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WILL THERE BE BLOOD?

INCENTIVES AND SUBSTITUTION EFFECTS

IN PRO-SOCIAL BEHAVIOR*

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Abstract

We present evidence from observational data on nearly 14,000 American Red Cross blood drives and from a randomized natural field experiment showing that economic incentives have a positive effect on blood donations without increasing the fraction of donors who come to a drive but are ineligible to donate. We also show that the effect of incentives on donations increases with the incentive's economic value. However, we further show that a substantial proportion of the increase in donations due to incentives may be explained by donors leaving neighboring drives without incentives to attend the drive with incentives, and the likelihood of this substitution is higher the higher the monetary value of the incentive offered. We conclude that extrinsic incentives stimulate pro-social behavior, but, unless substitution effects are also considered, the effect of incentives may be overestimated.

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1. Introduction

A large body of research has examined whether intrinsically motivated activities and, in particular, altruistic behavior can be stimulated by offering extrinsic rewards. On the one hand, standard economic theory predicts that offering any additional incentive for performing an activity will increase the supply of that activity. On the other hand, a long tradition of research in psychology claims that incentives might not work so simply when individuals are intrinsically motivated to perform the activity. The presence of tangible rewards may undermine the intrinsic drive thus causing a reduction in supply (Deci, 1975). In certain contexts, the presence of economic incentives may also attract the "wrong" type of suppliers of the pro-social activity (Titmuss, 1971). Further, if individuals perform a pro-social activity as part of which they obtain utility from being recognized by others for their good deeds, then offering an extrinsic incentive could undermine this utility by introducing confusion among others regarding the motivation for the action. Recent economic analyses have incorporated these insights into theoretical models that allow for motivational crowding out (Bénabou and Tirole, 2003, 2006).

Understanding and motivating individual behavior involving pro-social activities is of great interest among researchers and policymakers. Although these activities represent a substantial part of social life,[1] for many of them, supply is still below societal needs. This is certainly the case with human blood. Blood transfusions are required in such critical situations as massive blood loss due to trauma, blood replacement during surgical interventions, the treatment of premature babies as well as for several types of cancer and blood-related diseases. In recent years, the demand for blood has increased dramatically due to, among other causes, an aging population and new medical and surgical procedures, such as organ transplants. Although many individuals are eligible to donate blood and numerous awareness campaigns promote its importance, only a small percentage of eligible individuals (under 10%) donate blood in the US and other developed countries, and even fewer do so in developing countries. As a consequence, blood supply shortages (as defined by the supply of blood being below what is necessary for three days) have become the norm rather than the exception (DiRado 2004, Hemobiotech 2008, Oakley 1996).[2] Thus, even among eligible and informed individuals it appears that the benefits (utility) of donating blood fall short of the costs. This raises the question of whether "pure" altruism is sufficient to guarantee a steady supply of blood. In this paper, we provide robust evidence from observational and field experimental data that extrinsic, material incentives help increase blood donations.

[1] In the US alone, the value of volunteer time is over $240 billion annually (Independent Sector 2006).

[2] The website BloodBook.com reports that more than 16 million units of blood are annually collected in the United States. In the US, the American Red Cross and other organizations that collect blood aim to have, at any given point in time, blood necessary for three days of demand at each location and for each blood type, but this target is seldom met, especially for rare blood types (including 0 negative, which is the universal donor and, therefore, particularly precious). Moreover, it is estimated that, worldwide, there is currently a shortage of about 22 million units of blood per year (HemoBiotech, 2008). This shortage may grow worse over time as demand for blood increases.

Our reading of the empirical literature on the effects of extrinsic rewards for mainly intrinsically motivated activities in general is that the evidence is mixed and largely inconclusive. Early laboratory experiments by Edward Deci and his collaborators found that adding explicit rewards for intrinsically motivated activities crowded out the intrinsic motives and reduced the performance of those activities (Deci 1975). More recently, similar findings have been obtained by, among others, survey analyses of Frey and Oberholzer-Gee (1997) and field experiments by Gneezy and Rustichini (2000). Gneezy and Rustichini, however, found that "large enough" incentives will increase pro-social behavior.[3]

The evidence has also been mixed for blood donations. A framed field experiment by Mellstrom and Johannesson (2008) using Swedish college students showed that the female students who were offered cash were less willing to undertake a health test to determine their eligibility to donate blood though the authors detected no significant effect among the male students. Goette and Stutzer's (2008) natural field experiment found that offering lottery tickets to Swiss donors increased turnout only among infrequent donors; they found no effect among frequent donors or among any donors who were offered a free cholesterol test. Lacetera and Macis (2008) find that the legislative provision that guarantees a paid day off work to Italian blood donors led to a substantial increase in donation frequency.

The fact that the evidence on the effect of incentives on pro-social behavior in general, and on blood donations in particular, is inconclusive is perhaps not surprising, given a number of limitations and unanswered questions in the existing studies. First, existing studies based on *laboratory experiments* or *framed* field experiments usually use students (who are typically ages 18 to 25) as subjects. However, individuals under the age of 25 represent only a small portion of the population of blood donors and of volunteers in general; thus, results may not reflect how actual donors would respond to incentives if older people respond differently.[4] Second, because most studies examine the effects of just one or two specific incentives, the results could be idiosyncratic to the features of the incentive (e.g., lottery tickets vs. health test vs. cash), and the incentive may be perceived as "unusual," especially to more frequent donors. The only study which we are aware that analyzes the impact of a naturally occurring incentive (i.e., Lacetera and Macis, 2008), on the other hand, is limited by the fact that the incentive was in place throughout the whole period of observation. Third, the results could also be idiosyncratic to the specific context and, thus, may not be generalizable to others. For example, none of the existing empirical studies of incentives

[3] A number of studies have focused on other types of extrinsic motives, namely the quest for social recognition through participation in pro-social activities. Theoretical models, anecdotal evidence, and laboratory experiments suggest that individuals' altruistic behaviors are also driven, in part, by social-image concerns (e.g., Harbaugh 1998a, 1998b; Wedekind 1998; Nowak and Sigmund 2000; Price (2003); Ariely et al. (2009); Polborn (2007); Lacetera and Macis (2010). Ariely et al. (2009), for example, find that the effect of extrinsic incentives on pro-social behavior is more successful when the activity is done in private than in public, which suggests that the desire to appear pro-social is an important motivational factor in pro-social supply, and this image can be damaged when extrinsic incentives are provided.

[4] Garbarino and Slonim (2009), for instance, report that some results from laboratory experiments are consistent with experimental results from older adults – but not all.

for blood donation were run in the United States where many private blood banks also operate.[5] Fourth, surveys and framed experiments[6] might suffer from scrutiny and social desirability biases if the subjects are aware that they are being observed as part of a study or if the study is designed such that subjects are asked about their *intentions* to donate rather than being observed (without their knowledge) performing the relevant activity (Lazear et al., 2006; Levitt and List, 2007; List, 2008). In short, existing studies may lack the ability to strike the right balance between causal identification and external validity of the findings.

A fifth feature of the existing studies is that they examine the effect of incentives on pro-social behavior typically at a single location where and time when the activity can be performed. This approach does not consider the complete set of choices that individuals face when incentives are offered. Individuals might substitute among several voluntary pro-social activities, and, thus, offering incentives at one location and time, whatever its immediate effect may be, may also have consequences at other locations and times. For instance, incentives may increase blood donations when offered at one location, but could perhaps reduce donations at other locations or in the future. The opposite is also possible; incentives may crowd out blood donations at one location, but increase donations at other locations (presumably where incentives are not offered). Testing for the presence of these substitution effects will give a more comprehensive assessment of responses to incentives and also has major policy implications for the design and coordination of initiatives aimed at increasing pro-social behavior in a population.

Substitution from lower to higher utility activities is a standard behavioral response, but the evidence on how it plays out in the context of pro-social behavior is scant. Gross (2005) suggests that many of those who donated money towards Tsunami relief in 2005 and 2006 substituted their donations away from other charities. Cairns and Slonim (2008) document that, when a second collection is present at Catholic Mass, the amount collected for the first collection (which typically has a different destination) decreases significantly. On the other hand, Shang and Croson (2009) find no inter-temporal substitution in contributions to public radio. These studies, however, highlight the difficulty of examining substitution effects involving *monetary* contributions; it is possible that donors are substituting their charitable monetary donations away from other charitable causes and organizations not observed in these studies. Thus, with monetary donations, there could be many unobserved close substitutes.

In this paper, we combine evidence from observational data and from a randomized natural field experiment to examine the impact of economic incentives on voluntary blood supply in a way that overcomes the shortcomings of the existing literature. First, we use detailed data on a large sample consisting of all blood drives conducted by the American Red Cross (ARC) in northern Ohio between

[5] Healy (2006) reports on the importance of institutional details to understand blood donation behavior.

[6] In the taxonomy of Harrison and List (2004), a major difference between framed field experiments and natural field experiments is that, in the former, the subjects are aware that they are taking part in a study whereas, in the latter, subjects naturally undertake the tasks and are unaware that they are part of an experiment.

May 2006 and October 2008. Second, we study the effects of many different material incentives that the ARC offers to their donors. Third, we examine both local effects (what happens at drives when they offer incentives) as well as aggregate effects (we include what happens at drives when potential substitute drives offer incentives). Fourth, we present evidence from a randomized natural field experiment as part of which donors were offered gift cards of varying values to a variety of local merchants. We ran the field experiment at 54 blood drives between 2009 and 2010 in collaboration with the ARC in northern Ohio.

Section 2 describes the institutional features of blood collection by the ARC in northern Ohio and the observational data. Our unit of observation is a blood drive, and our data include about 14,000 observations. With an average of 36 donors per drive, the data include donations from 500,000 donor-drive pairs. The data for each drive include the number of people who present to donate, the number of blood units collected, the number of people deferred from donating because they are ineligible, and the drive's sponsor, date, and address. Crucial for the analysis, the data include information on whether an incentive was offered at each blood drive, the type of item offered (e.g., blankets, T-shirts, mugs, coupons, etc.), and the ARC cost to purchase the item.

Many drives were run at the same location and had the same host (we label a host-location combination a "sponsor") over time. A sponsor thus indicates the specific location of each drive along with the host who coordinates the drive with the ARC. Further, 78 percent of all drives we observe were hosted by sponsors in which the ARC at least once offered donors an incentive item and at least once did not offer any incentive. This within-sponsor variability lets us compare outcomes between drives that do and do not offer incentives holding constant the sponsor (i.e., location and host). Moreover, although the ARC does not assign incentives to drives in a purely random fashion, institutional details of ARC operations indicate that, once a set of observable drive-level characteristics are controlled for (e.g., calendar date of the drives), the presence of incentives is non-systematic. This follows, as described later, because the ARC has limited budgets for incentives that they attempt to apportion across all sponsors in a non-systematic way in order to treat all sponsors fairly. We will also show that the actual distribution of the value of incentives across sponsors cannot be distinguished from a simulated, random distribution.

Section 3 presents our analysis of the direct effect of incentives on turnout, units collected, and deferral rates at a given drive. Our estimates show that the number of donors who attempt to donate and the number of units of blood collected significantly increase when incentives are offered. On average, offering incentives leads to between 5 and 6.7 extra donors presenting at a drive -- an increase of 14-19%. We further find that offering incentives does not increase the fraction of donors being deferred, which suggests that the composition of the donor pool does not change when incentives are offered.

The richness of the data and several robustness tests provide confidence that the relationship between the presence of rewards and our outcome variables is causal and that the donors are responding to the economic value of the items. First, in addition to the results being robust to sponsor-fixed-effects regressions, we also find that the effect of incentives on donations is significantly larger when more

donors are made aware that an incentive is being offered and when more donors are permitted to donate at a drive (i.e. drives are "open" instead of "closed"/restricted to a particular category, e.g., employees of a company). This reinforces the identification of the relationships of interest. Second, using the cost of each incentive to the ARC as a proxy for the economic value of these promotions to the donors (or for the ranking of values), we analyze whether items of different value have different effects on the outcomes of interest. If the social image aspect of the items is the only motivation that increases donations, then we should not find a positive relationship between monetary value and donation response.[7] However, we find a positive, economically large and significant relationship between the cost of the incentives and turnout and units collected (but, again, no relationship with the percentage of deferred donors).

In our analysis of the historical data, a potential confounder may be that sponsors actively promote drives with or without incentives differently; thus, the incentive effect that we detect may be an information effect. However, this possibility is highly unlikely since the vast majority of sponsors do not play any active role in the management of blood drives; when hosting a blood drive, most sponsors only provide a physical location for the ARC to operate. In addition, we create a proxy measure of sponsor engagement in the blood donation process, and the results of regressions among the sponsors who are the least engaged yield qualitatively identical results to those for the full sample.

In Section 4, we present evidence from a randomized natural field experiment that we ran at 54 selected ARC blood drives between September 2009 and March 2010. In the experiment, pairs of similar drives were selected and then randomly divided into control conditions (i.e., no incentives were offered) and treatment conditions (i.e., $5, $10, and $15 gift cards for a variety of stores were offered). Comparing outcomes between control and treatment drives and controlling for past outcomes at the same drives (a difference-in-difference analysis) show that turnout and units collected are higher under the treatment conditions and increasingly greater in correspondence with increasing gift card value (and the results are highly statistically significant) with no discernible impact, again, on the share of deferred donors. These results indicate, again, that economic incentives do not crowd out the quantity of pro-social behavior in the context of blood donations – in fact, quite the opposite – and do not disproportionately attract individuals who are not eligible to donate. The results from the field experiment strongly corroborate our findings from the analysis of the observational data; the findings are qualitatively similar, and

[7] Some studies, including Heyman and Ariely (2004), and Kube, Marechal and Puppe (2008), show that, for activities with no direct pro-social content or motives (such as dragging computer balls across computer screens or moving sofas), small in-kind rewards motivate subjects more than small cash rewards. These studies interpret their findings as showing that the "social" component of rewards may be more important than the strictly economic one (as represented by the cash payments). However, note that, first, in these studies, the differences between the responses to in-kind and cash rewards vanish when the dollar value of the rewards is not minimal (Heyman and Ariely 2004), and, when asked to choose among in-kind and cash prizes, most subjects choose cash (Kube et al., 2008). Hosain and Li (2010) further show that cash rewards might have a negative effect only if the requested task is framed as a "favor" and not as a work relationship. Second, while the incentives offered by the Red Cross are not cash, we are able to specifically identify the impact of their *economic* component, as explained above and in sections 3.3.1 and 4.

importantly, any remaining identification issues are addressed in the experiment because the incentives were randomly assigned (by the researchers) and had no symbolic value whatsoever but only economic values of different sizes. Moreover, the results could not have been driven by sponsor behavior because exactly the same numbers of potential donors, with the identical information other than the incentives, were contacted for both the treatment and control drives.

In Section 5, we exploit the location and date information of each drive to analyze the impact that incentives have not only where they are offered but also at temporally and spatially neighboring drives to assess substitution and aggregate effects of incentives on donations. In contrast to monetary donations, which have many possible substitutes, there are only a few close substitutes to donating blood at a given drive other than donating blood at a different time or location.[8] For this reason, examining the substitution effects for blood donations becomes particularly insightful for determining whether pro-social activities are positively or negatively affected by the presence of material incentives. We find that donors not only respond to the presence of incentives in a standard way by increasing supply at a given site but also that they substitute supply across locations in response to incentives; we find that donors substitute their blood donation activity toward neighboring drives that offer incentives and are more likely to substitute away from drives that do not offer incentives than from those that do. In addition, we find that the substitution effects are larger if incentives are offered at physically and temporally close neighboring drives (e.g., within 2 miles), and these effects are even larger when the incentives offered at the close neighboring drives are of higher monetary value. Our results indicate that these substitution effects may be substantial depending on the value of the incentive given and on the number of neighboring drives; for instance, in an "average drive" scenario, we find that 45% of the additional donations at a drive that offers an incentive are a result of donors substituting from another location. Thus, ignoring substitution effects can lead to a substantial overestimate of the total effect of incentives on pro-social behavior.

Finally, Section 6 offers concluding remarks and directions for future research.

2. Institutional Context and Data

Our strategy to identify the effects of incentives on blood donation takes advantage of several institutional features of the blood collection system run by the American Red Cross. We first describe these institutional features in detail (Section 2.1) and then introduce the data for this study (Section 2.2).

[8] Besides neighboring ARC blood drives that are close substitutes, other potential substitutes, though less close than donating whole blood to the ARC, include plasma donations and donations at a few existing private blood banks. However, both of these potential substitutes are a small portion of the general blood product donation market; for instance, plasma donations are a tiny fraction of the blood donation market. In addition, plasma donations take substantially longer and typically attract distinct donors. To the extent that there are additional substitutes not captured by other ARC Northern Ohio drives, our estimates will underestimate substitution effects and, consequently, overestimate the total effect of incentives on donations.

2.1 The American Red Cross in Northern Ohio

2.1.1 The Organization of Blood Drives

The ARC operates 36 regional blood centers within the US and Puerto Rico. The data for this study covers all (14,029) blood drives organized by the Northern Ohio Blood Services Region from May 1, 2006 to October 8, 2008. A blood drive consists of a "sponsor" who works with an ARC representative for collection of blood at a specific location on a specific date.

The ARC defines individuals who have attempted to donate blood within the past two years as "active" and those who have not been disqualified as "eligible." Donors can be disqualified for a variety of reasons that either endanger the donor or result in an unusable donation including anemia, low blood pressure, and low iron as well as certain behaviors in the recent past (e.g., travel, ear piercing) that increase the risks of potential blood problems that tests cannot detect. Donors are also ineligible to donate for 56 days after making a whole blood donation.

The ARC follows several rules to determine who to inform of upcoming blood drives. First, the ARC restricts whom they contact to only eligible donors. Second, donors are typically informed only about the drives that occur in the county where they live. In some counties, ARC representatives send donors a postcard informing them of one specific drive occurring in the forthcoming calendar month, typically of a drive that will take place in the location where a donor has donated in the past. We call drives in these counties "postcard county drives." In other counties (the majority), representatives, instead, send a flyer that informs donors of all drives in the county that will occur in the next calendar month. We refer to drives occurring in these counties as "flyer county drives." Flyers are mailed out on the 23rd or 24th of the month, and postcards are mailed out on an ongoing basis as a drive approaches. Figure 1 provides an example of a flyer and postcard advertisement (identifying information has been blacked out for privacy considerations). Both flyers and postcards will include information on the location of the drive(s), the hours of operation, whether an incentive will be offered at the drive, and if an incentive is offered, what the incentive is (e.g., t-shirt, jacket, raffle ticket. We describe the allocation of incentive to drives next.

A blood drive is either "open" or "closed." In open drives, anyone can present to donate. Closed drives are not advertised on the monthly flyers, and only members of a given organization (e.g., students or employees) are informed about these drives.

2.1.2 The Allocation of Incentives to Blood Drives

The ARC offers one of a variety of economic incentives at some blood drives. The most common items include T-shirts, jackets, coolers, blankets, coupons, and gifts cards from various merchants. The ARC officer who is responsible for recruitment is given a budget each year to use to purchase incentive items. These items are then allocated proportionally to district managers. Each district manager then decides how to allocate the different promotions across the drives in his or her district. There are three district managers in northern Ohio. Importantly, if a drive offers an item as an incentive, the item *must* be

given to all presenting donors (i.e., those who show up) regardless of whether they donate or are deferred for any reason.[9]

For the ARC operations, the *sponsor* (host-location) is the relevant unit of observation for the assignment of incentives. Some locations may attract more donors and some locations may have donors who are more responsive to an incentive: for instance, because some items may appeal to different demographic groups. Nonetheless, ARC managers stressed that they make a conscious attempt to offer incentives evenly across most sponsor host-locations over time, mostly because of budget constraints and fairness considerations toward all sponsors. The allocation of incentives across and within a given sponsor, therefore, is, to a large extent, non-systematic.

2.1.3 The Role of a Drive's Host

In principle, sponsors have some flexibility in organizing drives. For instance, they can choose to make a drive open or closed, determine the location and number of hours of the drive, and select whom to inform (in addition to the county contact rules and donors who satisfy the ARC active and eligible requirements). This opens the possibility that economic incentives might affect how sponsors behave. For instance, sponsors might contact more donors when an incentive is given at a drive. Thus, higher turnout in response to economic incentives could be explained by either changes in donor supply or changes in sponsor behavior. From a public policy or Red Cross perspective, the total effect on donations is likely the most critical outcome, but from a research perspective, it is also critical to separate these alternative explanations to understand the effect of incentives on donor supply. However, although economic incentives may affect sponsor behavior in addition to donor behavior, this alternative explanation seems unlikely. Although, in principle, sponsors have some flexibility, in practice and by convention, the aspects of a drive that the sponsors might actually change is limited in many ways. First, the vast majority of sponsors (93%) organize either all open or all closed drives. Second, once the length of a drive has been determined, which typically occurs well in advance of determining whether an incentive will be offered, the length cannot be changed for any reason including the presence of an incentive.[10] Third, the vast majority of donors are contacted through standardized and centralized procedures; sponsors and ARC representatives affect the number and types of donors contacted only very marginally (e.g., possibly through talking with friends and colleagues). In addition to the limited flexibility that sponsors have, our econometric analyses and results from our randomized field experiment provide further support that donors rather than sponsors are changing behavior.

[9] The ARC gives the items to everyone and almost always when the participant first shows up to avoid potential donors having any incentive to falsify information in order to be classified as eligible so they can obtain the item.

[10] Changing the length of drives requires a long lead time for several reasons that center around organizing the drive, such as reallocating resources (e.g., staff and equipment), coordinating the changes between the ARC and the host sponsor, and communication with donors. Thus, the ARC avoids changing drive times once they have been established.

2.2 The Data

The ARC conducted 14,029 blood drives in northern Ohio between May 2006 and October 2008.[11] For each drive, we have information on the date, time, and location (street address, town, and zip code); the number of donors presenting and deferred; the number of units of blood collected; and whether the drive was open or closed and in a flyer or postcard county. Table 1 presents descriptive statistics on these variables for both the full sample and after dropping the bottom and top 1% of the distribution of turnout, which leaves 13,707 drives.[12] On average, 30.4 units of blood were collected from 35.9 donors who presented, and 15% (=5.5/35.9) of donors who presented were deferred because they were classified as ineligible to donate. Seventy-eight percent of drives were open and 80% were advertised using county-level monthly flyers. For each blood drive, we also gathered weather data for the day and location of each drive. There is substantial variation in temperature, rain, and snow conditions in northern Ohio. Temperature, rain, rain intensity (average rain per hour), and snow on the ground can exert significant influence on the outcome of blood drives, and, thus, controlling for these factors improves the precision of the estimates.

The data also indicate whether a promotion was offered at each drive and, if so, what kind of promotion. About 36% of all drives offered material incentives. The ARC began keeping track of the presence of promotions on May 1, 2006, which explains the starting date for the data that we analyze in this study.

Table 2 lists common items that the ARC offers. Given out in nearly 50% of all drives that offer incentives, T-shirts are the most common item offered. Coupons are the second most common incentive and are given out in over 8% of the drives that offer incentives. Coolers, sweatshirts, and umbrellas are the next three most common items. In some cases, sponsors purchase and offer incentives. This occurs in about 25% of the drives with incentives. Unfortunately, precise information on the nature of the sponsor incentives is not available. However, ARC managers informed us that the sponsor incentives almost always have small economic value (e.g., a cup of coffee or lottery tickets with expected values of about a dollar). Some drives are also characterized by special attributes; for example, a drive may be run in memory of or in honor of an individual or it may be particularly (but not exclusively) targeted to 0-type

[11] Northern Ohio covers 10,206 square miles and includes major cities in Cleveland, Toledo and Akron. About 5.3 million people live in Northern Ohio, the median income in 2008 was $48,120, the unemployment rate was 6.6 percent, and there were 82 percent Caucasian and 15 percent African Americans. For comparison, the median income in the US in the same year was $52,029, the unemployment rate was 5.8 percent and the fraction Caucasian and African American in the US population were 79.8 and 12.8 percent, respectively.

[12] Turnout varies from fewer than 10 to more than 700 donors. In a handful of drives, the number of donors presenting was zero due to extraordinary circumstances such as power interruptions. To ensure that our results are not driven by outliers, all of our analyses are limited to the sample that we obtain after dropping the top and bottom 1% of the distribution of presenting donors. In what follows, we always refer to the sample obtained after dropping the outliers. Table 1 shows that average turnout and units collected are slightly larger in the full sample. All other characteristics are virtually identical in the full and reduced samples. Also, none of our paper's results change if we use the full sample.

donors.

Table 3a shows summary statistics on sponsor types using the ARC's codification.[13] The most common sponsor type, hosting 44% of all drives, was the general community, which includes drives at town halls and libraries. Manufacturing firms, hospitals, and high schools each sponsored at least 7% of the drives. There is some variation across sponsor types in average turnout, with 35 or more donors, on average, presenting at sponsors such as high schools, colleges, general community, or Catholic churches and fewer than 30 donors presenting at nursing homes, professional services firms, retail stores, or government buildings. Also, there is some variation in the fraction of drives where incentives were offered, generally ranging from 23% (State) to 55% (high schools, Red Cross chapters). Incentives were offered at elementary schools in only 2.6% of cases.

As shown in Table 3b, there is substantial variation among the 2,595 different individual sponsors in terms of both the number of drives sponsored and in the presence of incentives. While 815 sponsors organized exactly one drive between May 2006 and October 2008, 1,780 others organized two or more drives. Table 3b shows that there is large variation also *within* sponsors who run more than one drive in terms of the presence of incentives at the drives. In particular, about 45% of sponsors (constituting more than 77% of all drives and nearly 11,000 drives) ran multiple drives with variation in terms of the presence of incentives. This variation, together with the ability to control for a number of other factors, will be critical for our identification strategy.

The present study departs from past empirical work by estimating the effects of incentives not only when and where they are offered, but also at potential "substitute drives" that donors may be attracted to (or away from) that are temporally and geographically close. We used GIS software to compute the driving distance between the street addresses of all blood drives in our sample.[14] To determine potential substitute drives for each of the drives in our data, we initially limited the travel distance between drives to be within ten miles. Next, we limited the set of potential substitute drives to those that were within 56 days prior to a drive's date, since donors are not eligible to donate again if they donated less than 56 days prior to a drive.[15] Finally, we limited potential substitute drives going forward in time to include only

[13] We only report sponsor types in Table 3a with at least 100 drives to protect the privacy of individual sponsors who ran just a few drives and could be identifiable. However, all sponsors are included in the regressions.

[14] Driving distances were calculated using standard GIS network-path algorithms for finding the shortest path through a network, following Dijkstra's (1959) shortest-path approach. The approach uses a shortest-path algorithm to find the shortest, lowest-cost route through a network from one point to another. In the case of distance, each road segment in the network was weighted by its Euclidean distance across space as the measure of "cost" in the shortest-path algorithm. All locations within a specified maximum distance (10 miles) were identified. All calculations were performed in GIS using the ESRI Streetmap 9.3 GIS data for North America, which includes highly detailed US street and rail network data provided by Tele Atlas. When the GIS software could not find an exact geo-location, the address of the nearest US post office was used. There were 321 such cases.

[15] It is, of course, possible that drives occurring more than 56 days earlier could be a substitute. For instance, if donors donate once per year and their next planned donation is 4 months away but a drive advertises a promotion that attracts them to shift forward their next donation with no effect on their once-a-year donation behavior, then

drives that donors would have been made aware of by either the monthly flyers or postcards. For drives occurring prior to the 25th of the month, we limit potential substitute drives going forward to only those that occur up to the end of that same month because donors would not have been made aware of drives occurring in the following month; and for drives occurring after the 25th of a given month, we extend potential substitute drives to those occurring up to the end of the following month because donors would have been made aware of drives occurring in the following month.

Table 4 shows that, on average in our observation period, 6.5 potential substitute drives occur within two miles of every drive, 7.7 between two and four miles, and nearly 37 additional potential substitute drives occur between four and ten miles away. Further, the average number of potential substitute drives that offer an incentive are 2.6, 3.1, and 14.6 that occur within two miles, between two and four miles, and between four and ten miles, respectively. The bottom panel in Table 4 shows that, when we limit the number of potential substitute drives to open drives in flyer counties, we obtain similar numbers of potential substitutes.

3. The "Direct" Effect of Incentives

We first describe our empirical identification strategy (Section 3.1) and then present our main findings (Section 3.2). We initially focus on the "direct" or "local" effects of incentives (i.e., ignoring substitution). Section 4 presents results from our natural field experiment that corroborates the main findings. Section 5 assesses the extent to which incentives affect outcomes at neighboring drives to determine how much of the local effect is due to new donations versus donors substituting donations across locations and time.

3.1 Empirical Model and Identification Strategy

To assess the impact of incentives at a specific drive, we estimate versions of the following model:

$$Y_{jt} = \alpha + \beta X_{jt} + \delta INCENTIVE_{jt} + \eta_j + \varepsilon_{jt} \qquad (1)$$

where j and t denote the drive's sponsor and calendar date, respectively. We examine three outcomes y_{jt}: the number of people presenting (turnout),[16] the units of blood collected, and the fraction of deferred people relative to those presenting. The variable $INCENTIVE_{jt}$ is an indicator of the presence of promotions at drive jt. Therefore, the parameter δ represents, ceteris paribus, the marginal effect on the dependent variable (i.e., turnout, units collected, or fraction deferred) between drives with no incentives

there would be no change in overall donations and only a substitution effect would have occurred. In analyses not shown, we did not detect temporal substitution over 56 days.

[16] If a donor leaves at any time after registering, she will be classified as presenting. It is possible that a donor could show up and then not register for some reason (e.g., if there is a crowded waiting area). The ARC believes that donors who leave without signing in are rare since there is virtually never any delay to sign in. If donors who show up but who do not register cause a bias in our estimates, it may be in the direction of underestimating the effect of incentives on donors who present because incentives might have caused the longer lines or crowds.

and drives with incentives.

The vector X_{jt} includes a drive's length in hours, weather conditions on the day of the drive (temperature dummies, rain, rain intensity, and snow on the ground),[17] and dummies for year, month, day-of-the week, and ARC representative as well as dummies that indicate the presence of specific attributes for a drive. Weather conditions represent temporary shocks to donations that should, however, be orthogonal to incentives. Including month fixed effects is important because the ARC operations have a seasonal dimension; district managers and drive representatives try to attract donors, for example, around the December holidays or in the summer months when donations are typically lower than other times of the year. We also control for ARC representative fixed effects since they may have, for instance, different social networks that they can use to affect turnout.[18] Furthermore, we include specific dummies to control for any other attribute of a drive (e.g., if the drive is given in memory or in honor of someone, if it is a drive specifically addressed to 0-type donors, etc.), and, limited to the OLS specifications, we include zip code fixed effects to capture any unobserved neighborhood characteristics.

Our main specification, however, includes host-location (sponsor) fixed effects, η_i. We include these fixed effects because heterogeneity across sponsors could explain some of the differences in outcomes across drives. In particular, sponsors may have different features (e.g., social networks) that can affect donor turnout. Sponsor fixed effects will control for this type of heterogeneity. Across and within sponsors, however, the presence of incentives is not systematically linked to characteristics other than those listed above (and that we can control for) because it is mostly dictated by fairness considerations and budget constraints. Once the confounding factors described above have been controlled for, an analysis of the effect of incentives on blood donation outcomes performed *within sponsors* through fixed-effect regressions will lead to well-identified, causal estimates. To the extent that different sponsors' characteristics (e.g., intrinsic motivation of an organization's members or simply the size of a sponsor's network) are connected with drives offering incentives, controlling for sponsor fixed effects is vital to separate incentive effects from sponsor effects. However, to the extent that sponsor characteristics are independent of the presence and types of incentives offered, including sponsor fixed effects unnecessarily reduces the power to estimate the effect of incentives although, as reported in Table 3b, there remains, nonetheless, nearly 11,000 drives with the same sponsors that vary in terms of the presence of incentives. Controlling for sponsor fixed effects thus errs on the side of caution and is justified because we do not observe many potentially important differences across sponsors. To account for heteroscedasticity as well

[17] We use flexible functional forms for weather conditions in order to account for non-linear effects. For example, both very low and very high temperatures may have a negative impact on the turnout.

[18] Also, representatives have monthly targets, and one might think that this might cause them to reallocate their budgets for offering incentives toward specific weeks of the month (e.g., week four) to meet their goals. Although this is unlikely to be the case because the allocation of incentives to drives is decided one or two months in advance, in the regressions, we include dummy variables for weeks of the month that are specific to each of the 25 ARC representatives.

as serial correlation within sponsors, we estimate and report robust standard errors clustered at the sponsor level.[19]

In a further attempt to isolate the impact of incentives and determine the mechanisms behind any effect that they might have on any of the outcomes, we examine the impact of incentives not only over all drives but also separately for closed drives, open drives, and open drives in flyer counties. If incentives attract more donors, this effect should be greater at open drives where more donors are permitted to donate and greater when promoted in flyers where more donors are made aware that an incentive is being offered.

In the next three sub-sections, we first present the results from our main specifications. We then assess whether variations in the economic value of the incentives affect donor responses, and, finally, we examine whether the effect of incentives on donor's behavior can be attributable, instead, to changes in the behavior of drive organizers. All of the evidence presented here will then be corroborated by the findings of our randomized field experiment.[20]

3.2 Main Findings

Table 5a presents regressions on the number of donors who presented. The OLS estimates shown in Column 1 without covariates compare simple mean differences between drives without incentives and drives with incentives. These comparisons indicate a statistically significant increase of 5.0 donors presenting when incentives are offered compared to when incentives are not offered. Compared to the mean number of 36 donors presenting across all drives, this estimated coefficient is substantial in magnitude. Including the controls described above does not substantively change the estimated effect of incentives (Column 2) nor does the inclusion of drive-sponsor fixed effects (Column 3).[21] The fact that the coefficient does not change much (about 2%) when we include sponsor fixed effects is consistent with the ARC allocating incentives across sponsors in a non-systematic manner.

The estimates presented in Columns 4-9 examine the effect of incentives at closed and open drives and open drives in flyer counties, and confirm expectations that incentives have a greater impact when

[19] For the small fraction (7%) of sponsors who ran both open and closed drives, we include a unique fixed effect for the open and for the closed drives. This again reduces power to estimate the effect of incentives in order to err on the side of caution.

[20] A further confounding effect may depend on the "signal" that the presence of an incentive at a drive may convey. For example, potential donors may view the incentives as a signal that blood is in short supply, either in aggregate or locally, and this might make donors more willing to donate themselves or encourage their friends and neighbors to donate blood. However, through the monthly fliers donors receive information on all the drives taking place in their county, so in most months donors will see one or more drives offering an incentive. Moreover, blood collected at a given location is not typically stored or used in the same location. Therefore, the presence of a reward at one drive is unlikely to convey any information on the aggregate or local demand for blood.

[21] The coefficients on the control variables are not reported here but are available upon request. Their signs are as expected. The length of a drive is associated with more donors presenting; rain, rain intensity, and snow all discourage donations (although these effects are not always statistically significant); and moderate temperatures are associated with more donations relative to either very cold or very warm weather.

anyone can present (in open rather than closed drives) and when more potential donors are made aware of the incentives (in flyer rather than postcard counties). Columns 4-6 add interaction terms between the presence of incentives and whether a drive is open and/or in a flyer county.[22] These regressions show that the effect of incentives on turnout at open drives is significantly greater than at closed drives (by an additional 3.7 donors presenting – Column 4), that significantly more donors present when incentives are offered in flyer compared to postcard counties (by an extra 1.8 donors presenting – Column 5), and that the effect of incentives is significantly greater on donors presenting in open drives in flyer counties than at either closed drives or in postcard counties (by an additional 3.5 donors – Column 6). Columns 7-9 present estimates for which the sample has been split according to whether drives are closed, open, or open in flyer counties, and shows similar results compared to the previous columns.

Table 5b presents regressions that examine the effects of incentives on units of blood collected (Columns 1-4) and on the share of donors deferred (Columns 5-8) using the final four models presented in Table 5a. The effect of incentives on units of blood collected is nearly identical to the effect on donors presenting. Column 4 shows that the effect of incentives at open drives in flyer counties is substantial; on average, compared to the mean number of 30.4 units collected across all drives, offering incentives increases donors presenting by 19% (5.8/30.4). Again, the effect is significantly stronger when the incentives are offered at drives that are open in flyer counties than when the drives are either closed or in postcard counties.

Columns 5-8 of Table 5b show that offering incentives does not change the share of donors who are deferred. Thus, these results indicate that offering incentives does not disproportionately attract individuals who are not in the right condition (i.e., ineligible) to donate blood.

3.3 Further Tests

3.3.1 Symbolic vs. Economic Value of Incentives

So far, the results indicate a strong, positive effect of incentives on turnout and units of blood collected with no disproportionate negative effect on the fraction of donors deferred. There are, however, potentially two distinct sources of utility that people may get when obtaining the items. First, people may be attracted by the material (internal consumption) value of the item. Second, donors may be attracted by the symbolic and social content that they may derive from receiving the items. For instance, donors might be attracted by a T-shirt or a jacket with the ARC logo because wearing these articles signals donors' pro-social behavior and earns them the status of being a donor to friends, peers, colleagues, and even

[22] The variable that indicates whether a drive is open cannot be estimated (i.e., drops out of the regression) because the sponsor fixed effects are always nested within either open or closed drives. Likewise, the variable that indicates whether a drive is in a flyer or a postcard county also cannot be estimated because the sponsor fixed effects are always nested within either a flyer or postcard county. This is the case also for zip-code fixed effects, which would capture heterogeneity correlated with socio-economic characteristics of the neighborhoods where drives take place. Incentives, and especially those with higher economic value, might have a greater impact in lower socio-economic areas.

strangers.

To disentangle the symbolic and social content values from the items' material values, Table 6 reports the results from the fully specified regressions of Tables 5a and 5b that include the dummy variable for the main effect of the item and add the cost (to the ARC) of each item and its square. If the symbolic value is the only reason that the items increase turnout and units collected (and the material and social values of the items are not strongly correlated), then the main effect of offering an incentive should remain significant and the cost of the items should not affect turnout or units collected. On the other hand, if donors are attracted only by the material value, then the main effect of offering an incentive should have no effect whereas the cost of the items should be positively correlated with turnout or units collected. Finally, if donors are attracted by both the symbolic and material value of the items, then both the main effect and cost of the item should significantly affect turnout and units collected.

The results in Columns 1-3 (examining all drives) and 4-6 (examining open drives in flyer counties) show that incentives with higher value have a substantial and highly significant impact on turnout and units collected. A one-dollar increase in the cost of an incentive is associated with almost 2.5 extra donors presenting and 2.2 extra units collected but has no effect on the share of deferred donors. Moreover, once the cost of the items is controlled for, the coefficient on the dummy variable indicating the presence of incentives becomes small in magnitude and statistically insignificant. These results strongly suggest that it is mostly the economic value of incentives that explains their effect rather than their symbolic value. Figure 2 shows the estimated effect of the cost of the items on turnout, units collected, and percentage of donors deferred using the estimates in Table 6; the estimated effect is essentially linear in the range of values observed in the sample (there is a slight concavity, and although statistically significant, it is quantitatively negligible) for both presenting donors and units collected.[23]

Table 7 presents results from a similar analysis for which, instead of including the cost of all items in a single continuous variable, we include a dummy variable for each item that is offered in at least 40 drives. The results in Tables 6 and 7 are similar. Items of higher monetary value generally seem to attract a larger number of donors;[24] for instance, T-shirts that cost $2.95 attract 6.5 extra donors,

[23] A potentially alternative interpretation of the positive relationship between the item's costs and the increase in turnout and units collected is that the higher cost items are offered less often and so higher cost items are correlated with the scarcity and novelty of the item being offered. For instance, since jackets are offered less than t-shirts, it is possible that donors will be more attracted to the jackets since they have fewer opportunities to obtain a jacket than a t-shirt. To examine this alternative explanation, we tested two specifications of the frequency an item was offered (not shown here, but available form the authors). In both specifications we re-estimated the models presented in Table 6, and added to them either the frequency each item was offered (and its square) or the percent of time each item was offered (and its square) at each drive-location. In either specification, we find no evidence that the less frequently offered items increase turnout or units collected. Moreover, in both specifications we find that the inclusion of the frequency each item was offered had no effect on any of the other estimates in the model. Thus, we find no support for the hypothesis that scarcity or novelty is affecting donor behavior.

[24] One exception is the 6-pack cooler, which is the second most expensive item at $9.37 and yet has one of the smallest, albeit significant, effects on turnout, only attracting 4.3 additional donors.

sweatshirts that cost $6.67 attract 13.2 additional donors, and jackets that cost $9.50 attract almost 25 extra donors (these coefficients are significantly different from each other at the 1% confidence level; *p*-values are reported at the bottom of Table 7). Because these three items tend to have very similar logos (in both shape and size), we can reasonably assume that they have extremely similar "social image" value. Yet, the impact on turnout and units collected increases with their economic costs.[25] This result provides further and more direct evidence that the material value of the items rather than the social image value is driving the effect of incentives on turnout and units collected.

3.3.2 The Non-Systematic Assignment of Incentives to Sponsors

Although the results in Tables 6 and 7 suggest that drives with higher valued incentives attract more donors, an alternative explanation is that the ARC representatives systematically allocate higher-value incentives to sponsor-drive pairs that they believe will attract the most additional donors. If this "targeting" occurs, then the relationship between higher-value incentives and greater turnout observed in Tables 6 and 7 may be not be entirely causal. To investigate whether this targeting occurs, note that, if ARC representatives provide specific sponsor-drives with higher (lower) valued incentives, we would anticipate that the distribution of the values of incentives allocated across sponsors would not appear random but would, instead, skew the distribution such that a higher proportion of sponsors would receive both higher- and lower-value incentives than a random allocation of incentives across sponsors. To test whether the actual distribution is different than a random allocation, we ran 1,000 Monte Carlo simulations to determine the distribution of a random allocation of incentives. In each simulation, we started with the entire set of incentives that the ARC allocated among sponsors who ran at least one drive with and without incentives (because this within-sponsor variation is what allows our regressions to identify the estimates when we include sponsor fixed effects). Each simulation then randomly allocates these incentives to each sponsor in the same proportion that we observe in the data (e.g., there are 99 sponsors who ran exactly 2 drives).[26] We then ranked each sponsor in the simulation from the lowest to highest mean value of incentive received. Finally, we take the mean value of incentives allocated for each rank over all simulations.

The results of this simulation exercise are shown in Figure 3. The figure shows that the actual and simulated distributions lie nearly on top of each other. A Kolmogorov-Smirnov test of the actual and

[25] Note that across all the incentives, only one item, t-shirts, indicates a significant increase in deferrals. Given the large number specific incentives we tested, we would anticipate that one or two of the incentives might have had a negative effect by chance. We thus do not speculate that t-shirts might somehow have had a unique effect on deferrals but rather attribute this one significant effect to chance.

[26] More specifically, in each simulation, we first allocated to each sponsor one drive with no incentive and one drive with a randomly chosen incentive; thus, every sponsor in the simulation, like every sponsor in the data that we use for identification, has at least one drive with and without an incentive. We then randomly assigned the remainder of the incentives with equal probability to all remaining sponsor drives in the same proportion as found in the actual data.

simulated distributions indicates no significant difference. These results suggest that the ARC representatives are not systematically targeting certain sponsor-drives with higher-value incentives, which is consistent with the ARC concern for fairness towards individual sponsors.[27]

3.3.3 The Role of a Drive's Host

A further alternative explanation not fully accounted for in the fixed-effects econometric approach is that sponsors might actively promote drives with incentives differently from drives without incentives. For instance, an active sponsor might contact more people when incentives are present, run an open rather than a closed drive, or run the drive for more hours. If this were the case, the incentive effect we find may actually be an information effect. Fortunately, we can largely rule out these possibilities. First, ARC managers and multiple ARC representatives repeatedly told us that sponsors, for the most part, just offer a location and a "name" for a drive but do not actively participate in the recruitment of donors. Moreover, ARC representatives are in charge of promoting blood drives, and they do so by following nearly identical, standardized procedures regardless of the presence of incentives. Second, on every observable that we could test in which sponsors might have some discretion (specifically, drive length and whether a drive was open or closed), we were never able to detect a significant difference *within* sponsor (or representative) behavior depending on whether incentives were or were not offered.[28]

As another way to check more directly whether sponsors might be more active when incentives are offered, we can exclude from the analysis the subset of sponsors (20.7% of the total number of sponsors) who, at least once, used their own budget to purchase and offer an incentive to donors. We consider this behavior to serve as a proxy for the most engaged sponsors. Excluding these "engaged" sponsors, we re-ran our main regressions on the sub-sample of sponsors who never had offered their own incentives. Table 8 shows that all of the main results in Tables 5-7 hold for this least engaged group of sponsors.[29] In sum, we cannot find any evidence in the data that sponsors are changing their behavior when incentives are offered.

4. Evidence from a Randomized Natural Field Experiment

In addition to the robustness checks that were performed, we also ran a randomized natural field

[27] Another competing hypothesis that might suggest that the incentive effect is not entirely causal is that the ARC representatives choose locations to offer incentives that do not have capacity constraints in order to maximize the potential gains. This targeting seems very unlikely, however, since, again, this would go against the ARC's principle to treat all sponsors fairly and since capacity is essentially never an issue; in determining the allocation of staff and physical equipment for each drive, the ARC builds in excess capacity to address unexpected increases. Moreover, during the course of a drive, it is possible that more donors than can be processed could arrive at a given time, but this would typically only build in delay for making a donation. Only if the delays cumulate past the end of the drive would this lead to capacity constraints.

[28] These analyses are available upon request.

[29] For completeness, we also ran our regressions on the subset of engaged sponsors only. We again find that all of the main results in Tables 5-7 hold.

experiment in collaboration with the ARC in northern Ohio. The experimental results offer strong assurance with respect to all of the inferences made in the previous section. First, we inferred that the positive incentive effect was due to the economic rather than the symbolic value of the items. To further test whether the economic value was driving the effects, the experiment will offer incentives that are devoid of any symbolic attributes. Also, in the experiment we will know (and manipulate) the actual value of the incentives to the donors, while in the previous analysis we only knew the cost of the items to the ARC. Second, we want to further ensure that the findings were not driven by representatives or sponsors changing their behavior when an incentive was allocated. To this end, the experiment will hold constant (at the ARC's standard level) the procedures of sponsors and representatives.

4.1 Experimental Design

We ran the field experiment in three waves: September 2009, December 2009, and March 2010. In each wave, we randomly selected 18 drives from the set of drives that satisfied the following criteria. First, the drive had to be open and in a flyer county. Second, the drive location had to have hosted at least three drives in the reference year. [30] Third, during the reference year, the mean turnout had to be within one standard deviation of the overall mean (35.9). Fourth, at most, 50% of the drives in the reference year could have offered an incentive and no incentive could have been offered in the drive immediately prior to the intervention drive. Fifth, all drive locations in the experiment had to be at least 5 miles from each other.[31]

Among the sites that satisfied these requirements, we randomly selected nine pairs of drives for each of the three waves. Both drives that comprised each pair were held in the same county and in the same month while each pair was held in a different county.[32] Last, within each pair and in each wave, we randomly chose one location to be the treatment and the other location to be the control. This gives us 27 treatment and 27 control drive locations.

No items were offered at control drives. At treatment drives, the incentive item had a value of $5, $10, or $15. We randomly allocated the values across drive locations so that there were nine treatment drives with each value. All incentive items were gift cards from various merchants in the community

[30] The reference year goes from 5/18/2008 through 5/18/2009. The latter is the date when we received the list of drives that were scheduled for the following year from the ARC. Because the ARC allocates incentives to drives months in advance, it was important that we pre-selected our treatment and control drives as much in advance as possible to "lock in" those drives as well as to ensure that no incentives would be allocated at those sites in the drives immediately prior to our intervention drives.

[31] In the next section, we report that incentives at a given drive do not affect turnout at neighboring drives located more than 2 miles away.

[32] The ARC operates in 17 counties in Northern Ohio, 13 of which are flyer counties. Thus, the counties that the experiment covers includes the majority of the ARC drive locations.

(e.g., Wal-Mart, Target, BP, Buehler's, and Giant Eagle).[33] We let donors choose their gift card from multiple merchants to increase the liquidity of the reward. The three values will let us assess the slope of the donation supply curve. We chose the value of the cards to be within the range of (retail) values of the items offered by the ARC.[34]

A few final features of the experiment are central to the inferences that we have been able to make. First, the gift cards include no reference to the ARC or blood donations; thus, we removed any symbolic or social value from the rewards. Second, the ARC guaranteed that identical (and standard) recruitment procedures were used for the drives with and without incentives. Third, at no point were donors informed that a study was being conducted, and, because gift cards had been offered at other drives, it is reasonable to assume that at no point were donors aware they were participating in a study and, by extension, being "observed." Fourth, donors were informed of the offer of incentives through the normal monthly flyers at 21 of the 27 treatment drives (seven per wave);[35] in the remaining six drives (two per wave), the flyers did not provide any information informing donors of the incentives. We included these six 'uniformed' drives in order to test whether the main vehicle through which donors know about the incentives is through the institutional channel of the monthly flyers as opposed to any informal channel such as "side-activities" by representatives or sponsors. If we find similar incentive effects at the uninformed and informed treatment drives, then this would provide strong evidence that some unobserved factor is driving the change in donations other than donors responding to the incentives. Thus, the six uninformed treatment drives are a further test of the causal mechanism.

In Table 9, we report summary statistics of various characteristics of the treatment and control drive locations during the year prior to our intervention. Not surprisingly, given the random assignment of drives to treatment and control, the table shows that treatment and control drives look similar along every dimension.

4.2 Findings

Table 10 presents the simple means from our field experiment. Specifically, we report outcomes (number of donors presenting, number of units collected, and share of presenting donors who were

[33] Offering gift cards was not rare at the ARC drives. As shown in Table 2, "coupons" (which include vouchers, gas cards and gift cards for various merchants) are the second most typical form of incentive offered by the ARC in Northern Ohio. Moreover, we also argued in footnote 23 that we could find no evidence that scarcity or novelty is associated with higher turnout or units collected in the historical data with the items the ARC offers.

[34] The items with the highest cost that the ARC used were almost $11, but we assume a higher value to the donors based on higher retail prices. However, with gift cards, there is no difference between the cost and the retail price.

[35] More precisely, potential donors on the ARC contact list were informed of the upcoming treatment and control drives in the standard ways using the monthly flyers. In the 21 informed treatment drive locations, a random sample of about half of the potential donors on the ARC contact list received flyers indicting that gift cards would be offered as well as the amount of the gift cards while the other half of the potential donors on the contact list received the nearly identical monthly flyers except their flyers excluded any information on the gift cards. As a consequence, note that any effect of the incentives on the "informed" drive might underestimate the effect that we would have had if all people on the contact lists had been informed.

ineligible to donate) for control drives, "surprise treatment" drives in which we did not advertise that incentives would be offered, and "advertised treatment" drives in which the incentives were advertised on the monthly flyers. For each of these groups of drives, we report average outcomes measured in the pre-intervention period, which includes all the drives that took place at each sponsor-location during the reference year (5/18/2008–5/18/2009), and average outcomes on the date of our intervention.

Panel A in Table 10 shows that in the control drives, on average turnout and units collected fell by 1.2 and 0.2, respectively, during the intervention period compared to in the pervious year, while the number of donors deferred fell by 3 percent. In the surprise treatment drives, turnout and units collected rose by 0.7 and 0.6, respectively, while the number of donors deferred increased by 1 percent. In contrast to these relatively small changes, in the announced treatment drives that advertised $5, $10 or $15 gift cards, on average turnout and units collected increased by 9.0 and 7.9, respectively, while the fraction deferred increased by less than 1 percent. Compared to the change in the control drives, turnout and units collected increased relatively by 10.2 and 8.0 units, respectively. Panel B shows that the higher value of the gift card advertised, the larger the effect on turnout and units collected; turnout increased on average by 3.7, 7.6 and 15.8 donors when the $5, $10 or $15 gift card, respectively, was advertised, while units collected increased by 2.8, 5.7 and 15.1 units. Panel B also shows that no particular pattern with respect to the amount of the gift card advertised and the percent of donors deferred; the percent of donors deferred falls 2.5 percent when the $15 card is advertised while it increases by 3.0 percent when the $10 card is advertised, and by 1 percent when the $5 card is advertised. These average results, not controlling for anything, at least directionally, support our previous results that offering incentives has a positive effect on turnout (diff-in-diff +10.2) and units collected (diff-in-diff +8.0) and that the higher the value of the incentive, the greater the positive response.

To test the significance of these average effects, and the robustness of the results described above, we estimate several versions of the following differences-in-differences (DD) specification:

$$Y_{jt} = \alpha+\beta EXP+\gamma_1 TR\_INFORM+\delta_1 EXP*TR\_INFORM+\gamma 2 TR\_UNINF+\delta_2 EXP*TR\_UNINF +\lambda X_{jt}+\eta_j+\varepsilon_{jt}, \quad (2)$$

where *j* denotes sponsors and t denotes time periods. There are two observations per drive: a pre-experiment observation (*EXP=0*) and an observation that corresponds to the experiment intervention drive (*EXP=1*). The pre-experiment observations represent the average of each outcome (turnout, units collected, percent deferred) across the drives that took place at each sponsor location during the reference year (5/18/2008–5/18/2009). The dummy variable *TR_INFORM* equals 1 for treatment sites where donors were informed of the gift card by the monthly flyers and 0 for control drives and drives where incentives were offered but no donors were informed. The coefficient on the interaction *EXP*TR_INFORM*, δ_1, is the difference-in-differences (DD) estimator, which indicates the difference

in outcomes between sites where donors were and were not informed that incentives were being offered during the intervention compared to the reference year. The dummy variable *TR_UNINF* equals 1 for treatment sites where donors were not informed of the gift card by the monthly flyers and 0 for control drives and treatment drives where donors were informed. The coefficient on the interaction *EXP*TR_UNINF*, δ_2, is the DD estimator, which indicates the difference in outcomes between drives (where donors were not informed) with and without incentives offered during the intervention compared to the reference year. To mimic our specification in the previous sections, all regressions include sponsor fixed effects, η_j. The control vector X_{jt} includes drive length and wave fixed effects. The outcome variable Y_{jt} is given, again, by the turnout (or the mean turnout in the reference year for the pre-experiment observations), the units of blood collected, and the donors deferred represents the fraction of turnout. The standard errors are clustered at the sponsor level; this is necessary, in particular, because of the way the two observations per sponsor are constructed. In fact, the first observation is a yearly average, while the second is just one drive, and this makes the errors heteroskedastic, and clustering at the sponsor level corrects for this heteroskedasticity.

The DD estimates that are reported in Table 11 confirm the striking impact of incentives at the informed treatment drives. Columns 1 and 2 show that, on average, and with the regression controls and clustering at the sponsor level, when donors had been informed of the incentives turnout and units collected increased by 10.3 and 8.2, respectively, relative to locations in which no incentives had been offered during the intervention (coefficients on *EXP*TR_INFORM*). These coefficients are similar to the diff-in-diff effects reported for the raw means in Table 10, and are statistically significant at the 1% level. Column 3 shows that these incentives did not induce a significant change in the fraction of donors being deferred.

Columns 4-6 replace the dummy variables for informed-donor locations with the monetary value of the incentives at these informed locations. The results show a monotonic relationship between the monetary size of the incentive and the estimated effect on turnout and units collected. The increases in turnout and units collected at the drives where informed donors received a $5 gift card compared to the averages in the reference year at the same locations, relative to the change in the control locations, were 4.5 and 2.6, respectively. The increases in turnout and units collected at the $10 drives were 8.8 and 5.9, and, at the $15 drives, the increases were of 17.9 and 16.2. The relationship between the monetary value of the incentives and its effect on turnout and units collected, moreover, seems to be roughly linear, which is consistent with our finding from the analysis of the historical data (although in that analysis the cost of the items to the ARC, not the value to the donors, was used). The estimated effects for the $10 and $15 cards on both turnout and units collected are all significant at the 5 percent significance level. The bottom of Table 11 reports *p*-values testing whether the DD coefficients on the $5, $10, and $15 treatments are different from each other. We find statistically significant differences between the $10 and $15 coefficients as well as between the $5 and

$15 coefficients. However, although the DD coefficient estimates on the $10 treatment are roughly twice as large as those of the $5 DD coefficients, this difference fails to attain conventional significance levels.

Columns 7-9 replace the DD treatment dummies from Columns 1-3 and the specific monetary value DD treatment dummies from Columns 4-6 with the monetary value of the incentives in a linear fashion. The DD estimates here indicate that a $1 increase in the value of the incentive at the informed drives leads to 1.1 extra donors presenting (Column 7, significant at the $p < .01$ level) and 0.94 extra units of blood collected (Column 8, also significant at the $p < .01$ level) with, again, no significant effect on the share of donors deferred.[36]

Finally, we can clearly attribute the effects of the incentives in the experiment to the value of the incentives rather than changes in the behavior of either the sponsors or representatives. All of the regressions in Table 11 include dummy variables for drives with incentives but where potential donors had not been informed (*TR_UNINF*), and an interaction term *EXP*TR_UNINF* that measures the change in outcomes at these uniformed drives relative to the change in outcomes at the control drives. The coefficients on the DD estimates for the effect at the uninformed locations on turnout and units collected, *EXP*TR_UNINF,* although positive, never comes close to reaching the level of significance (t-stats always less than 0.75). Thus, offering incentives without informing donors on the monthly flyers had no effect on turnout and units collected, which indicates that, if there is any unobserved "side activities" among sponsors and representatives, this behavior does not significantly affect turnout or units collected. Moreover, the difference in the coefficients for the DD estimates between the informed and uninformed drives are 8.47 and 7.45 for turnout (10.32-1.86) and units collected (8.18-0.73), respectively, and the bottom of Table 11 for Columns 1-2 shows that both of these differences are strongly statistically significant. Thus, informing donors through the monthly flyers rather than just providing the incentives was critical for the positive significant effect that the incentives had on turnout and units collected

The field experiment results confirm and strengthen our inferences from the historical data analysis. The field experiments confirm that offering incentives increases turnout and units collected, and this effect is larger the greater the value of the incentive offered. They strengthen our inference on two dimensions. First, the effect of the incentives cannot be driven solely by their symbolic value since the experimental results show that offering incentives with no symbolic value still results in a significant increase in turnout and units collected. Second, the significant increase in turnout and units

[36] In the specification with the dummies for each level of treatment, only the $10 incentive DD estimator is marginally statistically significant when the dependent variable is the shares of presenting donors who are deferred; the coefficient estimate on the $5 incentive is not significant; that on the $15 incentive is very small in magnitude and, again, statistically insignificant. Further, as the *p*-values at the bottom of Table 11 indicate, these three difference-in-differences coefficients are not significantly different from each other. In sum, there is no evidence that incentives increase the proportion of donors who are deferred from donating.

collected of incentives when advertised relative to when they are not advertised, in combination with no effect when the incentives were not advertised, strongly suggests that donors are changing their behavior in response to the advertised effects rather than representatives or sponsors modifying their behavior.

5. Assessing the Effect of Incentives on Neighboring Drives

One of the robust findings in our analyses thus far is the larger effect of incentives on turnout and units collected when drives are open (as opposed to closed) and when drives are advertised in flyer (as opposed to postcard) counties. This is a first indication of the possible presence of substitution effects; the significant interaction parameters in Columns 4-6 of Table 5a and Column 1 of Table 5b estimate the additional donors who are attracted to donate at drives that they would not otherwise be aware of (in the case of flyer rather than postcard information) or would not otherwise be aware of or able to donate at (in the case of open rather than closed drives). If donors are flexible regarding when and where they donate, then they may be influenced by incentives to change the date and location of their donations, in which case the above analysis could overestimate the overall effect of incentives; at least some of the increase may be explained by donors leaving one drive (that does not offer an incentive) and opting for another drive (that offers an incentive). To the extent that donors are substituting across drives, there is no increase in overall donations.

5.1 Empirical Strategy

To analyze the impact of incentives offered at drives that neighbor a drive *i* at time t and location j, we estimate the following modification of model (1):

$$Y_{jt} = \alpha + \beta X_{jt} + \delta INCENTIVE_{jt} + \mu N_{jt} + \rho NI_{jt} + \eta_j + \varepsilon_{jt} \qquad (3)$$

where *Y, INCENTIVE, X* and η are defined in equation (1) above, N_{jt} is the number of neighboring drives of drive *jt*, and NI_{jt} indicates the number of the neighboring drives that offer incentives.

We adopt a series of strategies to isolate the effects of interest. First, if they occur, substitution effects should be more pronounced with drives that are closer in time and space. Thus we distinguish neighboring drives that occur within 2 miles from a focal drive, within a 2- to 4-mile range, and within the 4- to 10-mile range. Our construction of the set of potential substitute drives has been described in Section 2.2 above. Table 4 presents summary statistics on the number of potential substitute drives at various distances and on the number of potential substitute drives that offered incentives. For instance, on average, 2.6 drives within a 2-mile distance offered incentives across all drives.

Second, as discussed previously, potential donors are informed of the upcoming drives either through a flyer or a postcard. More precisely, in flyer counties, donors are informed in advance of all of the *open* drives that have been planned for that month *in that county*, and, for each drive, the flyer indicates

whether there is a promotion and, if so, what kind. In postcard counties, in contrast, donors are informed only about one drive (or a small number of drives if they receive more than one postcard), just a few days before the drive date. Thus, if substitution effects occur, they should be stronger where donors are informed in advance about a larger number of drives, and, of course, if these drives are open so they can attend.[37] Therefore, we perform separate analyses for closed drives, open drives, and open drives in flyer counties. Also, if substitution is driven not only by the presence of a neighboring drive but also by the presence of incentives, then we should see a stronger decline in turnout at a given drive if there are incentives offered at neighbor drives. Thus, we calculate the impact of having any drives in the neighborhood of a focal drive as well as the effects of having neighboring drives with incentives; we look at all drives – closed drives, open drives, and open drives in flyer counties – separately. Finally, the results in Table 5-8 suggest that drives are more attractive to donors in accordance with increasing value of the incentive that is being offered. Thus, we will also examine whether substitution effects are stronger when substitute drives offer more expensive incentives.

For this analysis, we can only use observations with enough forward and backward temporal lags to have a complete record of all possible neighbors. To have a complete set of neighbor observations for every drive, we thus needed to remove drives from the analysis (as dependent variables) that occurred within the first 56 days and the last 30 days. This truncation of the data removes almost 7.5% of the observations. Regressions that have not been herein reported (available upon request) show that all of our previous results remain qualitatively (and, essentially, quantitatively) unchanged when repeated on this reduced dataset.

5.2 Findings

Table 12a shows the effect of potential substitute drives on presenting donors. All the regressions are versions of the full models that have been estimated in Table 6 with additions for potential substitute drives. Column 1 adds the number of potential substitute drives in three distance ranges: 0-2, 2-4, and 4-10 miles. The results indicate that the presence of one additional drive that is a potential substitute for a given drive reduces turnout significantly – by almost 0.2 donors on average – if it takes place within 0-2 miles. Additional drives taking place farther than 2 miles do not have a significant impact. Column 2 examines whether the number of neighboring drives that offer incentives affects turnout at a drive. The estimates suggest that, if one additional neighboring drive among the potential substitutes within 2 miles offers an incentive, the turnout will decline significantly – by nearly 0.25 donors. Drives that offer incentives but that are located farther away do not have any effect on turnout. Column 3 estimates the effects of a change in the dollar value of the highest monetary value of incentives offered across potential

[37] Because some donors may receive more than one postcard if they have donated at more than one location previously, they may have information on more than one drive. Therefore, some substitution may still occur in postcard counties, but, on average, it should be weaker than in flyer counties where all donors would be informed of all upcoming drives in the county.

substitute drives. We obtain negative, marginally significant coefficients that indicate that for every $1 increase in the highest monetary value incentives offered at potential substitute drives occurring within 0-2 and 2-4 miles, 0.1 fewer donors turnout; however, there is no effect for drives that are located 4-10 miles away. The results in Columns 1-3 reinforce the interpretation that donors are attracted to drives that offer incentives and more so when the incentives that are being offered have higher value; however, the results also indicate that the spatial substitution is limited to drives that are within 2 miles of each other.

Columns 4-6 repeat the analyses from Columns 1-3 and include estimates of the interaction of the variables of interest with the dummy variable thereby indicating whether an incentive was given at the current drive. We include these interactions because we anticipate that donors will be less likely to substitute away from a drive if the drive already offers an incentive. We do not find any significant effect for this interaction when examining the total number of potential substitute drives (Column 4) or the number of potential substitutes that offer incentives (though, in this case, the direction of the estimate is as anticipated). However, Column 6 shows that the negative effect on turnout at the focus drive as a result of the substitute drive that offers the costliest incentives within 0-2 miles (-0.21 fewer donors) occurs only for drives that do not offer incentives; this effect does not occur at all for drives that offer an incentive (the effect for these drives is +0.07=-0.21+0.28). This result indicates that donors are increasingly likely to substitute away from drives without incentives than from drives that offer incentives depending on the value of the item that is being offered at a neighboring drive.

The results in Columns 1-6 indicate that, for the most part, only potential substitute drives located within 2 miles have significant effects on turnout at the current drive. Therefore, in what follows, we restrict the analysis to substitute drives located within 2 miles. In Column 7, both the total number of potential substitute drives and the number of potential substitute drives that offer incentives are included at the same time. The coefficient estimate on the total number of potential substitute drives within 0-2 miles decreases substantially (compared to Column 4) from -0.19 to -0.09 and is no longer significant whereas the coefficient estimate on the number of neighboring drives that offer incentives falls only slightly (compared to Column 5) from -0.29 to -0.25 and remains highly significant. Column 8 adds the highest monetary value of incentives offered in potential substitute drives. All three variables of interest appear to affect turnout in a way that is consistent with the importance of substitution effects. Column 8 estimates show that an increase in the number of neighboring drives, an increase in the number of neighboring drives that offer incentives, and an increase in the highest cost of an item offered at a neighboring drive all negatively affect turnout; in contrast, offering an incentive at a drive will significantly decrease the number of donors who substitute away from the focal drive towards other drives that offer incentives.

Our estimates imply that substitution effects can be substantial because adding incentives can potentially affect many neighbors and can be especially large if the incentive is the highest valued item that is being offered in the neighborhood. For instance, consider a simple case in which an item that costs

$2.50 is added as an incentive to an existing drive in a neighborhood with four other drives within 0-2 miles driving distance (this case represents the average neighborhood conditions shown in the bottom-right panel of Table 4). We further assume that none of the other drives in the neighborhood are offering an incentive in order to keep this analysis simple. If we ignore substitution effects, the estimates in Column 1 of Table 6 indicate that an additional 5.38 donors ($0.02 + \$2.5*2.47 - 2.5^2*0.13$) will turn out. However, the estimates in Column 8 of Table 12a indicate that turnout will also decrease by $0.6 = 0.15 + 0.18 * \$2.50$ donors at each of the neighboring drives because none of the other drives are offering incentives. This implies that adding the incentive reduces turnout across all neighboring drives by a total of $2.4 = 4 * 0.6$ donors. Thus, about 45 percent (2.4 / 5.38) of the *extra* donors who turn out at the drive that is offering the incentive (when we ignored substitution effects) will comprise donors who would have donated otherwise at one of the neighboring drives. Thus, in this simple scenario, in a neighborhood with four other drives (none of which is offering incentives), for every "new" donor who shows up to donate when a $2.50 cost incentive is offered, 45% of the local increase is not due to new donors; rather, it is attributable to existing donors who have substituted away from donating at other drives. Hence, ignoring these temporal and spatial substitution effects can result in substantially overestimating the total effect of incentives on donations.

Table 12b provides further evidence that donors are substituting across drives. The estimates in Table 12b show that substitution effects are small and insignificant at closed drives, are generally much larger and significant at open drives, and are the largest at open drives in flyer counties. For instance, the point estimates indicate that adding an incentive to a neighboring drive decreases turnout by an insignificant 0.05 donors at closed drives (Column 4), but decreases turnout by 0.15 donors at open drives (Column 7) and by 0.19 donors at open drives in flyer counties (Column 10). It is not surprising that the substitution effects are more than three times larger at open drives and open drives in flyer counties because more donors are aware of their options and able to substitute their donations towards the open drives. Similarly, the estimates indicate that an increase in the value of the highest cost incentive offered at a potential substitute drive is smallest and most insignificant at closed drives (-0.05) and is much larger and significant at open drives (-0.21) and open drives in flyer counties (-0.22) when the current drive does not offer an incentive. Thus, as anticipated, substitution effects are larger when donors are able to substitute (at open drives) and when more donors are aware of more options to donate (in flyer counties).[38] These results are consistent with standard economic reasoning in general but have generally not been documented in the context of pro-social behavior.

[38] In open drives in flyer counties, we estimate that the addition of a $2.50 incentive in a neighbourhood with four other drives, none with incentives, will increase turnout by $6.83 = 0.69 + \$2.5*2.78 - 2.5^2*0.13$ donors if we ignore substitution effects (Column 4, Table 6); however, when we include substitution effects (Column 10, Table 12b), $3.06 = 4 * (0.19 + \$2.50*0.23)$ of these donors will have been drawn away from the neighboring drives. Thus, in open drives in flyer counties, the increase in turnout ignoring substitution effects is, again, almost exactly 45 percent (3.06/6.83).

Table 12b presents regressions for the units of blood collected and the percentage of donors deferred. The patterns that emerge for units collected are very similar to those estimated for the number of donors presenting. For deferrals, it is possible that drives that offer incentives could siphon donors who are more likely to be deferred because they have characteristics that might be more attracted to drives with incentives. However, we find no systematic evidence of this type of substitution occurring.

6. Discussion and Conclusions

We have presented evidence that shows that incentives offered at blood drives significantly increase the number of donors presenting and units of blood collected, but do not increase the proportion of deferrals. We also showed, however, that donors substitute donations across time and locations to take advantage of the material incentives. In the case of donors presenting at a drive, the estimated effect of incentives on donations may be unbiased if there are no neighboring drives, but could severely over-estimate the overall effect of incentives if there are many neighboring drives.

The most important contributions of this study to the literature on the effects of extrinsic incentives on pro-social behavior are twofold. First, within the current paradigm of looking at the "local" effects of incentives, we provide field evidence from a large and representative population, and analyze the effects of many incentives used in the field. In this setting – and with specific reference to blood donations – we found that neither crowding out of motivations nor adverse selection appear to be consequences of the presence of incentives.[39] Second, we expanded beyond the existing approaches and explore the "total" effects of incentives, when donors can choose between different locations and times to donate. This extension is crucial because it shows that the positive, local effects of incentives are attenuated when we consider substitution effects.

Our results also contribute to the literature on whether "repugnance" can be a barrier to the existence of a market for certain goods or services such as blood or human body organs (Becker and Elias, 2007; Roth, 2007). Repugnance for certain transactions goes beyond crowding out arguments and potential market failures to include moral concerns that raise opposition to certain market transactions being acceptable. The positive response to explicit incentives that we have documented suggests that receiving rewards for offering blood was not, for the most part, considered to be repugnant by blood donors in the US between 2006 and 2010. However, this does not mean that no donors exist who perceive receiving incentives for blood to be repugnant – nor can we say anything about overall social welfare affects from

[39] A possible criticism to our results is that in our setting, the material incentives were not in the form of direct cash, which might have a more negative connotation than other tangible rewards. However, the "traditional "crowding out theory does not seem to make distinctions between the specific type of the tangible rewards. Furthermore, as described also in footnote 8, the available evidence of a different (and potentially negative) impact of cash rewards as compared to non-cash items in the same setting is limited to activities with no intrinsic motivation content, and finds that the lower performance of cash rewards compared to non-cash payments is limited to very small monetary values, and disappears for more meaningful amounts (e.g. $5; see Heyman and Ariely 2004, Kube et al. 2008).

this study in regards to the repugnance. It is possible that US donor attitudes may be evolving with the increasing presence of private blood banks that pay donors for their blood products though it is difficult to assess cause and effect. If repugnance for compensation for blood donations is receding in the US, the presence of private blood banks could be part of the reason; yet the receding repugnance attitudes due to unrelated reasons could alternatively be opening the possibility for private blood banks to flourish.

One limitation of this study is that, although it is reasonable to argue that there are few close substitutes for donating blood at one location and at one time rather than donating at another location and time, it is also possible that there are other substitutes. For instance, donors may substitute away from donating plasma to instead donate blood; in other words, our analysis, which only includes American Red Cross blood donations as a possible substitute, may still overestimate the overall effect of material incentives on blood donations within the more general category of blood product donations. Whereas plasma donation has some differences from whole-blood donations (e.g., it takes longer and has more health restrictions), in one respect, it may be a close substitute because many plasma donors are compensated for their plasma donations. Broadening the category of possible substitutes even further, additional pro-social activities that may be a substitute for blood donations could be any number of other physical activities that require some effort and possibly some minor discomfort. Thus, we conjecture that the current analysis presents a potential lower bound on the size of the substitution effect, but we do not expect that the estimates presented in this paper are too far off the total substitution effects because we are able to estimate the effects of the closest substitutes, and also because we cannot detect any substitution effects beyond 4 miles and more than 56 days.

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Table 1: Summary statistics

	Full sample			Dropping outliers		
	Mean	St.Dev.	Median	Mean	St.Dev.	Median
Number of donors presenting	37.0	26.9	31	35.9	20.2	31
Units of blood collected	31.3	23.0	26	30.4	17.3	26
Donors deferred (fraction of presenting)	0.15	0.09	0.14	0.15	0.09	0.14
Open drives	0.78	0.42	1.00	0.78	0.42	1.00
Drives in "flyer" counties	0.80	0.40	1.00	0.80	0.40	1.00
Open drives in "flyer" counties	0.61	0.49	1.00	0.62	0.49	1.00
Drive length (hours)	5.36	1.18	5.00	5.35	1.14	5.00
Incentives given (yes = 1)	0.37	0.48	0.00	0.36	0.48	0.00
Temperature (F)	55.19	17.98	59.00	55.16	18.00	59.00
Fraction <32F	0.14			0.14		
Rain	0.13	0.32	0.00	0.13	0.32	0.00
Rain intensity	0.03	0.08	0.00	0.03	0.08	0.00
Fraction days with rain	0.46			0.46		
Snow	0.23	0.96	0.00	0.23	0.96	0.00
Fraction days with snow	0.09			0.09		
Number of drives	14,029			13,707		

Notes: Rain measures inches of rain on the day of a drive; Rain intensity is measured as rain divided by hours of precipitation on the day of a drive; Snow measures the amount of snow (inches) in the 48 hours preceding a drive, and it is meant to capture the amount of snow on the ground on the day of the drive. "Flyer" counties are counties where donors receive, every month, a flyer with information on all (open) drives that will take place in their county in that month. Donors in "non-flyer" or "postcard" counties, in contrast, receive only a postcard informing them of upcoming drives in the location(s) that the donors usually frequent. In the right panel we dropped drives in the top and bottom 1% of the distribution of donors presenting.

Table 2: Incentives

	At drives where incentives were offered	At open drives	At open drives in "flyer" counties
	%	%	%
T-Shirt	48.94	47.23	46.36
Coupon	8.55	9.30	9.88
Cedar Point ticket (raffle)	5.02	4.25	3.78
Cooler	3.01	3.23	3.23
Sweatshirt	2.49	2.91	3.02
Umbrella	2.35	2.50	2.27
Hat	1.67	1.87	1.87
6-Pack cooler	1.55	1.85	1.96
Blanket	1.16	1.31	1.33
Scarf	1.14	1.31	1.42
Mug	0.92	1.02	1.00
Music download card	0.88	0.90	0.48
Jacket	0.88	1.04	1.06
Miscellaneous items	3.07	3.16	3.05
Sponsor incentive	24.67	25.01	26.28
Number of drives	4,982	4,118	3,311

Table 3a: Sponsor types and incentives

Type of Drive Sponsor	Frequency	Percent of all drives	Mean # of donors presenting	% of drives with any incentives
	(1)	(2)	(3)	(4)
General community	6,005	43.81	35.53	41.18
Manufacturing	1,504	10.97	30.37	22.01
Hospital	1,206	8.80	35.92	39.22
High school	929	6.78	60.46	54.14
Professional services	614	4.48	27.69	22.64
Catholic	426	3.11	37.20	22.77
College	392	2.86	40.06	33.67
Banking	239	1.74	32.93	30.96
Elementary school	230	1.68	35.98	2.61
Red Cross chapter	221	1.61	32.43	54.75
Clinic	153	1.12	29.47	50.98
Federal	144	1.05	37.85	30.56
Lutheran	139	1.01	31.13	23.74
Nursing homes	134	0.98	18.78	35.82
County	124	0.90	24.79	29.03
Utilities	115	0.84	31.50	26.09
Retail	112	0.82	25.97	30.36
State	107	0.78	24.18	23.36
Other	913	6.66	35.17	33.41
Total	13,707	100.0%	35.86	36.34

Notes: The sponsor types are classified using the American Red Cross's classification. The "Other" category includes all sponsor types with fewer than 100 drives each.

Table 3b: Individual sponsors and incentives

	Number of sponsors	Percent of all sponsors	Number of drives	Percent of all drives	Mean # of donors presenting
1. Sponsors who ran exactly one drive	815	31.4	815	5.9	27.3
AND offered incentives	306	11.8	306	2.2	29.0
2. Sponsors who ran at least two drives	1,780	68.6	12,892	94.1	36.4
AND never offered incentives	414	16.0	1,534	11.2	29.3
AND always offered incentives	211	8.1	742	5.4	35.4
AND sometimes offered incentives	1155	44.5	10,616	77.4	37.5
among these, JUST drives NOT offering incentives			6,682	48.7	35.7
among these, JUST drives offering incentives			3,934	28.7	40.5
All Drives	2,595	100%	13,707	100%	35.9

Table 4: Statistics on potential substitute drives

Potential substitute drives							
For each drive				**For drives with incentives**			
	Potential substitute drives taking place within:				Potential substitute drives taking place within:		
	0-2 miles	2-4 miles	4-10 miles		0-2 miles	2-4 miles	4-10 miles
mean	6.5	7.7	36.6	mean	6.8	7.9	36.9
st. dev.	8.0	9.0	34.7	st. dev.	7.8	9.1	34.3
	Potential substitute drives **with incentives** taking place within:				Potential substitute drives **without incentives** taking place within:		
	0-2 miles	2-4 miles	4-10 miles		0-2 miles	2-4 miles	4-10 miles
mean	2.6	3.1	14.6	mean	3.6	4.4	21.0
st. dev.	3.8	4.5	15.8	st. dev.	4.6	5.8	20.2

Notes: The unit of observation is a location/date. The number of possible substitute drives was computed as follows. For a given drive X, **potential substitute drives** are open drives that occurred in the same county as drive X between 56 days prior to drive X and (1) the end of the month in which drive X occurred, when drive X occurred on the 24th of the month or earlier, (2) the end of the following month when drive X occurred on the 25th of the month or later. Further explanations are provided in the text. Distance was measured in travel miles between street addresses, which was computed using standard GIS network-path algorithms for finding the shortest path through a network. All calculations were performed in GIS using the ESRI Streetmap 9.3 (2008). More details are provided in the text.

Table 5: Direct effects of incentives regressions

5a: Donors presenting at a drive

Dependent variable	Donors presenting at a drive								
Estimation method	OLS		Fixed Effects						
Sample	All drives						Closed drives	Open drives	Open drives in "Flyer" Counties
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Incentive dummy	5.03***	5.30***	5.41***	2.41***	3.98***	3.21***	2.19***	6.15***	6.70***
	(0.37)	(0.32)	(0.32)	(0.51)	(0.57)	(0.40)	(0.52)	(0.37)	(0.44)
Incentive*Open Drive				3.73***					
				(0.63)					
Incentive*(Drive in "Flyer" County)					1.79***				
					(0.67)				
Incentive*(Open Drive in "Flyer" County)						3.52***			
						(0.60)			
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,707	13,529	13,529	13,529	13,529	13,529	2,999	10,530	8,340
R-squared	0.01	0.52	0.20	0.21	0.20	0.21	0.24	0.22	0.23
Number of sponsors effects			2,582	2,582	2,582	2,582	792	1,790	1,469
Mean of the dependent variable	35.9								

5b: Units of blood collected and fraction of donors deferred

Dependent variable	Units of blood collected				Share of donors deferred			
Estimation method	Fixed Effects							
Sample	All drives	Closed drives	Open drives	Open drives in "Flyer" Counties	All drives	Closed drives	Open drives	Open drives in "Flyer" Counties
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Incentive dummy	2.80***	1.82***	5.38***	5.85***	0.001	0.004	-0.003	-0.003
	(0.37)	(0.46)	(0.33)	(0.39)	(0.003)	(0.004)	(0.002)	(0.002)
Incentive*(Open Drive in "Flyer" County)	3.04***				-0.003			
	(0.53)				(0.003)			
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,529	2,999	10,530	8,340	13,529	2,999	10,530	8,340
R-squared	0.19	0.23	0.20	0.21	0.04	0.08	0.05	0.05
Number of sponsors effects	2,582	792	1,790	1,469	2,582	792	1,790	1,469
Mean of the dependent variable	30.4				0.15			

Notes: Columns (1) and (2) of Table 5a present results of OLS regressions. The remaining columns of Table 5a and all columns in Table 5b present results of fixed-effects regressions, where the fixed effects are defined at the level of the individual sponsor. Controls include year effects, month effects, representative fixed effects, representative-specific week-of-the-month effects, dummy variables for special attributes of the drive, the length of the drive (in hours), weather conditions on the day of the drive (amount of rain in inches and its square, rain intensity [measured as rain per hour of precipitation] and its square, amount of snow fallen in the 48 hours before a drive and its square, and temperature dummy variables [0-36, 36-53, 53-68, 68-75, 75+]), and dummy variables for zip codes (only in the OLS specifications of Columns [1] and [2] of Table 5a). Standard errors clustered at the sponsor level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 6: Effects of incentive costs regressions

Sample	All drives			Open drives in "flyer" counties		
Dependent variable	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred
	(1)	(2)	(3)	(4)	(5)	(6)
Incentive dummy	0.02	-0.13	0.005	0.69	0.29	0.001
	(0.92)	(0.82)	(0.006)	(1.19)	(1.07)	(0.007)
Cost of incentive to the ARC ($)	2.47***	2.23***	-0.003	2.78***	2.58***	-0.002
	(0.44)	(0.39)	(0.003)	(0.55)	(0.49)	(0.003)
Cost of incentive squared	-0.13***	-0.12***	0.000	-0.14***	-0.13***	0.000
	(0.04)	(0.04)	(0.000)	(0.05)	(0.05)	(0.000)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,529	13,529	13,529	8,340	8,340	8,340
Number of sponsor fixed effects	2582	2582	2582	1469	1469	1469
R-squared	0.22	0.20	0.04	0.25	0.23	0.05

Notes: All results are from fixed effects regressions, where the fixed effects are defined at the level of the individual sponsor. Controls include year effects, month effects, representative fixed effects, representative-specific week-of-the-month effects, dummy variables for special attributes of the drive, the length of the drive (in hours), weather conditions on the day of the drive (amount of rain in inches and its square, rain intensity [measured as rain per hour of precipitation] and its square, amount of snow fallen in the 48 hours before a drive and its square, and temperature dummy variables [0-36, 36-53, 53-68, 68-75, 75+]). The cost to the ARC of each specific promo is shown in Table 7. The regressions include a dummy variable for the items for which information on cost was not available (i.e., sponsor-provided promos and "Miscellaneous items"). Regressions that excluded drives where such incentives were provided yield essentially identical results. Standard errors clustered at the sponsor level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 7: Effects of specific incentive items

Sample			All Drives			Open Drives in "flyer" Counties		
Dependent variable	# Drives offered at	ARC cost	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred
			(1)	(2)	(3)	(4)	(5)	(6)
T-shirt	2,519	$2.95	6.48***	5.72***	-0.004**	7.85***	6.99***	-0.007***
			(0.37)	(0.33)	(0.002)	(0.48)	(0.42)	(0.003)
Coupon	431	$3.64	6.09***	5.24***	0.001	7.76***	6.62***	0.004
			(0.68)	(0.62)	(0.004)	(0.84)	(0.76)	(0.005)
Cedar point ticket (raffle)	258	$1.00 (a)	2.13**	1.56*	0.005	3.93*	2.91*	0.007
			(1.03)	(0.89)	(0.007)	(2.07)	(1.76)	(0.012)
Cooler	154	$1.78	2.61***	2.20***	0.003	3.98***	3.36***	0.002
			(0.94)	(0.80)	(0.009)	(1.28)	(1.07)	(0.011)
Sweatshirt	125	$6.67	13.23***	11.98***	-0.021**	16.24***	14.33***	-0.011
			(1.29)	(1.18)	(0.009)	(1.39)	(1.30)	(0.010)
Umbrella	122	$4.58	5.55***	4.62***	0.002	7.51***	6.35***	-0.001
			(1.00)	(0.88)	(0.007)	(1.31)	(1.13)	(0.010)
Hat	88	$1.94	3.57***	3.42***	-0.015	4.19***	3.75***	-0.008
			(1.22)	(1.03)	(0.010)	(1.56)	(1.27)	(0.012)
6-pack cooler	78	$9.37	4.33***	3.60***	0.003	7.44***	6.42***	-0.002
			(1.48)	(1.32)	(0.010)	(1.65)	(1.48)	(0.011)
Blanket	59	$6.33	14.37***	13.01***	-0.016	16.83***	14.98***	-0.008
			(1.76)	(1.67)	(0.012)	(1.96)	(1.88)	(0.012)
Scarf	59	$2.50	9.05***	6.88***	0.024*	10.78***	8.37***	0.024*
			(1.69)	(1.54)	(0.014)	(1.93)	(1.77)	(0.013)
Mug	49	$1.42	9.56***	8.07***	0.007	11.05***	8.94***	-0.006
			(1.60)	(1.35)	(0.010)	(2.71)	(1.99)	(0.018)
Music download card	48	$1.50	5.21**	4.24**	0.006	7.85**	6.35**	-0.011
			(2.42)	(2.12)	(0.018)	(3.09)	(2.66)	(0.019)
Jacket	44	$9.50	24.80***	21.68***	-0.02	27.02***	23.37***	-0.012
			(2.26)	(1.98)	(0.013)	(2.80)	(2.49)	(0.015)
Miscellaneous items	165	(b)	4.48***	3.27***	0.013*	4.99***	3.58***	0.016*
			(1.17)	(1.01)	(0.007)	(1.48)	(1.26)	(0.009)
Sponsor promo	1,287	(c)	2.08***	1.75***	0.002	2.20***	1.96***	-0.001
			(0.55)	(0.47)	(0.004)	(0.69)	(0.58)	(0.004)
Controls			Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects			Yes	Yes	Yes	Yes	Yes	Yes
Observations			13,529	13,529	13,529	8,340	8,340	8,340
Number of sponsors			2,582	2,582	2,582	1,469	1,469	1,469
R-squared			0.23	0.21	0.04	0.27	0.25	0.05
p-value of:	H0: T-shirt=Sweather		0.000	0.000		0.000	0.000	
	H0: Sweather=Jacket		0.000	0.000		0.001	0.001	
	H0: T-shirt=Jacket		0.000	0.000		0.000	0.000	

Notes: In these regressions, a dummy variable for each incentive item is included. The cost to the ARC of each item is included in the table, but it does not enter the regressions. (a): The expected value of a Cedar Point ticket incentive item was computed as follows: $15*2/(36+2)≅$1. (b) and (c): The value of sponsor promos and that of "Miscellaneous items" is unknown. As explained in the text, sponsor promos are typically lottery tickets and other items of small value. All results are from fixed effects regressions, where the fixed effects are defined at the level of the individual sponsor. Controls include year effects, month effects, representative fixed effects, representative-specific week-of-the-month effects, dummy variables for special attributes of the drive, the length of the drive (in hours), weather conditions on the day of the drive (amount of rain in inches and its square, rain intensity [measured as rain per hour of precipitation] and its square, amount of snow fallen in the 48 hours before a drive and its square, and temperature dummy variables [0-36, 36-53, 53-68, 68-75, 75+]). Standard errors clustered at the sponsor level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 8: The effect of incentives at inactive sponsors

Sample	All drives at "inactive" sponsors						Open drives in "flyer" counties at "inactive" sponsors		
Dependent variable	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Incentive dummy	5.63***	4.98***	-0.003	-0.29	-0.55	0.016*	-0.63	-0.97	0.012
	(0.37)	(0.33)	(0.002)	(1.17)	(1.07)	(0.009)	(1.63)	(1.48)	(0.013)
Cost of incentive to the ARC ($)				2.37***	2.24***	-0.009**	3.19***	3.02***	-0.007
				(0.56)	(0.51)	(0.004)	(0.76)	(0.69)	(0.006)
Cost of incentive squared				-0.11**	-0.11**	0.001	-0.17**	-0.17**	0.001
				(0.05)	(0.05)	0.000	(0.07)	(0.06)	(0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	9,802	9,802	9,802	9,802	9,802	9,802	5,646	5,646	5,646
Number of sponsor fixed effects	2,047	2,047	2,047	2,047	2,047	2,047	1,091	1,091	1,091
R-squared	0.18	0.16	0.05	0.19	0.17	0.05	0.23	0.22	0.07

Notes: A sponsor was classified as "active" if it provided an incentive item at least once in the period of observation. Thus, the baseline group of "inactive" sponsors consists of sponsors that never provided any incentive (beyond those offered by the ARC). All results are from fixed-effects regressions, where the fixed effects are defined at the level of the individual sponsor. Controls include year effects, month effects, representative fixed effects, representative-specific week-of-the-month effects, dummy variables for special attributes of the drive, the length of the drive (in hours), weather conditions on the day of the drive (amount of rain in inches and its square, rain intensity [measured as rain per hour of precipitation] and its square, amount of snow fallen in the 48 hours before a drive and its square, and temperature dummy variables [0-36, 36-53, 53-68, 68-75, 75+]). Standard errors clustered at the sponsor level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 9: Pre-treatment characteristics of the field experiment sites
(Based on all drives during the reference year 5/18/2008 – 5/18/2009)

	Control Sites (N=27)			
	Mean	Std. Dev.	Min	Max
Number of drives in reference year	5.56	1.40	3	9
Fraction of drives with incentives	0.23	0.2	0	0.67
Average drive length (hours)	5.21	0.76	4	6.3
Average number of donors presenting	29.75	10.15	14.33	51.17
Average number of units of blood collected	25.95	8.84	12.67	46
Donors deferred as a fraction of presenting	0.13	0.05	0	0.19
	Advertised treatment sites (N=21)			
	Mean	Std. Dev.	Min	Max
Number of drives in reference year	5.81	0.87	4	8
Fraction of drives with incentives	0.24	0.2	0	0.50
Average drive length (hours)	5.27	0.57	4	6
Average number of donors presenting	31.12	8.22	16.00	47.00
Average number of units of blood collected	27.55	7.22	14.25	40.2
Donors deferred as a fraction of presenting	0.11	0.03	0.05	0.18
	Surprise (non-advertised) treatment sites (N=6)			
	Mean	Std. Dev.	Min	Max
Number of drives in reference year	5.83	0.75	5	7
Fraction of drives with incentives	0.29	0.2	0	0.60
Average drive length (hours)	4.56	0.50	4	5
Average number of donors presenting	23.76	5.73	17.50	32.60
Average number of units of blood collected	20.07	5.27	14.50	27.4
Donors deferred as a fraction of presenting	0.15	0.03	0.10	0.19

Notes: The table presents characteristics of the 54 experimental drive locations measured in the reference year (i.e., from 5/18/2008 through 5/18/2009).

Table 10: Difference-in-differences results from the field experiment

Panel A: Averages				
	Control drives			
	Pre-intervention	Intervention	Difference	
Donors presenting	29.75	28.59	-1.16	
Units collected	25.95	25.78	-0.17	
Fraction deferred	0.13	0.10	-0.03	
N. Obs.	27	27		
	Surprise (non-advertised) treatment drives			
	Pre-intervention	Intervention	Difference	**Diff-in-Diff**
Donors presenting	23.76	24.50	0.74	**1.90**
Units collected	20.07	20.67	0.60	**0.77**
Fraction deferred	0.15	0.17	0.01	**0.04**
N. Obs.	6	6		
	Advertised treatment drives (all)			
	Pre-intervention	Intervention	Difference	**Diff-in-Diff**
Donors presenting	31.12	40.14	9.02	**10.18**
Units collected	27.55	35.43	7.87	**8.04**
Fraction deferred	0.11	0.12	0.00	**0.03**
N. Obs.	21	21		
Panel B: By $ value of the treatment				
	$5 advertised treatment drives			
	Pre-intervention	Intervention	Difference	**Diff-in-Diff**
Donors presenting	31.14	34.86	3.71	**4.88**
Units collected	27.47	30.29	2.81	**2.98**
Fraction deferred	0.11	0.12	0.01	**0.03**
N. Obs.	7	7		
	$10 advertised treatment drives			
	Pre-intervention	Intervention	Difference	**Diff-in-Diff**
Donors presenting	32.43	40.00	7.57	**8.73**
Units collected	29.01	34.71	5.70	**5.87**
Fraction deferred	0.10	0.13	0.03	**0.06**
N. Obs.	7	7		
	$15 advertised treatment drives			
	Pre-intervention	Intervention	Difference	**Diff-in-Diff**
Donors presenting	29.80	45.57	15.78	**16.94**
Units collected	26.18	41.29	15.11	**15.28**
Fraction deferred	0.12	0.10	-0.02	**0.00**
N. Obs.	7	7		

Notes: The pre-intervention observations consist of averages across all of the drives that took place at each sponsor during the reference year (5/18/2008–5/18/2009).

Table 11: Difference-in-differences results from the field experiment: Robustness to regression analysis

Dependent variable:	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred	Donors presenting	Units collected	Share deferred
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
EXP	-0.91	0.07	-0.027*	-0.80	0.18	-0.027*	-1.11	-0.37	-0.020
	(1.16)	(1.18)	(0.013)	(1.21)	(1.23)	(0.014)	(1.15)	(1.14)	(0.013)
TR_INFORM	-0.54	-1.34	0.021						
	(1.28)	(1.24)	(0.013)						
EXP*TR_INFORM	10.32***	8.18***	0.030						
	(2.45)	(2.37)	(0.021)						
$ value of treatment							-0.21	-0.27**	0.002
							(0.13)	(0.11)	(0.001)
EXP* $ value of treatment							1.10***	0.94***	0.002
							(0.23)	(0.23)	(0.002)
$5 TR_INFORM				3.56***	2.18*	0.029			
				(1.14)	(1.13)	(0.023)			
$10 TR_INFORM				0.79	0.55	-0.001			
				(1.73)	(1.77)	(0.025)			
$15 TR_INFORM				-5.18**	-6.09***	0.036*			
				(2.01)	(1.99)	(0.019)			
EXP*$5 TR_INFORM				4.52*	2.63	0.033			
				(2.32)	(1.89)	(0.028)			
EXP*$10 TR_INFORM				8.76**	5.89**	0.056*			
				(3.43)	(2.81)	(0.033)			
EXP*$15 TR_INFORM				17.86***	16.18***	0.001			
				(4.04)	(4.06)	(0.029)			
TR_UNINF	-7.23***	-8.87***	0.09***	-7.09***	-8.86***	0.092***	-7.71***	-9.32***	0.089***
	(1.14)	(1.27)	(0.024)	(1.07)	(1.36)	(0.028)	(1.40)	(1.35)	(0.024)
EXP*TR_UNINF	1.86	0.73	0.038	1.84	0.71	0.038	2.14	1.24	0.036
	(2.16)	(2.42)	(0.042)	(2.17)	(2.43)	(0.042)	(2.13)	(2.37)	(0.042)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
p-value of:									
H0: EXP*TR_INFORM =EXP*TR_UNINFORM	0.006	0.013	0.864						
H0: $5 DD = $10 DD				0.272	0.278	0.562			
H0: $10 DD = $15 DD				0.073	0.029	0.176			
H0: $5 DD = $15 DD				0.003	0.002	0.375			
Observations	108	108	108	108	108	108	108	108	108
Number of sponsor fixed effects	48	48	48	48	48	48	48	48	48
R-squared	0.43	0.37	0.17	0.55	0.53	0.2	0.54	0.49	0.14

Notes: The table reports coefficients from fixed-effects regressions, where the fixed effects are defined at the level of the sponsor. There are two observations per drive, a pre-experiment observation (EXP=0), and an observation corresponding to the experiment drive (EXP=1). The pre-experiment observations consist of averages across all of the drives that took place at each sponsor during the reference year (5/18/2008–5/18/2009). The dummy variable TR_INFORM equals 1 for treatment sites where donors were informed on the monthly flyers about the gift card and 0 for control drives and drives where incentives were offered but no donors were informed. The dummy variable TR_UNINF equals 1 for treatment sites where donors had not been informed by the monthly flyers about the gift card. The coefficients on the interactions EXP*TR_INFORM and EXP*TR_UNINF, therefore, are the difference-in-differences estimators. Controls include drive length (in hours) and wave fixed effects. Standard errors, reported in parentheses, are clustered at the sponsor level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 12a: Substitution effects on number of donors presenting

Dependent variable	Donors presenting							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Incentive dummy	0.01	0.27	0.04	0.78	0.4	-0.54	0.28	-0.25
	(0.96)	(0.96)	(0.96)	(1.01)	(1.00)	(1.04)	(0.99)	(0.99)
Cost of incentive ($)	2.53***	2.45***	2.52***	2.46***	2.44***	2.50***	2.45***	2.40***
	(0.46)	(0.46)	(0.46)	(0.46)	(0.46)	(0.46)	(0.46)	(0.46)
Cost of incentive squared	-0.13***	-0.13***	-0.13***	-0.13***	-0.12***	-0.13***	-0.13***	-0.12***
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Number of Potential Substitute Drives Overall taking place within 0-2 miles	-0.19***			-0.19***			-0.09	-0.10*
	(0.06)			(0.06)			(0.06)	(0.06)
x Incentive dummy				-0.01			-0.04	-0.05
				(0.04)			(0.06)	(0.06)
taking place within 2-4 miles	-0.06			-0.05				
	(0.05)			(0.05)				
x Incentive dummy				-0.03				
				(0.04)				
taking place within 4-10 miles	0.01			0.02				
	(0.02)			(0.02)				
x Incentive dummy				-0.01				
				(0.01)				
Number of Potential Substitute Drives With Incentives taking place within 0-2 miles		-0.24***			-0.29***		-0.25***	-0.15**
		(0.06)			(0.07)		(0.07)	(0.07)
x Incentive dummy					0.07		0.08	-0.04
					(0.07)		(0.11)	(0.11)
taking place within 2-4 miles		-0.003			-0.002			
		(0.04)			(0.05)			
x Incentive dummy					-0.003			
					(0.07)			
taking place within 4-10 miles		-0.002			0.01			
		(0.02)			(0.02)			
x Incentive dummy					-0.02			
					(0.02)			
Highest cost ($) of incentive offered at potential substitute drives, at drives:								
taking place within 0-2 miles			-0.10*			-0.21***		-0.18***
			(0.05)			(0.06)		(0.06)
x Incentive dummy						0.28***		0.35***
						(0.09)		(0.09)
taking place within 2-4 miles			-0.10*			-0.09*		
			(0.05)			(0.05)		
x Incentive dummy						-0.01		
						(0.09)		
taking place within 4-10 miles			-0.02			-0.01		
			(0.04)			(0.05)		
x Incentive dummy						-0.03		
						(0.08)		
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,254	12,254	12,254	12,254	12,254	12,254	12,254	12,254
Number of sponsors	2,469	2,469	2,469	2,469	2,469	2,469	2,469	2,469
R-squared	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22

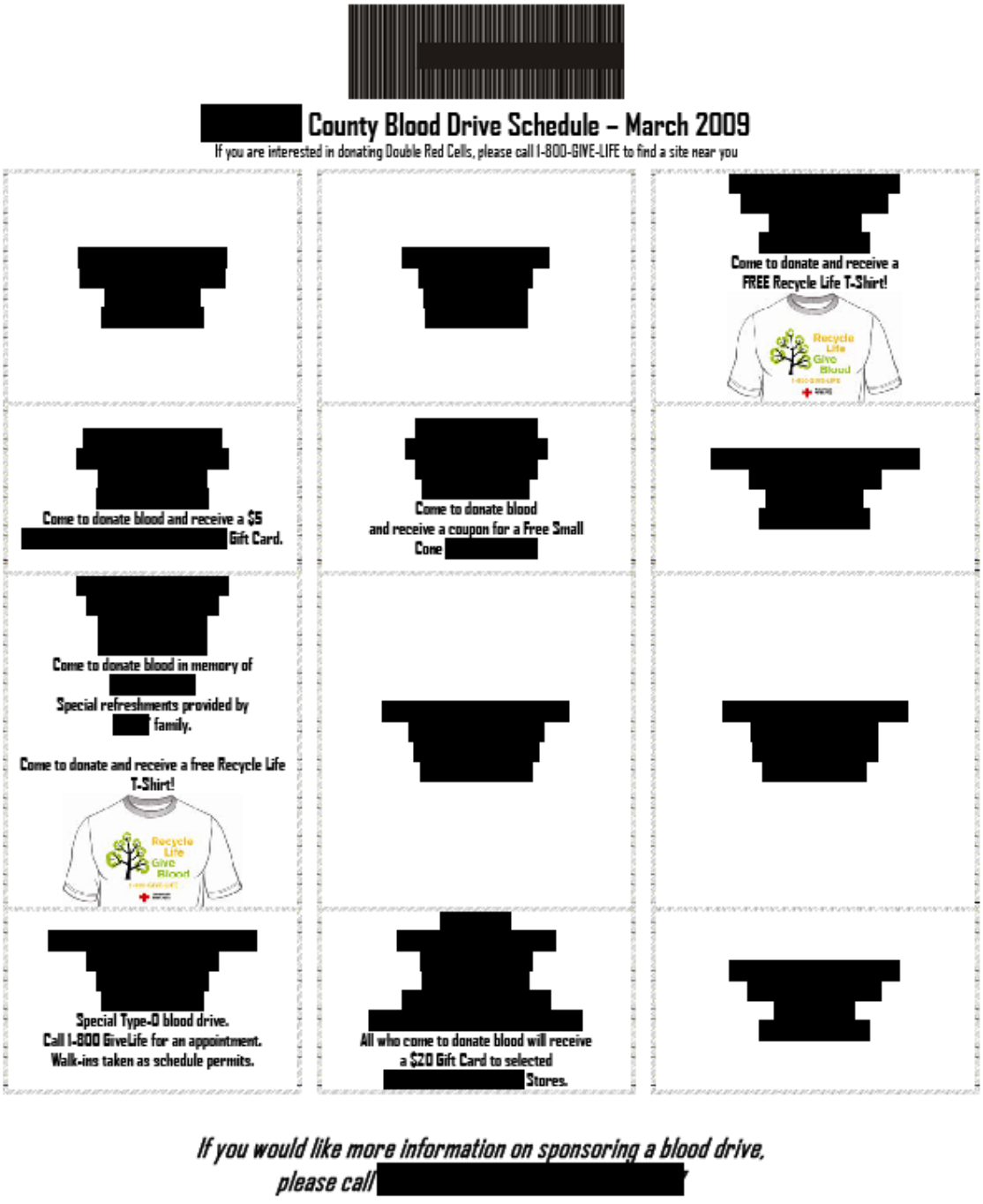
Table 12b: Substitution effects by type of drive

Sample	All drives			Closed drives			Open drives			Open drives in "flyer" counties		
Dependent variable	Donors presentin	Units collected	Share deferred	Donors presentin	Units collected	Share deferred	Donors presentin	Units collected	Share deferred	Donors presentin	Units collected	Share deferred
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Incentive dummy	-0.25	-0.43	0.006	-1.42	-1.23	0.010	0.42	0.104	0.006	0.03	-0.24	-0.002
	(0.99)	(0.87)	(0.007)	(2.19)	(1.64)	(0.015)	(1.08)	(0.97)	(0.007)	(1.27)	(1.13)	(0.008)
Cost of incentive ($)	2.40***	2.14***	-0.002	1.61	1.32	-0.002	2.49***	2.257***	-0.003	2.64***	2.41***	0.000
	(0.46)	(0.40)	(0.003)	(1.08)	(0.81)	(0.007)	(0.50)	(0.44)	(0.003)	(0.58)	(0.52)	(0.003)
Cost of incentive squared	-0.12***	-0.11***	0.000	-0.15	-0.12	0.000	-0.13***	-0.113***	0.000	-0.12**	-0.11**	0.000
	(0.04)	(0.04)	(0.000)	(0.13)	(0.09)	(0.001)	(0.05)	(0.04)	(0.000)	(0.05)	(0.05)	(0.000)
Number of Potential Substitute Drives Overall												
taking place within 0-2 miles	-0.10*	-0.09*	0.000	0.13	0.1	0.000	-0.14**	-0.127**	0.000	-0.27**	-0.23**	0.000
	(0.06)	(0.05)	(0.000)	(0.12)	(0.10)	(0.001)	(0.07)	(0.06)	(0.001)	(0.11)	(0.09)	(0.001)
x Incentive dummy	-0.05	-0.02	0.000	-0.05	-0.02	0.000	-0.05	-0.0245	0.000	0.11	0.1	0.001
	(0.06)	(0.05)	(0.001)	(0.09)	(0.07)	(0.001)	(0.07)	(0.06)	(0.001)	(0.12)	(0.10)	(0.001)
Number of Potential Substitute Drives With Incentives												
taking place within 0-2 miles	-0.15**	-0.1	-0.001	-0.05	-0.04	0.000	-0.15*	-0.089	-0.001**	-0.19*	-0.11	-0.002***
	(0.07)	(0.06)	(0.001)	(0.15)	(0.13)	(0.002)	(0.08)	(0.070)	(0.001)	(0.11)	(0.10)	(0.001)
x Incentive dummy	-0.04	-0.07	0.000	-0.21	-0.26*	0.002	-0.03	-0.063	0.000	-0.08	-0.13	0.001
	(0.11)	(0.10)	(0.001)	(0.18)	(0.15)	(0.002)	(0.13)	(0.110)	(0.001)	(0.17)	(0.14)	(0.002)
Highest $ value of incentive offered at potential substitute drives, at drives…												
taking place within 0-2 miles	-0.18***	-0.20***	0.001***	-0.05	-0.11	0.001	-0.21***	-0.22***	0.001**	-0.23***	-0.25***	0.002***
	(0.06)	(0.05)	(0.001)	(0.10)	(0.09)	(0.001)	(0.07)	(0.06)	(0.001)	(0.08)	(0.07)	(0.001)
x Incentive dummy	0.35***	0.32***	-0.001	0.42**	0.42**	-0.001	0.30***	0.28***	-0.001	0.25**	0.26**	-0.001*
	(0.09)	(0.08)	(0.001)	(0.20)	(0.17)	(0.002)	(0.10)	(0.09)	(0.001)	(0.12)	(0.11)	(0.001)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12,254	12,254	12,254	2,715	2,715	2,715	9,539	9,539	9,539	7,541	7,541	7,541
Number of sponsors	2,469	2,469	2,469	765	765	765	1,704	1,704	1,704	1,393	1,393	1,393
R-squared	0.22	0.20	0.05	0.27	0.26	0.09	0.25	0.22	0.05	0.26	0.24	0.06

Notes to Tables 12a and 12b: All results are from fixed-effects regressions for which the fixed effects are defined at the level of the individual sponsor. The number of observations in these regressions differs from the previous tables because here we exclude the drives that occurred in the first 56 days and those that occurred in the last 30 days of the sample period (although these drives were excluded from the sample used to run the regressions, these were not excluded for the computation of the number of substitute drives). The number of potential substitute drives was computed as described in the notes to Table 4 and in the text. Controls include year effects, month effects, representative fixed effects, representative-specific week-of-the-month effects, dummy variables for special attributes of the drive, the length of the drive (in hours), weather conditions on the day of the drive (amount of rain in inches and its square, rain intensity [measured as rain per hour of precipitation] and its square, amount of snow fallen in the 48 hours before a drive and its square, and temperature dummy variables [0-36, 36-53, 53-68, 68-75, 75+]). The standard errors of the coefficients (reported in parentheses) are clustered at the sponsor level. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 1: Examples of ARC flyers and postcards

1a: Monthly flyer with all upcoming drives in a county



1b: Postcard

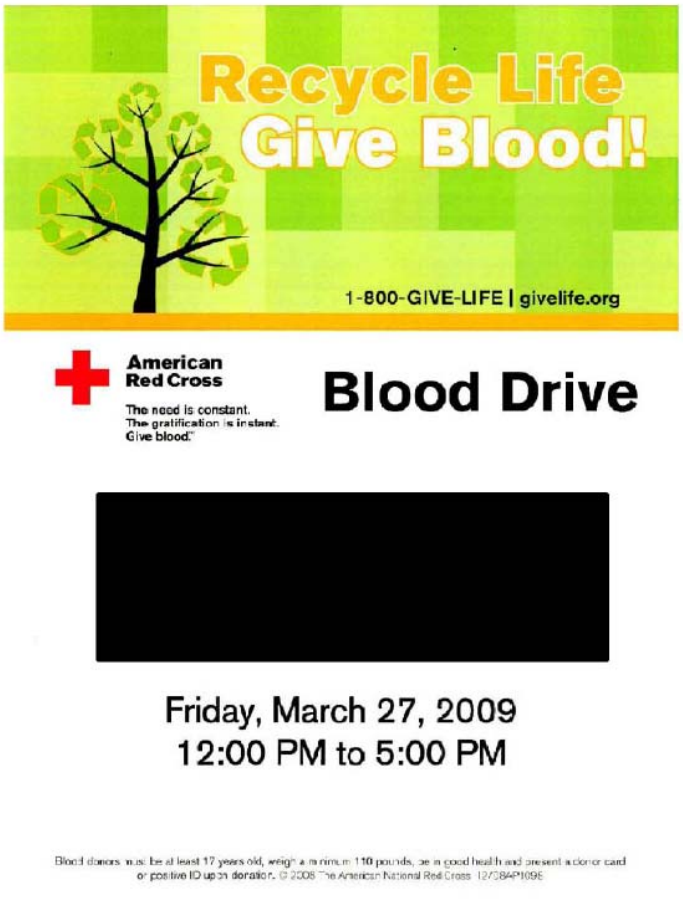
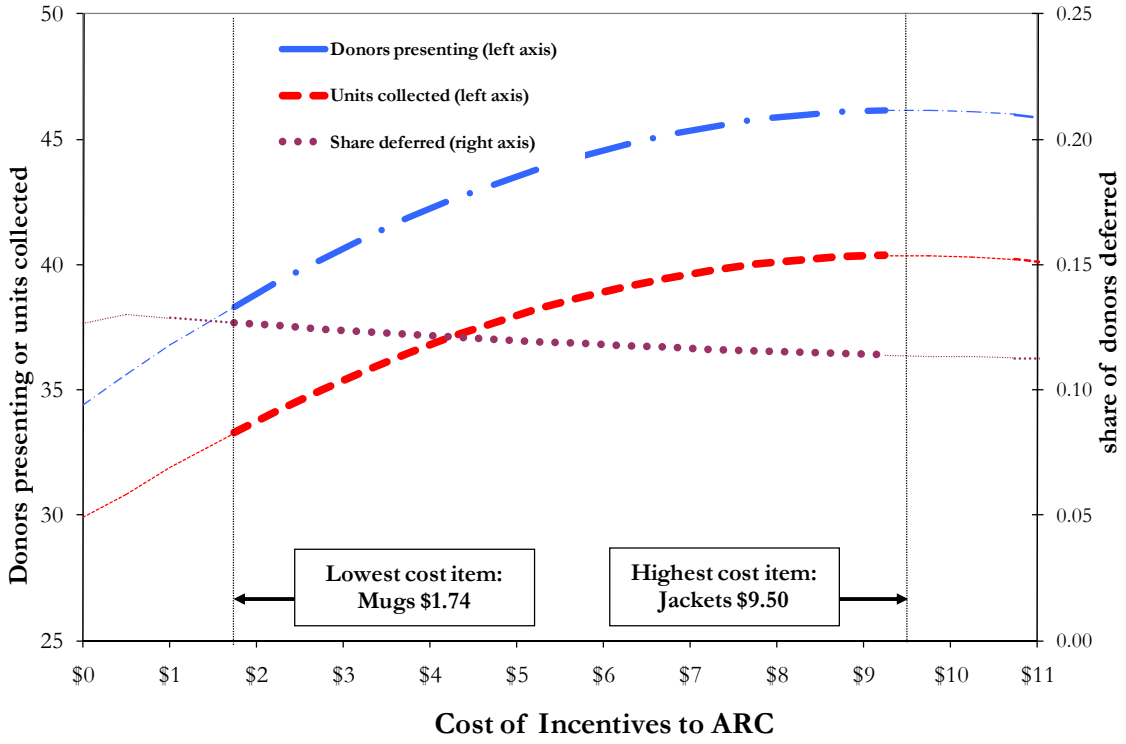
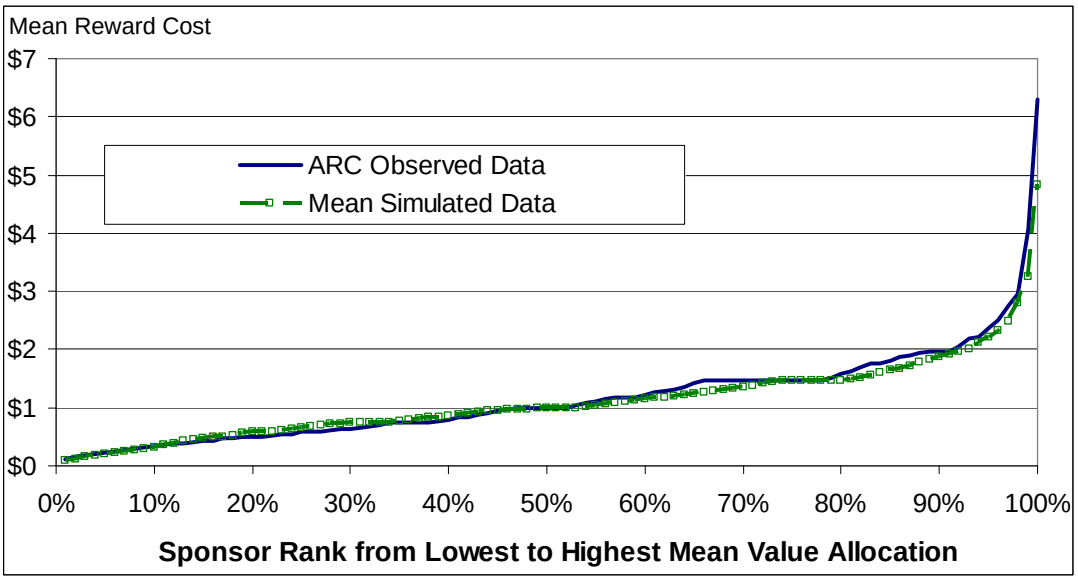

Recycle Life
Give Blood!
1-800-GIVE-LIFE | givelife.org
American
Red Cross
The need is constant.
The gratification is instant.
Give blood.
Blood Drive
[redacted]
Friday, March 27, 2009
12:00 PM to 5:00 PM
Blood donors must be at least 17 years old, weigh a minimum 110 pounds, be in good health and present a donor card
or positive ID upon donation. © 2008 The American National Red Cross 12/08AP1095

Figure 2: Estimated effects of incentive costs



Notes: Predicted values obtained using the results from Table 6, Columns 1-3. The baseline is open drives of average length (5.35 hours) taking place in flyer counties on the third Wednesday of April, on days with no rain, no snow, and with temperatures between 53F-68F.

Figure 3: Simulations



Notes: The figure shows the mean values from the simulations (described in detail in Section 3.3.2 in the text) and the mean values for each sponsor at each rank in the actual data. The horizontal axis shows the rank from lowest to highest mean value incentive allocated to sponsors. The vertical axis shows the mean value of the incentives that were offered at each sponsor rank. See Section 3.3.2 for details.