Nonresponse Prompting Behavior in a Monthly Establishment Survey

Richard L. Clayton, Richard J. Rosen, Thomas B. Rubino, Jr.
Bureau of Labor Statistics
Richard L. Clayton, BLS, 2 Massachusetts Ave. NE, Room 4860, Washington., DC, 20212

KEY WORDS: TDE, Nonresponse, CASIC, Establishment Survey

Introduction: All surveys have procedures to follow-up on units which do not respond within a specified time period. Nonresponse prompting (NRP) can take many forms; a re-mailing of the survey form, a postcard or letter, a telephone call, or in some cases a personal visit. Under traditional mail collection, NRP is often conducted in a step-wise fashion, first using mail and eventually telephone based recontacts on a diminishing pool of nonrespondents. This lengthy process is predicated on inherent problems with mail data collection, including a lack of knowledge on the status of responses, and a reluctance to unnecessarily bother the respondent increases the difficulty of nonresponse prompting. New technology, such as Touchtone Data Entry (TDE) collection provides survey researchers with exact knowledge of reporters who have and have not reported. Thus, applying TDE technology to data collection provides the potential to make NRP more effective.

The Bureau of Labor Statistics has used TDE data collection for the past eight years to collect Current Employment Statistics (CES) data. TDE provides the technology to obtain instantaneous knowledge and efficiently conduct NRP. In 1991 a model was developed to determine when to provide a nonresponse reminder call to individual units prior to developing estimates. The purpose of this paper is to evaluate the model's implementation. The evaluation will focus on the behavior of TDE units under the current prompting scheme. In addition, a process improvement plan will be developed from the results of the evaluation to further the effectiveness of nonresponse prompting.

CES Program: The CES survey collects monthly data on employment, payroll, and hours from a panel of over 380,000 business establishments for the pay period including the 12th of the month. Preliminary estimates are produced based on 10-15 days of collection in order to release the data on the first Friday of the following month.

Since its inception, the primary mode of data collection in the CES has been mail. Under mail collection, the response rate for preliminary estimates is generally 50-55 percent. NRP is difficult because at any given time it can not be determined where the data are. The data could still be with the respondent, in transit, or even in the key punch shop.

Automated collection methods offer the potential to make vast improvements in response rates and improve the survey management process.

The CES survey has developed a conversion plan to benefit from the advantages of automated collection. Panels of reporters which do not generally report in time for preliminary estimates are converted to Computer Assisted Telephone collection (CATI). After six months of CATI collection, they are converted to ongoing TDE collection.

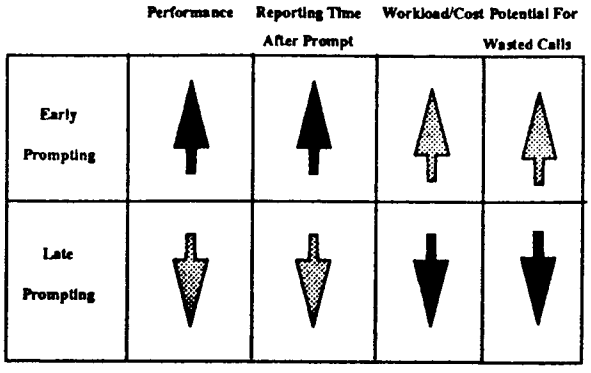
TDE respondents receive a postcard each month about a week after the 12th of the month reminding them that their data can be called into the system as soon as they are available. Respondents report their data by calling an "800" number, and entering their data into the computer using the keypad of their telephone. If respondents do not call in by a specified date, they receive a telephone reminder to call in their data.

Like mail, TDE relies on self-response on the part of a sample member -- respondents must remember to report on their own.

A Dynamic Theory of NRP: The ability of NRP activity to achieve high response rates is a function of timing the NRP contact. Figure 1 outlines the relationship between the timing of prompts and performance, workload and burden. Prompts delivered earlier tend to allow longer periods for the respondent to report before estimates are prepared. Since respondents have sufficient time after the reminder to report, the response rate will be higher. However, early prompts increase the risk of contacting respondents who would have reported on their own before the deadline. So, calling early increases the costs of NRP. By prompting delinquent units later, the workload and cost will be smaller, but the ability of the reporters to provide data in time is diminished. Thus, planning an

NRP process becomes an exercise in balancing workload and cost with performance with respect to timing the prompts.

Figure 1 The Relationship Between NRP Workload and Timing



Factors Affecting Nonresponse: The timing of reports to the CES, via any method, is affected by two major factors, the length of the establishment's pay period, and the number of collection days between the reference period and the first cutoff. Weekly and semi-monthly payrolls have the highest response rates, followed by biweekly, and then monthly reporters. Moreover, the greater the number of days in the collection cycle the greater the response rate. The variance in the number of data collection days is due to the difference in the number of working days between the 12th of the month and the end of the month.

Other factors which influence the reporting process include respondents remembering to complete the collection form, remembering to call in the data, vacations and competing workload, and the respondents ability to use this technology. These factors can be addressed directly through nonresponse prompting. Since the NRP call is a reminder to report data, respondents who simply forget to call should do so after the prompt. If the respondent goes on vacation, is out sick or has a competing workload, the prompt call can be used to find solutions, such as having a co-worker call in the data. Finally, the NRP call can be used to educate respondents who do not understand how to use the TDE system.

The TDE Nonresponse Prompting Methodology: The dynamic theory stated above holds true for NRP in the CES survey. Many respondents call in on their own without a prompt, so waiting as long as possible to make calls will reduce the overall workload and burden. However, by waiting until later in the week to make prompts, a peak workload period creates a staffing problem. At the time our intended model was developed there were no empirical results available to determine how long it took respondents to report their data after the prompt. Initially, NRP activity was limited to the last week of the collection period. In order to address these conflicting issues BLS developed an optimal model for nonresponse prompting [Rosen, Clayton, Rubino 1991]. This work concentrated on timing the prompt in relation to data availability and the need to spread calling out over additional days to alleviate the peak workload problem. The hypothesis was that data availability under TDE was a function of the reporting dates established while the unit was contacted under CATI. Thus, knowing when the data were reported in the past is a good indication of when the data are available in subsequent months. This information was captured and used to establish a date when the respondent should have already reported under TDE. Thus, respondents were given appropriate reminders to report their data and given time to report before the first cut-off.

Prompts are scheduled based on their length of pay and size. Weekly units with up to 250 employees are scheduled on Monday. All other weekly units are scheduled on Tuesday. All Semi-monthly, Bi-weekly, and Monthly, units are scheduled for prompts on Wednesday, Thursday, and Friday respectively. The scheduled prompt date is adjusted later, if the scheduled collection dates under CATI for each specific unit indicate that the respondent will not have their data available until later. Each unit receives a prompt on the scheduled day only if the unit has not reported.

Procedures: The results presented in this paper were developed using the experience with 332 Texas units prompted by the BLS Atlanta Data Collection Center and Westat, Inc. over 12 months beginning in February 1992. Westat built a CATI NRP system to BLS specifications including an MIS database of results on each step in the process, prompt outcomes, number of calls and time to complete the NRP calls.

The Overall Effectiveness of the Current Methodology: In evaluating the success of the prompts it is necessary to examine two areas. The first is the overall response rate for touchtone units which will tell us if the TDE model is performing adequately. The second area is the success of the prompts.

The overall response rates for the year averaged 80%. Generally the variation in response rates was due to the changing number of collection days from month to month. Thus, the TDE process works well.
The prompts are very effective in reminding respondents to call in their data. Figure 2 depicts the

NRP workload and effectiveness of prompts. The success rate of the prompts demonstrates the effectiveness of NRP. In addition, Figure 2 describes some important dynamic effects surrounding the NRP process.

Figure 2 NRP Workload and Prompt Effectiveness

	Monday	Tuesday	Wednesday	Thursday	Friday
Observations	360	756	468	1,356	1,044
Number Of Prompts	153	306	166	540	315
Percent Prompted	43	41	36	40	30
Successful Prompts	123	228	116	357	191
Percent Successful	80	75	70	66	61

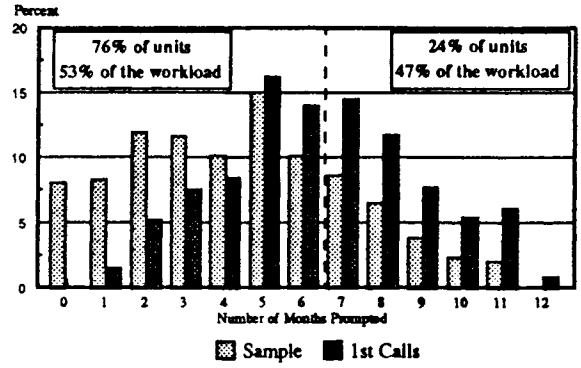
Notice in Figure 2 that the percent prompted by day decreases over the week. The rationale is that respondents have more time to call in on their own without needing a prompt. It seems as though waiting until the last possible moment is the best strategy, however, the success rate of prompts, defined as the proportion of prompted units providing data by the first cutoff, falls from 80% on Monday to 61% on Friday. The explanation for this drop is two-fold. On one hand, respondents prompted later in the week have less time to call in their data between the prompt and first closing. On the other hand, respondents prompted later in the week had more time to report on their own. So, those needing prompts may be especially recalcitrant or have some special problem.

Effectiveness of Prompts: Overall, 69% of the units which were prompted reported their data by the next closing. This statistic indicates that the NRP model is accurate in determining data availability, since units which did not have their data could not have reported, and less than three percent of the respondents indicated that their data were not yet available.

Workload Analysis: The above analysis showed that workload is a function of when the prompt occurs. It is also important to look closely at NRP workload over the course of a year. Figure 3 depicts the study group's distribution by the number of times each unit was prompted over the 12 month study period. Each pair of bars represents a group of the sample broken out by the number of months the units were prompted over the year. For example, 15% of the cases were prompted 5 times within the 12 month study period. For each pair of bars, the left hand bar shows the percent of the sample in that group. The right hand bar shows the percent of total calls represented by that group.

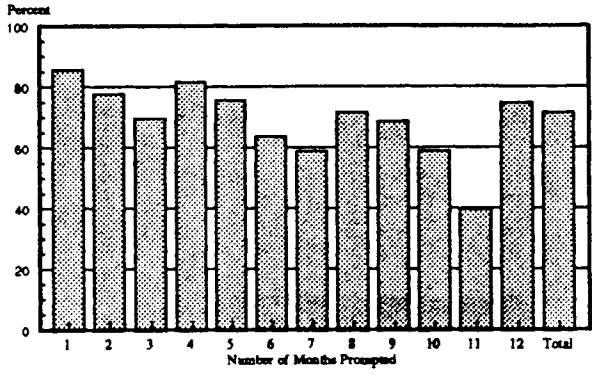
On one hand, about 7% of the sample did not require a single prompt over the course of a year, and about 37% needed three or fewer prompts. This portion of the sample consistently reports data on time and with little cost. On the other hand, units requiring seven or more prompts represented 24% of the sample. Moreover, this group represented 47% of the workload. This concentration of work and cost in a relatively small component offers an opportunity for a targeted improvement effort. In order to improve the behavior of these reporters, it is necessary to take a look at their characteristics.

Figure 3 Stratification Of TDE Reporters by Number of Prompts
Sample Size versus Workload



The success rate of prompts to units which require a larger number of prompts is lower than the success rate for prompts to units which require fewer prompts as shown in Figure 4. It follows that the response rate for units which need more prompts is lower than the response rate for units which need fewer prompts as shown in Figure 5.

Figure 4 Prompt Effectiveness: Percent of Prompt Yielding Timely Report



At this point it is clear that a large proportion of the work is due to a small proportion of the sample, and that work is not efficient.

The units which require a large number of prompts are generally prompted early in the week. Figure 6 shows that in each of the first three days of the prompting week, the group of respondents receiving seven or more prompts over the course of a year dominated the calls for the day.

Figure 5 Response Rate by Prompt Group

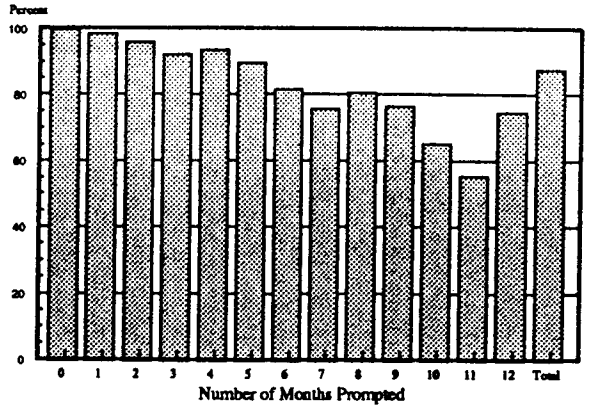
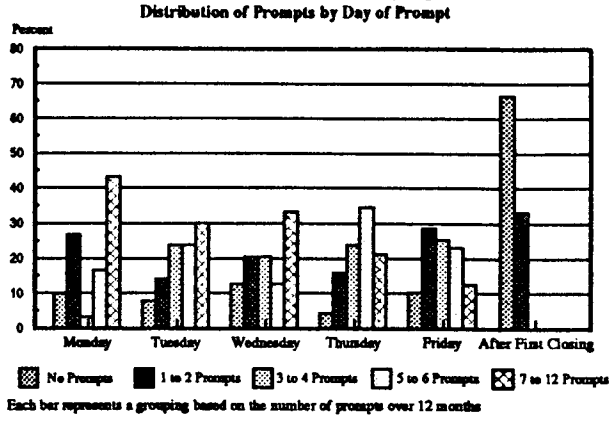


Figure 6 Nonresponse Prompting
Distribution of Prompts by Day of Prompt



For this same group of reporters, 86% were prompted during their first month on TDE; 83% required a prompt more than once in their first quarter on TDE. These relationships were tested using the Chi-squared test of independence. The number of times a unit is prompted is dependent upon whether a unit was prompted in the first month and also dependent upon whether that unit was prompted more than once in the first 3 months of TDE.

Both relationships make intuitive sense. If a unit requires a prompt in the first month, there may be some inherent problem, either technical or with the measure of data availability, that prevents reporting without a prompt. If a unit requires a prompt more than once in the first quarter on TDE then, again, problems are evident. These relationships can be used as a predictor of units which will require a large number of prompts.

Process Improvement Plan: The TDE data collection process works well with the current NRP strategy. Almost half of the calls are to only 27% of the sample. Recall that this small percentage of the sample has a lower response rate even though they tend to be called earlier in the week. So, there is an opportunity to make improvements in response rates by addressing a very small portion of the sample.

When the current NRP procedures were proposed, it was necessary to spread the workload over a week. The staff which conduct the NRP would be less burdened with the peak workload. However, it appears that by spreading the workload some respondents are being called earlier than necessary. Respondents are burdened, the staff has to make more total prompts, and response rates for the respondents called most frequently are low any way. One solution is to spread calls over a shorter period; however, prompting later in the week provides less time for the respondent to report before the cut-off day. We found that 80% of the respondents who are prompted on Monday and Tuesday report within two days after the prompt, so if prompts normally scheduled very early in the week are postponed there should still be sufficient time for the respondent to report.

A test was conducted to determine the ramifications of moving scheduled prompts from Monday to Tuesday. The test was conducted for July and August 1993 for the same Texas units. All units scheduled for a Monday prompt were re-scheduled for a Tuesday prompt and were not actually called unless they did not report by 8:30 A.M. Tuesday morning. In July, there was a 16.6% reduction in the number of calls made for the Monday group, and in August, the reduction was 15.5%. The overall response rate for the portion of the sample that was originally scheduled for a Monday prompt remained at previous levels, above 90%.

In August, a further test was conducted to determine the ramifications of moving both Monday and Tuesday scheduled prompts to Wednesday without affecting the response rate. Waiting to prompt these units reduced the Monday prompts by 29% and the Tuesday prompts by 7%, or a 7% reduction in the total week's workload. The response rate for all units of 87% was consistent with months with similar 15 day collection periods in the previous study. Monday units had a response rate of 94%, Tuesday units reported at a rate of 91%, and Wednesday units had a 90% response rate. These results are consistent with the dynamic description of NRP, that is, waiting longer to prompt will allow units to report on their own, thus reducing the workload and

cost. Most importantly, we see from this test that waiting until Wednesday does not harm response rates.

The next step in improving the TDE process is to look at the 10% of the sample that were not initially eligible for a prompt until after first closing. These units should be evaluated to determine if their scheduled prompts could be changed to a day prior to the cut-off.

The final area for improvement would be to identify units which would require frequent prompts, and resolve problems. From the analysis above we know that if a unit is prompted more than once during its first three months on TDE, then the reporter may require more frequent prompts. A database that monitors the number of prompts for the first three months should be developed. This database would be driven by an NRP output file containing information related to the prompts for each unit. When a reporter needed a prompt for the second time in the first three months, the NRP interviewer could conduct a special refresher prompt to help focus the respondent on what we want to do, when we need to do it, and to resolve reporting problems. One of the biggest advantages of automated data collection methodologies is the ability to contact respondents at appropriate times. Personal contact allows for problem solving and education that will improve the performance of respondents. Currently the role of NRP is to provide a reminder message. More work needs to be done in developing NRP contact as a problem solving tool.

Conclusions: The nonresponse prompting element of TDE data collection in the CES survey is functioning very well under the current procedures. However, we can take steps to improve the process. These steps include evaluating units which could be prompted at an earlier closing, identifying units which have the potential to require frequent prompts, and delaying prompts to units which may be prompted too soon under current procedures.

New technology will allow continuous improvement in NRP. By adjusting prompts later in the week to reduce the total number of calls to respondents a large peak workload must be completed in the remaining days. Early results of a separate study suggest that Facsimile messages sent as reminders for respondents to report are a cost efficient method for NRP [Rosen, Clayton 1992]. Automating at least part of the process will relieve the burden caused by a large peak workload. Also, the potential for expanding NRP to take advantage of respondent contact should be explored. Respondents can provide information during the NRP call, such as changes in data availability and the need to educate new respondents, that can be used to adjust the timing of prompts.

References:

Groves, Robert M. et. al., eds. Telephone Survey Methodology, New York: John Wiley & Sons, 1988 Section C.

Kasprezyk, Daniel, et. al., eds. Panel Surveys, New York: John Wiley & Sons. 1989, Chapters 4 and 5.

Rosen, Richard J., Clayton, Richard L., and Rubino, Thomas B. Jr., "Controlling Nonresponse In An Establishment Survey", Proceedings of the American Statistical Association, Survey Methods Section, August 1991.

Rosen, Richard J., and Clayton, Richard L., "An Operational Test of Fax For Data Collection", Proceedings of the American Statistical Association, Survey Methods Section, August 1992.