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# Not All Incentives Wash Out the Warm Glow:

## The Case of Blood Donation Revisited

### SUMMARY

The issue of the nature of the altruism inherent in blood donation and the perverse effects of financial rewards for blood giving has been recently revisited in the economic literature with limited consensus. As Titmuss (1970) famously pointed out, providing monetary incentives to blood donors may crowd out blood supply as purely altruistic donors may feel less inclined to donate. In this paper we examine how favouring different types of incentives is related to the likelihood of donating blood by exploiting a large sample representative of the population of fifteen European countries that contains information on both donation and attitudes towards incentives. Our results show that those who favour monetary rewards for blood donation are less likely to be donors and those who favour non-monetary rewards are more likely to have donated. This is consistent with the idea that while monetary rewards may crowd out blood donation, non-monetary rewards do not.

*Keywords:* Altruism, blood donation, incentives, nudging, recursive system, warm glow.

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## I. INTRODUCTION

There is increasing interest in the motivation of altruistic behaviour, not merely for the sake of exploring behavioural drivers which go beyond classical axioms of self-interest to explain individual behaviour, but more recently as a means of correcting government interventions which are held to crowd out individual actions. For example, the current UK government has advocated the notion of a 'big society', which, although rather unclearly defined, appears to have altruistic behaviour as a central theme. While there is much loose-talk centred around the definition of this policy tool, there is a growing interest in whether such behaviour can be motivated through incentive mechanisms. There has thus been interest in nudging behaviour towards pre-specified outcomes such as tackling health inequalities, preventing ill-health, improving health outcomes and spreading information and good health advice (Department of Health, 2011). Possibly one of the most long-lasting and discussed examples of behaviour broadly consistent with this notion of core altruistic behaviour is individual blood donation.

One donated unit of whole blood can save up to three lives but donated blood has a short shelf life. Regular donors are therefore essential to secure a constant supply. In 1997, the World Health Organization (WHO) recommended that all blood donations should come from unpaid voluntary donors. However, by 2006, only 49 of 124 countries surveyed had established this as a standard. Furthermore, in the WHO's European region the number of donors varies from less than 4.5 to over 45 per 1000 population. Only 39 per cent of the general population are eligible to donate, and fewer than 5 per cent of those eligible actually donate.

Individuals might undertake certain altruistic actions guided by an intrinsic motivation, including a '*warm-glow*' or moral satisfaction. Blood donation has often been seen as a clear-cut example of 'altruism with non-monetary pay-offs' (Elster, 1990). Nevertheless, the issue of the nature of the altruism inherent in blood donation is yet to be agreed upon in the economic literature. Cooper and Culyer (1968) argue that competition and monetary incentives would be suitable to motivate donors but Titmuss (1970) famously points out that providing incentives to blood donors may crowd out blood supply as purely altruistic donors may feel less inclined to donate if a reward is involved. Solow (1971) and Arrow (1972) discuss this proposition and suggest that the effects of price incentives can simply be added to those of altruistic donation, and hence if the price of blood is raised, the quantity offered would increase in accordance with a

supply function. However, the question of the effects of monetary incentives on altruistic behaviour has remained unanswered and the phenomenon discussed by Titmuss was coined as motivation crowd-out. Trying to answer the question of whether altruistic behaviour can be incentivised, Frey and Jegen (2001), Frey and Oberholzer-Gee (1997), and Benabou and Tirole (2006) point out that intrinsic motivation may go unnoticed if a payment is offered.

In this paper, we explore whether financial and non-financial incentives are associated with willingness to donate when other observed and unobserved factors are controlled for. We answer this question by exploiting a large dataset representative of fifteen European countries containing information on both whether or not an individual has been a donor in the past and her preferences towards monetary and non-monetary compensation for blood donation. This large dataset allows to control for country specific variation, which incorporate country level formal (e.g. regulations) and informal (e.g. social norms) heterogeneity. This information allows estimation of two recursive equation systems and exploration of the association of preferences for different types of rewards (attitudes) and the probability of being a donor.

Our results are consistent with the hypothesis of blood supply crowding out due to monetary incentives in all European countries. But, most importantly, we find no evidence of potential crowding out when non-monetary rewards are involved in most European countries. These results are robust to different specifications and are coherent with the idea that crowding out is a phenomenon linked to the introduction of a market based rationale for non-market decisions, and that socially motivated individuals remain willing to donate when non-monetary rewards are offered.

Our results confirm and to a certain extent generalise recent findings that monetary and non-monetary rewards may not crowd out donation (e.g. Goette et al. 2009; Mellstrom and Johannesson, 2008; Lacetera and Macis, 2010a, 2010b). The contribution of our present work to the extant literature is threefold. First, we use a large dataset representative of fifteen European countries containing both attitudes towards incentives for blood donation and past donation behaviour as opposed to smaller and/or experimental samples on donors. Second, because of that, we can directly analyse the relationship of the respondents' preferences for monetary and non-monetary rewards with the probability of being a donor. Further, by using a sample representative of fifteen countries, we can control for socio-cultural and institutional variations.

Third, our results are consistent with the idea that altruistic behaviour can be incentivised as long as the rewards do not conceal the identity of the blood giver as a ‘donor’.

The next section provides ~~some~~ background on altruism and blood donation; section 3 describes the data; section 4 describes our econometric model; section 5 discusses the results; and section 6 concludes.

## II. BACKGROUND

We first present some background on the motivation behind blood donation as an act of gift-giving and, more specifically, how it relates to different forms of socially motivated acts including altruism. We then discuss how the literature on blood donation addresses the question of providing incentives for altruistic behaviour.

### 1. *Blood Donation and Social Motivation*

Blood donation has been classified as an act of ‘collective gift-giving’ (Mercier Ythier, 2006). Donating blood is a pro-social act in the sense that donors incur individual costs in exchange for a collective benefit and contributes to ensuring the blood supply system works well.

In economic terms, blood donation, as any other donation or charitable act, is an economic voluntary transfer that traditionally has not been motivated by market exchange. It implies some form of economic sacrifice by the giver in exchange for the receivers’ benefit for which the giver expects no return. Moreover, since gift-giving individuals, or *knights* in the terminology of Le Grand (1997, 2003), ought to care about the receivers’ utility rather than their own pure self-interest only, theoretically it is envisaged as an act immune to strategic behaviour of giving agents towards the givers (Kolm, 2000). Nevertheless, some forms of altruistic behaviour take place partially as a result of a feeling of ‘duty’ towards others (Etzioni, 1988), from the imitation of others’ behaviours – especially of those individuals signalled as ‘reference groups’; from a feeling of social or moral indebtedness having been or expecting to be on the receiving end on another occasion; or, even from identity driven self-interested motivations (e.g. to attain a feeling of being a good person) as we argue in this paper.

Empirically, most blood donors will give some altruistic reason for giving, often citing feelings of community attachment or some commitment to the common good as their motive (Healy, 2000). The latter paves the way for the development of an identity as an altruist, which can be substantiated by a continuous act of blood donation or not. Hence, blood donation can be

considered a manifestation of impure altruism, insofar as donors receive a direct moral satisfaction for their act beyond that attributable to having contributed to the collective benefit. In that sense, Wildman and Hollingsworth (2009) examine the type and timing of blood donations between new and established donors. They find no evidence that O-negative donors (i.e., the universal blood group compatible with all blood types and hence more valuable for donation) donate more, suggesting no evidence of pure altruism. More precisely, in some forms of impure altruism such as blood donation agents are said to receive a warm-glow payoff by taking an action they believe to be virtuous (Andreoni, 1990). More recently, Stutzer et al. (2011) provide evidence from a field experiment with the Swiss red cross suggesting that altruistic preferences can be induced by making individuals reflect on the importance of contributing to a public good such as blood donation.

## ***2. Blood Donation and Incentives***

In his famous work, Titmuss (1971) reported evidence that nonmarket mechanisms for blood donation are not only ethically superior but also more efficient. Indeed, according to Titmuss, hepatitis rates from blood transfusions significantly decreased when the blood was donated rather than purchased. This was explained by the fact that donors who are not paid for blood have no incentive to hide an illness, which leads to a higher quality of blood in such systems. Moreover, a financial reimbursement for blood donation could induce those who are more 'in need' of money to oversupply, eliciting a 'new supply' from non-altruistic individuals, who are in turn likely to be less healthy. Reimbursement for blood would reduce the altruistic motivations behind individuals' blood donation behaviour, producing a decline in supply from those individuals, i.e. crowd-out. As mentioned, this seminal work prompted Arrow's (1972) and Solow's (1971) responses questioning the substitution of altruists by non-altruists in line with Cooper and Culyer's (1968) arguments. Kessel (1974) added that market mechanisms could provide guarantees for blood quality if accompanied by screening techniques to ensure product accountability. Interestingly, Thorne (2000) argued that with more effective exhortation, a donor system is capable of procuring more organs at lower costs than market procurement. More recently, Andreoni *et al.* (2008, p. 134) argued that 'having a personal identity as an altruist might necessarily precede altruistic acts' and that the use of monetary rewards would conflict with such identity and hence have unintended effect on individuals' altruistic motivations.'

It is worth mentioning, albeit briefly, that a string of theoretical papers discussing signalling models and crowding out have also touched upon the subject of donation. These papers discuss how individuals engage in civic activities to signal altruism. The introduction of monetary incentives may make signalling more difficult and thus cause crowding out (Seabright, 2004; Benabou and Tirole, 2006). Also, there exists some literature about the counter-productivity of monetary incentives in diverse settings (Gneezy and Rustichini, 2000a, 2000b; Fehr and Falk, 2002; Falk and Kosfeld, 2006). Drawing on Benabou and Tirole (2006), Ariely *et al.* (2009) model image motivation or the desire to be liked and well-regarded by others as a driver in prosocial behavior and analyse whether extrinsic monetary incentives have a detrimental effect on prosocial behavior due to the crowding out of image. They show and test this with an experiment that monetary incentives crowd out image motivation.

Empirical papers relating incentives and blood donation are summarised in the comprehensive reviews by Goette *et al.* (2010) and Kamenica (2012). Goette *et al.* (2010) conclude that incentives had no negative effects on blood donation in studies in which participants were adequately randomised and faced anonymised settings, providing no support for the motivational crowding out. Their analysis of the literature on whether incentives lead to increased blood donation concludes that results are so far mixed. Further, although some experiments suggest that concerns for one's image in public settings may create pro-social behavior, these authors point out that there is some controversial evidence on this result also.

In an illustrative example of the existing related literature on the effect of incentives on blood donation we have Mellstrom and Joannesson (2008) test Titmuss' proposition using a field experiment with three groups of individuals. Those that are offered money if they donate blood, those who are offered the possibility of donating the money directly to a charity, and those who are offered no compensation at all. They find that for men willingness to donate is not impacted by the treatment group they belong to, but monetary compensation crowds out potential female blood donors. Importantly, when charitable motivation is introduced, crowding out disappears. Glynn *et al.* (2003) surveyed 45,588 US blood donors on their *attitudes* towards incentives for blood donation. They found that giving blood credits, cholesterol screening and prostate-specific antigen screening encouraged donation and that 7 to 9 per cent of donors reported that compensatory incentives would have the opposite effect. In contrast, in a field experiment using more than 10,000 previous donors, Goette and Stutzer (2008) find that offering cholesterol tests

had no significant effect on donations. Offering lottery tickets instead did increase the turnout at blood drives among infrequent donors, but there were no effects among frequent donors. Further, in another field experiment on non-donors and previous donors, Goette *et al.* (2009) find that free cholesterol testing does not impact positively donations from neither group. Lacetera and Macis (2010a) exploit a longitudinal dataset on all donors in one town and find that publicly announcing symbolic prizes for donors achieving certain quotas encouraged frequency of donation. Their results suggest that in this setting social image concerns may promote prosocial behaviour. Lacetera and Macis (2010b) use a subsample of that population to answer a survey on attitudes towards different types of compensation. They find that whilst cash payments would reduce donations especially among women and older donors, an equivalent amount in the form of vouchers would not. Lacetera and Macis (2013) find that granting a one-day paid leave of absence to blood donors in Italy resulted in one extra donation per year (a 40% relative increase) and that, interestingly, this positive effect was persistent beyond the period beyond the end of the legislative change. Lacetera, Macis and Slonim (2011, 2012) further prove that monetary incentives may enhance the quantity of blood donations through field experiments using a American Red Cross drives. Lastly, Wildman and Hollingsworth (2009) examine the type and timing of blood donations between new and established donors and find a systematic difference between the two groups. Whilst new donors are sensitive to incentives, established donors' behaviour is driven primarily by social norms.

In general, most of the empirical studies suggest that crowding out is specific of the particular settings individuals are in. We advocate that extrinsic motivation or rewards for blood donation may take different meanings within each country's different social norms, and hence we should expect differential levels of crowding out by country. Furthermore, in line with the literature, we expect that not all rewards may crowd out an individual's identity as an altruist (or a donor) and that the response to different types of rewards will vary by country also.

For the purpose of motivating our empirical specification, we conclude this section by suggesting that the effect of monetary incentives on blood supply can be modeled by drawing on the concept of donor identity. Assume that blood donated enters an individual's utility function,  $U(\cdot)$ , by two means: positively through the (*warm glow*) effect that it has on her self-image or self-identity  $I(\cdot)$  as a donor, a gift-giver or an altruist, and negatively as a direct consequence of the inconveniences associated with donating blood. Also, monetary incentives for blood



donation,  $r(a)$ , increase the income of the donor but affect negatively the donor's self-image or self-identity ( $\partial I/\partial r \leq 0$ ). The individual maximizes utility:

$$U = U(a, c, I, D) \quad (1)$$

such that self-image  $I$  is

$$I = I(a, r(a), E, D) \quad (2)$$

subject to the budget constraint

$$pc = v + r(a)a \quad (3)$$

where  $a$  is the intensity of blood donation,  $c$  is a composite commodity with price  $p$ ,  $I$  is self-identity,  $D$  is a vector containing individual demographic characteristics and the individual social environment,  $E$  represents other environmental factors which include social norms,  $v$  is wealth of the individual, and  $r(a)$  is the monetary incentive given for blood donation. The (rearranged) first-order condition for the maximisation problem of this simplified image caring individual - and the expected sign of each partial derivative is

$$\frac{\partial U}{\partial a} + \frac{\partial U}{\partial I} \frac{\partial I}{\partial a} + r'(a) \left( \lambda + \frac{\partial U}{\partial I} \frac{\partial I}{\partial r} \right) = 0 \quad (4)$$

Assuming concavity of utility function with respect to  $a$ , the first-order condition above illustrates how a negative effect on self-identity from receiving a monetary reward for blood donation will decrease the optimal amount of donation,  $a^*$ . The reason is that without the negative effect of monetary rewards for donation on self-identity, i.e.  $(\partial U/\partial I)(\partial I/\partial r) = 0$ , the optimal amount of blood supply  $a^*$  satisfies  $(\partial U/\partial I)(\partial I/\partial a) + (\partial U/\partial a) + r'(a^*)\lambda = 0$ . But if  $(\partial U/\partial I)(\partial I/\partial r) < 0$ , then the associated optimum,  $a^{**}$ , satisfies the first order condition in (4) instead, i.e. at  $a^{**}$ ,  $(\partial U/\partial I)(\partial I/\partial a) + \partial U/\partial a + \lambda r'(a^{**}) = -r'(a^{**})(\partial U/\partial I)(\partial I/\partial r) > 0$ . This implies that the function  $(\partial U/\partial I)(\partial I/\partial a) + \partial U/\partial a + r'(a)\lambda$  has a positive gradient evaluated at  $a^{**}$ . Thus,  $a^{**}$  lies to the left of the original optimum  $a^*$ , i.e., it is smaller.

In the case that the rewards to blood donation are *not* monetary,  $\tilde{r}(a)$  and the utility function depends positively on them,  $\partial U/\partial \tilde{r}(a) > 0$ , the effect on blood donation is ambiguous as the associated first-order condition is  $(\partial U/\partial I)(\partial I/\partial a) + \partial U/\partial a + (\partial U/\partial \tilde{r})\tilde{r}'(a^{***}) = 0$ , and thus

the comparison between  $a^{***}$  and  $a^*$  will depend on the relative magnitudes of  $\lambda r'(a^{**})$  and  $(\partial U/\partial \tilde{r})\tilde{r}'(a^{***})$ , which we cannot establish *a priori*.

In the next section, we describe our dataset and later we explain our empirical approach to test whether monetary and nonmonetary incentives are negatively associated with blood donation.

### III. DATA AND SAMPLE

We use data from the 2002 Eurobarometer (58.2), a survey covering fifteen European countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, and the United Kingdom. The survey contains information on socio-demographic characteristics of the respondents, and health and attitudes towards risk. In particular, among other subjects, this issue of the Eurobarometer survey gathered information not only on blood donation but also on the respondents' views on blood and organ donation. We use the answers to the following questions:

The first question (Q59) is on blood donation and it is phrased as 'Have you donated in the past?' This question can be answered with a 'Yes' or 'No'. The second question (Q60), on attitudes towards rewards for blood donation, asks 'In your opinion, should someone who gives blood ...?' The possible answers were:

- receive a fixed fee of:
  - 10 Euros (Yes/No)
  - 25 Euros (Yes/No)
  - 100 Euros (Yes/No).
- be allowed to do so during working hours (Yes/No)
- be reimbursed for the expenses incurred (Yes/No)
- receive a small non-monetary gift (Yes/No)<sup>1</sup>

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<sup>1</sup> Unfortunately, the nature of the small gift is not precisely specified in the questionnaire or the codebook. We assume that a small gift in most European countries is understood to be a symbolic present such as a pen, a notebook, a mug, a badge, etc. commonly given during such blood drives.

- not receive anything (Yes/No)

As reported in Table 1, about 35 per cent of our sample of 8,821 European individuals have donated blood. Looking at the blood donors column, we observe that 86 per cent of donors do not think donors should be rewarded with a monetary compensation, while fourteen per cent believe they should. Eighty-two per cent of the non-donors think money should not be provided for blood donation and eighteen per cent believe it should. These percentages are all significantly different at the five per cent level.

In Figure 1 we plot the percentages of donors and non-donors who believe that €10, €25, and €100 should be given for blood donation. The graph shows negatively sloped offer curves for both donors and non-donors, i.e., the higher the price offered, the less people chose it as the right answer. Most significantly, the non-donors' curve appears to the right of that for the donors.

Table 2 displays a further summary of responses to these key questions by the respondents' socio-demographic characteristics and by their choices with regards to monetary versus non-monetary rewards. We notice from column one that more males have donated blood than females have (forty-one versus thirty per cent). Also, those living in Nordic European countries are more likely to have given blood than those in Central Europe (thirty-six per cent versus thirty-five per cent), the latter being more likely to have donated blood than the Mediterranean countries (thirty-four per cent). The second group of columns shows that eighteen per cent of the male respondents believe that monetary rewards should be given to donors and their reservation price (average amount) is €30.06. Sixteen per cent of females believe money should be offered and the average amount is very similar (€29.06). The regional differences in this table are remarkable. Although the Mediterranean countries have a similar percentage of donors to those of North and Central Europe (34 to 36 per cent), fewer Mediterranean individuals are in favour of monetary rewards for blood donation (six per cent as opposed to fifteen and twenty-five per cent), but on average they choose higher monetary rewards for donation – with an average of €52.77 as opposed to €23.78 and €28.29, respectively. These regional differences with respect to attitudes towards rewards could be explained by the levels of income per capita and/or the levels of social capital and trust in the institutions, although a more refined multivariate analysis is required to explore the differences behind these bivariate frequencies.

Finally, in the last column we report the percentages of those choosing non-monetary rewards for blood donation: sixty-seven per cent of males agree with a non-monetary reward,

while sixty-nine per cent of females do so. The percentages of Mediterranean, Nordic and Central European respondents who choose non-monetary rewards are sixty, seventy-eight and sixty-six, respectively. The row at the bottom of Table 2 summarizes the information broken down above for the aggregate, i.e., thirty-five per cent of the sample has donated blood, the average reward for the seventeen per cent favouring monetary rewards is €29.55, and 68 per cent of the full sample are in favour of non-monetary rewards.

Table 3 presents definitions and sample statistics of the variables used in the empirical analysis. Besides, the table includes two key variables: The percentages of the sample who considered that blood transfusion ‘less’, ‘as’ or ‘more’ safe in 2002 than in 1992 (14, 20 and 66 per cent, respectively) as this may be an important determinant of the decision to donate blood. And, the answer to the question on ‘how much concern others show towards oneself’ because we believe it may capture how much solidarity the respondent perceives in her/his environment, and that could influence altruistic tendencies. Five per cent of our sample felt other people do not show concern about what they are doing, fourteen per cent thought other people show little concern, forty-seven per cent felt that other people show some concern, and thirty-four per cent declared others showed a lot of concern.

In the next section, we describe our empirical approach to addressing the questions of interest.

#### **IV. EMPIRICAL STRATEGY: A RECURSIVE EQUATION SYSTEM**

Our empirical approach relies on two hypotheses. First, there are unobserved individual characteristics such as altruism and family history that influence both the decision of *donating blood* and the *views on rewarding blood donation*. Thus, the error terms of equations trying to explain having donated blood and beliefs towards rewarding blood donation with money or other rewards will be correlated. Second, beyond that unobserved correlation, individual preferences towards rewards for blood donation may have a direct influence on the likelihood of having donated blood but not *vice versa*.<sup>2</sup> Accordingly, to answer the question of whether being in

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<sup>2</sup> We also estimated two alternative specifications: one in which donation is allowed to affect the likelihood of favouring rewards (monetary and non-monetary) but not vice versa, and a ‘simultaneous equation system’ (SEQ) in which the attitude toward favoring rewards is

favour of *monetary/non-monetary rewards* is related to having donated blood, we estimate two recursive systems: one for donation and monetary reward, and the other for donation and other reward. In each case, the equation explaining donation depends on attitudes towards the type of reward analysed, but the equation explaining attitudes towards the reward does not depend on being a donor.

Thus, the system for binary blood donation ( $y_1$ ) and binary reward ( $y_2$ ) is characterized by the structural equations for the corresponding latent variables ( $y_1^*$  and  $y_2^*$ ):

$$y_1^* = \gamma y_2^* + x' \alpha_1 + z_1' \alpha_2 + u_1 \quad (5)$$

$$y_2^* = x' \beta_1 + z_2' \beta_2 + u_2 \quad (6)$$

In equations (5) and (6), the error terms  $[u_1, u_2]'$  are assumed to be distributed as bivariate normal with zero means, unitary variances, and correlation  $-1 \leq \rho \leq 1$ ; the variances are assumed to be unitary because observed outcomes for  $y_1$  and  $y_2$  are both binary.

Vectors  $x, z_1$  and  $z_2$  are observed individual traits such that  $x$  affects both blood donation and reward,  $z_1$  determines donation only, and  $z_2$  determines reward only; together, these variables constitute the individual demographics ( $D$ ) and environmental factors ( $E$ ) which enter the utility function (equations (1) and (2)).

The reduced form equation system constitutes equation (6) and

$$y_1^* = x'(\alpha_1 + \gamma \beta_1) + z_1' \alpha_2 + z_2'(\gamma \beta_2) + u_1^* \quad (7)$$

where the composite error term  $u_1^* = u_1 + \gamma u_2$ , and the error vector  $[u_1^*, u_2]'$  is distributed<sup>3</sup> as bivariate normal with zero means, finite variances  $[\omega_1^2, 1]'$  and correlation  $\tau = (\rho + \gamma)/\omega_1$ , where  $\omega_1^2 = 1 + 2\rho\gamma + \gamma^2$ . Based on the reduced form equations (7) and (6), binary donation and reward are characterized by

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allowed to affect donation as well. The effect of donation (on reward) is found to be statistically insignificant in both cases. Further, estimation of the SEQ produces few discernible differences in the effects of exogenous variables. These results offer empirical support for our specification of a recursive system.

<sup>3</sup> Note that by specifying a distribution for the error terms of the structural equations (5) and (6), rather than for the error terms of the reduced forms (7) and (6) as in Maddala (1983, p. 246), the composite error term  $u_1^*$  depends on error terms ( $u_1$  and  $u_2$ ) of both structural equations, leading to a covariance structure which accommodates heterogeneity in the reduced form in equation (7) for donation.

$$\begin{aligned}
y_i &= 1 \quad \text{if } y_i^* > 0 \\
&= 0 \quad \text{if } y_i^* \leq 0, i = 1, 2
\end{aligned} \tag{8}$$

To allow for the fact that countries from different regions may have very different ethnic, cultural and social backgrounds, different levels of social capital and trust in the institutions, as well as blood collection habits and infrastructures, we also estimate a model in which country dummy variables are interacted with latent reward  $y_2^*$  in equation (5). This amounts to making the coefficient  $\gamma$  of the latent reward a function of regional dummy variables  $d$  with parameter vector  $\delta$ :

$$\gamma = d' \delta \tag{9}$$

To simplify notations, express the deterministic components on the right-hand sides of the reduced forms (7) and (6) as  $h'\eta_1$  and  $h'\eta_2$ , respectively, where  $h = [x', z'_1, z'_2]'$  is the concatenated variable vector and  $\eta_1$  and  $\eta_2$  are conformable parameter vectors which are functions of the structural parameters in equations (5) and (6). Then, the sample likelihood function is similar to that of a bivariate probit model:

$$L = \prod_{all} \Phi_2(\kappa_1 h' \eta_1 / \omega_1, \kappa_2 h' \eta_2, \kappa_1 \kappa_2 \tau) \tag{10}$$

where  $\kappa_1 = 2y_1 - 1$  and  $\kappa_2 = 2y_2 - 1$  are dichotomous indicators,  $\Phi_2$  is the standard bivariate normal cumulative distribution function, and ‘all’ indicates multiplication over all sample observations.

### 1. Identification Strategy

Unique variables  $z_1$  in the donation equation (5) and  $z_2$  in the reward equation (6) serve to identify the model parameters (also see (7)).

Common explanatory variables for both processes ( $x$ ) are age, gender, education, marital status and country of origin. As variables that explain the *donation decision* but not *beliefs about rewards for blood donation* ( $z_1$ ), we include those related to individual health (self assessed health, having a long standing illness, exercise), the type of dwelling where the respondent lives – as it may reflect accessibility to blood donation infrastructure; whether the individual perceives donation to be safer or not than ten years ago; and whether or not the respondent feels concern from others - possibly capturing the individual’s perceived level of others’ altruism. As variables

explaining beliefs towards monetary and non-monetary rewards for donation but not the donation decision per se ( $z_2$ ) we have included the income of the individual and whether he is employed, self-employed or out of work. As noted below, the use of  $z_1$  in the donation equation and  $z_2$  in the reward equation are justified by Wald tests for their joint significance.

We present the results in the next section and discuss them in the following section.

## V. RESULTS

We first present estimates of the ‘having donated blood’ equation. Secondly, we provide country specific estimates of the coefficient associated with being in favour of monetary rewards and of non-monetary rewards.

Table 4 presents results for the recursive systems of having been a donor, and being in favour of monetary rewards and non-monetary rewards for blood donation, respectively. The top panel contains estimates for the system in which being in favour of monetary rewards is considered. The bottom panel presents the results for being in favour of a non-monetary rewards system. The first column in each specification reports estimates for the donation equation and the second column for the reward equation. We present the results starting with the most parsimonious specification and move on to specifications with an increasing number of controls. This is done to illustrate the robustness of the main coefficients of interest.

For both models, when estimating the probability of having donated, the first specification controls for self-assessed health, having a chronic illness, and gender; the second specification adds age and level of education; the third includes marital status and the level of urbanisation (rural, village, urban). The fourth specification additionally controls for country of origin and, finally, ‘model e’ adds to that the level of physical activity and the individual’s perceived solidarity towards oneself, *viz.*, perceived degree of concern from others. When estimating the likelihood of being in favour of a particular type of reward for blood donation, the first specification controls for gender and income; the second incorporates employment status, age and education; the third adds marital status; and the fourth and fifth additionally control for country of origin. In sum, in the benchmark specification, the blood donation equation identifying variables,  $z_1$ , are those related to health, physical activity, belief that blood donation is safer, type of dwelling, and perceived concern from others. The variables that identify the rewards equation,  $z_2$ , are income and employment status.

On favouring monetary rewards for donation, the top row of the top panel contains the coefficients associated with being in favour of monetary rewards in the equation explaining the probability of having donated blood for the different specifications. The coefficient is  $-0.593$  and significant at the 95 per cent level of confidence for the first and most parsimonious specification. This coefficient becomes  $-0.784$  and significant at the 99 per cent level of confidence in the second specification and remains very close in magnitude to those in subsequent specifications (i.e., taking values  $-0.793$ ,  $-0.760$  and  $-0.762$ ). This coefficient is robust to different specifications and thus establishes the negative association between being in favour of monetary rewards for blood donation and the likelihood of having donated blood hints at the crowding out effect of paying for blood donation. That is, donors are less likely to favour monetary compensation for donation than non-donors.

The bottom panel of Table 4 contains estimates for the donation-non-monetary system. The first row shows the coefficients associated with believing that non-monetary rewards for blood donation should be provided in the equation explaining the probability of having donated blood in the different specifications (from left to right). The coefficient is  $0.052$  and insignificant for the first specification; it remains insignificant and around  $0.05$  for the next two specifications, which do not control for countries of origin. When countries of origin are incorporated in the fourth and fifth specifications, the coefficient becomes about  $0.3$  and significant at the 95 per cent level of confidence. Although this coefficient is not as robust as that associated with believing in monetary rewards, these estimates suggest that those in favour of non-monetary rewards are less likely to have donated blood. The estimates for our benchmark (last) model can be found in Table 5. We briefly summarize the most interesting and significant results. Looking at the estimates for the recursive system of donation and monetary rewards in Table 5, we notice that, the use of the aforementioned identification variables are justified by their joint significance in the donation equation (Wald = 20.43, df = 12,  $p$ -value = 0.059) and money reward equation (Wald = 15.61, df = 3,  $p$ -value = 0.003). In addition, as expected, believing that donating blood is much safer than before is associated with a higher likelihood of donation, as are age, education level, gender (being male) and, surprisingly, widowhood. The positive coefficient of being male may be explained by physical reasons, *viz.*, donors have to be above a certain body weight, and pregnancy, breast-feeding and anemia are not conducive to blood donation. With respect to the likelihood of favouring monetary rewards, we observe that being employed and self-employed



(as opposed to unemployed) have a negative effect, as do age and being divorced. Income, having been in the education system until 20 years of age, and being male have a positive coefficient.

For the recursive system of donation and non-monetary rewards indicate that, the use of the identification variables are again justified by their joint significance in the donation equation (Wald = 33.51, df = 12,  $p$ -value = 0.001) and reward equation (Wald = 31.98, df = 3,  $p$ -value < 0.001). Results also suggest that again, being male, belief that blood donation has become safer, age, and education also have positive impacts on the donation equation, while widowhood is now negatively correlated with donation. With respect to the likelihood of favouring non-monetary rewards, we find that being employed has a positive coefficient while being self-employed and being a widow have negative effects.

Controlling for countries of origin has an important effect on the coefficients of interest. This is expected because of the different country-specific traditions and infrastructures for collecting blood, mix of ethnicities and cultures, and levels of social capital. For that reason, we estimate a modification of the benchmark model above by interacting latent rewards with country dummy variables, as described in (9). Table 6 displays these results. The most remarkable conclusion from the country analysis is that all countries show a similar and significant *negative association* between believing in monetary rewards and donation (except for Austria that has a larger negative coefficient), and thus, monetary rewards for blood donation could potentially mean a crowd out of blood supply of similar magnitudes. The second notable finding is that, when using this modified specification, the coefficient of non-monetary rewards is not everywhere positive. Only Austria shows a positive coefficient of 0.348, which is significant at the 99 percent confidence level. For Italy and Sweden, the coefficient is negative although only significant at the 90 percent confidence level; and, for the remaining countries the association is not significant. The no significance of these country-interaction coefficients is somehow puzzling vis-à-vis the significant positive coefficient obtained with the benchmark specification which controlled for country-level variation. In reality, some sort of non-monetary incentives are reportedly given already in most countries except for Finland, Slovenia, Spain, Serbia and United Kingdom. For instance, in the Czech Republic, Greece, Italy, Macedonia, Romania, Croatia and possibly France, blood donation has been often incentivised using days off work, tax reliefs or other material gifts (Abolghasemi *et al.*, 2010). Thus, the heterogeneity of non-monetary rewards

already in place could be influencing the country-specific responses to the question. But, the heterogeneous preferences across countries are only crudely captured by our analysis and there may be a myriad of attitudes and institutional differences underlying these preferences that we cannot disentangle and only more precise country level data would allow to fully understand.

In the next section we discuss these results and conclude.

## VI. DISCUSSION AND CONCLUSION

This paper analyses the question of whether offering monetary rewards for blood donation might crowd out blood supply, as well as whether non-monetary rewards would have the same effect. We examine these questions drawing on a large survey representative of individuals in fifteen European countries containing individual information on blood donation and preferences for monetary and non-monetary rewards for blood donation. Our results indicate that those who believe that monetary rewards should be given for blood donation are less likely to have donated blood, while those favouring non-monetary rewards instead are equally or more likely to have donated blood.

Although our data do not contain information on individual intensity of donations, we interpret the negative association between favouring monetary rewards and the actual donation of blood as indicative of the negative effect of cash for blood on the altruistic individual's identity. Using a stylised theoretical model, we show that a negative effect of monetary rewards on the altruistic individual's identity could result in less intensity of donations but non-monetary results would not necessarily lead to this outcome. Thus, our results suggest that offering monetary rewards for blood donation might indeed crowd out blood supply since the altruistic individual does not favour monetary rewards. Our results also indicate, however, that there would be no supply displacement of altruistic donors if non-monetary rewards were offered instead. Thus, non-monetary rewards could potentially be used to incentivise blood donation as this kind of rewards seems not to remove, in the terminology of Andreoni *et al.* (2008), the *warm-glow* associated with blood giving. Our findings contribute interestingly to the existing body of literature using experimental results of Mellstrom and Johannesson (2008) and Lacetera and Macis (2010b); and Lacetera, Macis and Slonim (2011, 2012); Lacetera and Macis (2010a, 2013); and Glynn *et al.* (2003) using donors' datasets. Our analysis further confirms their

findings by providing additional empirical evidence obtained using information on the preferences of both donors and non-donors.

We also find strong evidence of gender differences. First of all, males are more likely to be donors, more likely to favour monetary rewards, but not more likely to be in favour of non-monetary rewards. As noted earlier, males may be more likely to be donors for physical reasons (e.g., higher body weight, absence of pregnancy and lactation period, and lower likelihood of being anemic). Other explanations include the fact that some countries organise blood drives to factories and other places with a higher percentage of males – and even motivate very strongly those in the military service to give blood as is the case in Austria.<sup>4</sup>

Another remarkable finding of this paper is that although we confirm that country of origin is a very significant source of variation, a more detailed analysis at the country level reveals that the association of favouring monetary rewards and blood donation is uniformly negative and very significant across all countries. Nevertheless, the country coefficient for the association between non-monetary rewards and blood donation is much more heterogeneous, with Austria showing a strongly positive and significant sign but Italy and Sweden showing the opposite.

While this paper presents one of the first attempts at investigating the crowding out issue using large multi-country survey data from Europe containing not only observational data but also attitudinal information on donors and non-donors, a few caveats pertain. First, our data come from a cross sectional database which, while large and representative of fifteen European countries, imposes important restrictions on the interpretation of the results. Also, the definition of a donor in the data is very wide one and includes any person that has ever donated blood. Therefore, we can suitably measure donor identity but not intensity of blood donation as we cannot distinguish regular from non-regular donors. Further, our analysis seeks to establish associations between individual information related to ‘beliefs’ (being in favour of a type of reward for blood donation) with an ‘act realisation’ (having donated blood). The hypothetical nature of the stated ‘beliefs’ may therefore weaken the argument we are trying to make and the slightly judgmental nature of the question used during the survey (‘*should* someone who gives blood receive...’) may have further aggravated this problem. Additionally, having obtained the data using a survey, individual responses may be biased because of the wish to ‘look good’, and

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<sup>4</sup> In Austria there is an agreement between the army and the Red Cross. The army motivates blood donation by allowing donors to leave for the weekend earlier on the Friday after blood donation and the Red Cross provides the blood group test for free (Fiala, 1997).

this type of bias could have possibly even contaminate the declared donors' answers to the question on monetary rewards. Finally, we choose to allow favouring of rewards to have a direct association with being a donor but not *vice versa*. While bad experiences donating blood could affect beliefs about rewarding for blood donation (to compensate for pain, for instance), this seems implausible and statistical test during our preliminary analysis did not support the reverse causality of donation on beliefs (see footnote 2).

Our results suggest that altruistic actions may be incentivised as long as the incentives do not interfere with the self-identity/image of the individual as a donor. Thus, to deal with blood shortages, policies geared towards the provision of non-monetary incentives could be implemented. This is compatible with the notion of nudging behaviour to fulfill a wider social policy objective. That is, altruistic behaviour could be motivated by non-monetary means and thus nudge individuals to act in a manner that provides collective benefit.

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**Table 1**  
*Frequency of Preferences Towards Rewards*

	Donors	Non-donors	Full sample
	35%	65%	100%
Monetary reward			
No	86%	82%	83%
Yes	14%	18%	17%
Other reward			
No	33%	32%	32%
Yes	67%	68%	68%

*Note:* All differences are significant at the 5% significance level.

**Table 2***Donation and Reward by Gender and Geographic Area*

	% that have donated blood	Monetary reward		Non-monetary
		% favouring	Mean amount among those favouring (€)	reward: % favouring (€)
<b>Gender</b>				
Male	41.30	17.52	30.06 (30.51)	67.22
Female	29.63	15.83	29.06 (30.61)	68.53
<b>Area</b>				
Mediterranean	33.71	6.05	52.77 (41.72)	59.69
Nordic	36.07	15.43	23.78 (25.08)	77.97
Central Europe	35.26	25.37	28.29 (28.82)	65.90
Full sample	35.06	16.62	29.55 (30.56)	67.92

*Note:* Standard deviations in parentheses.

**Table 3**  
*Definitions and Sample Statistics of Explanatory Variables*

Variable	Definition	Mean
<i>Continuous explanatory variables</i>		
Age	Age in years	45.72 (17.28)
Income	Total wages and salaries per month, including pensions, child benefits, and other rents	13971.40 (3315.13)
Vigorous activity	Vigorous physical activity (minutes/week)	101.91 (173.56)
	Among those who exercise vigorously (39.59% of sample)	257.42 (189.91)
<i>Binary explanatory variables (yes = 1; no = 0)</i>		
Male	Gender is male	0.47
Education		
Education 1	Finished full-time education when age < 15 (ref.)	0.24
Education 2	Finished full-time education when $16 \leq \text{age} \leq 19$	0.38
Education 3	Finished full-time education when age $\geq 20$	0.29
Education 4	Still studying	0.08
Marital status		
Unmarried	Unmarried or separated (ref.)	0.31
Married	Married	0.52
Divorced	Divorced	0.09
Widowed	Widowed	0.08
Dwelling		
Village	Living in rural area or village	0.34
Town	Living in small or middle-sized town	0.34
City	Living in large town (ref.)	0.32
Employment		
Employed	Currently employed	0.47
Self-employed	Currently self-employed	0.07
Not working	Currently not working (ref.)	0.46
Self-assessed health		
Health very bad	Self-assessed health (SAH) is very bad or bad (ref.)	0.06
Health fair	SAH is fair	0.25
Health good	SAH is good	0.43
Health very good	SAH is very good	0.26
Standing illness	Suffering from long-standing illness	0.29

Safety in blood donation		
Less safe	Blood transfusion less safe than 10 years ago (ref.)	0.14
As safe	Blood transfusion as safe as 10 years ago	0.20
Safer	Blood transfusion safer than 10 years ago	0.66
Concern from others		
No concern	Receive no concern (from others)	0.05
Little concern	Receive little concern	0.14
Some concern	Receive some concern	0.47
Lots of concern	Receive lots of concern	0.34

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*Note:* Standard deviations in parentheses. For households who did not respond to the income question, we imputed income based on age, sex, marital status, education, health and number of members in the family. The term (*ref.*) indicates that that category has been used as reference in the estimation (omitted category). For the ease of interpretation later on, the variables ‘Age’ and ‘Vigorous Activity’ were rescaled by dividing them by 100, and the variable ‘Income’ was divided by 1000 during the estimation process.

Table 4

Simultaneous Equation Model of Donation and Beliefs towards Rewards (Pooled Sample)

		Model a		Model b		Model c		Model d		Model e									
		Donate		Monetary Rewards		Donate		Monetary Rewards		Donate		Monetary Rewards							
Variable	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.					
Reward	-0.593	(0.295)**			-0.784	(0.092)***			-0.793	(0.087)***			-0.760	(0.120)***			-0.762	(0.119)***	
Constant	YES		YES		YES		YES		YES		YES		YES		YES		YES		
Health	YES				YES				YES				YES				YES		
Chronic illness	YES				YES				YES				YES				YES		
Physical activity																	YES		
Safety																	YES		
Income			YES				YES				YES				YES			YES	
Employment status							YES				YES				YES			YES	
Gender	YES		YES		YES		YES		YES		YES		YES		YES		YES		
Age					YES		YES		YES		YES		YES		YES		YES		
Education					YES		YES		YES		YES		YES		YES		YES		
Marital status							YES		YES		YES		YES		YES		YES		
Dwelling							YES		YES		YES		YES		YES		YES		
Perceived solidarity																	YES		
Control countries		NO				NO				NO				YES				YES	
Error corr.(rho)		0.489		(0.316)		0.704		(0.103)***		0.712		(0.099)***		0.654		(0.136)***		0.658	(0.135)***

  

		Model a		Model b		Model c		Model d		Model e									
		Donate		Monetary Rewards		Donate		Monetary Rewards		Donate		Monetary Rewards							
Variable	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.					
Reward	0.052	(9.940)			0.048	(0.125)			0.056	(0.128)			0.322	(0.149)**			0.352	(0.151)**	
Constant	YES		YES		YES		YES		YES		YES		YES		YES		YES		
Health	YES				YES				YES				YES				YES		
Chronic illness	YES				YES				YES				YES				YES		
Physical activity																	YES		
Safety																	YES		
Income			YES				YES				YES				YES			YES	
Employment status							YES				YES				YES			YES	
Gender	YES		YES		YES		YES		YES		YES		YES		YES		YES		
Age					YES		YES		YES		YES		YES		YES		YES		
Education					YES		YES		YES		YES		YES		YES		YES		
Marital status							YES		YES		YES		YES		YES		YES		
Dwelling							YES		YES		YES		YES		YES		YES		
Perceived solidarity																	YES		
Control countries		NO				NO				NO				YES				YES	
Error corr.(rho)		-0.060		(9.936)		-0.068		(0.126)		-0.075		(0.129)		-0.332		(0.149)**		-0.363	(0.151)**

Note: Asymptotic standard errors are in parentheses. Significance at 1% is indicated with \*\*\*, at 5% with \*\* and at 10% with \*.

**Table 5***Maximum-Likelihood Estimates of Recursive Equation Systems*

Variable	Monetary		Non-monetary	
	Donation	Reward	Donation	Reward
Reward	-0.762 (0.119)***		0.352 (0.151)***	
Health fair	-0.058 (0.051)		-0.052 (0.062)	
Health good	-0.017 (0.053)		0.0007 (0.065)	
Health very good	0.017 (0.057)		0.043 (0.070)	
Vigorous activity	0.010 (0.007)		0.013 (0.008)	
Standing illness	0.002 (0.029)		-0.013 (0.035)	
As safe	0.002 (0.039)		0.025 (0.048)	
Safer	0.125 (0.039)***		0.170 (0.043)***	
Income / 1000		0.009 (0.005)*		0.0001 (0.006)
Employed		-0.180 (0.046)***		0.159 (0.037)***
Self-employed		-0.198 (0.065)***		-0.114 (0.061)*
Male	0.363 (0.041)***	0.178 (0.038)***	0.301 (0.032)***	-0.043 (0.030)
Age / 10	0.042 (0.117)**	-0.038 (0.016)*	0.090 (0.012)***	-0.0004 (0.013)
Education 2	0.363 (0.041)***	0.178 (0.038)***	0.272 (0.044)***	-0.012 (0.041)
Education 3	0.175(0.060)***	-0.024(0.053)	0.357(0.052)***	0.006(0.045)
Education 4	0.251(0.073)***	-0.023(0.057)	-0.032(0.084)	-0.106(0.075)
Married	-0.043(0.090)	-0.026(0.092)	0.004(0.038)	-0.037(0.038)
Divorced	-0.034(0.049)	-0.102(0.048)**	-0.002(0.057)	0.002(0.059)
Widowed	0.148(0.071)**	-0.006(0.071)	-0.155(0.077)**	-0.124(0.071)*
Village	-0.054(0.030)*		-0.030(0.035)	
Town	-0.031(0.029)		-0.018(0.034)	
Little concern	-0.061(0.057)		-0.074(0.069)	
Some concern	-0.056(0.052)		-0.061(0.063)	
Lots of concern	-0.048(0.053)		-0.049(0.065)	
Constant	-1.780(0.141)***	-1.341(0.128)***	-1.236(0.142)***	0.668(0.116)***
Countries	Yes		Yes	
Error corr. ( $\rho$ )	0.658(0.135)***		-0.363(0.151)	
Log likelihood	-8602.400		-10620.789	

*Note:* Asymptotic standard errors in parentheses. Asterisks indicate level of significance: \*\*\* = 1%, \*\* = 5%, \* = 10%.

**Table 6**  
*Country-Specific Association Between Rewards and Donation*

	Monetary	Non-monetary
Greece	-0.907 (0.086)***	-0.019 (0.131)
Belgium	-0.619 (0.132)***	-0.155 (0.142)
Denmark	-0.835 (0.097)***	-0.008 (0.122)
W. Germany	-0.791 (0.100)***	0.004 (0.131)
Italy	-0.598 (0.131)***	-0.244 (0.143)*
Spain	-0.782 (0.104)***	0.051 (0.138)
France	-0.893 (0.084)***	0.053 (0.128)
Ireland	-0.907 (0.090)***	-0.003 (0.143)
N. Ireland	-0.931 (0.098)***	0.160 (0.156)
Luxembourg	-0.679 (0.126)***	-0.114 (0.139)
Netherlands	-0.676 (0.121)***	-0.195 (0.132)
Portugal	-0.726 (0.119)***	-0.101 (0.134)
Britain	-0.839 (0.090)***	0.130 (0.137)
E. Germany	-0.740 (0.112)***	0.061 (0.130)
Finland	-0.878 (0.087)***	0.082 (0.126)
Sweden	-0.700 (0.118)***	-0.234 (0.123)*
Austria	-1.175 (0.058)***	0.348 (0.132)***

*Note:* Asymptotic standard errors in parentheses. Asterisks indicate level of significance:

\*\*\* = 1%, \*\* = 5%, \* = 10%.

**Figure 1 : Percentage of donors and non-donors choosing positive quantities as rewards for donating blood**

