Issues in the Design and Testing of Business Survey Questionnaires: What We Know Now that We Didn't Know Then – and What We Still Don't Know

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1.0 Introduction

The U.S. Census Bureau created the Establishment Survey Methods Staff (ESMS) in 1998 to aid economic survey programs with the development and pretesting of data collection instruments. ESMS' research program was launched through collaboration with survey research pioneer Seymour Sudman, who was the principal investigator for an in-depth study of the survey response process in large multi-unit businesses. This research resulted in two seminal papers, one describing a conceptual framework for business survey participation decisions (Willimack et al., 2002), the other proposing organizational steps added to the traditional cognitive response model (Sudman et al., 2000). In addition, recommendations from this study influenced strategic decisions about data collection procedures utilized by economic surveys at the Census Bureau.

Since that time, cognitive pretesting conducted by ESMS has become integrated into the survey design process for economic surveys. Using qualitative research methods, ESMS members have interviewed small numbers of business respondents for dozens of economic surveys during the past ten years. In total, ESMS members have conducted hundreds of interviews, testing survey questions and delivery modes for surveys of enterprises and establishments, as well as for two economic censuses. Drawing upon the collective experiences across ESMS, this paper reflects upon this accumulated knowledge.

I begin by providing a high-level overview of economic programs at the Census Bureau. Then I describe key differences in data collection procedures for economic and household surveys and discuss the economic survey response process. Next I describe the mechanics and logistics of procedures used by ESMS to conduct pretesting, and I discuss cognitive research methodologies used or adapted by ESMS. I then describe some of ESMS' most pervasive findings about respondents' behaviors. I close with a list of issues and recommendations on some of the unresolved or intractable issues that remain for pretesting and designing business surveys.

2.0 Background

The U. S. Census Bureau provides statistical measurement of economic conditions and indicators, by conducting more than 100 annual, quarterly or monthly surveys of U.S. businesses and government organizations. In addition, an economic census is conducted every five years to provide geographic and industry-level detail and to benchmark key measures of the economy, such as gross domestic product. The economic census and the annual surveys are collected under mandatory authority, while participation is voluntary for most of the sub-annual surveys. Nearly all of the Census Bureau's economic surveys are collected using self-administered data collection instruments. Paper forms are administered by mail, while electronic modes include

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Web surveys and software downloaded from the Internet. Many surveys feature multi-mode collection, offering businesses the opportunity to select their preferred response mode.

Data collection from businesses and organizations differs in some significant ways from surveys of households and individuals. Surveys collect factual information about the business, such as financial data or quantities. While some household surveys collect factual information, many social science surveys request autobiographical, behavioral or attitudinal information about individual persons, or attributes of the household. Social survey respondents can usually answer questions from memory about themselves, their households, or other individuals in the household. Business surveys require a person to act as an informant on behalf of the business.

The response process in surveys of businesses and organizations is complex. The model of survey response for individuals consists of four cognitive steps – comprehension, retrieval, judgment and communication (Tourangeau, 1984). The business survey response model wraps organizational steps around the cognitive steps (Sudman et al., 2000) as follows:

1. Record formation and encoding of information in memory
2. Selection and/or identification of the respondent(s)
3. Assessment of priorities affecting the respondent's motivation
4. Comprehension of the survey request
5. Retrieval of information from memory and/or records
6. Judgment of the adequacy of retrieved information to meet the intent of the question
7. Communication of the response
8. Review and release of the data to the survey organization

Organizational steps 1, 2, 3 and 8 provide context within which cognitive steps 4, 5, 6, and 7 occur. Surveys collecting business information rely heavily on data retrieved from records. However, records are formed around business' management and regulatory needs, and not for statistical purposes. It is the business, and not the survey organization, that decides who the survey respondent will be. In many businesses, particularly large ones, information is compartmentalized around specific organizational functions, and is distributed throughout the company. As a result, surveys that request multiple types of data require multiple informants. Respondents' priorities are to support business functions, while completing a survey is considered non-productive, a cost with no associated production. Additionally, releasing information outside the company may require approval from an appropriate authority.

The complexity of the response process, the nature of business surveys, and attributes of the establishment setting all combine to challenge the application of traditional cognitive research methods to pretesting economic survey data collection instruments. (See Willimack et al., 2004, for a comprehensive discussion of methods adapted to the establishment survey setting.)

3.0 Questionnaire pretesting for economic survey programs at the Census Bureau

Economic survey programs at the Census Bureau have integrated questionnaire pretesting into the survey development process. This activity is primarily conducted by members of ESMS, which has grown from one person to seven, with tenure ranging from one to ten years. Logistical procedures used by ESMS to conduct pretesting have stabilized and will be described next. Then, the use and adaptation of cognitive research methods by ESMS in the establishment

survey setting will be discussed, followed by some of ESMS' more pervasive research findings about business survey respondents and their behaviors.

3.1 Pretesting Procedures

The hallmark of ESMS' approach to questionnaire pretesting for economic surveys is close collaboration with survey program areas. A typical research team usually includes two researchers trained in survey methodology who work closely with survey analysts and subject matter specialists. The survey methodologists contribute their expertise in cognitive research methods, pretesting, and questionnaire design. Subject matter specialists contribute their expert knowledge of the concepts to be measured, familiarity with the target population, and hands-on experience with collected data. Together, the methodologists and the analysts identify problem areas to be investigated, define research goals, and develop the project plan.

Preparation for pretesting consists of developing an interview protocol that addresses the research needs, and recruiting respondents to participate in the study. The establishment survey response model presented in Section 2 guides the development of the protocol. Probes that investigate organizational steps 1, 2, 3, and 8 tend to form a preamble and a postlude to the question-by-question probes examining cognitive steps 4, 5, 6, and 7. First, general questions obtain background information about the organizational structure, respondent selection, and his/her role in the company. Next come cognitive probes about specific survey items. The interview ends with probes about what happens after a form is completed.

The protocol is used as a guide, outlining topics to be covered, and not as a set of standard probes asked verbatim. The intent is to get the respondent talking about the issue of interest and to obtain the key information for research purposes. ESMS researchers must be familiar with the protocol and adept at managing the interview to ensure the topics are adequately covered.

Participants are recruited from samples provided by the sponsors, who collaborate with ESMS researchers to determine selection criteria. The number of cases varies depending on characteristics of the target population and the questionnaire content. Sample sizes may range from as few as 8 or 10 to as many as 60 or more and are not meant to be statistically representative of the target population. Because participation in pretesting is voluntary, ESMS usually requests at least 5 times as many cases as the number of completed interviews desired.

ESMS researchers conduct cognitive interviews with respondents at their business locations for two reasons: 1) It is difficult to persuade business respondents to travel to a cognitive lab during work hours; and 2) The respondents' office settings provides access to business records as needed. ESMS researchers try to limit the length of their interviews to 60 – 90 minutes. For longer questionnaires, sets of questions may be distributed across multiple interviews with different respondents, thus requiring a larger sample size to ensure adequate coverage of the questionnaire. Interviews are audio recorded with permission of the respondent, to aid summarization. Subject matter experts participate in cognitive interviews as observers; they help ESMS researchers assess respondents' answers for adequacy vis-à-vis the question's intent.

ESMS researchers prepare written summaries of each individual interview. They lead meetings to debrief interviewers and subject matter specialists who participated in the pretest interviews,

looking for common findings across multiple interviews, as well as unique or exceptional situations. The researchers then draft a summary report of findings and recommendations as appropriate for each question. After the sponsors read the draft report, they meet with the researchers to review findings and recommendations. Decisions regarding each recommendation are negotiated, if necessary, and documented in the final report.

Schedule permitting, ESMS conducts multiple rounds of testing for a questionnaire. That is, after pretesting a draft form with roughly 8-15 respondents, the questionnaire is revised based on results and re-tested with different respondents. ESMS projects usually consist of 2-3 rounds, although as many as 5 rounds have been conducted for major projects. The minimum turnaround time is three months for a single round of interviews with 8-15 respondents. The duration of most of ESMS' typical pretesting projects is 6-9 months. Large projects with 5 rounds of interviews, such as those that support a major new or redesigned survey, may last 1-3 years.

3.2 Pretest Methods

A variety of cognitive research methods are commonly used in pretesting household survey questionnaires. (See Willis, 2005, for descriptions.) Many of these methods are being used by ESMS for pretesting economic surveys at the Census Bureau, with varying degrees of utility and success. Following are descriptions of some of the difficulties ESMS has found applying traditional cognitive methods, along with adaptations, for the establishment setting.

Because of the length of many establishment surveys, too much time passes for respondents to reconstruct what they were thinking while they were going through the questionnaire. In addition, data retrieval is often not straightforward for business respondents, unless items exactly match data found in readily accessible records. This is often not the case, particularly when surveys ask for different types of information that reside in different parts of the company. As a result, observation by ESMS researchers of actual response behavior is frequently not practical.

Similarly, because of the labor-intensive response process, respondents are reluctant, and thus unlikely, to complete a draft questionnaire before a cognitive interview, preventing the use of respondent debriefings to aid pre-production design of questionnaires. In respondent debriefings, respondents would be probed about their actual behavior for obtaining information, including records consulted, data retrieval processes, and reporting and release requirements.

Although concurrent probing and paraphrasing are commonly used during pretest interviews, probes must frequently be phrased as hypothetical questions because data retrieval is time-consuming – e.g., "How would you come up with this answer?" "Where would the data come from?" "Which records would you consult?" (Stettler et al., 2001).

A "funnel approach" to probing, much like that used in focus groups, has been adapted to the establishment setting. Researchers begin with non-directive probes to elicit respondents' initial thoughts or reactions to a survey question. However, sometimes respondents find it difficult to articulate their thoughts or to react to an open, non-directive question. It may then be necessary to help the respondent with a directive question, offering response options. Such a strategy may put the respondent back on track, "teaching" them the nature of the feedback being sought.

Specific probes may be used, as necessary, to obtain detailed information to help assess a question's effectiveness. Directive questions are useful for obtaining what respondents know about the specific topic or concept the survey is being developed to measure. For example, after first asking a standard cognitive probe like "What does 'this' mean to you?," the researcher may then provide the respondent with details about the concept we are attempting to measure, and ask, "What do you think we should do or say in order to get 'this'?"

This type of questioning is more exploratory in nature, trying to obtain the respondent's view on the concept of interest, to aid the formulation of measurements that can be queried in surveys. When such an exploratory step is not undertaken before drafting a questionnaire, "cognitive interviews" often devolve into a hybrid of cognitive probes and exploratory questions.

Cognitive probes tend to focus on the comprehension step of the cognitive response model, because findings usually help suggest revisions that may resolve problems of misinterpretation. The retrieval step is emphasized in pretesting because it affects the data so much, and has the greatest impact on respondent burden. The judgment step seems the hardest for respondents to articulate. Evaluation of the communication step is rare, since direct observation of respondent behavior is virtually impossible. Vignettes have been used to overcome this. For example, respondents were provided with simplified mock records, from which they retrieved data and entered them onto the questionnaire, enabling observation of the communication step during the limited time available for an interview (Morrison, et al., 2004).

Since many pretesting methods are qualitative, using more than one method during the development of a questionnaire can increase both researchers' and sponsors' confidence in the results. The various methods have their strengths and weaknesses, and they tend to be complementary. For example, before beginning to redesign an existing business survey form, Tuttle et al. (2007) 1) conducted focus groups with data analysts to isolate major problem areas; 2) observed telephone conversations between analysts and respondents to identify typical language; and 3) debriefed respondents to discern underlying issues with the problematic questions. Then questionnaire sections were drafted and cognitively pretested in an iterative manner, with revisions being made between each of five rounds of interviews. The new questionnaire was field tested with a subsample of businesses, to evaluate its effectiveness in a production setting. Respondent debriefings were conducted with a small number of field test respondents, to confirm appropriate response strategies.

3.3 Pretest Findings about Respondents and Their Behaviors

ESMS' pretest findings about business survey respondents and their behaviors have been remarkably consistent, across a wide variety of business survey topics and target populations. A few particularly pervasive findings will be presented here.

Economic surveys tend to ask questions about complex concepts. As a result, what we ask respondents to do is difficult. Data tracked by businesses in their records frequently differ from what we ask. Detailed instructions are often provided to aid respondents in adjusting their data to meet the intent of the question. However, findings have consistently shown that respondents do not read instructions, despite attempts to make them more noticeable. The best we seem to be able to do is to make the instructions more easily accessed by respondents when they feel they

need help, such as bulleted lists or step-by-step instructions that direct respondents through a task (Thomas et al., 2007). Since respondents do pay attention to questions, we have found that key instructions, such as those needed to correctly define the survey reporting unit, are more effective if they are reformulated as questions (Morrison et al., forthcoming).

Even if/when respondents understand the intent of a question, they may not have the desired data. As a result, we find that respondents construct ways to report the data they have by redefining our concept. For example, if there are four component parts to a figure in the respondent's records, and our survey only asks for three of them, the respondent often finds a way to report the remaining component as well. Many business respondents are accountants, who are uncomfortable when figures fail to balance. They also want data reported in surveys to match information found in annual reports or other public sources, thus presenting a consistent picture to the outside world.

Some techniques designed to ease reporting burden, such as requesting percentages instead of actual dollar figures, are counter-productive. Accountants, who feel compelled to provide precise figures, will retrieve both the numerator and denominator from records and then calculate, rather than estimate, the percentage.

Since different types of data are housed in different parts of a company, multiple people or sources are usually needed to complete a single form. Diligent respondents work hard to obtain data from others, and it is very time-consuming to identify, contact and follow up with appropriate persons or offices where the requested data reside. In contrast, some respondents avoid the extra effort and burden by answering questions themselves about topics with which they may be marginally familiar. However, this likely reduces data quality.

We find that surveys are often hardest for medium-sized companies. Large companies have entire staffs whose jobs are financial reporting, both for company purposes and to meet external requests like surveys. Large companies also have automated structured systems of information, aiding the retrieval of data to meet information requests. In very small companies, frequently there is one person who knows seemingly every detail about the business. However, medium-sized companies have many of the data requirements of larger companies without the additional staff, and accommodating survey requests is burdensome. An employee assigned to complete a survey form may be selected out of convenience, and may not know that particular data exist, much less where the data reside or how to retrieve them.

4.0 Issues and needs

Not only does ESMS' ten years of pretesting economic surveys provide experience adapting cognitive methods to the establishment survey setting and offer insights into respondent behavior, it also presents an opportunity to gauge unresolved issues in business survey development and pretesting and offer some recommendations for their resolution.

Issue: The burden of response and time limitations during interviews means that many probes are asked in a hypothetical manner. Yet, questionnaire design texts advise avoiding hypothetical questions, because research has shown that people's actual behaviors frequently differ from what they said they "would" do in hypothetical situations. (Sudman & Bradburn, 1982).

Recommendation: Conduct debriefing interviews with respondents after they have completed the survey during production data collection. Since many economic surveys are done monthly, quarterly, or annually, respondents' actual response behavior can be obtained, and findings can be used to improve the questionnaire for future iterations of the surveys.

Issue: The labor-intensive response process inhibits the ability of researchers to get respondents to complete draft forms in their presence or in advance of their visits. As a result, it is difficult, if not impossible, to use traditional pretesting methods such as observation, retrospective probes or respondent debriefings to aid questionnaire improvements before the survey is fielded.

Recommendation: Embed a "pilot" of a new questionnaire into production data collection. In a survey "pilot," the new questionnaire is sent to a sample of the target population. While the effects on summary estimates should be considered when designing a pilot study embedded in the existing survey, the pilot need not include full-scale implementation of downstream processing or produce statistical summaries of collected data. Rather, its main purpose is to permit different types of evaluation of the proposed questionnaire. Debriefing interviews can be conducted with respondents to investigate their actual reporting behaviors and to identify ineffective survey questions for further improvement. Response data can be evaluated relative to objective criteria to assess data quality.

Issue: Companies keep track of information needed to monitor the financial status of the business, to help managers make strategic decisions, and to meet regulatory requirements. As a result, data kept in business records does not always match the underlying economic concepts that surveys are trying to measure.

Recommendations:

- Involve survey methodologists in questionnaire development before a questionnaire is drafted. By working with data users and survey sponsors during the development phase, methodologists can learn about the underlying concepts and the intended purpose of each data item. This will aid them in identifying issues to address and pretesting methods to use, helping to develop questions that meet the intent of the measurement.
- Conduct exploratory interviews with target population members prior to drafting survey questions (Rutchik & Freedman, 2002). The purpose is to learn about the way businesses look at the topic of interest, definitions and language pertinent to developing measurements, and the availability of data in records. This helps methodologists develop a questioning strategy, alerts sponsors to discrepancies between the underlying concepts and available data, and informs survey managers about potential respondent burden.
- Use directive, but open, questions during these exploratory pre-design interviews. Procedures used in cognitive interviews are designed to learn how respondents process survey questions, without disclosing the question's intent. Instead, procedures for exploratory interviews call for explaining to the respondent the concept(s) we would like to measure, and then directly asking the respondent to explain the business' perspective on that topic – e.g., whether that topic is pertinent to the company and, if so, how it is measured, by whom and where.

Issue: Data items requested in economic surveys often have underlying intricate technical definitions. Financial data are guided by accounting standards. There is often a technical

"language" common among businesspeople responsible for areas or activities queried in surveys. However, data collection methodologists may not have expertise or in-depth technical knowledge of the subject matter or accounting principles. Cognitive interviews may not capture discrepancies between respondents' answers and the question's intent.

Recommendation: Use a collaborative approach to questionnaire development and pretesting. Pairing cognitive interviewers with subject matter specialists and accountants takes advantage of these disciplines and areas of expertise.

Cognitive interviewers are practiced in non-directive pretesting methods to elicit information from respondents about their thought processes, behaviors and strategies for completing the survey. Albeit somewhat artificial, the purpose of cognitive interviews is to glean as much as possible about how respondents go about answering survey questions without help. Thus it is imperative that respondents not be given guidance during the interview.

The role of subject area specialists or those with knowledge of accounting, then, is to aid cognitive pretesters in determining whether respondents' answers meet the intent of the questions. Collaboration is key and can be accomplished in multiple ways: 1) Cognitive interviewers can report descriptions of respondents' behaviors, and subject area specialists can then assess whether the question's intent is being met; 2) Experts in the subject matter or accounting can help researchers with developing and modifying the interview protocol to ensure that sufficient information is obtained to evaluate the effectiveness of the question; 3) Accounting or subject area specialists can participate in interviews as observers, to witness respondents' behaviors firsthand, and subsequently collaborate with researchers to improve the protocol; and 4) Following the cognitive portion of the interview, specialists may ask questions to help clarify whether the intent of the question is being met.

Issue: The "omnibus" nature of many economic surveys means that multiple respondents and/or sources are needed to provide the requested data. For these surveys, a single "right" respondent may not exist. Obtaining quality data, then, requires that the "right" informants – those closest to the data – are involved in providing the data.

Recommendations:

- Develop and/or adapt research methodologies to aid survey researchers in identifying and understanding the mechanisms used by business survey respondents to gather data from multiple sources/informants. A better, more in-depth understanding is also needed of models of organizational and informational structures used in businesses.
- Use results from this research to develop, study, and implement data collection procedures that encourage and facilitate respondents' ability to gather data from others in the organization where the requested data reside.

Issue: Since many economic surveys are self-administered, there tends to be heavy reliance on the questionnaire to convey the complex technical requirements of the requested information. Without the assistance of an interviewer, the questionnaire bears a heavy burden in establishment surveys. It is naïve to believe that questionnaire design can fix everything.

Recommendation: Encourage a new paradigm in the relationship between those that use the data and those that collect it. Questionnaires tend to be developed "top-down," where data

specifications, such as table stems, are reformulated as questions, rather than a more organic "bottom-up" approach starting with data actually tracked by businesses or organizations. Using both approaches may aid identification of collectable data with identifiable shortcomings that data users can consider when analyzing and interpreting results.

Issue: Results from cognitive pretesting are generally under-utilized. They are typically used to suggest improvements to inadequate questions. However, not every question can be "fixed." Since cognitive interviews obtain information about respondents' thought processes and behaviors in arriving at answers, the results reveal response error types and tendencies with implications for interpretation and quality of the resulting data. This qualitative information, which is not generally passed along to data users, offers insights into the context and utility of the reported data. In other words, data users are not always getting what they think they are getting, and descriptive results from cognitive pretesting can aid them in understanding the data.

Recommendation: Make cognitive assessments of data items available in survey documentation. This may be particularly appropriate when there is a direct relationship with the survey sponsor or when the consequences of misunderstanding are high. The manner of presentation should be explanatory, and not suggestive of inadequate data quality, and should include description of the characteristics of the cases interviewed, along with their number.

Issue: There is too much reliance on cognitive interviewing alone to identify and correct all of the measurement problems with a questionnaire. As a qualitative research method, cognitive pretesting does not pretend to be statistically representative of the behaviors of the target population. While its usefulness is to provide in-depth insights into respondents' strategies and their relationship to response errors, cognitive interviewing does have its shortcomings. Respondents may be more attentive to the response task during a cognitive interview. The presence of an interviewer may alter response behavior, particularly for self-administered surveys. In the establishment setting, there is heavy reliance on hypothetical questions. What respondents actually do to answer survey questions cannot be observed objectively.

Recommendation: Use multiple methods to enhance the effectiveness of research for improving survey questions. Just as one would not rely solely on a hammer to build a house, other tools are needed to obtain a useful end product. Cognitive interviews are but one tool in an arsenal of research methods to aid questionnaire development. Various methods complement one another, and the deficiencies and limitations of each method are offset by the strengths of another method. For example, a field pilot of a new questionnaire with a small sample of respondents provides a more realistic survey setting than cognitive interviews, where respondents might have altered their behavior in the presence of the interviewer. Respondent debriefings reveal actual response strategies that could only be discussed hypothetically during a cognitive interview. Record-check studies can identify data discrepancies that might be addressed in questionnaire design.

Issue: Little evaluation has been done to determine whether questionnaire revisions based on cognitive pretesting have improved data quality. This issue is not unique to economic surveys; social surveys struggle with this issue as well.

Recommendations:

- Conduct research to identify or develop meaningful, valid, reliable measures of the

effectiveness of cognitive pretesting for improving data quality. Some measures considered to indicate data quality include item nonresponse rates or the frequency of edit failures. Since the goal of cognitive pretesting is to aid the design of more effective questions, staff time resolving data errors may also be an indicator. The validity of these measures for evaluating cognitive pretesting needs to be assessed as well.

- Build procedures into production data collection for capturing appropriate measures of data quality. Using these measures, quantitative assessments may be conducted to evaluate the effectiveness of questions that have undergone cognitive pretesting.

5.0 Conclusion

Through ten years of experience pretesting establishment surveys, ESMS has demonstrated the utility of cognitive research for improving data collection instruments and methods in economic surveys. Some pretesting methodologies seem to be becoming standard, and some respondent behaviors appear to be pervasive across survey topics and target populations. Issues presented here represent a starting point for further research and development towards improvement of both pretesting methodologies and their impact on economic survey questionnaires. Perhaps this paper can provide a benchmark for comparison ten years from now, and many of the "issues" will be covered under "experience," and be replaced with much more provocative needs.

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