THE EFFECTS OF ADVANCE LETTERS AND REMINDER/THANK YOU LETTERS ON REDUCING NONRESPONSE IN AN ESTABLISHMENT SURVEY: AN EXPERIMENTAL STUDY

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Key Words: Nonresponse errors, organizational behavior, informants

1. INTRODUCTION

An increased nonresponse rate is a major problem not only in *household* surveys in the U.S. and abroad but also in *establishment* surveys (Christianson and Tortora, 1995) and economic censuses (Ambler and Mesenbourg, 1992). An increasing nonresponse rate in establishment surveys has been of primary concern to government bureaus collecting data from businesses or firms, as a high response rate is considered an important component of data quality, and the effort to reduce nonresponse mounts the survey cost. It is important for survey researchers to reduce as much nonresponse as possible, because nonresponse affects the reliability of statistical estimates by introducing bias.

This paper reports the findings from a recent field experiment conducted by the Bureau of Labor Statistics (BLS) that was designed to evaluate a set of nonresponse-reducing techniques for **an establishment mail survey**. The nonresponse reducers investigated are advance letters and reminder/thank you letters. Among various design techniques (e.g., personalization, stamped return envelope, first outgoing postage, sponsorship, financial incentives, questionnaire color, and etc.), the combined use of advance and reminder/thank you letters have been found most effective in reducing nonresponse rates for voluntary *household* surveys and censuses (Dillman et al., 1993), but have not been tested yet for *establishment* surveys.

2. RESEARCH DOMAINS AND HYPOTHESES

Reducing and measuring nonresponse errors requires an understanding of the sources of nonresponse errors. Sources of nonresponse errors are the societal environment, the situational context, and the variables involved in the brief survey interaction such as the respondent, the interviewer, the questionnaire, and the mode of data collection. The theoretical concepts relevant to household survey nonresponse (Groves, Cialdini, and Couper, 1992) may be applicable to understanding the nonresponse process in establishment surveys. At the societal level, those informants reporting for small firms tend to view the economic survey as data gathering tools of the large firms and refuse to participate. Borrowing from Cialdini's (1984) concept of authority, a *mandatory* establishment survey is likely to reduce nonresponse as compared to a voluntary establishment survey because of the social psychological pressure of obeying legal authority. Petty and Cacioppo's (1986) theory of attitude change offers an explanation that an establishment survey questionnaire, which looks very informant friendly (i.e., a peripheral cue), may reduce the informant's opt-out.

The reality that the informant's behavior takes place in organizational context of the establishment survey, however, demands theoretical approaches which take into account the organizational behavior of the informant. Research in organizational behavior (Taylor, 1911; Likert, 1967; March and Simon, 1957; Katz and Kahn, 1966; and Weick, 1969) and concepts specific to surveys of *facts* (Martin, 1993) bear on theorizing the informant's nonresponse process in establishment surveys. The informant behaves under authority within the organizational system and his reporting task primarily depends on the use of records. Organizational theory of communication is a good starting point to clarify our thinking about non-complying behavior in organizations.

We allude to four schools of organizational communication which Porter and Roberts (1983) classify: classical-structuralists, human relationists, decision theorists, and process or systems viewers. The classical structuralists (Taylor, 1911) view organizations as closed, hierarchical, and static systems while stressing authority, control, coordination and other internal structural relationships. In contrast, the human relations theorists (Likert, 1967) focus on informal interpersonal communication systems and group interactions inside organizations. The behavioral decision theorists (March and Simon, 1957) describe organizations as decision-making structures, and view that individuals in organizations make rational decisions while taking into consideration of inherent constraints in the organization. They indicate that decision making is hindered by the information

available being incomplete and thus "uncertainty absorption" takes place as information fails to fit the extant classification schemes. Their discussion offers an explanation of how information distortion and gatekeeping take place and influences nonresponding behavior in organizations. Process or systems theorists (Weick, 1969) move us to multivariate views of organizational communications where the larger environment of organizations is the important determinant of behavior. Each school of organizational communication theory has different degrees of merit in our search for ways to understand nonresponding behavior of the informant in organizations. From the classical structuralists, we learn that the informant's reporting behavior is to some extent controlled or coordinated by authority. The decision to participate in a survey is in part a function of the extent to which the informant responds to authority within the organization. The human relationists offers an explanation of how the request for surveys is routed within organizations, given the active nature of all potential informants. The decision theorists helps us understand the relation of information to the decision-making process, how this relates to nonresponse, and how such information is distributed, altered, and absorbed. Finally, the systems theorists direct our attention to forces outside the organization which influence internal nonresponding communication behavior. In sum, the merits of the decision theorists would be most obvious helping us understand the informant's nonresponse behavior within organizations. The systems theorists helps to identify factors external to organizations. The structuralists moves us to pay attention to authority based hierarchical structural components through which nonresponse can take place. The inherent shortcomings of organizational communication theories is that they do not pay attention to understand the nature of tasks given in establishment surveys, namely fact reporting as opposed to attitude response.

Three primary response functions that Martin (1993) describes as important in measuring facts in a survey are directly relevant to understanding the nonresponse behavior of the informant in fact-gathering establishment surveys. This is because the response burden perceived in response functions would also drive the informant not to comply with the survey request. Elicitation, classification, and enumeration (or quantification) are three major response operations. Elicitation is to call forth respondents' reports that involve comprehension, recall, judgment, and communication. Classification is to categorize facts according to the survey definition. Enumeration or quantification is accomplished by counting or estimating the events or persons. All these three functions are performed in establishment surveys. Informants who are asked to *elicit*, for example, reports of injuries of employees at work places in a calendar year should go through all cognitive information process to reach an answer. Informants who are asked to provide the number of nonsupervisory employees should *classify* data in their information system according to the survey definition to reach an answer, and *enumerate* the total. When any of these response functions are perceived to be difficult, informants are more likely to resist engaging the response process and thus instead opt out.

Nonresponse reducers we see in literature have not necessarily derived from the theoretical considerations we have described above. Among other procedures, requiring mandatory response, making multiple contacts, and identifying the informant have been suggested or tested as most effective. A change to mandatory reporting was the most common reason for unchanged nonresponse rates over the 10-year period in the international survey of business surveys (Christianson and Tortora, 1995). A similar finding was documented in the 1987 U.S. economic census where respondents attributed their filing mostly to the survey being required by law (Ambler and Mesenbourg, 1992). Making multiple contacts including those with telephone follow-up, and sending the survey to a named individual have also been shown to significantly increase the response rate (Paxon, Dillman and Tarnai, 1995). To date, establishment survey research has not provided us with insight about the relative effects of advance letters and reminder/thank you letters on nonresponse reduction. In contrast to household surveys, where it is usually clear who may serve as the respondent, establishment surveys are problematic because it is not obvious (1) who within the establishment is qualified to respond, and (2) how well the informant is able to use the information system that is usually necessary to provide data about employees. In such regards, advance letters and reminder/thank you letters are used to help the firm identify a correct informant and prepare the informant for the upcoming records-based establishment survey, and to remind the informant about the survey or to thank him/her for participating.

During this test, the selected establishments received an advance letter that describes several aspects of the survey. The importance of the survey was stressed, the uses of the data were explained, and the fact that the establishment was randomly selected to represent many

other firms in the industry was indicated. The letter indicates that the establishment should expect to receive the Hours at Work Report form requesting the total number of hours employees are paid including hours of paid leave, and the total number of hours they were actually on the job. The letter notes a distinction between production/nonsupervisory and nonproduction/supervisory workers. Confidentiality of data is promised in that only ratios of hours at work to hours paid are estimated for each of the major industrial groups. The Reminder/thank you letter is written to appreciate those who returned the form or reminding those who did not to complete it. Just like the advance letter, the reminder letter described the importance of the survey, and the importance of the respondent's answer due to representation of the reporting firm for many others. Confidentiality of data is again promised as well.

Several hypotheses can be tested. We suspect that the effect of the advance and reminder letters is short term, (perhaps a few days when received, but not more than a week) such that informants induced by these additional contacts are likely to behave quickly. The longer they wait after receiving these letters the less effect the letters will have on their willingness to respond. The most important hypothesis to test, however, in this experiment is that those firms receiving both advance and reminder/thank you letters should generate the highest response rate. We also expect that the nonresponse reduction by the advance and reminder letter is significant when compared to the control group.

It is also hypothesized that advance letters in establishment surveys are more effective in reducing nonresponse than reminder/thank you letters. The reason is that advance letters motivate the recipients to expect the upcoming survey of business facts and be prepared with the relevant data before receiving the first survey questionnaire. On the other hand, reminder/thank you letters remind nonrespondents of completing the survey questionnaire after they received the initial survey packet. Early warnings are generally better than late reminders. Sending advance letters also help the survey sponsor receive Post Office Returns (PORs) and other returns earlier. This allows the survey processors to correct the addresses and to allocate resources in a more informative manner.

At the industry level, we expect that the effect of advance and reminder letter is larger among manufacturing industries than among nonmanufacturing industries due to the perceived response burden related to the availability of hard data. Manufacturing industries are requested to supply data about production employees whose records are usually available in the information system; some nonmanufacturing industries find it difficult to locate the required information as hours data may not be available for commissioned workers or piece workers. Nonmanufacturing industries are also less likely than manufacturing industries to have individual or summary data, and are more likely to have employment mixes of part time, full time and temporary workers. This perceived response burden among nonmanufacturing industries may therefore cause informants to refuse to respond the survey.

3. RESEARCH DESIGN

Experiment: The experiment (n = 400) was embedded in the Hours at Work Survey (HWS) (n = 6000) which primarily collected employees' hours paid and hours at work for 1993. Three treatment groups were tested against a control group which received neither advance letters nor reminder/thank you letters: (1) a survey with advance letters and no reminder letters, (2) a survey with reminder/thank you letters and no advance letters, and (3) a survey with advance letters and reminder/thank you letters. Treatment and control groups all received an initial and two replacement survey packets.

The HWS is a national annual survey of 6,000 establishments conducted by the BLS since 1981. The HWS primarily collects data on both the total number of hours nonsupervisory or production employees were on the job (i.e., hours paid minus paid leave) and the total number of hours for which these employees were paid. The information obtained is used as one factor in the estimation of national productivity by industry. The HWS, which involves a self-administered mail survey with follow-up mailings, facsimile and computer-assisted telephone interview, provided the researchers with an opportunity to analyze the effect of sending advance letters and reminder/thank you letters in establishment surveys. The HWS is designed to construct ratios of hours at work to hours paid for each of the major industrial sectors of the U.S. economy, on a yearly basis. Ratios are also produced by quarter, and for four employment-size classes. These ratios are used to adjust the presently published hours paid measures. The resulting hours at work measures are incorporated into the labor productivity series as the revised labor input. The survey, conducted by mail and followed up by telephone, request that each selected

establishment report the total hours at work and the total hours paid for all production and nonsupervisory workers for each quarter of the previous year. Data collected will provide estimates for each of the major sectors (1-digit SIC) of the nonagricultural economy plus additional industry subdivisions (2-digit SIC) within the manufacturing sector.

Sample: The sample for the experiment (n = 400) was stratified by two major industrial divisions (manufacturing and nonmanufacturing) by three employment size classes (< 50, < 250, and 250 +). Within these strata additional sorting was done by industry and size to provide an implicit stratification by their industry and size classifications. Within the major stratifications (cell), units were systematically selected after a random start. Within each cell, units were systematically assigned to four treatment and control groups. The Hours at Work Survey is based on a probability sample taken from most of the 5.2 million nonagricultural establishments which report employment and earnings to State unemployment insurance programs. Approximately 6000 establishments are randomly selected after stratification by industry and employment sizes, using standard probability sampling methods. The sample is selected primarily from the most recent Universe Database (UDB). The UDB is the BLS sampling frame for all establishment surveys. It is comprised of administrative files produced by State agencies for the Unemployment Insurance (UI) programs. Information obtained from the UDB Frame usually include an establishment employment figure, a UI account number, a four-digit SIC code, a county code, a name and address for the establishment, a plant location, and an area code and telephone number, if available.

Analysis plan: Following Dillman and his colleague's (1993) approach, we report findings from the six pair-wise comparisons among treatment and control groups, and logistic regression analyses. The pair-wise comparisons of each of the treatments with the control group and with each other helps to determine the level of nonresponse reduction. The response rate is computed as follows:

R = Usable Units/Viable Units, where

- *Usable units* are defined as those which have provided data which passed all edit checks,
- *Viable units* are those eligible units such as usable units, nonrespondent, refusal, unsuccessful mailout, data unusable, and eligibility not determined when employment >=50. Excluded in the viable units are those units such as out of scope (e.g., a change in industry to a nonsampled industry), out of business, duplicate units, and eligibility not determined when employment < 50.

The hypothesis that the multiple contacts including advance letters and reminder/thank you letters would significantly reduce nonresponse in establishment surveys was tested after computing one-tailed t-test values.

Results from the logistic regression analysis indicate whether or not each component makes significant impact on the response rate. Its analytical limitation is that the parameter estimates themselves cannot be easily interpreted in terms of the size of the effect on the response rates. The first model includes all of the main effects (i.e., industry stratum, size stratum, advance, and reminder/thank you) and interaction terms. After observing which terms would turn out to be significant, the reduced model with main effects and a lesser number of interaction terms will be tested.

When making pair-wise comparisons and evaluating parameter estimates of the logistic regression analyses, we test the results at the alpha = 0.05 level. A significant t-test value computed for pair-wise comparisons indicates that the difference is due to a real effect and not just sampling variation.

4. FINDINGS AND DISCUSSION

The major results from this experiment are presented through descriptive and inferential statistical methods. The overall response rates for each of the treatments at the national, industry, and size levels are presented in Table 1.

Table 1. National & Stratum Level Response Estimates*
(A=Advance, R=Reminder, C=Control)

Contact Type	n	Response Rate (%)					
		National	Industry		Size		
			M	NM	S1	S2	S3
A&R	94	57.4	56.3	58.7	53.3	66.7	51.6
A	98	52.0	64.6	40.0	58.8	59.4	37.5
R	98	46.9	54.2	40.0	54.5	52.9	32.3
C	98	40.8	50.0	31.3	60.6	32.4	29.0

*Note: Industry level response rates are categorized by M (manufacturing) and NM (nonmanufacturing). Size level response rates are categorized by 'S1' where employment is less than 50, 'S2' where employment is greater than or equal to 50 and less than 250, and 'S3' where employment is greater than or equal to 250.

As expected, the response rate from the advance and reminder group obtained the highest response rate of 57.4 percentage points, followed by the advance group (52.0%), the reminder group (46.9%), and the control

group (40.8%). (Note that these are not the final response rates from the survey. Due to the confounding effect of CATI follow-up, we ended our test at this point. However, data collection continued via CATI.) An intriguing finding is that the nonmanufacturing group that received both advance and reminder letters had a higher response rate than the manufacturing group while all other nonmanufacturing groups gained lower response rates than the manufacturing groups. Within the manufacturing industry, the response rate of the advance group surpassed even that of the advance and reminder group.

Within each employment size group, no consistent pattern appeared. Within Size 1, the advance and reminder group had the lowest response rate. With Size 2 and 3, the advance and reminder group gained the highest response rate. Within each treatment group, no consistent pattern emerged either. Within the advance and reminder group and the advance group, the response rate was highest in Size 2. Within the reminder and control group, the response rate was highest in Size 1.

Table 2 below presents six comparisons corresponding to all possible comparisons among three treatments and one control group.

Table 2. Pair-wise comparison of response Estimates*
(AR=Advance+Reminder, A=Advance, R=Reminder, C=Control)

Pair	Response Rate Difference (%)					
	National	Industry		Size		
		M	NM	S1	S2	S3
A-C	11.2	14.6	8.8	-1.8	27.0*	8.5
R-C	6.1	4.2	8.8	-6.1	20.6*	3.2
AR-C	16.6*	6.3	27.4*	-7.3	34.3*	22.6*
A-R	5.1	10.4	0.0	4.3	6.4	5.2
AR-R	10.5	2.1	18.7*	-1.2	13.7	19.4
AR-A	5.4	-8.3	18.7*	-5.5	7.3	14.1

* See the note in Table 1. A single asterisk indicates a significant difference at the alpha = 0.05 level for a one-tailed t-test.

The most important finding in this table is that the group that received both advance and reminder letters gained the statistically significant response rate compared to the control group, and this difference of 16.6 percentage points mostly came from the gain in the nonmanufacturing industries. Differences from all other comparisons in the national level did not appear significant, although most of them were in the positive direction. Overall, nonresponse reduction was 11.2 percent due to advance letters; 6.1 percent due to reminder letters. (Recognize that the effect of advance letters was 10.5 percent when added after the reminder letter, and the effect of the reminder letter was 5.4 percent when added after the advance letter.) The pattern disappeared when viewed at the industry level. Within the manufacturing industry, none of the differences were significant, and the highest difference came from advance letters compared to the control group. Within the nonmanufacturing industry, we still find the advance and reminder letter combination made the significant nonresponse reduction effect when compared to the control group, and the difference from all other comparisons did not appear to be significant. These findings suggest that the effect of different treatment vary depending upon which industry units receive the treatment, which strongly indicates an interaction effect between industry types and response rates. At the size level, it was found in Size 2 and Size 3 that nonresponse reduction was significant and highest when the advance and reminder groups were compared against the control group. Size 1 did not conform to the pattern. Within Size 2, it is worth noting that the advance letter and the reminder letter made the significant nonresponse reduction against the control group. Size specific variations of treatment effects suggest an interaction effect between size and response rate. In sum, it appeared that the effect of the advance and reminder letter is most obvious among nonmanufacturing industries (as compared to manufacturing industries) and among firms hiring 50 or more employees.

Using logistic regression analysis, we observed parameter estimates in the full model that includes all main effects industry and size strata, and all possible interaction terms. The significant terms were intercept and size 1 (firms with less than 50 employees), and the interaction term of industry and size 1. We subsequently tested a reduced model that includes all main effects, and an interaction term only. The results are presented in Table 3.

Table 3. Logistic Regression Modeling* (n=388)

Variable	Parameter Estimate
Intercept	-1.5
Industry	1.1
Size 1	1.6
Size 2	0.7
Advance	0.5
Reminder	0.2*
Industry*Size 1	-1.5

*Note: All parameter estimates are significant at the alpha = 0.05 level unless indicated by a single asterisk.

Findings from the reduced model indicate that significant (at alpha = .05 level) improvements were

realized from the advance letter, industry, size 1, and size 2 , but not from the reminder letter. The interaction term of industry and size 1 was statistically significant. Substantively speaking, nonmanufacturing industries with less than 50 employees appeared to be more cooperative across all treatment and control groups than manufacturing industries. This finding puzzled the researchers because manufacturing industries have been conventionally more cooperative than nonmanufacturing industries in part because manufacturing industries appeared to have more record based information systems or individual/summary reports, thus allowing the informant to easily comply with the request. The reliability of this intriguing finding should be subjected to further testing with a larger sample as each cell (industry-size for treatments and control groups) in the current test includes less than 20 units and this small sample might have confounded the results.

5. CONCLUSIONS AND FURTHER RESEARCH

The experiment evaluated the separate and combined effects of advance letters, and reminder letters on response rate. A statistically significant result was found for the combined use of advance letters and reminder/thank you letters, increasing the response rate by about 16.6 (plus or minus 14.5) percentage points when compared to the control group that received neither contact. The findings here in the establishment survey complement those based on the household survey. The results helped us redesign the data collection process for the following year's HWS.

We conducted a full split sample test (n = 6000) for the 1994 survey, comparing the effect of the combined use of advance and reminder letters against the control group. The preliminary results confirm the major findings from the current small scale test, indicating the advance and reminder combination significantly reduces nonresponse in the establishment survey. The more complete reports at the industry and size level, the implications of nonresponse reduction in its interaction with measurement errors, and cost modeling will all be available from the full split sample test.

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