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Not all Incentives Wash out the Warm Glow: The Case of Blood Donation Revisited

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Abstract
The issue of the nature of the altruism inherent in blood donation and the perverse effects of financial rewards for blood and/or organ donation 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 if a reward is involved – in addition to having the effect of reducing blood quality. In this paper we examine how favouring different types of incentives are related to the likelihood of donating blood by exploiting a large sample representative of the population of fifteen European countries in 2002 containing information on both donation and attitudes towards incentives. Our results show those who have donated are less likely to favour monetary rewards for blood donation but are more likely to favour non-monetary ones. 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
JEL Classifications: I18, I38, Z13

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1 Introduction

There is increasing interest in the motivation of altruistic behaviour, not merely for the sake of exploring behavioural drives 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 extrinsic 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 to 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 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 generalise recent findings that monetary and non-monetary rewards may not crowd out donation as long as self-interest is removed from them (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 only. Second, because of that, we can directly analyse the relationship of the respondents'preferences for monetary and non-monetary rewardswith the probability of being a donor. Further, by using a sample representative of fifteen countries, we can control for ethnic, 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 our econometric model; section 4 discusses the results; and section 5 concludes.

2 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.

2.1 *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, 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 0-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 form 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.

2.2 *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).

There are very few empirical tests of Titmuss' claim but there exists some literature about counter-productivity of monetary incentives for other situations (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.

The empirical papers most directly related to our current paper are Mellstrom and Johannesson (2008), Goette and Stutzer (2008), Wildman and Hollingsworth (2009), Lacetera and Macis (2010a and 2010b) and Glynn *et al.* (2003). Mellstrom and Johannesson test Titmuss' proposition using a field experiment with three groups of individuals: blood donors who receive monetary compensation, those who receive no compensation at all, and those who receive monetary compensation given directly to a charity. Introducing compensation is found to crowd out only female blood donors. Importantly, when charitable motivation is introduced, crowding out disappears. Goette and Stutzer (2008) find that offering lottery tickets to donors increases the turnout at blood drives among infrequent donors, but there are no effects among frequent donors. 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 encourage donation and that 7 to 9 per cent of donors reported that compensatory incentives would have the opposite effect. Lacetera and Macis (2010a) exploit a longitudinal dataset on all donors in one Italian town and find that publicly announcing symbolic prizes for donors achieving certain quotas encouraged frequency of donation. Their results suggest that social image concerns may be a very important promoter of prosocial behaviour. In another paper, 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. 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.

Most of the empirical studies suggest that crowding out is specific of the particular settings individuals are in. Thus, 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, not all rewards may crowd out an individual's identity as an altruist (or a donor).

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 $I(.)$ 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 ($\frac{\partial I}{\partial r} \leq 0$). The individual maximizes utility:

$$U = U(a, c, I, D) \tag{1}$$

such that self-image I is

$$I = I(a, r(a), E, D) \tag{2}$$

subject to the budget constraint

$$pc = v + r(a)a \tag{3}$$

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 the 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 is

$$\underset{-}{\frac{\partial U}{\partial a}} + \underbrace{\underset{+}{\frac{\partial U}{\partial I}}\underset{+}{\frac{\partial I}{\partial a}}}_{+} + \underset{+}{r'(a)}(\underset{+}{\lambda} + \underbrace{\underset{+}{\frac{\partial U}{\partial I}}\underset{-}{\frac{\partial I}{\partial r}}}_{-}) = 0. \tag{4}$$

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.[1] Note that if the rewards to blood donation are *not* monetary, $\widetilde{r}(a)$ and the utility function depends positively on them, $\frac{\partial U}{\partial \widetilde{r}(a)} > 0$, the effect on blood donation is ambiguous as the associated first-order condition is $\frac{\partial U}{\partial a} + \frac{\partial U}{\partial I}\frac{\partial I}{\partial a} + \frac{\partial U}{\partial \widetilde{r}}\widetilde{r}'(a^{***}) = 0$, and, thus the comparison between a^{***} and a^* will depend on the relative magnitudes of $\frac{\partial U}{\partial \widetilde{r}}$ and λ, 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.

3 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

[1] Without the negative effect of monetary rewards for donation on self-identity ($\frac{\partial U}{\partial I}\frac{\partial I}{\partial r} = 0$), the optimal amount of blood supply a^* satisfies $\frac{\partial U}{\partial I}\frac{\partial I}{\partial a} + \frac{\partial U}{\partial a} + r'(a^*)\lambda = 0$. But if $\frac{\partial U}{\partial I}\frac{\partial I}{\partial r} < 0$, the optimum, a^{**}, satisfies the first order condition in (4) instead, i.e. at a^{**} the following is satisfied: $\frac{\partial U}{\partial I}\frac{\partial I}{\partial a} + \frac{\partial U}{\partial a} + r'(a^{**})\lambda = -r'(a^{**})\frac{\partial U}{\partial I}\frac{\partial I}{\partial r} > 0$, which means that the objective function $\frac{\partial U}{\partial I}\frac{\partial I}{\partial a} + \frac{\partial U}{\partial a} + r'(a)\lambda$ has a positive gradient evaluated at a^{**}. Thus, a^{**} lies to the left of the original optimum a^*, i.e., it is smaller.

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)
- 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 show 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 have 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.

4 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 on 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*.[2] Accordingly, to answer the question of whether being in 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. 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^*):

$$y_1^* = \gamma y_2^* + x'\alpha_1 + z_1'\alpha_2 + u_1 \tag{5}$$

$$y_2^* = x'\beta_1 + z_2'\beta_2 + u_2 \tag{6}$$

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

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

[2]We estimated alternative specifications in which donation is allowed to affect the likelihood of favouring monetary (and non-monetary) rewards. The effect was found to be insignificant, which offers empirical support for our specification of a recursive system.

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

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

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 γ of the latent reward a function of regional dummy variables d with parameter vector δ:

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

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 η_1 and η_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:

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

where $\kappa_1 = 2y_1 - 1$ and $\kappa_2 = 2y_2 - 1$ are dichotomous indicators, Φ_2 is the standard bivariate normal cumulative distribution function, and "all" indicates multiplication over all sample observations.

4.1 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)).

[3]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.

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 respondant 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 respondant 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.

5 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 anaemia 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 infrastructures for collecting blood, ethnicity, 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 the country-specific coefficients for the association between believing in (monetary and non-monetary) rewards for blood donation and actually having donated. The most remarkable conclusion from the country analysis is that all countries show a similar negative association between believing in monetary rewards and donation, 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 the positive coefficient of non-monetary reward obtained without the country dummy interactions does

not hold for any country except for Austria, with a coefficient of 0.348 which is significant at the 99 per cent confidence level. Most interestingly, for Italy and Sweden, the coefficient is negative but only significant at the 90 per cent confidence level. For the remaining countries, the association is not significant. In the next section we discuss these results and conclude.

6 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 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 would 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 as the altruistic individual do 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, the results of Lacetera and Macis (2010a) 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 anaemic). 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.[4]

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 coefficients 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. 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

[4]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).

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 fulfil 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

Frequencies 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 Rewards by Gender and Geographic Area

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

Note: Standard deviations in parentheses.

Table 3

Definitions and Sample Statistics of Explanatory Variables

Variable	Definition	Mean
Continuous explanatory variables		
Age	Age in years	45.72
		(17.28)
Income	Total wages and salaries per month, including	13971.40
	pensions, child benefits, and other rents	(3315.13)
Vigorous activity	Vigorous physical activity (minutes/week)	101.91
		(173.56)
	Among those who exercise vigorously (39.59%	257.42
	of sample)	(189.91)
Binary explanatory variables (yes = 1; no = 0)		
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 $16 \leq$ age ≤ 19	0.38
Education 3	Finished full-time education when age ≥ 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

Table 3

(Continued)

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

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).

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		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.	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		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		YES	
Age					YES		YES		YES		YES		YES		YES		YES		YES	
Education					YES		YES		YES		YES		YES		YES		YES		YES	
Marital Status									YES		YES		YES		YES		YES		YES	
Dwelling									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		Non-Monetary Rewards		Donate		Non-Monetary Rewards		Donate		Non-Monetary Rewards		Donate		Non-Monetary Rewards		Donate		Non-Monetary Rewards	
Variable	Coeff	S.E.	Coeff	S.E.	Coeff	S.E.	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			0.0559	0.128			0.322	0.149 **			0.352	0.151 **		
Constant	YES		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		YES	
Age					YES		YES		YES		YES		YES		YES		YES		YES	
Education					YES		YES		YES		YES		YES		YES		YES		YES	
Marital Status									YES		YES		YES		YES		YES		YES	
Dwelling									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 **			-0.3631	0.1508 **

Significance at 1% is indicated with ***, at 5% with ** and at 10% with *.

Table 5

Maximum-Likelihood Estimates of Recursive Equation Systems

Variable	Donation	Monetary reward	Donation	Non-monetary reward
Reward	−0.762***		0.352***	
	(0.119)		(0.151)	
Health fair	−0.058		−0.052	
	(0.051)		(0.062)	
Health good	−0.017		0.0007	
	(0.053)		(0.065)	
Health very good	0.017		0.043	
	(0.057)		(0.070)	
Vigorous activity	0.010		0.013	
	(0.007)		(0.008)	
Standing illness	0.002		−0.013	
	(0.029)		(0.035)	
As safe	0.002		0.025	
	(0.039)		(0.048)	
Safer	0.125***		0.170***	
	(0.039)		(0.043)	
Income / 1000		0.009*		0.0001
		(0.005)		(0.006)
Employed		−0.180***		0.159***
		(0.046)		(0.037)
Self-employed		−0.198***		−0.114*
		(0.065)		(0.061)
Male	0.363***	0.178***	0.301***	−0.043
	(0.041)	(0.038)	(0.032)	(0.030)
Age / 10	0.042**	−0.038*	0.090***	−0.0004
	(0.117)	(0.016)	(0.012)	(0.013)
Education 2	0.363***	0.178***	0.272***	−0.012
	(0.041)	(0.038)	(0.044)	(0.041)

Table 5

(Continued)

Variable	Donation	Monetary reward	Donation	Non-monetary reward
Education 3	0.175***	−0.024	0.357***	0.006
	(0.060)	(0.053)	(0.052)	(0.045)
Education 4	0.251***	−0.023	−0.032	−0.106
	(0.073)	(0.057)	(0.084)	(0.075)
Married	−0.043	−0.026	0.004	−0.037
	(0.090)	(0.092)	(0.038)	(0.038)
Divorced	−0.034	−0.102**	−0.002	0.002
	(0.049)	(0.048)	(0.057)	(0.059)
Widowed	0.148**	−0.006	−0.155**	−0.124*
	(0.071)	(0.071)	(0.077)	(0.071)
Village	−0.054*		−0.030	
	(0.030)		(0.035)	
Town	−0.031		−0.018	
	(0.029)		(0.034)	
Little concern	−0.061		−0.074	
	(0.057)		(0.069)	
Some concern	−0.056		−0.061	
	(0.052)		(0.063)	
Lots of concern	−0.048		−0.049	
	(0.053)		(0.065)	
Constant	−1.780***	−1.341***	−1.236***	0.668***
	(0.141)	(0.128)	(0.142)	(0.116)
Countries controled	Yes		Yes	
Error corr.	0.658***		−0.363**	
	(0.135)		(0.151)	

Note: Asymptotic standard errors in parentheses. Asterisks *** indicate statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

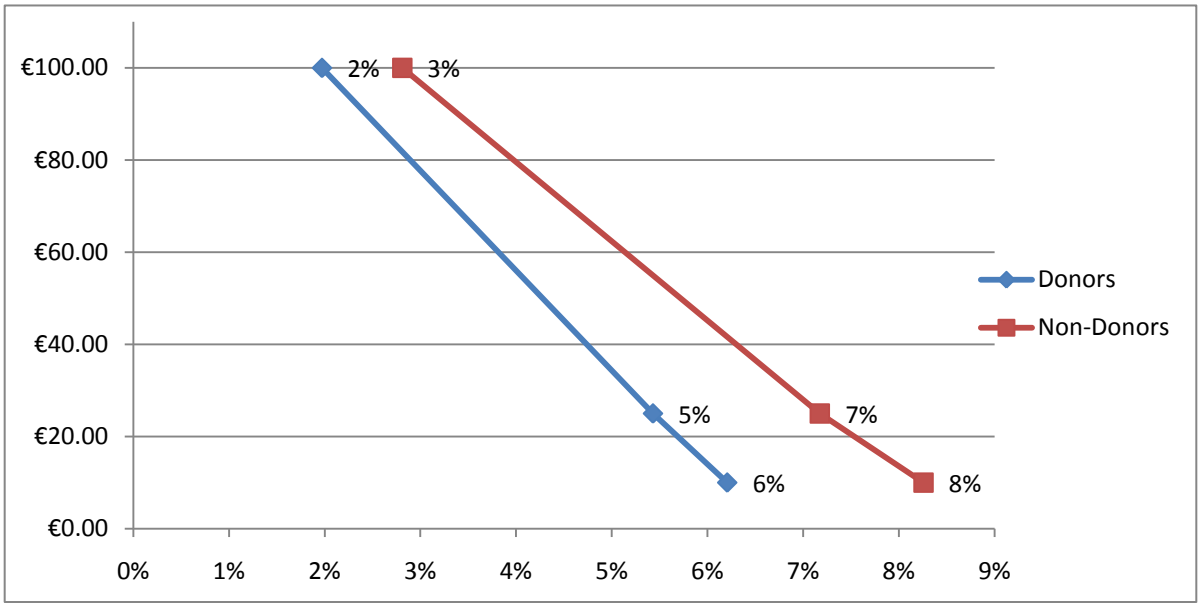
Table 6

Country-Specific Association Between Rewards and Donation

	Donation-money reward		Donation-other reward	
	Estimate	S.E.	Estimate	S.E.
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: Asterisks *** indicate statistical significance at the 1% level and * at the 10% level.

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



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