

The Effect of an Incentive on Sample Composition and Item Non-response in a Mail Survey

Mike Brennan, Massey University
Jan Charbonneau, Massey University
m.brennan@massey.ac.nz

Abstract

This paper examines the effect on sample composition and item non-response a chocolate incentive sent with either the first or second mail-out in a mail survey. The survey involved a sample of 1600 New Zealand residents aged 18 years or older, randomly selected from the 2005 Electoral Roll. The response rates after two reminders ranged from 62.3% to 66.5% for four treatment groups. The incentive generated a significantly higher response to the first mail-out, and a significantly higher response to the second mail-out when accompanied by a replacement questionnaire. The differences in sample composition and item non-response rates between the control and treatment groups were not statistically significant for any of the waves or treatments.

Keywords: Mail survey; survey non-response bias, incentive

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Introduction

Mail surveys are widely used in survey research, but declining response rates and increasing item non-response rates are both major issues for survey researchers (Beatty and Hermann, 2002; Bednall and Shaw, 2003; CMOR, 2003; Curtin, Presser and Singer, 2005; de Leeuw, 2001; de Leeuw and de Heer, 2002; Yan, Jans and Curtin, 2006). As a consequence, researchers are constantly searching for methods to boost survey participation. However, while finding ways to obtain respectable response rates is a priority, it is also clear that it is important to examine the effects such procedures may have on response bias and measurement error (Groves and Couper, 1998; Groves et al., 2006; Groves, 2006; Olson, 2006).

Concern has been raised over whether incentives affect sample composition, leading to biased results (e.g., Furse and Stewart, 1982; Hansen, 1980; Nederhof, 1983; Groves et al., 2006; Olson, 2006; Robertson and Bellenger, 1978; Ryu, Couper, and Marans, 2006; Willimack et al., 1995; Wotruba, 1966). But it is not necessarily differences in respondents' demographic characteristics that are of concern, but whether incentives affect the response distributions on key variables being investigated. Evidence on these matters to date is scant.

Nederhof (1983) found no bias in age, gender, marital status, religion, political creed and research experience associated with the use of an incentive, but did find significant differences for education and occupation. There is also some evidence that response distributions are not necessarily affected, even if demographic variables are (e.g., Finn, Wang and Lamb, 1983; Hansen, 1980; Mizes, Fleece and Roos, 1984; Nederhof, 1983; Ryu, Couper and Marans, 2006; Whitmore, 1976). Furthermore, a more recent study suggests that using an incentive may even help reduce nonresponse bias associated with the effects of respondent interest (or disinterest) in the survey topic (Groves et al., 2006), and there is some evidence that incentives may help reduce item nonresponse. Both Wotruba (1966), and James and Bolstein (1990), reported a higher level of completed questionnaires, as well as a higher response rate, when a pre-paid (monetary) incentive was used, while McDaniel and Rao (1980) found a monetary incentive significantly decreased item omission and response error, and improved completeness of answers.

While encouraging, most of the research to date on the effects of incentives on response and non-response bias has examined the effects of monetary incentives. This paper examines the effect that using an effective non-monetary incentive may have on sample composition and item non-response. The incentive employed is chocolate.

Method

Sample

An eight page questionnaire on the topic of product placement in Reality TV was sent in a mail survey to 1600 New Zealand residents randomly selected from the 2005 electoral roll. The overall response rate after two follow-up mail-outs was 64.3% (valid responses /1600 – returned GNA (gone no address) = 999 /1600 - 46).

Procedure

Respondents were randomly assigned to one of the four treatment groups set out in Table 1. Group 1 was the overall Control. Group 2 received a non-monetary incentive (chocolate) in the first mailing. Non-respondents in Group 3 received a chocolate incentive as well as a replacement questionnaire with the first reminder. Non-respondents in Group 4 received a chocolate incentive but no replacement questionnaire with the first reminder.

Table 1. Research Design

	Treatment Groups			
	T1	T2	T3	T4
First mailing	L + Q	L + Choc+ Q	L + Q	L + Q
Second mailing	L	L	L + Choc + Q	L + Choc
Third mailing	L + Q	L + Q	L	L + Q

L = Letter Q = Questionnaire Choc = Chocolate incentive attached to letter

Survey Instrument

The questionnaire was in the form of an A4 booklet (A3 folded). A reply paid envelope was provided. The questionnaire contained questions on product placement in Reality TV, Internet and computer usage and TV viewing in general, and a suite of demographic questions.

The incentive was a small (45mm x 55 mm x 6mm), individually foil-wrapped chocolate bar (see Appendix A). It was attached to the cover letter with double-sided adhesive tape, with the following statement added to the letter: “As a token of our appreciation, we hope you will enjoy the attached sample of Whittaker’s chocolate.”

Results and Discussion

A summary of response rates is reported in Table 2. The incentive prompted a statistically significant increase in response rate in both the first mail-out (T2) and second (T3). Further discussion of the effect of the chocolate incentive on response rates is reported elsewhere (see Brennan & Charbonneau, 2009)

Table 2. Response Rates by Treatment by Wave

Treatment Groups	Wave 1		Wave 2		Wave 1+2		Wave 3		Wave 1+2+3	
	N	%	N	%	N	%	N	%	N	%
T1 Control	382	34.0	252	21.8	382	48.4	194	27.3	382	62.3
T2 W1 Q+choc	392	41.3*	228	15.8	392	50.5	186	26.3	392	63.0
T3 W2 Q+choc	391	35.3	251	36.3#	391	58.6**	157	19.7	391	66.5
T4 W2 L+choc	389	31.9	264	22.7	389	47.3	201	34.8	389	65.3
Overall	1554	35.6	995	24.3	1554	51.2	738	27.5	1554	64.3

Note: * = p < .05 ** = p < .01 # = p < .001

Sample composition

An issue with using an incentive is that it may bias the results prompting disproportionate responses from different age or gender segments of the sample (Ryu, Couper and Marans, 2006). As can be seen in Table 3, the differences in mean age between the four treatment groups were non-significant for both the initial sample and the respondents. Similarly, the chocolate incentive did not significantly alter the ratio of male to female respondents across the three treatment groups and Control (see Table 4).

Table 3. Effect of Incentives on Sample Age Distribution

Treatment Groups	Sample		Respondents	
	N	Mean Age	N	Mean Age
T1 Control	382	44.94	238	45.18
T2 W1 Q+choc	392	45.11	247	46.12
T3 W2 Q+choc	391	44.81	260	47.02
T4 W2 L+choc	389	44.51	254	45.35
		F=.083, d.f. = 3,1550, p=.969		F=.639,df = 3, 995, p =.590

Thus it would appear that the use of chocolate as an incentive did not bias sample composition, at least with regards to age and gender. These findings for age and gender are consistent with previous findings regarding the effects of incentives on sample composition (e.g., Furse and Stewart, 1982; Hansen, 1980; Nederhof, 1983; Robertson and Bellenger, 1978; Ryu, Couper and Marans, 2006; Willimack et al., 1995; Wotruba, 1966).

Table 4. Effect of Incentive on Sample Gender Distribution

Treatment	Sample			Respondents		
	N	%F	%M	N	%F	%M
T1 Control	382	49.0	51.0	238	47.1	52.9
T2 W1 Q+choc	392	47.4	52.6	247	44.5	55.5
T3 W2 Q+choc	391	54.0	46.0	260	52.7	47.3
T4 W2 L+choc	389	47.0	53.0	254	41.7	58.3
1,2,3,4	$\chi^2 = 4.75, d.f. = 3, p = .191$			$\chi^2 = 6.74, d.f. = 3, p = .081$		

Item nonresponse bias

Another concern is that an incentive may affect item nonresponse, and thereby affect the interpretation of responses to survey questions. In this survey, there were seven demographic questions, three questions on computer use, five questions relating to general television viewing, including one question with 10 scale items, and seven questions relating to Reality TV, including one question with 18 items, one with nine items, and one with eight items. The item nonresponse for the single-item questions are reported in Table 5.

Table 5. Item Nonresponse for Single Response Questions

	T1	T2	T3	T4	Total	Chi-	p
	Control	Choc W1	Choc+Q W2	Choc-Q W2		square	
	%	%	%	%	%		
Demographics							
Income	8.4	9.4	8.4	14.0	10.1	6.022	.111
Age	4.6	9.4	5.3	7.8	6.8	5.605	.133
Gender	3.4	7.3	4.2	5.1	5.0	4.518	.211
Ethnic group	3.8	7.8	5.0	6.2	5.7	3.922	.270
Education	3.8	7.8	5.0	6.6	5.8	4.107	.250
Household size	4.7	7.8	5.4	5.5	5.9	2.402	.493
Children <18	31.3	34.3	28.8	23.5	29.1	3.686	.297
Computer use							
Use computer at work?	16.0	20.0	22.1	18.3	19.2	3.230	.358
Time spent on web	2.1	4.5	3.1	3.5	3.3	2.224	.527
Use computer at home?	2.5	2.9	1.1	1.6	2.0	2.498	.476
TV/movie viewing							
Hire movie DVDs?	6.3	8.6	6.5	6.6	7.0	1.258	.739
Time spent watching TV.	3.4	6.1	2.3	3.9	3.9	5.220	.156
Record TV movies?	8.4	9.0	12.6	9.7	10.0	2.910	.406
TV prog. recording freq.	1.3	1.6	1.5	2.3	1.7	.941	.815
Reality TV							
Time spent watching RealityTV	11.0	13.5	17.2	12.1	13.5	4.789	.188
Purchased a Reality TV product?	6.3	7.3	6.5	5.4	6.4	.762	.859
Discussed Reality TV products?	6.3	7.3	6.1	5.8	6.4	.543	.909
Visited a Reality TV website?	6.3	7.3	6.1	5.4	6.3	.789	.852

Note. The values reported in the Table are the % item missing for each question. For all items, d.f. = 3

A notable result is that item nonresponse did not differ significantly across treatment groups for any of the 18 single item questions. Although T2 (chocolate sent with the first mail-out) consistently produced higher item nonresponse across questions, suggesting a systematic effect, the differences between treatment groups are not statistically significant, so could be due to sampling error.

The item nonresponse for the multi-item questions, and for the 63 items overall, are reported in Table 6. As with the single item questions reported in Table 5, the item omission tended to be higher for the T2, but the differences between treatment groups were all non-significant at the .05 level. It would therefore seem that the use of an incentive and replacement questionnaires did not have a significant effect on item-nonresponse, and certainly did not reduce nonresponse, contrary to the findings reported by Wotruba (1966), and James and Bolstein (1990).

With the exception of four questions, item nonresponse rates for the single item questions, including demographics, generally range between 4% and 8%. For the four questions for which nonresponse was very high, there is good reason to believe that this result relates to the form of the question, and that respondents simply didn't bother to answer questions that they felt didn't apply to them (e.g., number of children at home; use of computer at work; time spent watching Reality TV; reasons for watching Reality TV). The key point is that even these questions demonstrate the absence of significant differences in item nonresponse across treatment groups.

Table 6. Mean Item Nonresponse for Questions with Item Lists

	T1	T2	T3	T4	Total	F	p
	Control	Choc W1	Choc+Q W2	Choc-Q W2			
	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)	Mean (S.E.)		
N	237	245	262	257	1001		
Reason watch TV (18 items)	1.760 (.333)	2.049 (.349)	1.637 (.303)	1.370 (.276)	1.698 (.158)	.801	.493
Beliefs re RealityTV (8 items)	.557 (.128)	.722 (.143)	.500 (.117)	.502 (.117)	.568 (.063)	.689	.559
Response to RealityTV (9 items)	.441 (.115)	.425 (.119)	.439 (.117)	.525 (.123)	.449 (.059)	.210	.615
TV viewing (10 items)	.080 (.043)	.118 (.043)	.191 (.061)	.082 (.029)	.119 (.023)	1.309	.270
Total set (63 items)	3.937 (.596)	4.841 (.665)	4.111 (.556)	3.798 (.564)	4.168 (.297)	.601	.672

Note d.f. = 3, 997

S.E. = standard error

It is also of note that the overall control (T1), which represents normal practice (questionnaires with first and third mail-out, no incentive) produced the lowest item nonresponse rates by far in each wave, and overall. This suggests that the procedures involving the incentive may speed up responses, but at some cost to data quality, as represented by item nonresponse. Although the differences in item nonresponse rates for the four treatment groups were not statistically significant for any of the waves, the results raise the possibility that the incentive and the replacement questionnaire may, in fact, decrease completion rates. This finding contradicts the findings of Wotruba (1966), McDaniel and Rao (1980) and James and Bolstein (1990).

Conclusion

The results of this study demonstrate that using a chocolate incentive had no statistically significant effect on sample composition (age or gender) or item non-response. However, the slight increase in item nonresponse associated with the use of the incentive (although statistically non-significant) suggests that it would be prudent to monitor this effect in surveys. In this study, the magnitude of this increase was small for most items, and would not have influenced the conclusions drawn from the analyses. Given the positive effect on increasing speed of response and the minimal negative effects on sample bias and item non-response, chocolate appears to be an acceptable incentive for mail surveys of the general public. However, since the study did not examine the effects of the incentive on responses to individual questions, or the potential for confounding effects if the incentive is used in surveys containing questions linked in some way to confectionary (e.g., diet, eating habits etc.), some caution is required until this issue has been addressed.

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