic						
Male <sup>2</sup> .....	94.68	84.24	.261	328.21	83.10	<.001
Age						
Less than 21 years old .....	-731.06	287.19	.0109	-489.09	281.97	.0828
21-34 years old.....	-712.18	117.72	<.001	-593.11	115.63	<.001
50-64 years old.....	3.80	117.23	.9741	-225.42	115.18	.0503
Greater than 65 years old.....	-34.10	233.21	.8838	-371.45	229.08	.1049
Race						
Black.....	-1,275.38	129.94	<.001	-1,032.57	127.77	<.001
Asian.....	-1,032.14	206.93	<.001	-604.39	203.35	.003
Other race.....	-137.19	273.80	.6163	-338.24	268.68	.2081
Education level						
College graduate .....	1,840.05	109.20	<.001	1,648.74	107.35	<.001
High school graduate.....	-876.37	108.25	<.001	-618.15	106.39	<.001
Less than high school.....	-1,773.17	132.75	<.001	-1,257.12	131.00	<.001
Household characteristic						
Age composition--number of members						
Under 18 years.....	587.80	52.35	<.001	511.54	51.42	<.001
18-64 years.....	165.83	89.61	.0642	209.24	87.96	.0174
Over 64 years.....	-383.78	148.01	.0095	-365.10	145.20	.0119
Family composition						
Husband and wife only .....	-428.66	155.68	.0059	-422.84	152.81	.0057
Single parent .....	-1,465.51	213.50	<.001	-1,276.94	209.55	<.001
Single.....	-2,443.97	195.04	<.001	-2,123.56	191.53	<.001
Other family type .....	-1,522.71	146.45	<.001	-1,278.00	143.87	<.001
Income before tax distribution <sup>3</sup>						
Negative income.....	6,135.78	1,052.52	<.001	5,729.98	1,032.66	<.001
25th-50th percentile .....	1,755.38	123.78	<.001	1,429.96	121.98	<.001
50th-75th percentile.....	4,184.24	142.15	<.001	3,642.01	140.52	<.001
Greater than 75th percentile .....	11,619.00	165.14	<.001	10,740.00	163.82	<.001
Number of earners.....	-192.75	71.24	.0068	-206.51	69.91	.0031
Renter.....	-1,012.39	102.76	<.001	-584.86	101.71	<.001
Outside of MSA <sup>2</sup> .....	-1,475.64	124.54	<.001	-1,431.44	122.45	<.001
Interview characteristic						
Interviewed by telephone <sup>2</sup> .....			273.06	85.81	.0015	
No use of records <sup>2</sup> .....			-444.80	88.27	<.001	
Time spent on answering expenditure questions						
Less than 28 minutes .....			-1,634.61	100.65	<.001	
Greater than 59 minutes.....			3,124.71	101.50	<.001	
R-square.....	.3453			.3700		

<sup>1</sup> The reference group is female, 35–49 years old, White, with some college education, family composition of husband and wife with children, income in the positive first quartile, and an interview time between 28 and 59 minutes.

<sup>2</sup> Following are indicator (0, 1) variables: Converted refuser, male,

renter, outside of MSA, interviewed by telephone, and no use of records.

<sup>3</sup> Income distribution was broken out into five categories: Negative income and positive (greater than or equal to zero) income divided into quartiles.

recall and report. Thus, the differences between respondents and converted refusers, who are proxies for nonrespondents, are less likely to affect spending on necessities.

### Conclusion

In summary, we found that converted

refusers answered fewer expenditure questions with valid values, more frequently responded with “don’t know” or “refused” answers, reported lower overall expenditures, provided less complete reporting of expenditures and income, and spent less time answering expenditure questions than respondents.

These behaviors are consistent with satisficing, and suggest that, when converted refusers agree to do the survey, they are more likely to rush through it and, thus, to provide poorer quality responses. There was mixed evidence for differences in demographics between converted refusers and respondents.



Table 6. Effect of converted refusers on expenditure estimates measured by relative bias, Consumer Expenditure Interview Survey, April 2005–September 2006

Expenditure category	Base-weighted mean expenditures (\$)			Relative bias	
	Converted refusers (N = 5,314)	Respondents (N = 38,081)	All respondents	Percent	95 percent confidence interval
Quarterly total expenditures .....	10,336.64	11,128.31	11,033.11	0.86	(0.64, 1.08)
Reading materials.....	22.48	31.70	30.59	3.62	(3.03, 4.27)
Personal insurance and pensions .....	842.97	1,169.02	1,129.82	3.47	(3.27, 3.67)
Tobacco .....	64.78	82.68	80.53	2.67	(1.98, 3.42)
Alcoholic beverages .....	73.05	91.30	89.10	2.46	(1.96, 2.97)
Cash contributions.....	369.16	439.80	431.30	1.97	(0.47, 3.64)
Entertainment .....	481.62	571.86	561.01	1.93	(0.97, 2.79)
Apparel .....	282.41	315.45	311.48	1.28	(0.54, 2.03)
Health care .....	601.68	668.91	660.83	1.22	(0.67, 1.75)
Personal care .....	63.85	70.49	69.69	1.15	(0.60, 1.69)
Transportation .....	2,014.91	2,141.52	2,126.30	0.72	(-0.06, 1.48)
Housing .....	3,633.79	3,670.39	3,665.99	0.12	(-0.27, 0.52)
Education.....	207.31	203.63	204.07	-0.22	(-2.10, 1.82)
Food .....	1,520.59	1,472.14	1,477.97	-0.39	(-0.59, -0.21)

Interviewers also perceived converted refusers as having more time-related concerns than respondents and as being less likely to express hostile behavior than final refusers. Regression analysis provided some evidence that differences in interview characteristics—not demographics—account for the disparity in the quality of reporting. This finding suggests that interview characteristics should be considered when evaluating whether the interview is providing good data.

When treating converted refusers as proxy nonrespondents, we found a small positive nonresponse bias for quarterly total expenditures. That is, including the expenditure reports of

converted refusers lowers overall expenditure estimates. Our estimate is within the range of estimates of relative bias from recent studies which used other definitions of proxy nonrespondents. This result raises the broader question of whether the cost and effort of converting refusal cases is justified.

One possible limitation of this research is the use of the converted refusal question in the questionnaire to identify converted refusal cases because of possible inconsistencies in how interviewers respond to the question. Another possible limitation derives from the measures used to evaluate data quality. Since there is no single measure of quality, we considered a variety of in-

dicators. We were not able to quantify the trade-off between these measures to come up with a single “weighted” measure of overall quality.

Further research is needed to examine the impact of converted refusers on published expenditure estimates by treating them as nonrespondents and reweighting the data. Another relevant research project would be using the panel feature of the Interview Survey to study the behavior of converted refusers in later waves; the study could measure whether they are more likely to become *dropouts* or intermittent respondents, or to exhibit reluctance compared to fully cooperative respondents. ■

# Acknowledgements

Steven Bass, Division of Consumer Expenditure Surveys, assisted with coding to create several key data qual-

ity measures; Jeffrey Gonzalez, Office of Survey Methods Research, assisted with the relative bias and variance com-

putations; and Geoffrey Paulin, Division of Consumer Expenditure Surveys, assisted with the regression models.

## References

The American Association for Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys*. 4th edition. Lenexa, Kansas: AAPOR, 2006.

Burton, Jonathan, Heather Laurie, and Peter Lynn. "The Long-term Effectiveness of Refusal Conversion Procedures on Longitudinal Surveys." *Journal of the Royal Statistical Society, Series A*, Vol. 169, Issue 3, 2006: 459–478.

CE Nonresponse Bias Team. *Nonresponse Bias: Using Harder-to-Contact Respondents as Proxies for Nonrespondents*. Internal BLS Report. 2007a.

CE Nonresponse Bias Team. *Pattern of participation while in sample: inter-*

*mittent respondents and attritors as proxy nonrespondents in the Interview Survey*. Internal BLS Report. 2007b.

Groves, Robert M. (2006). "Nonresponse Rates and Nonresponse Bias in Household Surveys." *Public Opinion Quarterly* Vol. 70, No. 5, 2006: 646–75.

McGrath, David E. "Comparison of Data Obtained by Telephone versus Personal Visit Response in the U.S. Consumer Expenditures Survey." *Proc. of the Section on Survey Research Methods Section*. August 7-11, 2005. American Statistical Association, 2005.

Reyes-Morales, Sally E. *Characteristics of Complete and Intermittent Responders in the Consumer Ex-*

*penditure Quarterly Interview Survey: 2001–2006*. Internal BLS Report. 2007.

Triplet, Timothy, Johnny Blair, Teresa Hamilton, and Yun Chiao Kang. "Initial Cooperators vs. Converted Refusers: Are There Response Behaviour Differences?" *Proc. of the Survey Research Methods Section*. August 4-8, 1996. American Statistical Association, 1996.

U.S. Bureau of Labor Statistics. "Chapter 16. Consumer Expenditures and Income." *BLS Handbook of Methods*. June 2007. Online: Internet. 1 June 2007. Available: <http://www.bls.gov/opub/hom/pdf/homch16.pdf>.

Wolter, Kirk M. *Introduction to Variance Estimation*. NY: Springer-Verlag, 1985.