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The effects of diversified incentives among two hard-to-reach groups in Sweden: persons aged 18-39 and persons born outside the Nordics

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ABSTRACT

It remains unclear how different incentives and values of the incentives affect response rates, non-response bias, and data quality among hard-to-reach groups. This note presents findings from two experiments targeting two hard-to-reach groups in Sweden: persons aged 18-39 and persons born outside the Nordics. The experiments were administered to random samples of residents in Sweden, the West Region of Sweden, and the city of Gothenburg in 2021, and investigated whether a higher value monetary incentive (retail value 50 SEK/ 99 SEK) improved response rates and reduced response bias while maintaining high data quality among these groups compared to a lower value lottery incentive (retail value 30 SEK). In contrast to the predictions, the results indicated that the higher value monetary incentive of 50 SEK reduced the response rate by 3.8 percentage points in the experiment targeting persons aged 18-39 compared to the lottery incentive. Furthermore, the incentive of 99 SEK made no difference to the response rate in the experiment targeting persons born outside the Nordics. At the same time, the share of incomplete answers was higher among those who were offered the higher value monetary incentive, and the non-response bias was reduced in terms of age and immigrant status in the experiment targeting persons aged 18-39. The outcomes of these two experiments contribute to the quite uninvestigated field of literature by suggesting that both direct and indirect values and the logistic surroundings of an incentive may affect the response rate, non-response bias, and data quality in hard-to-reach survey populations.

INTRODUCTION

Surveys have for a long period of time been struggling with declining response rates and its consequence, increased risk of non-response bias (Groves, 2006). Difficulties in obtaining responses from hard-to-reach groups within the survey population may affect the conclusions and information attained from the surveys (Groves, 2006; Groves and Couper, 2012; Groves and Peytcheva, 2008). However, studies on how to increase response rates among under-represented sub-groups are not as common as the literature about the issues related to non-response-bias (Blumberg and Luke, 2007; Groves 2006; Groves et al., 2012; Groves and Peytcheva 2008). Incentives as a benefit for participating in surveys have been found to improve response rates overall. But on the other hand, as missing data of non-respondents is common, much of the previous literature has not been able to investigate how different incentives may vary in results across different clusters of sample persons (Singer and Ye, 2013). Regarding different types of incentives, previous studies have found that lottery incentives performed worse than monetary incentives (Leung et al., 2002) in terms of response rates.¹ At the same time, other findings suggest that lottery incentives (regardless of possible winnings) show no difference in response rates from monetary incentives or no incentive at all (Halpern et al., 2011). In addition, although larger conditional incentives have been found to result in higher response rates, there is still a lack of knowledge on how much the value of conditional incentives affects response rates (Mercer et al., 2015), especially among hard-to-reach groups.

In surveys conducted in the Nordic countries, response rates among younger people and people born outside the Nordics seem to have decreased faster than for other groups, leading to the likely growth of non-response bias. As the SOM Institute already offer a conditional lottery incentive (retail value 30 SEK) to all sample persons in their surveys, a strategy to explore differentiated incentives was motivated.

This note describes the results from two experiments in three mixed-mode (paper-and-pencil mail-back and web) surveys that investigated the effects of diversified incentives among two hard-to-reach subgroups: people aged 18 to 39, and people born outside the domestic country and countries similar to the domestic country (in this case Sweden and the other Nordic countries). The two experiments were

¹ Ulrich and colleagues (2005) also found that lottery performed worse than monetary incentives. However, in their study, the lottery incentive was conditional, while the monetary was unconditional.

administered simultaneously in the fall of 2021. The experiment among persons aged 18-39 was administrated in both one random sample of inhabitants in Sweden and one random sample of inhabitants in the West Region of Sweden. The experiment among persons born outside the Nordics was administrated to a random sample of the population in the city of Gothenburg. The incentive experiment administered to persons aged 18 to 39 years compared a conditional monetary incentive (retail value 50 SEK) to a smaller value conditional lottery ticket (retail value 30 SEK). The experiment administered to persons born outside the Nordics compared the same types of incentives, with the only difference being that the conditional monetary incentive had a retail value of 99 SEK. The advantage of this kind of design is that the experiments focused both on the value of the incentives (50 SEK/99 SEK vs. 30 SEK) and the type of incentives (monetary vs. lottery). The experiments investigated if offering a larger value monetary incentive instead of the smaller value lottery incentive would improve the response rates in these hard-to-reach groups and reduce the overall non-response bias, while also not negatively affecting the quality of the data.

HYPOTHESIS

Four hypotheses were assessed:

RESPONSE RATES

The experiment among persons aged 18-39

H1a: Sample persons aged 18-39 who are offered the larger value monetary incentive may be more likely to complete the questionnaire than sample persons aged 18-39 who are offered the smaller value lottery incentive.

The experiment among persons born outside the Nordics

H1b: Sample persons not born in the Nordics who are offered the larger value monetary incentive may be more likely to complete the questionnaire than sample persons not born in the Nordics who are offered the smaller value lottery incentive.

NON-RESPONSE BIAS

The experiment among persons aged 18-39

H2a: Sample persons aged 18-39 who are offered the larger value monetary incentive may show less non-response bias than respondents born outside the Nordics, than sample persons aged 18-39 who are offered the smaller value lottery incentive.

The experiment among persons born outside the Nordics

H2b: Sample persons not born in the Nordics who are offered the larger value monetary incentive may show less non-response bias than sample persons not born in the Nordics who are offered the smaller value lottery incentive.

DATA QUALITY

Larger value monetary incentives may risk worse data quality as some sample persons be less thorough and prioritize sending in the questionnaire fast to receive the larger value monetary incentive faster.

H3a: Sample persons aged 18-39 who are offered the larger value monetary incentive may be more likely to generate worse data quality than sample persons aged 18-39 who are offered the smaller value lottery incentive.

H3b: Sample persons born outside the Nordics who are offered the larger value monetary incentive may be more likely to generate worse data quality than sample persons born outside the Nordics who are offered the smaller value lottery incentive.

PROPORTIONS OF ALL REMINDERS SENT

Sample persons who are offered the larger value conditional monetary incentive (99 SEK and 50 SEK respectively) may be more inclined to submit the questionnaire faster without having to be sent as many reminders as sample persons who are offered the smaller value lottery incentive. Hence, the proportion of all reminders sent to sample persons may be lower among sample persons who are offered the larger value monetary incentive (99 SEK and 50 SEK respectively) than sample persons who are offered the smaller value lottery incentive.

The experiment among persons aged 18-39

H4a: The proportion of all reminders sent may be lower for sample persons aged 18-39 who are offered the larger value monetary incentive than the sample persons aged 18-39 who are offered the smaller value lottery incentive.

The experiment among persons born outside the Nordics

H4b: The proportion of all reminders sent may be lower for sample persons born outside the Nordics who are offered the larger value monetary incentive than the sample persons born outside the Nordics who are offered the smaller value lottery incentive.

METHODS AND MATERIALS

SAMPLE

Two main samples were invited. The first main sample that was administered among persons aged 18-39 consisted of two sub-samples. The first sub-sample was a random sample of 24,500 individuals, 16-85 years old registered by the Swedish Tax Authority as residing in Sweden. Since Swedish law prohibits sending lottery tickets to citizens under 18 years, this left 8,471 individuals 18-39 years to participate in the experiment. The second sub-sample was a random sample of individuals 16-85 years old registered by the Swedish Tax Authority as residing in the West Region of Sweden. Among these, 2,218 were between 18 and 39 years old and included in the experiment.

The second main sample that was administered among persons people born outside the Nordics consisted of 7,000 individuals 16-85 years old, who were randomly selected as registered by the Swedish Tax Authority as residing in the city of Gothenburg. Among these were 1,998 inhabitants born outside the Nordics and over the age of 18. See table 1 for an overview of the groups. All samples were drawn on the 26th of August 2021.

The experiments were part of a national (The National SOM-survey 2021), a regional (The West Regional SOM-survey 2021), and a local (The SOM-survey in Gothenburg 2021) survey conducted by the SOM Institute at the University of Gothenburg. The national survey consisted of seven different editions randomized among sample persons, and the total number of survey questions varied between 59 and 68. The West Regional survey and the SOM-survey in Gothenburg consisted of one edition of 76 and 58 questions respectively. All samples were checked prior to administration not to contain the same individual twice. If that occurred, other randomly selected individuals replaced those individuals. Analyses were conducted on the two main samples separately.

PROCEDURE

In general, the procedure was in many aspects similar for both the experiment administered among persons aged 18-39 and persons born outside the Nordics. Mainly two aspects were different – the value of the monetary incentive for the treatment group in each experiment and the first invitation. In the experiment among persons aged 18-39, the value of the monetary incentive for the treatment group was 50 SEK, while in the born outside the Nordics experiment, the corresponding value was 99 SEK. Regarding the first invitation, half of the sample

persons in the experiment among persons aged 18-39 were offered to complete the questionnaire either through a self-administered paper-and-pencil questionnaire or by an online self-administrated questionnaire, and the remaining half sample was offered to complete the questionnaire only by an online self-administrated questionnaire. In the born outside the Nordics experiment, the full sample was offered to complete the questionnaire only by an online self-administrated questionnaire in the first invitation.

Prior to being invited to complete the questionnaire, each respondent in each experiment was randomly assigned to one of two groups. Numbers for the randomizations of the samples were extracted from random.org. One group was offered a conditional monetary incentive with a retail value of 50 SEK/99 SEK (treatment group) and one group was offered a conditional lottery incentive with a retail value of 30 SEK (control group).

The monetary incentive for the treatment group was a 50 SEK/99 SEK general coupon (*GoGift Superpresentkort*) sent to respondents by email after the completion of the questionnaire. In other words, the respondent had to give their email address to receive the coupon. After receiving the e-mail, the respondent had to enter a gift card code and a PIN code on the website of *GoGift*. In the step that followed, the respondent chose the preferred store to redeem the gift card. The lottery incentive was a scratch ticket a so-called *Trisslott*, a well-known and popular lottery ticket and the most sold one in Sweden (360,000 tickets per day, svenskaspel.se) and was sent to respondents by mail together with a letter, thanking them for participating in the survey.

All sample persons were sent a pre-notification by postcard one week prior to the first invitation. In the first invitation, sample persons were either offered to complete the questionnaire through the self-administered paper-and-pencil questionnaire or by the online self-administrated questionnaire or were only offered to complete the questionnaire by an online self-administrated questionnaire (for more information, see previous paragraph). Nine days after the first invitation, all sample persons received a postcard with an envelope in which the person was thanked for their participation and reminded to participate if not yet done so. The postcard included instructions on how to respond to the online self-administrated questionnaire. Sample persons who had not yet submitted their questionnaire or had refused 17 days after the first invitation received a text

message on their cell phone, reminding them to participate.² The text message included a link to the online questionnaire. Sample persons who had not submitted her or his questionnaire 24 days after the first invitation was sent a mailed reminder to complete the questionnaire either through the self-administrated paper-and-pencil questionnaire or by the online self-administrated questionnaire³. All mailed out letters and sent out text messages contained information about the incentives, the type of incentive (lottery or monetary), and the amount of the monetary incentive (50 SEK/99 SEK).

Sample persons who had not submitted their questionnaire or had not refused to participate received four mailed reminders with an offer to complete the questionnaire either through a paper-and-pencil questionnaire or by the online questionnaire, and four text messages including a link to the online questionnaire sent to their cell phone (i.e., nine reminders in total).

Table 1a. *Overview of experimental groups persons aged 18-39*

Persons aged 18-39			
Survey			
		The National survey	The West regional survey
Incentive types and amounts	Conditional monetary incentive (retail value 50 SEK)	Group 1 <i>n</i> = 4,278	Group 1 <i>n</i> = 1,099
	Conditional lottery incentive (retail value 30 SEK)	Group 2 <i>n</i> = 4,193	Group 2 <i>n</i> = 1,119

Table 1b. *Overview of experimental groups persons born outside the Nordic*

Persons born outside the Nordic 18-85 years		
Incentive types and amounts	Conditional monetary incentive (retail value 99 SEK)	Group 1 <i>n</i> = 1,012
	Conditional lottery incentive (retail value 30 SEK)	Group 2 <i>n</i> = 986

² Individuals who refused to respond either informed the SOM Institute this by email or telephone, or by clicking on a refuse link in text message two, three or four.

³ The postal reminders included the survey, an information letter, and a return envelope.

MEASURES AND ANALYSIS PLAN

RESPONSE RATES

To compare response rates between the groups, Response Rate 5 (RR5) was estimated according to the guidelines of the American Association for Public Opinion Research (AAPOR, 2016). Two sample-tests of proportions evaluating the difference in RR5 between the treatment and control groups were implemented to assess the response rate between the incentives.

NON-RESPONSE BIAS

The parameters of five OLS-regressions equations for each experiment were estimated and predicted the RR5 with the treatment variable, the independent variables of interest, and the interactions between them. A statistically significant negative parameter for the interaction meant that the higher value monetary incentive reduced the non-response bias in that subgroup. The variables of interest for the 18-39 subgroup were the individuals' sex, age (cohorts: 18-24, 25-29, and 30-39 cohort), marital status (married, not married), immigrant status (born in the Nordics, born outside the Nordics, and geographical settlement (living in a large city, not living in a large city). The variables used for the born outside the Nordics subgroup were the individual's sex, age (cohorts: 18-29, 30-39, 40-49, 50-59, 60-69, 70-79, 80-85), marital status (married, not married), immigrant status (born in a country in Europe, born in a country outside Europe) and socially underprivileged area⁴ (living in a social underprivileged area, not living in a socially underprivileged area).

Males, younger cohorts, not married people, people born outside of the Nordics, and in particular those born outside Europe and residents in socially underprivileged areas have previously been found to be less likely to complete the SOM-questionnaire (Falk et al., 2021). Hence, improving the response rate in these groups would mitigate the non-response bias.

DATA QUALITY

Data quality was assessed based on two concepts:

Item non-response: This indicator measured the proportion of missing answers. Missing answers were defined as a lack of an answer to a specific

⁴ Translated from the Swedish term "Utsatt område", defined by the Swedish Police Authority.

question. Sample persons who did not complete the questionnaire (answered less than 80% of the questions) were coded as missing. The parameters of OLS regressions equations predicted *item non-response* with each treatment variable.

Breakoffs/Partials/Completes: This indicator measured the proportion of answers of a maximum of 50 percent of all questions included in each questionnaire (Breakoffs), the proportion of answers between 50 and 79.9 percent of all questions included in each questionnaire (Partials) and the proportion of answers of 80 percent or more of all questions included in each questionnaire (Completes). The parameters of a multinomial logistic regression equation predicted breakoffs/partials/completes with each treatment variable.

PROPORTIONS OF ALL REMINDERS SENT

The indicator of the proportions of all reminders was created by dividing the number of all reminders sent by the maximum number of potential reminders sent. That is, for each experimental group, the total number of reminders sent was equal to the number of reminders sent if none of the sample persons submitted the questionnaire. In total, sample persons who did not submit their questionnaire and did not refuse to participate, received a postcard reminding them to participate, four mailed reminders with a questionnaire included, and four text messages sent to their cell phones (i.e., nine total). An OLS regression equation predicted the proportions of all reminders sent with each treatment variable.

RESULTS

RESPONSE RATES

The experiment among persons aged 18-39

A two-sample test of proportions revealed that sample persons who were offered the higher value monetary incentive were statistically significantly less likely to complete the questionnaire (RR5 = 26.0%) than those who were offered lottery incentive (RR5 = 29.9%) ($z = -4.61$ $p < .000$). The difference in response rate was 3.8 percentage points between the group that was offered monetary incentive and the group that was offered lottery incentive (see Table 2a).

Table 2a. *Effects of the monetary incentive on Response Rate in the 18-39 subgroup experiment (Proportions, Difference of Proportions)*

	Proportion	n	Standard error	z-value	95% CI lower	95% CI higher
Treatment group	0.2604	5,891	.0057		.2492	.2716
Control group	0.2986	5,803	.0060		.2869	.3104
Difference of proportions	-0.0382		.0083	-4.61	-.0545	0.0220

Note. Response rates were calculated in accordance with AAPOR 2016-standard (RR5). RR5 excludes some groups from the original sample which explains the somewhat reduced the sample sizes for the groups. The test was conducted by the two-sample test of proportion (prtest) in Stata 17 SE.

The experiment among persons born outside the Nordics

A two-sample test of proportions revealed that sample persons who were offered monetary incentive were not statistically significantly more or less likely to complete the questionnaire (RR5 = 22.1%) than those who were offered lottery incentive (RR5 = 22.5%) ($z = -0.24$ $p = .810$) (see Table 2b).

Table 2b. *Effects of the monetary incentive on Response Rate in the born outside the Nordics subgroup experiment (Proportions, Difference of Proportions)*

	Proportion	n	Standard error	z-value	95% CI lower	95% CI higher
Treatment group	0.2210	1,009	.0131		.1954	.2466
Control group	0.2255	989	.0133		.1994	.2515
Difference of proportions	-0.0045			-0.24		

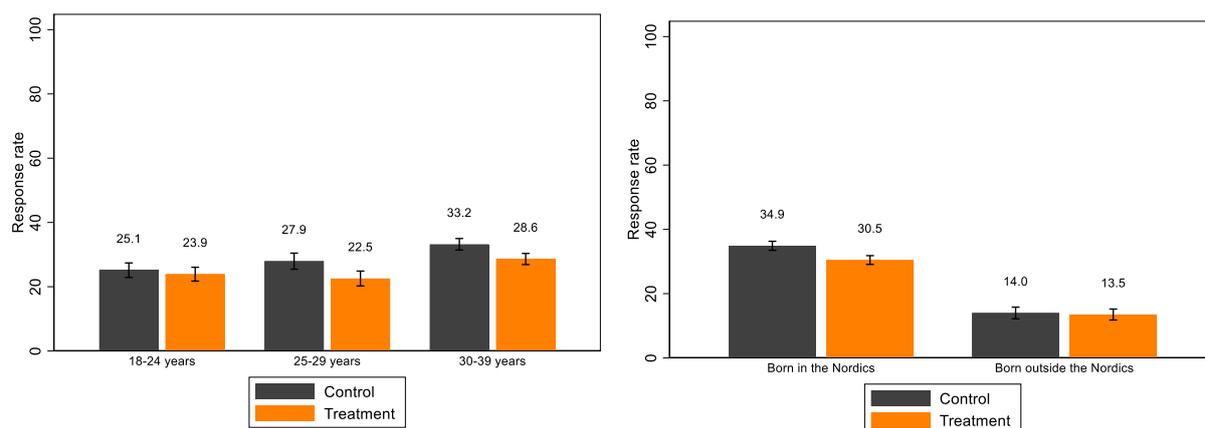
Note: Response rates were calculated in accordance with AAPOR 2016-standard (RR5). RR5 excludes some groups from the original sample which explains the somewhat reduced the sample sizes for the groups. The test was conducted by the two-sample test of proportion (prtest) in Stata 17 SE.

NON-RESPONSE BIAS

The OLS-regression estimation interactions of non-response bias revealed that the only significant effects were found in the experiment among persons aged 18-39. The higher value monetary incentive had a statistically significant negative effect on the response rate among persons aged 18-39 born in the Nordics compared to those aged 18-39 born outside the Nordics ($p = .010$) In a follow-up estimation, it appears that the significant interaction in large depended on the no difference in response rate between incentives among those born outside Europe compared to those born in the Nordics ($p = .018$). The estimations of the higher value monetary incentive and age in the same experiment with 18-24 as the reference dummy variable showed a marginal negative effect on response rate in the age-cohorts 25-29 ($p = .060$) and 30-39 ($p = .074$). All interaction estimations were conducted by controlling for all independent variables of interest in each experiment as

described in the previous section. The estimations of the two-way interactions with sex, marital status, and geographical settlement were not statistically significant in the young adult experiment. In the born outside the Nordics experiment, no statistically significant interaction effects were found at all. Table 3a and 3b presents the results from the OLS regression estimations and Figure 1 demonstrates the descriptive results of the significant effects.

Figure 1. Results of the larger value monetary incentive on response rate in the 18-39 subgroup experiment on immigrant status and age (percentage)



Hence, the higher value monetary incentive in the experiment targeting persons aged 18-39 appears to have decreased the non-response bias, but only by lowering the response rate in the groups that normally have a higher response propensity compared to their counterparts and not by improving the response rate in the groups that normally have a lower response propensity, as expected. The fact that no significant effect was found in the experiment among persons born outside the Nordics, where the monetary incentive had a higher value than in the experiment among persons aged 18-39 further confirms the misdirection of expectations of the effect of this type of incentive in terms of non-response bias.

Table 3a. Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and geographical settlement in the 18-39 subgroup experiment (OLS regression coefficients)

	Response					
	Baseline	Sex- interaction	Age- interaction	Marital- interaction	Immigrant- interaction	Geographical- interaction
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Treatment (reference: control)	-.03*** (.01)	-.05*** (.01)	-.01 (.01)	-.04*** (.01)	-.04*** (.01)	-.04** (.01)
Treatment * Female (reference: male)		.02 (.02)				
Treatment * Age: 25-29 (reference: 18-24)			-.04+ (.02)			
Treatment * Age: 30-39 (reference: 18-24)			-.04+ (.02)			
Treatment * Married (reference: Not married)				.01 (.02)		
Treatment * Born outside the Nordics (reference: Born in the Nordics)					.05* (.02)	
Treatment * Large city (reference: Not large city)						.01+ (.03)
Constant	.27*** (.01)	.27*** (.01)	.25*** (.01)	.27*** (.02)	.27*** (.02)	.42*** (.03)
Observations	10,660	10,660	10,660	10,660	10,660	7,945
R^2	.00	.05	.05	.05	.05	.11

Note. All models were estimated with sex, age, marital status, immigrant status, and geographical settlement as control variables but excluded in the table for readability. For the full tables, see the Appendix. Unstandardized OLS regression coefficients with standard errors in parentheses.

+ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 3b. Effects of the larger value monetary incentive on response rate on different immigrant status in the 18-39 subgroup experiment (OLS regression coefficients)

	Response		
	Immigrant- interaction A	Immigrant- interaction B	Immigrant- interaction C
	Model 1	Model 2	Model 3
Treatment (reference: control)	-.01 (.02)	-.05*** (.01)	-.05*** (.01)
Treatment * Born outside Europe (reference: Born inside Europe but outside the Nordics)	.01 (.03)		
Treatment * Born outside Europe (reference: Born in the Nordics)		.05* (.02)	
Treatment * Born inside Europe but outside the Nordics (reference: Born in the Nordics)			.04 (.03)
Constant	.15*** (.02)	.27*** (.01)	.26*** (.01)
Observations	2,746	9,901	8,673
R^2	.01	.05	.03

Note: All models were estimated with sex, age, marital status, immigrant status, and geographical settlement as control variables but excluded in the table for readability. For the full tables, see the Appendix. Unstandardized OLS regression coefficients with standard errors in parentheses.
+ $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

DATA QUALITY

To investigate if a larger value monetary incentive had an effect on the quality of the data *Item non-response* and *Breakoffs/Partials/Completes* were evaluated.

Item non-response

The results of the OLS regression of the linear variable *item non-response* showed that the proportion of missing answers was not statistically significantly different for the larger value monetary incentive compared to the smaller value lottery incentive in neither the experiment targeting persons aged 18-39 ($p = .702$) nor in the born outside the Nordics experiment ($p = .299$). Adding an interaction of mode made no difference to these results. The tables with the results are presented in Appendix.

Breakoffs/Partials/Completes

Respondents missing answers can further be analyzed as different proportions of answers in each questionnaire in terms of breakoffs, partials, and completes.

Statistically significant results were found in the experiment among persons aged 18-39, but not in the born outside the Nordics experiment. Table 4 presents the results from the experiment among persons aged 18-39 with a multinomial logistic regression predicting the probability of the treatment group yielding a higher share of breakoffs, partials, and a lower share of completes. The results showed that the share of breakoffs was statistically significantly higher ($p = .043$), while the share of completes was statistically significantly lower ($p = .033$), in the experiment among persons aged 18-39. The share of completes was 2.18 percentage points lower among those who were offered the higher value monetary incentive. Hence, it appears that individuals receiving an offer on the higher value monetary incentive in the 18-39 subgroup experiment led to decreased data quality in terms of more incomplete answers. At the same time, no statistically significant effects were found in the born outside the Nordics experiment (see Table A2a in Appendix).

Table 4. Effects of the larger value monetary incentive on the share of breakoffs, partials and completes in the 18-39 subgroup experiment (multinomial logistic regression coefficients)

	dy/dx	z-value	95% CI lower	95% CI higher
Breakoffs	.0176* (.0087)	2.02	.0005	.0347
Partials	.0042 (.0058)	0.72	-.0072	.0156
Completes	-.0218* (.0102)	-2.14	-.0418	-.0018

Note: Average marginal effects of the treatment group on breakoffs, partials and completes with standard errors in parentheses. The main effects of the multinomial logistic regression breakoff, partial and complete variables were included in the regression but were dropped from the table for readability. The number of observations was 3,654.

*p < .1, *p < .05, **p < .01, ***p < .001.*

PROPORTIONS OF ALL REMINDERS SENT

The OLS-regressions estimations of proportions of all reminders sent showed statistically significant results in the 18-39 subgroup experiment. The mean for the higher value monetary incentive was higher than for the smaller value lottery incentive, 58.3% received all potential reminders compared to 55.2%, a statistically significant effect ($p < .001$). No statistically significant effect was found in the born outside the Nordics subgroup experiment. Hence, as the response rate was lower in the group that was offered the higher value monetary incentive, it is natural that also the proportion of reminders was higher in this group, and consequently combined with a higher cost.

Table 5. Effects of the larger value monetary incentive on proportions of reminders sent in the 18-39 subgroup experiment (mean, difference in mean)

	Mean	n	Standard error	t-value	95% CI lower	95% CI higher
Treatment group	.5828	5,784	.0041		.5748	.5908
Control group	.5518	5,703	.0043		.5433	.5603
Difference in mean	.0310***		.0059	5.195	.0193	.0427

Note: Response rates were calculated in accordance with AAPOR 2016-standard (RR5). RR5 excludes some groups from the original sample which explains the somewhat reduced the sample sizes for the groups. The test was conducted by a t-test in Stata 17 SE.

CONCLUSION

This note describes the results from two experiments targeting two hard-to-reach subgroups in survey populations in Sweden: persons aged 18-39, and individuals born outside the Nordics. The experiments investigated the effects of a higher value monetary incentive (retail value 50 SEK/99 SEK) compared to a lower value lottery incentive (retail value 30 SEK). The main findings indicated that the higher value monetary incentive of 50 SEK caused a lower response rate (26.0%) compared to the lower value lottery incentive (29.9%) among the participants of the experiment targeting persons aged 18-39, a statistically significant difference of 3.9 percentage points. At the same time, the results from the experiment among persons born outside the Nordics showed that the higher value monetary incentive of 99 SEK generated no difference in response rate compared to the lower value lottery ticket. These results contradict the expectations that a higher value monetary incentive would generate improved response rates compared to a lower value lottery incentive. Instead, the 50 SEK value monetary incentive reduced the response rate. In line with the results of the response rate, the proportion of reminders sent was statistically significantly higher among those who were offered the higher value monetary incentive in the experiment about persons aged 18-39. The reduced response rate among those who were offered the higher value monetary incentive of 50 SEK was 2.2 percentage points less likely to complete the questionnaire after having started it compared to those who received the lottery ticket. It appears that the higher value monetary incentive of 50 SEK among the sample persons in the 18-39 experiment may not have been interesting enough compared to the lottery ticket. The larger amount of 99 SEK offered to those in the born outside the Nordics experiment instead caused no difference in the share of complete answers between the two incentive groups. Therefore, the negative effect

of the gift card may have been offset by the higher value (99 SEK instead of only 50 SEK) but still only offset enough to get to the same level as the lottery ticket.

The results further showed that in the experiment among persons aged 18-39, the non-response bias decreased. However, it was decreased only by a reduced response rate among those born inside the Nordics as opposed to an increased response rate among those born outside the Nordics (specifically born outside Europe) and a reduced response rate in the older sub-groups (25-29 and 30-39) instead of an increased response rate among the youngest (18-24). In other words, the response rate was decreased in the groups that normally have a higher response rate than their reference group in terms of immigrant status and age. On the other hand, the non-response bias was not affected in terms of sex, material status, and geographical settlement in the experiment targeting persons aged 18-39, and not at all in the born outside the Nordics experiment.

One explanation behind the lack of a higher response rate in the higher value monetary incentives groups may be the potential hassle to obtain the gift card. To get the card, sample persons had to state their email, get the gift card number, then choose the preferred store to redeem the gift card in, and finally choose something to buy. Sample persons may have perceived this as a burdensome process. Compared to the lottery incentive received automatically in a physically mailed envelope and the fact that the incentive is a very well-known scratch lottery ticket in Sweden (*Trisslott*), the digital gift card might not have been as attractive. In addition, although the retail values of the monetary incentives were higher in both experiments, the value of the lottery ticket may be perceived as higher than its retail value considering the possible winnings. Although the ambition of the experiments was to offer a more attractive incentive worth more in monetary terms, it appears that the well-known lottery ticket was a better offer, both in terms of response rate and complete answers in the experiment targeting persons aged 18-39 and in terms of a lower cost as the retail price was cheaper and the proportion of sent reminders was smaller.

The outcomes of these two experiments contribute to the quite uninvestigated field of literature by suggesting that both direct and indirect values and the logistic surroundings of an incentive may affect the response rate, non-response bias, and data quality in hard-to-reach survey populations. Future research on how to improve response rates in similar hard-to-reach survey populations, a different type of higher value monetary incentive would be recommended with a value larger than 50 SEK, combined with the simpler distribution and redemption of the incentive.

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APPENDIX

Table A1a. *Effects of item non-response in the 18-39 subgroup experiment (OLS regression coefficients)*

	Baseline		Mode control	
	Model 1		Model 2	
Treatment (reference: control)	.000 (.001)		-.001 (.001)	
Paper (reference: web)			.003* (.001)	
Treatment * Paper (reference: web)			.003 (.002)	
Constant	.979*** (.001)		.978*** (.001)	
Observations	3,267		3,267	
R^2	.000		.007	

Note: $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table A1b. *Effects of item non-response in the born outside the Nordics subgroup experiment (OLS regression coefficients)*

	Baseline		Mode control	
	Model 1		Model 2	
Treatment (reference: control)	-.004 (.003)		-.008 (.006)	
Paper (reference: web)			.018** (.006)	
Treatment * Paper (reference: web)			.006 (.008)	
Constant	.957*** (.003)		.947*** (.004)	
Observations	446		446	
R^2	.002		.006	

Note: $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table A2a. Effects of the larger value monetary incentive on the share of breakoffs, partials and completes in the born outside the Nordics subgroup experiment (Multinomial logistic regression coefficients)

	dy/dx	z-value	95% CI lower	95% CI higher
Breakoffs	.0101 (.0274)	0.37	-.0438	.0639
Partials	-.0295 (.0247)	-1.19	-.0781	.0189
Completes	.0195 (.0347)	0.56	-.0486	.0875

Note: Average marginal effects of the treatment group on breakoffs, partials and completes with standard errors in parentheses. The main effects of the multinomial logistic regression breakoff, partial and complete variables were included in the regression but were dropped from the table for readability. The number of observations was 569. $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table A2b. Effects of the larger value monetary incentive on proportions of reminders sent in the born outside the Nordics subgroup experiment (mean, difference in mean)

	Mean	n	Standard error	t-value	95% CI lower	95% CI higher
Treatment group	.6052	966	.0096		.5863	.6241
Control group	.5965	936	.0097		.5774	.6156
Difference in mean	.0087		.0137	.638	-.0181	.0356

Note: Response rates were calculated in accordance with AAPOR 2016-standard (RR5). RR5 excludes some groups from the original sample which explains the somewhat reduced the sample sizes for the groups. The test was conducted by a t-test in Stata 17 SE.

Table A3a (baseline, interactions). Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and geographical settlement in the 18-39 subgroup experiment (OLS regression coefficients)

	Baseline	Sex interaction	Age interaction	Married interaction	Immigrant interaction	Geographical interaction
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Treatment (reference: control)	-.03*** (.01)	-.05*** (.01)	-.01 (.02)	-.04*** (.01)	-.05*** (.01)	-.04** (.01)
Female (reference: male)	.07*** (.01)	.06*** (.01)	.06*** (.01)	.07*** (.01)	.07*** (.01)	.07*** (.01)
Age: 25-29 (reference: 18-24)	.01 (.02)	.01 (.01)	.03+ (.02)	.01 (.01)	.01 (.01)	.01 (.01)
Age: 30-39 (reference: 18-24)	.08*** (.01)	.08*** (.01)	.10*** (.01)	.08*** (.01)	.08*** (.01)	.08*** (.01)
Married (reference: Not married)	.00 (.01)	.00 (.01)	.00 (.01)	-.01 (.02)	.01 (.01)	.00 (.01)
Born outside the Nordics (reference: Born in the Nordics)	-.20*** (.01)	-.20*** (.01)	-.20*** (.01)	-.20*** (.01)	-.23*** (.01)	-.20*** (.01)
Large city (reference: Not large city)	.02* (.01)	-.02* (.02)	-.02* (.01)	.02* (.01)	.02* (.01)	.02 (.01)
Treatment * Female (reference: male)		.02 (.02)				
Treatment * Age: 25-29 (reference: 18-24)			-.04+ (.02)			
Treatment * Age: 30-39 (reference: 18-24)			-.04+ (.02)			
Treatment * Married (reference: Not married)				.01 (.02)		
Treatment * Born outside the Nordics (reference: Born in the Nordics)					.05* (.02)	
Treatment * Large city (reference: Not large city)						.01 (.02)
Constant	.27*** (.02)	.27*** (.01)	.25*** (.01)	.27*** (.01)	.27*** (.01)	.27*** (.01)
Observations	10,660	10,660	10,660	10,660	10,660	10,660
R^2	.05	.05	.05	.05	.05	.05

Note: Unstandardized OLS regression coefficients with standard errors in parentheses.
 $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$.

Table A3b (immigrant interaction A). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and geographical settlement in the 18-39 subgroup experiment (OLS regression coefficients)*

	Immigrant interaction A	
	Model 1	
Treatment (reference: control)	-.01	(.02)
Treatment * Born outside Europe (reference: Born inside Europe but outside the Nordics)	.01	(.03)
Female (reference: male)	.05***	(.01)
Age: 25-29 (reference: 18-24)	-.02	(.02)
Age: 30-39 (reference: 18-24)	.03+	(.02)
Married (reference: Not married)	-.03*	(.02)
Born outside Europe (reference: Born inside Europe but outside the Nordics)	-.05*	(.02)
Large city (reference: Not large city)	.00	(.01)
Constant	.15***	(.02)
Observations	2,746	
R^2	.01	

Note: Unstandardized OLS regression coefficients with standard errors in parentheses.

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A3c (immigrant interaction B). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and geographical settlement in the 18-39 subgroup experiment (OLS regression coefficients)*

	Immigrant interaction B	
	Model 1	
Treatment (reference: control)	-.05***	(.01)
Treatment * Born outside Europe (reference: Born in the Nordics)	.05*	(.02)
Female (reference: male)	.07***	(.01)
Age: 25-29 (reference: 18-24)	.01	(.01)
Age: 30-39 (reference: 18-24)	.08***	(.01)
Married (reference: Not married)	.01	(.01)
Born outside Europe (reference: Born in the Nordics)	-.24***	(.02)
Large city (reference: Not large city)	.02+	(.01)
Constant	.27***	(.01)
Observations	9,901	
R^2	.05	

Note: Unstandardized OLS regression coefficients with standard errors in parentheses.

+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A3d (immigrant interaction C). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and geographical settlement in the 18-39 subgroup experiment (OLS regression coefficients)*

	Immigrant interaction C	
	Model 1	
Treatment (reference: control)	-.05***	(.01)
Treatment * Born inside Europe but outside the Nordics (reference: Born in the Nordics)	.04	(.03)
Female (reference: male)	.08***	(.01)
Age: 25-29 (reference: 18-24)	.01	(.01)
Age: 30-39 (reference: 18-24)	.09***	(.01)
Married (reference: Not married)	.02	(.01)
Born inside Europe but outside the Nordics (reference: Born in the Nordics)	-.20***	(.03)
Large city (reference: Not large city)	.02*	(.01)
Constant	.26***	(.01)
Observations	8,673	
R^2	.03	

*Note: Unstandardized OLS regression coefficients with standard errors in parentheses.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*

Table A4a (baseline, interactions). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and underprivileged in the born outside the Nordics subgroup experiment (OLS regression coefficients)*

	Baseline	Sex interaction	Age interaction
	Model 1	Model 2	Model 3
Treatment (reference: control)	-0.00 (.02)	.00 (.03)	.02 (.04)
Female (reference: male)	.03 (.02)	.03 (.02)	.03 (.02)
Age: 30-39 (reference: 18-29)	-.01 (.03)	-.01 (.03)	-.01 (.03)
Age: 40-49 (reference: 18-29)	.08** (.03)	.08** (.03)	.11** (.04)
Age: 50-59 (reference: 18-29)	.09** (.03)	.09** (.03)	.09* (.04)
Age: 60-69 (reference: 18-29)	.19*** (.04)	.19*** (.04)	.22*** (.05)
Age: 70-79 (reference: 18-29)	.13** (.05)	.13** (.04)	.08** (.06)
Age: 80-85 (reference: 18-29)	.17* (.09)	.17* (.08)	.21+ (.12)
Married (reference: Not married)	.02 (.02)	.02 (.02)	.02 (.02)
Born outside Europe (reference: Born inside Europe)	-.02 (.02)	-.02 (.02)	-.02 (.02)
Underprivileged (reference: Not underprivileged)	-.07*** (.02)	-.07*** (.02)	-.07*** (.02)
Treatment * Female (reference: male)		-.01 (.04)	
Treatment * Age: 30-39 (reference: 18-29)			-.04 (.05)
Treatment * Age: 40-49 (reference: 18-29)			-.04 (.06)
Treatment * Age: 50-59 (reference: 18-29)			.00 (.07)
Treatment * Age: 60-69 (reference: 18-29)			-.06 (.07)
Treatment * Age: 70-79 (reference: 18-29)			.11 (.09)
Treatment * Age: 80-85 (reference: 18-29)			-.07 (.16)
Constant	.18*** (.03)	.18*** (.03)	.18*** (.04)
Observations	1,998	1,998	1,998
R^2	.04	.04	.04

Note: Unstandardized OLS regression coefficients with standard errors in parentheses.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A4b (baseline, interactions). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and underprivileged in the born outside the Nordics subgroup experiment (OLS regression coefficients)*

	Married interaction		Immigrant interaction		Underprivileged interaction	
	Model 4		Model 5		Model 6	
Treatment (reference: control)	.00	(.02)	-.00	(.03)	-.02	(.02)
Female (reference: male)	.03	(.02)	.03	(.02)	.03	(.02)
Age: 30-39 (reference: 18-29)	-.01	(.03)	-.01	(.03)	-.01	(.03)
Age: 40-49 (reference: 18-29)	.08**	(.04)	.08**	(.03)	.08**	(.03)
Age: 50-59 (reference: 18-29)	.09**	(.03)	.09**	(.03)	.09**	(.03)
Age: 60-69 (reference: 18-29)	.19***	(.04)	.19***	(.04)	.19***	(.04)
Age: 70-79 (reference: 18-29)	.13**	(.04)	.13**	(.04)	.13**	(.04)
Age: 80-85 (reference: 18-29)	.17*	(.08)	.17*	(.08)	.17*	(.08)
Married (reference: Not married)	.03	(.03)	.02	(.03)	.02	(.03)
Born outside Europe (reference: Born inside Europe)	-.02	(.02)	-.02	(.03)	-.02	(.02)
Underprivileged (reference: Not underprivileged)	-.07***	(.02)	-.07***	(.02)	-.09**	(.03)
Treatment * Female (reference: male)						
Treatment * Age: 30-39 (reference: 18-29)						
Treatment * Age: 40-49 (reference: 18-29)						
Treatment * Age: 50-59 (reference: 18-29)						
Treatment * Age: 60-69 (reference: 18-29)						
Treatment * Age: 70-79 (reference: 18-29)						
Treatment * Age: 80-85 (reference: 18-29)						
Treatment * Married (reference: Not married)	-.00	(.04)				
Treatment * Born outside Europe (reference: Born inside Europe)			.01	(.04)		
Treatment * Underprivileged (reference: Not underprivileged)					.05	(.04)
Constant	.18***	(.03)	.18***	(.03)	.19***	(.03)
Observations		1,998		1,998		1,998
R ²		.04		.04		.04

Note: Unstandardized OLS regression coefficients with standard errors in parentheses.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table A4c (age linear interaction). *Effects of the larger value monetary incentive on response rate on sex, age, marital status, immigrant status, and underprivileged in the born outside the Nordics subgroup experiment (OLS regression coefficients)*

	Age interaction (linear)	
	Model X	
Treatment (reference: control)	.00	(.06)
Treatment * Age (linear)	- .00	(.00)
Female (reference: male)	.03+	(.02)
Age (linear)	.00***	(.00)
Married (reference: Not married)	.02	(.02)
Born outside Europe (reference: Born inside Europe)	-.01	(.02)
Underprivileged (reference: Not underprivileged)	-.07***	(.02)
Constant	.06	(.04)
Observations	1,998	
R^2	.03	

*Note: Unstandardized OLS regression coefficients with standard errors in parentheses.
+ $p < 0.1$, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.*



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