UvA-DARE (Digital Academic Repository)

Payment choice, image motivation and contributions to charity: evidence from a field experiment

Soetevent, A.R.

Publication date
2009
Document Version
Submitted manuscript

Payment Choice, Image Motivation and Contributions to Charity: Evidence from a Field Experiment

Adriaan R. Soetevent[*]

Universiteit van Amsterdam and Tinbergen Institute

Abstract

This study uses a door-to-door fundraising field experiment to examine the impact of payment choice on charitable giving. The three treatments are distinguished by whether respondents can donate cash, use their debit card or have both options. Cash donations are anonymous whereas debit card donations are observed by the solicitor.

Due to dwindling participation, revenues are significantly lower in the debit-only treatment. In the combined treatment, participation decreases relative to the cash-only treatment. Small donors drop out in particular, which indicates that offering the possibility to donate non-anonymously reduces the reputational payoff of anonymous donations.

JEL classification: C93; D64; H41; E42
Keywords: Payment choice, field experiment, image motivation

1 Introduction

Debit card use has increasingly replaced cash as the instrument for making point-of-sale (POS) payments. In the Netherlands, the number of debit transactions increased in 2006 with about 9% to 1.45 billion and the total amount of money involved was 64.2 billion euro (Currence, 2006), see Table 1. This constitutes the highest growth rate since 2002. The Dutch central bank ascribes the high growth to the increased use of mobile debit terminals by merchants at fruit, vegetable, and fish markets and by waiters serving customers at the outdoor terrace of bars and restaurants (DNB, 2006, p. 97). Similar shifts in payment behavior are observed in other countries like the United States where debit card use now exceeds the number of credit card transactions (Borzekowski *et al.*, 2008). Still about 85% of all POS transactions are paid with cash, although in terms of amounts involved, the share of cash is much lower (Brits and Winder, 2005, p. 11).[1]

Given its ambulatory nature, it only seems natural that charities will introduce mobile debit terminals in their door-to-door fund-raising campaigns to enable potential donors to use their debit card instead of making cash payments. As compared to cash donations, debit card transactions carry a number of advantages both for donors as for charities: the solicitor no longer has to carry cash, which is both more convenient and enhances her safety; the solicitee receives a receipt of the transaction and the solicitors and the fund-raising institution save time and money.[2] Despite these benefits and the increased use of mobile debit terminals in other economic transactions, currently none of the charities offer this possibility in their door-to-door

---

[1]Point-of-sale debit transactions in the Netherlands are authorized by a PIN (Personal Identification Number). With a PIN debit transaction, the customer needs a debit card and the merchant needs a debit terminal. The customer swipes her card through the terminal and enters his PIN. The transaction is completed after the customer has pressed a confirmation button. Her deposit account is debited immediately.

[2]For example, in 2007 the total cost involved in depositing currency amounted to €5,880 for the Reumafonds, which is 0.2% of total revenues.

Table 1: Electronic point-of-sale payments in the Netherlands

	2000	2001	2002	2003	2004	2005	2006	2007
	Number of transactions (in mil.)							
Debit card	901	954	1.069	1.157	1.247	1.334	1.451	1.599
E-purse	25	31	97	109	127	147	164	175
Credit card	47	48	46	44	49	45	49	56
Cheques	14	5	0	0	0	0	0	0
Total	1,027	1,038	1,212	1,310	1,423	1,526	1,664	1,830

Source: DNB Annual Report 2006, 2007.

fund-raising campaigns. Instead, they all rely on the traditional collection box depicted in Figure 1. One obvious reason is the (one-time) cost associated with equipping all solicitors with a debit terminal. Other considerations may also play a role, like the possibility that donors will not use the terminal because of the risk of debit card fraud.

This study examines the impact of different payment options on the contributions to charity. To this end, I report on a door-to-door fund-raising field experiment with three treatments which differ with regard to the payment instruments that are accepted: the first group of respondents can only donate cash; the second group can either donate cash or by debit card using the mobile debit card terminal depicted in Figure 1; the third group is only offered the debit terminal and cannot donate cash. Although payment options and liquidity constraints faced by donors are potentially important and related determinants of contributions to charity, these factors have, to the best of my knowledge, not yet been studied in the extensive (field) experimental literature on the economics of charity (see e.g. Andreoni, 2008; Harrison and List, 2004).

Importantly, when respondents use their debit card, solicitors exactly observe the amount given whereas with cash donations they observe whether or not respondents give, but not the value of the donation. In this way, dif-

ferent payment instruments are associated with different degrees of visibility. As a consequence, contributions to charity are likely to be affected by image concerns via the menu of payment options presented to potential donors. Image concerns refer to the tendency of individuals to care about how they are perceived by others. Image concerns as a motive for prosocial behavior were put forward as a theoretical possibility by Bénabou and Tirole (2006). Ariely, Bracha and Meier (2009) have identified that both in the laboratory and in the field, image motivation interacts with extrinsic motives.[3]

This paper adds to this strand of research by providing a formal extension of the Bénabou and Tirole framework to situations where participation and the visibility of the action are choice variables. The decision whether or not to participate in a fund-raise where the charity offers multiple payment options is an example. The modified model has two testable implications regarding the interaction between image motivation and the set available payment options and contributions to charity. First, we expect to observe many small contributions in the treatments where paying cash is an option because when image concerns are important, even subjects with low intrinsic motivation for the charity will nevertheless contribute a small amount in these treatments. They do so because donating a small, inexpensive and unobserved amount allows them to join the group of participants and to signal to the solicitor that they are good. Second, because large donors are more inclined to donate non-anonymously, the reputational payoff of anonymous gifts decreases when the decision to donate anonymously or non-anonymously is a choice variable. Because of this, we expect to observe lower participation rates in the treatment with both the cash and debit instrument as compared to the cash-only treatment. The field experimental results presented support both implications.

Next to image concerns, a respondent's decision to contribute and choice

---

[3]Related laboratory and field studies by Andreoni and Petrie (2004), Rege and Telle (2004) and Soetevent (2005) find a positive effect of visibility on prosocial behavior.

for using a particular payment instrument of course depends on liquidity constraints in the form of the availability of sufficient cash in a respondent's wallet, her debit card balance as on safety concerns surrounding the use of the terminal.[4] The empirical literature on payment behavior points out that people dislike carrying around large amounts of weighty coins in their wallets (Zinman, 2008; Jonker, 2007). Within the context of door-to-door fund-raising, this "small coin nuisance" suggests that people without strong intrinsic motivation to donate may nevertheless contribute, because they seize the opportunity of a solicitor showing up at their doorstep to unload their wallet of change they consider to have little value. When the option to pay cash is not offered this opportunity disappears. To examine this relation between payment options and the denomination of tokens (coins and notes) given, I will distinguish individual contributions along two dimensions: the amount given and the number of tokens used. Attention for the number of tokens used is novel in the research on charitable giving but follows up on recent empirical studies on payment efficiency (Kippers *et al.*, 2003; Franses and Kippers, 2007). Payments are said to be efficient if, given the amount to be paid, the number of tokens involved in the transaction is minimized (Cramer, 1983).

The main results of the paper are as follows. First, I find that, as compared to the benchmark Cash-only treatment, total revenues in the Debit-only treatment are 68 percent lower. Participation in the fund-raise drops from 68 percent to nine percent. However, conditional on participation, the average amount given more than doubles from €1.81 in the Cash-only treatment to €4.34 in the Debit-only treatment. Second, the comparison of the Cash-only treatment with the Cash&Debit treatment surprisingly shows that participation rates and revenues are about fourteen percent lower in the

---

[4]Information on individual wallet contents is not available in our experiment. Given that the experiment takes place at the beginning of the month when most people have just received their paychecks, it is likely that most households approached have a positive balance at their debit card account.

5

Figure 1: The collection box (a) and the Vx670 debit card terminal (b)

latter treatment. Scrutiny of individual contributions however reveals that the presence of a debit terminal induces especially those donors to drop out who give small amounts using relatively many tokens.

Closely following the field experiment on door-to-door fund-raising by Landry *et al.* (2006), I also identify some physical and personal characteristics of solicitors as important determinants of the amounts contributed to the charity. The assertiveness and self-confidence of the solicitor have a negative effect on the amount given. No effects are identified with regard to the propensity to give. Landry *et al.* (2006) find that female solicitor attractiveness is positively correlated with both participation and contribution levels.[5] The results in this paper do not corroborate these findings. My estimates do indicate that female solicitors induce higher participation rates, both among male and female solicitees, but do not show a relation with the physical attractiveness of the solicitor.

The study proceeds as follows. The next section reviews the literature and presents a simple theoretical model. Section 3 describes the field experimental design. Section 4 provides the results and Section 5 concludes.

---

[5]Another related field experiment is Alpizar *et al.* (2008) who study voluntary contributions to a national park in Costa Rica.

2 Theoretical Framework and Related Literature

Differences in the acceptance of payment instruments across treatments may affect both the number of households participating in the fund raise (extensive margin) as well as the level of the individual contributions of households that do participate (intensive margin). Section 2.1 reviews the literature on payment choice to identify the relevant pecuniary and non-pecuniary product dimensions in comparing the cash and debit instrument. Section 2.2 presents and modifies the Bénabou and Tirole (2006) model in order to arrive at testable hypotheses about the interaction between payment choice and prosocial behavior.

2.1 Payment Choice Drivers

The literature on payment choice mentions a number of product dimensions that are important in choosing a particular payment instrument. These variables, or "payment choice drivers" as they are coined by Borzekowski *et al.* (2008), include time cost (a preference for speed), convenience, the transaction costs associated with using an instrument, restraint (a desire to limit overspending), acceptance of the payment instrument by retailers and security (Jonker, 2007; Borzekowski *et al.*, 2008; Zinman, 2008). This literature however almost exclusively focuses on retail point-of-sale situations. This necessitates a discussion about the implications of these results for the context of door-to-door fund-raising. A notable difference between retail POS settings and charitable giving is that in the former, the amount due is always exogenously given.

Using detailed survey data on payment behavior by Dutch consumers, Jonker (2007) reports that cash and debit card users both mention the perceived speed of the payment process as the most important reason to choose that instrument in a number of POS situations. This indicates small differences between cash and debit in the time dimension. In a donation context,

7

the average time to complete a cash transaction is likely to be shorter than in a POS situation because no change is given.[6] Apart from transaction speed, the lack of sufficient cash and the wish to pay exact amounts (e.g. parking meters) are the most important reasons for using the debit card (p. 286). In our fund-raising context, the latter motive seems less relevant since donors are free to donate any amount, which makes cash a better substitute for debit card payments than in POS situations.

Debit is often considered more convenient than cash in terms of the weight that one has carry around (one plastic card vs. a collection of coins and notes) (Zinman, 2008; Jonker, 2007, p. 295). Whereas this induces a preference for debit card payments in POS situations, it instead leads to a preference for using cash in contributing to door-to-door fund raises: solicitor visit people at home and respondents may seize the opportunity of a solicitor showing up at their doorstep to unload their wallet of change. In the experimental setup, cash and debit do not differ with regard to monetary transaction cost because, irrespective of the amount donated, neither the donor nor the charity has to pay a fee for using the debit terminal.[7]

Jonker (2007, p. 285) reports that consumers prefer to use cash in POS situations where the amounts involved are small. In her study, many consumers cite as a reason to pay cash "that it helps them monitor their expenses." This reason may as well apply when donating to a charity. In the experimental setup, acceptance is imposed by the experimenter and differs per treatment.

With regard to security, cash is sometimes perceived unsafe because of the risk of theft and of money being lost. Borzekowski *et al.* (2008, p. 158)

---

[6]The need to search for notes and coins and the time spent waiting for change are mentioned as major aversions against using cash (Jonker, 2007,p. 295).

[7]Many merchants in the Netherlands used to charge a small fee (€0.10-€0.20) for payments below €10 (Brits and Winder, 2005). Most of these surcharges have been abolished recently, due to decreases in electronic payment costs to merchants (DNB, 2007, p. 99). Despite a campaign called called to convince consumers to also use their debit card for small payments many still associate debit payments with amounts exceeding €10-15.

report that consumers who cite security as the most important driver most often substitute debit for cash, "driven by a fear of loss or theft of cash." In the experimental context, consumers are at home and this reduces the risk of theft. An important security issue surrounding debit card use is the risk of fraud (Jonker, 2007, p. 295). This may an extra concern in the door-to-door charity context because, other than in POS situations, the buyer does not choose to visit a known store or bar, but an unknown solicitor chooses to visit the potential donor at home. A number of respondents in the experiment told the solicitor that for this reason, they did not trust using the debit terminal.

Next to the importance of product attributes, empirical studies have identified correlations between a number of consumer characteristics and the adoption of types of payment instruments. The probability of debit card use is generally found to be higher among younger people and to increase with education level found and income (Stavins, 2001, p. 26-28; Borzekowski and Kiser, 2008, p. 895-896; Jonker, 2007, p. 289).[8] No strong gender effects have been detected in the choice between cash and debit. The empirical evidence naturally leads to the following hypotheses on the effects of different payment options on participation in the three experimental treatments.

Hypotheses on Payment Choice Drivers and Participation

    i Donors in a door-to-door fund-raise may prefer giving cash over using the debit terminal out of motives of convenience, restraint and safety. On the other hand, the lack of sufficient cash may induce donors to give electronically. The net effect of replacing the collection box by a debit terminal is not clear *a priori*;

    ii The average age of donors will be lower in the Debit-only treatment

---

[8]Zinman (2008) finds that debit use decreases with credit card possession; consistent with this, Borzekowski *et al.* (2008, p. 156) find that debit card use is lower for the lowest income category but that income in general is not a strong predictor of debit card use.

than in the Cash-only and Cash&Debit treatment; no gender effect is expected.

2.2 Image Motivation

This section modifies the Bénabou and Tirole (2006) model in order to develop qualitative and testable hypotheses about the impact of payment options on prosocial behavior (as measured by the value of donations) and the interaction between payment choice and image motivation. An agent's utility is specified by the additive quadratic utility function

$$U(a, m; M) = v_a a - C(a) + R(a, m; M), \tag{1}$$

with $a \in \mathbb{R}^+$ the amount given, $m \in M$ the payment instrument used and M the set of available payment instruments; $M = \{c\}, \{d\}, \{c, d\}$ in the Cash-only, Debit-only, and Cash&Debit treatment, respectively; c and d denote a cash and debit donation, respectively. An individual's incentives to behave prosocially are divided into two components. Besides an intrinsic motivation to donate a certain amount (v_a), agents are susceptible to image motivation ($R(a, m, M)$). The component in the Bénabou and Tirole (2006) model representing extrinsic motivation is not included because extrinsic or monetary rewards are absent in the experimental design of this paper.[9] The direct benefit of participation at level a is $v_a a$ and $C(a)$ is the cost of contributing a. I assume $v_a \sim \mathcal{N}(\mu, \sigma^2)$ distributed with $\mu > 0$ and $C(a)$ taking the form $a^2/2$. The reputational payoff function $R(a, m; M)$ is defined as:

$$R(a, m; M) \equiv \gamma_a E(v_a | a, m; M), \text{ with } \gamma_a \geq 0.^{10} \tag{2}$$

[9]Debit card users might receive a monetary reward in the form of a tax deduction when they keep their receipt and when their total donations to charity in a given year exceed 1% of gross income. The great majority of households does however not meet this threshold and moreover, solicitors do not observe who is eligible for a deduction and who not. For these reasons, this possibility is ignored. Empirical evidence on the effectiveness of tax deductions on charitable giving is mixed (see e.g. Andreoni, 2008; Fack and Landais, 2007).

[10]The definition in Bénabou and Tirole (2006) contains an additional parameter x measuring the visibility of action a. Here, differences in visibility between treatments are

One modification relative to the original model is that agents can choose both an amount a and a payment instrument m, whereas payment instrument is not a choice variable in Bénabou and Tirole. The visibility of the amount given differs per payment mode. In case the respondent uses her debit card the exact amount donated is visible (to the solicitor). When using cash, the solicitor only observes that a donation is made but not its value. For this reason, $\partial R(a, c; M)/\partial a = 0$, i.e. the reputational payoff of donating cash is independent of the amount given and $R(a, c; M) = R(c; M)$. Conditional on the available payment instruments M, agents maximize

$$\max_{a \in \mathbb{R}^+, m \in M} \{v_a a - a^2/2 + \gamma_a E[v_a|a, m; M]\}. \tag{3}$$

The behavioral implications of this model for the three experimental treatments $M = \{c\}, \{d\}, \{c, d\}$ are as follows. First consider the optimal individual supply of prosocial activity a^* for agents with $v_a > 0$, conditional on available and chosen payment instruments M and m. Given identical γ_a for all agents, Bénabou and Tirole (2006, p. 1661) show that in equilibrium, participating individuals donate at the level:

- $a^*(c; M) = v_a + r(c; M) = v_a$ when $m = c$; and $M = \{c\}$ or $\{c, d\}$;

- $a^*(d; M) = v_a + r(d; M) = v_a + \gamma_a$ when $m = d$ and $M = \{d\}$ or $\{c, d\}$,

with $r(m, M)$ denoting the (constant) marginal image motivation, which is independent of a.[11] Conditional on making a cash donation, agents have no incentive to donate more than their intrinsic value v_a because the exact amount given is unobserved. Agents will donate more when using the debit terminal if image motivation positively affects prosocial behavior ($\gamma_a > 0$) and less when the impact of image motivation is negative ($\gamma_a < 0$). The

---

accounted for in the conditional expectations and accordingly, I impose $x = 1$.

[11] $r(m; M) = \left. \frac{\partial E[v_a|a, m; M]}{\partial a} \right|_{x=1}$.

experimental design in this paper rules out the latter possibility because of the absence of extrinsic or monetary rewards.

Next to a decision on the amount given, agents have to decide whether or not to participate in the fund raise and, conditional on participation, which payment mode to use. Different from the experiments by Ariely *et al.* (2009) where subjects sign up for the experiment and subsequently learn the treatment they are assigned to, the participation decision needs to be modeled explicitly because agents observe the set of payment instruments M offered by the solicitor before they decide whether or not to participate. An agent's utility of non-participation in treatment M is

$$U(0; M) = \gamma_a E[v_a|0; M] \equiv R(0; M). \tag{4}$$

In the Bayesian-Nash equilibrium of this game, if agents of type $\hat{v}_a$ (do not) participate in the fund raise, all agents with $v_a > \hat{v}_a$ ($v_a < \hat{v}_a$) will also (not) participate. This implies that the reputational payoff from non-participation will never exceed the reputational obtained from donating cash, $R(0; M) = E(v_a|0; M) \leq E(v_a|c, M) = R(c; M)$, and that all agents with $v_a > 0$ strictly prefer giving cash over non-participaton.

Cash-only treatment ($M = \{c\}$) In the Cash-only treatment, agents with $v_a > 0$ will participate and contribute exactly v_a.[12] Reputational payoffs of donating cash and non-participation equal

$$R(c; \{c\}) = \gamma_a E[v_a|c, \{c\}] \geq \gamma_a \mu \text{ and } R(0; \{c\}) < 0,$$

respectively. Agents with $v_a \leq 0$ will prefer participation to non-participation by donating a minimal amount ϵ if and only if

$$U(\epsilon, c; \{c\}) > U(0; \{c\}) \Leftrightarrow v_a > \epsilon/2 - [R(c; \{c\}) - R(0; \{c\})]/\epsilon. \tag{5}$$

The agent with $\tilde{v}_0^{\{c\}}$ such that

$$\tilde{v}_0^{\{c\}} = \epsilon/2 - (E[v_a|v_a \geq \tilde{v}_0^{\{c\}}] - E[v_a|v_a < \tilde{v}_0^{\{c\}}])/\epsilon, \tag{6}$$

---

[12]Their utility from donating a equals $U(a, c; \{c\}) = v_a^2/2 + R(c; \{c\}) > R(0; M)$.

is indifferent between not participating and donating a small amount in cash. Since $\lim_{\epsilon \downarrow 0} \tilde{v}_0^{\{c\}} = -\infty$, in equilibrium all agents with $v_a < 0$ will participate when ϵ can be chosen arbitrarily small; I will refer to them as 'ϵ-donors'. The minimal contribution these agents donate is merely due to image concerns; by donating a small amount, they signal to the solicitor that they are "good". Their participation increases overall participation rates but they drag down the group of participators' reputation for prosocial orientation because of their low values for v_a; average conditional contributions will be lowered because ϵ-donors give small amounts. This situation is depicted in Figure 2. In practice, however, ϵ cannot be arbitrarily close to zero. The smallest coin in the euro area has a value of €0.01 and next to this, the minimal gift an agent can make depends on her wallet content at that time the solicitor solicits a donation.[13]

Debit-only treatment ($M = \{d\}$)   In the Debit-only treatment, agents with $v_a \geq -\gamma_a$ will not participate in the Bayesian-Nash equilibrium; agents with $v_a > -\gamma_a$ will participate and donate $a^* = v_a + \gamma_a$ if and only if

$$U(a^*, d; \{d\}) > U(0; \{d\}) \Leftrightarrow \frac{v_a^2}{2} - \frac{\gamma_a^2}{2} + \gamma_a v_a > R(0; \{d\}) \qquad (7)$$

For agent $\tilde{v}_0^{\{d\}}$ indifferent between not participating and making a debit card transaction

$$\frac{(\tilde{v}_0^{\{d\}})^2}{2} - \frac{\gamma_a^2}{2} + \gamma_a \tilde{v}_0^{\{d\}} = R(0; \{d\}) = \gamma_a E[v_a | v_a \leq \tilde{v}_0^{\{d\}}] = \gamma_a \left[\mu - \frac{\sigma \phi(\alpha)}{\Phi(\alpha)} \right]$$
$$(8)$$

where $\alpha \equiv (\tilde{v}_0^{\{d\}} - \mu)/\sigma$ and $\phi(\cdot)$ and $\Phi(\cdot)$ the pdf and the cdf of the standard normal distribution, respectively. The solution to equation (8) is not neces-

---

[13]Euro cash consists of eight coins with values 0.01, 0.02, 0.05, 0.10, 0.20, 0.50, 1 and 2 and seven banknotes with values 5, 10, 20, 50, 100, 200 and 500. The web site www.eurodiffusie.nl contains monthly statistics of people's self-reported wallet contents. My web site contains additional material on developments in the coin composition in people's wallet over the time period 2003-2008 based on these data. As of September 1, 2004, shopkeepers are allowed to round amounts to multiples of 5 eurocents. This has had the effect that the percentage of 1 (2) eurocent coins in individuals' wallets has decreased from 13 (14) percent of all coins in 2003 to 3 (3) percent of all coins in 2008.
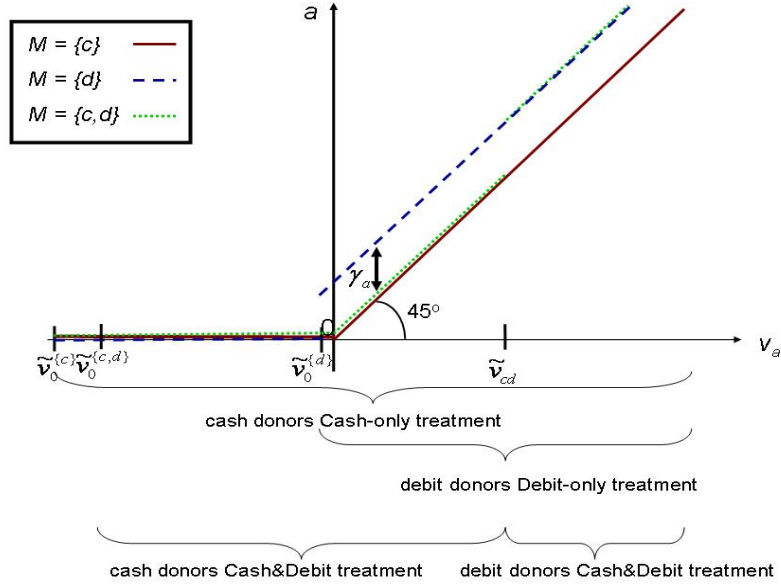
Figure 2: Individual donation levels and payment instruments used in the different treatments.

sarily unique such that there may be multiple equilibria, but in each of them, agents with $v_a \geq \max\{-\gamma_a, v_0^{\{d\}}\}$ will participate in the fund raise and contribute $a^* = v_a + \gamma_a$. Also, since the utility associated of non-participation is bounded above by $\gamma_a \mu$, agents with $v_a > -\gamma_a + \sqrt{2\gamma_a(\mu + \gamma_a)}$ will for sure use the debit terminal. Thus agents with high enough intrinsic motivation v_a will always prefer donating a^* electronically over non-participation.[14] See Figure 2 for an illustration. In the Debit-only treatment, image concerns may be decisive for some agents (those with $v_a \in [-\gamma_a, 0]$) in their decision to participate but, because individual contributions are observed, they will not drag down the reputational payoff of agents with higher v_a's.

Cash&Debit-treatment ($M = \{c, d\}$)   In the Cash&Debit treatment, agents have to decide both on participation and which payment instrument

---

[14]But for given μ, the probability that any of these agents is solicited is decreasing in $\tilde{v}_0^{\{d\}}$.

to use. For agents with $v_a > 0$, the utility of donating debit or cash is

$$U(a^*, d; \{c, d\}) = v_a^2/2 - \gamma_a/2 + \gamma_a v_a$$

and

$$U(a^*, c; \{c, d\}) = v_a^2/2 + R(c; \{c, d\}) = v_a^2/2 + \gamma_a E[v_a | \tilde{v}_0^{\{c,d\}} \le v_a < \tilde{v}_{cd}],$$

respectively, where $\tilde{v}_0^{\{c,d\}}$ denotes the agents indifferent between not participating and donating a small amount ϵ in cash, and $\tilde{v}_{\{c,d\}}$ the agent indifferent between a cash and debit card donation. Thus:

$$\tilde{v}_0^{\{c,d\}} = \epsilon/2 - (E[v_a | v_0^{\{c\}} \le v_a < \tilde{v}_{cd}] - E[v_a | v_a < \tilde{v}_0^{\{c\}}])/\epsilon \qquad (9)$$

Since $\lim_{\epsilon \downarrow 0} \tilde{v}_0^{\{c,d\}} = -\infty$, as in the Cash-only treatment, in equilibrium all agents with $v_a < 0$ will participate if ϵ can be chosen arbitrarily small. Because

$$U(a^*, d; \{c, d\}) - U(a^*, c; \{c, d\})|_{v_a = \tilde{v}_{cd}} = -\gamma_a/2 + \gamma_a \left\{ \tilde{v}_{cd} - E[v_a | v_0^{\{c,d\}} \le v_a < \tilde{v}_{cd}] \right\}$$

is positive for large enough values of $\tilde{v}_{cd}$, agents with high intrinsic motivation v_a will prefer debit card donations to cash donations. But when these choose to use debit and to reveal the amount given, this lowers the the reputational payoff of cash donations relative to cash donations in the Cash-only treatment. That is, $R(c; \{c, d\}) < R(c; \{c\})$ and, for a given ϵ, $\tilde{v}_0^{\{c,d\}}$ exceeds $\tilde{v}_0^{\{c\}}$, compare (6) and (9). Thus, the introduction of the debit terminal decreases the relative utility of cash donations compared to non-participation. Thus, an indirect effect of introduction of the debit terminal is to decrease the utility of cash donations relative to non-participation. This may in particular lead some small cash donors to opt out.[15] See Figure 2. In sum, this leads to the following research hypotheses:

---

[15]In the model, in equilibrium still all agents will participate if ϵ can be chosen arbitrarily small because $\lim_{\epsilon \downarrow 0} \tilde{v}_0^{\{c,d\}} = -\infty$.

Hypotheses on Payment Choice and Image Motivation *Ceteris paribus*, when image concerns are a motivation in giving to charity ($\gamma_a > 0$):

iii a) In the Cash&Debit treatment, the debit terminal will be used by the relatively larger donors; b) As a result, the reputational payoff of giving cash decreases and some of the ϵ-donors will decide not to participate thereby lowering participation relative to the Cash-only treatment;

iv a) In the Debit-only treatment, conditional on participation, donors give more than they would have given in the Cash-only treatment; b) ϵ-donors will not participate because individual donations are visible to the solicitor; c) As a consequence of a) and b), the average amount given by participants in the Debit-only treatments will exceed the average contribution of participants in the Cash-only and the Cash&Debit treatment.

3   Experimental Design

This experiment has been performed in collaboration with the Reumafonds. Reumafonds, the Dutch rheumatism fund, caters for people with rheumatic diseases and finances research on rheumatism. The fund is widely known and among the largest charities in the Netherlands in terms of income out of door-to-door fund-raising.[16] It is an important source of income for the fund: in 2006, the fund-raising brought in 3.2 million, on a total income of 16.1 million (Reumafonds, 2006). Other partners in this project were CCV and KPN. CCV supplied the solicitors with mobile debit terminals and KPN is the major Dutch telecommunications firm that supplied the data transmission technology necessary to record the individual debit card

---

[16]The Dutch Cancer Society tops the list with 8.8 million, followed by the Kidney Foundation (4.5 mln.), the Netherlands Heart Foundation (4.4 mln.) and the Rheumatism Fund (3.2 mln.). (CBF, 2006).

transactions.[17]

Door-to-door fund-raising campaigns in the Netherlands are coordinated by the Central Bureau on Fund-raising (CBF). This bureau assigns each of the charities a particular week in the year in which they may organize a nation-wide fund-raising drive. This has the advantage that households are never approached by more than one charity a week and that charities can publicize their fund-raising drive at national television and in newspapers.[18] The Reumafonds is traditionally allocated a fund-raising slot in the first half of March. This experiment was executed during the fund-raising week 2007 in selected districts of Amsterdam. The fund received the gross revenues raised.

The experiment consists of three treatments differing only in the payment instruments that are accepted by solicitors: households approached by the first group of solicitors can only pay cash; those approached by the second group can choose between donating cash using the box and donating by debit card using the mobile terminal; households approached by the third group can only give electronically using the debit terminal. All treatments rely on voluntary contribution mechanisms.

Solicitors in the treatments with cash received a sealed collection box and two small packages of envelopes which carried the official logo of the charity.[19] The envelopes were numbered on the inside and each solicitor supplied the envelope with number one to the first donor, the envelope with number two to the second donor, etc. In this way, the token composition of each donation was tracked and could afterwards be linked to the solicitee's

---

[17]Cooperation between the university, Reumafonds, CCV and KPN was essential in conducting this experiment. Levitt and List (2009) envision rapid growth in the area of field experiments done in partnership with private firms.

[18]This may explain partly why participation rates in the current study are much higher than in the study by Landry *et al.* (2006).

[19]The ordinary usage of these envelopes is that in some villages, they are distributed to households one or two weeks before the actual fund raise. Households are asked to put money in the envelope and to drop it into the box of the solicitor in the fund-raising week.

background characteristics. Households were asked to put their donation in the envelope and to put the filled envelope into the box. Solicitors in principle did not observe the amount given.

Solicitors in the treatments with the debit terminal participated in a training session in which an instructor from CCV explained how to use the debit terminals. After a plenary instruction, students practiced by sliding through their own debit cards and making donations of one eurocent. In the end, everyone understood how to operate the terminal and each solicitor succeeded in making a donation. Importantly, respondents who wanted to use the terminal had to tell the solicitor the amount they wanted to donate. The solicitor would type in this amount and then give the terminal to the respondent to authorize the transaction.[20] Due to this procedure, debit card donations are much more visible to solicitors than cash donations. Contributors using the terminal received a printed receipt from the solicitor as proof of their payment. Like the collection boxes, the debit card terminals carried the name of the Reumafonds. After having been returned, transaction summaries were printed for each terminal such that – like for the cash payments – the debit card payments could be linked to the background characteristics of the contributors.

In collaboration with the Reumafonds, suitable routes in the North of the city of Amsterdam were selected. Solicitors were randomly allocated to treatments and efforts were made to ensure that neighborhoods and streets in the different treatments were comparable in terms of characteristics of the households. The municipality of Amsterdam was informed about the research project.[21]

---

[20]In POS situations, it is also common practice that sellers insert the amount due. The reason for this is simply to to prevent buyers from paying the wrong amount.

[21]In the beginning of March it is still wintertime in the Netherlands and a result twilight sets in fairly early. Therefore ordinary solicitors of the Reumafonds often walk in pairs were one person visits one side of the street and the other the opposite site. We enabled our solicitors to do the same by allowing them to sign up as a pair. They split up when soliciting such that households were approached by one solicitor only.

Care was taken that this framed field experiment resembled ordinary door-to-door fund-raising drives as closely as the nature of our setup allowed. For example, the student-solicitors used the same type of collection boxes as the other solicitors of the fund, they carried a bag and portfolio with the official logo of the fund and the informational brochures and the balloons they could distribute to small children at the door were identical to the ones used by other solicitors of the fund.

Solicitors were recruited by e-mail among the students of the University of Amsterdam. Potential solicitors were told that they could earn €75 by signing up as a solicitor for the fund-raising drive of the Reumafonds.[22] In exchange, they complied with a ten-minute intake interview in which they completed an application form.[23] For reason of comparison, the questions in the form show a great overlap with the questions asked by Landry *et al.* (2006); we asked about one's work experience, experience with fund-raising activities and included questions about weight and height to calculate a solicitor's body mass index (BMI). Next to this, we used the same categorical-response questions as in Landry *et al.* (2006) to compose measure of assertiveness, sociability, self-efficacy, performance motivation and self-confidence.[24] This results in individual measures for the personality traits in the range $\{-8, -7, \ldots, 8\}$. As in Landry *et al.* (2006) for each solicitor a measure of physical attractiveness was derived. To this end, digital photographs of the solicitors were taken during the intake interview. Photos of two solicitors were randomly paired and printed in color on a sheet of paper. These photos were evaluated by 93 different observers who each

---

[22]The students were paid in vouchers. They could select themselves the type of voucher they wanted to obtain, such that in effect, the compensation was similar to receiving €75 in cash. The compensation was paid by CCV and not by the Reumafonds.

[23]Of the 36 recruited students, 34 showed up for the intake; two students dropped out in the week of the fund-raising due to personal circumstances; one of them could be replaced by a student who had already finished one route in the same treatment. Excluding data on the second route of this student does not change any of the results.

[24]See Landry *et al.* (2006) for details.

were given five randomly selected prints to evaluate, leading to a total of 930 personal attractiveness rankings. The evaluators were students recruited at the Hogeschool van Amsterdam. Each observer was given ten photographs in total on a scale of (1) extremely unattractive, to (10) handsome. Again following Landry *et al.* (2006), each rater's scores were normalized to arrive at a standardized scale across raters.[25] Summary statistics of the solicitor characteristics by treatment are provided in Table 2.

Table 2: Summary Statistics Solicitor Characteristics (s.e. within parentheses).

	CASH-ONLY	CASH&DEBIT	DEBIT-ONLY
Total # of solicitiors	11	11	11
Average earnings per hour[‡]	16.41	17.91	16.99
Mean beauty rating	-0.06	0.08	-0.01
	(0.21)	(0.18)	(0.20)
Mean body mass index	20.54	22.28	20.87
	(0.61)	(1.06)	(0.55)
% of male solicitors	54.6%	36.4%	45.5%
Age	20.45	22.64	21.09
	(0.39)	(1.47)	(0.96)
Mean sociability	4.64	4.27	3.18
	(0.59)	(0.45)	(0.44)
Mean assertiveness	3.91	4.64	3.64
	(0.31)	(0.41)	(0.49)
Mean self-efficacy	4.55	4.55	4.18
	(0.49)	(0.36)	(0.30)
Mean performance motivation	2.18	1.64	2.27
	(0.44)	(0.74)	(0.84)
Mean self-confidence	4.27	4.00	3.63
	(0.47)	(0.67)	(0.88)

[‡] based on time spent excluding the training session and the intake interview.

[25]Idem.

In the week before the actual fund-raise, three separate training sessions were organized on March 6, one for each treatment group in order to prevent cross-contamination and information exchange across treatments. These sessions lasted 40 to 50 minutes. Each session was conducted by the same researcher, the same spokesperson of Reumafonds (all groups) and the same instructor from CCV (Debit-only and Cash&Debit treatment). In the first part of the training, the setup of the project was explained and solicitors were supplied with materials. Solicitors were shown how to fill in the record sheet for each household that was approached (Was anyone home? Did the household make a contribution? What was the gender and the estimated age of the person you spoke to?) All solicitors received an official Reumafonds identification card, a detailed map of the streets in their route, brochures and balloons of the Reumafonds and a manual with extensive details on how to record observations and approach households, including a script. The identification card stated the name and address of the solicitor together with contact information of the charity fund such that people could make a phone call in case they questioned the trustworthiness of the solicitor.[26]

In the second part of the training, the spokesperson of the Reumafonds provided the solicitors with background information on the fund and reviewed the fund's mission statement. Explicit attention was given to the way volunteers of the fund tend to approach people to solicit donations. In case small children opened the door, solicitors were advised to ask if one of their parents was at home.

Like normal volunteers of the Reumafonds, our solicitors were free to choose which day(s) in the week March 10-15 they went out soliciting contributions, as long as they went out between 4-8.30 p.m. Door-to-door fund-raising drives usually take place within this time period because then most households are home. In total solicitors had to work for about four

---

[26]Examples of routes, manuals, scripts and record sheets can be found on my web site.

hours; most chose to solicit one day, but some split work in two days of about two hours each. A short summary of the experimental design is presented in Table 3. The Table shows that the days chosen by the solicitors are comparable across treatments. In particular, only one solicitor went on the weekend.

Table 3: Experimental design.

		Number of solicitors that went out on...						
		Mo.	Tu.	We.	Th.	Fr.	Sa.	Su.
CASH-ONLY	1609 Approach							
11 Solicitors	752 Home	1	3	3	5	0	0	0
CASH&DEBIT	1510 Approach							
11 Solicitors	762 Home	2	1	4	1	3	1	0
DEBIT-ONLY	1494 Approach							
11 Solicitors	792 Home	2	1	3	5	2	0	0

4 Experimental Results

This section reports the results of the experiment. First the effects on total revenues (Section 4.1) and participation (Section 4.2) are explored. Whereas individual contributions in these sections are characterized by their value only, Section 4.3 looks at a second characteristic of individual donations: the number of tokens given. Section 4.4 contains regression estimates that relate the decision to participate and the amount given to individual background characteristics.

Before moving to the results, I first present in Table 4 per treatment summary statistics on the contribution decisions and the average background characteristics (age and gender) of households that answered the door. I use these to check whether the routes are indeed similar across treatments.[27]

---

[27]In constructing this table, observations of one solicitor who erroneously wrote down

Table 4: Summary Statistics Solicitees (standard errors within parentheses).

	CASH-ONLY	CASH&DEBIT	DEBIT-ONLY
Total housholds home	659	753	767
% of male solicitees	41.3%	37.8%	45.9%
Percent of males			
Non-contributors	35.6%	38.9%	92.9%
Contributors - Cash	64.4%	60.0%	
Contributors - Debit		1.1%	7.1%
Percent of females			
Non-contributors	30.3%	39.3%	89.2%
Contributors - Cash	69.7%	60.7%	
Contributors - Debit		0.0%	10.8%
Mean age			
Overall	46.82	48.65	41.78
	(0.56)	(0.58)	(0.54)
Cash payments	45.78	48.71	
	(0.63)	(0.75)	
Debit payments		35.00	38.93
		(7.64)	(1.40)
Non-contributors	48.31	48.69	42.05
	(0.99)	(0.92)	(0.57)
Median age			
Overall	45	45	40
Cash payments	45	45	-
Debit payments	-	30	35
Non-contributors	50	50	40

I regress age and gender of all households that answered the door on treatment dummies.[28] If the coefficients of the treatment dummies are significantly different from zero, this indicates that the average value of these variables differs across treatments. I find no indication that the gender distribution is different across treatments, but with regard to age, it turns out that individuals that opened the door in the Debit-only treatment are significantly younger than those in the two other treatments. Both the group of contributors and non-contributors are on average slightly younger than in the two other treatments. Since the age of respondents is estimated by the solicitors, a potential reason for the difference might be a systematic bias from the side of one or more solicitors. A regression of the age of the respondents on the age and gender of the solicitor does however not reveal such a bias. Despite the randomization, the average age of households in the Debit-only treatment does seem to be slightly lower.[29] Given the evidence of a negative correlation between age and the use of electronic payment instruments, this implies that participation rates in the Debit-only treatment might be slightly biased upward.

4.1 Revenues

Table 5 provides summary statistics on contributions in each treatment. In total €926, €821, and €316 was raised in the three treatments.[30] The treatments were cash is allowed raised significantly more than the treatment

the age and gender only of non-contributors were discarded. Some other solicitors in a few cases occasionally forgot to write down these items. In those instances, I dropped the observations concerned but not the other observations by the same solicitor. This is the reason why Table 4 is based on less observations than Table 5.

[28]The regression results are not reported in the text but are available upon request.

[29]Inspection of the data reveals that routes of different treatments that where streets of one route are knitted into those of the others (knitting pattern) are similar in terms of age build-up; whereas differences occur when routes are close but adjacent (block pattern). Thus, experiment designs with a knitting pattern seem to be preferable.

[30]This amounts to €84, €75 and €29, respectively, per solicitor. For comparison, the average amount raised by a Reumafonds solicitor is about €55. In our case, average revenues are higher because our solicitors were supplied with about 120 addresses in order to obtain sufficient observations. Normal routes contain about 80 addresses.

with only debit terminals ($p < 0.001$).[31] In the Cash&Debit treatment, less is raised than in the Cash-only treatment ($p = 0.057$). In the Cash-only treatment, the average donation per contact is €1.23, in the Cash&Debit treatment €1.08 and in the Debit-only treatment €0.40.

As stressed by Landry *et al.* (2006), these numbers are independent across treatments, but dependent within treatment because a given solicitor approaches a number of households. They use a conservative test at the solicitor level by calculating for each solicitor the average donation and then rank solicitors on basis of these averages. This approach is followed here. Figure 3 depicts for each treatment the average amount per contact raised by each solicitor. The figure shows that average contributions are much higher when cash is accepted; none of the solicitors in the Debit-only treatment has average contributions in excess of €1, while in the other treatments about two-thirds of the solicitors bring in more. I test for differences in treatment using a Mann-Whitney rank sum test and find that a) average donations in the Debit-only treatment are significantly lower ($p < 0.001$) than in the other two treatments and, b) that no significant difference is detected between average donations in the Cash-only and Cash&Debit treatment.

The next section will show that the lower amounts raised in the treatments with the debit option are to a great extent due to lower participation rates. If one takes out non-participants and focuses on the average contributions of households that do donate, a different picture emerges; Table 5 shows that with €3.17 and €4.34, contacts who use their debit card in the Cash&Debit and Debit-only treatment donate, respectively, 75% and 138% more than cash donors. A Mann-Whitney rank sum test shows that, conditional on contributing, households in the Debit-only treatment donate significantly more than those in the Cash-only treatment ($p = 0.017$). This lends support to hypothesis $iv(a)$, but the effect might be driven by selection bias:

---

[31]Unless stated otherwise, the reported p-values in this section are based on two-sided t-tests with unequal variances.

Table 5: Summary Statistics Contributions (s.e. within parentheses).

	Cash-only	Cash&Debit	Debit-only
Total households approached	1609	1510	1494
Total households home	752	762	792
# households that contributed	512	447	73
# households that use debit terminal	–	3	73
Percent of households contributing	68.1%	58.7%	9.2%
Total amount raised	€926.73	€821.34	€316.50
Average donation per household that answered the door	€1.23 (0.05)	€1.08 (0.06)	€0.40 (0.07)
Average donation per household that contributed			
Cash contributions	€1.81 (0.06)	€1.83 (0.09)	–
Debit contributions	–	€3.17 (0.08)	€4.34 (0.54)
Median contribution per household that contributed			
Cash contributions	€1.55	€1.50	–
Debit contributions	–	€2.50	€3.00
Percent of contributors donating less than €1	19.3	22.3	4.1

Tokens used	Frequency		
20	0.0%	0.2%	–
10	0.1%	0.6%	–
5	1.5%	1.0%	–
2	12.9%	11.2%	–
1	14.2%	16.7%	–
0.50	13.9%	15.7%	–
0.20	19.3%	20.9%	–
0.10	15.7%	15.3%	–
0.05	18.9%	15.4%	–
0.02	2.3%	1.5%	–
0.01	1.3%	1.5%	–
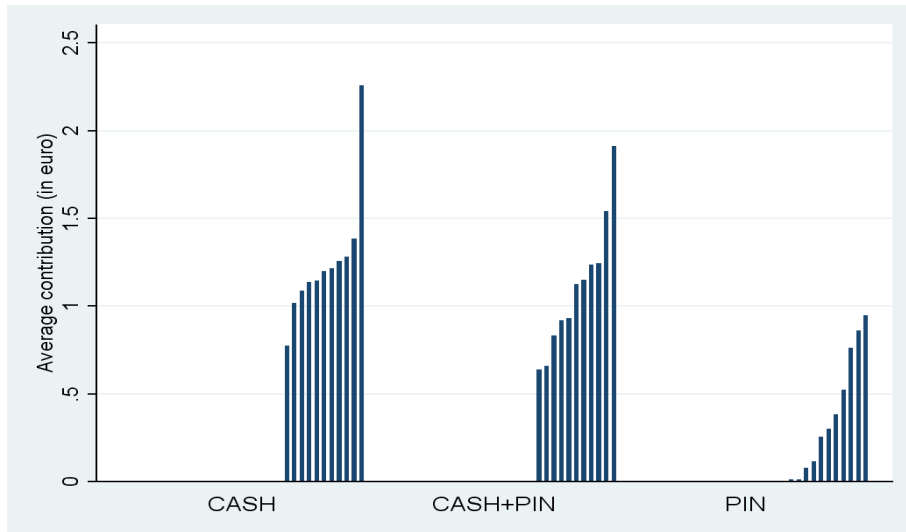
Figure 3: Average contributions per household: solicitor level

participation in the Debit-only treatment is much lower (see Section 4.2) and it may be that the households who give in this treatment have high intrinsic motivation and would also have given a high amount when presented with another treatment. However, the result that the largest debit card donation (out of 76) with €35 is almost twice as large as the largest cash donation (out of 956) was €20 does suggest that respondents who use the terminal make a higher contribution than they would have made in cash. Next to image motivation, an alternative explanation for this phenomenon is that donors feel less restraint in making larger gifts when using their debit card because they do not physically observe the amount they transfer to the charity.

4.2 Participation

Table 5 makes clear that participation in the fund-raising drive strongly decreases as one moves from the Cash-only to the Debit-only treatment. This is also reflected in Figure 4 where the percentage of households that contributed is plotted at the solicitor level. By again applying the Mann-Whitney-Wilcoxon rank sum test where the average success rate of a solicitor

is the unit of observation, I find evidence that success rates in the Debit-only treatment are significantly lower than in both the Cash-only ($p < 0.01$) and the Cash&Debit treatment ($p = 0.033$). The net effect of replacing the collection box by the the debit terminal is clearly negative. Households have a great preference for donating cash and with regard to hypothesis i, this implies that the convenience, restraint and safety concerns of using cash seem to outweigh the problems of not having sufficient cash by far. Notably, not only replacement of the collection box by the debit terminal reduces participation, but also the mere introduction of the terminal next to the box. This does lend some support to hypotheses $iii(b)$ and $iv(b)$ but alternative explanations are possible. For example, having the choice between two payment instruments may lead to information overload on the side of respondents, leading to lower overall participation (Schwartz, 2004).[32] However, arguments based on decision-making paralysis do not provide guidance on whom of the respondents will be affected by this, whereas image motivation predicts that in particular small donors will opt out. Table 5 indicates that in the Debit-only treatment the percentage of donors giving less than €1 is only 4.1 percent, which is significantly lower than the 19.3 and 22.3 percent in the Cash-only and the Cash&Debit treatment ($p < 0.01$ in both comparisons). This corroborates hypothesis $iv(b)$ which says that small donors will drop out in the Debit-only treatment. A competing explanation for this result is that despite the abolishment of surcharges (see footnote 6) people still associate use of their debit with larger amounts with the effect that people willing to donate at most €1 do not give when only debit is offered. Research however shows that the threshold value for both surcharges and using the debit card is around €10-15 which does not explain the observed effect for amounts less than €1.

The results do not support hypothesis $iii(b)$ which predicts a lower num-

---

[32]Thanks to Maarten van Rooij for bringing up this explanation.

ber of small cash donors in the Cash&Debit treatment relative to the Cash only treatment. I return to this in the next section.
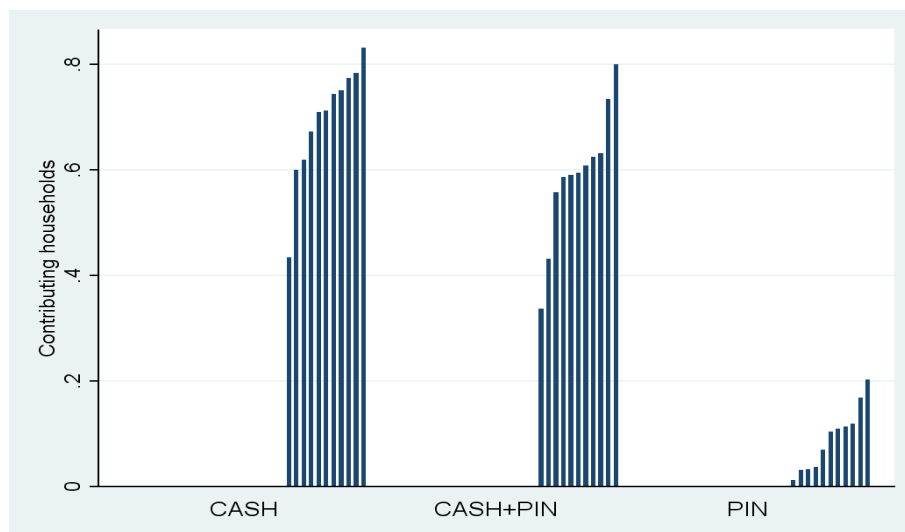
Figure 4: Percent of households contributing: solicitor level

4.3 Image concerns and small coin nuisance

So far, the analysis on the effects of different payment instruments was limited to effects on average participation rates and contribution levels. This section instead concentrates on individual contributions and distinguishes these along two dimensions: the amount given and the number of tokens used. The question is whether donors in door-to-door fund raising drives are primarily driven by a preference for donating their gift in an efficient manner, that is, using as few tokens as possible, or by small coin nuisance, in that they seize the opportunity presented by the fund-raise to get rid of their bulky small change. Franses and Kippers (2007) find evidence that most payments at checkouts of retail locations are efficient. But these authors note that with cash payments in shops, individuals do not get much time to make their choice amongst coins and notes because other buyers may be waiting. In our context, the choice is less constrained in both time and

29

complexity, because individuals are visited at their home and do not have to donate a specified amount.

The decisions how much to donate and which tokens to use are not entirely independent. The relationship between the amount given and the minimal number of tokens needed to donate this sum is non-monotonic with downward spikes around the denominations 10, 20, 50 eurocent and 1, 2, 5, 10 and 20 euro. Thus when solicitees care about payment efficiency, this might induce them to donate less or more than the amount they would prefer in the absence of payment efficiency considerations by giving an amount which coincides with a currency denomination. Since debit card transactions do not involve the transaction of physical tokens, solicitees are not hampered by payment efficiency considerations in transferring the amount they wish. If payment efficiency is a major issue, one would therefore expect that compared to the cash donations, the amounts given by debit card would be associated with an on average larger number of tokens. I test this hypothesis by comparing cash payments with debit card payments. Because debit card payments do not involve physical tokens, I compare cash and debit card payments by looking at the efficient or minimal number of tokens needed to donate a given amount. Payment efficiency predicts that this number is larger for debit card payments. Results of a regression of the efficient number of tokens associated with a given amount on treatments dummies are presented in Table 6. In contrast to what payment efficiency predicts, the table shows that for the amounts given in the Debit-only treatment, significantly less tokens are necessary than for those in other two treatments. That is, debit donors are more likely to give amounts that coincide with a currency denomination.

These results point in the direction of small coin nuisance: individuals may actually value the possibility given in the first two treatments to pay in an inefficient way. Figures 5 and 6 depict in a bubble chart the observed

Table 6: Regression minimal number of tokens needed to donate given amount.

amount contributed	0.0176
	(0.0149)
CASH&DEBIT	-0.1756
	(0.1091)
DEBIT-ONLY	-0.4584**
	(0.1038)
constant	1.7111**
	(0.0782)
obs.	738

Non-zero contributions only;
Errors clustered at the solicitor level.
†: significant at the 10-percent level;
*: significant at the 5-percent level;
**: significant at the 1-percent level.

amount-token combinations in the Cash-only and Cash&Debit treatment, respectively, with the size of the bubble marker representing the relative frequency of the observation. The figures show that in both treatments, many solicitees donate a coin of one or two euro or (to a lesser extent) a note of five euro or a coin of fifty cents. A considerable number of solicitees gives two tokens with a total value of one, two, three or four euro. Besides this group of rather efficient donors, the figures show the presence of another group of solicitees who give a large number of tokens, in particular among those who give less than €3. One explanation for the behavior of inefficient donors is simply that their wallet content does not allow them to give the same value more efficiently. Another explanation is that these donors perceive their small change not as a valuable asset but as a mere nuisance they are happy to divest of. That is, these are ϵ-donors who make a minimal contribution to the charity – 'minimal' in terms on how the solicitees perceive their contribution, not in terms of value. But then, given that image concerns play a role and some these ϵ-donors are motivated by a desire to look good, hypothesis $iii(b)$ predicts that some of them will opt out in the

Cash&Debit treatment because of the lower reputational payoff of donating cash.
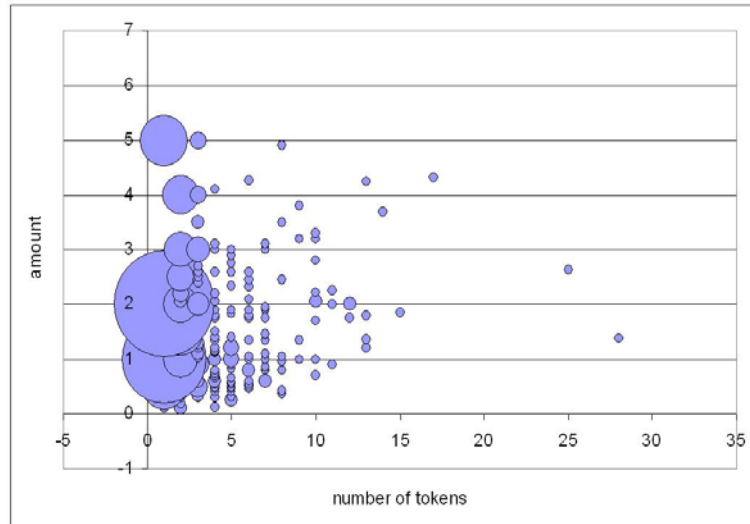

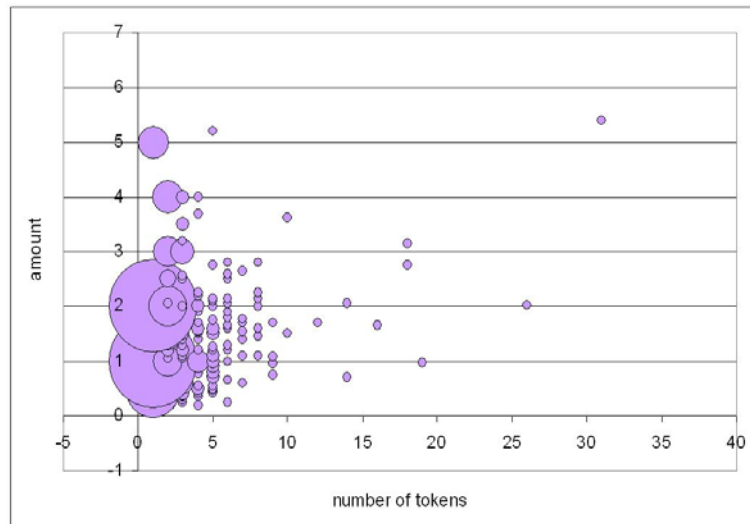Figure 5: Amount-token distribution of cash donations in the Cash-only treatment.

Figure 6: Amount-token distribution of cash donations in the Cash&Debit treatment.

A comparison of figures 5 and 6 gives the impression that the share of inefficient donors might be somewhat smaller in the Cash&Debit treat-

ment, but this is by no means decisive evidence that small inefficient donors drop out by the introduction of the terminal. To complete our picture, figure 7 plots for Cash-only and the Cash&Debit treatment the percentage of donors that makes an efficient donation. Donors are distinguished on basis of the amount given. The figure shows that in both treatments the fraction of efficient payments is increasing in the amount given. Most interestingly, the figure shows that among the donors contributing less than €1, the share of donors who give this amount efficiently is significantly higher in the Cash&Debit treatment ($p = 0.040$), with their level of efficiency becoming comparable to those of the bigger donors. Thus in line with hypothesis $iii(b)$ on the reduced reputational payoff of cash donations when the possibility of debit card donations is offered, we find that there are relatively less inefficient small cash donors in the Cash&Debit treatment. It is possible that the inefficient donors do not drop out in the Cash&Debit treatment but instead start donating more efficiently. However, the fourteen percent lower participation rate in the Cash& Debit treatment reported in Table 5 leads me to conclude tentatively that introducing the debit terminal considerably reduces the participation of inefficient small-cash donors in the fund-raise.

4.4 The role of individual characteristics

The field character of the experiment entails that one has to control for a number of covariates that potentially affect both participation and household contribution levels. In this section, I closely follow Landry *et al.* (2006) and estimate a series of linear regression models that explicitly control for observable and unobservable differences across solicitors.

In donating to charity, households make two separate but closely related decisions; the decision whether or not to participate in the fund-raising and the decision which amount to contribute. First, I estimate a linear regression model of the amount contributed for each respondent (including
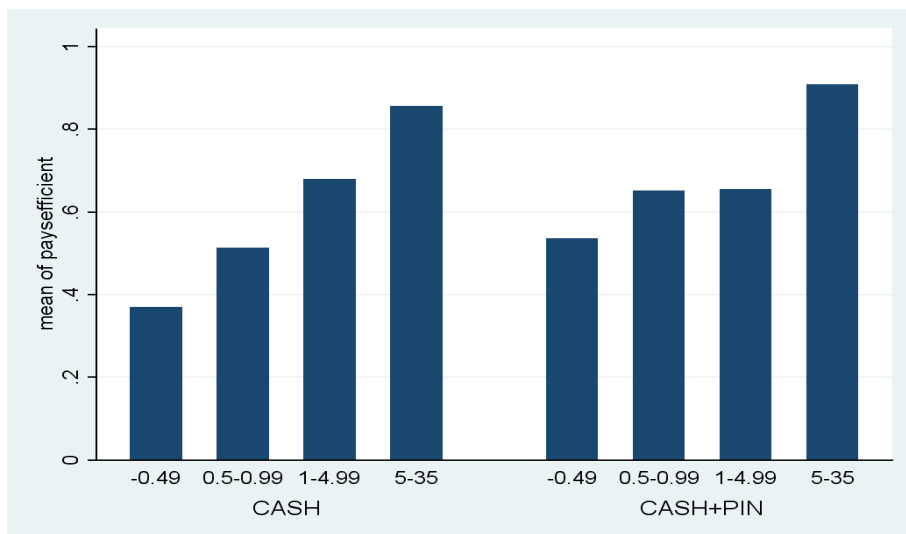
Figure 7: Average number of solicitees making an efficient cash payment

non-participants, i.e. respondents who chose not to donate) on treatment dummies and a number of other covariates:

$$L_{ij} = \mathbf{Z}_{ij}\delta + \mathbf{X}_{ij}\beta + \epsilon_{ij} \tag{10}$$

In this equation, L_{ij} is the contribution of household j to solicitor i (including zero contributions). Equation (10) further contains a vector of treatment dummies $\mathbf{Z}$ and a vector $\mathbf{X}$ containing observable solicitor and solicitee characteristics and day-dummies to account for temporal heterogeneity in giving rates, for example due to changing weather conditions. The errors are clustered at the solicitor level to account for unobservable heterogeneity across solicitors. I assume that the errors are normally distributed. The estimates for three specifications of this model are presented in the first three columns of Table 7.

Second, to increase our understanding of the determinants in the decision of households to participate in the fund raise, I estimate a similar linear regression of the participation decision of households that answered the door:

$$C_{ij} = \mathbf{Z}_{ij}\delta + \mathbf{X}_{ij}\beta + \upsilon_{ij} \tag{11}$$

34

with C_{ij} equaling unity if solicitor i received a positive contribution from household j and zero otherwise. The explanatory variables are identical to those in equation (10). The standard errors are again clustered by solicitor. Estimates for different specifications of this model are presented in the last three columns of Table 7.

In Model A of Table 7, only the treatment dummies and a constant are included. The estimates confirms the findings in previous sections:

- Replacement of the collection box by mobile debit terminals leads to significantly lower participation;

- Offering the possibility to pay by debit terminal next to the option of paying cash has a negative but insignificant impact on both participation and contributions;

In line with most empirical evidence (Bekkers and Wiepking, 2007, p. 14), no gender difference between the donations of male and female solicitees is detected. Next the model is extended with solicitor's physical and personal characteristics like their assertiveness, self-confidence, BMI etc. Table 7 shows that solicitor assertiveness and self-confidence both have a negative impact on average household contributions. These results are by and large consistent with Landry *et al.* (2006) who also find self-confidence to decrease average contributions. They also find a negative impact of assertiveness, but only through participation rates. In addition, they find self-efficacy to positively affect contribution levels through an increase in participation rates. I find a positive but insignificant effect of self-efficacy on contributions. Unlike Landry *et al.* (2006), I do not find an effect for performance motivation but I do find that obese solicitors are somewhat more successful in soliciting a donation than nonobese solicitors. Landry *et al.* reach the conclusion that "the primary effect of personality traits is on the probability that the solicitor will elicit a contribution." (p. 772). This is in contrast with the

Table 7: Linear probability model: Total household contributions and participation decision.

	Contributions			Participation		
	Model A	Model B	Model C	Model A	Model B	Model C
constant – Cash is baseline	1.332**	1.276**	1.423**	0.690**	0.737**	0.747**
	(0.214)	(0.359)	(0.334)	(0.081)	(0.071)	(0.079)
Cash&Debit	-0.218	-0.111	-0.259	-0.043	-0.062	-0.075
	(0.204)	(0.137)	(0.168)	(0.064)	(0.052)	(0.055)
Debit	-0.741**	-0.694**	-0.650**	-0.575**	-0.590**	-0.595**
	(0.216)	(0.097)	(0.121)	(0.054)	(0.034)	(0.041)
(age ≤ 30)*Cash			-0.030			0.021
			(0.146)			(0.059)
(age ≤ 30)*(Cash&Debit)			-0.017			0.004
			(0.175)			(0.066)
(age ≤ 30)*Debit			-0.074			0.033†
			(0.116)			(0.019)
(age > 60)*Cash			0.038			-0.056
			(0.187)			(0.068)
(age > 60)*(Cash&Debit)			0.426†			0.008
			(0.216)			(0.061)
(age > 60)*Debit			-0.341			-0.074†
			(0.277)			(0.041)
Female solicitee			0.003			0.024
			(0.066)			(0.019)
Solicitor beauty rating		0.174			0.048*	
		(0.127)			(0.021)	
Beauty – male solicitor			0.337*			0.083†
			(0.141)			(0.044)
Beauty – female solicitor			0.061			0.029
			(0.206)			(0.032)
Assertiveness of solicitor		-0.102†	-0.097†		-0.011	-0.008
		(0.057)	(0.052)		(0.015)	(0.013)
Sociability of solicitor		0.063	0.064		-0.002	-0.003
		(0.073)	(0.070)		(0.012)	(0.012)
Self-efficacy solicitor		0.160	0.153		0.013	0.015
		(0.107)	(0.101)		(0.016)	(0.017)
Performance motivation		0.021	0.024		0.011	0.011
		(0.021)	(0.021)		(0.008)	(0.008)
Self-confidence solicitor		-0.094†	-0.098*		-0.011	-0.012
		(0.054)	(0.050)		(0.010)	(0.011)
BMI ≥ 25		-0.018	-0.021		0.133*	0.130*
		(0.399)	(0.415)		(0.060)	(0.061)
R^2	0.043	0.059	0.065	0.288	0.297	0.300
day fixed effects	YES	YES	YES	YES	YES	YES
obs.	1861	1861	1861	2137	2137	2137

**: significant at the 1% level; **: significant at the 5% level; †: significant at the 10% level.

Errors clustered at the solicitor level.

estimates of Model B, which show that whenever personality traits house-hold contribution levels, this is not due to increased participation rates. One possible explanation for this difference may be that households in the current study are already better informed about the charity that is supported by the fund-raise than in the Landry *et al.* study, which gives solicitors less room to affect the decision to participate in the fund-raise.

The results with regard to solicitor attractiveness are strikingly different from those obtained by Landry *et al.* (2006). Whereas they find that only female physical attractiveness is correlated with higher contributions, estimates of Model C in Table 7 instead show a significant effect of attractiveness on participation rates for male solicitors only. The effects of attractiveness however disappear as soon as interaction terms between the gender of the solicitor and the solicitee are included (reported as Models D-F in Table A.1 in the Appendix). It turns out that, irrespective of the gender of the solicitee, female solicitors are more effective in eliciting participation; Table A.1 shows that households approached by a female are on average about fourteen percent more likely to contribute.

Model C also includes the solicitee's age. Given the empirical evidence on higher debit card adoption rates among younger people, the specification allows the age effect to differ per treatment. For our purposes it is of particular interest to assess how differences in treatment effects regarding participation rates and conditional contributions are related to the age of the solicitee. The estimates show that, relative to the benchmark category of people aged 30-60, conditional contributions among elderly people are slightly higher in the treatment that only includes the traditional collection box but not in the treatments that include debit terminals. For young people under the age of thirty the opposite holds: in line with non-experimental evidence, they are more likely to participate in the Debit-only treatment than those between the age of thirty and sixty. To the disadvantage of the

charity however, the higher participation rates among young people do not translate into a significant increase in their contribution levels.

In sum, this set of estimates supports hypothesis *ii* in that the probability that a solicitor will elicit a contribution is decreasing with the age of the solicitee in case households can pay by debit card only. Gender differences between male and female solicitees are not detected.

5   Concluding remarks

This study reported on a door-to-door field experiment on the effects of introducing mobile debit terminals on the contributions to charity. About 4,500 households were approached, randomly divided in three experimental treatments, distinguished by the possibility for respondents to pay with cash, electronically, or both.

The study shows that replacing the collection box for cash payments by mobile debit terminals leads to significantly lower solicitor productivity. I find that much of this effect comes from the impact on participation rates. Only few households seem to use the terminal because they lack sufficient cash to donate the preferred amount, but many households seem to prefer using cash over debit because of convenience, restraint and safety motives. As long as the option to pay cash is available, elderly people are relatively more likely to participate than younger people.

Since debit card payments are visible to the solicitor whereas cash payments are not, the theory on image motivation predicts that offering the possibility to pay by debit terminal *next to* the option of paying cash reduces the reputational payoff of giving. In line with this theory, I find lower participation in the Cash&Debit treatment than in the Cash-only treatment and higher contributions among donors who use the terminal. On average, households that use their debit card make gifts that are 75% to 140% larger than the average contributions of those who pay cash.

Some households seize the fund-raise as an opportunity to get rid of small change in their wallet, donating relatively small amounts with a large number of tokens. This is no longer possible when solicitors only carry a debit terminal which may explain part of the lower participation rate in that treatment. In support of the hypothesis that image concerns are important, some of these donors already seem to opt out in the combined treatment where both payment instruments are offered.

Borzekowski *et al.* (2008, p. 171) ask whether "there is a base level of cash (. . .) use that will remain even after debit cards have diffused fully into the economy." This study shows that charities should not underestimate the importance of giving donors the opportunity to donate cash.

References

ALPIZAR, F., F. CARLSSON, AND O. JOHANSSON-STENMAN (2008): "Anonymity, Reciprocity, and Conformity: Evidence from Voluntary Contributions to a National Park in Costa Rica," Journal of Public Economics, 92(5-6), 1047–1060.

ANDREONI, J. (2008): "Charitable Giving," in New Palgrave Dictionary of Economics, ed. by S. N. Durlauf, and L. E. Blume. Palgrave Macmillan, 2nd edn., doi:10.1057/9780230226203.0221.

ANDREONI, J., AND R. PETRIE (2004): "Public Goods Experiments Without Confidentiality: A Glimpse Into Fund-Raising," Journal of Public Economics, 88(7-8), 1605–1623.

ARIELY, D., A. BRACHA, AND S. MEIER (2009): "Doing Good or Doing Well? Image Motivation and Monetary Incentives in Behaving Prosocially," American Economic Review, 99(1).

BEKKERS, R., AND P. WIEPKING (2007): "Generosity and Philanthropy: A Literature Review," Available at SSRN: http://ssrn.com/abstract=1015507.

BÉNABOU, R., AND J. TIROLE (2006): "Incentives and Prosocial Behavior," American Economic Review, 96(5), 1652–1678.

BORZEKOWSKI, R., AND E. K. KISER (2008): "The Choice at the Checkout: Quantifying Demand Across Payment Instruments," International Journal of Industrial Organization, 26, 889–902.

BORZEKOWSKI, R., E. K. KISER, AND S. AHMED (2008): "Consumers' Use of Debit Cards: Patterns, Preferences, and Price Response," Journal of Money, Credit and Banking, 40(1), 149–172.

Brits, H., and C. Winder (2005): "Payments are No Free Lunch," DNB Occasional Study no. 3(2).

Cramer, J. S. (1983): "Currency by Denomination," Economics Letters, 12(3-4), 299–303.

Currence (2006): Annual Report: Transparent Payments in an European Context.

De Nederlandsche Bank (2006): Annual Report.

——— (2007): Annual Report.

Fack, G., and C. Landais (2007): "Are Fiscal Incentives Towards Charitable Giving Efficient? Evidence from France," working paper, Paris School of Economics.

Franses, P. H., and J. Kippers (2007): "An Empirical Analysis of Euro Cash Payments," European Economic Review, 51, 1985–1997.

Harrison, G., and J. A. List (2004): "Field Experiments," Journal of Economic Literature, XLII, 1013–1059.

Jonker, N. (2007): "Payment Instruments as Perceived by Consumers – Results from a Household Survey," De Economist, 155(3), 271–303.

Kippers, J., E. v. Nierop, R. Paap, and P. H. Franses (2003): "An Empirical Study of Cash Payments," Statistica Neerlandica, 57, 484–508.

Landry, C. E., A. Lange, J. A. List, M. K. Price, and N. G. Rupp (2006): "Toward an Understanding of the Economics of Charity: Evidence Form a Field Experiment," Quarterly Journal of Economics, CXXI(2), 747–782.

Levitt, S. D., and J. A. List (2009): "Field Experiments in Economics:The Past,the Present, and the Future," European Economic Review, 53, 1–18.

Rege, M., and K. Telle (2004): "The Impact of Social Approval and Framing on Cooperation in Public Good Situations," Journal of Public Economics, 88(7-8), 1625–1644.

Reumafonds (2006): Jaarverslag 2006.

Schwartz, B. (2004): The Paradox of Choice: Why More is Less. Ecco.

Soetevent, A. R. (2005): "Anonymity in Giving in a Natural Context ? A Field Experiment in 30 Churches," Journal of Public Economics, 89(11-12), 2301–2323.

Stavins, J. (2001): "Effect of Consumer Characteristics on the Use of Payment Instruments," New England Economic Review, 3, 19–31.

Zinman, J. (2008): "Debit or Credit?," Working Paper, Darthmouth College.

A Appendix – Additional linear regression estimates

Table A.1: Linear probability model: Contributions and participation.

	Contributions			Participation		
	Model D	Model E	Model F	Model D	Model E	Model F
constant –	1.137**	1.093**	1.510**	0.630**	0.614**	0.864**
Cash is baseline	(0.340)	(0.338)	(0.352)	(0.093)	(0.099)	(0.080)
Cash&Debit	-0.262	-0.262	-0.434	-0.073	-0.073	-0.224**
	(0.171)	(0.171)	(0.318)	(0.054)	(0.054)	(0.055)
Debit	-0.651**	-0.650**	-1.016**	-0.593**	-0.593**	-0.714**
	(0.109)	(0.109)	(0.260)	(0.041)	(0.041)	(0.057)
(age $\leq$ 30)*Cash	-0.026	-0.028	-0.012	0.024	0.023	0.035
	(0.145)	(0.145)	(0.152)	(0.059)	(0.058)	(0.058)
(age $\leq$ 30)*(Cash&Debit)	0.037	0.034	0.009	0.024	0.024	0.034
	(0.168)	(0.169)	(0.169)	(0.061)	(0.063)	(0.056)
(age $\leq$ 30)*Debit	-0.058	-0.057	-0.042	0.039*	0.039*	0.044**
	(0.112)	(0.113)	(0.109)	(0.018)	(0.019)	(0.016)
(age $>$ 60)*Cash	0.056	0.056	0.020	-0.049	-0.050	-0.071
	(0.196)	(0.195)	(0.207)	(0.068)	(0.069)	(0.068)
(age $>$ 60)*(Cash&Debit)	0.397†	0.398†	0.380†	-0.001	-0.001	-0.002
	(0.215)	(0.216)	(0.214)	(0.060)	(0.060)	(0.061)
(age $>$ 60)*Debit	-0.361	-0.357	-0.340	-0.083*	-0.082†	-0.061
	(0.272)	(0.273)	(0.270)	(0.042)	(0.042)	(0.037)
Female solicitee						
Male solicitor –	0.019	0.102	0.012	0.034	0.060	0.030
female solicitee	(0.071)	(0.073)	(0.069)	(0.032)	(0.045)	(0.032)
Female solicitor –	0.365†	0.393†	0.313	0.136*	0.158*	0.085†
male solicitee	(0.217)	(0.224)	(0.237)	(0.058)	(0.065)	(0.048)
Female solicitor –	0.347	0.400†	0.274	0.149**	0.158*	0.097*
female solicitee	(0.218)	(0.218)	(0.232)	(0.056)	(0.063)	(0.042)
Assertiveness of	-0.091†	-0.092†	-0.060	-0.007	-0.007	0.006
solicitor	(0.051)	(0.051)	(0.041)	(0.013)	(0.013)	(0.010)
Sociability of	0.040	0.040	0.042	-0.011	-0.011	-0.012
solicitor	(0.062)	(0.062)	(0.062)	(0.011)	(0.011)	(0.008)
Self-efficacy	0.160†	0.160†	0.099	0.022	0.022	0.001
solicitor	(0.091)	(0.091)	(0.076)	(0.015)	(0.015)	(0.011)
Performance	0.009	0.010	0.010	0.005	0.004	0.008
motivation	(0.022)	(0.022)	(0.025)	(0.008)	(0.008)	(0.008)

Table A.1: (continued)

	Contributions			Participation		
	Model D	Model E	Model F	Model D	Model E	Model F
Self-confidence	-0.071	-0.070	-0.037	-0.005	-0.005	-0.012
solicitor	(0.052)	(0.052)	(0.054)	(0.009)	(0.009)	(0.008)
BMI $\geq$ 25	-0.058	-0.056	-0.277	0.105	0.104	0.122**
	(0.453)	(0.453)	(0.486)	(0.070)	(0.070)	(0.045)
Beauty – male	0.112			-0.007		
solicitor	(0.149)			(0.063)		
Beauty – female	-0.076			-0.022		
solicitor	(0.235)			(0.035)		
Beauty – male		0.030			-0.033	
solicitor & male solicitee		(0.170)			(0.079)	
Beauty – male		0.189			0.017	
solicitor & female solicitee		(0.160)			(0.055)	
Beauty – female		-0.042			-0.041	
solicitor & male solicitee		(0.280)			(0.050)	
Beauty – female		-0.099			-0.010	
Solicitor & female solicitee		(0.244)			(0.034)	
Beauty – male			0.752†			0.314**
solicitor in Cash			(0.419)			(0.066)
Beauty – female			-0.068			-0.042
solicitor in Cash			(0.337)			(0.044)
Beauty – male			0.070			-0.108
solicitor in Cash&Debit			(0.459)			(0.069)
Beauty – female			-0.552			0.047
solicitor in Cash&Debit			(0.434)			(0.060)
Beauty – male			-0.063			-0.035
solicitor in Debit			(0.169)			(0.055)
Beauty – female			0.263			-0.088
solicitor in Debit			(0.236)			(0.092)
R^2	0.067	0.068	0.073	0.305	0.305	0.317
day fixed effects	YES	YES	YES	YES	YES	YES
obs.	1861	1861	1861	2137	2137	2137

**: significant at the 1% level; **: significant at the 5% level; †: significant at the 10%

level. Errors clustered at the solicitor level.