The Researcher, the Incentive, the Panelists, and Their Response: The Role of Strong Reciprocity in Panelists' Survey Participation

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In this article, the hypothesis of reciprocity is tested *directly* in order to contribute to an evidence-based explanation of *how* and *why* an unconditionally prepaid monetary incentive is the most effective and efficient strategy for boosting response rates in surveys. In the context of a multiple-wave panel, Swiss juveniles who received cash are interviewed in an online survey concerning their taste for reciprocity. This information is used in the next panel wave a year later to reveal the effect of the panelists' reciprocal preferences and altruistic reciprocity on their propensity to start completing an online questionnaire. Applying longitudinal para-data from the fieldwork period and the statistical procedures of event history analysis, it is found that panelists who indicate strong reciprocal preference are more likely to take part in the survey immediately after the invitation compared to those invitees with weak reciprocal preferences. It is also found that the likelihood of reciprocating declines the greater the time since the gratuities are given and the invitation to participate in the survey is delivered. In sum, prepaid monetary incentives are necessary but not sufficient for enhancing response rates: they are one of several strategies for inducing target persons' participation in surveys.

Keywords: Event history analysis; online survey; panel; preference; prepaid monetary incentive; reciprocity; response rate

1 Introduction

In the research on survey methods, a huge number of randomized trials and quasi-experimental studies provide strong empirical evidence that unconditionally prepaid monetary incentives are among the most efficient and effective strategies for enhancing response rates in surveys (Blohm & Koch, 2021, p. 694; Lipps et al., 2019, p. 6; Becker et al., 2019, p. 222; Göritz, 2015, p. 343; Blom et al., 2015, p. 7; Pforr et al., 2015, p. 744; Mutti et al., n.d., p. 339; Singer & Ye, 2013, p. 114; Scherpenzeel & Toepoel, 2012, p. 483; Lipps, 2010, p. 81; Laurie & Lynn, 2009, p. 205; Singer & Couper, 2008, p. 49; Birnholtz et al., 2004, p. 357; Davern et al., 2003, p. 140; Singer et al., 1999, p. 225; Warriner et al., 1996, p. 545; Church, 1993, p. 75; Wotruba, 1966, p. 400) This prepayment also contributes significantly to the target persons' willingness to participate in a follow-up survey (Blom et al., 2015, p. 13; Singer et al., 1999; Singer et al., 1998), as well as to an increased speed of survey return (Becker & Mehlkop, 2011; Becker et al., 2019; Lipps, 2010). These findings have been observed for general and special populations (Becker & Mehlkop, 2011; Becker et al., 2019; Blohm & Koch, 2021; Cantor et al., 2008; Conn et

al., 2019; Deutskens et al., 2004; Mehlkop & Becker, 2007; Mercer et al., 2015; Singer & Kulka, 2002; Szelényi et al., 2005), as well as for different survey modes (Singer et al., 2000; Yu & Cooper, 1983). For example, there is evidence that prepaid cash works for mail surveys (Church, 1993; Edwards et al., 2005; Fox et al., 1988; James & Bolstein, 1992; Linsky, 1975; Yammarino et al., 1991) and for telephone surveys (Cantor et al., 2008; Lipps & Pekari, 2016; Singer et al., 1999; Singer et al., 2000). Even for innovative survey modes that have relatively low response rates, such as web-based online surveys, several studies demonstrate that prepaid monetary incentives significantly enhance response rates (Becker et al., 2019; Birnholtz et al., 2004; Blom et al., 2015; Cook et al., 2000; Fan & Yan, 2010; Göritz, 2006, 2015; LaRose & Tsai, 2014; Lipps & Pekari, 2016; Manzo & Burke, 2012; Millar & Dillman, 2011; Porter, 2004). This effect also holds true for cross-sectional surveys and for panel studies (Becker et al., 2019; Blohm & Koch, 2021; Blom et al., 2015; Castiglioni et al., 2008; Diekmann & Jann, 2001; Jäckle & Lynn, 2008; Laurie & Lynn, 2009; Lipps, 2010; Mehlkop & Becker, 2007).

Most of the aforementioned studies—apart from the modification of the invitees' cost-benefit calculation in favor of their decision to take part in the survey as stressed by economic and sociological rational action theories (e.g. Becker et al., 2019) or supplementing the respondent's intrinsic motivation with extrinsic incentives as pointed out by the so-

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cial exchange theory (Dillman, 2000)—refer to classic contributions on the *logic of reciprocity* in order to explain the effect of unconditionally prepaid monetary incentives on response rates. Since reciprocity is defined as a mutual social exchange between actors, and is a fundamental principle in the social actions of human beings, it is assumed that the principle of give, take and reply is the main *mechanism* responsible for the positive effect of prepayment on response rates (Becker et al., 2019, p. 223; Singer & Ye, 2013, p. 115; Scherpenzeel & Toepoel, 2012, p. 472; Jäckle & Lynn, 2008, p. 107; Ryu et al., 2005, p. 91; Jobber et al., 2004, p. 21; Porter, 2004, p. 8; Warriner et al., 1996, p. 546). From a *sociological view*, it is claimed that sampled and invited target persons are more likely to take part in a survey if a universal norm of reciprocity has been established between themselves and the researchers or the survey management (Gouldner, 1960; Mauss, 1923/1924; Simmel, 1908). In an exchange situation, this norm will be legitimized by giving a gift and accepting it.

The *economics of strong reciprocity* provides an alternative approach (Falk & Fischbacher, 2005; Fehr & Fischbacher, 2005; Fehr et al., 2002; Fehr & Gächter, 1998, 2000), and one that is compatible with arguments on the potential respondents' cost-benefit calculation in favor of an immediate survey response (Singer, 2011). If the researchers' unconditionally prepaid monetary incentive is interpreted by the invitees receiving the donation as a kind act of cooperation, they expect to optimize their own and the researchers' payoff by a positive and fair response to the donors' request for survey participation (Fehr et al., 2002). As a result, provided that the invitees have a strong preference for reciprocity, survey participation on the part of the recipients should be likely. Otherwise, maybe regardless of the strength of their taste for reciprocity, if the prepayment is considered an unkind act by them, then the invitees might refuse to take part in the survey. In sum, after receiving cash, the invitees' strong preference for reciprocity is seen as an important motivational driver for survey participation. From the point of view of those with a strong preference for reciprocity, their likelihood of taking part in the survey should be particularly high if the gift is seen as an act of kindness.

In their contribution, Singer and Ye (2013, p. 115) note that "there is no research on whether the respondent actually feels the obligation to respond; nor have survey researchers explored the perceptions of respondents with respect to the benefits and costs of answering survey questions."[1] Indeed, in the area of survey research, there is still no *direct test* of the hypothesis of reciprocity. Empirical studies measuring individuals' reciprocal preferences in responding to the researchers' prepayment, and the effect of this on survey response directly, are still missing. Instead, in terms of an indirect test of this hypothesis, the correlation of a prepaid incentive and a response has been interpreted in the sense of

the norm of reciprocity (Gajic et al., 2012, p. 797; Diekmann & Jann, 2001, p. 25). However, interpretations of empirical findings which are consistent with notions of reciprocity motivating responses to prepaid incentives do not provide a valid test of a reciprocity hypothesis per se. Thus, from the point of view of potential respondents, the validity of the preferences for strong reciprocity itself has not yet been revealed.

Therefore, in regard to the effect of prepayment on survey participation, the question is still open: is reciprocity really a key element in explaining the emergence of social cooperation between researchers and their sampled target persons? To answer this question, there is a need to measure the individuals' preference for reciprocity directly in order to overcome the *identification problem* (Manski, 1995) and to measure if this preference is correlated with the survey responses of invitees receiving the donation. This contribution seeks to fill this gap in the research on survey methods empirically. A direct test of the reciprocity hypothesis is conducted in the context of a multiple-wave panel study on young people's educational and occupational trajectories in Switzerland (Becker et al., 2020). The target population consists of juveniles born around 1997 and living in the German-speaking cantons of Switzerland. In Wave 8, conducted in May and June 2020, the panelists were interviewed about their reciprocity intentions in the event that they received a gift. One year later (2021), the most recent Wave 9 was completed in the same months (May and June). This provides a unique opportunity to analyze the impact of the panelists' standards of reciprocity in respect of their survey participation, speed of survey return (indicated by the latency period, i.e. the time that elapses between survey launch and response) and the sustainability of their reciprocity across the fieldwork period after the receipt of an unconditionally prepaid monetary incentive (10 Swiss Francs in cash). For the longitudinal analysis, the fielding paradata are linked with the panelists' preferences for reciprocity and other panelist characteristics. The linked data are analyzed by means of statistical procedures of event history analysis in order to reveal the short- and long-term effect of reciprocity on the panelists' response behavior.

In the remainder of this article, Section 2 outlines the the-

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[1] It has to be kept in mind that targeted persons who have some experience in survey participation or have been requested to take part in a survey consider these previous experiences in light of their recent decision (Stocké & Langfeldt, 2004). In particular, for long-running panel studies, the history of previous participation of their panelists could influence the perceived strength of the reciprocal impulse ("money in the hand"). There is evidence that the interviewees receiving previous donations have no significant expectations of future monetary incentives (Singer et al., 1998). Additionally, it is found that, generous in their amount, time-limited promised and postpaid monetary incentives seem to be more successful in bringing back nonrespondents to the current panel survey (Friedel et al., 2022).

oretical background and the hypotheses to be tested. Section 3 comprises a description of the data, variables and statistical procedures. Section 4 presents the empirical findings, while Section 5 presents a discussion and conclusion.

2 Theoretical considerations

Since participation in a social-scientific survey is voluntary, the individuals who are asked to take part are free to accept or reject that request (Groves & Couper, 1998, p. 1). Their decision regarding survey participation is thus based on their "free will" (Blossfeld, 1996, p. 197). Therefore, in the case of self-administered surveys at least, they can choose their own time to respond to the request (Groves & Couper, 1998, p. 32). They can respond immediately after the invitation, at a later more convenient point in time, or never. Thus, intrinsically or extrinsically motivated survey participation, as observed by social researchers, can be conceptualized as the result of individuals' subjective rational decisions (Singer, 2011), and can occur at any point in time (Sigman et al., 2014). When a researcher encloses an unconditionally prepaid monetary incentive in their request for survey participation (the invitation letter), it is done out of a strategic motivation. This "thank you in advance" represents a *strategic reciprocity* based on the long-term rational calculation of "encouraging" the target person to take part in a survey in order to optimize the total response rate (Berger & Rauhut, 2015, p. 719). Through the researchers' prepayment, a *heteromorphic reciprocity* (Gouldner, 1960, p. 172) – i.e. exchange of answers for cash—should be initiated. In terms of *conditional fairness* (Diekmann, 2004, p. 489), the target persons who have received the money might take part in the survey as a subjectively equivalent response to the researcher's kind request.

As already mentioned above, it is observed that, in terms of *altruistic reciprocity* as a form of unconditional kindness (Fehr & Gächter, 2000, p. 160), invitees reciprocate positively to such a request without any prepaid incentive, while target persons who have received money are usually more likely to respond more quickly after the receipt of the "gift" than unpaid invitees. Generally, from the *theoretical view of rational choice*, it is argued that the prepayment outweighs the target persons' cost (e.g. time or effort) and increases their net benefit of survey participation (Becker & Glauser, 2018; Becker & Mehlkop, 2011; Singer & Ye, 2013). According to the *economics of strong reciprocity approach*, there are additional benefits for the invitee arising from the reciprocal exchange and the distribution of the payoffs among target person *i* and the researcher *j*—besides the invitee's material benefit π_i based on the prepayment (Fehr & Fischbacher, 2005, p. 194). The *kindness term* φ indicates the target person's kindness experiences from the researcher's request for survey participation. If this term is positive, the researcher's request is considered as kind by

the invitee; otherwise, the request is perceived as an unkind intrusion. The *reciprocation term* σ measures the invitee's response to this request. The outcome of the response, i.e. participation or refusal, is the researcher's payoff. The product of the kindness term φ and the reciprocation term σ defines the *reciprocity utility*. The size of the reciprocity utility is anchored in the target person's interest in an equitable share of the payoffs.[2] The distribution of the payoffs is based on the target person's strength of *reciprocal preferences* ρ_i (Fehr et al., 2002, p. C2). In regard to reciprocal fairness, this reciprocity parameter ρ_i captures the likelihood that a target person *i* will respond to the request of researcher *j*. The reciprocity utility is weighted by the invitee's strength of reciprocal preferences. The donated target person's utility of survey participation U_i is expressed by the following formula: $U_i = \pi_i + \rho_i \varphi \sigma$ (Falk & Fischbacher, 2005, p. 193). Overall, the researcher's payoff in terms of the invitee's survey participation is conditional on the invitee's subjective perception of the kindness of the researcher's request, and on the invitee's reciprocal preferences (Fehr & Fischbacher, 2005, p. 153; Fehr et al., 2002, p. 17). The invited target person's utility is derived from their own pecuniary payoff and a fair payoff distribution (Fehr et al., 2002, p. C7). [3] Due the willingness to sacrifice resources (e.g. time and effort on completing the questionnaire), the target person's survey participation is a reciprocal response to a perceived kind or unkind act (Fehr et al., 2002).

However, given that the expected benefit of survey participation is low, the *reciprocal preferences* and the *reciprocity utility* have to be stronger than the cost of survey participation expected by the interviewees. In other words, the strength of reciprocal preferences must exceed the constraints for the person to participate in a survey. Therefore, target persons with strong reciprocal preferences are more likely to take part in a survey than those with weak reciprocity. An unconditionally prepaid monetary incentive will be more likely to be promptly reciprocated by those target persons with a strong

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[2]There has been indirect confirmation that an individual inclines toward conditional fairness in the case of prepaid monetary incentives. For example, Becker and Mehlkop (2011) and Becker et al. (2019) report that some nonrespondents returned the money they had received before since they did not complete the questionnaire. Therefore, they felt that they did not deserve the money.

[3]Furthermore, in line with the theory of strong reciprocity, it is found empirically that recipients appear to be more averse to over-benefiting from social exchanges than they are to under-benefiting from them (Uehara, 1995). This might explain why there is no strict linear relationship between the amount of prepaid monetary incentive and the likelihood of a response (Church, 1993; James & Bolstein, 1990, 1992; Mercer et al., 2015). Although it is mostly observed that higher incentives result in significantly higher response rates (Hsu et al., 2017), it is also argued that it is the act of giving an unconditional incentive itself, not its value, which boosts the response rate.

reciprocal preference in contrast to invitees with a weak reciprocal preference (*Hypothesis 1*).

There are empirical studies showing that the effect of reciprocity is time limited (Burger et al., 1997). That means that the longer the delay in the reciprocal return by the recipient in the fieldwork period, the larger is the risk that reciprocity will wane over time, and that the recipients' propensity to reciprocate the prepaid request will also dissipate. Another study by Chuan et al. (2018) also found that positive reciprocity, in terms of any costly behavior that is intended to reward a past action that is either kind or beneficial, decays over time. In particular, this might be true for self-administered questionnaires (Chuan et al., 2018, p. 1766). Since invitees with strong preference for reciprocity reply early after the receipt of the prepayment, the response rate is the highest in the initial stage of the fieldwork period. Because invitees with weak preference for reciprocity procrastinate on completing the questionnaire, the response rate stagnates at later stages of the fieldwork. The drop in the response rates over time is related to the strength of the reciprocity preference (*Hypothesis 2*).

However, the longer the delay in the reciprocal return by the recipient in the fieldwork period, the larger is the risk that reciprocity will wane over time, and that the recipients' propensity to reciprocate the prepaid request will also dissipate (Burger et al., 1997). Another study by Chuan et al. (2018) also found that positive reciprocity, in terms of any costly behavior that is intended to reward a past action that is either kind or beneficial, decays over time: "In particular, if feelings of reciprocity diminish over time, interactions between parties may need to be temporally close to sustaining strong reciprocal relationships" (Chuan et al., 2018, p. 1766). Additional contacts between researchers and their target persons—so-called reminders—become necessary to remind non-respondents to fulfil their part of the reciprocal exchange indirectly at least (Becker, 2021; James & Bolstein, 1990). Therefore, considering the pressure by cognitive dissonance, it is expected that reminders to participate in the survey "refresh" the reciprocity that otherwise declines across the fieldwork period (*Hypothesis 3*).

This theoretical approach is innovative in two respects. On the one hand, there is no need to include moral principles per se to explain reciprocity even among self-interested actors. On the other, it can be generalized for panel studies. In repeated situations of a series of surveys such as a panel study, providing a long "shadow of future" (**xx**), "reciprocity of a pattern of mutually contingent exchange . . . may evolve among self-interested actors without the existence of a norm of reciprocity . . . However, even if a norm of reciprocity is not a necessary precondition to establishing reciprocal cooperation, such a norm may evolve from a pattern of reciprocity and also may greatly facilitate the stability of reciprocal exchange" (Diekmann, 2004, p. 490; see also: Fehr & Gächter, 2000, pp. 168, 170).

3   Data, variables, and analytical strategy

3.1   Dataset

The empirical analysis is conducted in the context of a panel study concerning determinants of educational choice and training opportunities of adolescents and young adults in the German-speaking cantons of Switzerland (Becker et al., 2020)dab20. The initial target population consists of eighth graders who were born around 1997 and enrolled in regular classes in public schools in the 2011/12 school year. The panel data are based on a random and 10% stratified gross sample of 296 school classes, out of a total universe of 3,045 classes. A disproportional sampling of school classes from different school types, as well as a proportional sampling of school classes regarding the share of migrants within schools, was applied. At school level, a simple random sample of school classes was chosen (Glauser, 2015). The project started in 2012. In the first three waves, the target persons were interviewed in the context of their school class. Since the fourth wave, after their compulsory schooling, the target persons have been pursued individually. Nine panel waves have been completed in the meantime. The response rate (PR1 AAPOR, 2016, p. 61) was about 80% for each of the waves. In the first wave, the gross sample consisted of 3,815 individuals, which diminished to 2,363 panelists in Wave 8. While in Wave 8, 1,887 individuals took part in the survey, 2,315 panelists were contacted in the fieldwork period in the most recent wave (Wave 9). About 78% of them responded to the online survey.

In this panel study, there is a history of incentives for the target persons. Unconditional incentives were used in the DAB panel study since Wave 4, when a controlled experiment was conducted (Becker & Glauser, 2018). One half of the sample received a voucher (a hypermarket cash card worth 10 Swiss francs) enclosed in the advance letter as an unconditional prepaid incentive. The rest of the sample made up the control group who did not receive an incentive. In Wave 5, each of the panelists received a voucher (a hypermarket cash card worth 10 Swiss francs) and in Wave 6 they got an engraved ballpoint pen (worth 2 Swiss francs) as a gift. From Wave 7 onwards each of the invitees received a prepaid monetary incentive of 10 Swiss francs in cash (Becker et al., 2019). An empirical test of the effectiveness of these different incentives found that the lowest response rate was observed for Wave 6 (76%), while the other incentives resulted in higher response rates (Wave 5: 80%; Wave 7: 79%). Additionally, it has been found that the latency was the lowest when the invitees received cash. After 10 days, half of the people who received the cash incentive had started the questionnaire. For the other types of non-monetary incentive, the response rate was too low to calculate the median for the

latencies until survey return. This latter finding could be interpreted as suggesting that the non-monetary incentives, in particular the ballpoint pen, were perceived by the invitees as an unkind act. The invitees procrastinated and therefore delayed their response to the researchers' request for survey participation.

For our purposes, only the two most recent surveys are considered (see Figure A1 in Section A of the Appendix). This is because, in Wave 8, conducted in May and June 2020, the respondents were interviewed on their taste for reciprocity. Fieldwork paradata on the sample of Wave 9 (Kreuter, 2015), completed one year later, in May and June 2021, are then used to reveal the effect of the invitees' reciprocal preferences on their propensity to take part in the online survey after they receive, unconditionally, a prepaid monetary incentive (10 Swiss francs in cash) (Becker et al., 2019). This gift was enclosed in the personalized invitation letter sent via the postal mail. Using the fast postage option offered by Swiss Post (A-post), it was guaranteed that eligible target persons would receive this letter the day after it was sent.[4] In this letter, the panelists were also given the URL of the online questionnaire and the password for accessing the web-based questionnaire. In regard to the reputation of the researchers, panelists were also informed that the panel study was being funded through a grant by a governmental agency and was being conducted by the same team of researchers at a university. One day later, the panelists received the clickable URL and a password to log onto the website, in a personalized e-mail. If they did not start completing the questionnaire after several days, they received personalized reminders via text message (SMS or e-mail), with a link to the online survey.

3.2 Dependent and independent variables

The *dependent variable* is a panelist's *survey response* (regarding the target person's strength of *reciprocal preferences* ρ_i and the overall payoff σ). The response rate (RR1) is defined as the ratio of eligible units and their response in terms of starting and completing the online questionnaire (AAPOR, 2016, p. 61).

Since the material benefit π_i, i.e. the prepayment of 10 Swiss Francs, is identical for each of the invitees while their subjective benefit (perceived kindness of prepayment) is unknown, the *main independent variable* is the reciprocity parameter ρ_i, i.e. the panelists' *preference for strong reciprocity*. The target person's strength of *reciprocal preferences* ρ_i is indicated by the individuals' propensity to respond to a gift received: "If someone gives you something, how likely is it that you will give something to that person as well?" The range of answers is between 1 for "Not at all likely" and 5 for "Very likely." *Altruistic reciprocity* is measured using the following item: "If someone does me a favor, I am ready to return it". The possible answer ranges from 1

for "Not true at all" to 5 for "Completely true". For distinguishing between *strong* and *weak reciprocity* in line with the *economics of strong reciprocity*, these variables are converted into binary dummy variables, while the discrete values of "4" and "5" are recoded as 1. It indicates the invitees' strong reciprocity. The other values become zero (weak reciprocity). About 78% of the panelists indicate a strong reciprocal preference, while 22% of them have a weak preference for reciprocity. About 91% of the panelists show strong altruistic reciprocity. Since, during the fieldwork period, it is not possible to measure the *kindness term* φ directly, which indicates the recipient's kindness experiences from the donor's request for survey participation, it has to be neglected in this study.[5]

Regarding the panelists' *social characteristics*, different time-constant sociodemographic characteristics of the panelists have been considered in order to control for their impact on the response to the invitation to take part in the survey. These characteristics are considered as a control for their "free will" (Blossfeld, 1996), i.e. the unobserved motivations of the invitees to take part at the survey (Stocké & Langfeldt, 2004). Based on previous studies that have found that women are more likely to respond to surveys than men (Becker, 2022, p. 13), the panelists' *gender* (reference category: male) is used. Since there is consistent evidence that the socioeconomic conditions in which target persons have grown up (including welfare, integration, and environment) affect their survey participation, their *social origin* is included in the multivariate analysis since it correlates with the target persons' openness to scientific surveys (Groves & Couper, 1998, p. 30). Social origin is indicated by the class scheme suggested by Erikson and Goldthorpe (1992, pp. 38–39). This class scheme is a well-established concept in research into social stratification and mobility and is used to indicate the class position of employees and their families. The social classes are categorized by an employee's market situation, employment relationship, and working conditions. The *education* of a target person correlates positively with their survey response rates (Becker, 2021). The panelists' education level is also positively correlated with their appreciation of the utility of social-scientific research and information-

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[4]The B-post is the alternative and less expensive option to send letters. This option, however, has disadvantages for the survey management. The letter is delivered later, and it is not possible to estimate after how many days it will be delivered. Despite the fact that the A-post option is labelled as being for important letters, it is considered a standard, just like the B-post option, in the eyes of the population.

[5]It is impossible to measure the invitees' subjective benefits in terms of perceived kindness of prepayment. On the one hand, this would be possible for the respondents only while information on nonrespondents' perception is missing. On the other, the subjective post-assessment of prepayment could be biased due to social desirability.

gathering activities (Groves & Couper, 1998, p. 128), as well as with their computer literacy. The educational level of panelists is measured by the *school type*—such as lower secondary schools with basic or intermediate requirements and pre-gymnasiums, implying advanced requirements (reference category: miscellaneous school types, such as comprehensive schools without selection)—in which they were enrolled at the end of their compulsory schooling. A panelist's *language proficiency* is indicated by their standardized grade point average in German language class (Wenz et al., 2021).

3.3   Analytical strategy

Since reciprocity includes a temporal element, which affects the degree of impact of the social exchange, multivariate analysis in a comparative-static design is not an adequate strategy to reveal the time-dependent relation between strong reciprocity and survey participation. Additionally, because survey response itself is a stochastic event that could occur at any point in time across the fieldwork period, it is necessary to observe the impact of reciprocity time-continuously based on longitudinal data providing an event-oriented design. The propensity of the panelists to change their behavior due to the initiation and change of reciprocity ΔX_t should therefore be modeled as a stochastic process:

$$\Delta X_t \rightarrow \Delta \Pr(\Delta Y_{t'}) \rightarrow \Delta r(t'), t < t'   ,$$

where $\Pr(\Delta Y_{t'})$ is the panelists' propensity for survey response. In terms of a statistical model, the propensity can be defined as the time-dependent transition rate $\Delta r(t')$ for the survey response, provided that the individual has not responded before.

Event history analysis provides statistical methods for analyzing stochastic processes with discrete states, such as survey response, and continuous time, such as response latency in the fieldwork period since survey launch. Given that T_y is a random variable indicating the point in time when the event y (e.g. survey participation) occurs, it is true that a change in a variable Y at time t defines $T_y = t$. The transition rate is thus formalized as follows: $\Pr(t \leq T_y < t'|T_y \geq t)$ (Blossfeld et al., 2019, p. 28). This probability reflects the fact that an event y occurs in the time interval from t to t', provided that this event has not occurred before in the time interval from 0 to t. In order to take the future process into account additionally to the process observed in the past, the ratio of the transition probability to the tenure of the time interval indicates the probability of future changes in the dependent variable per unit of time: $\Pr(t \leq T_y < t'|T_y \geq t)/(t'-t)$. Since t' approaches t, the transition rate (or hazard rate) is defined as follows:

$$r(t) = \lim_{t' \to t} \frac{\Pr(t \leq T_y < t'|T_y \geq t)}{t'-t} \quad (1)$$

According to Blossfeld et al. (2019, p. 29), this transition rate can be interpreted as the actors' propensity to change their state, e.g. from nonresponse to survey response. This propensity is defined in relation to a risk set at moment t, i.e. the set of individuals who survived until t and who therefore can experience the event since they are not absorbed by the event before t. At each point in time, the transition rate connects the previous events in the closed past with the open future. Since the intensity of possible future changes at each point in time is analyzed by the transition rate, it is obvious that this is a well-suited tool for describing stochastic processes in terms of the distribution of (potential) survey participation after the receipt of an incentive.

The *proportional-hazards model* proposed by Cox (1972) is a semi-parametric regression model commonly used for the impact of covariates, but which leaves the shape of the transition rate as unspecified as possible (Blossfeld et al., 2019, p. 231). The transition rate is defined in this way: $r(t) = h(t) \exp(A(t)\alpha)$, where $h(t)$ is an unspecified baseline rate and $A(t)$ is the covariate vector specifying the possible influences of a set of explanatory variables on survey participation

Since it is assumed that the process is not time-dependent, this model provides an insufficient fit with social reality. Therefore, another model is chosen to analyze the likelihood of an event in a theoretically adequate way. Based on the assumption that the hazard rate of participation in an online survey increases after receiving the invitation and declines over the fieldwork period, the *Gompertz-Makeham model* is used. According to this model, it is assumed that the hazard rate increases exponentially with the interviewees' response latency and a time-independent component. This is formalized as follows:

$$r_j(t|k) = \exp\left(\beta_j' x_k\right) \exp(c_j t)   ,$$

where k indicates the outcomes of reciprocity, $j = 1$ is the participation and $j = 0$ is the refusal, x_k are k explaining covariates x, and $c_j t$ controls for the time dependence of the process until completion of the questionnaire.

Furthermore, for fine-grained parametric analysis of the speed and time-dependent selectivity of survey participation, the *piecewise constant exponential model* will be utilized. According to Blossfeld et al. (2019, p. 124), the "basic idea is to split the time axis into time periods and to assume that transition rates are constant in each of these intervals but can change between them." Using this model makes it possible to analyze the role of reciprocity in the participation pattern in the initial phase of the fieldwork in comparison to the other phases of the fieldwork period. Applying this procedure, the differences in the strength of the reciprocal preference and its time-related decay are analyzed across time within the fieldwork period. In particular, it is possible to reveal whether the sample responding early is different from the sample com-

pleting the questionnaire at later stages of the fieldwork period (Blossfeld et al., 2019, p. 125). Finally, it is possible to detect the impact of reminders on the nonrespondents' participation patterns.

According to theoretical assumptions about the time-dependency of this process, the transition rate can be specified parametrically to analyze how the transition rate depends on a set of covariates. To account for time-varying covariates, the technique of *episode splitting* is used, i.e. the initial process time is split into sub-episodes on a daily basis. For each of these short sub-episodes, a constant hazard rate is assumed. The *exponential model* is then able to model step functions displaying the empirically observed hazard function for the entire process up to participation. If one assumes that this rate is continuous for each of the points in time, the *exponential model*—the simplest transition rate model: $r_k(t) = r_k$—can be applied. In order to consider the impact of time-varying covariates, such as reminders, on the likelihood of completing the online questionnaire, the transition rate will be estimated on the basis of an *exponential distribution*:

$$r(t|x(t)) = \exp(\beta' x(t)) \quad,$$

where $x(t)$ is the time-dependent vector of exogenous variables whose unknown coefficients β have to be estimated.

Finally, by means of non-parametrical procedures, such as the discrete-time *survival analysis* and the *Kaplan-Meier method* of calculating the *failure rate*, the pattern of participation across latency of response since the invitation to the current wave are described on the basis of relative prevalence across time. By calculating indices, such as the median, it is possible to show how long it takes panelists who share different degrees of reciprocal preferences to start filling out the questionnaire, and how many of the panelists had not responded at different points in time in spite of the prepaid incentive and their taste for reciprocity.

4 Empirical results

4.1 Impacts of reciprocity on survey response

First of all, the role of reciprocal preference and altruistic reciprocity in regard to the likelihood of response is analyzed by applying the Kaplan-Meier method. According to this procedure, and by considering only the panelists who responded completely in Wave 8, 88 per cent of panelists with a strong reciprocal preference took part in the online survey in Wave 9 (median value of response latency: five days), while only 85% of the invitees with a weak preference for reciprocity started to complete the questionnaire (median: six days) (see left panel in Figure 1). Each of the tests of the failure curves for these two groups are significant, i.e. the response patterns depend on their taste for reciprocity. This finding is in line with *Hypothesis 1*.

In regard to altruistic reciprocity, it is found that the response rate (87%) is equal for panelists with a weak or strong preference for altruism (see right panel in Figure 1). The difference in survey participation in terms of weak or strong altruism is limited to the initial stage of the fieldwork period. While the median value for the latency is five days for invitees with a weak altruistic reciprocity, the median is six days for those with weak altruism. However, the differences of the failure curves for these two groups are insignificant.

This theoretically unexpected finding could be explained by the sample selection bias of the remaining target sample in regard to reciprocity. It cannot be ruled out that those target persons who already have a low taste for reciprocity did not participate in Wave 8. However, logically, these people could not be asked about their reciprocity. Therefore, in the next step, it is assumed that these nonrespondents from Wave 8 have a weak preference for reciprocity. They can be included in the following simulation by imputing the missing information on their reciprocal preference.

First, the previous findings are reanalyzed using multivariate analysis. Running the Cox regression, panelists' characteristics such as gender, social origin, and education are controlled for (see models 1 and 2 in Table 1). It becomes obvious again that invitees with a significant likelihood of reciprocity are more likely to complete the online questionnaire than their counterparts with a weak reciprocal preference. This result supports *Hypothesis 1* again. The greater the strength of the reciprocal preference, the greater is the panelists' propensity for survey response. The difference in participation between both groups is 13 percentage points.

This finding is replicated by the *Gompertz model* (model 2). Additionally, it is in line with *Hypothesis 2*, and tells us that the effect of invitees' reciprocal preference is not constant across the fieldwork period but is time-dependent according to the negative *Gamma* term. It results in increased survey participation in the initial stage of the fieldwork period and fades at later points in time (see also Figure 1).

However, the correlation of altruistic reciprocity and survey participation is statistically insignificant (models 1 and 2). Second, as a next step, the missing values on reciprocity for the nonrespondents in the previous Wave 8 are included again. The imputed terms of reciprocity are strong and statistically significant (see model 3). At a glance, in particular, the strength of altruistic reciprocity exceeds the role of taste for reciprocity on the likelihood of survey participation (model 3).

If the reason for the imputation of missing values for the panelists' taste for reciprocity (i.e. the nonresponse in the previous Wave 8) is considered, the following is revealed. The effect of strong altruistic response on survey participation in Wave 9 is significant and rather similar to the effect of strong reciprocal preference (see model 4). In regard to the previous nonresponse in Wave 8, on the one hand it is
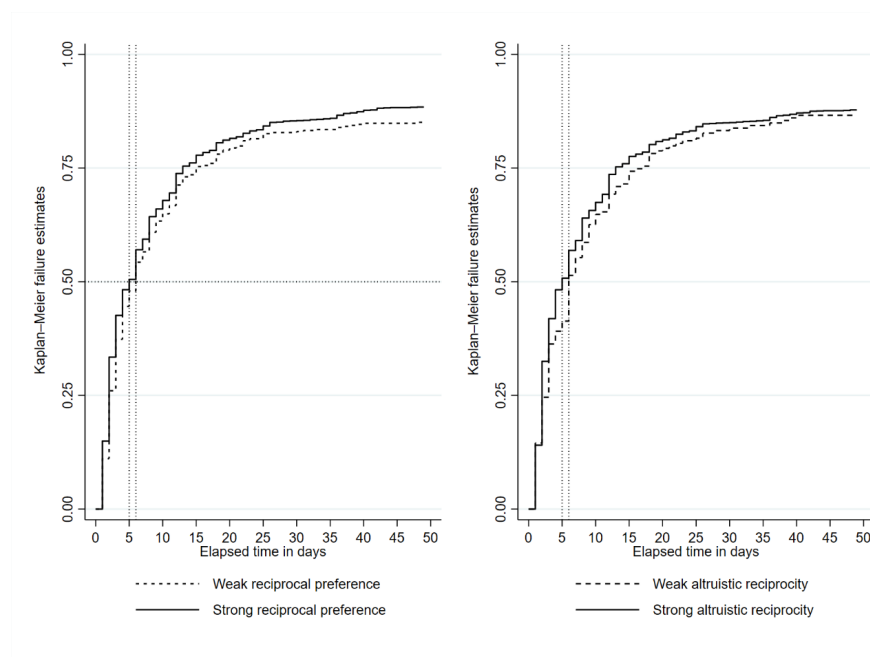
Figure 1

Survival estimation for different outcomes in the panelists' response to a request for participation (altruistic preference) and a gift (reciprocal preference)

obvious that nonrespondents could not be brought back to the recent survey.

On the other hand, this result indicates the validity of the measure of the panelists' strength of their reciprocal preference. Again, it should be emphasized that these findings only apply to a limited extent, since missing values on panelists' reciprocity were imputed. This imputation is based on a strong assumption drawn from their previous survey participation.[6]

4.2 Decline of reciprocal behavior across the fieldwork period

The descriptive findings on the reciprocal preference suggest that the development of the response rate is significantly different in the initial stage of the fieldwork period for panelists with a strong or weak taste for reciprocal preference. This result is replicated by the predicted time-related hazard rates (see Figure 2). After a week since the survey launch, the patterns of survey participation indicated by the time-related hazard rate become increasingly similar for both groups.

It seems to be that the reciprocity effect on survey participation tends to decline across the time that elapses after the receipt of the gift. The question is whether this fact depends on the time-related change in the number of panelists who indicate a significant taste for strong reciprocity and have already responded, in relation to the number of nonresponding panelists with a low preference for reciprocity. Or is it

the fact that the preference to reciprocate to the gift declines with the elapsed time since the survey launch? These two questions are answered by applying the *piecewise constant rate model* (Figure 3).

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Controlling for invitees' characteristics, such as their gender, social origin, education, and language proficiency, it

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[6]In terms of a robustness check, therefore, an alternative imputation of missing values for the altruistic reciprocity was carried out. Missing values were randomly replaced with values in the range of (0,1). It is found again that the invitees' reciprocal preference and their strong altruistic reciprocity are correlated with their likelihood of survey participation (see model 1 in Table B3 in Section D of the Appendix). The impact of altruistic reciprocity becomes insignificant if the pattern of survey participation in the previous survey is controlled for (see model 2). Additionally, an index which indicate altruistic reciprocity is used (for details: see Section D in the Appendix).

Table 1

Role of altruistic and direct reciprocity (i.e. response to a gift) on panelists' response

	Invitees in Wave 9 only		Invitees in Wave 8 and Wave 9	
Sample				
Model: distribution type	1: Cox	2: Gompertz	3: Gompertz	4: Gompertz
Taste for reciprocity				
Strong vs weak altruistic reciprocity	0.024	0.030	0.917***	0.193*
	(0.079)	(0.085)	(0.085)	(0.085)
Strong vs weak reciprocal preference	0.125*	0.128*	0.370***	0.185**
	(0.056)	(0.059)	(0.061)	(0.059)
Nonresponse in Wave 8				−1.890***
				(0.158)
Gender (Ref.: Male)				
Female	0.157***	0.166***	0.155***	0.168***
	(0.046)	(0.050)	(0.045)	(0.049)
Social origin (Ref.: Upper service class)				
Lower service class	0.015	0.010	0.028	0.008
	(0.078)	(0.082)	(0.076)	(0.080)
Routine non-manual employees	0.009	0.009	0.011	0.005
	(0.072)	(0.078)	(0.071)	(0.076)
Farmers, small proprietors	−0.017	−0.024	−0.033	−0.088
	(0.096)	(0.112)	(0.094)	(0.111)
Foremen, skilled manual workers	−0.088	−0.097	−0.081	−0.112
	(0.085)	(0.090)	(0.083)	(0.088)
Semi-skilled / unskilled manual workers	−0.175	−0.190	−0.148	−0.184
	(0.119)	(0.126)	(0.117)	(0.123)
Missing value	−0.108	−0.118	−0.094	−0.146
	(0.086)	(0.095)	(0.085)	(0.093)
School type (Ref.: Basic requirements)				
Extended requirements	0.205**	0.216**	0.275***	0.239***
	(0.064)	(0.067)	(0.062)	(0.065)
Advanced requirements	0.425***	0.448***	0.492***	0.455***
	(0.074)	(0.080)	(0.074)	(0.079)
Other types	0.139	0.142	0.154	0.133
	(0.084)	(0.094)	(0.082)	(0.092)
Language proficiency	0.042	0.044	0.053*	0.053*
	(0.025)	(0.027)	(0.025)	(0.027)
Constant		−2.286***		−2.494***
		(0.123)		(0.119)
Gamma		−0.067***		−0.068***
		(0.003)		(0.003)
Number of individuals	1,978	1,978	2,313	2,313
Number of events	1,735	1,735	1,800	1,800
LR chi2 (d.f.) / Wald chi2 (d.f.)	74.66 (13)	75.59 (13)	440.09 (13)	712.41 (14)

Notes: *p<0.05; **p<0.01; ***p<0.001; β-coefficients (in brackets: robust standard error).
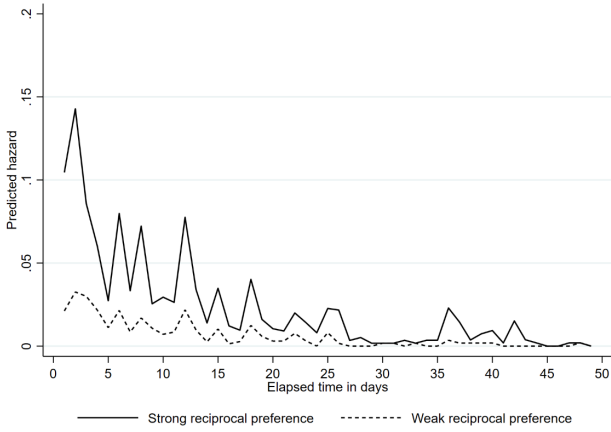
Figure 2

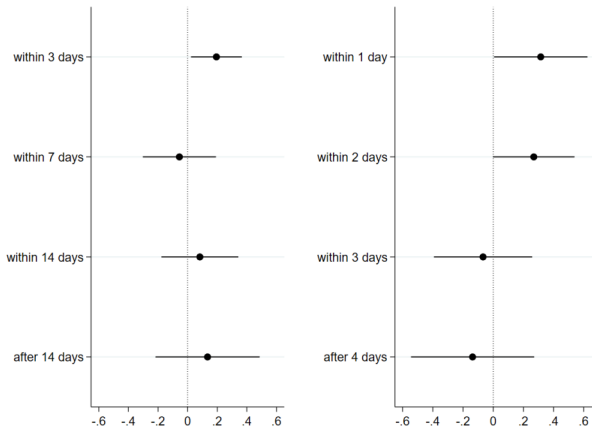*Predicted hazard rates of survey participation by reciprocal preference*

Figure 3

Decline in reciprocity effect on survey response since survey launch. Marker symbols show coefficients of piecewise constant rate model (by control for social origin, education, achievement and gender) and whiskers deonote the confidence interval of the coefficients.

seems to be the case that the reciprocity effect initiated by the unconditionally prepaid monetary incentive declines across the fieldwork period. The first model (see the left-hand panel) shows that the reciprocity effect is significant within the initial stage of the fieldwork, i.e. the first three days (i.e. the horizontal whiskers of the coefficient do not cross the vertical reference line); after this, it becomes insignificant. Since the decay occurs before more than 50% of the invitees who have a strong preference for reciprocity have responded (median value of response latency: five days), it can be con-
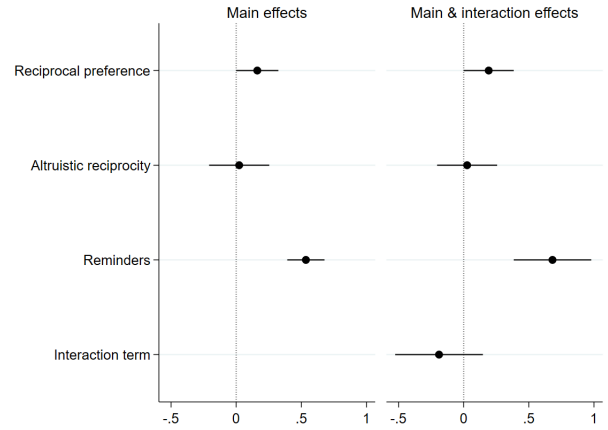

Figure 4

Reciprocity effect and effects of reminders on survey response from the time of survey launch. The marker symbols show the coefficients of exponential model (episode splitting by control for social origin, education, achievement and gender).

cluded that the inclination in regard to reciprocity fades and is replaced by the impact of other causes dominating invitees' propensity for survey participation (see Table A1 in Section B of the Appendix).

This finding is verified by a more fine-grained definition of time intervals on a daily basis (see the right-hand panel). Within the first two days, the effect of reciprocal preference is significant. In this time interval, about two-thirds of the invitees with a strong taste for reciprocity responded, while it took almost four days for the same proportion of panelists who did not indicate a high propensity for reciprocity to respond.

4.3 Refreshing the reciprocity by reminders?

In the final step, the question is analyzed if reminders are suitable for refreshing the inclination to reciprocity. For this purpose, the initial episode has been split into sub-episodes lasting one day. This makes it possible to specify the timing of digital reminders, such as SMS messages or emails, as well as to identify the short- and long-term effects of these on the interaction of reciprocal preference and response. The first reminders are sent about five to six days after survey launch; they are then sent periodically after three days.

Controlling for gender, social origin, education and achievement, there are simultaneous effects of panelists' inclination for reciprocity and reminders on the invitees' likelihood of starting to complete the online questionnaire (see the left-hand panel in Figure 4; see also model 1 in Table B4 in *Section E of the Appendix*). The effect of reminders is stronger than the reciprocity effect. While the panelists' taste

for reciprocity results in an increased response rate of about 18 percentage points, the reminders enhance the response by about 71 percentage points.

If the reminders contribute significantly to an increased response rate, what about the refreshing of reciprocity by reminders? The result here is unexpected (see right panel in Figure 4; model 2 in Table B4). The interaction effect of the reciprocal preferences and reminders is statistically insignificant. The main effects of reciprocal preferences and reminders remain significant. In sum, the reminders do not refresh the declining inclination for positive reciprocity at all.

This final finding, however, is not in line with *Hypothesis 3*. It seems not to be possible to stabilize panelists' taste for reciprocation by additional contacts via reminders. In sum, in this respect, the different strategies for improving the response rate do not work cumulatively but are independent of each other.

5 Discussion and conclusions

In survey methodology, it is agreed that an unconditionally prepaid monetary incentive ("money in the hand") is the most effective and efficient strategy for boosting response rates (Becker et al., 2019; Friedel et al., 2022; Göritz, 2015; Pforr et al., 2015, e.g.). It is taken for granted that the logic of reciprocation is the decisive mechanism behind this correlation (Diekmann & Jann, 2001; Groves et al., 2000, e.g.). Thus, by shedding light in to the "black box" of individuals' preference for reciprocity, the aim of this contribution has been to test the hypothesis of reciprocity *directly* in the context of a social-scientific panel study applying longitudinal data and statistical procedures of event history analysis.

In regard to the panelists' participation in an online survey, the two main findings indicate that reciprocity might indeed be a key element in explaining the emergence of social cooperation between researchers and their sampled target persons. *First*, there is strong reciprocity (Fehr et al., 2002): besides the immediate positive reply to the researchers' request for survey participation, which is based on altruistic reciprocity, a gift (an unconditionally prepaid monetary incentive) will mostly be reciprocated by the invited target persons. In particular, this is additionally indicated by the high response rate after eight panel waves. One could argue that the minor effect of reciprocity could be based on the fact that each of the eligible panelists received a monetary incentive in advance in the previous wave, and that the reciprocity effect is underestimated due to their expectation of an additional gift in Wave 9. However, Singer et al. (1998) provide evidence that a past prepayment does not create such expectation effects, resulting in significantly biased responses. *Second*, recipients with a strong reciprocal preference usually respond immediately to the donors' request that they take part in the survey. However, the greater the latency of response, the lower is the invitees' propensity to start to complete the questionnaire and

the more likely is a decline in reciprocity. *Third*, reminders do not refresh procrastinating non-respondents' reciprocity decline across the fieldwork period.

The boosting effect of prepaid monetary incentives therefore seems to be based on the logic of reciprocity and the role of donated target persons' reciprocal preferences. However, in the case of web-based online surveys, this effect is not long-lasting during the course of the fieldwork period. For other survey modes such as CAPI (computer-assisted personal interview) or CATI (computer-assisted telephone interview), how long it takes for invitees' preference for reciprocity to fade should be investigated. In general, it is obvious that an unconditionally prepaid monetary incentive and the related inclination for reciprocity are necessary but not sufficient for enhancing the response rate (Becker & Glauser, 2018; Becker et al., 2019). There is a need for different arrangement such as reminders or a mixed-mode design or other adaptive survey frames (Becker, 2021; Friedel et al., 2022). Overall, it is confirmed again that prepaid monetary incentives tend to save fieldwork time and to reduce efforts in survey management (Blohm & Koch, 2021). However, in particular, this is true if the researchers' gift ("money in the hand") is perceived as an act of kindness by target persons with a strong preference for reciprocity receiving the donation.

This contribution has some limitations. First, the findings are valid for a special target population consisting of a cohort of juveniles born around 1997 and living in the German-speaking cantons in Switzerland. Since preferences for strong reciprocity are universal, it is assumed that the current findings are valid for each of the different populations, which are heterogeneous in regard to other characteristics and attitudes (see Table B2 in Section C of the Appendix). Second, the panel study has been running since 2012. The test of the reciprocity hypothesis involved data gathered in Wave 8 (May/June 2020) and Wave 9 (May/June 2021). On the one hand, due to this long time interval, the findings are based on rather 'panelized' individuals, who have survived up to these points in time. In sum, condition effects due to a long-term experience with the panel as well as expecting incentives they have received in previous waves cannot completely be ruled out (see also: Singer et al., 1998). On the other hand, the test was conducted for panelists who took part in Wave 8 and who answered the questions on their reciprocity. This could be a source of biased estimations since there is no information on the nonrespondents' taste for reciprocity. However, the empirical results based on imputed missing values seems to be theoretically plausible. Third, the panelists' preference for strong reciprocity is measured as a time-constant construct. Nevertheless, for a more realistic test, there is an urgent need to measure time-varying indicators of individuals' preferences in regard to reciprocation, in order to reveal declines in reciprocity across time. How-

ever, it would be a challenge to interview nonrespondents on this issue during the running fieldwork. This circumstance makes it difficult to test the time-related hypotheses on the time-dependent effects of reciprocity in an experimental design, which then has to struggle with the same methodological problems based on missing data. In the current study, this issue has been minimized by applying event history analysis (for details: Blossfeld et al., 2019, :19–29). Furthermore, it can be assumed that the panelists' subjective perception of the researchers' kindness could vary across panel waves. Therefore, there is a need to measure the respondents' parameters of reciprocity in each of the surveys. All in all, it is necessary to replicate this current study for different populations, cultures, and societies as well as for different birth cohorts, historical periods, and stages in the individuals' life course.

Acknowledgments

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Appendix A
Figures

Response patterns across two panel waves and survey modes

Whether the response patterns are different for both waves that were considered in the multivariate analysis is analyzed. In Wave 8 a sequential mixed-mode design (online and CATI) was applied, while in Wave 9 the data were gathered via an online survey. Response rates could develop differently across the fieldwork period, for several reasons; these include expectation effects relating to the continuous delivery of unconditionally prepaid cash, the different effects of the Covid-19 pandemic, panel fatigue, and so on.
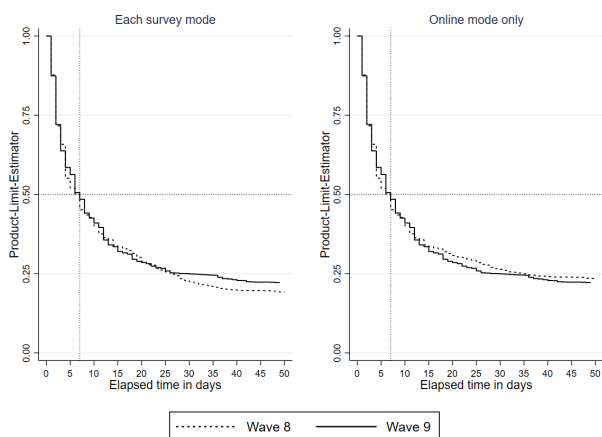
Figure A1

Kaplan-Meier survival estimation—survey response in Waves 8 and 9

The results of the Kaplan-Meier estimations do not reveal any differences in response patterns across the waves (see Figure A.1). The response rate in Wave 9 is 78 per cent. In Wave 8, the response rate is 81 per cent if each of the survey modes is considered, while the response rate for the online mode alone is 76 per cent. For each of the waves, the median value is seven days, i.e. it took a week for 50 per cent of the invitees to have completed the questionnaire. Each of the tests—such as the Wilcoxon-Breslow-Gehan (sensitive at the beginning of the process time), Peto-Peto-Prentice, Tarone-Ware test, and the Generalized Savage Log-rank test, stressing increasing differences at the end of the process time—confirm insignificant differences between the waves (Blossfeld, Rohwer, & Schneider, 2019, p. 83). Therefore, the null hypothesis that survivor functions do not differ across the waves cannot be rejected.

Appendix B
Tables

Period-specific impact of reciprocity on participation

      It is obvious that the panelists' propensity for response declines with the amount of time that elapses from survey launch. The reciprocity effect is valid for the initial period of fieldwork only. The impact of social origins on participation is insignificant, but there is an educational selectivity in regard to response. This is partially true for a gender effect on survey participation.

Table B1

Period-specific impact of direct reciprocity on participation

	TP1 (within 3 days)	TP2 (within 7 days)	TP3 (within 14 days)	TP4 (after 14 days)
Periods				
TP 1	−2.231*** (0.146)			
TP 2		−2.815*** (0.220)		
TP 3			−2.879*** (0.221)	
TP 4				−3.496*** (0.288)
Reciprocity (Ref.: Weak reciprocal preference)				
Strong preference for reciprocity	0.194* (0.088)	−0.056 (0.126)	0.082 (0.133)	0.134 (0.179)
Gender (Ref.: Male)				
Female	0.159* (0.073)	0.192 (0.111)	0.310** (0.114)	−0.088 (0.155)
Social origin (Ref.: Upper service class)				
Lower service class	0.097 (0.115)	−0.191 (0.198)	0.025 (0.184)	−0.032 (0.272)
Routine non-manual employees	−0.010 (0.111)	0.183 (0.174)	0.010 (0.178)	−0.257 (0.268)
Farmers, small proprietors	−0.172 (0.171)	−0.003 (0.254)	−0.072 (0.251)	0.197 (0.334)
Foremen, skilled manual workers	−0.062 (0.130)	0.077 (0.201)	−0.490* (0.222)	−0.003 (0.270)
Semi- or unskilled manual workers	−0.218 (0.191)	−0.004 (0.275)	−0.302 (0.286)	−0.026 (0.361)
Missing values	−0.177 (0.139)	−0.024 (0.213)	−0.091 (0.210)	−0.118 (0.290)
School type (Ref.: Basic requirements)				
Extended requirements	0.223* (0.102)	0.342* (0.152)	0.135 (0.150)	−0.029 (0.193)
Pre-Gymnasium	0.397*** (0.116)	0.506** (0.180)	0.504** (0.179)	0.317 (0.271)
Other types	0.147 (0.140)	0.071 (0.214)	−0.002 (0.213)	0.541* (0.262)
Language proficiency	0.056 (0.040)	0.054 (0.061)	0.022 (0.063)	−0.097 (0.086)
Number of episodes		4,743		
Number of cases		1,980		
Number of events		1,736		
Wald χ^2 (d.f.)		10401.50 (52)		

β-coefficients, estimated by piecewise constant exponential model (in brackets: robust standard error)
*p<0.05   **p<0.01   ***p<0.001;

Social characteristics of reciprocity

It is documented in Table C.1 that reciprocity is universal for the target sample of this panel study, i.e. individuals born around 1997 and living in German-speaking cantons in Switzerland. This might be the reason that reciprocity is not correlated with individuals' social characteristics, except for gender and education. At a glance, this result might indicate indirectly at least that willingness for reciprocity is learned in the process of primary socialization. However, from the view of this target population, this could also be based on the fact that it is only valid for this 'panelized' group in a mature panel study.

Table B2

Social characteristics of the invitees' propensity for reciprocity

	Preference for reciprocity		Altruistic reciprocity	
	Initial measure	Imputation	Initial measure	Imputation
Gender (Ref.: Male)				
Female	0.042*	0.030	−0.008	−0.008
	(0.020)	(0.017)	(0.013)	(0.011)
Social origin (Ref.: Upper service class)				
Lower service class	−0.034	−0.030	−0.005	−0.005
	(0.032)	(0.028)	(0.020)	(0.017)
Routine non-manual employees	0.002	−0.004	−0.008	−0.008
	(0.030)	(0.026)	(0.019)	(0.017)
Farmers, small proprietors	−0.010	−0.008	−0.025	−0.021
	(0.045)	(0.039)	(0.028)	(0.025)
Foremen, skilled manual workers	−0.009	0.001	−0.027	−0.021
	(0.035)	(0.030)	(0.024)	(0.020)
Semi- or unskilled manual workers	0.056	0.043	−0.020	−0.020
	(0.044)	(0.038)	(0.031)	(0.027)
Missing values	−0.013	−0.010	−0.073**	−0.061*
	(0.035)	(0.030)	(0.028)	(0.024)
School type (Ref.: Basic requirements)				
Extended requirements	−0.006	−0.036	0.054	0.024
	−0.006	−0.036	0.054	0.024
Pre-Gymnasium	−0.058	−0.100***	0.071	0.035
	(0.031)	(0.027)	(0.024)**	(0.019)
Other types	−0.033	−0.050	0.085	0.055**
	(0.035)	(0.029)	(0.025)***	(0.019)
Language proficiency	−0.011	−0.012	0.005	0.003
	(0.011)	(0.009)	(0.008)	(0.007)
Number of individuals	1,980	2,313	1,974	2,313
Pseudo-R^2	0.0079	0.0144	0.0238	0.0144
Wald χ^2 (d.f.)	15.73 (11)	20.68 (11)	32.56 (11)	20.68 (11)

AME (estimated by logistic regression; in brackets: robust standard error)
* p<0.05 ** p<0.01 *** p<0.001

Robustness check for the impact of reciprocity on survey participation

In order to validate the measurement of altruistic reciprocity, an index is defined by calculating the means of all of the indicators of altruistic reciprocity. The first indicator is measured by the item "If someone does me a favor, I am ready to return it". Additionally, the following item is used: "I make an extra effort to help people who have helped me before". The final indicator is operationalized in this way: "I am ready to take effort and cost to help people who have helped me in the past". The possible answer ranges from 1 for "no, not at all" to 5 for "yes, of course". Missing values are imputed by the value "1". The mean of this index is 3.85 and its standard deviation is 1.31.

Table B3

Role of altruistic and direct reciprocity on panelists' response (Gompertz-Makeham model)[a]

Models	1) Random 4) Index imputation	2) Random imputation	3) Index (no imputation)	(imputation)
Direct reciprocity				
Strong altruistic reciprocity	0.257***	0.138*	−0.010	0.097**
	(0.065)	(0.059)	(0.040)	(0.035)
Strong reciprocal preference	0.185***	0.171***	0.135*	0.149*
	(0.048)	(0.049)	(0.061)	(0.062)
Unit nonresponse in Wave 8		−2.128***		−1.772***
		(0.140)		(0.173)
Constant	−3.382***	−2.371***	−2.220***	−2.705***
(0.121)	(0.121)	(0.186)	(0.163)	
Gamma	−0.076***	−0.068***	−0.067***	−0.067***
	(0.003)	(0.003)	(0.003)	(0.003)
Number of individuals	2,313	2,313	1,979	2,313
Number of events	1,800	1,800	1,736	1,800
LR χ^2 (d.f.)	303.83 (14)	700.67 (14)	75.48 (13)	7715.09 (14)

β-coefficients (in brackets: robust standard error).

[a] Control for gender, social origin and education.

* $p<0.05$ ** $p<0.01$ *** $p<0.001$

As a first result it is found that the initial index of reciprocity is statistically insignificant while the initial measure of the panelists' reciprocal preference reveals that a strong preference for reciprocity is correlated significantly with their participation (model 3). If the imputed index for altruistic reciprocity and reciprocal preference is considered, it is found that a strong characteristic shapes the likelihood of survey participation in a significant and positive way, even when the invitees' previous participation is considered (model 4). However, in line with the previous findings above, it becomes obvious that the strength of the reciprocal preference exceeds the impact of altruistic reciprocity. In sum, the previous analysis with the original items produced robust findings.

Interaction of reminders and reciprocity norm in regard to survey participation

There are independent positive main effects of high reciprocity and the digital reminders periodically sent out to the invitees on their survey response. Reminders do not help to refresh panelists' declining obligation in regard to reciprocation, since the interaction of reminders and reciprocity is statistically insignificant.

Table B4

Role of reminders in regard to participation in the DAB panel study

Models	1	2
Reciprocity		
High vs low preference for reciprocity	0.162*	0.192*
	(0.083)	(0.098)
High vs low altruistic reciprocity	0.023	0.026
	(0.118)	(0.118)
Reminder (Ref.: No reminder)		
Time-dependent reminder	0.535***	0.682***
	(0.073)	(0.152)
Interaction: Reciprocal preference and reminder		−0.189
		(0.172)
Gender (Ref.: Male)		
Female	00.209**	0.208**
	(0.070)	(0.070)
Social origin (Ref.: Upper service class)		
Lower service class	−0.012	−0.012
	(0.121)	(0.120)
Routine non-manual employees	0.004	0.003
	(0.112)	(0.112)
Farmers, small proprietors	−0.005	0.001
	(0.149)	(0.149)
Foremen, skilled manual workers	−0.154	−0.153
	(0.129)	(0.129)
Semi- or unskilled manual workers	−0.248	−0.247
	(0.174)	(0.174)
Missing values	−0.162	−0.163
	(0.131)	(0.131)
School type (Ref.: Basic requirements)		
Extended requirements	0.275**	0.275**
	(0.093)	(0.093)
Pre-Gymnasium	0.622***	0.620***
	(0.114)	(0.114)
Other types	0.193	0.195
	(0.126)	(0.126)
Language proficiency	0.056	0.056
	(0.038)	(0.038)
Constant	−3.166***	−3.193***
	(0.167)	(0.173)
Number of episodes	24,519	24,519
Number of cases	1,978	1,978
Number of events	1,735	1,735
Wald χ^2 (d.f.)	144.27 (14)	143.94 (15)

β-coefficients, estimated by exponential model with episode splitting (in brackets: robust standard error).
* p<0.05   ** p<0.01   *** p<0.001