Short-term, Long-term, Social and Spatial Effects of Incentives for Pro-social Behavior: Micro Evidence from a Natural Field Experiment*

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Abstract

We conducted a natural field experiment with the American Red Cross to study the effects of economic incentives on pro-social behavior. The experiment was designed to assess the *total effects* of incentives on pro-social behavior including local and short-term effects, but also spatial and temporal substitution, heterogeneity and social spillovers. Subjects offered $5, $10, and $15 gift cards to donate blood were more likely to donate and more so for the higher reward values. The incentives also led to spatial displacement and a short-term shift in the timing of donation activity, but no long-term effects. The effects were heterogeneous; subjects with lower donation costs and less reputational concerns responded more to the rewards. We also detected a social spillover effect whereby subjects who were not informed of the incentive offers by the American Red Cross nonetheless learned about the offers and were more likely to donate. These responses imply that the total genuine effect of incentives on pro-social behavior includes not only the immediate local effects, but also spatial displacement, social spillovers and dramatic heterogeneity. Overall, economic rewards can be used to increase donations and smooth them over time and space in response to seasonal shortages and local and temporal shocks.

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1. Introduction

Economists have long been interested in what drives people to devote time and effort to altruistic, pro-social activities (Becker, 1974; Simon, 1957). These activities (e.g., helping the elderly, working in soup kitchens, donating blood) represent a large industry. In the U.S., the estimated value of volunteer time is over $240 billion (Independent Sector, 2006). However, the supply of these activities often falls short of societal needs.

One potential solution to address this short fall is to offer economic incentives, but theoretical debates exist regarding whether economic rewards will in fact increase the supply of these activities. Theory shows that the effects of economic incentives on the supply of activities in which agents have intrinsic motives can depend on context (e.g., what is or is not observed), which motives are more dominant (e.g., pure altruism, warm glow, self-image, reputation) as well as how the context and motives interact with each other and with and the desire for material rewards (Andreoni, 1989; Bénabou and Tirole, 2006; Exley, 2012).

Studies on the effects of incentives on pro-social behavior have almost exclusively examined the effects at the location and time of the incentive offer leaving many key questions unanswered.[1] To fully understand the effects of economic incentives on pro-social behavior and whether they motivate or inhibit pro-social activities overall, one must go beyond local contemporaneous effects to explore spatial and inter-temporal substitution, indirect social effects and heterogeneity. For instance, an incentive offer may affect the supply of an activity at other locations, over time, or even the supply of other related pro-social behaviors.[2] An economic incentive may also have effects on individuals who received the offer beyond their supply if they inform others. The effects on motives for pro-social behavior may also occur in the longer term after the incentives have been removed. For example, motivational crowding out may reduce future pro-social supply. Finally, the effects might also change for different types of potential or actual donors.

This paper presents the first comprehensive study of the effects of incentives on pro-social behavior in the context of blood donation, a pro-social activity that saves lives, has no substitute and experiences frequent supply shortages.[3] In fact, the debate on the impact of incentives on pro-social behavior started precisely in the context of blood donation (Arrow, 1972; Solow, 1971; Titmuss, 1971).

We conducted a natural field experiment with the American Red Cross Blood Service Unit in Northern Ohio (ARC) involving 98,278 blood donors. We offered $5, $10 and $15 gift cards to ARC donors to present at blood drives, randomizing subjects to receive the reward offers both across and within blood drives. We obtained individual-level data for all of the subjects including demographics and detailed blood donation

[1] Gneezy, Meier and Rey-Biel (2011) and Kamenica (2011) review the literature on incentives and pro-social behavior.

[2] Spatial and temporal substitution in response to financial incentives has been observed in workplace and market settings (e.g., Kumar and Leone 1988; Larkin 2013; Oyer 1998). Cairns and Slonim (2012) show that appeals for monetary donations to one cause reduced donations to a closely related cause, suggesting donors substitute between different pro-social activities.

[3] Blood transfusion is needed for trauma, surgeries, treating premature babies, and many chronic diseases. Population aging and new surgical procedures are increasing blood demand. Only about 5% of eligible individuals donate blood in developed countries annually and fewer in developing countries. The available blood is often below three days' worth of demand. The estimated worldwide shortage is about 22 million units annually (DiRado 2004; Hemobiotech 2008; Oakley 1996).

behavior. As well, the potential donation mindset before, during and after our intervention was tracked. Our design and the detailed individual-level data let us explore: (a) the immediate effects at the location and time of the offer; (b) the shape of the individual-level "blood supply curve" over the $5, $10 and $15 incentives; (c) heterogeneous effects; (d) whether incentive offers for some subjects increased donations of others; (e) whether rewards generated genuine new donations or instead displaced donations that would have occurred elsewhere; (f) whether rewards generated genuine new donations or instead displaced donations that would have occurred at another time; and (g) whether rewards affect longer term donation behavior (e.g., by undermining motivation). This is the first study designed to study all of these potential effects simultaneously in a single pro-social context and with an empirical strategy that gives causally identified estimates.

In previous work (Lacetera et al., 2012), we considered three of these questions (a, b and e). We specifically analyzed *drive-level* data primarily examining the incentive items that the American Red Cross provides (e.g., t-shirts, mugs, etc.). We also provided drive-level analysis of the short-term local effects (questions a and b only) from experimental treatments reported in the current paper. We found significantly more donations at drives offering incentives with the effects being larger the higher the value of the rewards. Using observational drive-level data and the rewards the ARC provides, we also found that donations were lower at drives that did not offer incentives when a neighboring drive (spatially and temporally) offered a reward. Because these results were based on the drive-level, they do not identify individual-level responses to precisely estimate short-term local effects or any heterogeneity nor could we test for individual-level substitution effects (spatial or temporal), spillovers or longer-term effects that are needed to identify the underlying mechanisms and total effects of incentives. The current paper uses *individual-level* experimental data to examine the full effects and to isolate all of the channels through which incentives may operate.[4]

Consistent with drive-level data, the results reported here show a positive, short-term, local individual response of the supply of blood to reward offers, increasing in the rewards' value. The probability of donating increased from 0.53% without any incentive to 0.77%, 0.99% and 1.33% for $5, $10 and $15 gift card offers, respectively. This positive response to rewards is consistent with two other field studies on blood donations, Goette and Stutzer (2011) and Lacetera and Macis (2012), but contrasts with existing laboratory evidence (Bowles and Polania-Reyes, 2012).

We next show that only looking at the short-term local direct effects of incentives gives incomplete and biased results. We examined four general categories of this incompleteness. First, we find evidence of *spatial*

[4] Another study related to the current one is the field experiment by Goette and Stutzer (2011). This study estimates the effects of a free cholesterol test offer and a lottery ticket offer on blood donations. Heterogeneous effects are considered, but the analysis is limited to contemporaneous effects and does not include spatial or inter-temporal substitution or social spillovers. A few less closely related studies are worth noting. Mellstrom and Johannesson (2008) conduct a study to examine the effect of a cash incentive on Swedish students to take a health test to determine their eligibility to be blood donors. Thus they do not observe actual blood donations, subjects know they are participating in a study and only direct local contemporaneous effects are considered. In terms of monetary donations, there have been just a few examinations of spatial and temporal displacement; Cairns and Slonim (2011) found that fundraising for one cause negatively affected donations to a second concurrent cause and Shang and Croson (2008) found that fundraising at one time had no effect on donations for the same cause at a later date.

displacement; on average, 31% of the increase in the propensity to donate at the intervention drives is explained by a contemporaneous reduction in the probability to donate at some other ARC drive. Moreover, displacement increases with the value of the incentive and is nearly 45% for the highest-valued reward ($15).

Second, there is *heterogeneity* in the magnitude of both the local and displacement effects. In particular, the rewards increased the likelihood to donate at the intervention drives by over 50% among subjects who had previously donated at these sites (from 13.2% without rewards to 20.9% with rewards) and by over 200% (from 0.08% to 0.22%) for subjects who had never donated at those sites. The effects for donors with previous donation history at the intervention sites are also larger for subjects who are older, donated more often or donated more recently. These findings are consistent with a standard incentive effect as one would find outside of the pro-social context in the sense that individuals who have donated in the past at a given location are more likely to have lower costs of donating there again. This also holds true for individuals with lower cost of time and donation discomfort such as older or more experienced subjects. Experienced donors may also be more likely to have a stronger reputation for being pro-social and thus less concerned with rewards undermining their self-image, social image or intrinsic motivations (Exley, 2012). The displacement effects were stronger among donors who were older, who had donated at multiple sites in the past (and therefore plausibly have lower mobility costs) and who had donated mostly at drives where the ARC offered material rewards in the past (and hence revealed greater extrinsic motivation). Contrary to previous findings from surveys (Lacetera and Macis, 2010a) or framed experiments (Mellstrom and Johannesson, 2008), we find no gender differences. The rewards did not have negative effects for any subgroup that we considered.

Third, we find significant *social spillovers*. Informing individuals of rewards through official ARC channels results in others (including active, lapsed, and new donors) donating more often. The effect on active donors is stronger for higher reward values. We also estimate that for every 100 subjects who were contacted to donate, offering a reward induced an additional 3.9 new and lapsed donors to donate.[5]

These results indicate that focusing on local average treatment effect of reward offers on donations would underestimate the total effect due to the significant spillovers, overestimate the total effect due to spatial displacement and miss substantial heterogeneity.

The fourth key result is that the post-intervention behavior of the subjects is consistent with donors shifting the timing of donations immediately after the intervention, but with no overall long term effects. When we initially compare donations (likelihood or amount) before versus after our intervention between all subjects who were and were not offered rewards, we do not find any long-term effects. However, when we limit the comparison to include only subjects who donated during the intervention, we find that the incentive offer induced a short-term adjustment of the timing of donations consistent with subjects pushing forward their future donation schedule, but no long-term displacement effect. Those offered the rewards were on

[5] Attracting new donors may lead to larger effects on the blood supply in the long run because new donors could become long-term, regular donors. Our sample size for new donors is too small to estimate such long-term effects.

average 12 percentage points less likely to donate within 12 weeks after the intervention than were those not offered a reward. The effect was again largest among individuals informed of the $15 rewards. The 12-week analysis suggests that either the extra donations at the intervention reward drives were not a genuine additional donation but instead were at least partially some donors displacing a future donation to get the reward, some donors permanently losing motivation to donate blood or donors pushing forward their entire schedule but the time between donations was greater than 12 weeks. Examining long-term behavior, we show that the decline was limited to the 12 weeks following the intervention. Comparing donations at 26 and 39 weeks before and after the intervention showed no change in the likelihood to donate or total donations. The additional donations generated at the intervention reward drives period were genuine extra donations and donors did not experience a permanent loss in motivation to donate. Methodologically, this analysis also shows that observing a sufficiently long-term horizon can avoid drawing potentially incorrect inferences about the effect of incentives on pro-social behavior.

In contrast with surveys and many laboratory and artefactual experiments, this study therefore indicates that economic incentives affect pro-social supply in a standard (i.e., outside the pro-social context manner. In addition to their academic relevance, our findings have policy implications because they suggest that economic rewards can be used to motivate individuals to increase and smooth donations over time and space in response to seasonal shortages or local shocks. We also calculated the cost-effectiveness of the intervention. Our preferred estimates indicate that the cost per extra unit collected is between $22 and $55, which is arguably well below the value of having one additional blood unit available.

The paper proceeds as follows. Section 2 provides information on the ARC Northern Ohio Blood Service Unit and the individual-level data that is available. Section 3 describes the experimental design. We report and discuss our findings in Section 4, and conclude in Section 5.

2. Institutional Background and Data

The ARC's Northern Ohio Blood Service Unit runs over 7,000 blood drives per year.[6] Each drive has a host partner (e.g., a school, church, private firm or hospital) that provides space at a specific location and date. The ARC provides the blood collection equipment and administrative and collection staff (including a drive representative). Several thousand individuals are typically informed about each drive. In most counties in Northern Ohio, the ARC mails a flyer on the 23rd or 24th of each month with information on all of the drives in the county for the following month. Figure 1 provides an example of a flyer (identifying information has been redacted). The flyers indicate each drive's location, date and time as well as whether an incentive is offered and the type of incentive. The ARC or the hosts provide the incentives and the most common items

[6] The ARC operates 36 regional blood centers within the US and Puerto Rico. Northern Ohio covers 10,206 square miles and includes major cities including Cleveland and Akron. In 2010, about 4.1 million people lived in Northern Ohio; median income was about $47,000 (overall US: $50,221); the unemployment rate was 9.9% (US: 9.6%); and there were 83% Caucasians and 11.4% African Americans (US: 72.4% and 12.6%).

are T-shirts (about 50% of all drives with rewards), coupons or gift cards (about 10%), followed by jackets, coolers and blankets. It is also extremely rare to observe more than one item per drive. A reward is given when donors "present" (i.e., show up) rather than for making an actual blood donation.

The ARC mails county flyers to everyone who has previously donated in that county who are active and eligible. An active donor is someone who has donated at least once over the past two years. An eligible donor is someone who is not currently disqualified from donating. Donors can be disqualified if donating may endanger them or if their donation would be unusable. Specific examples include individuals with anaemia, low blood pressure, low iron or recent behaviors that increase the risk of potential problems with their blood. Donors are also not permitted to donate for 56 days after making a whole blood donation.

Almost 40% of drives offer a promotional item and most flyers show at least one drive with a promotional item. Thus our treatments that include reward offers on flyers should not be perceived as unusual, which could otherwise potentially confound the interpretation of responses (Levitt and List, 2007; List, 2008). Furthermore, subjects could always choose to donate when and where no items were offered, which lets us easily observe whether subjects spatially or temporally change behavior.[7]

For the drives and counties in our experiment, 98,278 subjects were contacted through the ARC's standard procedures. For all subjects, we observe gender, age and blood type, as well as every donation during our intervention as well as up to four years before and at least nine months after the intervention. We also observe the location of each of these donations and the total number of lifetime donations. This data lets us distinguish between subjects who have and have not donated in the past at each intervention site. This heterogeneity is important because people who have previously donated at a drive are more likely to live closer to it, know how to get to it and be familiar with ARC staff and hosts. Thus, they are likely to have lower costs to donate at these drives and be more likely to donate at sites that they have donated at previously. Beyond the subjects contacted by the ARC for our interventions, we also observe every person who donated at all of intervention drives who was not formally contacted by the ARC including new donors and lapsed donors who are eligible but have not donated for some time.

3. Research Design and Descriptive Statistics

3.1 The Structure of the Experiment

The experiment was run over four periods (September 2009, December 2009, March 2010, and July-August 2010) to collect more independent observations and control for seasonal effects. We randomly chose 72 drives (18 in each of the four intervention waves) from a large set of "standard" drives in terms of historical turnout, openness to the public and frequency. We also only included drives that had no other incentive offer

[7] The blood donation context thus includes subjects who have been exposed to, and many who have received, incentive offers in the past. This can be seen as the "normal" context for most people involved in charitable activities (e.g., many individuals receive tax deductions for charitable donations). Moreover, if no one has ever received a reward for donations, our intervention would be a one-time event with limited generalizability. The conclusion further discusses this point.

during the intervention period or on the date of the drive immediately prior to the intervention. Full details on the drive selection and the experimental design are provided in the Appendix.

Drive-level Randomization and Incentives: In each intervention wave, the 18 drives were divided in nine pairs, such that the drives within a pair were held in the same county while each pair was in a different county. Within each pair, we randomly assigned one drive to have a reward (Reward drives) and the other to have no reward (No reward drives) so we have 36 Reward and 36 No reward drives. The Reward and No reward drives were not only similar in meeting the standard drive criteria, but also had the same population of potential donors who were contacted because the drives in a pair were advertised on the same county flyer. Because no incentive was offered at the No reward drives, from the perspective of potential donors and the hosts, these drives functioned identically to any other ARC drive that did not offer a reward.

At the Reward drives, presenting donors (regardless of their eligibility to donate) received gift cards for $5, $10 or $15. We randomly allocated the three dollar values equally across the 36 Reward drives across the four time periods. Having three dollar values, but no other differences, lets us estimate the shape of the supply curve and whether subjects respond to the economic value (donate more with higher values) or to receiving a gift (donate the same amount regardless of value). Because the ARC sometimes offers gift cards and the $5 to $15 values are in the normal range of item values the ARC offers, the cards were unlikely to be perceived as unusual by donors. An unusual gift or value may signal that there is a greater need for blood or that the ARC is running an experiment and might affect the interpretation of the results.[8] One more advantage of offering gifts is that we were able to observe whether donors accept or refuse the gift cards and how much they used the cards. If the cards were not accepted or used, that would suggest that the dollar values are not a good proxy for the value of the reward to the donor.[9]

Individual Level Within-drive Randomization: We randomized the 36 Reward drives into two conditions: 27 "Advertised reward" drives and nine "Unadvertised reward" drives. Seven of the 27 Advertised reward drives took place in each of the first three periods and the other six in the last period. In the Advertised reward drives, a random sample of approximately half of the subjects per drive was informed that a reward would be given, the gift cards offered and the dollar amount. We eventually used only 26 of the 27 Advertised treatment drives in the analysis because unforeseen contingencies at one location did not allow the host to apply our protocol. In the nine Unadvertised reward drives (two in each of the first three periods

[8] More generally, it may be argued that the presence of rewards is perceived as a signal of scarcity and subjects would react to this rather than to the rewards per se. However, the subjects receive information about a set of drives in the flyers with only some offering rewards. Thus, it is unlikely that they derive any information on scarcity from a single drive on the flyer.

[9] Offering cash may have further guaranteed the same monetary value to the donors; however, the FDA prohibits that blood collected from donors paid in cash be labeled as blood coming from volunteer donors. Therefore the policy of the ARC is to not offer cash. This might raise the question of whether gift cards may elicit a different response than cash. Some research has shown that small in-kind rewards might be more effective than direct cash. However, cash was found to be as strong a motivator (if not stronger) than in-kind gifts for non-negligible dollar values (Heyman and Ariely, 2004). Furthermore, in experiments for which subjects are asked to choose among in-kind and cash prizes, most subjects choose cash even if they stated a preference for the in-kind gift (Kube, Marechal and Puppe, 2012).

and three in the last period), no subject was informed in advance of the incentive. Regardless of whether the rewards were advertised, all donors who presented were given the gift cards at all of the 36 Reward drive.

The ARC guaranteed that identical, standard procedures were used for all drives in the experiment. Also, because subjects were not informed that a study was conducted and ARC offers gift cards or other items of similar value, it is reasonable to assume that subjects were not aware that they were participating in a study or being observed. Furthermore, the only change to the ARC's operations was the random assignment of rewards to drives and who was informed about them; no other aspect (e.g. personnel, location, supplies, or communications) changed. Thus, our study is a natural field experiment (Harrison and List, 2004).

3.2 Exploiting the Data and Experimental Design to Assess the Impact of the Rewards

The experimental design and rich data allow us to test multiple channels through which incentives might affect subject behavior and blood donation. These various tests are described below.

Short-term Local Effects: The uninformed-of-reward subjects at the Advertised reward drives provide the obvious control group for the informed subjects. The random assignment of subjects to be uniformed or informed ensures that subject characteristics (demographics and donation history) and donation opportunities (e.g., date, location, weather conditions and hosts) are balanced. The only difference between these informed and uninformed subjects is whether they received a flyer indicating or not indicating the reward offer.

Social Spillovers: We anticipate that some individuals receiving flyers that did not indicate the rewards as well as lapsed and non-donors who did not receive the flyer, may learn about the rewards from the informed subjects through word-of-mouth or other social networking activities. To measure this potential spillover effect, which contributes to the overall impact of incentives,[10] we included the Unadvertised reward drives in the design. Because no subject receiving flyers for the Unadvertised reward drives was informed of the rewards, the donation behavior of this group offers a benchmark for the donations of the uninformed subjects at the Advertised drives. The difference in the likelihood to donate between these two groups gives us one measure of the possible informed subjects' indirect efforts to motivate others (for a similar design strategy in a different context, see Duflo and Saez, 2003). Also to the extent that these spillovers occur, comparing donations between the Informed and Uninformed subjects at the Advertised reward drives will underestimate the effect of rewards. We also measure spillover effects by comparing the number of new and lapsed donors who present at the Advertised reward drives with those who donate at No reward drives. A higher number of new and lapsed donors at Advertised reward drives than No reward drives is further indication of spillover effects. Finally, we also designed the experiment to detect any potential effects of incentives on uninformed subject's behavior if drive hosts or ARC personnel who were aware of the rewards communicated with

[10] It is also possible that officially informed subjects might learn that a uniformed subject did not receive a reward offer. This could potentially introduce uncertainty with the informed subject regarding whether a reward would be given and thus lower the subject's expected value of the reward. In this case, we would underestimate the effect of the incentive offer.

subjects beyond the formal channels. While we did not anticipate informal communications since ARC personnel were requested to follow our protocols, this communication can be detected by comparing donations at Unadvertised reward drives and No Reward drives.

Spatial Substitution: Observing donations at all drives in Northern Ohio lets us test for displacement generated by the incentive offers. Specifically, subjects may be attracted to a drive offering a reward and away from another drive where they otherwise would have donated. Thus, the reward has a spatial substitution effect, but not an effect on total donations. We explore this channel through which incentives operate to estimate the overall, immediate effect of the rewards that accounts for spatial substitution.

Heterogeneous Responses: Given the wealth of individual-level data that include demographic and donation behavior, we can test whether incentives have heterogeneous effects. In particular, our data provides reasonable proxies for both intrinsic motivation and costs to donate. As already mentioned, having donated previously at a given location likely reveals lower costs of donating at that site than at a different one (e.g., in terms of travel time). A past donation at a certain site can also lower the cost of future donations at the same location to the extent that it lowers logistical costs and uncertainty (e.g., finding the location). We therefore expect stronger absolute responses to incentive offers for those who have donated at the Advertised reward drives. The higher costs to those who have not donated at a location may be too high to overcome with the current rewards. Similarly, we anticipate that the reward will need to be larger to induce a donation at a drive for those who have not donated at the drive previously in order to overcome the higher cost of donating at a new location.[11] Furthermore, we can identify the total number, frequency, and recency of past donations as well as blood type for each subject, which can provide plausible proxies, *ceteris paribus*, for intrinsic motivation. We assume that more donations and donating more recently are indicators of higher intrinsic utility from donating. Whether donors with greater intrinsic motivation should be more or less responsive to incentives is theoretically ambiguous. On the one hand, more intrinsically motivated individuals might be likely to donate irrespective of the presence of incentives and therefore be unaffected or even negatively affected by rewards. On the other hand, a stronger reputation for volunteering may lessen the severity of the negative image effects (Exley, 2012). Blood types may also indicate different levels of intrinsic motivation. In particular, 0-negative individuals (universal donors) might have higher intrinsic motivation given the greater potential usage of their blood (Wildman and Hollingsworth, 2009). Using the individual-level donation history data, we also constructed a proxy for extrinsic motivation based on the share of drives a subject donated at in the previous four years that offered economic rewards and which ranges from 0 (never donated at a drive with rewards) to 1 (always donated at drives offering rewards). Finally, although we do not have a specific prior, we test for differential responses between men and women. A survey based on

[11] Another proxy for donation costs is age; older individuals may have higher costs because of their health status and mobility. However, older age may also correlate with lower opportunity cost of times if, for example, they are retired, and thus age may not be an ideal proxy for donation cost.

stated preferences about incentives for blood donations (Lacetera and Macis, 2010a) and an experimental analysis on a student sample of whether an incentive induces subjects to take a health test to qualify as a potential blood donor (Mellstrom and Johannesson, 2008) found a negative response to rewards for women. Here we have the opportunity to assess gender differences in actual behavioral responses among subjects who are not aware of being studied.

Long-term Effects: We assess the long-term impact of the incentives by comparing post- to pre-intervention donations. We are interested in two types of effects. First, like spatial displacement, subjects may shift the timing of a donation that they would have made otherwise to obtain the rewards. This type of response leads to only a short-lived change in behavior and implies that the reward has no effect on overall donations. Second, if being offered rewards permanently reduces intrinsic motivations, then decreases in donations after the intervention will be longer-lasting and negatively affect total donations.

3.3 Sample and Design Checks

Table 2 shows statistics on the characteristics of the sites in the experimental conditions (No reward, Advertised reward, and Unadvertised reward) and the drives not selected for the study during the year prior to our intervention as well as during the intervention. Given the random assignment, it is not surprising that the three conditions have very similar characteristics and the differences are small and not significant. Given our selection criteria for inclusion in the study (see the Appendix), there were more drives in the prior year among the selected drives (we required at least three) and there were fewer drives with incentives (we required a maximum of 50% and no reward in the drive just prior to the intervention), otherwise the selected drives have nearly identical characteristics (e.g., similar turnout and units of blood collected).

There were 98,278 unique subjects who received at least one flyer for our interventions. About 50% were contacted in exactly one intervention period, 30% were contacted in two periods and 20% were contacted in three or four periods. Over all these contacts, there were 176,327 subject-wave observations. We limit the sample to those who were eligible to donate at the intervention drives,[12] giving us 79,680 subjects and 128,690 total contacts to analyze. Table 3 shows the characteristics of these subjects for each condition.

Our randomization was successful. Subjects were statistically nearly identical across the three conditions, overall (Columns 1-3) as well conditional on having previously donated at an intervention site (Columns 4-6) or having never donated at an intervention site (Columns 7-9). Identifying subjects based on whether they have or have not previously donated at a specific location naturally led to substantial heterogeneity because individuals who donate at more locations will be more likely to have donated at a

[12] When a flyer is mailed, the ARC requires the recipient to be eligible for at least one of the advertised drives. A donor may thus be ineligible for an intervention drive on a flyer if the drive is before he becomes eligible to donate later in the month

given location and the subject characteristics reflect this heterogeneity.[13] Subjects with a past donation history at the sites (Columns 4-6) on average had donated at 3.0 different locations, whereas subjects without a past donation history at the sites (Columns 7-9) had donated on average at 1.9 different locations. Consistent with identifying individuals who had donated at more locations, those with past history at an intervention site also had made more total donations, donated more frequently in the past two years, donated more recently and were older than those who had not donated at the intervention sites. This heterogeneity highlights the importance of separately analyzing subjects with and without past donation experience at the intervention sites. We henceforth refer to subjects with and without at least one past donation at the intervention sites simply as subjects with and without history. Our sample includes 4,745 and 123,945 total contact observations among subjects with and without history.

We make three final points to further verify the validity of the design. First, an anonymous survey was conducted at the Reward drives during the last two intervention waves to assess whether the information on the rewards was communicated as designed. The survey asked presenting donors whether they knew about the presence of gift cards before coming to the blood drive and if so, how they learned about them. The response rate was 94% and we collected 640 surveys. Among those who were sent flyers with the reward information, 52% indicated knowing about them primarily through the flyers.[14] In contrast, only 4% (6/149) of the respondents at the Unadvertised reward drives reported knowing about the rewards. This confirms that the official communication of rewards was effective and the lack of awareness of subjects at the Unadvertised drives is consistent with our procedures that ARC representatives and hosts would not tell anyone about the rewards. However, a significantly higher percent of the uninformed-of-reward respondents (14% (29/209)) at the Advertised reward drives indicated knowing about the rewards and a large share of these respondents reported that they knew through family and friends. This greater knowledge suggests some spillovers of information regarding the rewards occurred between the informed and uninformed subjects at the Advertised reward drives. We discuss this in much greater detail below.

Second, to further investigate if the same standard recruitment procedures were used for the drives with and without rewards, we compared donations at No reward drives with donations at Unadvertised reward drives where ARC representatives were aware of the incentives, but no subjects were informed. Appendix Table A2 shows no significant difference in donation rates at the Unadvertised and No reward drives. This result indicates that there is no significant unofficial information regarding rewards being communicated

[13] To illustrate this point, consider a county with two intervention drive locations, X and Y, and two types of people, A and B, each comprising half of the population. Suppose type A people have donated at both locations and half of type B people have only donated at X and the other half only at Y. In this case, although there would be an equal number of types A and B overall, all type As and half of the type Bs have past history at an intervention drive whereas no type As and half of type Bs have never donated at an intervention drive. Thus, the subjects who have donated at more locations (type As) will make up more of the population among those who have past history (they make up 2/3 of this population) than among those who have never donated at an intervention site.

[14] There could be many reasons why only 52% of informed respondents indicated knowing about the rewards. For instance, they may have not noticed, forgotten or not wanted to admit knowing about them. In our analysis, we adopt the standard conservative approach of estimating "intent to treat" effects. This implies that our results may underestimate the effect of incentives to the extent that donors did not even notice the reward offer.

from the ARC representatives and drive hosts to subjects.

Third, we examined whether gift cards were actually taken and used. We find that 98% of the cards offered were taken and more than 90% of the sum of all the cards' value was spent within the first four weeks after being given out with no differences across our conditions. We are thus confident that the subjects perceived the rewards as having economic value.

4. Results

We first report on all short-term impacts of the rewards and then assess the long-term effects. We conclude by quantifying the overall costs and benefits of the intervention.

4.1 Short-Term Responses

4.1.1 The Effect of the Incentives at the Advertised Reward Drives

Direct Effects: Figure 2 shows the average donation rates at the Advertised reward drives for all subjects and separately for subjects with and without history. Figure 2a shows that the likelihood of donating was higher when subjects were informed a reward and when offered the $15 reward. Figures 2b and 2c show similar patterns for subjects with and without past history and a dramatically higher likelihood of donating for subjects with past history. Table 4 reports estimates of versions of the following model:

$$Prob(DONATED_{ijt}=1) = f(INFO\_REWARD, X_{ijt}, \eta_j, \varepsilon_{jt}). \quad (1)$$

The outcome variable $DONATED_{ijt}$ is a dummy for whether subject *i* donated at intervention drive *j* on date *t* (one of the intervention periods). The coefficient on the dummy variable *INFO_REWARD* (= 1 if subject *i* was informed of a reward and 0 otherwise) estimates the difference in the probability of donating for those who were informed of the reward relative to those who were not informed of the reward at the same drive. We also estimate the effect of the three dollar values by replacing *INFO_REWARD* with *$5–INFO_REWARD*, *$10-INFO_REWARD*, and *$15-INFO_REWARD*. The controls in vector X_{ijt} include intervention period fixed effects (for waves 1, 2, 3, and 4), gender (dummy for female), age (dummies for 18-25, 25-49, and 50+), O-Neg blood type, total donations to date (dummies for 1-4, 5-9, 10-14, and 15+ donations), annual donation frequency in the past two years (dummies for at most 1, between 1 and 1.5, and 1.5+), number of distinct sites where donated in the past (dummies for 1, 2, and 3+) and most recent donation (more than 12 months ago, within the last 6 to 12 months, or within the last 6 months). For all categorical dummies, we omitted the first category in the regressions. The term η_j represents drive-level fixed effects. We report estimates from linear probability models because they allow us to conveniently include drive-level and other fixed effects without running into incidental-parameter problems (Angrist and Pischke, 2009) as well for a more immediate interpretation of the marginal effects especially on the interaction terms (Ai and

Norton, 2003).[15] Standard errors are clustered by individual as about half of the subjects were contacted in more than one intervention period. The estimates and standard errors in the tables have been multiplied by 100 so they can be read as percentage-point changes.[16]

Consistent with the data shown in Figure 2, the regressions estimate a higher donation likelihood by informed-of-reward subjects (Column 1) and increasing with the dollar value of the reward (Columns 2 and 3). Subjects with history at the Advertised reward drives were approximately 170 times more likely to donate at these drives than those with no history. Given this heterogeneity we always present in addition to the overall results, estimates separately for subjects with and without history. For subjects with history (Columns 4 and 5; baseline 15.3%), offering rewards increased the donations by 5.5 percentage points for informed subjects. Without drive fixed effects, the increase in donations to $5, $10, and $15 offers is estimated to be 3.66, 5.52, and 7.19 percentage points higher respectively, than donations by the uninformed subjects — a 24%, 36%, and 47% relative increase.

Column 6 presents estimates with drive fixed effects to control for idiosyncratic variation across sites not captured by the other regressors. Although the estimated effects are closer across the three dollar amounts, this does not necessarily imply that the effect of the reward offer on donations is more similar (or non-monotonic). In particular, if knowledge about the reward offer was passed from informed to uninformed subjects and if this donor-to-donor spillover was more prevalent for higher reward values, then uninformed subjects would also show a higher donation response to higher reward offers. Figure 2b shows precisely this pattern. This higher donation rate among the uninformed with higher reward offers thus compresses the difference in the fixed effects estimated likelihood of donating between informed and uninformed donors. We explore the significance of this donor-to-donor communication more formally below.

For subjects with no history at the advertised drives, the estimated effects are significant and large. Being informed of a reward led to an average 0.16 percentage point increase in the likelihood to donate, compared to 0.09 percentage point base rate for the uninformed subjects. The response to the $15 offer was particularly large as it increased the likelihood to donate by about 0.36 percentage points approximately 400% over the uninformed-subjects base rate (Columns 7-9).[17]

[15] Appendix Table A3 reports marginal effects from Logit estimates of our main models. For individuals without history, we use a Rare Events model to account for the rare occurrence of donations at our drives (King and Zeng, 1999a, 1999b). The results from these alternative specifications are very similar to those from linear probability models.

[16] Here we report the main estimates of interest; the other estimates are in Appendix Table A4. The estimates show that women were less likely to donate whereas the oldest subjects, subjects who had donated more than 15 times, subjects with higher donation frequency and subjects who had donated in the last six months were more likely to donate.

[17] In Appendix Table A9, we also report results with individual fixed effects added. The effect of the rewards in these specifications is identified from individual subjects who have been contacted for an advertised reward in more than one intervention period and exposed to different treatments (i.e., informed in at least one drive and uninformed in at least one drive). The results on the full sample and on the subsample of subjects without history are qualitatively and quantitatively similar to those presented in the text. The results on the subsample with history are very noisy because only 20 of the 3,493 subjects were contacted in more than one intervention period. We report these latter results for completeness but they should be cautiously interpreted with this small-sample caveat in mind.

Indirect Effects-Social Spillovers: Figure 2b shows that donations increased with the reward value among subjects with history and who received flyers that did not advertise the rewards suggesting that some of these subjects may have learned about the rewards from informed subjects. The survey evidence described in Section 3 is also consistent with this potential information spillover. Significantly more donors at Advertised reward drives who did not receive the flyers advertising the reward offer reported knowing about the reward (14%) than donors at the Unadvertised drives (4%) ($p<.01$).

We test this social spillover effect in two ways. First, we compare the behavior of the officially uninformed subjects at the Advertised drives (where the other half of the subjects were informed of the rewards by the ARC flyer) with subjects at the Unadvertised drives. Any difference in donations may be attributed to informed donors affecting the behavior of uninformed donors because only the presence of informed subjects systematically differs. ARC representatives and hosts were aware of the rewards in both sets of drives. Second, we analyze the distribution of donations made by individuals who were not contacted officially by the ARC across the various treatment conditions. Subjects informed of the reward may also influence other people beyond our subject population and this could result in disproportionally more donations at the Advertised than non-advertised drives. The comparison among uninformed subjects receiving a flyer at the Advertised and Unadvertised drives is in Figure 3 and Table 5, where we estimate:

$$Prob(DONATED_{ijt}=1) = f(ADV\_UNINFORMED_{ijk}, X_{ijt}, \varepsilon_{jt}), \quad (2)$$

where *ADV_UNINFORMED* equals 1 if a subject was contacted for an Advertised reward drive but was uninformed about the reward and 0 if the subject was contacted for an Unadvertised reward drive. We again add dummies for the different dollar levels of the rewards, use linear probability models and the same basic specifications as in Model (1).[18] Because this analysis relies on across-drive comparisons, the standard errors need to be corrected for potential within-drive correlation (Donald and Lang, 2007; Moulton, 1990). Thus, we cluster at both the individual and drive level applying the multi-way procedure in Cameron et al. (2011).[19]

Columns 1-2 of Table 5 show that Uninformed subjects were significantly more likely to donate at the Advertised than Unadvertised drives, driven by the $15 reward. Figure 3a and columns 3-6 of Table 5 further show that this difference is entirely driven by subjects with history. Among these subjects, the uninformed at Advertised reward drives were 2.3 percentage points more likely to donate than were those at the Unadvertised drives (significant at the 10 percent level) and this increase is driven primarily by the $15 reward, which raised the likelihood of donation by almost 3.6 percentage points (significant at the 5 percent level). For subjects with no history, no substantial effects were detected. The fact that the effect is limited to

[18] A full set of estimates is presented in Appendix Table A5.

[19] Although the number of clusters in our analysis (35) exceeds the threshold of 30 suggested by Cameron et al., in Appendix Tables A6 and A8, we report results of regressions for which *p*-values were obtained by two-way clustering (by donor and drive) and bootstrapping along the drive dimension using the Wild Bootstrap procedure described in Cameron et al. (2008). The estimated standard errors are larger, but the key results from Table 5 are statistically significant at the 10% level, and those from Table 7 at the 5% and 1% levels.

the sub-population of those with history at a drive is further evidence of a social spillover. The individuals who have donated before at the same site are more likely to share social ties, for example they might live and donate in the same neighborhood or work together and donate near the office.

Table 6 shows further evidence of social spillover effects. We examine the 328 individuals who donated at the intervention sites and who were not contacted through any formal ARC channel about the presence of these drives. Among these individuals 108 were first-time donors and the remaining 220 had donated at some point in the past (lapsed donors). If there were no indirect social effects, we would expect the donations of these individuals to be distributed across the drives proportionally to the number of drives for each condition, thus 36.7% (26/71) at Advertised reward drives, 50.6% (36/71) at No reward drives and 12.7% (9/71) at Unadvertised reward drives. Instead, we observe a shift in the actual distribution of these donors toward Advertised reward drives; 46.3%, 43.5%, and 47.7% of overall, first-time and lapsed donors, respectively, donated at the Advertised drives and the differences from the theoretical 36.7% level are statistically significant. These proportions translate to the average number of not-contacted donors per drive being higher at the Advertised reward drives (5.8) than at the No reward and Unadvertised reward drives (3.9). Thus, 1.9 extra non-contacted individuals donated per Advertised reward drive when the ARC officially communicated the reward to only half the subjects. Given that on average each drive generated 26.8 units of blood during the pre-intervention period (Table 2), this implies 7.1% (1.9/26.8) additional donations per drive were due to social spillovers to non-contacted individuals. If we assume that these additional new and lapsed donors were primarily attracted by the informed-of-reward subjects with history (Table 5), then the 1,283 informed-of-reward subjects over the 26 drives with history attracted on average 1.9 extra donors or 3.9 new and lapsed donors for every 100 subjects informed of the reward ([26*1.9]*[100/1,283]). Moreover, the value of attracting new and lapsed donors to make a donation may be greater to the organization than the donation itself to the extent that they become active and repeat donors.

Two primary social mechanisms may explain these results. First, informed-of-reward subjects may actively motivate their relatives, friends, and coworkers if they think the rewards may motivate them to donate. Second, more passive peer or neighborhood effects may occur when more people are seen donating, other individuals, even if not aware of the rewards, may decide to donate in order to conform (Brock and Durlauf, 2001). Separating these mechanisms is an important avenue for future research.

The Total Direct Effect of Incentives: The social spillovers between subjects informed and uninformed of rewards indicates that the difference in donations between these subjects (Table 4) under-estimates the total direct effect of offering rewards, especially for the highest-value reward. Thus, to estimate the total direct effect, we compare the donations of subjects who were informed of rewards at the Advertised drives with all the subjects invited to the Unadvertised reward drives. We estimate:

$$Prob(DONATED_{ijt}=1) = f(ADV\_INFORMED_{ijk}, X_{ijt}, \varepsilon_{jt}), \quad (3)$$

The model is identical to model (2) except that we replace the uninformed-of-reward subjects with those informed of the rewards (*ADV_INFORMED* = 1). The subjects contacted for the Unadvertised reward drives remain the reference group (*ADV_INFORMED* = 0). The standard errors are again clustered by individual and drive. The results are found in Table 7.

Subjects with and without history were more likely to donate if informed than uninformed of the rewards. Over all three reward values, the likelihood to donate was about 7.7 percentage points higher for subjects with history (a relative increase of over 50% compared to a baseline of 13.2%) and 0.14 percentage points higher for those without history (a relative increase of 175% compared to a baseline of 0.08%). The effects increased with the dollar value of the reward. The $5, $10, and $15 rewards increased the likelihood of donating by 5.7, 7.4 and 9.5 percentage points, respectively, for subjects with history at the sites (all significant at the 1% level) and by 0.03 (not significant), 0.11 (not significant), and 0.34 (significant at the 1% level) percentage points for subjects with no history at the sites.[20] These results indicate that advertising rewards significantly increased donations at the drives advertising the rewards. We now test whether there were any effects at other locations or in the longer term that might dampen these estimates.

4.1.2 The Effect of the Incentives at Non-intervention Drives: Testing for Spatial Displacement

To measure displacement, we estimate the effect of our intervention on donations at ARC drives other than the intervention drives that were advertised on the same flyer and at drives that took place elsewhere in Northern Ohio during the intervention month. For this analysis, we assume that any unobserved donations at other locations outside of the ARC's operations were unlikely to affect the displacement estimates in any meaningful way since other blood banks played a minor role in Northern Ohio (under 15% of the total units collected) and donors are unlikely to donate with multiple blood collection organizations.[21] We also report estimates of the effect of the reward offer at *all* ARC drives (including the intervention drives) during the intervention months to determine the overall short-term effects.

We compare the behavior of subjects informed of the rewards at the Advertised drives with subjects at the Unadvertised reward drives. We estimate versions of model (3) using the binary outcomes "donated somewhere else in the county," "donated somewhere else in Northern Ohio outside the county" and "donated anywhere in Northern Ohio." Because the likelihood to donate somewhere else may depend on the number

[20] Appendix Table A9-b presents results from regressions that include individual fixed effects. Similar to what is described in footnote 17, the results on the full sample and on the subsample of subjects without history are qualitatively and quantitatively similar to those presented here, whereas the results on the subsample with history are very noisy because only a very small number of subjects (24 out of 3,006) were contacted in more than one intervention period.

[21] It is also possible that displacement could occur outside Northern Ohio, but this is likely to reflect subjects moving rather than being an effect of the rewards. Substitution may also occur with plasma or platelet donations; however, these components represent only a small share of donations. Finally, subjects could substitute some other form of pro-social behavior in response to a blood donation reward offer, but this also is unlikely to affect the estimates given the unobvious relationship between blood donations and other pro-social activities. An analysis of displacement to all possibly relevant activities is beyond the scope of this paper, but studying displacement in the blood donation context may be as ideal a context as possible because there are no close substitutes for blood donations (as opposed to, e.g., cash donations).

and characteristics of the alternative options, these regressions add controls for the number of other drives included on the flyer when the intervention drive was advertised[22] and whether a blood drive where the subject had donated in the past (other than the intervention drive) offered a reward during the intervention month. The coefficient of interest in these regressions is again the one on *INFO_REWARD* (=1 if subject *i* was informed of the reward at the Advertised drive, and =0 if contacted for an Unadvertised reward drive).

Table 8 presents the estimated coefficient on *INFO_REWARD* from sixteen separate regressions.[23] Columns 1 and 5 show the estimates on "donated at the intervention drive" from Table 7 with the added control variables. Row 1 shows the estimates from regressions aggregating across the three reward values, and Rows 2-4 show the estimates with dummies for each reward value. Thus each column shows results from two regressions, one in Row 1 and one in Rows 2-4. All the regressions include period fixed effects and use two-way (drive and donor) clustered standard errors. Columns 1 and 5 show that the extra control variables increase the estimated effect of reward offers on donations by 0.23 and 0.02 percentage points for subjects with and without history (compared to those presented in Table 7), but they do not change the qualitative interpretation of any of the results described above.

For subjects with history, being informed of the rewards increased the likelihood of donating at an intervention drive by 7.9 percentage points, but decreased the likelihood of donating at another site within the same county by 2.45 percentage points ($p<.10$) and had no effect on the likelihood of donating at other drives outside the county. The within-county displacement explains roughly 31% (2.45/7.9) of the increase at the intervention drives. The displacement effect was especially large for the $15 reward ($p<.01$), explaining nearly 45% (4.5/10.1) of the higher donation rates at the intervention drives. The estimated overall effect of the $15 incentive, net of any displacement effect reported in column 4, is 6 percentage points. A consequence of the larger spatial displacement at the $15 drives is that, in contrast to the local effect, the "net" increase in donation rates that excludes displacement effects no longer differs between the $10 and $15 offers.

For subjects without history, there is no evidence of displacement.[24] Because the overwhelming majority (over 99%) of these donations occurred at locations other than the intervention drives, there is greater noise

[22] We could control for either the number of drives offering incentives or the total number of drives on a flyer, but we could not add both since the correlation between them was nearly 0.8. The results do not change meaningfully with either control; because there is a better fit with the number of drives offering rewards, we present these estimates.

[23] Appendix Tables A10-a and A10-b show the full results. Among subjects with past history (A10-a), the number of drives at which the ARC offered some reward was positively correlated with the likelihood that the donor gave blood at some drive other than the intervention drive and the dummy variable capturing whether some ARC-provided reward was offered at a drive at which the donor had given blood in the past (excluding the intervention site) was positively correlated with the likelihood that the donor gave blood at some drive in the county other than the intervention drive and negatively correlated with the likelihood of donating at the intervention drive. Among donors without history (A10-b), the offer of a reward at drives where they had given in the past was positively correlated with the likelihood that they donated somewhere other than the intervention site.

[24] The higher displacement among subjects with history is consistent with the evidence in Table 3 that subjects without history donated at fewer locations in the past (1.9) and were more likely to have only donated at one location (55%) than were donors with history (3% and 29%, respectively); thus, donors with history have a history of more flexibility in the locations where they donate and should be more prone to displacement effects.

(unrelated to the experimental conditions) in these estimates. Thus, although the effect of the $15 reward is now 0.29 percentage points, it is not significant because the standard errors increased substantially.

4.1.3 Heterogeneous Effects

We now add an interaction term for each subject characteristic by *INFO_REWARD* to model (3) for the regressions "donating at the intervention drive" (direct effect) and "donating at some other site in the county" (spatial displacement effect). We estimate each interaction separately so that the heterogeneous effects for each characteristic are evaluated at the mean value of the other characteristics (which are included in all regressions). Results are in Tables 9a, 9b, and 9c for all subjects and for subjects with and without history.[25] The "Int.Dr." and "Oth.Dr." columns report the estimates that pertain to the intervention drives (direct effects) and the other drives (displacement effects).

Heterogeneity in Direct Effects: We find no significant gender or blood type differences in the response to rewards, both overall and for subjects with or without history. We find, however, evidence of a stronger response to incentives by older donors and this effect seems to be driven by individuals with no history. We also find that the effects are heterogeneous among donors with different amounts and patterns of donation history. Specifically, the response was stronger for donors with more total donations (and once again this effect was driven by donors who had no history at the intervention sites), for donors who donated with higher frequency in the previous two years and for donors who made their last donation within six months prior to the intervention (the latter effects were significant for subjects with and without history). One explanation for the stronger response of older and more experienced subjects is that they may be more secure (or less concerned) with rewards undermining their self-image, social image or their intrinsic motivations (Exley, 2012). Because these effects only occur for subjects with no history, the results may also reflect greater mobility and to the extent that older more experienced subjects may be retired, a lower time valuation. As for the result that subjects who donated more frequently and who have donated more recently were more responsive to the reward offer, their intrinsic motives might also be less affected by receiving a reward. Finally, subjects who gave blood always at the same site or at no more than two sites were less likely to respond to the incentives than were subjects who gave blood at three or more sites in the past (this effect was significant only for subjects with no history). This is not surprising because donors who gave blood at multiple locations are presumably those with lower mobility cost and hence more likely to be induced by a reward to donate at a different location.

We also constructed a proxy for extrinsic motivation equal to the share *s* of drives a subject donated at in the previous four years that offered some material reward. The variable ranges from 0 (never donated at drive offering rewards) to 1 (always donated at drives offering rewards). We then constructed dummies for

[25] Tables 8a-b only report the estimated coefficients for the main incentive term (aggregating across the three reward values) and the interactions. The full results are reported in Appendix Table A11.

whether s=0, 0<s≤50% or s>50%. We interacted these dummies with our treatment indicators to explore whether the effect of incentives varied depending on subjects' past propensity to donate at drives with rewards. Because s can be very noisy for subjects who gave blood only a few times, we restricted the sample to subjects with at least one donation per year. We find that subjects with s>50% were more likely to respond to rewards among the subjects with no history. No effect was found for subjects with history. These results indicate that the extrinsic motivation to donate at drives offering rewards is sufficient to attract more subjects to incur the additional cost of donating at a new location.

Heterogeneity in Spatial Displacement Effects: There was also some heterogeneity in the displacement effects. Consistent with our finding that displacement occurred only among subjects with history, we only find significant heterogeneity within this group. Table 9b shows stronger displacement effects for subjects who were older and had donated at more than two sites and at drives that offered rewards. These results affirm our view that subjects with lower mobility costs (i.e., donating at multiple sites) and stronger extrinsic motivation (i.e., donating mostly at drives where rewards were offered) are more likely to spatially alter their donations toward drives offering incentives.

4.2 The Long-Term Impact of the Rewards

In this section, we explore whether the incentive offer had any effects on donation behavior beyond the intervention period. For each subject, we have data on pre-intervention donations for up to 4 years and for 20, 17, 14, and 9 months after the 1st, 2nd, 3rd, and 4th interventions, respectively. We limit the pre- and post-intervention windows to 9 months before and after the intervention since that allows us to use data from all four periods and because a longer time horizon would include noisier data (e.g., increased likelihood of subjects moving outside the region).

4.2.1 Effect of Incentive Offer on Post-intervention Donations: Full Sample

Our first analysis examines the subjects' donations in the N weeks after the intervention with N = 12, 26 and 39.[26] We consider the fullest possible sample of contacted subjects and compare two groups: (a) those who were invited to an Advertised reward drive and were informed in advance of the reward (and who were thus most likely aware of the reward offer), and (b) those who were not contacted for any Advertised reward drive during the intervention period (and who were thus unaware of the intervention reward being offered). The groups defined in this analysis are ex-ante statistically equivalent since they were randomized into these conditions. We estimate versions of model (3) where the dependent variable is whether a subject donated within N weeks of the intervention date (excluding donations made in the intervention period), or the number

[26] Because the American Red Cross requires at least 56 days have to pass between two donations, the 12-week period gives donors 4 weeks (i.e., approximately one month) to donate post-intervention, thus reflecting their immediate response. We refer to weeks because most drives at each location occur on the same day of the week and most individuals donate at the same location over time. The results are not sensitive to choosing different time periods (e.g., 11 or 13 weeks as the first cut-off or 25 or 27 weeks for the second cut-off), and 39 weeks is the longest time we have for the fourth wave of our data.

of donations made in the same period (limited to the 26- and 39-week periods because a subject who donated at an intervention drive would only be eligible to donate at most once within the 12 weeks post-intervention period). Table 10 shows the results. For subjects both with (10a) and without (10b) history at the intervention drives, the incentive offer did not meaningfully affect the subjects' post-intervention donations. The estimates are small in magnitude relative to the baseline donation rates and statistically insignificant. We interpret this evidence to indicate that among all contacted subjects incentive offers had no overall long-term effect. We also repeated this analysis but limited the comparison group to (b') those who were not contacted for *any reward drive* during the intervention period (and who were thus not only unaware of the intervention reward being offered, but would not have received one if they donated at an Unadvertised reward drive). The purpose of this analysis was to remove the potential effects of the subset of subjects who received a reward unexpectedly. The comparison groups defined in this analysis, (a) and (b') are again ex-ante statistically equivalent since they were randomized into these conditions. The results are qualitatively identical to those presented in Table 10 (and thus not shown here); the estimated magnitudes are again small and statistically insignificant. We interpret this as further support that incentive offers had no overall long term effects.

4.2.2 Effect of Incentive Offer on Post-intervention Donations: Subjects who Donated at the Intervention Drives

We now further limit the sample to subjects who donated during the interventions. Our goal here is to determine whether subjects who were informed of the reward and donated at the intervention drives changed their donation patterns in the post-intervention period compared to pre-intervention. We thus compare the following two groups: (c) those who donated at an Advertised reward drive and were informed in advance of the reward through the ARC's formal channels; these subjects were the most likely subjects to be aware of the reward offer and received the reward when they donated; and (d) those who were not contacted for any Advertised reward drive and donated at a No reward drive; these subjects were unaware of the intervention reward being offered and did not receive any reward. The informed subjects who donated at the Advertised reward drives are not a random sample; they differ from those who donated at the No reward drives on the characteristics that significantly differed in the heterogeneity interaction terms documented in Table 9 and also, potentially, on other unobservable traits. Nonetheless, this is a critical comparison in order to isolate and focus on whether the higher donations that occurred among the subjects informed of the rewards were genuine new donations or were instead due to a shift in the timing of their donations or inter-temporal displacement. Moreover, individual-level fixed effects within a difference-in-differences framework will address the non-random sample concerns (e.g., fixed effects will control for the observable and unobservable differences across the comparison groups).

Our estimation strategy compares subjects' donations in the N weeks preceding an intervention to the N weeks after the intervention, with the following difference-in-differences specification:

$$Y_{it} = \alpha + \beta POST + \delta_2 POST*TR\_COND + \lambda X_{it} + \eta_i + \varepsilon_{it}, \quad (4)$$

where Y_{it} is the outcome for subject *i* in period *t*, with t representing time period *N* pre- or post-intervention, excluding the date of the intervention (i.e., any donation that occurred on the intervention date is excluded). The regressions include individual fixed effects (η_i), and the standard errors are clustered at the individual level. *POST* is a dummy for the period after the intervention that captures any seasonal changes or trends in donations, thus the coefficient on *POST* measures the change in donations for the No reward control group (d). *TR_COND* is a dummy to indicate the treatment condition for subject i (equal to 1 if in condition (c) and to 0 if in the No reward condition (d)). Because we estimate individual fixed effects models and each subject was only in one treatment condition, the regressions omit the main effect for the variable *TR_COND*.

The key parameter estimate, on *POST*TR_COND,* measures the change in donation likelihood (or number of donations) from the pre- to the post-intervention period for the two groups. There are no subject-specific controls in these regressions because we include subject fixed subject. However, we now control for pre- and post-intervention drive-level factors that will vary across subjects and conditions and that we anticipate will affect donations that include the number of drives run in the reference period at sites where the subject gave blood in the past and the number of these drives that offered material rewards.

We report the results in Table 11. For subjects with history, Figure 11a shows a significant decrease in donations 12 weeks after than before the intervention drive donation for those who donated at the Advertised than No reward drives. The decline was 12.3 percentage points ($p<0.05$) from a baseline rate of 47%. This negative effect increased with the value of the reward and was especially strong for the $15 reward, where the likelihood of donating within 12 weeks of the intervention dropped 18.3 percentage points or a 40% relative fall compared to subjects who donated at No-reward drives. This result follows logically since, although subjects are more likely to incur the same rescheduling costs regardless of the dollar value of the rewards, the benefits of rescheduling are greater the higher the reward value. However, there were no significant systematic effects for longer periods of time. Figure 11a also shows that for subjects with no history there was no significant difference in donations after than before the intervention drive donation. Figure 11b indicates that, for both subjects with and without history, there was essentially no significant change in the number of donations in the 26 and 39 weeks after than before the intervention for subjects who donated at the Advertised than at the No reward drives.

These findings are consistent with the additional donations during the intervention being genuine extra donations rather than inter-temporal displacement and subjects with history (i.e., lower costs to take advantage of the reward offers) adjusting the timing of donations to obtain the rewards rather than rewards causing a reduction in overall donations or a permanent negative effect on motivation. First, because there is no difference in the likelihood of donating (or in the total number of donations) in the 26 and 39 week pre vs. post analyses, the total number of donations before and after the intervention is unchanged and thus the extra

donations during the intervention period are genuine additional donations. Second, because the negative effect disappears in the 26 and 39 week medium-long term, the 12-week short-term decrease is unlikely to reflect a change in motivation. These findings have clear implications also for policy. Economic rewards can be used to not only generate new donations, but can also temporarily shift the timing of the donations.

4.3 Cost-Benefit Analysis

To assess whether the rewards were cost-effective, we quantify the cost per each extra unit of blood collected when a reward was offered. Because we find no evidence that advertising rewards significantly affected the number of donations after the intervention, we only include blood collected during the intervention periods. Table 12 reports the results using the information in Table 8, Column 1 (estimated coefficient for "donated at intervention drive" for the number of rewards given out) and Column 4 (estimated coefficient for "donated anywhere in Northern Ohio" for the overall number of extra units collected). We also only consider estimates that are statistically significant ($p<0.05$) and assign a value of zero to the others. This implies that we focus on the effects of offering rewards to subjects with history at the intervention sites, because for those without history the estimated effect of incentives on "donated anywhere" was very noisy.

Column 1 in Table 8 shows that 13.2% of contacted subjects with history donated when uninformed of the rewards. This result is reported in the first row of Table 12 and assumes 100 individuals are contacted. The third row in Table 12 reports the additional units of blood collected when the reward was offered (Column 4 in Table 8). Because the ARC has to give the reward to all donors presenting, regardless of whether they donated, we convert the estimates on units collected to donors presenting to determine the number of the rewards that have to be provided. Our past work (Lacetera et al., 2012) found that the blood units collected were 13% less than the number of presenting donors due to deferrals, regardless of the presence or cost of the reward. Table 12 thus shows the donors presenting to be the units collected times 1.149 (=1.00/0.87). Rows 2, 4 and 5 show the estimated number of donors who presented when no incentives were offered, the extra donors presenting when incentives were offered and the total number of donors presenting when incentives were offered. We do not include the extra donations by lapsed and new donors due to spillover effects because the small numbers of Advertised reward drives for each dollar value make it difficult to separate these effects. Inclusion of these effects would lower the estimated cost of incentives to attract each additional donation by about 25%. Moreover, to the extent that new and lapsed donors become regular donors, the estimated costs would be even lower. Row 6 indicates the total cost of the rewards per 100 contacted individuals (i.e., the product of donors presenting and dollar value of the gift cards), and Row 7 reports the additional cost per extra unit of blood collected. The $5 and $10 rewards were the most cost-effective, costing only $22 and $32 per extra unit of blood collected, respectively, while it cost $55 per extra unit for the $15 reward. This higher cost was due to the fact that the $15 reward was more expensive and

triggered a substantial displacement from other drives.[27] Had we only examined the local effects, and ignored the displacement effects, we would have estimated the cost per extra unit of blood for the $5, $10 and $15 offers to be $18, $34 and $40, respectively, suggesting a bigger gap between the $5 and $10 offers as well as a much smaller gap between the $10 and $15 offers.

Estimating the benefit from collecting one extra unit of blood is difficult. One approach is to estimate a lower bound based on the amount that is paid for each unit of blood. The Medicare hospital outpatient payment rate for a unit of whole blood for transfusion was set in 2010 at $206.25 (Centers for Medicare and Medicaid Services, 2010).[28] This suggests that the $5, $10, and $15 rewards for people with history are all highly cost-effective. Another approach is to calculate the value of the potential uses of the additional blood collected. For example, about seven units of blood are needed for brain surgery, hip replacement, and cancer treatment on average per patient per week, as well as for certain organ transplants (Canadian Blood Service, 2011). To fully capture the benefits, we would need to further determine the expected impact of these procedures on the life expectancy and quality of the patients multiplied by the dollar value of those extra (quality-adjusted) years of life to the recipient and to the rest of society.[29] Although there may be a potentially large variation in these expected benefits, it seems reasonable to assume that the benefits will far outweigh the extra costs we have estimated.[30]

5. Summary and Discussion

Titmuss's (1971) claim that offering economic incentives for blood donations might lower donations has motivated many studies on the impact of rewards on intrinsically motivated activities. However, no study to date has offered a comprehensive and fully causally identified analysis of whether and how incentives affect pro-social behavior, including the shape of the supply curve, heterogeneity in responses, spatial and inter-temporal responses and social spillovers that motivate others. The experiment presented here fills this gap. We find that offering economic rewards led to a large increase in the propensity of subjects to donate and the effect was larger for higher-valued incentives. In addition, we observe that the incentives caused an indirect effect in which donations were higher among individuals who had not been officially informed of the rewards when other people received flyers officially informing them of the reward offers. The rewards also led to spatial displacement and short-term shifts in the timing of donations, but no long-term effects.

[27] We are not considering mailing costs because they are incurred irrespective of the presence of rewards. We are also ignoring the marginal costs of the ARC operations to collect each additional unit. We assume these are relatively small given the scale of the ARC's operations and low variable costs for the equipment and storage. We are also not including the two percent of the cards that presenting donors did not take, which would slightly further reduce the cost per unit of blood collected.

[28] Our personal communications with medical professionals suggest that the amount that hospitals bill to patients and insurers when performing transfusions can reach about $1,000 per blood unit.

[29] Note that one unit of blood collected provides a full unit of red cells and several partial units of plasma, platelets, and cryoprecipitate. Up to three of these four products can be derived from one unit and used on multiple patients.

[30] From the ARC's perspective, an alternative assessment involves considering alternative methods to increase donations and determine whether reward offers are the cheapest method. We are not aware of the full possibility set, but this could include changing who is contacted (e.g., the definition of active and eligible donors), telemarketing, and advertising procedures.

The results have implications for policymakers and organizations interested in enhancing the supply of blood and other products whose availability relies on a vast and diverse set of primarily volunteer suppliers. For these organizations, understanding what motivates volunteers is crucial. Also, because many of these activities originate in civil society (e.g., within firms, associations, churches, etc.), it is important to understand and quantify the social mechanisms that are put in motion by economic incentives.[31] Further, because donors may substitute among pro-social activities, we need to assess whether and how the presence of rewards prompts substitution to quantify the net effect. With reference to our findings, spatial substitution indicates that part of the expenditures for the rewards displaces donations that would have occurred anyway and ignoring this substitution would lead to over-estimates of the effects. On the other hand, the inter-temporal, short-term shift in the timing of donations that we observe could be used to enhance efficiency in blood collection or any other pro-social activity for which demand varies over time. Incentives may be an effective way of reallocating donations toward periods of greater shortage. Finally, organizations involved in managing these activities and products (such as blood) can also benefit from identifying which subgroups of the population are more or less responsive to rewards.

Our evidence also has implications for theory. First, and perhaps most importantly, to our knowledge most theoretical work examining the effects of incentives on charitable behavior does not consider environments in which donors have the option to choose the timing and location of donations in order to donate when rewards are offered or donate when no rewards are offered. This flexibility, however, may be critical to understanding the effects of an incentive offer. We believe that most pro-social contexts, like the one studied here, do not always require donors to accept rewards for donating. And in our context, we found heterogeneity in whether donors donate when rewards were offered and donors who donated more often when rewards were offered were more responsive to the rewards. Second, we believe that reputation may also critically affect the impact of an incentive offer on donations. As Exley (2012) notes, reputation may be the missing link to reconcile some of the conflicting findings on the effects of incentives on pro-social behaviour. Donors' intrinsic motivations among those who have donated often may not be adversely affected by a small reward.

We conclude by discussing some limitations of this work and directions for future research. First, almost all subjects studied in this paper had donated at least once in the past. Although studying existing donors is a natural starting point to study the effect of incentives on donations, future research can examine whether incentives can also induce non-donors to donate, potentially repeatedly. People who have never donated are, *ceteris paribus*, presumably less intrinsically motivated than current donors thus it might be problematic to

[31] The diffused supply of pro-social activities and products, especially in the health sector, is emerging also in developing countries (Ashraf, Bandiera and Jack, 2012; Cohen and Dupas, 2010; Dupas, 2011). Evidence of social incentives has been found in the workplace by Bandiera, Barankay and Rasul (2010), Ichino and Maggi (2000), and Mas and Moretti (2009).

test for any trade-off between extrinsic and intrinsic incentives. Also, our results hold across different levels of past experience including among subjects who had donated the least.

Second, we assessed the effect of incentives in an environment where donors are sometimes exposed to rewards. This has the advantage that subjects are less likely to interpret the rewards as unusual and possibly to react to the unusual aspect rather than to the economic value of the incentives per se, which would make the interpretation of any results problematic. One interesting question is whether incentives would have similar effects if they were offered where none had been previously offered. Another question is how donations would respond if incentives were offered at every drive. In this latter situation, we would not anticipate spatial or temporal substitution, given that rewards are always offered. However, in the context that we examined with incentives only sometimes being offered, incentives can be used specifically to take advantage of spatial and temporal substitution to address short-term shortages. The current environment thus makes the spatial and temporal displacement relevant and perhaps as important if not more so than studying incentives without the possibility for displacement effects.

Third, from a policy perspective on the efficacy of offering incentives in the long term, studying a context where donors are persistently exposed to reward offers would be appropriate for understanding if the policy is sustainable. For instance, it is possible that reward offers could have negative effects the first time individuals are exposed to them, but could have positive effects in the long run as individuals get used to receiving rewards, vice-versa, or individuals could habituate to the presence of incentives and so donation levels would revert to levels without reward offers.

Last, we focused on incentives with a financial value in this paper, but other motivators and actions [32] could be used to induce more blood donations. These motivators and actions include social recognition, reducing waiting times, rewarding hosts or ARC representatives, increasing the saliency of the benefits to the recipients of the donations, reducing the social distance between donors and recipients, or encouraging donors to actively focus on the donation decision. It would be interesting from both academic and policy perspectives to assess how these policies compare to those of economic incentives.

[32] For instance, Stutzer, Goette and Zehnder (2011) find that active-decision reflection increases donations among individuals who have not thought about the importance of blood donations. See also Ashraf et al. (2011) and Lacetera and Macis (2010b) on the impact of social image incentives.

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Figures

Figure 1: Example of the ARC flyers used in the experiment

The drive locations have been redacted for confidentiality reasons. The individuals informed of rewards received this flyer and the Advertised reward drive of which they were informed is the one in the bottom-left corner. The position within the drive was the same within a given county, but varied in a random way across counties for different drives. The contacted individuals uninformed of the reward would receive the exact same flyer, with the exclusion of the information about the reward at the intervention drive highlighted (by us) in the flyer reported here. A flyer including an Unadvertised reward drive would include information about the host, location and time of a drive, but not on the rewards. More details are given in the Online Appendix.

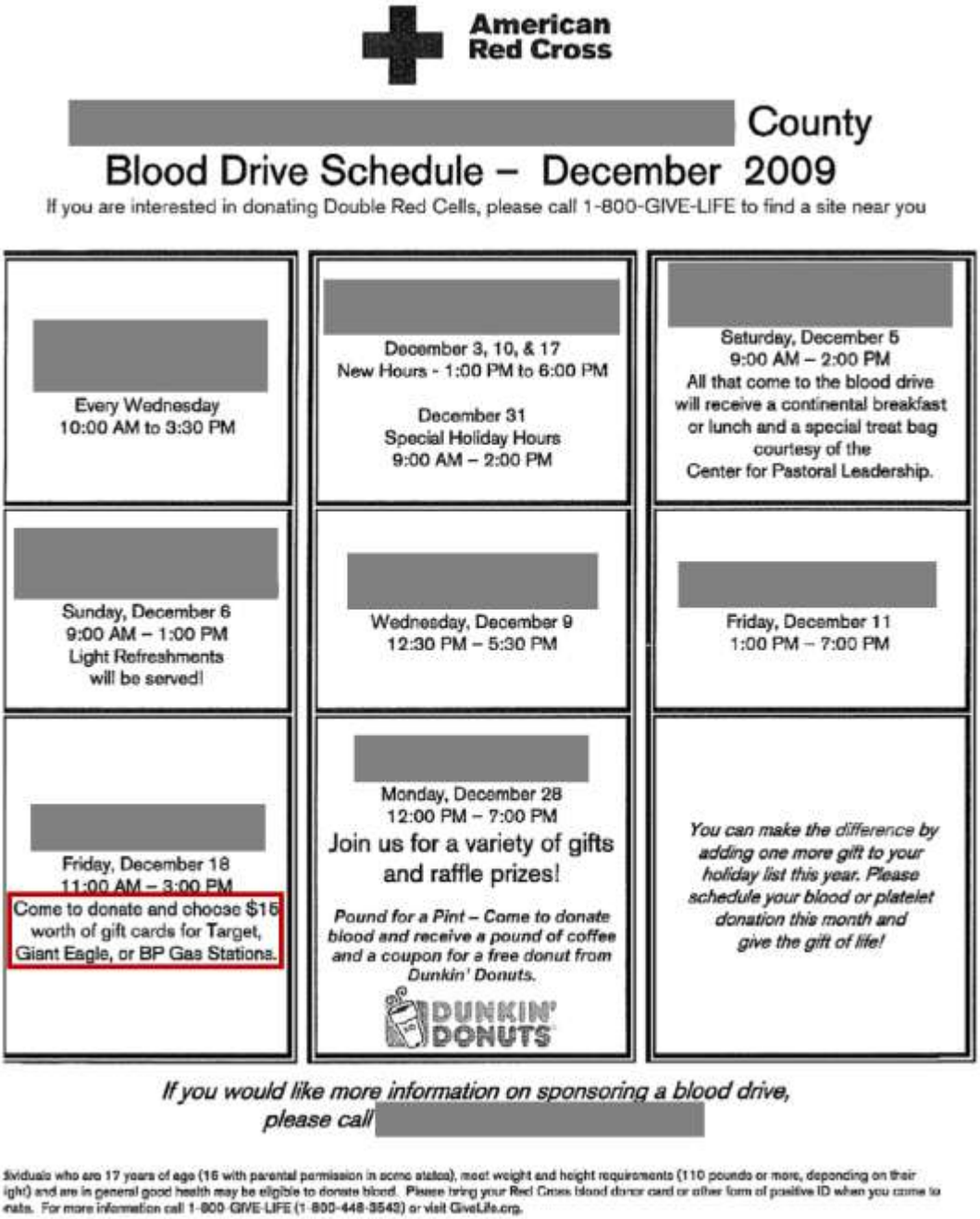
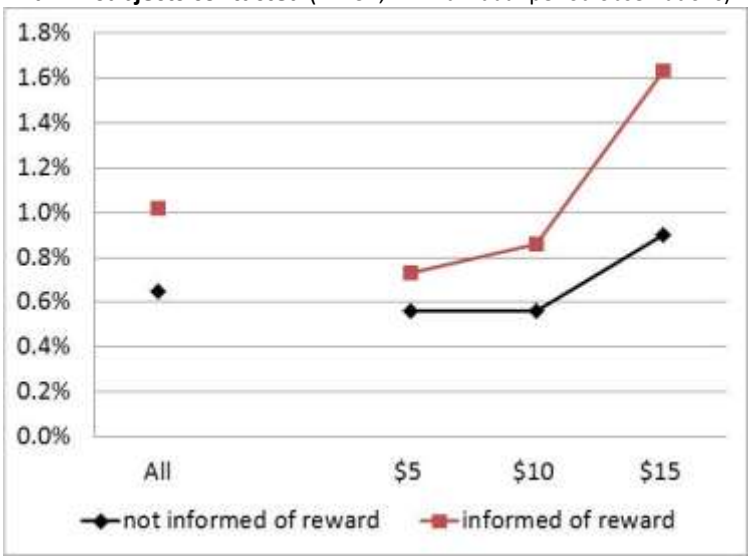


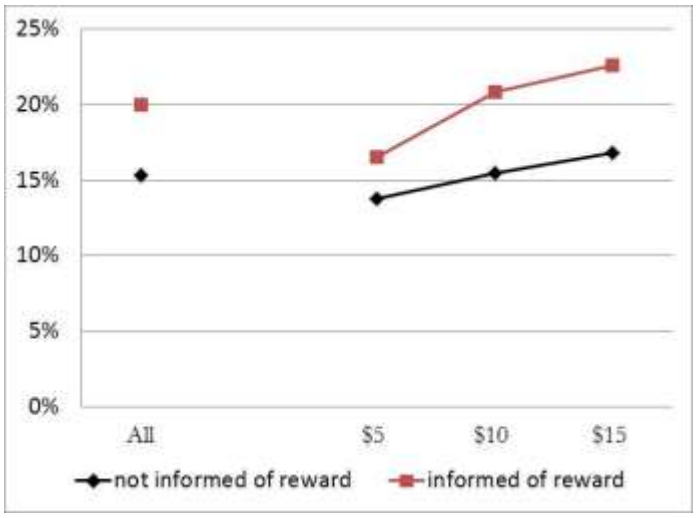
Figure 2: Percent of subjects who donated at the Advertised Reward drives

The graphs show the percent of subjects contacted for an Advertised reward drive who donated blood at that drive who were not informed of the reward (black diamonds) and who were informed of the reward (red squares). The overall donations are shown on the left side. The right side shows the donations broken into the specific reward dollar values.

2a: All subjects contacted (N = 92,722 individual-period observations)



2b: Subjects who had previously donated at intervention sites (N = 3,516 individual-period observations)



2c: Subjects who had not previously donated at intervention sites (N = 89,206 individual-period observations)

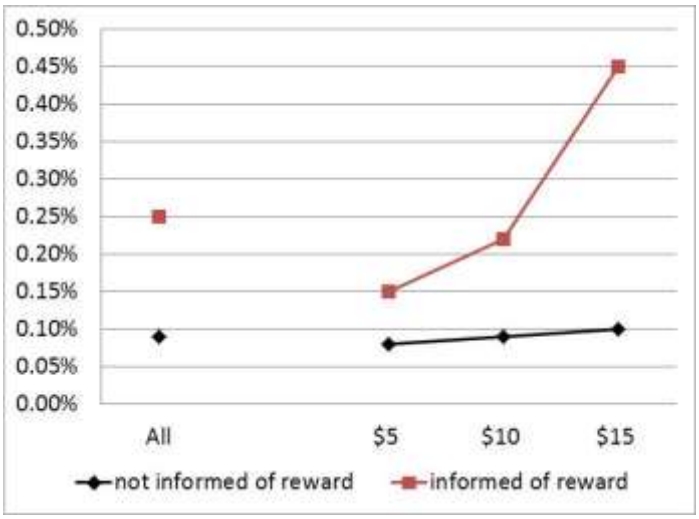
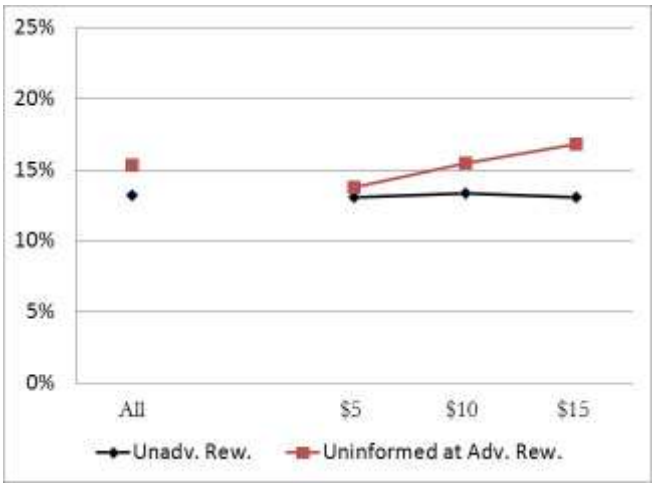


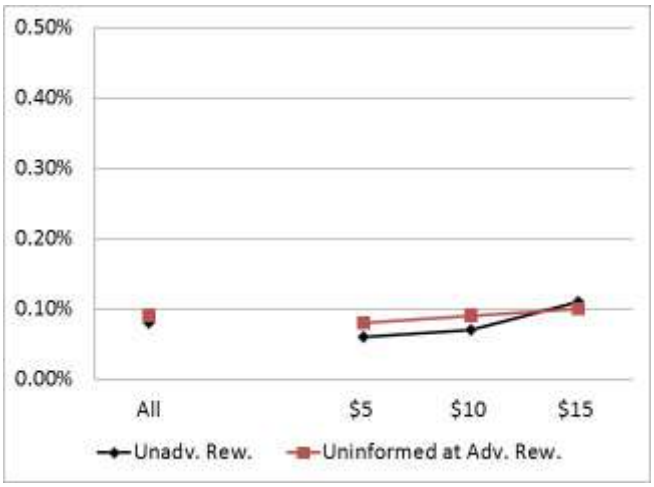
Figure 3: Percentage of subjects, uninformed of the rewards at Advertised Reward drives, and at Unadvertised Reward drives, who donated at the treatment drives

The black diamonds represent the percent of subjects informed of an Unadvertised Reward drive who donated at that drive. The red squares report the percent of subjects informed of an Advertised reward drives, but not informed by the ARC of the reward offer, who donated at that drive.

3a: Subjects who previously donated at intervention sites (N = 2,939 individual-period observations)



3b: Subjects who had not previously donated at intervention sites (N = 79,317 individual-period observations)



Tables

Table 1: Experimental design – effect identified by each type of drive. The shadowed areas show the different sources in which subjects in each condition could have learned about the incentives. Subjects in the Advertised reward condition who were informed by the ARC (condition 1) could have heard about the incentives through the flyers, from other informed donors or potentially informally from ARC representatives or drive hosts. Subjects in the Advertised reward condition who were not informed by the ARC's formal channels (condition 2) could have heard about the incentives from an informed donor or potentially informally from ARC representatives or drive hosts. Subjects in the Unadvertised reward condition (condition 3) could only have heard about the incentives potentially from ARC representatives or drive hosts. The difference in donations between conditions (1) and (2) estimates the direct reward communication effect at Advertised reward drives. The difference in response between (2) and (3) estimates the indirect donor-to-donor communication effect. The difference between (1) and (3) estimates the direct reward communication effect excluding potential donor-to-donor communication effects. The difference between (3) and (4) during the intervention lets us verify whether our protocols were followed regarding no informal host/representative communication with donors. More importantly, the No reward condition (4) lets us estimate the long-term effect of offering a reward by comparing donors at the intervention drives in (1) vs. (4) and of giving a Unadvertised reward by comparing donors at the intervention drives in (3) vs. (4).

		Potential Effects		
Treatment Condition		Direct incentive effect	Donor-to-Donor communication	Rep-to-Donor, Host-to-Donor communication
(1)	Advertised reward drive & Subjects informed of rewards	■	■	■
(2)	Advertised reward drive & Subjects uninformed of Rewards		■	■
(3)	Unadvertised reward drive (No subject informed of rewards)			■
(4)	No Reward drive			

Table 2: Characteristics of the experimental sites before and during the intervention. The table presents characteristics of the universe of 1,472 ARC blood drive sites in Northern Ohio and our 71 experimental drive sites measured in the reference year before the first intervention wave and on the intervention date.

	All ARC N. Ohio Sites		No Reward Sites		Advertised Reward Sites		Unadvertised Reward Sites	
	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev	Mean	Std. dev
Pre-Intervention								
N. of drives in reference year	2.63	(2.35)	5.56	(1.38)	5.70	(1.30)	6.00	(0.71)
Fraction of drives with incentives	0.42	(0.36)	0.21	(0.19)	0.24	(0.18)	0.25	(0.19)
Average drive length (hours)	5.27	(1.11)	5.22	(0.76)	5.29	(0.62)	4.98	(0.77)
Average N. of donors presenting	29.92	(21.31)	30.68	(10.20)	32.05	(9.63)	27.38	(7.97)
Average N. of units of blood collected	25.61	(17.93)	26.69	(8.94)	28.07	(8.34)	23.79	(7.59)
Donors deferred as a share of presenting	0.14	(0.08)	0.13	(0.04)	0.12	(0.03)	0.14	(0.04)
At intervention drive								
Drive length			5.18	(0.90)	5.08	(0.78)	4.89	(0.78)
N. of drives in flyer					15.35	(6.42)	13.67	(4.95)
N. of drives with ARC rewards in flyer					8.50	(5.16)	6.89	(2.52)
N	1,427		36		26		9	

Table 3: Subjects contacted for the intervention drives – Individual characteristics. The table presents characteristics for the total 128,690 individual-wave subjects contacted for an intervention drive, divided by experimental condition and previous donation experience at the intervention sites.

	All subjects contacted			Subjects with previous donation experience at the intervention site			Subjects without previous donation experience at the intervention site		
	Advertised reward		Unadvertised reward	Advertised reward		Unadvertised reward	Advertised reward		Unadvertised reward
	Informed of reward	Not. Inf. of reward		Informed of reward	Not. Inf. of reward		Informed of reward	Not. Inf. of reward	
Ethnicity									
Caucasian	0.929	0.931	0.937	0.973	0.978	0.980	0.928	0.929	0.936
African American	0.023	0.023	0.020	0.004	0.005	0.001	0.024	0.023	0.021
Other	0.047	0.046	0.043	0.023	0.016	0.019	0.048	0.048	0.043
Female	0.522	0.524	0.507	0.492	0.502	0.478	0.523	0.525	0.508
O-Negative blood type	0.089	0.089	0.088	0.112	0.100	0.107	0.088	0.089	0.087
Age									
16-25	0.311	0.312	0.301	0.128	0.136	0.141	0.318	0.319	0.307
26-50	0.383	0.383	0.379	0.363	0.353	0.319	0.383	0.384	0.381
51+	0.307	0.305	0.320	0.509	0.511	0.540	0.298	0.297	0.312
N. of previous donations									
1-4	0.525	0.527	0.531	0.217	0.229	0.228	0.538	0.539	0.542
5-9	0.163	0.164	0.156	0.189	0.186	0.168	0.162	0.163	0.155
10-14	0.079	0.079	0.078	0.125	0.105	0.098	0.077	0.078	0.077
15+	0.232	0.229	0.235	0.469	0.480	0.505	0.223	0.220	0.226
Donations/year in past 2 years									
average	1.206	1.196	1.122	1.967	1.942	2.036	1.175	1.167	1.090
at most 1	0.679	0.683	0.724	0.397	0.405	0.373	0.691	0.693	0.736
between 1 and 1.5	0.117	0.118	0.095	0.148	0.140	0.138	0.116	0.117	0.093
more than 1.5	0.204	0.199	0.182	0.455	0.455	0.490	0.194	0.190	0.171
Time of last donation prior to intervention									
within 6 months	0.380	0.376	0.378	0.573	0.574	0.588	0.372	0.368	0.371
between 6 and 12 months	0.279	0.277	0.276	0.202	0.191	0.197	0.282	0.280	0.279
more than 12 months	0.341	0.347	0.345	0.225	0.236	0.215	0.346	0.351	0.350
Number of sites where donated in the past									
average	1.990	1.980	1.763	3.083	2.945	3.068	1.950	1.942	1.717
one site only	0.551	0.553	0.639	0.295	0.335	0.292	0.561	0.561	0.651
two sites	0.211	0.214	0.182	0.219	0.212	0.229	0.211	0.214	0.180
three or more sites	0.238	0.234	0.179	0.487	0.453	0.479	0.228	0.225	0.169
Fraction of times received material reward in last 4 years									
average	0.501	0.499	0.484	0.365	0.364	0.435	0.507	0.504	0.486
never	0.248	0.252	0.288	0.224	0.229	0.138	0.249	0.253	0.294
between 0 and 0.50	0.332	0.331	0.305	0.517	0.519	0.538	0.324	0.324	0.296
more than 0.50	0.421	0.417	0.407	0.260	0.253	0.324	0.427	0.423	0.410
N	46,434	46,288	35,968	1,806	1,710	1,229	44,628	44,578	34,739

Table 4: The effect of the incentives at the Advertised reward drives. The sample includes all subjects who were contacted for an Advertised reward drive. The dependent variable is equal to 1 if a subject has donated blood at the intervention drive, and 0 otherwise. The estimates are from linear probability models. All regressions include controls for sex, age, blood type, total number of past donations, number of sites where donated in the past, annual frequency of donation in the past two years, and time of most recent donation (full results are reported in Appendix Table A4). Intervention period fixed effects are included in all specifications (except in those with site fixed effects), and standard errors clustered by individual are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated coefficients were multiplied by 100 and thus represent percentage changes.

Dependent Variable	1 if donated at intervention drive, 0 otherwise								
Sample	Subjects contacted for an Advertised reward drive								
	All			Previous history at site			No previous history at site		
Mean of dep. var. (for Uninformed subjects)	0.65 %			15.32 %			0.09 %		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Informed of Reward	0.33***			5.50***			0.16***		
	(0.06)			(1.18)			(0.03)		
Informed of $5 Reward		0.11	0.15*		3.66**	3.72**		0.055*	0.062*
		(0.07)	(0.08)		(1.61)	(1.89)		(0.032)	(0.036)
Informed of $10 Reward		0.33***	0.31***		5.52***	7.02***		0.135***	0.142***
		(0.08)	(0.09)		(1.90)	(2.26)		(0.041)	(0.045)
Informed of $15 Reward		0.66***	0.61***		7.19***	5.52***		0.356***	0.341***
		(0.11)	(0.13)		(1.66)	(2.01)		(0.064)	(0.067)
P-value of:									
$10 Informed ≥ $5 Informed		0.01	0.08		0.20	0.13		0.05	0.08
$15 Informed ≥ $10 Informed		0.01	0.03		0.23	0.69		0.00	0.01
$15 Informed ≥ $5 Informed		0.00	0.00		0.04	0.26		0.00	0.00
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	No	Yes	Yes	No	Yes	Yes	No
Site FEs	No	No	Yes	No	No	Yes	No	No	Yes
Observations	92,722	92,722	92,722	3,516	3,516	3,516	89,206	89,206	89,206
R-Squared	0.143	0.144	0.146	0.157	0.158	0.168	0.002	0.002	0.003

Table 5: Donor-to-Donor Effects; Uninformed at Advertised reward drives vs. Uninformed at Unadvertised reward drives. This table compares donations of subjects contacted but not informed of the rewards at the Advertised and Unadvertised reward drives. The dependent variable is equal to 1 if a subject has donated blood at the intervention drive, and 0 otherwise. The estimates are from linear probability models. All regressions include controls for sex, age, blood type, total number of past donations, number of sites where donated in the past, annual frequency of donation in the past two years, and time of most recent donation (full results are reported in Appendix Table A5). Intervention period fixed effects are included in all specifications. Two-way (donor and drive) clustered standard errors (Cameron, Gelbach and Miller 2011) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated coefficients were multiplied by 100 and thus represent percentage changes.

Dependent Variable	1 if donated at intervention drive, 0 otherwise					
Sample	Uninformed Subjects (either at Unadvertised or Advertised Reward drives)					
	All		Previous history at site		No previous history at site	
Mean of dep. var. (for Uninformed subjects at Unadvert. drives)	0.53%		13.18 %		0.08 %	
	(1)	(2)	(3)	(4)	(5)	(6)
Uninformed at Advertised Reward Drives	0.16		2.26		0.000	
	(0.08)**		(1.36)*		(0.024)	
Uninformed at $5 Advertised Reward Drives		0.11		2.45		-0.008
		(0.11)		(2.11)		(0.023)
Uninformed at $10 Advertised Reward Drives		0.16		0.31		0.000
		(0.11)		(1.87)		(0.036)
Uninformed at $15 Advertised Reward Drives		0.24		3.57		0.013
		(0.12)**		(1.75)**		(0.034)
P-value of:						
$10 Adv.Rew. ≥ $5 Adv.Rew.		0.35		0.19		0.40
$15 Adv.Rew. ≥ $10 Adv.Rew.		0.28		0.06		0.31
$15 Adv.Rew. ≥ $5 Adv.Rew.		0.19		0.33		0.20
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82,259	82,259	2,939	2,939	79,320	79,320
Adjusted R-squared	0.127	0.127	0.154	0.155	0.001	0.001

Table 6: Distribution of Not Contacted Donors at Intervention Drives. This table reports which intervention drives individuals donated at who were not contacted by the ARC. We distinguish two types of non-contacted donors: first-time donors, and those with some past donations.

	No Reward Drives	Unadvertised Reward Drives	Advertised Reward Drives
N. of drives	36	9	26
Share of total N. of drives	50.7%	12.7%	36.6%
		All non-contacted donors	
N. of non-contacted donors	148	28	152
Share of total N. of non-contacted donors	45.1%	8.5%	46.3%
Difference			**+9.7%**
Binomial test p-value			*0.01*
		First-time donors	
N. of non-contacted donors	56	5	47
Share of total N. of non-contacted donors	51.9%	4.6%	43.5%
Difference			**+6.9%**
Binomial test p-value			*0.07*
		Non first-time donors	
N. of non-contacted donors	92	23	105
Share of total N. of non-contacted donors	41.8%	10.5%	47.7%
Difference			**+11.1%**
Binomial test p-value			*0.01*

Table 7: The total direct effect of the incentives. This table compares the donations of informed of reward subjects at the Advertised reward drives with the donations of subjects contacted for Unadvertised reward drives. The dependent variable is equal to 1 if a subject has donated blood at the intervention drive, and 0 otherwise. The estimates are from linear probability models. All regressions include controls for sex, age, blood type, total number of past donations, number of sites where donated in the past, annual frequency of donation in the past two years, and time of most recent donation (full results are reported in Appendix Table A7). Intervention period fixed effects are included in all specifications. Two-way (donor and drive) clustered standard errors (Cameron, Gelbach and Miller, 2011) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated coefficients were multiplied by 100 and thus represent percentage changes.

Dependent Variable	1 if donated at intervention drive, 0 otherwise					
Sample	Uninformed Subjects (either at Unadvertised or Advertised Reward drives)					
	All		Previous history at site		No previous history at site	
Mean of dep. var. (for Uninformed subjects at Unadvert. drives)	0.53%		13.19 %		0.08 %	
	(1)	(2)	(3)	(4)	(5)	(6)
Informed of Reward	0.47***		7.67		0.142***	
	(0.10)		(1.47)***		(0.042)	
Informed of $5 Reward		0.24**		5.73***		0.033
		(0.10)		(1.66)		(0.041)
Informed of $10 Reward		0.46***		7.40***		0.111
		(0.12)		(2.02)		(0.074)
Informed of $15 Reward		0.80***		9.54***		0.344***
		(0.23)		(2.14)		(0.102)
P-value of:						
$10 Informed ≥ $5 Informed		0.04		0.23		0.18
$15 Informed ≥ $10 Informed		0.08		0.21		0.04
$15 Informed ≥ $5 Informed		0.01		0.06		0.00
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82,399	82,399	3,035	3,035	79,364	79,364
Adjusted R-squared	0.137	0.137	0.158	0.159	0.003	0.003

Table 8: Local, Displacement, and Total Effects. The table reports estimated coefficients on a dummy variable equal to 1 if the subject was informed of the reward. Each coefficient in the first row comes from a separate linear probability regression, and the coefficients in rows 2-4 come from one linear probability regression for each dependent variable. The samples include all the subjects informed of rewards who were invited to an Advertised reward drive and all subjects invited to the Unadvertised reward drives. The dependent variable is indicated at the top of each column, and the specifications are the same as those in Table 7 with the addition of control variables for the number of alternative drives with material rewards offered in the County and for a dummy variable equal to 1 if a material reward was offered in the intervention month at some drive where the donor had given blood in the past. Two-way (donor and drive) clustered standard errors (Cameron et al., 2011) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated coefficients were multiplied by 100 and thus represent percentage changes.

Sample	Subjects informed of reward at Adv. or uninformed at Unadv. drives							
	Previous history at intervention site				No previous history at intervention site			
Dependent Variable	Donated at Intervention Drive	Donated at Other Drives in County	Donated at Other Drives Outside County	Donated Anywhere	Donated at Intervention Drive	Donated at Other Drives in County	Donated at Other Drives Outside County	Donated Anywhere
Mean of dep. var. (for Uninformed subjects)	13.19%	8.88%	2.69%	24.74%	0.08%	5.79%	3.53%	9.40%
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All	7.90***	-2.45*	0.50	5.96***	0.16***	0.47	-0.59	0.05
	(1.51)	(1.48)	(0.82)	(1.52)	(0.05)	(0.59)	(0.55)	(0.35)
$5 Adv. Rew.	6.31***	-2.19	0.49	4.62**	0.06	0.35	-0.83	-0.43
	(1.66)	(1.66)	(0.92)	(2.12)	(0.05)	(0.64)	(0.63)	(0.42)
$10 Adv. Rew.	6.86***	-0.17	0.57	7.26***	0.12*	0.55	-0.41	0.26
	(2.13)	(1.80)	(0.86)	(1.97)	(0.07)	(0.70)	(0.54)	(0.37)
$15 Adv. Rew.	10.06***	-4.50***	0.44	6.00**	0.36***	0.51	-0.58	0.29
	(2.02)	(1.47)	(1.07)	(2.33)	(0.10)	(0.63)	(0.71)	(0.44)
P-value of:								
$10 Adv.Rew. ≥ $5 Adv.Rew.	0.41	0.11	0.44	0.15	0.23	0.36	0.17	0.32
$15 Adv.Rew. ≥ $10 Adv.Rev	0.11	0.00	0.45	0.32	0.03	0.48	0.37	0.38
$15 Adv.Rew. ≥ $5 Adv.Rew.	0.05	0.05	0.49	0.31	0.00	0.35	0.30	0.16
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	3,034	3,034	3,034	3,034	79,329	79,329	79,329	79,329

Table 9: Heterogeneous Effects. This table compares the donations of informed-of-reward subjects at the Advertised reward drives with the donations of subjects contacted for Unadvertised reward drives. The dependent variable is either whether the subject donated at the intervention drive ("Int.Dr.") or whether the subject donated at some other drive in the county during the intervention month ("Oth.Dr.").The estimates are from linear probability models. All regressions include controls for sex, age, blood type, total number of past donations, number of sites where donated in the past, annual frequency of donation in the past two years and time of most recent donation (full results are reported in Appendix Table A10). The sample size in the last column is reduced because we restrict the sample to subjects with at least four donations in the past four years, which allows us to compute meaningful measures of the share of times a donor received material rewards in the past. Intervention period fixed effects are included in all specifications. This table only reports the main effect of the reward treatment and those of interaction terms. Full results are in Appendix Table B9. Two-way (donor-drive) clustered standard errors (Cameron et al. 2011) are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. The estimated coefficients were multiplied by 100 and thus represent percentage changes.

9a: Full Sample

Sample	Subjects informed of reward at Advertised Drives or uninformed at Unadvertised Drives																	
	Full sample																	
Dependent Variable: Donated at	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.
Informed of Reward	0.24***	0.41	0.58***	0.28	0.23**	0.38	0.49***	0.36	0.29**	0.38	0.22**	0.27	0.20**	0.03	0.13	0.27	0.95**	2.73*
	(0.07)	(0.58)	(0.15)	(0.63)	(0.09)	(0.30)	(0.11)	(0.56)	(0.14)	(0.42)	(0.09)	(0.31)	(0.10)	(0.31)	(0.10)	(0.38)	(0.47)	(1.54)
Previous history at site*Informed of Reward	6.63***	-1.81																
	(2.24)	(1.54)																
Female*Informed of Reward			-0.17	0.11														
			(0.13)	(0.36)														
Age 26-50*Informed of Reward					0.20	0.29												
					(0.14)	(0.42)												
Age 50+*Informed of Reward					0.59***	-0.48												
					(0.20)	(1.07)												
O-Negative*Informed of Reward							0.01	-0.27										
							(0.23)	(0.53)										
Two sites*Informed of reward									0.13	0.49								
									(0.19)	(0.64)								
Three or more sites*Informed of reward									0.91***	-0.70								
									(0.26)	(1.24)								
5-9 Past Donations*Informed of Reward											0.32*	-0.03						
											(0.18)	(0.51)						
10-14 Past Donations*Informed of Reward											0.37	0.00						
											(0.23)	(0.90)						
15+ Past Donations*Informed of Reward											0.85***	0.31						
											(0.30)	(1.15)						
Between 1 and 1.5 donations/year * Informed of Reward													0.69***	0.42				
													(0.20)	(0.60)				
More than 1.5 donations/year * Informed of Reward													1.21***	1.41				
													(0.37)	(1.74)				
Last donation within past 6 months * Informed of Reward															0.93***	0.37		
															(0.29)	(0.96)		
Last donation between 6 and 12 months * Informed of Reward															0.07	-0.26		
															(0.10)	(0.49)		
0-50% material rewards at past drives * Informed of Reward																	0.04	-0.51
																	(0.59)	(2.06)
50%+ material rewards at past drives * Informed of Reward																	0.16	-3.33
																	(0.54)	(2.32)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	82,360	29,267	29,267
Adjusted R-squared	0.142	0.091	0.137	0.091	0.137	0.091	0.137	0.091	0.137	0.091	0.137	0.091	0.138	0.091	0.138	0.091	0.168	0.075

9b: Subjects with Previous History at the Intervention Sites

Sample	Subjects informed of reward at Advertised reward drives or uninformed at Unadvertised reward Drives															
	Previous history a intervention site															
Dependent Variable: Donated at	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.
Informed of Reward	8.86***	-1.91	5.73**	0.12	8.02***	-2.34	8.26***	-0.29	7.28**	0.70	3.52*	-1.19	2.67	-2.05**	11.76	1.69
	(2.14)	(1.57)	(2.41)	(1.33)	(1.62)	(1.63)	(2.53)	(0.98)	(3.46)	(1.08)	(2.11)	(0.74)	(2.28)	(0.92)	(7.19)	(2.54)
Female*Informed of Reward	-1.97	-1.09														
	(2.32)	(1.87)														
Age 26-50*Informed of Reward			0.79	-0.79												
			(3.10)	(2.07)												
Age 50+*Informed of Reward			3.64	-4.38**												
			(3.02)	(2.17)												
O-Negative*Informed of Reward					-1.06	-1.00										
					(4.10)	(3.39)										
5-9 Past Donations*Informed of Reward							-1.92	-0.70								
							(3.47)	(1.88)								
10-14 Past Donations*Informed of Reward							-4.47	-5.02*								
							(3.49)	(2.70)								
15+ Past Donations*Informed of Reward							0.97	-3.09								
							(3.33)	(2.55)								
Two sites*Informed of reward									-0.56	-1.85						
									(4.89)	(1.95)						
Three or more sites*Informed of reward									1.61	-5.83**						
									(4.42)	(2.96)						
Between 1 and 1.5 donations/year * Informed of Reward											9.26***	-0.85				
											(3.59)	(2.53)				
More than 1.5 donations/year * Informed of Reward											6.61**	-2.42				
											(3.09)	(2.61)				
Last donation within past 6 months * Informed of Reward													8.57**	-0.25		
													(3.78)	(2.58)		
Last donation between 6 and 12 months * Informed of Reward													0.98	-1.31		
													(2.44)	(1.89)		
0-50% material rewards at past drives * Informed of Reward															-2.64	-1.57
															(8.00)	(2.92)
50%+ material rewards at past drives * Informed of Reward															-5.40	-12.38***
															(7.99)	(4.50)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	3,034	2,159	2,159
Adjusted R-squared	0.160	0.079	0.160	0.080	0.160	0.078	0.160	0.079	0.160	0.081	0.162	0.079	0.163	0.079	0.179	0.082

9c: Subjects with No Previous History at the Intervention Sites

Sample	Subjects informed of reward at Advertised reward drives or uninformed at Unadvertised reward drives															
	No previous history a intervention site															
Dependent Variable: Donated at	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.	Int.Dr.	Oth.Dr.
Informed of Reward	0.17***	0.41	0.04	0.44	0.16***	0.49	0.53***	0.07	0.06	0.32	0.06*	0.10	0.02	0.37	0.16	3.02*
	(0.06)	(0.66)	(0.04)	(0.30)	(0.05)	(0.59)	(0.15)	(1.41)	(0.04)	(0.31)	(0.03)	(0.31)	(0.03)	(0.38)	(0.12)	(1.63)
Female*Informed of Reward	-0.02	0.12														
	(0.05)	(0.37)														
Age 26-50*Informed of Reward			0.14**	0.31												
			(0.06)	(0.43)												
Age 50+*Informed of Reward			0.22***	-0.27												
			(0.08)	(1.13)												
O-Negative*Informed of Reward					-0.05	-0.18										
					(0.11)	(0.56)										
Two sites*Informed of reward							0.12	0.53								
							(0.08)	(0.64)								
Three or more sites*Informed of reward							0.49***	-0.37								
							(0.15)	(1.31)								
5-9 Past Donations*Informed of Reward									0.13*	0.00						
									(0.08)	(0.52)						
10-14 Past Donations*Informed of Reward									0.17**	0.30						
									(0.08)	(1.01)						
15+ Past Donations*Informed of Reward									0.27**	0.59						
									(0.11)	(1.23)						
Between 1 and 1.5 donations/year * Informed of Reward											0.24***	0.47				
											(0.09)	(0.56)				
More than 1.5 donations/year * Informed of Reward											0.43***	1.84				
											(0.13)	(1.96)				
Last donation within past 6 months * Informed of Reward													0.32***	0.48		
													(0.09)	(1.00)		
Last donation between 6 and 12 months * Informed of Reward													0.07	-0.25		
													(0.05)	(0.51)		
0-50% material rewards at past drives * Informed of Reward															0.05	-0.54
															(0.16)	(2.18)
50%+ material rewards at past drives * Informed of Reward															0.54***	-2.83
															(0.14)	(2.45)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Intervention wave FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	79,326	27,108	27,108
Adjusted R-squared	0.003	0.093	0.003	0.093	0.003	0.093	0.003	0.093	0.003	0.093	0.003	0.093	0.003	0.093	0.005	0.077

Table 10: Long-term effects. Informed of the Reward vs. Uninformed at Unadvertised Reward Drives. The sample includes subjects who were informed of rewards at the Advertised reward drives and subjects contacted for Unadvertised reward drives. The estimates are from linear probability models. All regressions include controls for sex, age, blood type, total number of past donations, number of sites where donated in the past, annual frequency of donation in the past two years and time of most recent donation. Intervention period fixed effects are included in all specifications. Standard errors (reported in parentheses) are clustered by individuals. *** p<0.01, ** p<0.05, * p<0.1. In 10a, the estimated coefficients were multiplied by 100 and thus represent percentage changes.

10a: Dependent variable = 1 if the subject donated anywhere within 12, 26 or 39 weeks before or after intervention

Dependent variable	Donated in the N weeks before/after intervention											
	12 weeks		26 weeks		39 weeks		12 weeks		26 weeks		39 weeks	
Sample	Previous history at site						No previous history at site					
Mean of the dep. var. (Uninformed donors)	41.77%		45.84%		53.32%		25.49%		29.29%		35.513%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Informed of Reward	0.26		1.17		0.10		-0.09		0.01		-0.04	
	(1.19)		(1.18)		(1.15)		(0.23)		(0.23)		(0.24)	
Informed of $5 Reward		1.44		2.60		1.71		-0.27		-0.31		-0.28
		(1.76)		(1.74)		(1.71)		(0.31)		(0.32)		(0.33)
Informed of $10 Reward		2.22		1.87		1.56		0.14		0.50		0.30
		(2.03)		(2.02)		(1.94)		(0.33)		(0.34)		(0.35)
Informed of $15 Reward		-2.27		-0.67		-2.46		-0.12		-0.15		-0.15
		(1.73)		(1.69)		(1.69)		(0.37)		(0.38)		(0.38)
Observations	5,861	5,861	5,861	5,861	5,861	5,861	115,435	115,435	115,435	115,435	115,435	115,435
Adjusted R-squared	0.259	0.259	0.282	0.282	0.309	0.309	0.231	0.231	0.249	0.249	0.270	0.270

10b: Dependent variable = Number of donations made within 26 or 39 weeks before or after intervention

Dependent variable	Number of donations in the N weeks before/after intervention							
	26 weeks		39 weeks		26 weeks		39 weeks	
Sample	Previous history at site				No previous history at site			
Mean of the dep. var. (Uninformed donors)	0.70		1.07		0.40		0.60	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
POST*Informed of Reward	0.01		-0.02		-0.00		-0.01	
	(0.02)		(0.03)		(0.00)		(0.00)	
POST*Informed of $5 Reward		0.04		0.02		-0.01**		-0.01
		(0.03)		(0.04)		(0.00)		(0.01)
POST*Informed of $10 Reward		-0.00		-0.04		0.01		-0.01
		(0.03)		(0.05)		(0.01)		(0.01)
POST*Informed of $15 Reward		-0.02		-0.05		-0.00		-0.01
		(0.03)		(0.04)		(0.01)		(0.01)
Observations	5,861	5,861	5,861	5,861	115,435	115,435	115,435	115,435
Adjusted R-squared	0.296	0.297	0.338	0.338	0.289	0.289	0.337	0.337

Table 11: Long-term effects. Informed of the Reward and donated at Advertised Reward site vs. Donated at No Reward site. The sample includes all subjects who either (A) donated at the No Reward drives (and were not informed of any Advertised reward drive) or (B) donated at the Advertised reward drives and were informed of the reward. Each subject has two observations: one for the pre-intervention period and one for the post-intervention period. POST is a dummy variable equal to 1 for the post-intervention observation and 0 for the pre-intervention observation. The variable DON_ INFO_REWARD is equal to 1 if the subject was in group (B). Individual fixed effects are included in all the regressions. Controls include the number of drives offered in the donor's county in the X-week period before/after the intervention, and the number of such drives with rewards. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. In 10a, the estimated coefficients were multiplied by 100 and thus represent percentage changes.

11a: Dependent variable equals 1 if the subject donated anywhere within 12, 26 or 39 weeks before or after intervention

Dependent variable	Donated in the N weeks before/after intervention											
	12 weeks		26 weeks		39 weeks		12 weeks		26 weeks		39 weeks	
Sample	Previous history at site						No previous history at site					
Mean of the dep. var. (No reward donors, before interv.)	46.60%		86.04%		92.23%		15.56%		60.00%		75.56%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
POST	3.86	3.85	-7.09***	-7.08***	-6.09***	-6.08***	3.17	3.16	-6.73	-6.74	-14.73	-14.45
	(3.53)	(3.53)	(2.65)	(2.65)	(2.29)	(2.29)	(6.65)	(6.68)	(8.64)	(8.67)	(8.92)	(8.94)
POST*DON_INFO REWARD	-12.32**		-1.55		-1.93		0.03		0.92		4.62	
	(4.91)		(3.79)		(3.29)		(8.59)		(10.17)		(10.11)	
POST*DON_$5 INFO REWARD		-5.10		0.02		0.22		6.23		7.14		5.83
		(7.00)		(5.51)		(4.76)		(14.67)		(13.62)		(13.39)
POST*DON_$10 INFO REWARD		-10.87		-0.88		-0.51		-8.08		16.31		17.31
		(7.15)		(5.97)		(5.11)		(9.66)		(13.71)		(12.33)
POST*DON_$15 INFO REWARD		-18.34***		-3.10		-4.43		2.53		-11.33		-4.61
		(6.42)		(4.82)		(4.18)		(11.11)		(11.35)		(11.47)
P-value of:												
$10 Informed - $5 Informed		0.50		0.90		0.90		0.34		0.54		0.39
$15 Informed - $10 Informed		0.36		0.74		0.49		0.36		0.03		0.05
$15 Informed - $5 Informed		0.10		0.62		0.39		0.82		0.15		0.40
Observations	1,348	1,348	1,348	1,348	1,348	1,348	322	322	322	322	322	322
N of donors	653	653	653	653	653	653	161	161	161	161	161	161
R-squared	0.021	0.026	0.035	0.036	0.043	0.044	0.049	0.056	0.013	0.046	0.058	0.078

11b: Dependent variable = Number of donations made within 26 or 39 weeks before or after intervention

Dependent variable	Number of donations in the N weeks before/after intervention							
	26 weeks		39 weeks		26 weeks		39 weeks	
Sample	Previous history at site				No previous history at site			
Mean of the dep. var. (No reward donors, before interv.)	1.53		2.09		0.76		1.20	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
POST	-0.16***	-0.16***	-0.12*	-0.12*	-0.02	-0.02	-0.03	-0.03
	(0.06)	(0.06)	(0.07)	(0.07)	(0.12)	(0.12)	(0.17)	(0.17)
POST*DON_INFO REWARD	0.05		-0.02		0.07		-0.10	
	(0.08)		(0.10)		(0.14)		(0.20)	
POST*DON_$5 INFO REWARD		0.21*		0.08		0.14		-0.08
		(0.12)		(0.13)		(0.21)		(0.30)
POST*DON_$10 INFO REWARD		-0.12		-0.06		0.23		-0.03
		(0.12)		(0.15)		(0.19)		(0.25)
POST*DON_$15 INFO REWARD		0.06		-0.06		-0.06		-0.16
		(0.11)		(0.13)		(0.17)		(0.24)
P-value of:								
$10 Informed - $5 Informed		0.03		0.43		0.70		0.88
$15 Informed - $10 Informed		0.19		0.98		0.15		0.61
$15 Informed - $5 Informed		0.27		0.36		0.32		0.79
Observations	1,348	1,348	1,348	1,348	322	322	322	322
N of donors	653	653	653	653	161	161	161	161
R-squared	0.028	0.035	0.029	0.030	0.008	0.025	0.023	0.025

Table 12: Cost calculations

In this table we show the cost calculations that are used in the welfare analysis presented in section 5.3.

		Past history at sites		
	All values are per 100 individuals contacted	$5	$10	$15
1	Units collected - baseline when no incentives offered [(1)]	13.19	13.19	13.19
2	Donors presenting - baseline when no incentives offered[(2)]	15.16	15.16	15.16
3	Extra units collected when incentives offered[(3)]	4.62	7.26	6.00
4	Extra donors presenting when incentives offered[(1)(2)]	5.31	8.34	6.89
5	Total N. of donors presenting when incentives offered	20.46	23.50	22.05
6	$ cost of providing incentives[(4)]	$102.3	$235.0	$330.7
7	$ cost per extra unit collected[(5)]	$22.1	$32.4	$55.1

[(1)] From Table 8, column 1.
[(2)] Donors presenting = units collected * 1.149 (donors deferred are 13% of donors presenting, irrespective of the presence of incentives).
[(3)] From Table 8, column 4.
[(4)] $ value of the incentives * total N. of donors presenting at drives with incentives.
[(5)] Total cost of providing incentives/N. of extra units collected when incentives provided.