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Maximising response in an address-based push-to-web survey: adjusting the communication and incentive strategies

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Non-Technical Summary

Push-to-web designs, where an offline mode is used to invite sample members to complete a web questionnaire, are increasingly used. This design allows the use of a sample frame to select a probability sample while benefiting from the lower costs of the web mode. One of the challenges of such designs is to maximise web response in order to reduce the risk of non-response bias, i.e., the differences between respondents and non-respondents, and reduce additional fieldwork efforts that increase costs.

Offering incentives or sending additional communications might help maximise the response rate and prompt a faster response, which could translate into lower survey costs. This paper presents the results of two intertwined experiments. The first gauges the effect of adding an advanced letter, an additional reminder or both to the standard contact strategy that comprises an invitation and two reminder letters. The second experiment tests the use of a £30 conditional incentive versus a £20 conditional incentive plus a £10 early bird incentive (EBI) for those who complete the web questionnaire within the first two weeks of fieldwork.

The experiment was embedded in the wave 14 refreshment sample of the Innovation Panel of *Understanding Society*, where a sample of 6,047 addresses was sent a series of letters asking them to complete the household and individual questionnaires online. The results of these experiments were essential to inform the design of the wave 14 boost sample, a refreshment of the UK general population for UKHLS main sample, which was partly recruited using a push-to-web approach.

The analysis shows the superiority of the advanced letter in increasing the household response rate compared to a third reminder letter, and that the £20 conditional incentive plus a £10 EBI is more cost-effective than offering £30. Moreover, the analysis shows that using a holistic design that combines an advance letter that announces the EBI is the most cost-effective alternative.

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Abstract: Push-to-web designs, where an offline mode is used to invite sample members to complete a web questionnaire, are increasingly used. This paper presents the results of two intertwined experiments in the context of a push-to-web design. The first experiment gauges the effect of adding an advanced letter, an additional reminder or both to the contact. The second tests the use of a £30 conditional incentive versus a £20 conditional incentive plus a £10 early bird incentive (EBI). The analysis shows the superiority of the advanced letter in increasing the household response rate compared to a third reminder letter, as well as the cost-effectiveness of using the early bird incentive. The results suggest that using advance letters in combination with the early bird incentive is the best strategy to minimise costs whilst increasing response rates.

Keywords: push-to-web, mixed-mode, non-response, incentives, reminders.

JEL classification: C81, C83.

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1. Introduction

The use of push-to-web survey designs, i.e., using an offline mode, mostly mail, to obtain responses to a questionnaire over the internet (Dillman, 2017), has increased in the last few years. A push-to-web design combines the benefits of using a web mode with the option of selecting a probability sample from population registers or lists of addresses (Lynn, 2020). However, implementing this type of design presents challenges – the main one being the achievement of an optimal balance between data quality and survey costs. This paper examines the trade-offs between quality and costs of two response maximisation interventions related to the sequence of mailings and the use of an early bird incentive (EBI) embedded in an address-based push-to-web survey. We also discuss how a theory-driven design can help leverage the distinctive features of the letters and incentives to improve the quality-cost trade-off.

These experiments aimed to determine the optimal number and sequence of letters, as well as the most effective use of a fixed budget for survey incentives, to enhance response rates while minimising survey costs. The experiments were embedded in a refreshment sample from the Innovation Panel of *Understanding Society*, a longitudinal household survey that represents the household population of Great Britain (GB). An early analysis of these and other experiments included in the Innovation Panel refreshment sample can be found in Williams et al. (2022)[1]. The primary objective of these experiments was to guide the design of a refreshment sample for the main study of *Understanding Society*, to be implemented at wave 14 (2022/23), which employed a push-to-web methodology. The enhanced communication experiment tested the effect of additional letters to the standard sequence of an invite and two reminders. The experimental design had three conditions, each adding: 1) an advance letter, 2) a third reminder letter, and 3) both an advance letter and a third reminder. The incentive experiment compared using a £30 conditional incentive for individual respondents to a £20 conditional incentive combined with an extra £10 EBI offered to those completing the survey in the first two weeks of the fieldwork. The

[1] The working paper *Understanding Society Wave 14 Boost Trial: Experiments with methods of recruiting a probability online boost sample* includes an analysis of different response maximisation strategies that were tested in wave 14 IP refreshment sample (n = 6,047) and the wave 14 pilot of the main study (n = 11,257). Note that the analysis presented in this paper is exclusively based on the data from the IP refreshment sample.

analysis of the experiments examines response rates – after two weeks and at the end of the fieldwork, survey costs and the sample profile of the sample of respondents.

The results show that using the advanced letter and the third reminder achieved the highest number of responding households compared to adding just the third reminder. However, there was no difference between the advance letter and the combination of the advance letter and the extra reminder, suggesting that the prenotification might be driving the effect. Regarding the incentives, although the response rates were similar at the end of the fieldwork, the group receiving the early bird incentive exhibited a higher response rate after two weeks of fieldwork. This early response resulted in reduced survey costs for those who received the combination of the £20 conditional incentive and the £10 EBI. Also, the combination of the advance letter and the early bird incentive increased the response rate after two weeks of fieldwork and minimised costs compared to the other combinations of communications and incentives.

2. Background

In the last few years, particularly after the COVID-19 pandemic, we have seen an increasing number of general population surveys employing a push-to-web methodology, which combines mail to invite sample members with a web survey as the primary mode of data collection. Some examples are cross-sectional surveys such as the European Social Survey (Clery et al., 2021), 'Food and You 2' (Smith et al., 2021), Community Life Survey (Kantar Public, 2017), or Active Lives survey (Ipsos, 2024), and longitudinal studies such as the Innovation Panel of *Understanding Society* (Lynn, 2020). Compared to other mixed-mode designs, using the web as the primary mode for data collection can lower survey costs. However, the research before COVID-19 has shown that probability-based web surveys have a lower response rate compared to other modes (Daikeler et al., 2020), whilst some recent experiments in the United Kingdom suggest the superiority of using web instead of CAPI as the main mode in a push-to-web design (Williams, 2025). In both instances, the volume of non-response affects the accuracy of survey estimates and can bias them if respondents and non-respondents differ with regard to the characteristic being estimated (Groves et al., 2002). In this context, response maximisation strategies to foster contact and cooperation, such as enhanced communications and incentives, play a key role in increasing participation in push-to-web surveys (Bosch et al., 2024).

Enhanced contact strategy: advance letter and additional reminder

Advance letters could enhance participation in a push-to-web survey. In light of social exchange theory, an advance letter introduces the survey and provides essential information about the project, which can help establish trust that the study is legitimate and not an unsolicited request (Dillman et al., 2014, p. 417). Advance letters have been shown to increase response rates in mail (Edwards et al., 2023) and telephone surveys (Leeuw et al., 2007). In web surveys, an advance letter has been shown to increase response rates in surveys of the general population (e.g., Rao et al., 2010) and some surveys of population subgroups (e.g., Kaplowitz et al., 2004). However, a recent meta-analysis found that prenotifications were more effective in raising response rates in other modes compared to the web (Daikeler et al., 2020).

Also, additional reminders can increase the likelihood that the survey request is received and attended, prompting the feeling that the survey request is important and requires attention

(Dillman et al., 2014, pp. 417–419). Regardless of their characteristics, reminders have been shown to increase response rates (Porter & Whitcomb, 2007). However, most studies show that the impact of reminders on response rates decreases with each additional attempt (Bosch, Calderwood, and Gaia 2024). Therefore, hypotheses 1.1 and 1.2 predict a greater effect of the advance letter compared to a third reminder letter, and the superiority of the combination of both interventions.

H1.1: *Enhancing the contact strategy with an advance letter will outweigh the impact on the final response rate of a third reminder letter.*

H1.2: *Combining an advance letter and a third reminder will result in a higher final response rate than adding the advance or third reminder separately.*

The additional communications can increase response rates and, as a result, reduce the cost-per-response. We anticipate that the larger effect of the advance letter on response rates will make this intervention the most cost-effective compared to the third reminder or the combination of the advance letter and the third reminder.

H1.3: *The cost-per-response will be lower for the groups receiving the advance letter but not the third reminder.*

It is unclear what effect the advance letter or the additional reminder might have on sample composition. For example, a study focused on the subpopulation of students in Belgium found no difference in sample composition when sending an additional reminder to sample members (Van Mol, 2017). In line with this weak evidence, we do not anticipate sample composition to vary across experimental groups.

H1.4: *The sample profile of respondents will not vary across the different communication sequences.*

Early-bird and conditional incentives

Survey incentives are effective in increasing response rates in surveys (e.g., Mercer et al., 2015; Singer, 2011; Toepoel, 2012). Although unconditional incentives have generally demonstrated a greater effect than conditional ones on response rates, an experiment comparing these two types

of incentives for previous wave non-respondents in the *Understanding Society* Innovation Panel (wave 7) revealed that both groups had similar response rates. However, the use of conditional incentives significantly reduced survey costs (Al Baghal, 2015). Economic exchange theory (Biner & Kidd, 1994) can explain the positive effect of conditional incentives on response. The theory states that a sample member is more likely to participate if they think that the incentive compensates for the time and effort of completing the survey.

More recently, there has been an increasing use of conditional incentives that encourage response within a defined time period, also known as early bird incentives. EBIs are potential cost-effective interventions since the savings in field costs due to the earlier response may outweigh the cost of the EBI (Lynn et al., 1998). The regret avoidance decision-making theory can explain the effectiveness of EBIs prompting for an early response (Zeelenberg & Pieters, 2007), as sample members are reluctant to regret missing the opportunity to secure the higher value incentive.

Several experiments have evaluated the effectiveness of EBI to prompt an early response. A quasi-experiment in wave 8 of the main study of UKHLS found an increase in early web response when a £10 EBI was offered (Carpenter & Burton, 2018). Another experiment tested using a €20 and €50 EBI to recruit a refreshment sample in the German Internet Panel (GIP). The results show that the EBI increased the registration questionnaire response rate for those receiving it, in contrast to those who only received a €5 cash unconditional incentive. No difference was found between the groups offered €20 and €50 (Friedel et al., 2022). An experiment in the Food and You survey compared a conditional £10 shopping voucher to a £15 EBI with an 8-day deadline (Smith et al., 2021). After the deadline, sample members who were offered the EBI could obtain either a £10 or £5 voucher, conditional on response. The group being offered the £15 EBI and a £10 incentive after the eight-day period resulted in a higher response rate after eight days and at the end of the fieldwork. The group being offered the £15 EBI and a £5 conditional voucher had a higher response rate after eight days compared to the control group, but exhibited the lowest response rate at the end of the fieldwork period. Additionally, an experiment embedded in the Participation Survey, a survey targeting the adult population of Great Britain, found that raising the £10 conditional incentive to £15, if the sample member responded within the first two weeks, slightly improved response rates (Williams,

2024). Therefore, we expect that the group being offered the early bird incentive will present a higher response rate at the end of the period when the EBI was active (i.e., two weeks).

H2.1: *The groups offered a £10 EBI with a 2-week deadline, plus a £20 conditional incentive, will have a higher response rate after two weeks of fieldwork than those offered a £30 conditional incentive.*

One aspect that has been discussed is whether withdrawing the early bird incentive might have a detrimental effect on the final response rates. However, several studies did not find any evidence of this negative effect (Calderwood et al., 2023; Smith et al., 2021). We, therefore, expect the response rates to be similar for the two experimental groups.

H2.2: *The response rate at the end of the fieldwork will be the same regardless of the experimental group.*

The earlier response expected for the EBI group might result in a lower cost-per-response if we consider the costs of the incentives and the communications.

H2.3: *The cost-per-response of the incentive strategy will be lower for the experimental group being offered a £10 EBI plus a £20 conditional incentive compared to the £30 conditional incentive.*

Finally, it may be the case that the combination of the £10 EBI and the £20 conditional incentive was more effective than the £30 conditional incentive across some subgroups, thereby altering the profile of the sample of respondents. However, given that both groups were offered conditional incentives, with or without an EBI component, with the same maximum value (£30), we do not expect an impact on sample composition.

H2.4: *The sample profile of respondents will be the same for both groups: those offered the £10 EBI with a 2-week deadline, plus a £20 conditional incentive, and those offered the £30 conditional incentive.*

Holistic design

The idea of a holistic design involves coordinating all features of a survey in order to maximise trust, increase benefits and reduce costs (of participation) as a pathway to increase participation

rates (Dillman et al., 2014, pp. 42–44). Thus, instead of considering enhanced communications and incentive experiments separately, we examine the possible interaction between them. We have hypothesised that combining the conditional incentive with an EBI component results in a similar response rate to offering a conditional incentive but reduces survey costs. In that case, the advance letter can be used to increase the likelihood that sample members will learn about the two-week deadline. This combination of the EBI and the advance letter may lead to a higher proportion of sample members completing the survey earlier, which will minimise the costs of the interventions.

H3.1: *The response rates after two weeks of fieldwork will be higher for sample members receiving both the advance letter and the EBI compared to those receiving either of these interventions.*

H3.2: *The advance letter and the EBI will minimise the cost-per-response at the end of the fieldwork, compared to the other experimental groups.*

3. Data and methods

Understanding Society Innovation Panel refreshment sample

Understanding Society Innovation Panel is a household probability sample that covers the population of residents in Great Britain. This is a longitudinal household study in which individuals who participated in the initial wave or any of the refreshments have been asked to participate in annual waves alongside other household members. The main purpose of the Innovation Panel is to develop and test methodological innovations. The IP study began in 2008, when a clustered and stratified sample of 2,760 addresses was selected. Since then, the sample has been refreshed at waves 4, 7, 10, 11 and 14.

The present experiments were carried out at wave 14, during the recruitment of the wave 14 refreshment sample. This refreshment consisted of 6,047 addresses selected from 32 clusters (postcode sectors) and used a push-to-web methodology to collect the data. Residents at the sampled addresses received an invitation letter and two reminders to complete the questionnaire online. The fieldwork for the refreshment sample took place over five weeks, from September 3, 2021, to October 3, 2021.

Experimental design

The enhanced communication sequence experiment randomly allocated addresses to three experimental groups (see Table 1). All addresses received the standard communication sequence, which included an invitation and two reminder letters. In addition to this, the addresses allocated to the first group received an advance letter, those allocated to the second group received an extra (third) reminder letter, and those allocated to the third group received both the advance letter and the third reminder letter.

The early bird incentive experiment split the sample of addresses into two random groups (see Table 1). Individuals aged 16 or over in households allocated to the early bird incentive group were offered a £20 incentive for completing the individual questionnaire and a £10 boost if the sample member participated in the first two weeks of fieldwork – a total of £30. The conditional incentive group was offered a £30 incentive upon completing the individual questionnaire before

the end of the fieldwork. The vouchers were announced in the advance and invitation letters. Respondents were sent a voucher that could be used in the main high street retailers in the UK.

Table 1. **Experimental design: enhanced communications sequence and early bird incentive experiments**

	Incentive		
Communication	**£30 Cond.**	**£20 Cond. + £10 EBI**	**Total**
Advance letter	1,008	1,007	2,015
3rd reminder	1,008	1,008	2,016
Advance letter & 3rd reminder	1,008	1,008	2,016
Total	3,024	3,023	6,047

Analysis

The analysis of the experiments focused on three main outcomes: response rates, cost-per-response and sample profile. The following paragraphs provide details about how each of these analyses was conducted.

We calculated four response rates, three at the household level, and one at the individual level. At the household level, we used three different numerators: 1) any information corresponds to the addresses where any information, i.e., household grid, household questionnaire, or individual interview, was obtained, 2) household response corresponds to household where at least the household questionnaire and one adult individual interview were completed, 3) the full-household response rate refers to households where the household questionnaire and all individual interviews were completed. The denominator for this response rate is the total number of addresses issued to the field. At the individual level, we calculated a conditional response rate for those who were enumerated in the survey – i.e., at least one adult from the household had completed the household grid. The numerator, respondents, were those who completed the individual interview, and the denominator was all people aged 16 or older who had been enumerated in the households.

The response rates were calculated after two weeks of fieldwork (the EBI deadline) and at the end of the fieldwork. To test the differences between response rates, we used a logistic regression model with the response indicator as the dependent variable and the experimental

allocation flag as the predictor. The predicted probabilities were used to test the differences between the estimated response rates (Mize, 2019).

The analysis of survey costs is restricted to the variable costs-per-response of the two response maximisation strategies – communications and incentives – covered in this paper. We estimated a fixed cost per letter and the cost of incentives, including the letter used to send them. To do this, we used indications of the likely cost of printing and sending the letter from previous works (Carpenter et al., 2019). These estimates of costs-per-response were used to compare the different experimental groups by using a ratio.

Finally, we used chi-squared tests corrected to account for the sample design to examine the impact of the experiments on the sample profile of the respondents. The variables included in this analysis are sex, age, ethnicity, marital status, subjective health status, personal income and education which identify some subgroups that might exhibit an above-average effect size.

4. Results

The next section presents the main results of the analysis for each experiment and the combination.

Enhanced communications

Enhancing the contact strategy with an advance letter might outweigh the impact on the final response rate of a third reminder letter (Table 2). The group receiving the advance letter exhibits slightly higher household response rates than the group receiving the third reminder letter. The differences are statistically significant at the 95% level for any information and household response rates. However, the full household response rate and the individual response rate do not show significant differences between the two experimental groups.

The combination of the advance letter and a third reminder outperforms the third reminder alone in terms of any information rate, household response rate, and full household response rate. However, no differences are observed when compared to the group receiving the advanced letter but not the third reminder. Regarding the individual response rate, the group receiving the advance letter has a 3.6 p.p. (percentage points) lower response rate compared to the group receiving both the advance letter and the third reminder. This difference is not statistically significant.

Table 2. Communication sequence experiment: Household and individual estimated response rates, standard errors, and pairwise contrasts

	Advance letter	3rd reminder	Advance letter & 3rd reminder
Any information	13.5[b]	10.9[a,c]	14.0[b]
	(1.0)	(0.8)	(1.0)
Household response	11.0[b]	9.2[a,c]	11.5[b]
	(0.8)	(0.7)	(0.9)
Full household response	6.8	6.3[c]	7.9[b]
	(0.6)	(0.6)	(0.7)
Addresses (n)	2,015	2,016	2,016
Individual response	64.9	68.2	68.5
	(2.1)	(2.8)	(1.9)

Enumerated adults (n)	515	400	524

Note - Superscript indicates a significant difference ($p < .05$) with: (a) Advance letter, (b) 3rd reminder, (c) Advance letter + 3rd reminder.

Figure 1 presents the ratio of costs-per-response among the three experimental groups for the different household and individual response. Regarding the cost of the communications, the advance letter stands out as having a lower cost-per-response compared to the additional reminder or the group that received both the advance letter and the third reminder. The figure also shows that the level of costs-per-response is similar for the third reminder and the combination of the third reminder and the advance letter.

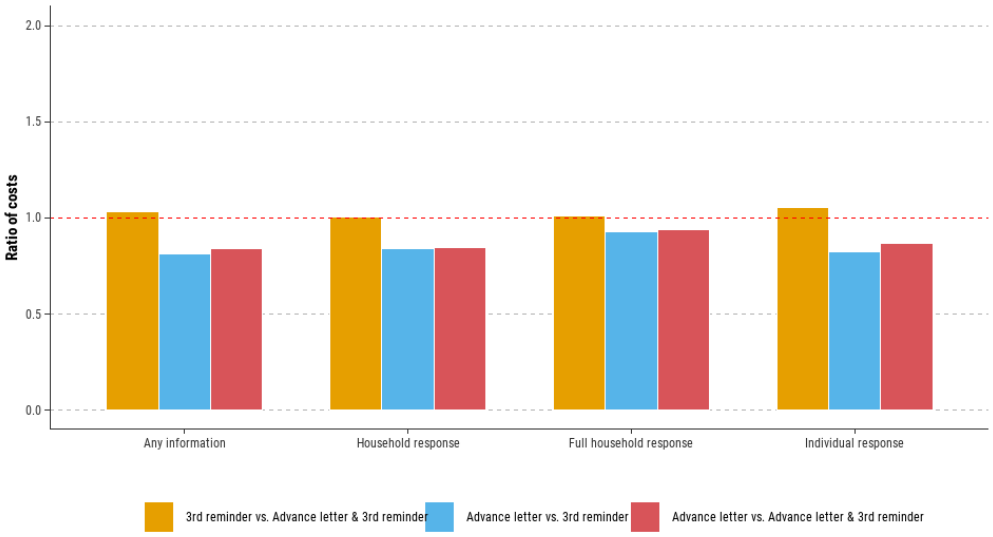

Figure 1. Communication sequence experiment: Ratios of cost by type of response

The comparison of sample profile across experimental groups is presented in Table 5 (Appendix A). The results show no differences in the sample profile across groups.

Incentives experiment

Table 3 shows that all response rates after two weeks of fieldwork are higher in the group offered the £20 conditional incentive with an extra £10 EBI compared to those offered the £30 conditional incentive. The group that was offered the EBI has a 3.5 p.p. higher any information

rate, a 3.2 p.p. higher household response rate, a 1.7 p.p. higher full household response rate, and a 14.4 p.p. higher individual response rate. The response rates at the end of the fieldwork are similar for both experimental groups. Offering the EBI does not affect the final response rate, although, the response rates of the group receiving the EBI are slightly higher than the group receiving the £30 conditional incentive, but not significantly so.

Table 3. Incentives experiment: Household and individual estimated response rates after two weeks and at the end of the fieldwork and standard errors

	After 2 weeks of fieldwork		End of fieldwork	
	£30 Cond.	**£20 Cond. + £10 EBI**	**£30 Cond.**	**£20 Cond. + £10 EBI**
Any information	5.4	8.9*	12.3	13.3
	(0.6)	(0.8)	(1.0)	(0.8)
Household response	4.5	7.8*	10.1	11.1
	(0.5)	(0.7)	(0.8)	(0.7)
Full household response	2.7	4.4*	6.9	7.1
	(0.4)	(0.6)	(0.6)	(0.6)
Addresses (n)	3,024	3,023	3,024	3,023
Individual response	37.9	52.3*	66.2	67.9
	(3.1)	(2.6)	(2.1)	(2.8)
Enumerated adults (n)	523	644	678	761

* $p < .050$

Figure 2 shows that the combination of the early bird incentive and the conditional incentive resulted in slightly lower incentive costs compared to the conditional incentive. This is true for the four types of response considered in the analysis. The comparison of sample profiles across experimental groups is presented in

Table ***6*** (Appendix A). The results only show a slight difference with regard to sex, where there are more females when the EBI is used.

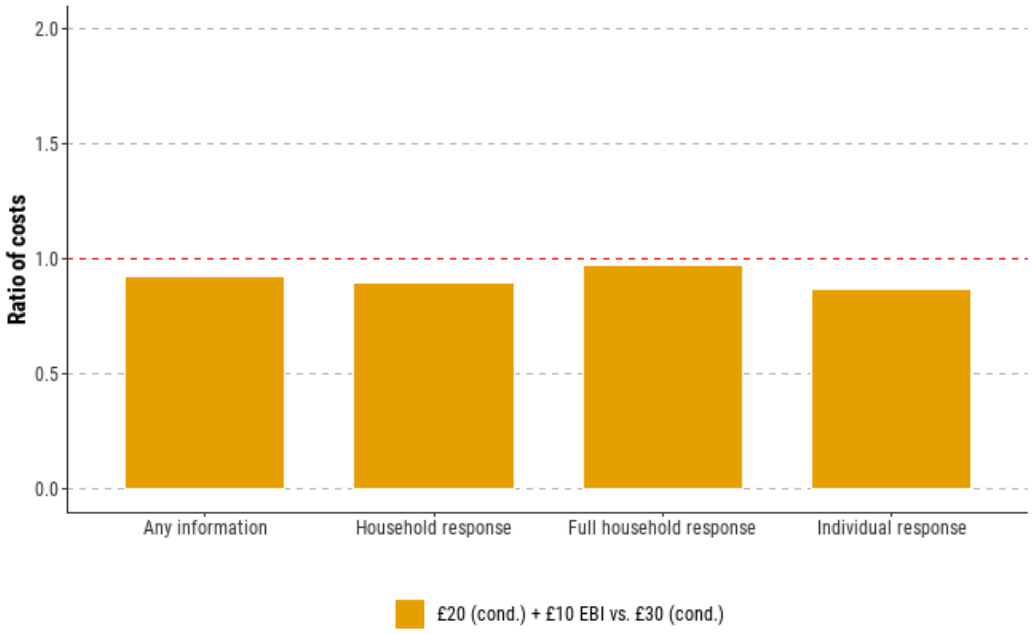

Figure 2. Incentive experiment: Ratios of cost by type of response

Combining communication and incentive strategy

To analyse the impact of combining the advance letter and the early bird incentive on the response rate after two weeks, we combined the experimental groups based on whether they received an advance letter or not. This way, within each incentive group, we merged the group that received the advance letter only with those receiving both the advance letter and the third reminder. Note that for these two groups, the treatments were identical during the first two weeks of fieldwork and only differed with respect to the third reminder that was sent in the fourth week of fieldwork.

Table 4 shows that combining the EBI with the advance letter results in the highest any information and household response rates after two weeks of fieldwork, compared to those who

were not offered the EBI and those who were offered the EBI but did not receive the advance letter. The full household response rate was also higher for the group that combined the advance letter and the EBI; however, only the differences with the groups that were offered the £30 conditional incentive were significant. The individual response rate after two weeks was higher for the group that received the advance letter announcing the EBI compared to the groups that were offered the £30 conditional incentive, 16.5 p.p. and 15.9 p.p., respectively.

Table 4. Communications and incentives experiments: household and individual estimated response rates after two weeks, standard errors, and pairwise contrasts

	£20 Cond. + £10 EBI		**£30 Cond.**	
	Advance letter	**No advance letter**	**Advance letter**	**No advance letter**
Any information	10.1[b,c,d]	6.6[a,d]	6.1[a]	4.2[a,b]
	(1.0)	(0.7)	(0.6)	(0.9)
Household response	8.8[b,c,d]	5.7[a]	5.1[a]	3.7[a]
	(0.9)	(0.7)	(0.6)	(0.8)
Full household response	4.7[c,d]	3.7	2.9[a]	2.3[a]
	(0.7)	(0.6)	(0.5)	(0.6)
Addresses (n)	2,016	1,008	2,015	1,008
Individual response	54.2[c,d]	47.9	37.7[a]	38.3[a]
	(2.9)	(4.6)	(3.9)	(4.2)
Enumerated adults (n)	454	190	395	128

Note - Superscript indicates a significant difference ($p < .05$) with: (a) £20 Cond. + £10 EBI & Advance letter, (b) £20 Cond. + £10 EBI & 3rd Reminder, (c) £30 Cond. & Advance letter, (d) £30 Cond. & 3rd Reminder

Figure 3 presents the ratios of costs for the combination of the advance letter and the early bird incentive versus the other experimental conditions. This analysis refers to the costs of both interventions – the communication sequence and incentives. The results show that the combination of the advanced letter and the EBI was more cost-effective than the others across response types. However, in terms of full household response, those receiving the conditional incentive and the third reminder, as well as those receiving the early bird incentive and the third reminder, exhibit a similar level of cost efficiency compared to the group receiving the advance letter and the EBI. This is also true for the individual response for the groups receiving the EBI

and the third reminder, which exhibit a similar level of cost-per-response to the strategy that combines the advance letter and the EBI.

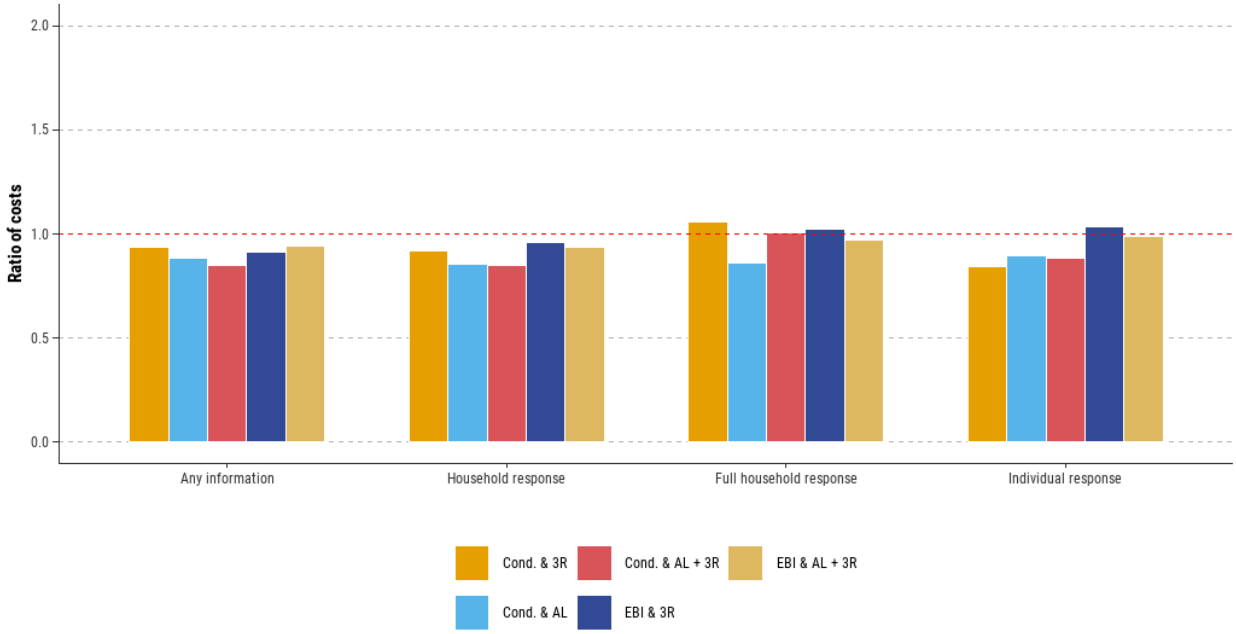

Figure 3. Communications and incentives experiments: Ratios of cost for the advance letter and EBI group vs. the rest of the groups

5. Conclusions

The response maximisation interventions aimed to increase response rates in a cost-efficient manner within the context of a push-to-web design. The first experiment tested the effect of expanding the communications sequence by adding an advance and/or a third reminder letter. Hypothesis H1.1 referred to the superiority of the advance letter over the third reminder. The analysis partially supports this hypothesis. The final any information and household response rates were higher for the group receiving the advance letter compared to those receiving the third reminder letter. However, the differences observed for the full household and individual response rates were not significant. The hypothesis H1.2 stated that combining the additional advance letter and the third reminder would result in the highest response rate compared to the groups that just received either of the treatments. The analysis indicates that the combination of both is more effective in increasing household response rates than using the third reminder alone; however, the relatively small differences observed with the group receiving an advance letter alone were not significant. The individual response rate was slightly higher for the group that received two extra letters, but none of the differences were significant.

Adding an advance letter to the contact strategy, in line with the literature, emerges as a more effective intervention than sending a third reminder to increase response rates (Bosch et al., 2024; Kaplowitz et al., 2004; Rao et al., 2010). However, the results suggest that the third reminder may be more effective in prompting individuals to respond, provided that someone in the household completes the household grid. This might be explained because once the household grid is completed, each adult receives an individual reminder asking them to participate, which might prompt individuals to respond. This evidence together suggests that the two elements of the contact strategy – the advance letter and the third reminder – may target different outcomes (i.e., household response vs. individual response), and that both should be considered based on their effect on response rates. This is especially relevant in the context of a household survey, where obtaining information from all resident adults is a key objective.

Regarding the cost-effectiveness of these interventions, hypothesis H1.3 stated the superiority of the advance letters in terms of cost-per-response compared to the third reminder. The results of the cost analysis confirm that sending an advanced letter is more cost-effective than sending a

third reminder. Also, the cost analysis indicates that sending both the advance letter and the third reminder is equally cost-effective as sending the third reminder alone. The results highlight the superiority of the advance letter, primarily because it achieves a higher response rate and, consequently, a lower cost per response than the third reminder. Note that these findings are only based on the variable costs of the letters sent as part of the communication strategy.

Finally, we also examined the sample profile by experimental group using a set of demographic variables. The findings support hypothesis H1.4, which stated that the impact of the communication sequence on response rates would not affect the sample profile of the survey respondents.

The second experiment tested the administration of two conditional incentives with the same maximum value: on the one hand, a £30 conditional incentive and on the other, a £10 EBI with a 2-week deadline, plus a £20 conditional incentive. Regarding the response rate, we hypothesised that the EBI would be more effective in prompting a faster response to the survey – before the two-week deadline (H2.1), but that this difference in response rates would erode by the end of the fieldwork (H2.2). The results show that the group being offered the EBI exhibits higher response rates after two weeks of fieldwork than those who were only offered the £30 conditional incentive. At the end of the fieldwork, the differences between the two groups had vanished. These results support the idea that EBIs effectively prompt an earlier response and that the time-limited offer does not influence the final response rates (Calderwood et al., 2023; Smith et al., 2021).

Regarding the cost-effectiveness of the incentive strategy, given the similar response rates, the cost per response was lower for the group offered the combination of the £10 EBI plus a £20 conditional incentive, as we had hypothesised (H2.3). These results indicate that, given a fixed budget for incentives, splitting the overall value between an EBI and a conditional part can reduce survey costs because the total amount to be paid for incentives would be lower and because an earlier response will reduce other fieldwork efforts (e.g., additional communications).

The sample profile was similar across both experimental groups (H2.4), with the exception of gender, where there was a higher prevalence of women in the group that was offered an EBI.

However, the sample was balanced in terms of age, education, ethnicity, marital status and subjective health status.

Finally, we draw attention to the intersection between the two experiments. The holistic design approach recommends considering the survey design as a whole, where the various design decisions are consistent with one another to increase benefits or minimise the costs of participating in the survey (Dillman et al., 2014). In line with this theory, hypothesis H3.1 expected a higher response rate after two weeks if the advanced letter was used to announce the EBI. The results indicate that those informed about the EBI in the advance letter exhibit higher response rates after two weeks (any information and household response) than all the other experimental groups. The full household and individual response rates were also higher compared to those offered the £30 conditional incentive, but not in relation to the group offered the EBI without receiving an advance letter.

Considering the costs of the communications and incentives together, we hypothesized that combining the advance letter and the EBI was the most effective strategy regarding the cost-per-response at the end of the fieldwork (H3.2). This was true if we consider as respondents the households that completed at least the household grid (any information) or the households where at least one adult completed the individual questionnaire (household response). Regarding the full household response rate and the individual response rate, we found that it was similarly cost-effective compared to the other groups that were offered the EBI. Furthermore, for the full household response rates, the groups that were offered the conditional incentive and received the third reminder show similar levels of cost-per-response to combining the EBI and the advance letter.

In conclusion, these experiments helped examine the quality-cost trade-off of the push-to-web methodology used to design the wave 14 boost sample of the main study. We learned from these experiments that additional communications, especially advance letters, can help increase the number of households that participate in the survey. Likewise, given a fixed budget for survey incentives, we found that combining an EBI and a conditional incentive yields a similar response rate to using a conditional incentive of the same amount, but at lower costs for the survey. Also, we learnt that theory-driven decisions can help improve quality whilst controlling survey costs.

Including an advance letter was essential to reinforce the message conveyed in the invite letter for those being offered the EBI, and as a result, improving the 2-week response rate.

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Appendix A. Sample profile by experimental group

Table 5. Communication sequence experiment: Sample profile by experimental group

	Advance letter	3rd reminder	Advance letter & 3rd reminder	p-value
Sex				0.385
Male	45	49	46	
Female	55	51	54	
Age (grouped)				0.651
16-29	22	21	22	
30-44	31	28	33	
45-64	32	31	27	
65+	15	19	18	
Ethnic background				0.724
White British	81	78	80	
Ethnic minority	19	22	20	
Marital status				0.197
Single	34	44	38	
Married or Civil Partner	51	39	47	
Separated, divorced, widowed	15	16	14	
Subjective health				0.071
Excellent	13	11	15	
Very good	32	29	36	
Good	38	37	30	
Fair	12	19	15	
Poor	5.7	4.8	4.2	
Personal income (Quartiles)				0.589
Q1 (Bottom)	24	29	23	
Q2	25	25	25	
Q3	26	22	27	
Q4 (Top)	25	25	25	
Subjective health				0.297
Degree	40	41	43	
Other higher degree	13	10	9.7	
A-level etc	16	21	22	
GCSE etc	19	21	15	
Other qualification	6.7	3.3	4.1	
No qualification	5.3	3.7	5.3	
Respondents (n)	627	476	646	

Table 6. Incentives experiment: Sample profile by experimental group

	£30 Cond.	£20 Cond. + £10 EBI	p-value
Sex			0.013
Male	49	44	
Female	51	56	
Age (grouped)			0.701
16-29	23	21	
30-44	29	32	
45-64	31	29	
65+	17	18	
Ethnic background			0.68
White British	79	80	
Ethnic minority	21	20	
Marital status			0.756
Single	37	40	
Married or Civil Partner	47	46	
Separated , divorced, widowed	16	15	
Subjective health			0.078
Excellent	11	14	
Very good	37	29	
Good	32	37	
Fair	15	14	
Poor	5	5	
Personal income (Quartiles)			0.52
Q1 (Bottom)	25	25	
Q2	23	27	
Q3	26	24	
Q4 (Top)	26	24	
Education			0.445
Degree	42	42	
Other higher degree	10	12	
A-level etc	22	18	
GCSE etc	17	19	
Other qualification	4	5	
No qualification	6	4	
Respondents (n)	813	913	