QUANTIFYING THE INFLUENCE OF INCENTIVES ON MAIL SURVEY RESPONSE RATES AND NONRESPONSE BIAS

Virginia M. Lesser
Oregon State University

Don A. Dillman
Washington State University

John Carlson
University of Idaho

Frederick Lorenz
Iowa State University

Robert Mason
Oregon State University

Fern Willits
The Pennsylvania State University

Send Communications to:

Virginia M. Lesser
Department of Statistics
Oregon State University
Survey Research Center, 44 Kidder Hall
Corvallis, OR 97330
Phone: 541-737-3584
lesser@science.oregonstate.edu

ABSTRACT

An accumulation of research from the 1930s through the 1980s has shown that token financial incentives of a few dollars sent with the survey request improve response rates. Our objectives here were to determine whether the positive effect of such incentives was maintained in the 1990s and whether their use affects nonresponse bias. Eight marketing studies on general public and student samples were conducted to investigate these issues. Results showed that such incentives remain as powerful for improving response as previously shown. And, demographic characteristics of the incentive groups tended to be more similar to the total selected sample than were results from nonincentive control groups for most of the studies where nonresponse bias could be investigated. This suggests that estimates produced from studies using financial incentives may have lower errors than those studies offering no financial incentives.

Keywords: Nonresponse bias, financial incentives, mail surveys, multiple studies

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Introduction

Traditionally, the two most powerful techniques available to researchers for improving response rates to mail surveys are number of contacts and financial incentives sent with the survey request. Previous studies have consistently shown that token incentives of a few dollars included with the request for survey participation increases the likelihood that subjects will respond, while promises of even large cash rewards, when the questionnaire is returned, do not (Church 1993). Inasmuch as the real value of given incentives has declined, it is important that the utility of such token monetary incentives be re-examined to see if their positive effect on response rates continues to be maintained. An objective of this paper is to report results from a number of new experiments conducted between 1994 and 1998.

To the extent that token incentives still improve response rates, it is important to know whether this improvement is successful in reducing nonresponse error, i.e., the extent to which respondents differ from nonrespondents. Some recent studies on telephone surveys (Keeter et al. 2000; Mason, Lesser and Traugott 2002) raise the question of whether obtaining the participation of reluctant respondents actually reduces nonresponse error and is therefore worth the additional cost. Thus, a second objective of this paper is to conceptualize and conduct a nonresponse analysis using the six studies,

where some information on the characteristics of both respondents and nonrespondents was available. Implications for the future use of incentives are also reported.

Theoretical Background

Over the past several decades a number of meta-analyses of survey research procedures have shown that token financial incentives sent with the request to complete the questionnaire improve mail survey response rates (Armstrong 1975; Church 1993; Fox, Crask and Kim 1988; Heberlein and Baumgartner 1978; Jobber, Saunders and Mitchell 2004; Yammarino, Skinner and Childers 1991; Yu and Cooper 1983,). The most recent of these meta-analyses (Jobber et al. 2004) examined 44 studies conducted throughout the world since 1975. Their regression analysis (in which incentive values ranged from 10 U.S. cents to US $1) found that prepaid incentives produced an increase in response rate of 15% across all the studies. Church (1993) examined 38 studies, two-thirds of which were reported in the 1970s and 80s that included incentives $5 or less. His analysis found that prepaid incentives produced response rates 19% higher than those who received no financial incentive. We conclude from these studies that small token financial incentives have been quite effective for improving response rates through much of the 20th Century.

Some studies have shown that the effectiveness of financial incentives persist at high response rates when other procedures known to improve response rates are employed in the overall approach to data collection (James and Bolstein 1990, 1992; Martinez-Ebers 1997; Singer, VanHoewyk and Maher 1998; Tambor et al. 1993; Warriner et al. 1996).

It is not clear why token incentives of $5 or less have been found to be so effective for increasing mail survey response rates. One suggestion is the existence of a norm of reciprocity (Gouldner 1960), i.e., a tendency for people to do something of commensurate value in return for the incentive. If that is the guiding consideration then we should expect to see a diminishment in response as inflation decreases the real value of a few dollars. We should also expect that slightly higher incentives should obtain higher response rates. If on the other hand the effectiveness of token incentives stems from their role in bringing the survey request to the attention of the respondent, and a more generalized social exchange, whereby other considerations (e.g., promised uses of the results for positive social purposes) come into play as suggested by Dillman (2000), we might expect a continuation of the effectiveness of small token cash incentives.

In this paper we present results from eight new studies conducted on different populations providing incentives ranging from $2 to $5. They are applied in conjunction with at least three (and up to five) contacts and other design features with the aim of achieving high overall response rates so that the test of effects is made under high response rate conditions.

The design of the various studies allowed some additional issues to be tested, e.g., type of delivery, whether cash or check, or whether a $2 bill or two $1 bills. James and Bolstein (1992) did not report any difference in response rates when comparing a $5 check to a cash incentive of $5. They concluded that checks are a better choice than cash when incentives of $5 or more are used since not all checks are cashed. No comparisons were made of cash versus check for amounts less than $5, such as $2 used in the current studies.

Nonresponse Bias

In an ideal survey, where nonresponse is considered a random event, respondents will have the same characteristics as nonrespondents. This assumption is often difficult to evaluate since information is seldom available to compare the nonrespondents with the respondents. A major reason for attempting to improve response rates is to obtain participation from more individuals selected for the study, thus decreasing the non-response rate. To the extent that token financial incentives improve response rates, it is important to ask whether the introduction of the financial incentive decreases non-response error by bringing the characteristics of the sample closer in line with population characteristics.

McDaniel and Rao (1980) compared information given by the respondent with actual values to validate the reported information. They concluded that those respondents receiving a financial incentive of $0.25 were more likely to provide accurate information on the questionnaire and to do a more thorough job of filling it out. Goetz, Tyler and Cook (1984) recruited a sample of Chicago residents to view a television program. They concluded that financial incentives increased response rates but there were no differences in the representativeness of the sample between the incentive and control groups.

Nonresponse Error as a Component of Total Survey Error

Nonresponse error is one component of total survey error (the other three are frame, measurement, and sampling error) and is the focus of this research. We will study on nonresponse bias since errors associated with the inability to obtain measurements on all the members of the selected sample can be viewed as constant over all possible

samples, i.e., a fixed error. Nonresponse bias is defined as the multiplicative effect of the nonresponse rate (λ) of a sample survey and the difference in the measured population characteristic between the nonrespondents and respondents $(\bar{Y}_{NR} - \bar{Y}_R)$.

$$\text{Nonresponse bias} = \lambda(\bar{Y}_{NR} - \bar{Y}_R)$$

For one component of this error, nonresponse rate, the literature has shown there is a reduction in the nonresponse rate when mail surveys use both multiple mailings and financial incentives. In order to investigate whether there are differences between the nonrespondents and respondents, data are needed on the nonrespondents. Few experiments have actually had this information available. Data summarized by McDaniel and Rao (1980) and Shettle and Mooney (1999) did not show any increased differences between respondents and nonrespondents for the variables examined, but Tambor et al. (1993) did see significant differences between the two groups. One approach to further evaluate differences between respondents and nonrespondents is to compare their demographic characteristics. The present research includes six studies that include demographic data on both respondents and nonrespondents. This information will be used to evaluate the impact of financial incentives on nonresponse bias. A comparison of results between student and general populations will be discussed.

Experiments

Eight studies were conducted by different investigators in Idaho, Iowa, Pennsylvania, Oregon, and Washington. Subjects were randomly assigned to either the incentive group or a nonincentive group for a variety of populations, both student and general:

1. A 1997 survey of students who recently left the College of Agricultural Sciences at Oregon State University without graduating. The questionnaire had 22 questions and 3 mailings were sent. Approximately one-third of the sample received no incentive, another third received a $2 check with the initial mailing, and the final third received a $2 bill with the initial mailing. Each check was written to the person selected for study.
2. A 1998 study of students who recently graduated from the College of Agricultural Sciences at Oregon State University. The questionnaire had 24 questions and four mailings were sent. One third of the sample received no incentive, another third received a $2 bill with the initial mailing, and the final third received a $5 bill with the initial mailing.
3. A 1997 study of distance education issues for students who recently attended Oregon State University but left before receiving their degree. There were 15 questions on this questionnaire and 4 mailings were sent. Five treatment groups were compared. In addition to no incentive, one of four cash incentive treatments were included in the second mailing – a $2 check, a $2 bill, a $5 check, or a $5 bill. Each check was to the person selected in the study.
4. A 1998 satisfaction study was conducted using students who graduated from Oregon State University in June 1997. There were 20 questions on this questionnaire and 4 mailings were sent. In two treatment groups, a preletter was used followed by the mailing of questionnaire and two follow-up reminders. In the two other treatment groups, there was no preletter but three follow-ups. The last mailing consisted of a postletter with no questionnaire.

The four treatment groups were compared: (i) postletter, no cash incentive; (ii) preletter, no cash incentive; (iii) postletter, $2 cash incentive included with the first mailing; (iv) preletter with $2 included in the preletter.

5. A 1994 customer satisfaction survey of new residents who visited the Washington State Department of Motor Vehicles to obtain a new state license. The questionnaire had 52 questions. Half the sample received no incentive while the other half received a $2 bill with the first mailing. Up to four contacts were sent to each individual in the sample.
6. A study of new residents in Iowa who obtained a new State of Iowa drivers license were surveyed in 1997. The questionnaire was eight pages in length. Approximately one-third of the sample received no incentive, another third received two $1 bills, and the final third received a $2 bill in the first mailing. There were four mailings in this study.
7. A 1996 study was conducted on people aged 50-70 who had recently moved to Idaho. There were 50 questions in this questionnaire. Approximately one-third of the sample received no incentive, another third received a $2 bill with the first mailing, and the final group was informed in their first cover letter that they could be entered in a drawing to win $300 if they completed and returned their questionnaire..
8. A mail survey assessing citizen's views about current social issues was carried out in Centre County, Pennsylvania in 1998. The questionnaire contained 60 items. There were three mailings and all included a copy of the questionnaire. The response experiment involved both a cash incentive (two $1 bills) and

personalization. Sample members were randomly assigned to six treatment groups: (i) no incentive, no personalization; (ii) no incentive, first mailing not personalized but second mailing personalized; (iii) no incentive, first and second mailings both personalized; (iv) incentive, no personalization; (v) incentive and personalization both on the second mailing only; (vi) incentive on first mailing, personalization on first and second mailings.

Results

Overall Influence on Response Rates

All of the financial incentive treatments reported here showed increased response rates as compared to the nonincentive group (Table 1). The increase in response rate due to the $2 financial incentive ranged from 5% (for the check) in Study 3 to 31% in Study 6, with a mean of 18.9%. Each of the 14 $2 incentive treatment groups was compared to the study nonincentive groups. The $5 incentive improved response from 11-22%, with the increase being much greater than the $2 incentive in Study 2 (81% vs. 67%), and exactly the same (32%) in study 3. These results leave little doubt that the positive effects of small cash incentives remain quite substantial. Moreover, the magnitude of the mean increase in response remains equivalent to that reported in the earlier meta-analysis by Church (1993), leaving little doubt that token cash incentives remain powerful inducements to survey response. There were, however, some differences in the amount of the increase depending upon how the financial incentive was packaged (i.e., check, cash, novelty bill, etc.).

[TABLE 1 ABOUT HERE]

Check versus cash. There were no significant differences in the comparisons testing the response rates obtained from the cash versus the check incentive (Table 1, Studies 1 and 3). Study 1 comparing a $2 bill versus $2 check showed no significant difference in response rates (p-value = 0.212), while Study 3 has a p-value = 0.479. In addition, there was no significant difference in the response rates comparing a $5 check or $5 cash (p-value = 0.899).

Since there were no significant differences in response rates between cash and check in any of the three tests where this was examined, we asked whether cash or check is less expensive to use. Fewer than half of the subjects in Study 1 and less than a quarter of those in Study 3 cashed the $2 check, but more than 90% cashed the $5 check. Only a few subjects (14 in Study 1 and 8 in Study 3) returned the $2 cash incentive and just one person returned the $5 in cash in Study 3. However, to determine whether using cash or checks was more cost effective, one needs to consider not only the actual incentive money disbursed, but also the administrative costs of preparing the checks. In our studies, it was administratively difficult to deal with checks. For example, the checks had to be individually typed and recorded. We calculated that it was 21% less expensive using a $2 bill rather than a $2 check. However, it was 20% more expensive to use a $5 bill rather than a $5 check. Thus, although James and Bolstein (1992) suggested that checks are more cost-effective and hence should be used as a general rule in financial incentive studies, our data suggest that this decision should be made only after consideration of the administrative costs involved.

$2 versus $5. Study 2 showed a significant increase in response rates between the $2 and $5 treatment groups (p-value = 0.008). However, there were no significant

differences found between the $2 and $5 treatment groups in Study 3, regardless of whether check or cash was used (cash p-value = 0.96; check p-value = 0.44). It should be noted that the incentive in Study 3 was sent in the second mailing of the questionnaire while the incentive in Study 2 was sent in the first mailing.

Two $1 bills versus one $2 bill. In Study 6, there was a three-percentage point increase in response rate between the groups receiving the novelty of a $2 bill over the two $1 bill group, but this difference was not statistically significant (p-value = 0.48).

Prepayment versus lottery. There was a 5% increase in the response rate for the group that received notice of the lottery as compared to the nonincentive group (Study 7). However, this increase in the response rate was not significant between these two treatments (p-value = 0.11), while the test between the $2 prepayment and the control group in this study was significant (p-value < 0.0001).

Personalization with incentive. At each level of personalization, there was an increase in response rates of approximately 20%. This increase in response rate, due to the financial incentive, appears to decrease with increasing levels of personalization (Study 8). However, the interaction between personalization and incentive was not significant (p-value = 0.32).

Impact of Incentives on Reducing Nonresponse Bias

There are two components to reducing nonresponse error. The first is to decrease the nonresponse rate; the second is to decrease the differences between nonrespondents and respondents. Token cash incentives have been shown to increase response rates, but the question remains: do monetary incentives also serve to lessen the differences between

respondents and nonrespondents. That is, do incentives decrease the selectivity in who answers a mail survey? Six of the studies mentioned above (1, 2, 3, 4, 5, and 6) contained demographic information on gender, age, and (for the student samples) grade point averages (GPAs) for nonrespondents as well as respondents. The availability of such data allowed for some insight into the nature of nonresponse bias and how it might be affected by the use of incentives.

In most studies of students, the financial incentive groups did as well or better than the nonincentive groups in obtaining a sample of completed surveys that matched the gender distribution of the selected sample (Table 2). In Study 1, the percentage of females in the selected sample was 45%. The percentage of completed responses from females was 61% for the non-incentive group, while the percentage of completed responses from females was 57% and 54% for the $2 check and $2 bill groups, respectively. In Study 2, the percentage of females in the selected sample was 38%. The percentage of completed responses from females was 50% for the nonincentive group, while the percentage completed responses from females was 35% and 34% for the $2 incentive and $5 incentive, respectively. As compared to the nonincentive group, Studies 3 and 4 also showed a slight improvement for the incentive groups for some, but not all incentive groups, in bringing the sample of completed responses closer to the demographic ratio of the selected sample. This smaller difference, combined with the lower nonresponse rate for the incentive groups, suggest that nonresponse bias may be reduced when financial incentives are used in student population studies. In the two studies of the general population, the $2 bill treatment also brought the gender characteristics of the completed sample more in line with the gender characteristic of the

selected sample as compared to the control group (Table 2). However, the two $1 bills in Study 6 appeared to increase the number of females in the completed sample more than the number that appeared in the selected sample.

[TABLE 2 ABOUT HERE]

The effect of incentives on reducing nonresponse bias in regard to students' grade point averages (GPAs) was explored for the student samples in Studies 1 and 2 (Table 3). For both studies, the use of a cash incentive brought the GPA characteristic of the completed sample more in line with the selected sample compared to the other treatment groups. The GPAs for the check group in Study 1 were less similar to the selected sample as compared to the no incentive group.

[TABLE 3 ABOUT HERE]

Age was another variable available for all participants in these studies. However, since student populations provide little variation in age, only the general population surveys were analyzed. In these studies, age was compared across the treatment groups. In only one of the two studies did the use of the cash incentive bring the distribution of age in the completed sample more in line with the age demographics of the selected sample (Table 4).

[TABLE 4 ABOUT HERE]

Adjustment for Unit Nonresponse

Nonresponse still exists in these studies regardless of financial incentives. To adjust for unit nonresponse, a number of procedures are available in the survey literature. These procedures adjust the respondent data in order to bring the completed survey data more in balance with the demographics of the selected sample. One of these procedures

is a weighting class adjustment (Lessler and Kalsbeek 1992). Demographic variables, such as age or gender, are often defined as weighting adjustment classes. It is hoped that the responses between the nonrespondents and respondents in the same weighting classes are similar. Gender was selected as a class and a weighting class adjustment was applied to both control and incentive groups for the six studies discussed in Table 2. After applying this weighting factor, we expected that each of the groups would have a similar balance to the respondent sample with respect to gender. Sampling error is a function of sample size and the weights employed in a survey design. Clearly the use of financial incentives increases sample size and therefore increases precision. However, one drawback to the introduction of variable weights due to the weighting class adjustment is a loss in precision compared to a design with equal weights.

The influence of variable weights on sampling error was compared across groups for each study. The impact of the variable weights introduced by the nonresponse adjustment is presented in Table 5. The design effect is calculated which provides a measure of the precision lost by the use of variable weights (Gabler, Haeder, and Lahiri 1999). For example, in the first study, the control group with the nonresponse adjustment has a variance 1.18 times larger than the control group with no nonresponse adjustment. For all studies of the student populations, the incentive groups show a smaller increase in variance due to the nonresponse weighting procedure as compared to the control groups. This was expected since the gender demographic in the incentive groups was more similar to the selected sample as shown in Table 2. This suggests that the use of the financial incentive in student populations not only decreases nonresponse bias with regard to gender but also decreases sampling error. Subsequently, after adjusting for

nonresponse due to gender, nonresponse error in the financial incentive groups is lower as compared to the group with no financial incentive. Results from the two studies of the general population were unclear as to whether the use of incentives, as compared to no incentive, decreased variance. The design effect increased in two financial incentive groups while decreased in one financial incentive group. Although nonresponse rate was reduced in the incentive groups, it is not clear based on these two studies whether the nonresponse bias and total survey error is also reduced in studies of the general population.

[TABLE 5 ABOUT HERE]

Discussion and Conclusions

Token cash incentives of a few dollars sent with the request to complete a questionnaire continue to have a powerful influence on response rates to mail surveys. In the 14 experiments nested in the eight studies reported here, a $2 incentive improved response rates an average of 18.9 percentage points, accounting for nearly one third of the 61.1% average response rates. These findings leave little doubt that such incentives continue to be an important method for achieving high response rates.

The similarity to the magnitude of effect reported by Church (1993) and Jobber, et. al. (2004) -- 19.1% and 15% respectively -- in their meta- analyses are particularly noteworthy when one recognizes that inflation has continued to decrease the real value of the dollar over the years. This suggests to us that the effectiveness of the incentives cannot be attributed solely to the value of the money for purchasing other goods and services. Their power to induce response seems to stem from something other than a

simple reciprocal obligation measured by the value of the incentive.

The analysis presented here also suggests that incentives maydecrease nonresponse bias in regard to gender by increasing the likelihood that males (who are generally less likely to respond to mail surveys than are females) will participate. There were thirteen different financial incentive groups investigated in this analysis. Nine of these groups brought the completed sample more in line with the distribution of the total selected sample with respect to gender as compared to the no incentive group. Of the remaining four comparisons, one financial incentive group did not differ from the no incentive group, and in three cases, the financial incentive groups showed no improvement over the no incentive control group in bringing the completed sample in line with the gender distribution of the total sample. In all studies the use of financial incentives reduced nonresponse rates. This suggests that the use of financial incentives is likely to bring the gender distribution more in line with the selected sample than will the failure to use an incentive. Since the multiplication of this difference with the non-response rate is a measure of nonresponse bias, it is expected that nonresponse bias attributed to variability in gender may be smaller for the financial incentive groups compared to the other groups.

To the extent that financial incentives encourage traditionally underrepresented groups to complete and return their surveys, a similar decrease in nonresponse bias would be expected for them as well. For the student populations studied, this appears to be the case for those with lower grade point averages. Further study of this matter is warranted to ascertain the relative impact of financial incentives on nonresponse bias for other populations with respect to other demographic variables, such as age and ethnicity.

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Table 1. Studies conducted to investigate impact of financial incentives in mail surveys.

Population/ Year	Sample Size[a]	Groups	Response Rate	Chi-Square	p-value
Students					
1.OSU/CAS Students	133	$0	28%	-	
(1997)	130	$2 Check	44%	7.35	0.0067
	125	$2 Bill	53%	16.77	<0.0001
2. OSU/CAS	129	$0	59%	-	
Graduates (1998)	135	$2 Bill	67%	1.70	0.1925
	141	$5 Bill	81%	15.55	<0.0001
3.[b] OSU Distance Ed	249	$0	20%	-	
(1997)	91	$2 Check	25%	0.90	0.3430
	92	$2 Bill	32%	4.56	0.0327
	87	$5 Check	31%	4.03	0.0448
	97	$5 Bill	32%	5.08	0.0241
4.[c] OSU Graduate	232	$0 postletter	44%	-	
(1988)	231	$0 preletter	52%	-	
	234	$2 postletter	67%	24.33	<0.0001
	234	$2 preletter	65%	8.64	0.0033
General Public					
5. Washington State	368	$0	44%	-	
	357	$2 Bill	63%	25.52	<0.0001
6. Iowa Statewide	317	$0	42%	-	
	313	2 $1 Bills	70%	9.76	0.0018
	313	$2 Bill	73%	14.63	0.0001
7. Idaho Statewide	526	$0	53%	-	
	526	$2 Bill	72%	41.27	<0.0001
	524	$300 Lottery	58%	2.62	0.1053
8.[d] Pennsylvania -	287	$0, No personz	35%	-	
Centre County	470	$0, 1 personz	39%	-	
	287	$0, 2 personz	45%	-	
	282	$2, No personz	59%	33.94	<0.0001
	288	$2, 1 personz	62%	37.44	<0.0001
	282	$2, 2 personz	64%	19.70	<0.0001

[a]Reflects the sample size sent for each treatment group after adjusting for the undeliverables.
[b]Financial incentive sent in second mailing. Initial total sample was 972. There were 217 completed on first mailing, with 111 undeliverable addresses. The response rates listed are results from the second mailing only.
[c]Chi-square tests reflect comparison of the financial incentive within the postletter and preletter groups.
[d]Personz denotes amount of personalization, either none, 1 personz for personalization on second mailing, or 2 personz for personalization on first and second mailings. Chi-square tests reflect comparisons of the financial incentive within each level of personalization.

Table 2. Comparison of gender characteristics between the sampled population and the respondents completing questionnaires in each treatment group.

Study	Group	Gender (Percent composition of group) Male(%)	Female (%)
Student Population Studies			
1	Selected sample	55	45
	$0	39	61
	$2 Check	43	57
	$2 Bill*	46	54
2	Selected sample	62	38
	$0	50	50
	$2 Bill*	65	35
	$5 Bill	66	34
3	Selected sample	56	44
	$0	47	53
	$2 Check*	57	43
	$2 Bill	48	52
	$5 Check	26	74
	$5 Bill	45	55
4	Selected sample	47	53
	4 Mailings, $0 postletter	51	49
	4 Mailings, $0 preletter*	47	53
	4 Mailings, $2 preletter*	47	53
	4 Mailings, $2 first mail	54	46
General Population Studies			
5	Selected sample	55	45
	$0	48	52
	$2 Bill*	50	50
6	Selected sample	48	52
	$0	44	56
	Two $1 Bills	40	60
	$2 Bill*	49	51

*The treatment group that most closely resembles the sampled population.

Table 3. Comparison of GPA characteristics for two student populations between the sampled population and the respondents completing questionnaires in each treatment group.

		GPA (Percent composition of group)			
Study	Group	>3.0	2.25-3.0	1.5-2.25	<1.5
1	Selected sample	20	32	33	15
	$0	31	31	31	8
	$2 Check	22	46	18	14
	$2 Bill*	20	32	29	18

		GPA (Percent composition of group)			
Study	Group	>3.4	3.0-3.4	2.6-3.0	<2.6
2	Selected sample	21	26	27	26
	$0	18	38	21	23
	$2 Bill*	18	26	25	30
	$5 Bill	31	23	22	25

*The treatment group that most closely resembles the sampled population.

Table 4. Comparison of age characteristics for two general population studies between the sampled population and the respondents completing questionnaires in each treatment group.

Study	Group	Age (Percent composition of group) 50+	40-49	30-39	18-29
5	Selected sample	11	21	31	37
	$0*	15	21	30	34
	$2 Bill	13	27	32	28

Study	Group	Age (Percent composition of group) 65+	55-64	45-54	35-44	25-34	<25
6	Selected sample	6	7	15	25	32	16
	$0	8	9	17	23	29	14
	Two $1 Bills	7	7	16	29	31	9
	$2 Bill*	7	9	14	22	34	14

*The treatment group that most closely resembles the sampled population.

Table 5. Design effects (DEFF) resulting from a weighting class adjustment accounting for differential response rates for gender.

Study	Group	Design Effect (DEFF)
Student Population Studies		
1	$0	1.118
	$2 Check	1.052
	$2 Bill	1.031
2	$0	1.012
	$2 Bill	1.000
	$5 Bill	1.000
3	$0	1.087
	$2 Check	1.027
	$2 Bill	1.013
	$5 Check	1.086
	$5 Bill	1.066
4	3 Mailings, $0	1.023
	4 Mailings, $0 postletter	1.013
	4 Mailings, $0 preletter	1.015
	4 Mailings, $2 preletter	1.006
	4 Mailings, $2 first mail	1.003
General Population Studies		
5	$0	1.005
	$2 Bill	1.014
6	$0	1.005
	Two $1 Bills	1.012
	$2 Bill	1.004