Gemini Project Vision Document

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Gemini Project Mission

With the Gemini Project, the U.S. Bureau of Labor Statistics (BLS) aims to redesign the Consumer Expenditure (CE) surveys to improve data quality through a verifiable reduction in measurement error—particularly error caused by underreporting. The effort to reduce measurement error will combat further declines in response rates by balancing any expected benefits of survey design changes against any potential negative effects on response rates.

CE Survey Objectives and Uses

By improving the quality of the CE estimates, the CE surveys satisfy their primary purpose: maintaining the integrity of the expenditure weights used in the Consumer Price Index (CPI). Improved data quality and stable or increasing response rates enhance the usefulness of the CE data for both public and private users. In the Federal sphere, for example, the Bureau of Economic Analysis (BEA) uses the data to estimate Personal Consumption Expenditures (PCE), while the Bureau of the Census employs the data to construct experimental poverty measures. Congressional committees also request special tabulations of the data on issues such as the potential impact of increases in the minimum wage. The academic community and research organizations use CE public-use microdata extensively in their analytical work, investigating topics such as consumption over a person's lifecycle, trends in expenditure inequality, the impact of public policy proposals on spending by consumers, and the consumption behavior of consumer units given differences in socioeconomic and demographic characteristics. Private companies use both CE tabular data and CE microdata in marketing their products and services. They do this directly or through firms that purchase CE microdata to provide such analytical services. In addition, CE data are a recommended resource for prospective entrepreneurs developing their business plans.

Motivation for Redesign

The design of the CE surveys must be updated on an as-needed basis to address the effect of changes in society, technology, new consumer products, and spending methods on survey estimates. Without these updates, the CE surveys will not be able to continue producing high quality expenditure estimates for users.

Surveys today face well-known challenges that affect response rates, such as increasingly busy respondents, confidentiality and privacy concerns, competing surveys, controlled-access residences, and non-English-speaking households. The CE surveys face unique challenges that directly influence the quality of the data collected. Presented in order of importance, the three most challenging issues for the CE surveys are the evidence of measurement error in the survey data, environmental changes related to new technology and consumption behaviors, and the need for greater flexibility in the mode of data collection and ability to update data collection strategies.

1. Measurement Error. From 1984 until the present, the ratios of aggregate expenditure estimates from the CE compared with Personal Consumption Expenditures (PCE) data from the National Accounts show a declining trend for a large number of spending categories, serving as evidence of underreporting. Similar findings from internal methodological studies and the 2008 CE Program Review Report present further evidence of a growing concern about the quality of reported data. Underreporting in the CE may result from perceived (and real) respondent burden due to survey length and complexity, panel or questionnaire conditioning, increasing telephone administration of a survey originally designed for personal visit interviews, proxy reporting by a single household member, recall effects stemming from a 3-month reference period, and other sources of measurement error.

2. Environmental Changes. As new technologies evolve and are adopted, the CE survey must adapt to account for the environmental changes that accompany technological innovation. The two most important changes are the transformation of respondent behavior and the emergence of new data collection options. For example, online purchases and automatic payments are two popular methods of payment, and questionnaire design and data collection methods may have to be adapted to better account for them. The availability of new technology for data collection, such as a web diary, a portable digital assistant (PDA) instrument, or financial-software-generated balance sheets, offers new opportunities by which to collect data. Additionally, respondents may expect to be able to respond to the survey online, a service which BLS does not currently offer. Further, a different survey design may better capture certain types of expenditures, such as automatically-billed payments. Finally, the impact of shopping at large general

merchandise stores, such as Costco and Walmart, on expenditure reporting is not known, but the topic-specific design of the survey may not correspond well to purchases of a large variety of goods at a single store. A different survey design may be better suited for capturing such expenditures.

3. Greater Flexibility. The CE needs greater flexibility for two main reasons: to enable interviewing in more than one mode and to allow for faster implementation of changes to the questionnaire or instrument. Regarding the first reason, a multimode design would allow data collection to be tailored to the needs of the respondent, and could help to address the environmental changes noted above. For example, respondents who have very little time, or have difficulty keeping a diary, or do not want an interviewer in their home all have different ways of optimally reporting their data, and would be more likely to complete an interview using one mode over another. The second reason for greater flexibility is that, as currently designed, changing the computer-assisted personal interviewing (CAPI) instrument requires considerable lead time. Increased flexibility in the instrument would allow the program to be responsive to social and external changes without a major instrument restructuring.

Reducing measurement error is the primary mission of the Gemini Project, but environmental changes are an increasingly important mechanism through which measurement error may be introduced to the survey. And greater flexibility in the ability to update or revise data collection strategies better positions the survey to quickly respond to these environmental changes over the long term.

Furthermore, the consumer expenditures that the survey seeks to measure have changed considerably over the past 30 years, while the fundamental design of the survey has not. Although a number of smaller scale improvements have been incorporated into the survey design, including the transition to a CAPI instrument, these changes have not been made within a larger, more comprehensive framework of addressing identified survey weaknesses.

BLS is initiating the survey redesign plans now to account for the length of time needed to develop, evaluate, pilot test, and implement a large-scale survey redesign. If the process goes according to schedule, the Gemini Project will have a redesign plan in place by 2012.

Gemini Project Objectives

The primary and short-term objective of the Gemini Project is to develop a detailed research planning document for a redesign of the CE surveys, which will promote improved expenditure estimates through a reduction in measurement error. The planning document will describe the priorities, individual steps, timeframe, resource needs, and costs required for the development, pilot testing, evaluation, and implementation of a redesigned CE survey or surveys. The document will also guide the development and implementation of CE research studies throughout the Gemini Project lifecycle.

The long-term objectives of the redesign initiative are to reduce measurement error, improve overall data quality, enhance the analytic value of CE data to users, and implement a new design that supports a greater operational flexibility to respond to changes in the interviewing environment.

Finally, the costs of a redesigned survey cannot exceed current budget levels. Therefore, all proposed changes will be subject to budgetary constraints, and implementation decisions will be considered in terms of priorities and trade-offs. To allow for an unpredictable budgetary environment, the planning document will address both a complete redesign of the CE surveys as well as more limited modifications to the current design.

Approach

The Gemini Project is managed by a project leader and steering team, with guidance from an executive management group. The project steering team will also seek input from a panel of survey experts from outside BLS, who will meet with the team periodically over the course of the project.

The Gemini Project includes two stages of work. Stage 1 focuses on research to reduce measurement error in the process of redesigning the CE surveys. It consists of five major steps:

1. Establish a chartered steering team to oversee project activities.
2. Create a research project tracking system.
3. Define data quality for CE.
4. Coordinate a series of information gathering events.
5. Evaluate user impact of alternative redesign scenarios.

There will be multiple information-gathering meetings, conference sessions, forums, and workshops. In calendar year 2010, this will (or has) include(d) the following events:

- Survey Redesign Panel Discussion, co-sponsored by the Washington Chapter of the American Association for Public Opinion Research (DC-AAPOR) and the Washington Statistical Society (WSS) (January 2010)
- Data Capture Technology Forum (March 2010)
- AAPOR Panel on Respondent Record Use (May 2010)
- Data User Needs Forum (June 2010)
- CE Methods Workshop (Fall 2010)
- CE Redesign Options Workshop (Summer 2011)

For 2011 and beyond, the focus will be on redesign options, data collection technology, and the future survey, as well as issues identified during the 2010 events and other survey method topics of interest.

The timeframe for Stage 1 is outlined in Attachment 1. Stage 2 will integrate the research findings from Stage 1 into a coherent plan consisting of three major steps:

1. Develop models for a redesign.
2. Present redesign models to management.
3. Create a detailed redesign planning document.

Pilot testing the proposed redesigns, conducting additional research on alternative designs, and implementing the approved redesign can be considered a third stage of the redesign process. Stage 3, although a part of the survey redesign, is not described here because the steps are beyond the scope of the initial iteration of the Gemini Project. Once the planning document has been approved by senior management, the initial phase of the Gemini Project will end and a new iteration will carry the survey redesign to implementation.

Redesign Topics

Many different elements of survey methodology affect a survey redesign. Table 1 includes a list of those topics that are most important to preliminary discussions for a redesigned CE, a description of those topics, and examples of the forums where the topic can be discussed. Note that this is not meant to be a complete list of topics, nor is it a complete list of venues for discussion. Additionally, Attachment 2 lists the current and possible BLS research projects to support the survey redesign. Since these projects span a number of the survey methods topics, it made sense to list them separately rather than fitting them into this table.

Table 1. Topics for Investigation and Further Research (listed alphabetically)

Topic	Description	Forum for discussion
Administrative records/external data	Some of the information that CE collects is collected in other sources. Using external data could reduce respondent burden and potentially improve data quality (depending on the quality of the external data).	- CE Redesign Options Workshop (Summer 2011)
Data user needs	It is important to get input from data users to understand their uses of the data and to get suggestions for changes to the surveys.	- On an ongoing basis, keep users informed of the status of the project through meetings and presentations, including the expert panel - Data User Needs Forum (Spring/Summer 2010)
Mixed-mode designs	Offering more than one data collection mode (e.g., telephone or web) may increase response rates and reduce bias. BLS must determine how to design and implement a successful mixed-mode survey.	- CE Redesign Options Workshop (Summer 2011)
New technology	BLS will examine technologies for data collection, such as PDAs, smart phones, or various types of scanning technologies, and determine their possible use and cost for CE.	- Data Capture Technology Forum (March 2010) - CE Redesign Options Workshop (Summer 2011)
Proxy reporting	Collecting data from all consumer unit members may result in better reporting. BLS will determine how best to collect data from all consumer unit members without increasing unit nonresponse.	- CE Methods Workshop (Fall 2010)

Topic	Description	Forum for discussion
Questionnaire design	The use of alternative designs for the CE survey may allow for more efficient data collection or the collection of higher quality data. BLS will determine how CE can incorporate different types of interview structures or technology-driven approaches into the data collection process.	- CE Methods Workshop (Fall 2010) - Survey Redesign Panel Discussion, sponsored by DC-AAPOR and WSS (January 2010)
Recall period	A shorter recall period may result in better recall and therefore higher quality reporting. On the other hand, contacting respondents more often (such as monthly) might lead respondents to stop reporting or to report fewer expenditures.	- CE Methods Workshop (Fall 2010)
Records and recall aids	Increased reliance or improved guidance on records, receipts, and recall aids, including electronic records, may result in better reporting. BLS will determine how these resources can be integrated effectively into the CE.	- AAPOR Panel on Respondent Record Use (May 2010)
Respondent burden	An interview that is shorter or less burdensome cognitively could result in better reporting, higher retention rates, and reduced bias in later interviews. Possible approaches might include increased use of screener questions or asking subsets of questions supplemented by global questions in place of the whole interview.	- CE Methods Workshop (Fall 2010)

Criteria for Success

The success of the Gemini Project will be judged based on the accomplishment of the following three sets of criteria, listed in descending order of priority:

1. There is a measurable reduction in measurement error.
2. There is an overall increase in data quality, including a balanced evaluation of the mean squared error of the cost weights, and reduction of components of bias and variance

attributable to specific sources of sampling or nonsampling error, such as unit nonresponse, wave nonresponse, or item nonresponse. Data quality criteria may also include other factors such as timeliness. Practical decisions on methodology and field operations will involve trade-offs among cost and error factors for different components of bias and variance. Realistically, it is not expected that there will be uniform improvement in all components of error: some will decrease, and some will increase.

3. The analytic value of CE data for researchers and policymakers is maintained or improved, both for microeconomic and macroeconomic data users.

To the extent possible, it is also important that the new design supports a greater operational flexibility to respond to changes in the interviewing environment, and that results from the success criteria are reasonably robust against future changes in societal and technological factors and variability in budgetary levels.

Stakeholders

The stakeholders for the Gemini Project include all groups involved in or concerned about the impact of survey design changes on the collection, processing, editing (including imputation and allocation), weighting, estimation, evaluation, quality, and use of CE data. These groups include

- BLS Associate Commissioner, Office of Prices and Living Conditions (OPLC)
- BLS Division of Consumer Expenditure Information Systems (CEIS)
- BLS Division of Consumer Expenditure Surveys (DCES)
- BLS Division of Consumer Prices and Price Indexes (CPI)
- BLS Division of Price and Index Number Research (DPINR)
- BLS Division of Price Statistical Methods, Branch of Consumer Expenditures (SMD)
- Census Field Operations (FLD)
- Other Federal Agencies including the Bureau of Economic Analysis (BEA), the Internal Revenue Service (IRS), and the Department of Defense (DoD)
- Other individual users of CE microdata and published estimates in the academic, Government, nonprofit, and commercial sectors.

Attachment 1. Gemini Project Timeline

2009

February	Milestone *	-	Gemini Project kick-off
Spring	Milestone *	-	Research Project Tracking System Team, Redesign Conference Team and Data Quality Team chartered
July	Milestone *	-	Expert Panel chartered
August	Milestone *	-	Expert Panel kickoff meeting
October	Deliverable *	-	Data Quality Definition report completed
December	Deliverable *	-	CE Methods Workshop issue papers completed

2010

January	Event*	-	Survey Redesign Panel Discussion featuring representatives from five major Federal surveys
March	Deliverable *	-	Research Project Tracking System report completed
March	Event *	-	Data Capture Technology Forum
May	Event	-	AAPOR (American Association for Public Opinion Research) Panel on Respondent Record Use
June	Event	-	Data User Needs Forum
August	Deliverable	-	Data User Needs Team report completed
September	Deliverable	-	Statement on CE Data Priorities released
Fall	Event	-	CE Methods Workshop
Fall	Event	-	Household Survey Data Producer Forum
Winter	Deliverable	-	Conference Team report completed
Winter	Deliverable	-	User Impact Team report completed

2011

Spring	Milestone	-	Develop models for a redesign
Summer	Deliverable	-	Present models to Expert Panel and CE Management for review and feedback
Summer	Event	-	CE Redesign Options Workshop
Fall	Deliverable	-	Create a detailed planning document for proposed design

* Completed tasks

Attachment 2. Research Projects Related to the Redesign (listed alphabetically)

The following is a list of current or future BLS projects that could inform the survey redesign effort for FY10 or FY11, depending on resources and funding.

- Balancing. Balancing of reported expenditures, income, and assets during the interview. This will require careful evaluation of burden, potential impact on data quality, and cooperation in subsequent interview waves, beginning with some relatively simple cognitive laboratory experiments by the cognitive psychologists in the Office of Survey Methods Research. Larger scale evaluations or development would depend on the results of the initial experiments.
- Diary double placement. Analysis of existing CE diary data is underway to determine if there is an impact on data quality when placing two diaries at week one rather than single placements at week one and week two.
- Incentives. Incentive experiments have been completed for both surveys. Results for a one-time $40 prepaid debit card mailed to households that responded to the Interview survey showed a significant increase in response rates across the five waves of interviews. Given adequate resources and Office of Management and Budget approval, the CE program would like to implement this procedure into the production sample. The Diary experiment did not show a significant increase in response rates for the test group over the control group, but since response rates for both groups increased during the test, the CE program would like to conduct an additional Diary test.
- Individual diaries. CE staff conducted a feasibility test of placing diaries with each teenage and adult member of a CU. The test was very small and not designed to evaluate expenditures. Results showed promise for collecting more expenditures, but also yielded a lower response rate. Given adequate resources and Office of Management and Budget approval,, the CE program would like to do a test in a production setting to determine if individual diaries could be a possible redesign option.
- Personal digital assistants (PDAs) and financial software. PDAs and other smart handheld communication devices offer a potential alternative approach for capturing expenditure data. These devices may give respondents a means of recording purchases at the time they are made. CE staff plan to explore available hardware

and software to see how well these products may satisfy CE data needs, and to explore the viability of these devices in terms of data security and transfer to CE systems.

Personal financial management software provides users with the ability to monitor and track their spending. This study will have two objectives:

1. Explore the capabilities of various financial management software products and assess the extent to which they can be used to provide data needed for the CE program.
2. Evaluate how current users of the products work with the software and determine how that usage could be adapted to meet CE program needs.

- Measurement issues study. (Field period: June 2010–February 2011.) This study is part of a comprehensive and ongoing effort to respond to the challenges of respondent burden by examining alternative data collection strategies for the CE Interview Survey. The goal is to improve data quality, maintain or increase response rates, and control data collection costs. In particular, this study will assess the impact of a shorter interview with a split questionnaire design and a shorter recall period. The research questions are as follows:

  1. What are the effects of administering a shorter (split) CE Interview Survey questionnaire on respondent burden, data quality, and nonresponse error?
  2. Does using a 1-month (versus a 3-month) recall period affect reporting?
  3. Does collecting data monthly have an effect on refusals or respondent behaviors?

- Order effects test. (Field period: April 2010–March 2011.) The Interview Survey currently takes approximately an hour to complete. Because of the large number of expenditure items that require a response in the survey, there is concern that respondent fatigue and conditioning adversely affect the reporting quality of later sections in the interview instrument. The research questions are as follows:

  1. Will asking a section earlier in the interview improve reporting for that section?
  2. If so, will reporting in later sections be adversely affected?

One of the proposals for the Interview Survey is to shorten the interview. The Order Effects test will provide data on the effect that the order of interview sections has on the quality of data for each section. If moving a section earlier in the interview significantly improves data quality, the results would support efforts to shorten the interview.

- Split questionnaire. Over the past 2 years, the CE program has explored the use of split questionnaire methods as an alternative to the current data collection procedures implemented. Split questionnaire methods involve dividing a questionnaire into subsets of questions and then administering each subset to a subsample of the full sample. Analyses have been simulation-based using historical CE data. Past research has investigated the utility of a relatively simple adaptive procedure for allocating survey items to sample members. This procedure was based on expenditure information provided by a sample member during a previous interview wave. Because split questionnaire methods create item-missing data, additional research has focused on methods to supply the missing data on those questions not asked of a sample member. Specifically, the CE program has explored the use of imputation-based procedures to draw inferences using all sample cases as opposed to only those directly asked about the expenditure. Future research will be devoted to refining allocation and imputation or inferential procedures as well as studying each of the procedures in tandem.

- Records study. The CE program completed a small validation study to explore the sources of measurement error and to develop methods to quantify the magnitude of measurement error in different expenditure categories. In the initial study, participants completed a CE interview (either on the phone or in person) and then an in-person debriefing interview. The resulting data are now being analyzed. The CE program is planning a larger study in which respondents will complete a partial CE interview. Respondents will then be asked to locate all available records that are relevant to the expenditures covered in the interview. In a subsequent visit, interviewers will attempt to match the records with expenditures and to identify gaps—expenditures without records, and expenditures on records that were not reported—as well as to assess the adequacy of the records for expenditure reporting. As part of this investigation, the study will investigate the viability of using financial software as an aid to recall for respondents who use such software.