

# Managing Data Quality on the 2004 Survey of Consumer Finances

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## Abstract

There are many reasons why researchers would elect to gather factual information through personal interviews rather than by consulting records, which may be difficult, or even impossible, to assemble and abstract. In choosing to gather facts directly from respondents, however, researchers must address potential sources of error in respondent reporting and recording of that information by interviewers. The Survey of Consumer Finances gathers detailed household financial information from a sample of 4500 Americans. This survey faces the challenge of collecting high-quality numerical data from a complex interview on a subject that is often poorly understood by respondents and untrained interviewers alike. For the 2004 round of this triennial survey, the Federal Reserve Board and NORC teamed to improve the quality of the financial information collected by interviewers. Attempted improvements included changes to interviewer recruitment, training, testing and retention strategies; and provision of both rapid turnaround and more in-depth feedback to interviewers about their data quality during data collection. We present both a description of the attempted improvements and an estimate of their impact on the quality of the financial information collected.

## Background and Objectives

This paper presents the methods and results for an initiative, jointly undertaken by the Federal Reserve Board (FRB) and NORC, to improve data quality on the 2004 round of the Survey of Consumer Finances (2004 SCF).

The SCF has been conducted every three years by the FRB since 1983. NORC has performed the data collection since 1992. This computer-assisted-personal interviewing (CAPI) survey collects detailed financial information from a nationally representative sample of Americans. The sample consists of two parts. One part is a multi-stage area-probability sample selected from the NORC National Frame. The other part, which is selected using statistical records derived from tax returns, is stratified to over-

sample wealthy households. The results of the survey are widely used by researchers and policy makers to examine the effects of economic policies and trends on American households. More information on the background and methods of the survey can be found in Aizcorbe, Kennickell and Moore (2003).

The SCF interview presents several challenges with respect to data quality. During the interview the respondent is asked to supply a large quantity of factual information about his or her finances. Among other things, respondents are asked whether they have different types of assets or debts, their value, and which financial institutions they use. Although a survey of records would yield the most accurate information for many of the questionnaire items, it is simply not feasible to obtain access to, link, and compile, all of the records necessary to develop the detailed financial profile of each household required to fulfill the survey objectives. Respondents, however, are encouraged to consult their records as they complete the interview.

In choosing to collect this information directly from respondents, the study protocols needed to address the following sources of error that might affect data quality:

- Respondents not understanding their own finances and/or recall errors;
- Respondents not thinking of their financial assets and debts in the same way as researchers, and consequently misreporting or misclassifying their assets during their interview;
- Interviewers making errors in understanding and recording of responses; and
- Interviewers not probing incomplete or inconsistent responses.

Because of the complexity of the subject matter of the interview, completed SCF interviews not infrequently contain inconsistent information. Further, respondents often recall information later in the interview that belonged in an earlier section, or the interviewer determines by probing for clarification or later respondent reports that information that should have been collected earlier in the interview had been missed. As specified more fully below, such problems were anticipated in both in the instrument design and in the protocol used for

data collection. Among other things, that protocol specifies that interviewers should make detailed comments where problems arise that cannot be coded directly into the instrument at the point in the interview where the problem occurred.

Historically, one of the keys to SCF data quality has been the in-depth review and editing of the data performed by the Federal Reserve Board project staff. For each case, they assemble all comments and verbatim responses entered by the interviewer, along with a list of potential problems detected by an extensive software system designed to capture classes of anomalies that had reflected problems in earlier years of the study. All this material is reviewed in parallel with the main data displayed in a virtual questionnaire image. The goal is to identify important inconsistencies and to reconcile them where possible. Where such reconciliation is possible, actions may include “back-coding” information contained in interviewer comments into the questionnaire, rearrangement of data included in the questionnaire, and related actions. Where the reconciliation is less perfect, some data values may be set to missing or the initial inconsistency may be allowed to stand. Clear comments from interviewers are a crucial element in this process. For example, a note explaining that the respondent used records for a particular unusual response would normally forestall further examination of that variable. When comments are less clear or are missing altogether, more values may be set to missing or obvious irreconcilable inconsistencies may be left in the data.

After each succeeding survey, an attempt has always been made to use the problems detected in editing to revise the instrument, other materials aimed at the respondent, and the interviewer training materials for the next round of the survey. However, research into the quality of the quality of the data collected (see Kennickell 2002) indicated that despite these efforts, data quality was declining over time. The potential seriousness of allowing this decline to continue led to the initiative to improve data quality on the 2004 SCF. Underlying the apparent decline were at least three factors. First, innovations in financial markets have presented families with more complex choices that may further strain the comprehension of some people. Pension assets in particular have evolved rapidly. Second, a shift in the interviewer labor pool seems to have reduced the ease with which qualified professional interviewers can be recruited. Third, with the escalating difficulties faced in gaining respondents’ cooperation, emphasis in feedback to interviewers in past surveys had focused increasingly on costs and production, thus communicating

indirectly that data quality was a less important objective.

Through a variety of strategies, the data quality initiative for the SCF 2004 directly targeted improving the quality of data collected during the interview process. To provide material for resolution of the inevitable problems detected in editing, the initiative also targeted improving the quality and quantity of the interviewers’ comments provided to the FRB.

## Methods

As part of the data quality initiative NORC introduced the following changes for the SCF 2004:

- A renewed emphasis on data quality in interviewer recruitment, training, evaluation and retention;
- More rapid turnaround of data to the Federal Reserve Board for review, allowing them to provide more timely and systematic data quality feedback from their in-depth data review to interviewers during the data collection period; and
- A system of quick feedback to interviewers based on a small number of data quality indicators that could be measured by an automated process and provided to field managers weekly for review with the interviewers reporting to them.

These steps were in addition to the measures used in other rounds of the SCF including:

- Careful question wording and automated logic checks in the Computer Assisted Personal Interviewing (CAPI) instrument;
- Verification screens in the questionnaire that translated dollar amounts entered by the interviewer into text, which interviewers were told to read back to respondents to help catch data entry errors;
- Encouragement of respondents to consult records during the interview;
- A facility for recording interviewer or respondent comments at any point in the instrument and space at the end of the questionnaire for respondents to describe any assets or debts inadvertently left out in the responses to earlier questions;
- Requiring interviewers to complete an in-depth debriefing instrument after leaving the respondent. This largely unstructured

debriefing questionnaire asks the interviewer to describe the interview in detail and elaborate on comments left in the instrument.

The changes implemented in the 2004 SCF, in more detail, were:

*Interviewer recruitment.* Recruiters staffing interviewers on the project were briefed about the importance of data quality and instructed to focus on evaluating candidates' abilities for thoughtful and active listening, and ability to understand numbers. In addition to evaluating potential interviewers by the usual standards (demeanor in the interview, relevant past employment, ability to convince the recruiter to hire them), candidates were asked to administer a very short financial interview to the recruiter acting as the respondent. The recruiter was provided with scripted answers. In order to successfully complete the mock interview, the candidate needed to be able to read a fairly complicated question with several financial terms clearly, and to recognize that the recruiter had given a non-responsive answer and probe for the correct response. The interview also included numerical responses that appeared inconsistent. Although recognizing such problems was not a prerequisite for hiring a candidate, the recruiter noted whether each candidate identified the discrepancy. Recruiters were told clearly to leave areas of the country un-staffed rather than to take a candidate they did not believe would be successful.

*Interviewer training.* The four-day interviewer training included a module devoted to data quality, and an exercise in recording numbers. Further, the practice mock interviews emphasized probing for the correct answer, liberal use of comments throughout the questionnaire, and careful completion of the debriefing instrument. The critical importance of data quality was repeated throughout other parts of the training, including in sections about gaining cooperation. The training also incorporated a basic review of the financial terms and concepts believe to be essential to prepare interviewers to assist respondents and to detect problems during the interview.

*Interviewer evaluation and retention.* Interviewers were evaluated by several means throughout the training. These included review of the home study exercises submitted by interviewers when they arrived at training, daily written evaluations of each interviewer by the trainer that identified interviewers who required remedial training and in which areas, a graded written final examination and administration of a mock interview to a trainer. All of these needed

to be completed successfully before an interviewer could begin interviewing.

Further, once interviewers began work in the field, their cost, production and data quality statistics were evaluated weekly. Data quality was evaluated using both quick turnaround feedback and reports from the in-depth editing of cases, as described in more detail below. On the SCF 2004, interviewers were released very quickly if they did not meet the study standards for production, cost and data quality. Although we were prepared to release interviewers for data quality problems alone, in practice these were invariably accompanied by problems with cost and production, and interviewers were usually dismissed for failure to perform on more than one dimension. Earlier SCF research (Kennickell 2002) suggested that good production and high data quality were only weakly linked. Even in this round of SCF some interviewers who remained at or near the end of the data collection period had notable data quality problems, but there was no practical alternative at that point to retaining high producers, unless extremely serious problems emerged.

*Feedback from in-depth editing by the FRB.* During the SCF 2004, NORC delivered questionnaire data weekly to the FRB. This allowed the FRB to begin editing cases very early in the field period. Early delivery together with rapid editing had the added benefit of allowing us to refer to the interviewer, and possibly again to the respondent, to resolve confusing issues because they were surfaced while the survey was still in the field.

Because it was not possible for the FRB staff to review every case at the beginning of the field period, when the flow of cases is relatively heavy, a flexible selection of cases for editing was needed to ensure that all interviewers received prompt attention and that the cases most likely to have complex problems would be addressed first. In the early part of the field period, two weeks might be taken to edit the data from a single week; the next week to be edited in full would then temporarily skip the intervening week. In every week, all cases from the sample strata likely to contain cases for the wealthiest households were edited immediately. In general, all cases for a given interviewer in a given week were edited by the same person, allowing a clearer understanding of problems associated with that interviewer. In addition to specifying any changes to the data, the editor wrote a set of comments directed to the interviewer and assigned a priority code to the comments. The comments were intended both to support good behavior, recognize difficulties in individual cases,

and to point out where the interviewer might have done something different that would have improved the data quality.

Every week to two weeks, the FRB delivered interviewer feedback to NORC in a spreadsheet with comments and a score for each case. This spreadsheet was cumulative over the course of the field period. Upon receipt of the spreadsheet, NORC would identify cases edited since the last report using a flag provided by the FRB, extract that portion of the spreadsheet and send it to the field managers. Field managers incorporated that feedback into their weekly calls with their interviewers.

*Quick turnaround feedback on data quality.* The most reliable indicators of data quality were the reports generated from the in-depth editing of cases by the FRB. However, because this process was very time-consuming, for at least the first two months of the field period it was not possible to review every case within a week of receipt. Thus, in order to have a basis for emphasis on data quality with the field staff, we needed a supplemental system capable of providing at least basic data quality information more rapidly. In particular, we wanted a process that could be run automatically and provide weekly feedback to field managers on every interview completed by their interviewers in the previous week, for discussion during the weekly meetings between interviewers and their managers.

The program and reports that we devised to provide the quick turnaround feedback to the field managers are discussed in detail in Wang and Pedlow (2005). However, in summary, interviewers appeared on the report submitted to field managers if one of two circumstances occurred: the percent of “Don’t Know” or “Refused” responses for dollar-amount variables was greater than 10% (an average over their interviews), or if the sum of the number of characters entered in a group of five variables at the end of the main interview or in the debriefing instrument used to describe the interview was less than 25 (for any interview).<sup>1</sup> A too-high incidence of “Don’t Know” or “Refused” responses was considered indicative of

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<sup>1</sup> The count of missing values also included some filter questions that must be answered before a question with a dollar response could be asked. For example, when the respondent refused to answer a filter question asking whether his or her family had a checking account, the count of missing values would be increased by one. Most often, filter questions preceded multiple questions asking for dollar responses.

interviewers not probing for complete and thoughtful responses to questions, or not providing sufficient assurance of the confidentiality of the information requested. An insufficiency of characters in the text fields used by the interviewer to describe the interview in detail indicated interviewers not taking the time or care to make the responses clear to the FRB, or not understanding when information was incorrect, incomplete or inconsistent. As noted earlier, the FRB relied heavily on comments left by interviewers to resolve difficult or confusing interviews, and we continually reinforced the importance of clearly describing the interview to the field staff. These threshold values of 10% for the “Don’t Know” and “Refused” responses and 25 characters in the verbatim fields were not shared either with the field interviewers or field managers during the field period.

In addition to indicating interviewer data quality performance against these threshold measures, the report also indicated interviewers leaving significantly fewer or more comments than their colleagues, and having significantly fewer or more “Don’t Know” or “Refused” responses.

One of the goals of this report was to take time-consuming analysis and decision-making out of the hands of the field managers. The reports were very short, containing only simple statements such as:

Interviewer 111111 – Jane Doe  
Problem # 1 (Too few comments)  
Insufficient comments were left for 1 out of 3 interview(s) this week.  
Overall, insufficient comments were left for 1 out of 8 interview(s).

Field managers were instructed to address any data quality issues appearing on the reports with the interviewer involved immediately. Many times, problems were fully explainable. For example, there may have been respondents whom no amount of reassurance would persuade to cooperate more fully. Regardless of the resolution of such conversations between field managers and interviewers, the review served to emphasize that data quality was being watched and that performance in that area was important.

## Results

*Interviewer recruitment.* A total of 196 interviewers were recruited for the SCF 2004, and 186 were trained. However, as in past years, the majority of work was done by a small core of interviewers.

Forty-eight (26% of our trained interviewers) completed 60.4% of our cases. While we know anecdotally that we were able to eliminate some candidates unlikely to be successful by means of the new recruitment procedures, and we saved on cost, we cannot say that our recruitment procedures produced a substantial gain in the number of our core group of the most successful interviewers over previous years.

Our policy of not staffing some areas of the country rather than hiring a less qualified candidate resulted in two un-staffed areas of the country at the start. As attrition occurred, even during training, the number of un-staffed areas increased. However, we were able to cover these areas either by sending traveling interviewers to them or completing those cases by telephone.

*Interviewer training and evaluation in training.* The written exercises, tests and daily evaluations used during the 2004 SCF training almost invariably validated the trainers' more qualitative, personal, assessment of the performance of trainees. They provided an added benefit of structuring and documenting the feedback to interviewers. The graded home study exercises were returned to interviewers during training so they could see clearly where they were misunderstanding the material, and the graded final examinations were provided to field managers after the close of training so they could address errors with interviewers at the start of the field period. Further, we learned from the field managers in the project debriefing that these tests and evaluations sent a strong message to the interviewing staff about how serious we were about having them master the material that had several indirect benefits both in training and during the field period.

*Interviewer evaluation in the field and retention.* As mentioned above, interviewers who were not meeting the project standards for production, cost or data quality were given a very short time to improve and were released promptly from the study if they did not. Although we were prepared to dismiss interviewers for poor data quality alone, in reality interviewers who were not performing with respect to data quality were also not performing on other dimensions and were released from the study for multiple reasons. As time went on, interviewers were also released from the project if they had completed their assignment and were not interested in traveling or working by telephone, and a small number of interviewers took other jobs during the field period. At the end of two months our interviewing staff had declined from the 186 trained to 134, and by the final

month and a half of our almost seven-month field period we had 48 interviewers left on staff, many of whom traveled extensively for the project. In the last month of the project, this number dropped continuously, reaching 28 at the end.

We can make several observations about our experience with the SCF 2004:

- Interviewers who were successful on other studies were not necessarily successful on SCF and, conversely, interviewers who performed marginally on other studies did well with SCF. This lends weight to the argument that interviewers need to be carefully paired to the study.
- Although many of the best-producing interviewers had high data quality, this was not true for all of them. There appeared to be a broad range of overall data quality across the group. Subsequent analysis is expected to probe this point further.
- We did an analysis of the limited data we had on the work history of our interviewers and were not able to clearly identify a set of interviewer qualifications that reliably predicted interviewer success on the SCF that could be measured prior to hiring. It was, however, true that a very large proportion of the interviewers making up our final core team of 48 had interviewing experience on at least one other study with NORC.

*Rapid turnaround data quality feedback.* We have some evidence to suggest that the rapid turnaround feedback based on automated data checks that monitored the percent of "Don't Know" and "Refused" responses and number of characters in verbatim fields used to describe the interview did positively affect interviewer behavior. According to these automated measures, the proportion of interviews with at least 10% "Don't Know" and "Refused" responses was between 5% and 10% for the first 20 weeks of data collection (with the exception of one week when it was above 10%), but dropped to near 5% for all but one of the remaining 14 weeks of the field period. This is remarkable given that a higher proportion of the interviews completed near the end of the field period were with wealthier respondents. Since these respondents had more assets and complicated financial situations, and therefore more opportunities for "Don't Know" and "Refused" responses, one might hypothesize that the proportion of such responses in the data would increase over the course of the field period. Further, the percentage of interviews with too few comments

decreased gradually over the project. Each week for the first seven weeks of data collection, more than 5% of the interviews had too few comments. After the seventh week of the field period, there was never another week where the proportion of interviews with too few comments was above 5%. For the last 13 weeks of the field period, there was only one week during which the proportion of interviews with too few comments exceeded 3%. We also know anecdotally from the field managers that interviewers in general responded to the feedback from these reports. This is supported by the fact that there were very few “repeat offenders” appearing on the reports throughout the course of the field period.

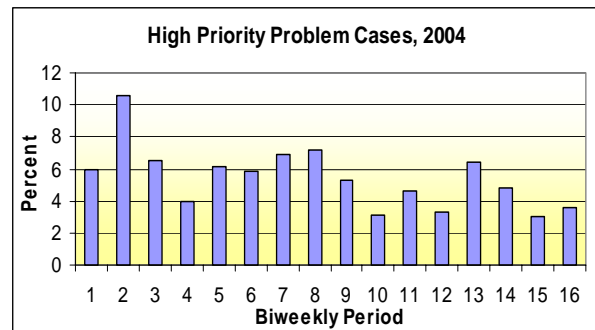
The logistics of producing and distributing the reports ran smoothly. The most common feedback from the field staff was the desire to know the details of the specific cases that generated a negative data quality report, and requests for the threshold values that triggered negative reports. The thresholds were not supplied, and the details of cases were supplied only rarely as they were not necessary for interviewers to get a clear understanding of what we were asking them to do going forward.

*Results of in-depth editing by the FRB.* As noted above, the most reliable indicators of data quality were the results of the in-depth, case-by-case editing done by the FRB. It is very difficult to summarize the highly heterogeneous information contained in the weeks of written feedback and the effects that had on subsequent data quality. Nonetheless, from continuing review of the interviewers, there was an informal perception among the editors that individual interviewers improved in terms of data quality over the field period. A few straightforward quantitative comparisons may also be made. We are able to track the rate of serious problems over the field period and for some other measures we are able to compare outcomes with comparable periods in the field period for the 2001 SCF.

### High priority problem cases in 2004

As noted above, the FRB editors assigned a priority score to each case. The highest level of priority indicated that there was a problem with a case that called into question the integrity of at least one key part of the interview. Sometimes the feedback for such cases asked the interviewer for additional information or asked for retrieval of additional or confirming information from the respondent. In a peak period of case completion in the third and fourth weeks of the field period, over 10 percent of all interviewers were judged to have serious problems,

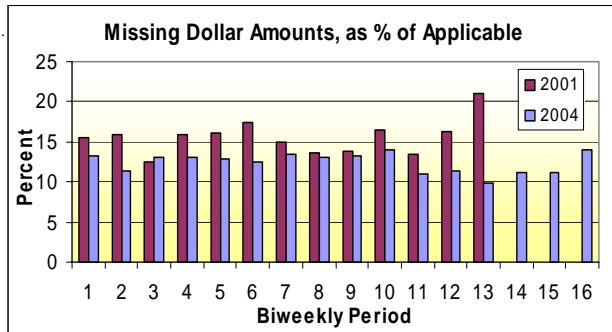
many of which could be reconciled later. Although the difficulties faced in cases completed over the remainder of the field period appeared to rise, the percent of high priority problems tended to decline. The graph in Exhibit 1 shows the frequency of high priority problem cases in consecutive biweekly periods during the SCF 2004 data collection.



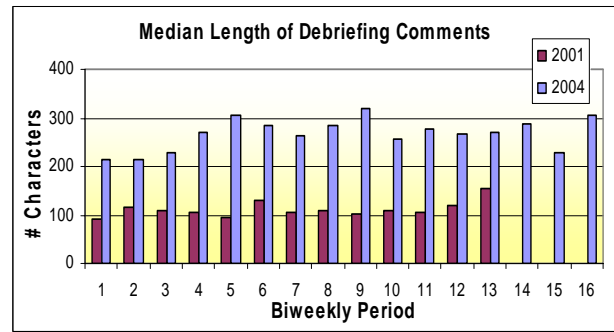
**Exhibit 1.** Frequency of High Priority problem cases in each biweekly period during the 2004 SCF data collection.

### Percent of missing dollar amounts

In the FRB editing, missing dollar amounts were defined differently than in the rapid turnaround feedback generated automatically at NORC. Like the NORC measure, the FRB measure treated as missing those dollar variables directly answered by the respondent with a final “Don’t Know” or “Refused” response after probing for a range. But the FRB measure also included dollar variables that were not known for certain to be relevant, because the respondent had declined to answer a question that was higher in the logical hierarchy of questions; for example, if the respondent refused to say whether he or she had a pension, then all dollar amounts in the pension sequence were counted as missing values. Relative to a comparable measure computed by week of the field period in the 2001 SCF, the rate of missing dollar amounts is lower in the 2004 survey and the rate did not rise appreciably over the field period. As noted above, we might expect the percent of missing values to increase in interviews near the end of the field period, when the interviews completed were more complicated and therefore had more opportunities for missing values. The graph in Exhibit 2 compares the percent of missing dollar amounts in interviews completed in each consecutive biweekly period during the 2001 SCF and 2004 SCF data collections.



**Exhibit 2.** Percent of missing dollar amounts by biweekly period in the 2001 SCF and the 2004 SCF data collections.



**Exhibit 3.** Median length of debriefing comments by biweekly period in the 2001 SCF and the 2004 SCF data collections.

**Median number of characters in the interviewer debriefing comments**

The interviewer debriefing questionnaire was to be completed away from the respondent and as soon as possible after an interview was completed. All problems detected during an interview were intended to be summarized there as were any very unusual, but valid, responses that occurred during the interview. In addition, interviewers were told repeatedly that even if there were no problems apparent to them in a case, it could turn out to be extremely useful in editing to know that any problems detected at that stage were not a result of particular stresses during the interview or of systematic respondent inattention or deception. Thus, interviewers' performance in the debriefing questionnaire should be a clear indicator of just how seriously they received the data quality message. Here the data show a dramatic improvement over performance in the 2001 SCF, at least as measured by the quantity of information provided there. The median total length of comments in the debriefing instrument was over twice as high in almost every biweekly period. The same result holds if we look at the 75<sup>th</sup> and 90<sup>th</sup> percentiles of the distribution. Although more examination of the data will be required to identify patterns of behavior for individual interviewers, this result is encouraging. The graph in Exhibit 3 compares the median length of debriefing comments (number of characters) by biweekly period during the 2001 SCF and 2004 SCF data collections.

**Discussion**

Overall we believe that our data quality improvement initiative for the SCF 2004 did result in improvements in the quality of the auxiliary information supplied to the FRB for use in their editing, and more importantly, in the quality of the data collected in the interviews.

The continuous feedback throughout the data collection period about the importance of extensive comments about the interview, key to the ensuring the quality of the final data set, was clearly effective in increasing the number and length of interviewer comments in the 2004 SCF. We believe that the emphasis in training on the importance of comments was necessary to set the right initial expectations among interviewers, but the quick-turnaround feedback and the reports from the in-depth analysis by the FRB were responsible for much of the improvement.

The decrease in "Don't Know" and "Refused" responses in this round of the survey, and reduction in the number of high-priority problem cases over the field period is also encouraging.

We believe that our training program was largely effective in communicating our expectations regarding data quality to interviewers but we recommend, of course, that it should be enhanced for the next round of the study. Two points in particular should be mentioned here. It would be useful to provide interviewers with a set of specific examples of problems and address how one might respond to them during the interview with different types of respondents. A closely related point is the need to continue to search for ways to train more effectively on active listening skills and the role of probing.

Although we would retain the improvements to our recruiting procedures -- briefing recruiters on the study data quality issues, the mock financial interview and choosing to leave areas of the country understaffed or understaffed if we cannot find a suitable candidate-- we have not yet found reliable predictors of success among our interviewing staff that could be detected prior to hiring them. Thus we remain unable to identify a clear alternative to overstaffing and expecting attrition. Hiring interviewers who cannot provide high quality data and overstaffing in anticipation of staff loss is costly for the project. We continue to search actively for a solution that would allow us to hire and train a smaller but more constant staff of high-quality interviewers. One possibility suggested by simple labor economics would be to alter the compensation scheme offered to interviewers with the hope of changing the pool of people who are willing to apply for such work. Unfortunately, little is known now about what effect variations in compensation have in that market, but some information may be gained by looking at labor markets for related professions.

Some interviewers are clearly good at convincing respondents to participate in surveys, but they are less able to collect high-quality data. Other interviewers have the technical skills to collect excellent data, but they lack the skills or desire to persuade respondents to participate. The effort to persuade and the effort to code respondents' information in a consistent and coherent way within a technical instrument may well engage quite different cognitive abilities. Some attempt was made in a field test for the 2004 SCF to split these tasks, but the coordination problems of doing so on a large scale proved insuperable. However, by the end of the 2004 SCF field period, such a practice was in place in a flexible form; travelers and specialized refusal converters gained respondents' cooperation and other field interviewers specialized in collecting the data by telephone. Further examination of the implications of this effort for data quality is needed.

Respondents clearly have a central role in producing high quality data. Additional systematic efforts may be needed to address specific problems that lead to resistance or lack of engagement; some additional insights in this vein were gathered in the 2004 SCF.

But ultimately, field surveys must depend on the ingenuity and flexibility of interviewers to bridge many gaps. A successful survey will always require well-trained, intelligent and motivated professional interviewers.

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