Public Opinion Quarterly, Vol. 74, No. 1, Spring 2010, pp. 68–84

RECRUITING PROBABILITY SAMPLES FOR A MULTI-MODE RESEARCH PANEL WITH INTERNET AND MAIL COMPONENTS

KUMAR RAO*
OLENA KAMINSKA
ALLAN L. MCCUTCHEON

Abstract Survey response rates have been declining over the past several decades, particularly for random-digit-dialing (RDD) telephone surveys (see de Leeuw and de Heer 2002; Steeh 1981). This trend affects research panels such as the Gallup Panel, which uses RDD methodology to recruit its members. If significant improvements in panel recruitment response rates are to be achieved, new approaches must be considered. This paper presents the findings of a mail and telephone mode experiment conducted by the Gallup Panel to analyze the individual and combined effects of incentives, advance letters, and follow-up telephone calls on the panel recruitment response rate. Study results indicate that the mail recruitment approach nets a higher panel response rate, and that the cost-effectiveness of the mail recruitment approach is significantly greater than the telephone recruitment approach. Study results also suggest that the advance letter, incentive, and telephone follow-up conditions all have independent, positive influences on the response rate; and that the groups that receive an advance letter, that receive incentives, and that receive a follow-up telephone call have higher panel recruitment response rates than the control group.

KUMAR RAO is with The Gallup Organization, Omaha, NE, USA. OLENA KAMINSKA is with the Survey Research and Methodology Program, University of Nebraska, Lincoln, NE, USA. ALLAN L. MCCUTCHEON is with the Gallup Research Center, University of Nebraska, Lincoln, NE, USA. A previous version of this paper was originally presented at the 2008 American Association of Public Opinion Research (AAPOR) conference in New Orleans, LA, USA. The authors would like to thank Darby Miller Steiger, Julie Curd, Larry Curd, Alison Hunter, Susan Sorenson, and Julie Zeplin of the Gallup Organization for their research assistance at various stages of this project, and also Lisa Crockett, Chase Harrison, and the anonymous reviewers for their helpful comments and suggestions. All errors remain our own. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Gallup Organization. *Address correspondence to Kumar Rao, The Gallup Organization, 1001 Gallup Drive, Omaha, NE 68102 USA; e-mail: Kumar_Rao@Gallup.com.

doi: 10.1093/poq/nfp091 Advance Access publication February 16, 2010

Introduction

> It would be hardly possible in one interview to ask people about their leisure-time activities, give them a personality test, collect biographical information, and so on. But it is possible to secure part of this information each time we return to the panel. —Lazarsfeld and Fiske (1938)

Over seventy years ago, Lazarsfeld and Fiske recognized the advantages of panel surveys as a new tool for the emerging field of survey research and opinion measurement. Since then, panel research has expanded significantly, offering researchers a chance to collect a variety of data at a relatively low marginal screening cost, over an extended period of time. Currently, a number of consumer panel[1] organizations are operating in several countries. The Gallup Panel is one of the few consumer research panels in the United States with recruitment based on random-digit-dialing (RDD) methodology. Gallup Panel members are randomly recruited by telephone and, depending on their level of usage of the Internet, are assigned to receive surveys either through the Internet or the mail (in addition to telephone surveys). However, panel recruitment using RDD methodology has become more difficult lately. The declining response rate for RDD surveys (Curtin et al. 2005; de Leeuw and de Heer 2002; Groves and Couper 1998; Massey et al. 1997; Steeh 1981; Steeh et al. 2001), coupled with the demand on panel members, once recruited, to agree to participate in numerous surveys at regular intervals, has made it increasingly difficult to assemble a truly representative panel sample. To achieve significant improvements in panel recruitment response rates, the Gallup Panel conducted a mixed-mode experiment in early 2007 that contrasted telephone, the current mode of recruitment, with mail and measured the impact of various response-inducement techniques such as advance letters, incentives, and telephone follow-up. Broadly, the experiment was geared toward achieving two central objectives: 1) to improve the panel recruitment rate of the current mode of recruitment (i.e., phone) using advance letters, with and without incentives, and telephone follow-up; and 2) to improve the panel recruitment rate by switching from phone mode to mail, in conjunction with and without incentives, and telephone follow-up. Although it is common for consumer panels to offer rewards such as monetary incentives to their members for participating in surveys, little is known or has been documented about the use of such offerings for initial panel recruitment. In addition to monetary incentives, advance letters and telephone follow-up are two other response inducements whose effectiveness in panel recruitment is supported by little,

1. The term "panel" in this paper refers to recruitment of a sample of individuals who are representative of a particular population and have agreed to take part in surveys on an ongoing basis. This is different from studies that involve panel design where a sample of individuals is followed across time with repeated measures being taken.

if any, empirical evidence. This paper reports the findings from a multi-mode recruitment experiment and describes the cost-effectiveness of these alternative approaches for increasing panel recruitment response rate.

Role of Response Inducement Techniques in Mail and Telephone Surveys

Researchers have studied the effect of advance letters on telephone survey response rates and have found the expected increase in response rate (e.g., Link and Mokdad 2005; Traugott, Groves, and Lepkowski 1987). Recently, in a meta-analysis of the use of advance letters in telephone surveys, de Leeuw et al. (2007) concluded that advance letters have a positive effect on response rate in telephone surveys for RDD and list-based samples, and improve the response rate in telephone surveys on average by about eight percentage points. The impact of advance letters on mail survey response rates looks equally positive. Advance letters have been reported to increase response rate in mail surveys (e.g., Childers and Skinner 1979; Ford 1967; Heaton 1965; Scott 1961). A meta-analysis of mail survey research indicated that advance letters/pre-notifications significantly increased response rates in 19 out of 22 experimental comparisons (Fox et al. 1988).

Furthermore, according to the Leverage-Saliency theory of survey participation, monetary incentives can motivate respondent cooperation (Groves, Singer, and Corning 2000). Monetary incentives for survey participation have long been used in mail surveys, including both prepaid and promised incentives (see Church 1993 for a review). In fact, the payment of incentives in mail surveys is one of two design factors that consistently increase response rates, the other being the number of contacts (Heberlein and Baumgartner 1978; Yu and Cooper 1983). This is in agreement with findings from a meta-analysis (Church 1993) that showed that the use of prepaid cash rewards for completing surveys had the most significant impact on increasing mail survey response rates. A number of other studies (Furse and Stewart 1982; Furse, Stewart, and Rados 1981; Goodstadt et al. 1977; Huck and Gleason 1974; Kimball 1961) have echoed similar findings. In the case of telephone surveys, the use of prepaid incentives to increase response rates has been addressed in the survey literature, mostly through experiments. In a re-interview experiment, Berk et al. (1987) found that, among those who were interviewed by telephone, the prepaid incentive group produced the highest response rate compared with the promised payment and no-payment groups. In a more recent study involving a series of experiments, Singer, Howeyk, and Maher (2000) concluded that prepaid incentives enclosed with advance letters reliably increase response rate in RDD telephone surveys by at least 10 percentage points. Additionally, in a systematic review of previous studies, Singer et al. (1999) reported that in interviewer-mediated surveys, prepaid incentives yield higher response rates than do promised incentives.

Finally, telephone follow-up techniques are generally used to enhance the overall survey response rate and reduce nonresponse bias. Although it is a recommended technique to use with persistent nonresponders (Berdie and Anderson 1974; Bourque and Fiedler 1995), very few studies have specifically examined the use of this approach (Dillman 2007). However, telephone follow-up, when used, has produced good results in some studies. Brennan and Hoek (1992) report an eight-percentage-point increase in final mail survey response rate after a follow-up telephone survey of nonresponders. In a widely cited study, Dillman (1991) notes that in mail surveys nearly comparable response rates can be obtained by substituting a telephone follow-up for the final certified mailing, when a telephone number is available.

Data and Methods

THE GALLUP PANEL

The Gallup Panel recruits its members using an RDD frame of phone numbers. In the first step of the recruitment process, the interviewer asks to speak to an adult member of the household.[2] During this first telephone contact, respondents answer a short RDD survey about presidential approval and other current-event topics and then are asked to participate in additional surveys as a member of the Gallup Panel. Those who agree are mailed a "welcome packet," which is a folder containing a pamphlet, the business card of the panel relationship manager, and a questionnaire booklet (with a business-reply envelope) that is referred to throughout this article as the welcome packet questionnaire. The welcome packet questionnaire invites the respondent and up to three additional household members (ages 13 and over) to join the panel. The questionnaire also asks each participating household member a short set of demographic questions. Upon receipt of this welcome packet information, the respondent (classified as the primary member in the household) and members of the household are officially enrolled in the panel. Once enrolled, panel members participate in an average of three surveys per month. The surveys are either self-administered (on the Web or by mail, depending on respondents' access to the Internet) or conducted by an interviewer (over the phone). For more information about the Gallup Panel, including panel recruitment response rates, refer to Rookey, Dillman, and Hanway (2008).

SAMPLE

The Gallup Panel conducted its recruitment experiment in spring 2007 using a list-assisted RDD sampling technique involving both telephone and mail recruitment modes. The sample was purchased from Survey Sampling, Inc.

2. No within-household sampling of any kind is followed at this step. The interview is conducted with any adult in the household.

Table 1. Experimental Design

Treatment groups	Recruitment mode	Advance letter	Prepaid incentive	21-Day telephone follow-up	Sample size (*n*)
	Mail	Yes	Yes	Yes	0
				No	0
			No	Yes	0
				No	0
A		No	Yes	Yes	1,423
B				No	1,435
C			No	Yes	1,439
D				No	1,428
E	Phone	Yes	Yes	Yes	1,436
F				No	1,439
G			No	Yes	1,442
H				No	1,435
		No	Yes	Yes	0
				No	0
I			**No**	**Yes**	**1,442**
				No	0

NOTE.—N = 12,919; the boldfaced row represents the control group.

(SSI), in Fairfield, CT, USA. For the sample of listed phone numbers selected, SSI provided the name and address of the household subscriber for all numbers listed in their residential telephone directory database. Following this, the addresses were subjected to one more round of reverse-address matching by a different vendor. The resulting sample was then randomly divided into one of nine treatment groups. It is important to note that all inferences drawn from this study must be based on the distinction that the final sample used after address-matching was a directory-listed RDD telephone sample and not an RDD sample of the general, noninstitutionalized population. Table 1 shows all combinations of treatments with the set of response inducements and sample sizes.

The zeros in the cells correspond to those treatments that were not part of the recruitment experiment design. The reason these zero cells are mentioned is that they are considered as "structural zeros" in our multivariate analysis.[3] In the table, the first nonzero mail treatment group is interpreted as follows. This treatment condition involved sending the welcome packet questionnaire

3. The reason these are deemed as structural zeros is that there is no one in the population who was in the mail mode group, received an advance letter and an incentive, but did not join the Gallup Panel. This is because we did not send an advance letter to anyone in the mail population. For more information about structural zeros, refer to Fienberg (1975).

by mail to the household of the sampled telephone number with a prepaid $2 incentive and telephone follow-up for nonresponse after 21 days. Similarly, the first nonzero telephone treatment group is interpreted as the treatment condition involving sending an advance letter with a prepaid $2 incentive to the household of the sampled telephone number, calling the telephone number of the household for agreement to join the panel[4] and, upon agreement to join and after sending the welcome packet questionnaire by mail, following up for nonresponse after 21 days.

STEPS INVOLVED IN RECRUITMENT EXPERIMENT

Figure 1 illustrates the two stages and different steps involved in the recruitment experiment for telephone and mail recruitment modes. Stage 1 refers to the panel telephone recruitment phase that involves calling the sampled phone numbers and asking respondents to become members of the Gallup Panel but without following up with nonrespondents. Stage 2 refers to the phase of panel mail and telephone recruitment that involves receiving the previously mailed welcome packet questionnaire from the primary member in the solicited household, before and after nonresponse follow-up via telephone.

DESIGN OF ADVANCE LETTER (FOR PHONE MODE ONLY) AND WELCOME PACKET MATERIALS (FOR PHONE AND MAIL MODES)

Two versions of an advance letter were designed based on several psychological principles and best practice recommendations identified in past research (Dillman 2007; Groves, Cialdini, and Couper 1992; Traugott, Groves, and Lepkowski 1987).[5] Both were essentially the same, except that one mentioned an enclosed $2 incentive for participation while the other did not. Both versions had trust-inducing elements (Dillman 2007) such as letterhead stationery and a scanned signature.

For this study, the content of the welcome packet was slightly altered to include the $2 incentive attached to a letter[6] urging recipients to accept the

4. Irrespective of the outcome of sending the advance letter (i.e., whether it was received back as undeliverable or not), the household was called. We did not monitor the eligibility of advance letters, but we suspect it to be very high because, as we found out later in mail treatment groups, the number of undeliverable welcome packets was small to nil.

5. Refer to the Appendix for an example of the advance letter.

6. The letter was designed in a way to be more of a placeholder for the $2 bill, which was clipped to the letter, than to convey a meaningful or impactful message. With the letter, the bill was more noticeable when the packet was opened and less likely to be buried or lost in the midst of other documents than if it had been kept alone in the welcome packet. The content of the letter was derived from portions of text from the welcome packet and the brochure; it did not contain any unique or important information. Therefore, even though mail treatment groups A and B received an incentive that was attached to a letter in the welcome packet, these treatments are considered as containing only an incentive in our analysis and conclusions.

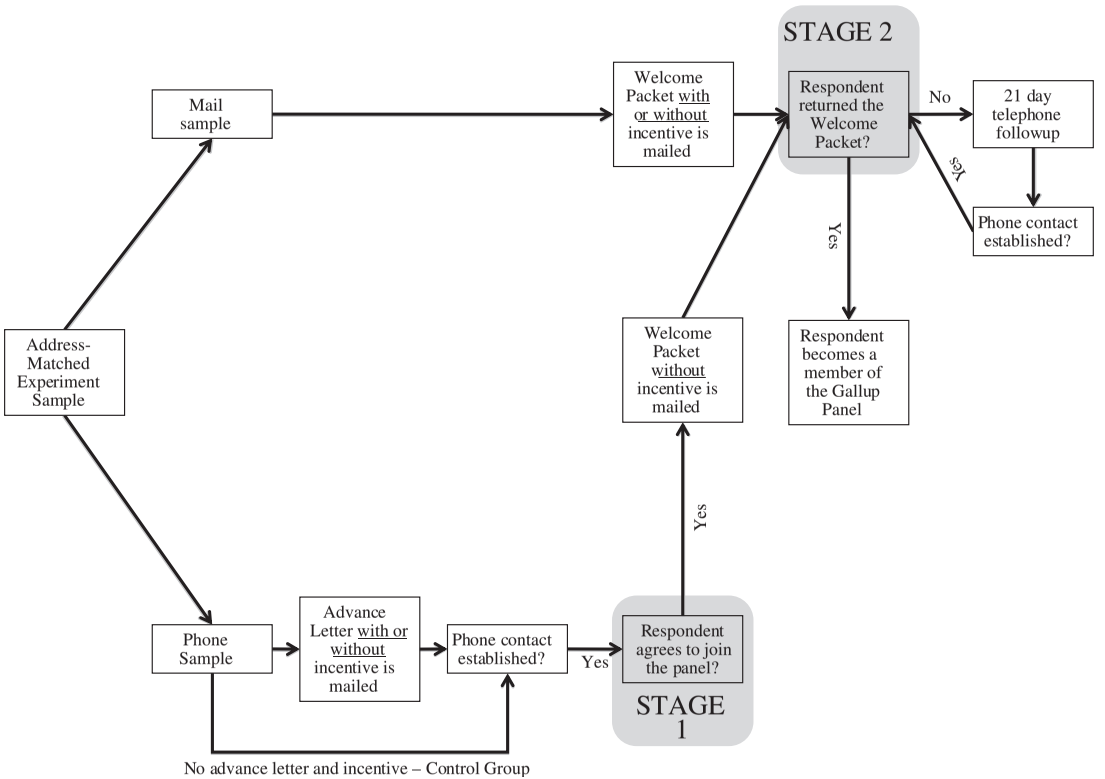

Figure 1. Flow Chart of Steps Involved in Gallup Panel Recruitment Experiment.

incentive as a gift for joining the panel. No letter was enclosed in the welcome packet for those who were in the non-incentive mail treatment groups.

Results

EFFECT ON RESPONSE RATES

It is evident from figure 1 that the steps involved in panel recruitment for mail and phone modes are slightly different. Therefore, the response rates are determined separately at two successive stages, stage 1 and 2. To simplify analysis, we divided these two stages further. Stage 1 consists of RDD telephone response rate and agreement rate, whereas stage 2, referred to as the final panel recruitment rate, consists of welcome packet return rates before and after 21 days.[7] An important note merits mention at this juncture. The welcome packets were sent to sampled households in both modes; hence, the unit of analysis for response rate calculation is household rather than individual panel member.[8] Unless mentioned explicitly, all results in this paper refer to recruited households and not members. The response rates of recruited households for all treatment groups at each stage are presented in table 2.

STAGE 1 RESPONSE RATES

In stage 1, the RDD telephone response rates varied significantly across the treatment groups ($\chi^2 = 56.2$, $df = 4$, $p < .001$). The lowest RDD telephone response rate (25.6 percent), as expected, was obtained for the control group (i.e., group I), and the two highest response rates were obtained for groups E (37.7 percent) and F (35.6 percent), which received both the advance letter and incentives. Post-hoc analyses with Bonferroni corrections reveal a significant difference ($p < .05$) between phone treatment groups with incentives (i.e., groups E and F) and without incentives (i.e., groups G and H), and also with the control group. The RDD telephone agreement rates[9] also varied sig-

7. The reason for selecting 21 days in this particular analysis is that the telephone follow-up of the RDD telephone survey was done after 21 days. By classifying the welcome packet return rates of treatments that had no telephone follow-up based on this time frame, it was possible to do a side-by-side, step-by-step comparison with treatments that did include a telephone follow-up.

8. The objective of Gallup Panel recruitment is to recruit households with at least one adult (age 18 and above) household member who is willing to join the panel. In fact, during the first step of the recruitment process (i.e., RDD telephone survey), if the respondent refuses to join the panel, then the interviewer asks to speak to any other adult member of the household who may be interested in joining the panel.

9. Note that the denominator for agreement rate is completed interviews and not all eligible respondents. We considered the calculation of agreement rate in this way to be more meaningful, since it is a sub-proportion of completed interviews. When calculated as a proportion of eligible cases, the agreement rates for groups E to I are 25.8%, 22.3%, 20.3%, 19.7%, and 15.2%, respectively.

Table 2. Response Rates (Household Level) by Treatments by Recruitment Stages

Mode	Treatment groups	Treatment description	Total eligible* sample size (*n*)	Stage 1: Agreement to join the panel (phone only)		Stage 2: Returning the welcome packet questionnaire (phone and mail)		
				(A) RDD response rate	(B) RDD agreement rate (% of A)	(C) before 21 days	(D) after 21 days	(C+D) final panel recruitment rate (*n*)
Mail	A	(WPQ+ $2) + TF	1,423			$11.9\%_{a}$	2.6%	**14.5%** (206)
	B	(WPQ+ $2)	1,435			$11.4\%_{b}$	2.0%	**13.4%** (192)
	C	WPQ + TF	1,439			$10.1\%_{c}$	2.2%	**12.3%** (177)
	D	WPQ	1,428			$7.0\%_{a,b,c}$	1.6%	**8.6%** (123)
Phone	E	(AL + $2) + Phone Survey + WPQ + TF	1,172	$37.7\%_{a}$	68.3%	4.9%	$8.7\%_{a}$	**13.6%** (159)
	F	(AL + $2) + Phone Survey + WPQ	1,187	$35.6\%_{b}$	62.6%	4.6%	$6.4\%_{b}$	**11.0%** (131)
	G	AL + Phone Survey + WPQ + TF	1,178	$30.1\%_{a,b}$	67.5%	3.1%	$5.6\%_{a}$	**8.7%** (102)
	H	AL + Phone Survey + WPQ	1,154	$28.2\%_{a,b}$	69.6%	3.5%	6.3%	**9.8%** (113)
	I	Phone Survey + WPQ + TF	1,183	$25.6\%_{a,b}$	59.4%	3.0%	$3.6\%_{a,b}$	**6.7%** (79)

NOTE.—*For mail treatments, the entire address-matched sample selected was deemed eligible, whereas for phone treatments, ineligible numbers (i.e., non-working, non-residence, and fax/data line numbers) were removed from the analysis; treatment descriptions within brackets indicate they were mailed together; AL—Advance Letter; TF—Telephone Follow-Up; WPQ—Welcome Packet Questionnaire; refer to figure 1 for an illustration and to the text for description of recruitment stages; stage 1 RDD Response Rate is the proportion of completed interviews in the total number of eligible respondents; stage 1 RDD Agreement Rate is the proportion of respondents who agreed to join the panel in the total number of completed interviews; rates marked with the same individual subscript differ significantly ($p < .05$) from one another within each mode. Within each column, rates marked with more than one subscripts (i.e., a,b) differ significantly ($p < .05$) from the groups that have only a single subscript. For example, the RDD response rate of group F is significantly different from groups G, H, and I, but not from group E. In the same way, the RDD response rate of group H is significantly different from groups E and F.

nificantly across the treatment groups ($\chi^2 = 11.1$, $df = 4$, $p < .05$). However, upon close examination of the post-hoc results, a marginally significant difference ($p = .06$) was noticed only between group H and the control group.

In summary, in contrast with the control group, sending an advance letter with an incentive increased RDD telephone response rate significantly by as much as 12.1 percentage points (i.e., group I versus E; 37.7 minus 25.6 percent). Similarly, in contrast with sending only an advance letter, adding an incentive to the advance letter increased the RDD telephone response rate significantly by as much as 9.5 percentage points (i.e., group H versus E). In the case of agreement rate, however, the effect of the advance letter and/or incentive was found to be inconclusive.

STAGE 2 RESPONSE RATES

In stage 2, there were significant differences only in the early (i.e., before 21 days) return of welcome packets among mail treatment groups ($\chi^2 = 22.8$, $df = 3$, $p < .001$) and also when all treatment groups (mail and phone) were pooled and analyzed together ($\chi^2 = 215.6$, $df = 8$, $p < .001$). From post-hoc comparisons of mail treatment groups, significant differences in the early welcome packet return rate were found only between group D and groups A, B, and C, thereby suggesting that the group without an incentive (i.e., group C with 10.1 percent) is equally as effective as those with an incentive (i.e., groups A and B with 11.9 percent and 11.4 percent, respectively) in providing an early response to the request for returning the welcome packets. In contrast, significant differences in the later (i.e., after 21 days) response to the request for returning the welcome packets were found only among the phone treatment groups ($\chi^2 = 27.1$, $df = 4$, $p < .001$), with a few notable post-hoc comparative differences. Telephone follow-up in the phone sample, when used in combination with advance letter and incentive, and with advance letter only, did not result in a higher rate of later return of welcome packets (i.e., by comparing the after 21 days return rate of groups E and F and groups G and H). On the other hand, prepaid incentive in the phone sample, when used in combination with advance letter and follow-up, significantly increased the later return of welcome packets by 3.1 percentage points (i.e., by comparing groups E and G; 8.7 minus 5.6 percent). With the advance letter only, however, prepaid incentive did not result in a significantly higher rate of later return of welcome packets (i.e., by comparing groups F and H; 6.4 percent versus 6.3 percent). Finally, in contrast with the control group, including the advance letter, alone or in combination with incentive and telephone follow-up, increased the later return of welcome packets significantly by 2.0 and 5.1 percentage points, respectively (i.e., by comparing group I with groups G and E).

MULTIVARIATE ANALYSIS

We examine a binomial logistic regression model with structural zeros that simultaneously include the effects of mode, incentive, advance letter, and telephone follow-up in an equation predicting the log odds of joining the panel. Using Aitkin's test (1979), we find that none of the two-way or higher-order interactions among mode, advanced letter, incentive, and telephone follow-up are significant.[10] The partial association test, however, indicates that each of the three factors should be included in the model. The final model includes the main effects of recruitment mode, incentive, advance letter, and telephone follow-up. This model fits the data quite well; it yields an insignificant likelihood ratio chi-square test statistic, $L^2 = 7.97$ with 11 degrees of freedom, indicating

10. Due to the presence of structural zeros, some of the higher-order effects are not possible to estimate in our model.

Table 3. Odds Ratio for Parameters in a Logit Model for Panel Recruitment

	Model
Model Parameters:	
Recruitment Mode (Mail)	2.18**
Advance Letter (Yes)	1.51**
Incentive (Yes)	1.39**
Telephone Follow-Up (Yes)	1.17**
Summary Statistics:	
Number of Observations	12,919
L^2	7.97
Df	11
P	0.72

NOTE.—All variables are coded with values 0 and 1; *$p < .05$.; **$p < .01$ (two-tailed).

that the observed cell frequencies are not significantly different from the values predicted by the model. Table 3 summarizes the findings from the multivariate analysis.

As we can see from this table, the main effects have independent, positive impacts on panel recruitment. The highest increase in the likelihood of joining the panel is observed for mode of recruitment. The estimated increase in the odds of joining the panel using mail mode of recruitment versus telephone is 118 percent (i.e., a marginal odds ratio of 2.18). Furthermore, the estimated increase in the likelihood of joining the panel when an incentive is provided, versus no incentive, is 39 percent. Finally, for advance letter and telephone follow-up, the estimated increases in the likelihood of joining the panel are 51 percent and 17 percent, respectively.

EFFECT ON SAMPLE DEMOGRAPHICS

The experiment, in total, recruited 2,042 panel members from 1,282 households at an average of 1.6 panel members per household.[11] To determine whether the use of different recruitment modes, in combination with various response inducements, has an effect on the demographic composition of those who are recruited to the panel, we compared the sample demographics across various treatment groups. No significant results in demographic measures between treatment groups within mail and phone modes were found. However, in the comparisons made between mail and phone recruitment modes, we found a significant difference only regarding race and homeownership. In general, the mail treatment groups had a higher percentage of minorities (i.e., non-Whites; 28.3 percent in mail versus 17.1 percent in

11. The breakdown of number of households and members across experimental conditions is given in table 4.

Table 4. Recruitment Cost Distribution by Treatments

		Mail				Phone				
	Cost description	Group A	Group B	Group C	Group D	Group E	Group F	Group G	Group H	Group I
	Number of households recruited	**206**	**192**	**177**	**123**	**159**	**131**	**102**	**113**	**79**
	Number of members recruited	**322**	**312**	**289**	**210**	**251**	**204**	**164**	**173**	**117**
1	Sample cost ($0.139 per case for mail and phone)	$198	$199	$200	$198	$200	$200	$200	$199	$200
2	RDD panel recruitment telephone survey cost	$0	$0	$0	$0	$16,514	$16,549	$16,583	$16,503	$16,583
3	Materials for WPQ and mail labor costs ($1.93 per case for mail; $1.98 per case recruited for phone[a])	$2,746	$2,770	$2,777	$2,756	$315	$259	$202	$224	$156
4	Incentive ($2.0 per case for mail and phone)	$2,846	$2,870	$0	$0	$2,872	$2,878	$0	$0	$0
5	Mail postage costs for sending WPQ ($2.08 per case for mail; $2.48 per member recruited for phone)	$2,960	$2,985	$2,993	$2,970	$394	$325	$253	$280	$196
6	Follow-up telephone call costs	$1,635	$0	$1,716	$0	$709	$0	$521	$0	$345
7	Incoming mail postage, scanning, and processing costs	$1,364	$1,271	$1,172	$814	$1,053	$867	$675	$748	$523
8	Production/panel labor costs and miscellaneous costs	$4,981	$5,023	$5,037	$4,998	$5,026	$5,037	$5,047	$5,023	$5,047
	Total cost	$16,730	$15,118	$13,895	$11,737	$27,083	$26,115	$23,481	$22,977	$23,051
	Total cost per household recruited	**$81**	**$79**	**$79**	**$95**	**$170**	**$199**	**$230**	**$203**	**$292**
	Total cost per member recruited	**$52**	**$48**	**$48**	**$56**	**$108**	**$128**	**$143**	**$133**	**$197**

NOTE.—[a]From RDD recruitment telephone survey; WPQ—Welcome Packet Questionnaire; refer to table 2 for group descriptions.

phone) and renters (16.9 percent in mail versus 12.0 percent in phone) than did the phone treatment groups.

COST-EFFECTIVENESS

In the last part of our analysis, we compare the cost of recruitment of all treatment groups at the member and household level. The costs of mail treatment groups, in general, include reverse-matching to obtain addresses from the RDD sample, mailing supplies (welcome packet questionnaire and incentives) and postage, production and labor costs to assemble and mail the welcome packet questionnaire, and telephone follow-up for nonresponse. Similarly, the costs of phone treatment groups include reverse-matching to obtain addresses from the RDD sample; RDD recruitment telephone survey; mailing supplies (advance letter, welcome packet questionnaire, and incentives) and postage; production and labor costs to assemble and mail the advance letter and welcome packet questionnaire; and telephone follow-up for nonresponse. The costs are broken down into their constituent parts and summarized in table 4.

These prices reflect costs of real resource use and for some treatments include overhead costs.[12] For phone treatments, a substantial part of the total cost is attributable to the RDD recruitment telephone survey, whereas for mail treatments, a substantial part of the total cost is attributable to production/panel labor costs. Note the wide disparity between mail and phone treatment groups for cost items three and five (materials and postage for the welcome packet questionnaire). This is because, in mail recruitment mode, all address-matched sampled numbers are sent a welcome packet questionnaire, whereas in phone recruitment mode, the welcome packet questionnaire is sent to only those households whose members have agreed to join the Gallup Panel in the RDD recruitment telephone survey. Overall, the cost per household/member recruited for mail treatments is less than for phone treatments, with group A (mail treatment group with incentive and follow-up) being the most cost-effective group among all treatment groups.

Conclusion

Interestingly, each of the four (incentive-by-follow-up) treatment groups for the mail-out recruitment mode shows a higher rate of recruitment to the panel than do the corresponding incentive-by-follow-up treatment groups for the telephone recruitment mode. As expected, we also find that the $2 incentive,

12. For example, the materials cost for phone treatments is slightly higher than that for mail treatments because of the additional overhead cost of advance letters used in the phone recruitment mode.

advance letter, and 21-day follow-up telephone reminder contributed a positive, independent, and significant impact on recruitment to the panel.

Importantly, our cost-effectiveness analysis indicates that using the mail-out mode for recruitment is more cost efficient than using telephone recruitment. Once again, for each of the four incentive-by-follow-up treatment groups, the cost of panel recruitment—whether measured as cost per household recruited or cost per household member recruited—appears to be significantly less for the mail treatment groups than for the telephone treatment groups.

The clear recruitment rate advantage for the mail treatment group over the telephone treatment group may derive from at least two possible sources. First, the receipt of the welcome packet—containing an attractive, well-designed pamphlet, questionnaire, business card, and business-reply envelope—may serve as more of an inducement to participate than does a telephone call. In addition, those in the telephone sample were requested to participate at the time of the call, before they received a welcome packet. The additional time to consider the request may have served those in the mail sample, relative to those in the telephone sample, as a further inducement to participate.

It is necessary to note that the use of reverse-matched (telephone and addresses) sampling is likely to have restricted the universe to those households with listed telephone numbers. Although the restriction to listed numbers was required by the study design, it is unlikely to pose a serious drawback to mail recruitment in practice; a follow-up telephone call for nonresponse, however, would clearly require a matching telephone number. Furthermore, within-household sampling using the mail recruitment approach may be complicated. Alternatives such as sampling from a household enumeration, last birthday, and other methods remain to be investigated.

Appendix

ADVANCE LETTERS (NON-INCENTIVE VERSION)

In a few days, you will be receiving a phone call from the Gallup Poll inviting you to partake in a short public opinion survey. I encourage you to participate and share your opinions with us. As you may or may not know, the Gallup Poll has been conducting public opinion research for 70 years and has continuously collected presidential approval ratings for every president since Franklin Delano Roosevelt. We also gather public opinion to guide many industries in the private sector, ranging from healthcare to banking to retail shopping. When you receive your phone call from Gallup, this will be your opportunity to have your opinions be heard. In addition to asking for your views on President Bush and other current events, the Gallup interviewer will also ask if you and your household (ages 13 and older) are interested in joining the Gallup Poll Panel. The Gallup Poll Panel is an exclusive group of American households who re-

spond to Gallup surveys on an ongoing basis—results from these surveys are used to guide leaders in government, media, and the private sector. The commitment is not a large one—Gallup Panel members are invited to participate in an average of three surveys per month—so if you enjoy sharing your opinions, this is **a great opportunity**[13] for you to have your voice be heard. When you receive a phone call from the Gallup interviewer in the next few days, please tell us what you think about the president, and please consider joining our panel. We invite you and your household to **have your opinions be heard!**

ADVANCE LETTERS (INCENTIVE VERSION)

In a few days, you will be receiving a phone call from the Gallup Poll inviting you to partake in a short public opinion survey. I encourage you to participate and share your opinions with us. In fact, we have enclosed a $2 gift to thank you in advance for accepting our call. As you may or may not know, the Gallup Poll has been conducting public opinion research for 70 years and has continuously collected presidential approval ratings for every president since Franklin Delano Roosevelt. We also gather public opinion to guide many industries in the private sector, ranging from healthcare to banking to retail shopping. When you receive your phone call from Gallup, this will be your opportunity to have your opinions be heard. In addition to asking for your views on President Bush and other current events, the Gallup interviewer will also ask if you and your household (ages 13 and older) are interested in joining the Gallup Poll Panel. The Gallup Poll Panel is an exclusive group of American households who respond to Gallup surveys on an ongoing basis—results from these surveys are used to guide leaders in government, media, and the private sector. The commitment is not a large one—Gallup Panel members are invited to participate in an average of three surveys per month—so if you enjoy sharing your opinions, this is a **great opportunity** for you to have your voice be heard. When you receive a phone call from the Gallup interviewer in the next few days, please tell us what you think about the president, and please consider joining our panel. We invite you and your household to **have your opinions be heard!**

References

Aitkin, Murray. 1979. "A Simultaneous Test Procedure for Contingency Table Models." *Applied Statistics* 28:233–42.

Berdie, Douglas, and John Anderson. 1974. *Questionnaires: Design and Use*. Metuchen, NJ: Scarecrow Press.

Berk, Marc, Nancy Mathiowetz, Edward Ward, and Andrew White. 1987. "The Effect of Prepaid and Promised Incentives: Results of a Controlled Experiment." *Journal of Official Statistics* 3 (4):449–57.

13. Boldfaced emphasis was added in the advance letter at places as shown.

Bourque, Linda B., and Eve P. Fiedler. 1995. *How to Conduct Self-Administered and Mail Surveys*. Thousand Oaks, CA: Sage Publications.

Brennan, Mike, and Janet Hoek. 1992. "The Behavior of Respondents, Nonrespondents, and Refusers across Mail Surveys." *Public Opinion Quarterly* 56(4):530–5.

Childers, Terry L., and Steven J. Skinner. 1979. "Gaining Respondent Cooperation in Mail Surveys through Prior Commitment." *Public Opinion Quarterly* 43(4):558–61.

Church, Allan H. 1993. "Estimating the Effects of Incentives on Mail Survey Response Rates: A Meta-Analysis." *Public Opinion Quarterly* 57(1):62–79.

Curtin, Richard, Stanley Presser, and Eleanor Singer. 2005. "Changes in Telephone Survey Nonresponse over the Past Quarter Century." *Public Opinion Quarterly* 69(1):87–98.

de Leeuw, Edith, Mario Callegaro, Joop Hox, Elly Korendijk, and Gerty Lensvelt-Mulders. 2007. "The Influence of Advance Letters on Response in Telephone Surveys: A Meta-Analysis." *Public Opinion Quarterly* 71(3):413–43.

de Leeuw, Edith, and W. de Heer. 2002. "Trends in Household Survey Nonresponse: A Longitudinal and International Comparison." In *Survey Nonresponse*, eds. R. Groves, D. Dillman, R. Litte and J. Eltinge. New York: Wiley-Interscience.

Dillman, Don A. 1991. "The Design and Administration of Mail Surveys." *Annual Review of Sociology* 17:225–49.

———. 2007. *Mail and Internet Surveys: The Tailored Design Method 2007 Update with New Internet, Visual, and Mixed-Mode Guide*. Hoboken, NJ: John Wiley and Sons.

Fienberg, Stephen E. 1975. *The Analysis of Cross-Classified Categorical Data*. Cambridge, MA: MIT Press.

Ford, Neil M. 1967. "The Advance Letter in Mail Surveys." *Journal of Marketing Research* 4:202–4.

Fox, Richard J., Melvin R. Crask, and Jonghoon Kim. 1988. "Mail Survey Response Rate: A Meta-Analysis of Selected Techniques for Inducing Response." *Public Opinion Quarterly* 52 (4):467–91.

Furse, David H., and David W. Stewart. 1982. "Monetary Incentives Versus Promised Contribution to Charity: New Evidence on Mail Survey Response." *Journal of Marketing Research* 19 (3):375–80.

Furse, David H., David W. Stewart, and David L. Rados. 1981. "Effects of Foot-in-the-Door, Cash Incentives, and Follow-Ups on Survey Response." *Journal of Marketing Research* 18 (4):473–8.

Goodstadt, Michael S., Linda Chung, Reena Kronitz, and Gaynoll Cook. 1977. "Mail Survey Response Rates: Their Manipulation and Impact." *Journal of Marketing Research* 14 (3):391–5.

Groves, Robert M., Robert B. Cialdini, and Mick P. Couper. 1992. "Understanding the Decision to Participate in a Survey." *Public Opinion Quarterly* 56(4):475–95.

Groves, Robert M., and Mick P. Couper. 1998. *Nonresponse in Household Interview Surveys*. New York: Wiley.

Groves, Robert M., Eleanor Singer, and Amy Corning. 2000. "Leverage-Saliency Theory of Survey Participation: Description and an Illustration." *Public Opinion Quarterly* 64:299–308.

Heaton, Elvia Jr. 1965. "Increasing Mail Questionnaire Returns with a Preliminary Letter." *Journal of Advertising Research* 5:36–9.

Heberlein, Thomas A., and Robert Baumgartner. 1978. "Factors Affecting Response Rates to Mailed Questionnaires: A Quantitative Analysis of the Published Literature." *American Sociological Review* 3:447–62.

Huck, Schuyler W., and Edwin M. Gleason. 1974. "Using Monetary Inducements to Increase Response Rates from Mailed Surveys: A Replication and Extension of Previous Research." *Journal of Applied Psychology* 59(2):222–5.

Kimball, Andrew E. 1961. "Increasing the Rate of Return in Mail Surveys." *Journal of Marketing* 6:63–4.

Lazarsfeld, Paul F., and Marjorie Fiske. 1938. "The Panel as a New Tool for Measuring Opinion." *Public Opinion Quarterly* 2(4):596–612.

Link, Michael W., and Ali Mokdad. 2005. "Advance Letters as a Means of Improving Respondent Cooperation in Random Digit Dial Studies: A Multistate Experiment." *Public Opinion Quarterly* 69(4):572–87.

Massey, James T., O'Connor Dan, and Krotki Karol. 1997. "Response Rates in Random Digit Dialing (RDD) Telephone Surveys." *Paper presented at the Proceedings on Survey Research Methods of the American Statistical Association*.

Rookey, Bryan D., Don A. Dillman, and Steve Hanway. 2008. *Does the Inclusion of Mail and Web Alternatives in a Probability-Based Household Panel Improve the Accuracy of Results?* Paper presented at the American Association of Public Opinion Research Conference, New Orleans, LA, USA.

Scott, Christopher. 1961. "Research on Mail Surveys." *Journal of Royal Statistical Society* 124:143–205.

Singer, Eleanor, John Van Howeyk, Nancy Gebler, Trivellore Raghunathan, and Katherine McGonagle. 1999. "The Effect of Incentives in Interviewer-Mediated Surveys." *Journal of Official Statistics* 15:217–30.

Singer, Eleanor, John Van Howeyk, and Mary P. Maher. 2000. "Experiments with Incentives in Telephone Surveys." *Public Opinion Quarterly* 64(2):171–88.

Steeh, Charlotte. 1981. "Trends in Nonresponse Rates, 1952–1979." *Public Opinion Quarterly* 45:359–75.

Steeh, Charlotte, Nicole Kirgis, Brian Cannon, and Jeff DeWitt. 2001. "Are They Really as Bad as They Seem? Nonresponse Rates at the End of the Twentieth Century." *Journal of Official Statistics* 17(2):227–47.

Traugott, Michael W., Robert M. Groves, and James M. Lepkowski. 1987. "Using Dual Frame Design to Reduce Nonresponse in Telephone Surveys." *Public Opinion Quarterly* 51:522–39.

Yu, Julie, and Harris Cooper. 1983. "A Quantitative Review of Research Design Effects on Response Rates to Questionnaires." *Journal of Marketing Research* 20:36–44.