Article

How Do Lotteries and Study Results Influence Response Behavior in Online Panels?

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Abstract

Two incentive experiments on response behavior were conducted in a nonprofit online panel. Experiment 1 examined effects of a lottery and of the lottery's splitting into multiple prizes. Two cash lotteries and a no-incentive control group were compared. One lottery was announced to be paid out in one lump sum, whereas the other lottery was split into multiple smaller prizes. Dependent variables were two facets of response quantity, namely response and retention, and two facets of response quality, namely nondifferentiation and item nonresponse. Moreover, panelists' characteristics were tested whether they moderated the lottery effects. The lottery and its splitting did not significantly affect response behavior; however, in terms of effect sizes, splitting the lottery mildly decreased response quantity. Experiment 2 was in part aimed at replication. In addition, it examined the effect of offering study results. Dependent variables were response, retention, and nondifferentiation. The cash lottery mildly enhanced response quantity and quality, whereas splitting the lottery tended to decrease response quantity. Offering study results had no impact on response behavior, both as a stand-alone incentive and in combination with a lottery. The two experiments revealed moderating effects, but these were not stable across both studies. A share of invitees in Experiment 1 was reinvited in Experiment 2, thus enabling analysis of whether their lottery condition in Experiment 1 influenced their response behavior 5 months later in Experiment 2. No such longitudinal effects were found.

Keywords

lottery, study results, incentive, online panel, response behavior, quality

Academic and commercial researchers frequently draw upon prerecruited samples to ensure fast, cost-efficient, and high-quality online data collection (Baker et al., 2010; Göritz, 2006a). Such prerecruited samples are termed *online panels*. They provide a pool of people who have agreed to occasionally take part in web-based studies. Compared to samples that are recruited ad hoc, online panels

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allow for several advantages: Shorter field times, immediate availability of respondents at affordable costs (Göritz, 2008), and improved data quality, for example, by being able to ascertain refusal bias (O'Neil & Penrod, 2001).

To realize online panels' potential at the lowest possible costs, researchers try to move panelists who are invited to a survey to actually take part in the survey, to stay until the end of the survey, and to answer the survey questions conscientiously. Technically spoken, through offering rewards researchers aim at augmenting: (1) response, which is the share of invited panelists who call up the first page of a study, (2) retention, which is the share of respondents who stay until the final page of the study, and (3) several facets of response quality such as item nonresponse, the length of open-ended answers, and response nondifferentiation.

Possible means of rewarding panelists for their study participation are payments, redeemable loyalty points, donations to charity, study results, and lotteries. This article deals with lotteries and survey results when used in online panels. We focus on cash lotteries, that is, lotteries that raffle one or more cash prizes rather than noncash items such as vouchers or surprise gifts (Göritz & Luthe, in press; Göritz & Wolff, 2007).

Lotteries have been widely used to incite people to take part in web-based studies (e.g., Göritz, 2006a, 2006b; Göritz & Luthe, in press; Porter & Whitcomb, 2003). The frequent use of lotteries might be due to their many benefits over other rewards: They are easy to implement, transaction costs incur only for a few winners, and the incentive costs proper are considerably lower. The greater the number of people who take part in a study that relies on a lottery the more cost-efficient the lottery in comparison to a per-capita reward.

In a meta-analysis of 32 web-based incentive experiments, Göritz (2006b) finds lotteries to mildly enhance response and retention compared to no incentive: People who are offered inclusion in a lottery have their odds of responding increased by 19% (odds ratio [OR] = 1.19) and their odds of finishing the study by 26% (OR = 1.26). However, this meta-analysis might be of limited predictive value for cash lotteries that are offered in online panels. First, the meta-analysis contains many studies that were conducted outside of online panels. Second, the meta-analysis contains studies that featured types of lotteries other than cash such as lotteries of vouchers and tangible items.

Göritz (2006a) summarizes six experiments using cash lotteries in a nonprofit online panel. Compared to no incentive the lottery mildly but nonsignificantly promotes response (OR = 1.03) and retention (OR = 1.13). Similarly, Göritz and Luthe (in press) examine the effects of cash lotteries in two experiments in a nonprofit online panel. In Experiment 1, a lottery fails to significantly increase response (OR = 1.48) and retention (OR = 1.40). In Experiment 2, the lottery does not increase response (OR = 0.86) and fails to significantly increase retention (OR = 1.43).

One might speculate that in online panels in general and in nonprofit online panels in particular, people have primarily nonmaterialistic motives to participate in research such as curiosity or a desire to contribute to scientific progress as well as a higher a priori willingness to participate than people who are recruited ad hoc. Consequently, a cash lottery's effectiveness to increase response and retention is at best limited.

To date, only few web-based experiments have gone beyond the effects of lotteries on response quantity and have examined response quality as well. If the offer to be included in a lottery calls forth extrinsic motivation, respondents might be tempted to fill out the questionnaire superficially leading to lowered response quality. Inferior response quality might manifest in increased response nondifferentiation, shorter answers to open-ended question, and higher item nonresponse, among others. Some studies find lotteries to reduce item nonresponse, for example, by 3–4% in Heerwegh (2006) and by 10% in Porter and Whitcomb (2003). Both studies, however, were conducted outside of online panels so the studies leave open whether the lottery effects on response quality hold true for online panel studies.

In a nonprofit online panel, Göritz and Luthe (in press) examine the effects of cash lotteries on four facets of response quality. In Experiment 1, a cash lottery heightens the number of characters in open-ended questions and reduces nondifferentiation, but both effects did not reach a conventional level of significance. In Experiment 2, a cash lottery somewhat improves response quality, but not significantly so. Here, the examined facets of response quality are respondents' use of a "no comment" option, nondifferentiation, and item nonresponse.

To sum up, current research does not provide evidence for the existence of a noteworthy beneficial lottery effect in online panels. Therefore, to avoid spending money on possibly ineffective lotteries, two experiments are conducted in an online panel to broaden the database on the impact of cash lotteries on both response quantity and response quality. Especially response quality has hitherto hardly been looked at. However, not only is the database to be broadened but two additional issues surrounding the effect of lotteries shall be addressed.

The first issue is whether a lottery should be split into multiple prizes. If a researcher has chosen to apply a cash lottery to attract panelists to his or her study, this researcher needs to decide whether to raffle the lottery payout in one lump sum or to split it into multiple smaller prizes. Regardless of whether the lottery is split into multiple prizes the total payout and therefore the lottery's expected value remain the same. Thus, according to expected utility theory the way a lottery is split into prizes should not influence invitees' response behavior. By contrast, cumulative prospect theory posits that people overweigh extreme but unlikely outcomes (Tversky & Kahnemann, 1992). If one big prize is raffled the probability of winning is smaller than if multiple smaller prizes are raffled; thus participants are more likely to respond and be retained in the lump sum lottery. What does the literature say on this issue?

In a commercial online panel, Göritz (2004) finds that raffling the lottery's payout in its entirety rather than splitting it mildly but nonsignificantly raises response (OR = 1.07) and lowers retention (OR = .64). Likewise, in a nonprofit online panel raffling the lottery's payout in its entirety mildly but nonsignificantly raises response (OR = 1.19) and lowers retention (OR = .39). In neither of the two experiments does the splitting of the lottery have an effect on item nonresponse and nondifferentiation. Finally, in six experiments using cash lotteries in a nonprofit online panel, the effect of raffling one big prize rather than several smaller prizes on response (OR = 1.02) as well as on retention (OR = .98) is nonsignificant (Göritz, 2006a). Given this inconsistent pattern of results in the literature, will our data support expected utility theory, or will they be in line with cumulative prospect theory?

The second additional issue we examine in this work is the combined effect of lotteries and study results. The literature to-date does not tell us much about the impact of study results as incentives on response behavior—neither as a stand-alone incentive nor in combination with a lottery. The few studies that are available suggest that result summaries lower response while not affecting or slightly increasing retention (Batinic & Moser, 2005; Göritz, 2010). However, topic salience and type of feedback of study results appear to play a moderating role for the effectiveness of study results: Offering study results enhances both response and retention if topic salience is high (Tuten, Galešić, & Bošnjak, 2004) and if the feedback is not general but personalized (Marcus, Bošnjak, Lindner, Pilischenko, & Schütz, 2007).

However, there is no research whatsoever on whether study results affect response quality. If being offered study results, respondents might fill out the questionnaire more conscientiously for two reasons. First, respondents might perceive the study as more important as obviously some consequences accrue from this study. Second, being offered the study's results might induce trust and reciprocity toward the researcher.

Nothing at all is known about the interplay of employing lotteries and study results because study results have either been offered to all participants (Göritz, 2004; Göritz & Wolff, 2007; Heerwegh,

2006) or used as compensation in the control group only (Marcus et al., 2007; Tuten et al., 2004). Hence, no conclusion can be drawn pertaining to the combined impact of lotteries and study results on response behavior. On the one hand, if lotteries and study results are offered in combination, material motivation as elicited by lotteries and immaterial motivation as elicited by study results—such as curiosity, perceived importance, or trust—might both be fostered and thereby augment people's willingness to participate and to give answers of high quality. On the other hand, material and immaterial motivation might compete and cancel each other out.

The questions examined in this work (i.e., cash lottery against a no-incentive control group, splitting of the lottery, survey results, different facets of response quality as dependent variables, moderating effects of respondent characteristics, long-term effect of a cash lottery and of splitting the lottery) have been studied more or less sparsely and in particular, they have only been studied separately. This work adds value to the knowledge base in that it: (1) addresses questions that have sparsely or not at all been addressed and (2) brings together issues that have not been examined in conjunction with each other—thereby drawing a more comprehensive picture. This work answers the following questions: Is a cash lottery an effective incentive in terms of response quantity and quality in nonprofit online panels? Should the payout of a lottery be raffled in one lump sum or split into multiple smaller prizes? Are there respondent characteristics that moderate the effectiveness of lotteries and of its splitting? How does offering study results affect response behavior, and are there interaction effects with the lottery, with splitting the lottery, or with respondents' characteristics? Are there longer term effects of a cash lottery and of the splitting of this lottery on response behavior? Two experiments shed light on these questions.

Study 1

This experiment examines whether a cash lottery compared to no incentive influences response quantity and two facets of response quality, and whether raffling multiple smaller prizes instead of one lump sum makes a difference with regard to response quantity and quality. As for hypotheses, since the literature shows inconsistent effects of cash lotteries on response behavior in online panels, we conservatively propose that cash lotteries have no impact on response behavior (Hypothesis 1). Moreover, since the literature also shows inconsistent effects with regard to splitting of the lottery, in line with expected utility theory we conservatively propose that raffling multiple smaller prizes instead of one big prize does not impact response behavior (Hypothesis 2). As any effect—or its absence—regarding a lottery or its splitting may be concealed by moderators, potentially moderating demographic variables are exploratively put to the test.

Testing null hypotheses needs special reasons. First, the literature on the issue does not bear a clear message. On the one hand, the scattered positive findings in the literature insinuate that lotteries are mildly effective. On the other hand, given the inconsistency of results in the literature null hypotheses are more prudent. Second, lotteries are frequently used incentives in web-based research. If it turned out that they are ineffective (i.e., the null hypothesis is upheld) researchers could save money and effort by doing without lotteries in the future. By contrast, if lotteries are effective after all (i.e., the null hypothesis is rejected) by not revealing their effect through empirical tests researchers would forego many benefits: Compared to other incentives, lotteries are easier to implement, transaction costs incur only for a few winners, and the incentive costs proper are considerably lower. Moreover, our approach goes beyond significance testing as we take a look at the size of the lottery effects. Even if some lotteries' effectiveness turns out to be statistically significant as these lotteries cost money the size of their effect matters for practical decisions on whether to use them or not use them.

Method

Sample

People are recruited from the WiSo-Panel, a German university-based nonprofit panel that holds demographically heterogeneous panelists from all walks of life. Panelists are randomly assigned to the conditions. Invitations to the study are sent out via e-mail to all people in the panel ($N = 3{,}045$). Invitees' characteristics are shown in Table 1.

Procedure

The invitation e-mails to a survey on "life events" contain varying incentive information but are otherwise identical. The additional text segment in the lottery conditions reads: "As a way of saying thank you, we are going to raffle 90 EUR [three times 30 EUR] among the participants." The survey consists of a welcome screen, two consecutive pages with a BIG-5 inventory (BFI-K, 21 questions in one grid; Rammstedt & John, 2005) and a German version of the Regulatory Focus Questionnaire (RFQ, 11 questions in one grid; Higgins et al., 2001), and it ends with a thank-you screen. See Table 1 for details of the study.

Design

Participants in the two lottery conditions are offered to be included in a cash lottery of either 90 EUR (lump sum condition) or three times 30 EUR (split lottery condition), whereas the control group is offered no incentive. To evaluate the impact of a cash lottery, both lottery conditions are collapsed and tested against the no-incentive condition. To examine differences due to splitting the lottery, the lump sum and the split lottery condition are compared with each other.

Two dependent variables indicate response quantity: (1) response (i.e., whether a panelist calls up the study's first page) and (2) retention (i.e., whether the respondent finishes the study). Furthermore, two dependent variables indicate response quality: (1) Nondifferentiation, which is a stereotypical response pattern in grid questions reflected in the tendency to give identical answers blockwise (sometimes also called straightlining). Each respondent's nondifferentiation index (Holbrook, Green, & Krosnick, 2003; Tourangeau, Couper, & Conrad, 2004) is the frequency of the most frequently chosen answer in each grid divided by the number of grid questions in the questionnaire, whereby the latter is adjusted by the number of omitted items. This index of nondifferentiation theoretically ranges from 0 to 1, with lower values indicating less nondifferentiation, that is, higher response quality. The lowest possible value of nondifferentiation, however, depends on the number of questions forming one grid and the number of scale points in the grid. The lowest possible value of nondifferentiation in this study is .25. (2) Item nonresponse, which is the percentage of omitted free-choice items. Analyses pertaining to item nonresponse are restricted to retainees to prevent confounding with retention. Item nonresponse ranges from 0 to 1, with lower values indicating higher response quality.

As potential moderators, we take five demographic details into consideration that panelists provided at their registration with the panel, namely sex, age (in years), education (originally five levels, but to prevent statistical flukes in small subgroups we exclude 23 panelists without graduation leaving us with four levels), frequency of Internet use (originally six levels, but we dichotomized this variable into "daily" and "less frequent" because the six subgroups were vastly unequal), and panel tenure (in years). Moreover, we examine whether retainees in the incentive groups differ in the Big-5 personality factors extraversion, openness for experience, neuroticism, agreeableness, and conscientiousness, which were collected in the survey.

Table 1. Characteristics of Experiments 1 and 2.

Study Topic	Field Time	Lottery		Announced Duration of Study [min]	No. of Invited Panellists	Age (*SD*), Range	Women (%)	A-Levels or Higher (%)	Daily Internet Use (%)	Panel Tenure Years (*SD*)
		Lump Sum	Splitting							
1: Life events	03/01/2006 until 16/01/2006	90 EUR	3 × 30 EUR	5	3,045	35 (11), 9–1	53	65	79	1.9 (1.8)
2: Brand choice	6/06/2006 until 22/06/2006	100 EUR	5 × 20 EUR	15	1,029	35 (12), 15–91	53	61	82	1.9 (1.9)

Table 2. The Effect of Lotteries and of Splitting the Lottery in Experiment 1.

		Lottery		Lottery vs. No Lottery		Lump Sum vs. Split Lottery	
Characteristics	No Lottery	3 × 30 EUR (split)	90 EUR (lump sum)	Effect Size	*p*	Effect Size	*p*
n invited	1,012	1,012	1,021				
Response (rate)	542 (53.6%)	531 (52.5%)	568 (55.6%)	OR = 1.02	.79	OR = 1.14	.15
Retention (rate)	507 (93.5%)	496 (93.4%)	543 (95.6%)	OR = 1.20	.42	OR = 1.53	.11
Nondifferentiation (SD)	.44 (.08)	.44 (.09)	.43 (.08)	$d = -.02$	.76	$d = -.01$	.89
Item nonresponse (*SD*)	.01 (.06)	.00 (.05)	.00 (.04)	$d = -.05$	.30	$d = -.01$	.93

Analyses

To test our hypotheses, regression analyses are carried out. Response and retention—as dichotomous dependent variables—are tested using logistic regression. Reported effect size is OR. The other dependent variables are continuous and are therefore subjected to linear regression. Reported effect sizes are β-values and Cohen's *d*. Moderator analyses are carried out with the main effects of the independent variable and the moderator in question plus this moderator's interaction with the independent variable included in the model.

Because of postulating null effects of the independent variables on response behavior, the probability of finding a null effect in the sample while an effect in the population does exist needs to be kept as small as possible. As this β error cannot be influenced post hoc, a significance level of .10 is adopted. This does not hold true for the exploratory moderator analyses, where no direction of effect is hypothesized and where many tests are conducted. To prevent immoderate inflation of α error, we keep the conventional significance level of .05 for moderator analyses.

Results

Overall, 54% of invited panelists respond to the invitation and 94% of them finish the study (see Table 2).

Lottery versus no lottery. No significant difference emerges between the two collapsed lottery conditions and the control condition with regard to response, retention, nondifferentiation ($\beta = -.01$, *ns*) and item nonresponse ($\beta = -.03$, *ns*). With regard to possible moderators that were collected from all invitees, 20 tests (4 dependent variables × 5 moderators) are conducted, of which two reveal significant interactions. In the presence of a lottery, nondifferentiation is less frequent with men ($\beta = -.26$, $p = .028$) and fewer items are skipped the higher a panelist's education ($\beta = -.33$, $p = .029$). Moreover, there is no difference between retainees in the Big-5 in the lottery versus control condition (all ps > .1).

Splitting the lottery. There is no significant difference between raffling a lump sum and multiple smaller prizes with regard to response and retention, although a greater percentage of people take part and finish the study with the lump sum lottery. Nondifferentiation and item nonresponse are linearly independent of splitting the lottery (both $\beta = .00$, *ns*). With regard to possible moderators that were collected from each invitee, one of the 20 tests (4 dependent variables × 5 moderators) reveals a significant interaction: Splitting the lottery deters more recently registered panelists from finishing the survey (OR = 1.57, $p = .003$, per year of tenure for split lottery vs. lump sum).

Moreover, retainees in the lump sum versus split lottery condition do not differ in the Big-5 (all $ps > .1$), except for one personality factor: Retainees in the split lottery are more open for experience than retainees in the lump sum lottery ($t = 2.41$, $p = .02$).

Discussion

The lottery does not significantly affect response behavior. Response quantity and quality are somewhat higher with the lottery, but all these effects remain below the level of significance. Thus, Hypothesis 1 is confirmed. In Bošnjak and Batinic (2002), people report the motives for their participation in online studies in descending importance: curiosity, contribute to scientific progress, learn something about oneself, and material incentives. In online panels—especially in nonprofit ones—the nonmaterialistic motivation can be assumed to be even stronger and the initial willingness to participate to be higher compared to web-based studies with ad hoc recruitment, as panelists consented to occasionally take part in studies with their registration. In addition, the duration of Study 1 was announced to be 5 min, which might be short enough that no material incentive is required to increase the motivation to take part. This explanation is strengthened by high baseline response and retention and is corroborated by Marcus et al. (2007), who show higher response in shorter surveys independent of the incentive. High initial nonmaterialistic motivation paired with short completion time presumably leads to a ceiling effect of motivation. In other words, a lottery can hardly increase motivation any further.

With regard to the splitting of the lottery, response and retention are somewhat higher if one big prize rather than several smaller prizes are raffled. However, both effects narrowly fail the significance level of .1. Thus, Hypothesis 2 is formally upheld, but the next experiment will sound out the robustness of this finding.

Four moderating effects of sex, education, panel tenure, and openness for experience are observed. These moderating effects appear scattered over both the independent variables (i.e., lottery vs. no lottery, splitting the payout) as well as the outcome variables (i.e., nondifferentiation, item nonresponse, retention), have not been postulated beforehand, and might have been found erroneously on account of the high number tests conducted. Their robustness is looked at in the second experiment.

Panelists—especially in nonprofit online panels—hardly seem to be driven by materialistic motives. Thus, incentives other than lotteries might be more attractive. In view of the three most frequently self-reported motives for taking part in online studies, curiosity, contribution to scientific progress, learning about oneself (Bošnjak & Batinic, 2002), study results might be a suitable incentive, as they might be able to satisfy these immaterial motives. It is yet unclear how material and immaterial incentives act together on response behavior. The next experiment is aimed at examining the robustness of findings in Study 1, but adds value in that it extends the inquiry to offering study results.

Study 2

This experiment examines: (a) whether a cash lottery compared to no incentive influences response quantity and quality, (b) whether splitting the lottery into several smaller prizes makes a difference, (c) whether study results are an effective incentive, (d) whether there is an interaction of the lottery or its splitting with offering study results, and (e) whether the lottery condition implemented in Study 1 has an effect on the share of people who are reinvited to Study 2. In addition to the same hypotheses pertaining to offering a cash lottery (Hypothesis 1) and to splitting the lottery (Hypothesis 2) that were posited in Study 1, we postulate that offering study results has no or only negligible impact on response behavior (Hypothesis 3). We propose a null effect of study results because topic

salience is assumed to be low and the feedback is not personalized (Marcus et al., 2007; Tuten et al., 2004). The interactions of study results with the lottery and its splitting are exploratively tested. Furthermore, a share of invitees in Study 1 was reinvited in Study 2, thus enabling explorative analysis of whether their lottery condition in Study 1 influenced their response behavior 5 months later in Study 2.

Method

Sample

Invitations are e-mailed to 1,029 randomly selected panelists from the same panel that was used in Study 1 (see Table 1). Thereof, 780 people had already been invited to Study 1.

Procedure

The invitation e-mails to a survey on ''brand choice'' contain varying incentive information but are otherwise identical. Depending on condition, the text segment with the lottery reads: ''We are going to raffle 100 EUR [5 times 20 EUR] among the participants.'' In the conditions offering study results, the e-mail additionally mentions: ''If you are interested, you will receive this study's results.'' There are five versions of the questionnaire with slightly different content but comparable length. Depending on branching, the survey consists of 18–21 pages with a total of 86–104 items. We restrict all analyses pertaining to response quality to the sections that are identical in each version: the welcome screen, two pages with a total of 21 questions in two grids capturing need for cognition, one page with eight questions in one grid about brand awareness, and a debriefing page at the end on which eligible respondents can request study results. See Table 1 for details of the study.

Design

We implement a 2×3 factorial design, resulting in six experimental groups: Participants are either offered study results or not. Crossed with study results, participants are either not offered a lottery, offered to be included in a cash lottery paid out in a lump sum of 100 EUR (i.e., lump sum lottery) or offered to be included in a cash lottery with five prizes each worth 20 EUR (i.e., split lottery). There are three dependent variables (i.e., response, retention, and nondifferentiation) and six potential moderators (i.e., sex, age, education, frequency of Internet use, panel tenure, and survey results). The lowest possible value of nondifferentiation is .19.

Analyses

To evaluate the impact of a cash lottery, we collapse the four lottery conditions and test them against the two collapsed no-lottery conditions (i.e., no study results or results). To examine differences due to splitting the lottery, the two lump sum conditions are collapsed and compared to the two collapsed split lottery conditions. Otherwise, the approach is the same as in Study 1.

Results

Across the six conditions, 41% of invited panelists respond to the invitation and 83% of them finish the study (see Table 3).

Table 3. The Effect of Lotteries and of Splitting the Lottery in Experiment 2.

		Lottery		Lottery vs. No Lottery		Lump Sum vs. Split Lottery	
Characteristics	No Lottery	5 × 20 EUR (split)	100 EUR (lump sum)	Effect Size	*p*	Effect Size	*p*
n invited	343	344	342				
Response (rate)	124 (36.2%)	144 (41.9%)	158 (46.2%)	OR = 1.39	.02	OR = 1.19	.25
Retention (rate)	96 (77.4%)	117 (81.3%)	140 (88.6%)	OR = 1.67	.06	OR = 1.79	.08
Nondifferentiation (*SD*)	.44 (.14)	.41 (.12)	.41 (.12)	$d = -.21$	.05	$d = .06$	.64

Table 4. The Effect of Study Results in Experiment 2.

Characteristics	No Results	Study Results	Effect Size	*p*
n invited	513	516		
Response (rate)	213 (41.5%)	213 (41.3%)	OR = .99	.94
Retention (rate)	177 (83.1%)	176 (82.6%)	OR = .97	.90
Nondifferentiation (*SD*)	.42 (.13)	.42 (.12)	$d = -.02$	.86

Lottery versus no lottery. In the presence of a lottery, response is significantly higher (44.1%) than without a lottery (36.2%). Furthermore, retention is higher with a lottery (85.1%) than without (77.4%). Given the significance level of 10%, this effect is statistically significant. With regard to response quality, nondifferentiation is slightly and significantly lower with a lottery ($\beta = -.10$, $p = .053$). To specify the size of this effect, without a lottery, people select the same answer in a grid once more on average. None of the 18 moderator tests (3 dependent variables × 6 moderators) reveals a significant interaction.

Splitting the lottery. Although response tends to be higher if one big prize is raffled, this effect is not statistically significant. Retention is lower with the split lottery. Nondifferentiation is independent of splitting the lottery ($\beta = .03$, *ns*). In total, 18 moderator tests (3 dependent variables × 6 moderators) are performed, of which two reveal significant interactions: (1) Men are more likely to respond to a study if offered the lump sum lottery (OR = .53, $p = .043$, for men vs. women for split lottery vs. lump sum lottery) and (2) splitting the lottery prevents younger responders from finishing the study (OR = 1.08, p = .020, per year for split lottery vs. lump sum).

Offering study results. The offer of results (see Table 4) does not impact response, retention, and nondifferentiation ($\beta = -.01$, *ns*). Only one of the 15 moderator tests (3 dependent variables × 5 moderators) reveals a significant interaction: More educated panelists are less likely to drop out of the study if results are offered (OR = 1.77, $p = .036$, per rising education level for results vs. no results).

Interaction effects. There is no interaction effect between the lottery and offering study results on response (OR = 1.00, $p = .99$), retention (OR = .59, $p = .33$), and nondifferentiation ($d = .17$, $p = .11$). Moreover, there is no significant interaction effect between splitting the lottery and study results on response (OR = 1.80, $p = .06$), retention (OR = .72, $p = .61$), and nondifferentiation ($d = .21$, $p = .10$).

Overlap between Study 1 and Study 2. The offer of a lottery in Study 1 does not influence whether the same people respond to Study 2 ($n = 780$; $\varphi = -.01$; $p = .77$) and whether they are retained in Study 2 ($n = 280$; $\varphi = .07$; $p = .27$), which was conducted about 5 months after Study 1. Furthermore, the offer of a lottery in Study 1 does not impact nondifferentiation in Study 2 ($n = 230$; $t = .90$; $p = .37$). Moreover, splitting the lottery in Study 1 does not influence whether the same people respond to Study 2 ($n = 526$; $\varphi = .02$; $p = .72$) and whether they are retained in Study 2 ($n = 187$; $\varphi = -.01$; $p = .98$). Furthermore, splitting the lottery in Study 1 does not influence nondifferentiation in Study 2 ($n = 158$; $t = .55$; $p = .58$).

Discussion

The cash lottery significantly increases response quantity and quality. Thus, Hypothesis 1 (i.e., no effect of the lottery) is rejected. At first sight, the beneficial effect of a lottery in Study 2 seems to contradict the null finding in Study 1. However, in both experiments the direction of the effects is the same, only the effects' size differs. There are differences between the two studies that might account for the larger effect in Study 2 by way of having prevented a motivational ceiling effect: First, the invitation e-mail announces a longer duration of the survey (i.e., 15 min in Study 2 in contrast to only 5 min in Study 1), which renders a reward more salient (Marcus et al., 2007). Moreover, Study 2's topic is "brand choice," which introduces a more commercial context than Study 1's topic, which is "life events." In general, the attitude toward scientific and nonprofit studies is more positive than toward commercial studies, hence the baseline willingness to participate is greater in nonprofit than in commercial online studies (Bošnjak & Batinic, 2002). The overall lower response and retention rate in Study 2 compared to Study 1 evidence the lower quantity of motivation (i.e., no motivational ceiling effect) in Study 2 compared to Study 1. In addition, in terms of quality of motivation, the commercial topic in Study 2 presumably impairs intrinsic motivation and brings to the fore material motives.

Furthermore, splitting the lottery significantly reduces retention and slightly, but nonsignificantly reduces response. Response quality is not affected. Thus, Hypothesis 2 (i.e., no effect of splitting the lottery) is partly rejected. Again, in both Study 1 and Study 2 the direction of the effects is the same, while the size of the effects is larger in Study 2. This might be due to panelists' lower baseline motivation to participate in Study 2, thus leaving more room for an effect of the splitting of the lottery.

There is no effect of offering study results, which confirms Hypothesis 3 (i.e., no effect of study results). Furthermore, a lottery and study results show no interaction when being combined. Finally, moderating effects of sex, education, and age are observed. These effects are scattered over the independent variables (i.e., splitting the lottery and study results) as well as over the dependent variables (i.e., response and retention), they have not been postulated beforehand, they are different from moderating effects found in Study 1, and they might have been found erroneously given the high number of 51 tests performed. Thus, their robustness is questionable and should be examined in more depth in future research.

In the overlap of Study 1 and Study 2, the offer of a lottery as well as the splitting of the lottery in Study 1 does not influence response, retention, and nondifferentiation five months later in Study 2. Given that already in Study 1 there were no significant lottery effects it is no surprise that no lottery effects were found 5 months later. Moreover, it is possible that invitees in Study 1 had simply forgotten about the incentive when they were re-invited about 5 months later. This null finding certainly does not rule out carry-over effects of incentives to later studies, especially if the interval between studies is shorter than 5 months. Moreover, such longitudinal effects might be found on facets of response behavior other than examined in this study.

General Discussion

Despite some differences in statistical significance, the result pattern in Studies 1 and 2 is alike. In both studies a lottery mildly increases response quantity and quality. This finding was made in most prior online panel experiments on response (Göritz, 2006a; Experiment 1 in Göritz & Luthe, in press) and in all prior online panel experiments on retention (Göritz, 2006a; Göritz & Luthe, in press). Lotteries' response- and retention-enhancing tendencies, however, do not always reach statistical significance because of varying effect size and test power. This work provides a hint at what influences the effectiveness of a cash lottery: Longer study duration and a commercial rather than scientific study topic prevent a motivational ceiling effect, thus leaving more scope for the lottery to unfurl its effect. To sound out this idea in more depth, future studies could systematically vary study duration as well as the nature of the study topic. What the studies at hand cannot answer, however, is whether a different lottery payout brings about stronger effects.

In a similar vein, the two experiments show that splitting a lottery into multiple prizes harms response quantity. The response-diminishing effect of splitting the lottery is in line with all previous online panel experiments on splitting a lottery (Göritz, 2004; 2006a), whereas a retention-diminishing effect of splitting the lottery has not been observed before (Göritz, 2004, 2006a). Even if the effect of the splitting of the lottery does not always reach statistical significance, the result pattern across the two experiments lends itself to tentative interpretation: While the lump sum lottery and the split lottery do not differ in payout and therefore in expected value the value of the single prizes differ. A single prize, however, is the actual sum an individual participant receives in case of winning. The pattern found in the data is at odds with expected utility theory, which posits the lump sum and the split lottery to be equal because their expected value is the same. Instead, the pattern found is in line with cumulative prospect theory, which predicts that people overweigh extreme but unlikely outcomes and hence are risk seeking with low-probability gains (Tversky & Kahnemann, 1992). However, any conjectures about an underlying decision model remain speculative because invited panelists were not told how many people were invited, and therefore panelists were unable to determine their odds of winning. Moreover, despite the experimental design that was used, invitees' assumptions about the number of invited people might not have been the same in the two versions of the lottery. The information of how the lottery is split and participants' assumption as to the number of invitees might be confounded in these between-subjects experiments (Birnbaum, 1999). Specifically, panelists who are told that multiple prizes are raffled might think that more people have been invited to the study than panelists who are only told a lump sum. In addition, low odds of winning might induce more suspense and might thus be perceived more attractive than higher odds of winning (Demaree, DeDonno, Burns, & Everhart, 2008), which would also entail the split lottery to reduce response quantity. As an outlook on further research, a more extreme splitting of the lottery might bring about different effects.

When looking at response quality, we find no consistent or practically relevant impact of cash lotteries and of splitting the lottery. These findings corroborate Göritz (2004) and Göritz and Luthe (in press). However, it remains open to further examination whether lotteries influence facets of response quality other than nondifferentiation and item nonresponse such as socially desirable responding and acquiescence.

Offering study results neither enhances response quantity nor response quality. Several reasons might account for this null effect: (1) We offered a general result summary instead of personalized feedback (Tuten et al., 2004), (2) the salience of Study 2's topic was probably low (Marcus et al., 2007), and (3) the commercial topic of Study 2 might have dampened intrinsic motives, which study results likely appeal to, and/or put off invitees with high intrinsic motivation by way of a self-selection effect. The question of whether results' effectiveness differs with study topic and context as well as type of feedback needs to be answered in future research. As there is no interaction of

study results with the lottery or with its splitting, we find no evidence for a benefit or danger of offering study results in combination with lotteries.

Moderator analyses show that response behavior as a function of a cash lottery, of its splitting and of study results partly depends on panelists' characteristics. In Study 1, men give higher quality answers with the lottery, and in Study 2, men are more likely to respond if the lottery is not split. Moreover, younger panelists in Study 2 are more likely to be retained if the lottery is not split. This pattern likely is due to men and young people being more risk seeking than women and older people (Lauriola & Levin, 2001). Another plausible moderator is Study 2's finding that more educated people are more likely to be retained if study results are offered. However, three moderator effects in Study 1 do not lend themselves to such straightforward interpretation, namely (1) more educated people respond to more items if a lottery is offered, (2) longer term panel members are more likely to be retained if the lottery is not split, and (3) retainees in the split lottery are more open for experience than retainees in the lump sum lottery. However, as these effects have cropped up in the work at hand future studies could look for them more directly. This points to the general caution that the moderators found in both experiments might be chance findings as they are scattered across the independent and dependent variables, they are not stable across both experiments, and a large number of moderator tests was conducted. Moreover, additional participant and study characteristics not looked at in this work might have a moderating effect as well such as income or topic salience.

The fact that both experiments are conducted in the same online panel is a mixed blessing. On the downside, it leaves unclear if the results generalize to other—especially nonprofit—online panels. On the upside, the two experiments are comparable in many background variables, which reduces confounding that would occur in comparisons of studies conducted in different panels. Moreover, the overlap of both experiments in terms of participants presented an opportunity to examine the carry-over effects of cash lotteries from one study into a subsequent study.

To give recommendations for practical use, employing a cash lottery is worthwhile if the lottery is inexpensive, announced as a lump sum, and respondent burden is high and/or participants' initial motivation low. A result summary does not confer any benefit.

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