

EFFICACY OF INCENTIVES IN INCREASING RESPONSE RATES

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Nonresponse has become one of the major challenges to conducting high quality survey research, since the quality of survey estimates is contingent upon a high rate of response. Now, more than ever before, securing a respectable response rate is an objective that is hard to achieve in most surveys, as cooperation rates seem to be on a decline in the developed world (Leeuw and Heer 2002). There is a body of research suggesting that using incentives of appropriate amounts can provide a cost-effective means for increasing overall response rates and achieving the desired number of completed interviews. Examples of such research studies include those conducted by: Berlin et al., 1992; Kulka, 1992; Church, 1993; Kulka, 1994; Mosher, 1994; Warriner, Goyder, Gjertsen, Hohner, & McSpurren, 1996; Singer, VanHoewyk, Gebler, Raghunathan, and McGonagle, 1999; and Link, Malizio, Curtin, 2001.

This paper provides a summary of the results obtained from an experiment conducted to assess the effectiveness of incentives for increasing the response rate, overall and in particular for hard-to-reach individuals. Data for this research come from the 2003 field test of the National Study of Postsecondary Faculty (NSOPF), conducted for the National Center for Education Statistics, US Department of Education. This nation-wide study involved collection of data from faculty at postsecondary institutions. The experiment consisted of a design where two levels of incentives for nonresponse follow-up were nested within three levels of incentives for early response. Results include statistical tests of significance and a cost-benefit analysis to assess the efficacy of incentives.

Key words: Nonresponse, Incentive, and Experimental Design.

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1. OVERVIEW

In preparation for the full-scale administration of the 2004 National Study of Postsecondary Faculty, NSOPF:04, a corresponding field test was designed and administered to examine a number of operational details. Moreover, this field test set out to assess the following hypotheses regarding the efficacy of incentives.

Hypothesis I: Incentives increase the response rate during the initial phase of data collection (Phase I) and promote a higher rate of web-based (self-administered) responses;

Hypothesis II: Incentives increase the completion rate during the nonresponse follow-up phase of CATI data collection (Phase III); and

Hypothesis III: A higher amount of incentive increases the response rate more than a lower amount during Phase I.

The first hypothesis addresses the need for increasing the number of early responses – a byproduct of which could be an increase in the number of low-cost, web-based (self-administered) interviews. Testing the second hypothesis assesses the effectiveness of incentives as a tool for increasing the completion rate, overall and in particular for hard-to-reach faculty, by converting a subset of the initial refusals. The third hypothesis addresses the effectiveness of offering higher levels of incentives for increasing the Phase I response rates.

The employed experimental design consisted of three early response incentive groups ER1 (\$0), ER2 (\$20), and ER3 (\$30) within which two CATI nonresponse follow-up groups of NF1 (\$0) and NF2 (\$30) were nested. In order to avoid potential issues resulting from offering different amounts of incentives to faculty members within a given institution, each institution was randomly assigned to one of the six treatment groups as shown in **Exhibit A.1** when the sample of individuals was selected. The randomization process was controlled so that the number of sample members was about the same for all six treatment groups. The field test was then implemented throughout the following three phases:

Phase I: 2/1/03 to 2/23/03 – those in groups ER2 and ER3 were offered an incentive to complete the survey by self-administration;

Phase II: 2/24/03 to 4/15/03 – nonrespondents from Phase I were prompted by telephone to complete the survey by self-administration or CATI during which no individual was offered an incentive; and

Phase III: 4/16/03 to 6/7/03 – Nonrespondents from Phase II were contacted by telephone to complete the survey by CATI or self-administration and those in group NF2 receiving a \$30 incentive.

Operationally, at the commencement of the experiment all sample faculty members were sent an invitation letter on February 1, asking them to complete the survey by February 23, 2003. Those in the first treatment group (ER1) received no initial incentive offer as part of their invitation letter, while those in treatment groups ER2 and ER3 were offered the low (\$20) and high (\$30) amounts of incentives, respectively, for completing the survey by February 23, 2003. In Phase II, nonrespondents from the previous phase were contacted by telephone and asked to complete the survey without being offered an incentive.

At the onset of Phase III, all outstanding nonrespondents who were pre-assigned to CATI no response follow-up incentive group (NF2) were offered the high category of incentive (\$30) to complete the survey, while those in the no incentive group (NF1) were pursued as before, without receiving an incentive offer. In the final stage of data collection, beyond Phase III, all remaining faculty members were offered the high level of incentive (\$30) to secure as many completed interviews as possible. Such respondents, however, are not included in the analysis of the incentive experiment.

Exhibit A.1. Initial allocation of faculty to the six experimental groups²

Treatment Group (Early Response)	Treatment Group (CATI Nonresponse Follow-up)		Total
	<i>NF1 (\$0)</i>	<i>NF2 (\$30)</i>	
<i>ER1 (\$0)</i>	211	191	402
<i>ER2 (\$20)</i>	192	199	391
<i>ER3 (\$30)</i>	196	208	404
Total	599	598	1,197

2. ANALYSIS OF PHASE I DATA

As summarized above, all 1,197 faculty members were partitioned into the three early response treatment groups. Those in the first treatment group were offered no incentive, while those in the second and third treatment groups were offered \$20 or \$30, respectively, to complete the survey within three weeks of receiving their invitation letters. **Exhibit A.2** shows the distribution of the resulting respondents and nonrespondents for the first phase of the experiment.

Exhibit A.2. Faculty distribution and response rates for phase I (faculty in groups ER2 and ER3 were offered incentives)

Treatment Group (Early Response)	Respondent	Nonrespondent	Total	Response rate Percent
<i>ER1 (\$0)</i>	66	336	402	16.4
<i>ER2 (\$20)</i>	120	271	391	30.7
<i>ER3 (\$30)</i>	138	266	404	34.2
Total	324	873	1,197	27.1

Accordingly, 66 of the 402 faculty who were not offered incentives responded to the survey during the first phase (16.4 percent), while 258 (120+138) of 795 (391+404) faculty who were offered incentives (low or high) responded to the survey during this phase (32.5 percent). The observed difference of 16.1 percent is statistically significant at p-value of less than 0.0001.

Furthermore, a multiple comparisons test (Tukey's Studentized Range Test) was used to examine the observed differences in response rates among the low and high web incentive groups, which were 30.7 percent and 34.2 percent, respectively. While this difference is directionally in support of the third hypothesis, there is not enough evidence to conclude that an increase in the

² The sample of 1,197 excludes the 27 faculty members who were determined ineligible upon contact, which were part of the initial sample of 1,224 faculty members.

incentive amount significantly increases the response rate of faculty members during the first phase.

3. ANALYSIS OF PHASE II DATA

In accordance with study guidance, attempts were made to complete as many interviews as possible during this phase without offering any incentives. For this purpose, all outstanding faculty members from the first phase were contacted by telephone and asked to complete the survey, either on the phone or via the web at their convenience. *Exhibit A.3* shows the distribution of the resulting respondents and nonrespondents for the second phase of the experiment.

Exhibit A.3. Faculty distribution and response rates for phase II (CATI started and no one was offered incentives) by phase I incentive groups

Treatment Group (Early Response)	Respondent	Nonrespondent	Total	Response Rate (Percent)
<i>ER1 (\$0)</i>	109	227	336	32.4
<i>ER2 (\$20)</i>	91	180	271	33.6
<i>ER3 (\$30)</i>	96	170	266	36.1
Total	296	577	873	33.9

While results from this phase were of no particular analytical interest, analyses similar to those conducted for the first phase were applied to data from this phase as well. Accordingly, no significant differences in response rates were detected among those who were offered incentives during the first phase and those who were not, 34.8 percent vs. 32.4 percent, respectively. Thus, having been offered an incentive during the first phase had no significant effect on response rates during the second phase when no one was offered any incentives.

4. ANALYSIS OF PHASE III DATA

Upon expiration of the allotted time for the second phase (i.e., after April 15), the remaining nonrespondents were contacted by telephone for nonresponse follow-up. Those who were re-assigned to the CATI nonresponse follow-up treatment group NF1 were offered no incentive, while those treatment group NF2 were offered \$30 to complete the survey. *Exhibit A.4* shows the distribution of the resulting respondents and nonrespondents for the third phase of the incentive experiment.

Exhibit A.4. Faculty distribution and response rates for phase III (faculty in group NF2 were offered incentive)

Treatment Group (Nonresponse Follow-up)	Respondent	Nonrespondent	Total	Response Rate Percent
<i>NF1 (\$0)</i>	98	190	288	34.0
<i>NF2 (\$30)</i>	135	154	289	46.7
Total	233	344	577	40.4

Accordingly, 98 of the 288 faculty who were not offered incentives responded to the survey during the third phase (34.0 percent), while 135 of the 289 faculty who were offered the high

amount of incentive responded to the survey during this phase (46.7 percent). Note that the observed difference of 12.7 percent is statistically significant at p-value of less than 0.002.

Also, a comparison was made among all respondents for the three phases of the experiment to detect differences in proportions of respondents who completed the survey by web. As summarized in Exhibit A.5, over 60 percent of all responses have been secured via web. It is anticipated that the offer of incentive during the first phase of data collection, which promoted web-based interviews, is in part responsible for this favorable outcome.

Exhibit A.5. Distribution of completed interviews for all three phases by web incentive groups

Treatment Group (Early Response)	Complete Interviews			
	Web	CATI	Total	Percent Web
<i>ER1 (\$0)</i>	164	113	277	59.2
<i>ER2 (\$20) & ER3 (\$30)</i>	360	216	576	62.5
Total	524	329	853	61.4

5. COST BENEFIT ANALYSIS

In order to determine the cost benefit of offering incentives, relevant information from the pool of administrative data that were recorded during the data collection period were extracted. Cognizant of various cost components that make up the complete cost of an interview, a proxy measure of cost was developed for each sample faculty. As represented below, this cost measure reflects both productive and nonproductive CATI telephone calls, as well as the amount of incentive paid to faculty members. The total CATI time in minutes spent on each individual was calculated by:

$$\text{CATI_Time (minutes)} = \begin{cases} n_0 \times \bar{t}_0 + t_{ip}, & \text{if started CATI and completed CATI} \\ n_0 \times \bar{t}_0 + \bar{t}_p, & \text{if started web and completed CATI} \\ n_0 \times \bar{t}_0, & \text{if started web complete and completed web} \\ n_0 \times \bar{t}_0, & \text{if nonrespondent} \end{cases} \quad (1)$$

Here, n_0 represents the number of unproductive calls, \bar{t}_0 represents the average length of unproductive calls (assumed to be 5 minutes³), t_{ip} represents the length of productive call for the i^{th} CATI interview, and \bar{t}_p is the average length of CATI interviews (estimated to be 42 minutes). Subsequently, with a measure of CATI time calculated for each sample faculty, the cost measure for each case was calculated by:

$$\text{Cost} = \text{CATI_Time} \times 0.5 + \text{Incentive} \quad (2)$$

³ The time required for an unproductive call entails a number of administrative details, beyond the simple process of dialing a number. This time was estimated based on total CATI hours charged and total hours spent directly conducting interviews.

Here, it has been assumed that on average the cost of CATI is \$0.5 per minute and *Incentive* represents the actual amount of incentive that was paid to secure the interview. The following two charts show the average CATI time and cost for each of the sample groups based on their final status.

Exhibit A.6. Average CATI time in minutes by sample group

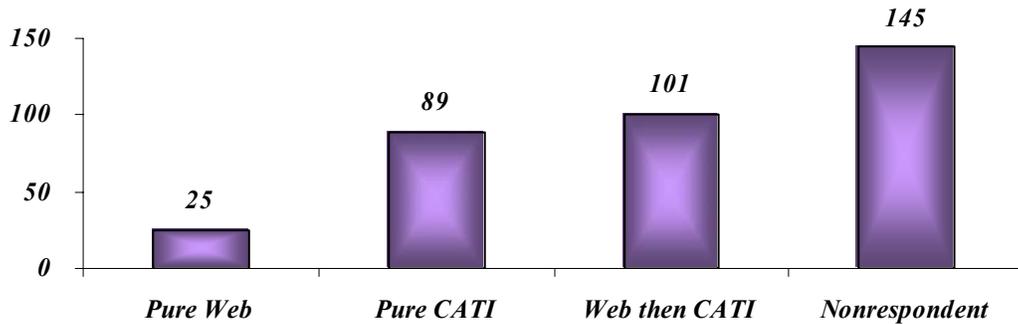
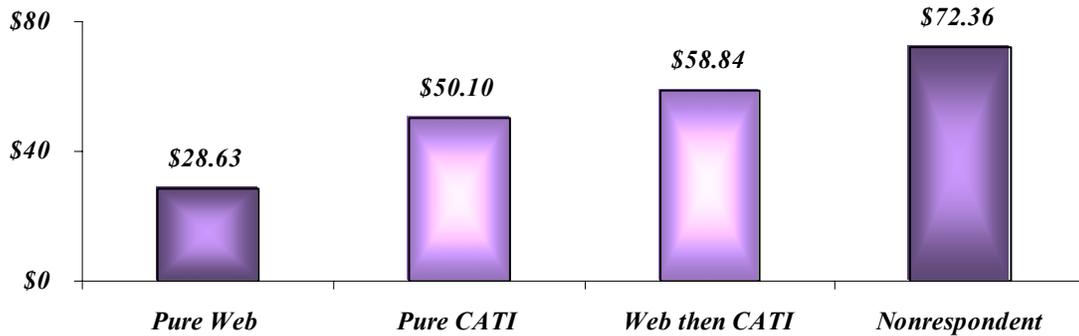


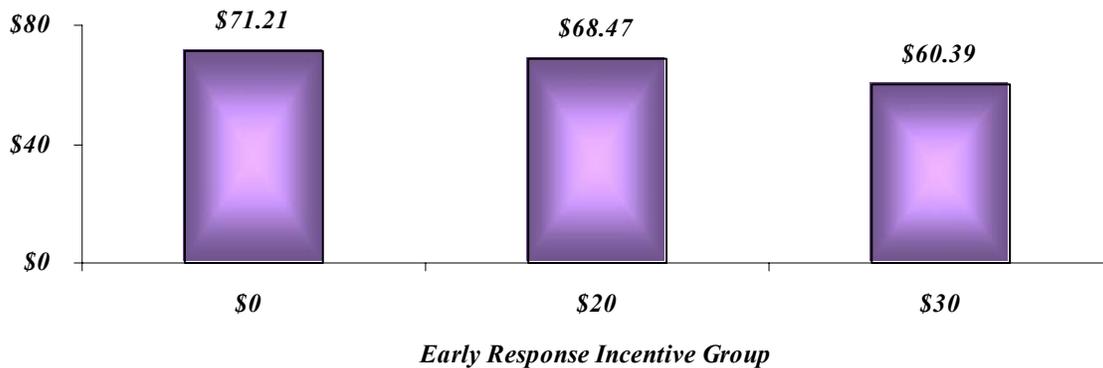
Exhibit A.7. Average cost by sample group



As seen, interviews that required no CATI intervention (Pure Web) were the least time consuming (costly), followed by those that were completely CATI based. Mixed mode interviews (Web then CATI) were the most expensive of all three types of interviews, while nonrespondent incurred the highest cost, on average.

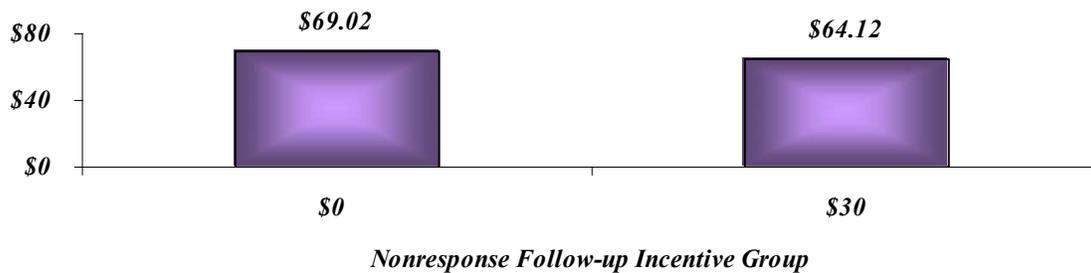
Next, an average cost per completed interview was calculated for each of the early response incentive treatment groups. For this purpose, the total cost for the given group – including respondents and nonrespondent – was divided by the number of completed interview for the given group. As shown in the following chart, the average cost per interview was least (\$60.39) among faculty who were offered the highest amount of incentive (\$30) for early response. Next was the average cost of \$68.47 for those who were offered the \$20 incentive for early response. The non-incentivized group had the highest average cost per interview, \$71.21.

Exhibit A.8. Average cost of completed interview by early response incentive



With respect to the nonresponse follow-up incentives, the average cost per completed interview for those who were offered a \$30 incentive was lower than those who were not offered any nonresponse follow-up incentive. As shown in the following chart, on average the cost per completed interview for the former group was \$64.12, while that for the latter group was \$69.02.

Exhibit A.9. Average cost of completed interview by nonresponse follow-up incentive



6. CONCLUSIONS

As seen above, the results of this field test clearly support the first two hypotheses. That is, offering incentives significantly boosts the response rate during the first phase of data collection, and increases the completion rate during the CATI nonresponse follow-up phase of data collection (Phase III). Moreover, it is anticipated that the offer of early response incentives during the first phase, when web interviews were encouraged, is in part responsible for securing over 60 percent of interviews via web.

Results from the first phase seem to indicate that a higher amount of incentive may not further increase response rates as compared to a lower amount. While the response rate for a larger amount of incentive was higher than the response rate for a lower amount, the observed difference in response rates does not appear to be statistically significant. This, however, could be due to small sample sizes and potentially inadequate increment between the low and high amounts of incentive (\$10) for the type of respondents under consideration.

On the cost benefit analysis, it appears that on average cost per completed interviews are lower when incentives are offered. This seems to be the case both for the early response and CATI

nonresponse follow-up incentives. That is, by offering incentives the overall level of resources required to complete an interview gets reduced, as compared to a situation when no incentives are offered. Moreover, it should be noted that a comprehensive cost benefit analysis needs to take into account nonmonetary gains that result from offering incentives as well. For instance, it has been shown that response rates can increase significantly when incentives are offered for early response and refusal conversion, leading to a higher overall response rate. The resulting gain in survey data quality, due to reduced nonresponse bias, can easily offset the added cost of incentives.

7. WHAT IF SCENARIOS

The results of this field test can be used to estimate the overall response rates for different hypothetical scenarios. For instance, by using the response rates for the incentivized and non-incentivized groups at each phase, it is possible to estimate what the overall response rates would be with and without incentives for all individuals. The following three tables summarize the expected number of completed interviews under the three scenarios of offering no incentives during any of the three phases, offering the low and high amounts of incentive to all faculty members during phases I and III, respectively, and offering the high amounts of incentive to all faculty members during phases I and III. Note that under both scenarios, during the second phase no individual is offered any incentives.

Exhibit A.10. Potential response rates if no individual is offered incentive during any phase

Phase	Sample	Respondent	Completion Rate (Percent)
I	1,197	196	16.4
II	1,001	324	32.4
III	677	230	34.0
Total		751	62.7

Exhibit A.11. Potential response rates if all individuals are offered \$20 incentive during phase I and \$30 during phase III

Phase	Sample	Respondent	Completion Rate (Percent)
I	1,197	367	30.7
II	830	279	33.6
III	551	257	46.7
Total		904	75.5

Exhibit A.12. Potential response rates if all individuals are offered \$30 incentive during phase I and phase III

Phase	Sample	Respondent	Completion Rate (Percent)
I	1,197	409	34.2
II	788	284	36.1
III	504	235	46.7
Total		929	77.6

Accordingly, offering the low and high amounts of incentive during phases I and III could result in overall response rates of about 75 and 78 percent, respectively, while offering no incentives during any of the three phases could result in an overall response rate of about 63 percent.

8. REFERENCES

Berlin, M., Mohadjer, L., Waksberg, J., Kolstad, A., Kirsch, I., Rock, D., & Yamamoto, K. (1992). An experiment in monetary incentives. *Proceedings of the American Statistical Association Section on Survey Research Methods*, 393-398.

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

Chromy, J.R. & Horvitz, D.G. (1978). The Use of Monetary Incentives in National Assessment Household Surveys. *Journal of the American Statistical Association*, 73, 473-478.

de Leeuw, E. and de Heer, W. (2002). "Trends in Household Survey Nonresponse: A Longitudinal and International Comparison," Chapter 3 in Groves, R., Dillman, D., Eltinge, J., and Little, R. (eds.), *Survey Nonresponse*, New York: Wiley, 41-54.

Hubbard, R. & Little, E.L. (1988). Promised contributions to charity and mail survey responses. *Public Opinion Quarterly*, 52, 223-230.

Kulka, R. (1992). A brief review of the use of monetary incentives in federal statistical surveys. Paper presented at the *Council of Professional Associations on Federal Statistics/OMB Symposium on Providing Incentives to Survey Respondents*. Cambridge, MA. Harvard University.

Kulka, R. (1994). The Use of Incentives to Survey "Hard-to-Reach" Respondents: A Brief Review of Empirical Research and Current Practice. Paper prepared for the *Council of Professional Associations on Federal Statistics' Seminar on New Directions in Statistical Methodology*, Bethesda, MD.

Link, M. Malisio, A. Curtin T. (2001) Use of Targeted Monetary Incentives to Reduce Nonresponse in Longitudinal Surveys. Paper prepared for the *Annual Conference of the American Association for Public Opinion Research (AAPOR)*, Montreal, Canada, May 2001.

Mosher, W., Pratt, W. F., & Duffer, A.P. (1994). CAPI, Event Histories, and Incentives in the NSFG Cycle 5 Pretest. In the American Statistical Association (ed.), *Proceedings of the American Statistical Association, Section on Survey Research Methods*, 59-63.

Singer, E., VanHoewyk, J., Gebler, N., Raghunathan, T., & McGonagle, K. (1999). The Effect of Incentives on Response Rates in Face-to-Face, Telephone, and Mixed Mode Surveys. *Journal of Official Statistics*, 15: 217-230.

Warriner, K., Goyder, J., Gjertsen, H., Hohner, P., & McSpurren, K. (1996). Charities, No; Lotteries, No; Cash, Yes. *Public Opinion Quarterly*, 60, 542-56.