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

Mike Brennan, Massey University, m.brennan@massey.ac.nz
Judith Holdershaw, Massey University, j.holdershaw@massey.ac.nz
Terry Macpherson, Massey University, t.a.macpherson@massey.ac.nz

Abstract

This paper examines the effect on sample composition and item non-response of a chocolate incentive sent with either the first or second mail-out in a mail survey. The survey involved a sample of 1800 New Zealand residents aged 18 years or older, randomly selected from the 2006 Electoral Roll. The response rates after two reminders ranged from 36.7% to 45.9% for six treatment groups. The incentive generated a significantly higher response to the first mail-out only. The differences in sample composition and item non-response rates between the control and treatment groups were not statistically significant for any of the treatments, suggesting that a chocolate incentive does not bias either sample composition or responses.

Keywords: Incentive, mail survey

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

Introduction

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). As a consequence, so considerable effort is spent searching for procedures that will effectively boost survey participation. In mail surveys, the most effective ways to lift response rates is to send multiple mail-outs, and to use an incentive, particularly a pre-paid cash incentive (Church, 1993; Dillman, 1978, 1991, 2000; Duncan, 1979; Fox, Crask, and Kim, 1988; Harvey, 1987; Jobber, Saunders and Mitchell, 2004). However, a researcher needs to ensure that the methods employed to improve response rates do not themselves introduce response bias.

While this concern has been raised by a number of commentators (e.g., Furse and Stewart, 1982; Hansen, 1980; Nederhof, 1983; Robertson and Bellenger, 1978; Ryu, Couper and Marans, 2006; Singer 2002; Whitmore, 1976; Wotruba, 1966), there appears to be little evidence that incentives do in fact introduce response bias. Several commentators have noted that an incentive does not necessarily introduce bias into response distributions, even if demographic variables are affected (e.g., Finn, Wang and Lamb 1983; Hansen, 1980; Mizes, Fleece and Roos, 1984; Nederhof, 1983; Ryu et al., 2006). There is also some evidence that incentives may help improve data quality. 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.

The question of whether a non-monetary incentive can produce similar effects has received little or no attention to date, yet there are circumstances when using a cash incentive is inappropriate, or illegal (as in New Zealand), so a non-cash incentive must be used. However, given the implications for data quality, these previous findings suggest that any study using an incentive should determine whether the incentive influences sample composition, item non-response rates and response distributions, and not just focus on response rate.

Unfortunately, most non-cash incentives are ineffective (Arzheimer and Klein, 1999; Gajraj, Faria and Dickinson, 1990). However, one that does show promise is chocolate (Brennan and Charbonneau, 2009; Brennan and Xu, 2009; Gendall, Leong, and Healey, 2005). The particular chocolate incentive used in these studies has the advantage of being small and flat, so is easily attached to a letter and posted in a normal envelope, is low cost, and has wide appeal. It would also appear to be an effective way to boost responses. This paper examines the effect of a chocolate incentive on sample composition, item non-response rates and response distributions,

Method

A mail survey of 1800 members of the general public was conducted between June 25 and August 31, 2007. Six quota samples of 300 people each, balanced in terms of gender and age-group (5 categories), were randomly selected from the 2006 Electoral Roll of a major South Island city in New Zealand. Members of each of these six samples were then systematically allocated to one of six mail survey treatment groups, balanced in terms of gender and age-group. The topic of the survey was "New Zealanders attitudes towards new products" and contained questions about five "new" products or services. The questionnaire was 12 A4 pages long. The incentive used in some mail treatments was a small, flat (44mm x 45mm x 6mm) foil-wrapped milk chocolate (Whittaker's), which was attached to the cover letter with double sided adhesive tape. After removing GNA's and ineligibles, the final sample size was 1646.

Results

Response rates

For Wave 1, a comparison of the average response rate for the controls (T1,T2,T3,T4) with the average response rate for the incentives (T5, T6) indicates that the incentive produced a significantly higher response rate than the control (control: 24.5%, incentive: 29.7%, z = 2.281, p = .023**).** The chocolate incentive is therefore an effective way to boost responses to the first mail-out. The question is whether or not the incentive introduced response bias.

Table 1. Effect of Incentive and Replacement Questionnaire on Response Rates

	Wave 1		Wave 2		Wave 1+2		Wave 3		Wave 2+3		Wave 1+2+3	
	N	%	N	%	N	%	N	%	N	%	N	%
T1: QLQ	269	22.3	209	12.0	269	31.6	184	13.6	209	23.9	269	40.9
T2: QQL	270	23.0	208	13.9	270	33.7	179	4.5	208	17.8	270	36.7
T3: Q(L+C)Q	274	24.5	207	11.6	274	33.2	183	14.2	207	24.2	274	42.7
T4: Q(Q+C)L	274	28.1	197	15.2	274	39.1	167	5.4	197	19.8	274	42.3
T1+T2+T3+T4	1087	**24.5**										
T5: (Q+C)LQ	281	31.3	193	10.9	281	38.8	172	11.6	193	21.2	281	45.9
T6: (Q+C)QL	278	28.1	200	14.5	278	38.5	171	7.6	200	21.0	278	43.2
T5+T6	559	**29.7**										
Mean	1646	26.2	1214	13.0	1646	35.9	1056	9.6	1214	21.3	1646	42.0

Note: The table reports the response rates to a particular mail-out or set of mail-outs.
QLQ means Questionnaire in mail-out 1, Letter only in mail-out 2 and Questionnaire in mail-out 3.
(Q+C) means Questionnaire + Chocolate ; (L+C) means Letter + Chocolate

In Wave 2, sending a chocolate incentive with a reminder letter was no more effective than sending a reminder letter without an incentive (T3 : T1, 11.6% c.f. 12.0%, z =.116, p = 0.908), sending a replacement questionnaire with a chocolate incentive was no more effective than sending a replacement questionnaire without an incentive (T4 : T2, 15.2% c.f. 13.90%,

z =.366, p = 0.714). The chocolate incentive is therefore not an effective way to boost responses to a follow-up mail-out.

Effect of incentive on sample characteristics

A comparison of the responses for the three main treatments (No incentive (T1+T2); incentive sent with first mail-out (T5 +T6); and incentive sent with first reminder (T1+T2), was made for two types of questions: demographic (gender, age, ethnicity, employment, formal education, formal qualifications, personal and household income); and behavioural (subscriptions to various digital TV services and broadband internet services; web access; and ownership of a cell phone). No statistically significant differences between the two sets of incentive treatment groups were found for any of the demographics (Table available from author) or behavioural variables (see Table 2), so one may conclude that the chocolate incentive does not introduce sampling or response bias.

Table 2. Effect of Incentive on Sample Characteristics: Behavioural Variables

	T1+2 No incentive	T3+4 Incentive in Wave 2	T5+6 Incentive in Wave 1			
	%	**%**	**%**	**X^2**	**d.f.**	**p**
Subscribe to Sky UHF	14.3	14.0	10.2	1.699	2	.428
Subscribe to Sky Digital	43.0	40.1	41.2	0.353	2	.838
Subscribe to MY SKY	2.8	2.0	1.1	1.208	2	.547
Heard of MY SKY	54.0	50.4	57.3	2.201	2	.333
Use Freeview	1.5	1.8	2.0	0.212	2	.899
Heard of Freeview	73.0	73.2	71.3	0.259	2	.878
Have a powersave meter	1.5	4.8	4.5	4.138	2	.126
Have access to Web /home	81.6	78.8	75.5	2.511	2	.300
Have access to Web /work	67.7	65.7	68.8	0.481	2	.786
Subscribe to broadband	49.3	47.2	46.7	0.322	2	.851
Own a cellphone	87.3	86.9	89.3	0.773	2	.679
				F	**d.f.**	**p**
Hours/week spent on personal email	2.6	2.0	2.5	1.081	2, 547	.340
Hours/week spent on personal Web use	4.4	3.9	4.5	.421	2, 589	.656
Amount spent Internet shopping past 6 mths ($)	857.7	1060.1	821.4	1.355	2, 519	.259
Hours/week watching TV	19.2	21.3	21.3	2.236	2, 499	.108

Effect of incentive on item non-response

It is also important to ensure that the use of an incentive does not bias the survey responses, which might happen if the incentive affects item non-response. If item non-response varies across treatment groups for demographic or psychological variables, then it will be difficult to determine whether the incentive has induced response bias. Thus it is also important to consider item non-response as well as survey non-response. The chocolate incentive had no

statistically significant effect on item non-response for the demographic (see Table 3), behavioural (see Table 4), or psychological variables (available from author), except for one behavioural variable (Hours/wk on personal Web use).

Table 3. Item Non-response: Demographic Variables and Willingness to be Re-interviewed

	T1+T2 No incentive N=209 %	T3+T4 Incentive in Wave 2 N=233 %	T5+T6 Incentive in Wave 1 N=249 %	X^2	df	p
Gender	2.4	2.6	2.8	0.080	2	.961
Age	4.3	3.4	3.2	0.424	2	.809
Ethnicity	3.8	2.6	4.0	0.858	2	.651
Employment	3.3	3.0	4.0	0.381	2	.826
Formal Education	3.3	3.0	4.0	0.381	2	.826
Formal Qualification	3.3	3.0	4.8	1.236	2	.538
Personal Income	7.2	5.2	7.2	1.072	2	.585
Household income	9.6	5.2	6.4	3.492	2	.174
Willingness to be re-interviewed	4.8	3.0	3.6	0.988	2	.610

Table 4. Item Non-response: Behavioural Variables

	T1+2 No incentive **%**	T3+4 Incentive in Wave 2 **%**	T5+6 Incentive in Wave 1 **%**	**X^2**	**d.f.**	**p**
Subscribe to Sky UHF	25.8	29.6	24.5	1.708	2	.426
Subscribe to Sky Digital	10.5	9.0	8.8	.445	2	.800
Subscribe to MY SKY	32.1	34.3	28.9	1.651	2	.438
Heard of MY SKY	2.9	3.9	3.6	.346	2	.841
Use Freeview	1.9	3.9	1.6	2.926	2	.232
Heard of Freeview	1.9	3.9	1.6	2.926	2	.232
Have a powersave meter	1.9	2.6	2.4	.228	2	.892
Have access to Web – home	3.8	3.0	3.2	.248	2	.883
Have access to Web –work	20.1	15.0	16.1	3.779	2	.151
Subscribe to broadband	2.9	1.7	2.8	.811	2	.667
Own a cellphone	2.4	1.7	2.0	.254	2	.881
Hours/wk spend on pers.email	22.0	21.5	18.1	1.325	2	.516
Hours/wk on pers. Web use	19.1	13.7	10.8	6.471	2	**.039**
Amount spent on Internet shopping past 6 mths	24.9	22.3	26.1	.963	2	.618
Hrs watching TV per week	29.2	25.3	27.3	.853	2	.653

As these variables are not independent in the sense that the data for each variable comes from the same respondents in each group, a tendency for a respondent to omit items may affect several variables. Even so, given the general lack of strong evidence of an effect, it seems likely this one significant result was due to random effects.

Discussion

While the intended effect of using an incentive is to improve response speed and response rate, an incentive can also have unintended consequences. For example, there is some evidence that some incentives may boost responses from members of the sample for whom the topic has little salience (Baumgartner and Rathbun, 1997; Shettle and Mooney, 1999), and of people in lower socio-economic categories (Berlin et al., 1992; Martinez-Ebers, 1997; Groves, Singer and Corning 1999) thus helping to address the issue of under-representation of these groups. However, there was no evidence to support this effect in the present survey, with no significant differences between treatment groups for any of the eight demographic, fifteen behavioural or eight psychological measures examined.

It has also been suggested that incentives might also help reduce item non-response (McDaniel and Rao, 1980; James and Bolstein, 1990; Baumgartner, et al., 1998; Shettle and Mooney, 1999; Singer, Van Hoewyk and Maher, 2000). However, the results of the present study suggest that the chocolate had little or no effect on item omission and so do not support this claim. On the other hand, the chocolate did not increase item non-response either. By the end of the survey, there were no statistically significant differences between the three pairs of treatment groups on any of the demographic, psychological, or behavioural variables (except one), and no differences in item non-response across these variables (except one). It would seem that that the use of chocolate as an incentive does not make any significant contribution to either sample bias, item non-response bias or response bias. These results are consistent with the conclusions drawn by Singer (2002), although her review dealt mainly with the effects of pre-paid monetary incentives.

In conclusion, the present study provides further evidence that using chocolate as an incentive with the first mail-out is an effective means of speeding up responses to that wave in a mail survey of the general public, confirming the findings of previous studies (Brennan and Charbonneau, 2009; Brennan and Xu, 2009; Gendall, Leong, and Healey, 2005). It would also appear that using a chocolate incentive does not introduce either sample or response bias or affect item non-response. However, it should be noted that if at least two mail-outs are used, the effect of the chocolate incentive on the overall response rate is negligible. This reinforces the point made many times before (e.g., Brennan and Charbonneau, 2009; Dillman, 1978, 2000), that the most effective way to improve mail survey response rates is to use follow-up mail-outs to non-responders. However, if one wants a quick response to the first mail-out, or is only able to send a single mail-out, using a chocolate incentive is an option worth considering.

References

Arzheimer, K., Klein, M. 1999. The effect of material incentives on return rate, panel attrition and sample composition of a mail panel survey. International Journal of Public Opinion Research 11, 368-377.

Baumgartner, R., Rathbun, P., Boyle, K., Welsh, M., Laughland, D., 1998. The effect of prepaid monetary incentives on mail survey response rates and data quality. Paper presented at the Annual Conference of the American Association of Public Opinion Research, St Louis, Missouri.

Baumgartner, R., Rathbun, P., 1997. Prepaid monetary incentives and mail survey response rates. Paper presented at the Annual Conference of the American Association of Public Opinion Research, Norfolk, Virginia.

Beatty, P., Hermann, D., 2002. To answer or not to answer: Decision processes related to survey item nonresponse. In Groves, R.M, Dillman, D.A., Eltinge, J.E., Little, R.J.A. (Eds.), Survey Nonresponse. New York: Wiley, pp.71-86.

Bednall, D.H.B., Shaw, M., 2003. Changing response rates in Australian market research. Australian Journal of Market Research 11(3), 31-41.

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

Brennan, M., Charbonneau, J., 2009. Improving mail survey response rates using chocolate and replacement questionnaires. Public Opinion Quarterly 73 (2), 368-378.

Brennan, M., Xu X., 2009. The effect of questionnaire colour, a chocolate incentive and a replacement return envelope on mail survey response rates. Australasian Journal of Social and Market Research 17 (1), June, 29-35.

Church, A.H., 1993. Estimating the effect of incentives on mail survey response rates: A meta-Analysis. Public Opinion Quarterly 57, 62-79.

CMOR., 2003. Respondent Cooperation and Industry Image Study. The Council for Marketing and Opinion Research, Port Jefferson, New York. Available online at http://www.cmor.org/resp_coop_studies.cfm.

Curtin, R., Presser, S., Singer, E., 2005. Changes in telephone survey nonresponse over the past quarter century. Public Opinion Quarterly 69, 87-98.

de Leeuw, E., de Heer, W. 2002. Trends in household survey nonresponse: A longitudinal and international comparison. In Groves, R.M, Dillman, D.A., Eltinge, J.E., Little, R.J.A. (Eds.), Survey Nonresponse. New York: Wiley, pp.41-54.

de Leeuw, E., 2001. Reducing missing data in surveys: An overview of methods. Quality and Quantity 35, 147-60.

Dillman, D.A., 1978. Mail and Telephone Surveys: The Total Design Method. New York: John Wiley & Sons.

Dillman, D.A., 1991. The design and administration of mail surveys. Annual Review of Sociology 17, 225-49.

Dillman, D.A., 2000. Mail and Internet Surveys: The Tailored Design Method. New York: John Wiley & Sons.

Duncan, W. J., 1979. Mail questionnaires in survey research: A review of response inducement techniques. Journal of Management 5 (Winter), 39-55.

Finn, D.W., Wang, C-K., Lamb, C.W., 1983. An examination of the effects of sample composition bias in a mail survey. Journal of the Market Research Society 25 (4), 331-338.

Fox, R.J., Crask, M.R., Kim. J., 1988. Mail survey response rate: A meta-analysis of selected techniques for improving response. Public Opinion Quarterly 52, 467-91.

Furse, D.D., Stewart, D.W., 1982. Monetary incentives versus promised contribution to charity: new evidence on mail survey response. Journal of Marketing Research XIX (August), 375-380.

Gajraj, A.M., Faria, A.J., Dickinson, J.R., 1990. A comparison of the effect of promised and provided lotteries, monetary and gift incentives on mail survey response rates, speed and cost. Journal of the Market Research Society **32** (1), 141-162.

Gendall, P, Leong, M. & Healey, B., 2005. The effect of pre-paid non-monetary incentives in mail surveys. In proceedings of ANZMAC 2005 Conference, December 5-7, Freemantle, Australia.

Groves, R.M., Singer, E., Corning, A.D., 1999. Leverage-saliency theory of survey participation: Description and an illustration. Public Opinion Quarterly 64, 299-268.

Hansen, R.A., 1980. A self-perception interpretation of the effect of monetary and nonmonetary incentives on mail survey respondent behaviour. Journal of Marketing Research XVII, 77-83.

Harvey, L., 1987. Factors affecting response rates to mailed questionnaires: A comprehensive literature review. Journal of the Market Research Society 29 (3), 341-53.

James, J.M., Bolstein, R., 1990. The effect of monetary incentives and follow-up mailings on the response rate and response quality in mail surveys. Public opinion Quarterly 54, 346-361.

Jobber, D., Saunders, J., Mitchell. V-W., 2004. Pre-paid monetary incentive effects on mail survey response. Journal of Business Research 57, 347-50.

Martinez-Ebers, V., 1997. Using monetary incentives with hard-to-reach populations in panel surveys. International Journal of Public Opinion Research 9, 77-86.

McDaniel, S.W., Rao C.P., 1980. The effect of monetary inducement on mailed questionnaire response quality. Journal of Marketing Research XVII (May), 265-268.

Mizes, J. S., Fleece, E. L., Roos, C. 1984. Incentives for increasing return rates: Magnitude levels, return bias, amid format. Public Opinion Quarterly 48, 794-800.

Nederhof, A.J., 1983. The effects of material incentives in mail surveys: Two studies. Public Opinion Quarterly 47, 103-11.

Robertson, D. H., Bellenger, D. N., 1978. A new method of increasing mail survey responses: Contributions to charity. Journal of Marketing Research 15, 632-633.

Ryu, E., Couper, M.P., Marans, R.W., 2006. Survey incentives: cash vs in-kind; face-to-face vs mail; response rate vs nonresponse error. International Journal of Public Opinion Research 18 (1). 89-106.

Shettle, C., Mooney, G., 1999. Monetary incentives in government surveys. Journal of Official Statistics 15, 231-250.

Singer, E., Van Hoewyk, J., Maher, M.P., 2000. Experiments with incentives in telephone surveys. Public Opinion Quarterly 47, 68-83.

Singer, E., 2002. Chapter 11. The Use of Incentives to Reduce Nonresponse in Household Surveys. In Groves, R.M,, Dillman, D.A., Eltinge, J.L., Little, R.J.A. (eds.) Survey Nonresponse. NY: John Wiley & Sons, pp.163-177.

Whitmore, W.J., 1976. Mail survey premiums and response bias. Journal of Marketing Research XII (February), 46-50.

Wotruba, T. R., 1966. Monetary inducements and mail survey response. Journal of Marketing Research 3, 393-400.