BLOOD DONATION AS A PUBLIC GOOD: ANALYSIS OF DETERMINANTS OF BLOOD DONATION

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Ignacio Abásolo [1], Aki Tsuchiya [2]

[1] Departamento de Economía de las Instituciones, Estadística Económica y Econometría, Facultad de Ciencias Económicas y Empresariales. Universidad de La Laguna, Campus de Guajara. La Laguna. Tenerife. Spain.

[2] Department of Economics and School of Health and Related Research, University of Sheffield, 30 Regent Street, Sheffield, S1 4DA,United Kingdom.

Abstract.

Background and methods: This paper presents an empirical assessment of the determinants of donation and free riding in the blood donation context. A representative sample of the Spanish population is interviewed (n=1,211). Respondents were asked whether they are (or have been) regular blood donors, and a series of background characteristics. We define "free riders" as those individuals who say they do not donate because "others already do it". Bivariate associations between being a blood donor and different individual characteristics are analysed. In addition, binomial and multinomial logit models (MNLM) are specified to estimate the effect of individual characteristics on the propensity to donate or to behave as a free rider.

Results: A quarter of respondents report to be (or have been) regular blood donors. The most likely Spanish blood donor is: a well educated man of no specific age, in good health, with centre political views, who voted in the last elections. Of those individuals who do not donate blood, 20% are "free riders". The MNLM indicate that the set of determinants for giving a particular reason for not donating varied across the four reasons available in the questionnaire. The most likely free rider relative to those who have never thought about donating is: a married individual of either gender, and of no specific age, who does not practice a religion, with centre political views.

Conclusion: The behaviour of donating blood and the reasons for *not* doing so (as opposed to the reasons for donating) have been successfully estimated based on interview data.

1. INTRODUCTION

On the one hand, human blood can be regarded as a health care resource. There is limited supply of it, and since every unit of blood transfused to a particular patient is a unit of blood that cannot be used for another patient, there is opportunity cost associated with its use. It is a highly perishable good in that there is a strict 'use by' date beyond which it should not be put to therapeutic use, so effective management of its stocks is important. In addition, it is a resource that can only be procured by drawing it from another human being; modern biotechnology has not yet achieved the synthesis of artificial blood.

In the context of "allogeneic" blood transfusion across different people (as opposed to "autologous" transfusion, based own blood banking), a further consideration is how human blood can do harm as well as good. There are a few potentially serious diseases that are transmitted through exchange of body fluids, particularly blood. A classic example was hepatitis, and a more modern concern is AIDS. In both cases, the problem lies in not being able to detect contaminated blood. Titmuss (1971) compared the UK system which was solely based on blood donors, who gave blood for no pecuniary compensation, and the US system where a high proportion of those who gave blood were paid a financial incentive. One of his findings is that the risk of contracting hepatitis after blood transfusion during a surgical operation was much higher in the US, and he argues that this is because those who sell blood have a lower incentive to report their own hepatitis history compared to those who give blood for no reward. Moreover, Titmuss argued that not only is the reliance on purchased blood a potential cause of ill health, it can also lead to the erosion of other-regarding altruistic behaviours, and hence to the diminishing of the moral fibre of society.

At the level of international health policy, since the 17th International Conference in 1948, the League of Red Cross Societies has advocated the use of voluntarily donated blood for transfusion (Hollán, Szilassy, 1990), and the Resolution of the 28th World Health Assembly re-emphasises this by "urging member states to promote the development of national blood services based on voluntary nonremunerated donation of blood" (WHA, 1975). The ideal situation is one where all blood used in transfusions are sourced from voluntary donors[1].

[1] In Spain, where our survey was conducted, blood donations are also voluntary and altruist with no monetary (or in-kind) remunerations at all (RD 1854/1993 and RD 1088/2005). In 2004 – the year of the survey – the donation index (no. of donations per 1,000 population) was 39.6 (INE 2008), just below the WHO recommended index of 40-45 donations per 1,000 population.

However, some economists were critical of Titmuss' view. For instance, Arrow (1972) argues that Titmus "does not explain why this willingness [of some people to donate blood for free] should be affected by the fact that other individuals receive money for these services, especially when the others include those whose need for financial reward is much greater". Thus, Arrow seems to expect that if a system allows both unpaid donations and commercial blood giving, then the total quantity of blood supplied should simply be the sum of these two independent components. What Arrow and a few other economists have in mind is the atomistically independent economic agent, making a rational decision about the altruistic behaviour of giving blood (see for example Singer, 1973, for a utilitarian philosopher's counterargument to support Titmuss).

It is straightforward to go from this basis to a game theory framework with two types of individuals, those who will donate because it increases their utility by knowing they have done the right thing, and those who will sell because the marginal financial reward they receive outweighs the associated costs. (Giving blood consists of four costs to the donor. One is the time cost. The second is the low grade pain associated with inserting the needle. The third is the anxiety associated with the needle and/or the sight of blood. The fourth is the short term health impact caused by loss of blood, as some people feel faint after giving blood.) If there is no interaction between the two types, then one simple equilibrium price can be derived that matches the supply of blood from the two different sources to the (supposedly fixed) demand for blood. The game can be made increasingly more complex by, for instance, allowing interactions so that the first type will no longer donate if the reward for selling blood became too high or the number of people selling became too large.

This paper takes a different starting point. We will look at the supply of human blood as a public good. Blood for transfusion is not a pure public good. The unit of blood used for one patient is a unit of blood that cannot be used for another patient, and therefore the non-rival requirement for public goods is not satisfied. However, there is an element of non-exclusivity. Under a national health care system where consumption of health care is not determined by one's willingness and ability to pay, but by some medically determined 'needs', whether or not one receives blood transfusion is determined by one's medical condition and the availability of suitable blood, and not by one's preferences or budget constraint (or one's health care insurance policy). Technically, where there is a severe shortage of blood it is possible to introduce a rationing system that gives higher priority to those who have donated blood themselves in the past. But unless such a policy is in practice, blood in a national health care system can be regarded as a non-exclusive quasi-public good.

Furthermore, whilst the allocation of units of blood to patients is non-rival, the supply side of the system can be perceived by individuals as having a non-rival aspect in the sense that whether or not one donates makes a negligible difference to the total blood supply. Thus, if one feels that a large enough number of other people already donate anyway, then one does not have to. (And note that blood is a perishable good and cannot be stocked indefinitely.) Where this is coupled with the understanding that whether or not one has donated in the past will not affect one's future entitlement to receive blood transfusions should this become necessary, this may lead to free riding behaviour.

There is a literature in theoretical economics and experimental economics that looks at peoples' behaviour on charitable giving. The general findings on free-riding seems to be that while people do not free-ride in single-short games (see for example Marwell, Ames, 1981), people do tend towards free-riding in repeated games (for example Andreoni, 1988; also see Eckel et al, 2005 on crowding out of charitable giving).

In this study, we will look at how people respond to survey questions, as opposed to experimental settings. Titmuss (1971) surveyed those individuals who *donate* blood for no financial reward to find out why they donate. In this study, we look at reasons why people *do not donate*. This is because in order to encourage people to donate, it is those who do not do so that we need to understand. We have conducted a survey of a representative sample of the general public in Spain and asked (i) whether they are a regular blood donor, and (ii) if not, why. Our objectives are: to determine whether or not free riding behaviour actually exists; and to explore the different background characteristics of those who report free-rider reasoning as an explanation for not donating. In this paper, we will not distinguish between the various blood products (whole blood, red cells, plasma, and other blood based products). In what follows, section 2 explains the methods and data, section 3 presents the results, and section 4 concludes.

2. METHOD AND DATA

2.1. A MODEL FOR BLOOD DONATION

We specify a model to estimate the effect of individual characteristics in the propensity to be a regular blood donor. An underlying (or latent) variable (D^*) represents an individual's propensity to be a blood donor. We anticipate that demographic, socio-economic and ideological characteristics are associated with people's attitudes towards donation. First, amongst the demographic characteristics, age and gender are considered. Second, some previous studies have supported the proposition that the free rider problem increases as group size increases (Olson 1968, Sweeney 1973), therefore we also consider size of area of residence as a proxi for group size. Thirdly, since we are dealing with attitudes regarding altruism, we may expect there to be some pattern in the responses by respondents' socio-economic status; educational qualification is used as a proxie for socioeconomic status. In addition, political affiliation, or ideology, is also assumed to have a role in the model. We anticipate that people's attitude towards altruism might also be influenced by their ideological position. A further interest is the role of political participation, which we interpret as a proxy for the individual's level of engagement with the community.

Thus, the model can be written as:

$$D_i^* = x_i \beta + \varepsilon_i \qquad [1]$$

In equation [1], the *i* subscripts represent individual respondents, *x* are the covariables, β represente the parameters and ε_i is the random error term. In practice, D_i^* is unobserved. Rather, we observe D_i which is a dummy variable representing whether or not the individual is actually a regular blood donor (in this paper, we do not distinguish between *self-reported* regular blood donors and *actual* regular blood donors, although we acknowledge there may be some problems with truthful reporting). Therefore it is the realization of a binomial process defined by:

$$D_i = 1 \ \ if [D_i^* > 0] \qquad [2]$$

So, if the individual's propensity to donate blood is positive ($D_i^* >$ 0) s/he will choose to be a regular blood donor (Di = 1), and if otherwise ($D_i^* \leq$ 0) s/he will not (Di = 0).

In order to select the functional form of the empirical model, socio-economic and statistical criteria are used. This has allowed us to consider the definitions of the set of dummy variables. Interactions between regressors are also included and tested in the model.

The estimation process will be undertaken through non-linear logit regressions. So, we assume that ε_i is distributed logistically, leading to the binary logit model with the simpler equation:

$$\Pr(D_i = 1 \mid x_i) = \frac{\exp(x_i\beta)}{1+\exp(x_i\beta)} \qquad [3]$$

Likelihood ratio (LR) tests and Reset specification tests will be carried out to appraise the appropriateness of the different functional forms.

Estimations of equation [1] will allow us to empirically assess the relevance of the different hypothesised explanatory variables.

2.2. A MODEL FOR FREE RIDING IN BLOOD DONATION

The second stage looks exclusively at those individuals that are not regular blood donors. We specify a model to estimate the effect of individual characteristics on the propensity to behave as a free rider of these respondents. We estimate a multinomial logit model (MNLM), which applies to discrete dependent variables that can take (unordered) multinomial outcomes representing reasons for not being a regular blood donor, eg. y = 1, 2, ….m.

Given a set of binary variables defined to indicate which alternative (j=1,…., m) is reported by each individual (i= 1,……, n), y_{ij} = 1 if y_i= j; and 0 otherwise, with associated probabilities $P(y_i=j) = P_{ij}$

Then, the MNLM uses,

$$P_{ij} = \frac{\exp(x_i\beta_j)}{\sum_k \exp(x_i\beta_k)} \qquad [4]$$

with a normalization that β_m = 0; the normalization reflects the fact that only relative probabilities can be identified, with respect to the base alternative *m* (Jones 2000).

The reasons that we consider for not being regular blood donors are: 1) "I have not thought about it"; 2) "I can't because of health reasons"; 3) "others already do it; and 4) "I have an aversion to needles". Of these, response category 3 is interpreted as (self reported) free riding. One reason is recorded for each respondent who was asked this question. We assume as the baseline alternative "I have not thought about it".

Therefore, the MNLM would identify the probability of being a free rider relative to the reference outcome and the probability of rejecting to donate due to health problems, relative to the choice of not having thought about it. We consider the same set of covariates as those in the model of blood donation above.

The MNLM implies the assumption of the "independence of irrelevant alternatives" (IIA) property. That is, if we consider the ratio of the probability of two different reasons for not being a regular blood donor *j* and *k*, this property implies that the relative probability depends only on the characteristics of the two reasons and not on any of the other reasons (i.e. if a new alternative is introduced, all of the absolute probabilities will be reduced proportionally).

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Given that the IIA impose a strong restriction, we test for its appropriateness in this particular case using the Hausman and Small-Hsiao tests, by first estimating the model with all of the three reasons for not being a regular blood donor, and subsequently re-estimating it dropping one of the reasons. This is then followed by the tests for IIA. If IIA is violated, an alternative model should be considered (as the nested multinomial logit or the multinomial probit models) that relax the IIA property. In particular, the structure of the data suggests a nested structure, where the main questions on reasons is only asked after a screening question on donating, so the application of a nested model may be of relevance. In addition, a Wald test is conducted to explore whether or not combining some of the response categories would make the model more efficient. Passing this test will indicate whether or not the individual categories of reasons not to donate are distinct from each other.

Throughout, a 5% and a 10% significance level are used.

2.3. DATA AND VARIABLES DEFINITION

The data were collected during 2004 in Spain. A survey of 1,211 individuals over 18 years of age was undertaken. Face to face interviews were assigned across the 17 "Comunidades Autónomas" ("Regions" for short), reflecting the local resident population proportionally. Within each of the Regions, interviews were randomly allocated so that the achieved sample will be representative of the general Spanish population in terms of socio-demographic characteristics. In general, 48% of the individuals were male, with average age of 45.15 (SD 18.10); and 52% female, with average age of 46.45 (SD 18.04).

The binary dependent variable, *donate*, takes the value 1 if individual *i* reports to be (or has ever been) a regular blood donor, 0 if otherwise. *Age* has been categorised in four dummy variables to show the different age groups: age_18_35 (baseline category), age_36_45, age_46_55, age_56_65, age_more_65. The binary variable *female* indicates whether or not the individual is female. Education is recorded by level of schooling and has been categorised in three dummy variables representing low education *primary_studies* (those with primary school education or less, the baseline category), middle education *secondary_studies* (those with secondary school education, and high education *university_studies* (those with higher and university education). Political affiliation is recorded by three categorical indicators, *right* (those who report as being centre-right, right or extreme right wing), *left* (those who report as being centre-left, left or extreme left wing), and *centre* (those who are in the political centre, the baseline category). Civil status is indicated by *single* (the baseline), *married* and *divorced_widowed.* Population size of the area of residence is proxied by *small_area* indicating whether the individual lives in an area of 10,000 or less inhabitants. The variable *abstenc* indicates that the individual did not vote in the March 2004 national election. Finally, the binary variable *no_relig* indicates whether the respondent practices a religion.

3. RESULTS

Out of the 1,211 participants in the survey, item non-response leads to 317 missing cases, which corresponds to 26% of the entire data, leaving 894 individuals as valid cases. Table 1 summarises the two sample characteristics. As can be seen, the distribution of background characteristics across the whole sample and the smaller sample used for the analyses are similar. Overall, 24% of the whole sample, and 25% of the respondents included in the analyses report to be (or have been in the past) a regular blood donor. Table 2 reports (in odds ratios) the results of the logit regression that explains individuals' propensity to report themselves as a regular blood donor. The model passes the Reset specification test, indicating that there is no evidence of functional form problems.

As can be seen, females have a significantly lower propensity to donate blood than men: the relative risk of donating is a 40% lower in females than in males. Similarly, those who did not vote in the last elections have about half relative risk of being blood donors than those individuals who voted ($p<0.05$). The same applies to those who report to be right wing voters, with an odds ratio of 0.56 ($p<0.05$) and those who report to be left wing voters OR= 0.70 ($p<0.1$). On the other hand, as respondents report to have better health status the probability of being regular donors increases (there is a gradient as the health status improves), with higher and more statistically significant odds ratios. The level of education is also positively correlated with the propensity to donate blood, with a clear gradient: individuals with secondary studies have a 63% more relative risk to be a regular blood donor than those with primary or less studies (baseline), whilst individuals with university studies have more than twice relative risk (OR= 2.34) than the baseline category. Neither age nor size of area of residence have a significant impact on the probability to be regular blood donor. In summary, the most likely Spanish blood donor is: a well educated man of no specific age, in good health, with centre political views, who voted in the last elections.

Table 3 reports the descriptive statistics of those who do not donate, have answered the reason for not donating, and have the relevant set of covariates; i.e. those who were entered into the MNLM on reasons for not donating. As can be seen, while around half the respondents say they cannot donate due to health reasons, around 20% say they do not donate because other people already do so. Table 4 reports the results of the MNLM on the reasons why some respondents do not donate blood regularly. There is no evidence to reject the null hypothesis that IIA holds (Hausman and Small-Hsiao tests). In other words, this suggests that we do not need to estimate alternative models such as nested logit or multinomial probit. Furthermore, a Wald test for combining alternative reasons supports rejecting the null hypothesis that any pair of reasons for not donating blood are indistinguishable; in other words, each response category is distinguishable from each other with respect to the variables of the model.

Regarding the coefficients, as expected, health status is only a significant covariate (with respect to the baseline category) chosen by those who report that they do not donate for health reasons (reason no.2); the ratio of relative risks of the reason no.2 over reason no.1 for those with better health status, is about 0.27. Gender has a significantly positive sign in reasons 2 and 4, showing that females are more likely to report health reasons (reason no.2) or fear of needles (reason no.4) than arguing that they have not thought about it (baseline reason). In particular, being female increases the odds of giving reasons 2 and 4 instead of reason 1 by more than twofold and fourfold, respectively. However, there is no evidence that gender is associated with free riding behaviour (reason no.3).

Regarding the free riding behaviour (reason no.3), having no religious practice has a significant effect: those with no religious practice are less likely to behave as free riders than to report that they have not thought about it. In particular, having no religious practice reduces the odds of being a free rider relative to being in category 1 (the baseline) by 75%. In addition, those individuals who report to be left wing, reduces the odds of being a free rider instead of being in category 1 by 65%. Finally, those married individuals who do not donate, are more likely to be free riders (relative risk of 1.32). In summary, the most likely free rider in this context is: a married individual of either gender, and of no specific age, who does not practice a religion, with centre political views.

4. DISCUSSION

This study is based on a large scale face-to-face interview survey of the representative sample of the general public in Spain. The interview included a set of questions on whether or not the respondent is a regular blood donor, and if not, for what reason. Around three quarters of the sample reported themselves not to be (or have been in the past) regular blood donors. Using a logit regression, individual propensity to donate blood was explained in terms of gender, political participation, political affiliation, health, and education. This was followed by a MNLM that explained the reasons why those who are not or have not been regular blood donors, do not do so. The results indicate that the set of determinants for giving a particular reason for not donating varied across the four reasons available in the questionnaire. For example, those who responded that they do not donate blood because of health reasons were more likely to have poorer health than those who gave other reasons.

Of interest to this study is the group of respondents who replied that the reason why they do not give blood is because others already do it; in other words, those who admit to being free riders. Religious practice, political affiliation, and marital status were found to be the background variables that are associated with free riding relative to not having thought about donating blood. The exercise clearly indicates that free riding is not distributed randomly across the non-donating population.

Based on the Hausman and Small-Hsiao tests, we cannot reject the null hypothesis that IIA holds, and thus we have not explored further modelling of the data for this paper. However, given the structure of the questions over donating behaviour and reasons for not donating, it seems natural to explore further specifications that reflect this nested structure, and to examine the robustness of the findings reported here.

While the study was conducted on a large scale representative sample of the general public, there are a few things that should be taken into account before the findings can be generalised. First, the results are based on self-reported donating behaviour, and there are no external checks to see whether or not the responses to this question are realistic. Different people may have different perceptions of what constitutes "regular" blood donation, and if there is a systematic pattern across respondent subgroups so that a particular group has a higher or lower threshold than others, then the results will be affected by this. It may be useful to compare the composition of background characteristics of those who say they are blood donors with any data on the characteristics of the actual blood donors in Spain.

Some may prefer the rigour of an experimental setting over surveys, since in the former we can actually observe people making the relevant choices (however constrained and controlled the context may be), whereas in interview surveys, people can just say what they want. However, one distinctive advantage of interview surveys is that we can ask people for the reasons for particular behaviours, and our interest in this paper has been precisely to explore this. Another alternative is to research revealed choice and actual behaviour (as did Titmuss); but the behaviour of interest in this paper is not of donating blood, but of *not* donating blood.

Similarly, the results are based on self-reported reasons for not donating. Firstly, unlike current statistics, based on people who currently are regular blood donors, our question has been designed to consider both current and past regular donors, so the proportion of donors in our study (about 25%) is higher than those statistics published and based only on current donors (about 5%); in addition, we believe that there may be a positive self-reported bias in this main question, given the likely tendency of some respondents to report more socially "acceptable" responses to an interviewer, and say that they are a blood donor whereas in reality they are not. Second, regarding the reasons for not donating blood, again, given the face-to-face interview setting, people may have been lead to give possibly more acceptable reasons for not giving, such as health reasons. But even then, about 20% of those valid cases who are not regular donors indicate that the reason why they do not donate blood is because they think other people are already doing it, and therefore there is no need for them to.

In reality, people may have more than one reason for not donating blood: for example, somebody with a health problem may, as a result, not think about donating blood. Or, somebody who does not want to admit a fear of needles may say because others do it, if they think this reason is somewhat less embarrassing than the real one. However, in this study, the interview has only coded the first reason people chose out of the set of reasons presented, which we interpret as the main reason. This is a limitation of a quantitative survey, where we have to take responses at face value.

A further consideration is how we define "free riding". In this paper, we have defined this to be a deliberate choice not to donate specifically because the individual believes (rightly or wrongly) that so long as others contribute the system can be maintained without them contributing themselves: i.e. "because others already do so". One reason for choosing this definition was because if individuals had (genuinely) "not thought of it", then they cannot be interpreted to have made a deliberate and strategic decision not to donate, which seems to be the definition of free riding under the model of a rational economic agent. However, one may argue that beyond the arena of economic models of strategic behaviour, the relevant definition of free riding in the context of public health policy should be all those who do not donate despite having no legitimate reason. If this alternative definition is taken, then those who have "not thought about it" could be included amongst the free riders alongside those who deliberately do not donate because "others already do so". In other words, the current paper looks at the determinants of self reported deliberate free riding, as opposed to a wider concept of free riding with no legitimate reason. We plan to explore this alternative definition of free riding.

There is a large literature based on experimental economics that examines whether or not individuals will contribute towards the provision of public goods (see Ledyard, 1995 for a classic review). There is also a social psychology literature that research why people give to charitable causes (see for example Armitage, Conner, 2006). However, in this study, we have used non-experimental data and focused on the *reasons* why people *do not* donate.

Altruist blood donation is a fundamental element for a National Health System to work appropriately. Regular blood donating behaviour can be analysed by interpreting blood donation as a public good. This allows us to draw parallels with the topic of charitable giving to support the provision of public goods, where free riding is the key issue. The reasons why people do not donate can thus be re-interpreted as "free riding". Based on interview data, in this paper we estimate the effect of background characteristics on the propensity for not donating blood and for being a free rider. Our results suggest that these individuals are not randomly distributed in the population, and thus could potentially be targeted for promotion interventions.

ACKNOWLEDGEMENTS

We are grateful to Juan Diez-Nicolas, all the respondents who agreed to take part in the survey, and also to the Spanish *Instituto de Estudios Fiscales* for financial support to undertake this research. The usual disclaimers apply.

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TABLES

TABLE 1: SUMMARY STATISTICS

Variable	Whole Sample			Sample used in logit model		
	n	Mean	Std. Dev.	n	Mean	Std. Dev.
Blood_don	1208	0.2417	0.4283	894	0.2517	0.4342
Female	1211	0.5161	0.4999	894	0.5145	0.5001
age_18_35	1211	0.3452	0.4756	894	0.3389	0.4736
age_36_45	1211	0.1965	0.3975	894	0.2013	0.4012
age_46_55	1211	0.1296	0.3361	894	0.1264	0.3325
age_56_65	1211	0.1470	0.3542	894	0.1577	0.3647
age_66_more	1211	0.1817	0.3857	894	0.1756	0.3807
poor_health	1209	0.0480	0.2138	894	0.0403	0.1967
fair_health	1209	0.2093	0.4070	894	0.1980	0.3987
good_health	1209	0.6344	0.4818	894	0.6544	0.4758
excellent_~h	1209	0.1084	0.3110	894	0.1074	0.3098
Single	1210	0.2595	0.4385	894	0.2472	0.4316
Married	1210	0.6231	0.4848	894	0.6477	0.4780
divorc_wid	1210	0.1174	0.3220	894	0.1051	0.3069
primary_le~s	1208	0.3311	0.4708	894	0.3188	0.4663
second_stu~s	1208	0.5414	0.4985	894	0.5481	0.4980
university~s	1208	0.1275	0.3337	894	0.1331	0.3399
small_area	1211	0.2428	0.4289	894	0.2271	0.4192
no_relig	1149	0.4482	0.4975	894	0.4597	0.4987
ideol_right	1008	0.1617	0.3684	894	0.1756	0.3807
ideol_centre	1008	0.2917	0.4548	894	0.2763	0.4474
ideol_left	1008	0.5466	0.4981	894	0.5481	0.4980
Abstenc	1085	0.1733	0.3787	894	0.1107	0.3140

TABLE 2: LOGIT ESTIMATION OF DONATION - ODDS RATIOS - AND RESET TEST

blood_don	Odds Ratio	Robust Std. Err.	z	P>z	[95% Conf.	Interval]
Female	0.6147	0.1000	-2.99	0.003	0.4468	0.8456
age_36_45	0.7385	0.1774	-1.26	0.207	0.4612	1.1825
age_46_55	0.8780	0.2477	-0.46	0.645	0.5050	1.5262
age_56_65	0.7369	0.2130	-1.06	0.291	0.4183	1.2984
age_66_more	0.5918	0.1980	-1.57	0.117	0.3072	1.1400
fair_health	1.5555	0.8550	0.8	0.421	0.5297	4.5682
good_health	2.4989	1.2988	1.76	0.078	0.9023	6.9208
excellent_~h	3.0007	1.6779	1.97	0.049	1.0029	8.9780
Married	1.4997	0.3471	1.75	0.08	0.9528	2.3604
divorc_wid	1.9403	0.6963	1.85	0.065	0.9603	3.9202
second_stu~s	1.6331	0.3512	2.28	0.023	1.0714	2.4893
university~s	2.3656	0.6603	3.08	0.002	1.3688	4.0883
small_area	1.1117	0.2204	0.53	0.593	0.7538	1.6395
no_relig	1.2555	0.2188	1.31	0.192	0.8923	1.7666
ideol_right	0.5609	0.1456	-2.23	0.026	0.3372	0.9329
ideol_left	0.6995	0.1330	-1.88	0.06	0.4818	1.0154
Abstenc	0.5172	0.1472	-2.32	0.021	0.2961	0.9034

Number of obs = 894

Wald chi2(17) = 55.99

Prob > chi2 = 0.0000

Log pseudolikelihood = -475.754

Pseudo R2 = 0.0567

Reset Test (test blood_donf2=0)

chi2(1) = 0.97

Prob > chi2 = 0.3259

TABLE 3: SUMMARY STATISTICS OF MNLM SAMPLE

Variable	Obs	Mean	Std. Dev.
have_not_t~t	475	0.1853	0.3889
health_rea~s	475	0.4926	0.5005
free_rider	475	0.2168	0.4125
aversion_n~e	475	0.1053	0.3072
female	475	0.5621	0.4967
age_18_35	475	0.3095	0.4628
age_36_45	475	0.1895	0.3923
age_46_55	475	0.1347	0.3418
age_56_65	475	0.1642	0.3709
age_66_more	475	0.2021	0.4020
poor_health	475	0.0611	0.2397
fair_health	475	0.2358	0.4249
good_health	475	0.5979	0.4908
excellent_~h	475	0.1053	0.3072
single	475	0.2400	0.4275
married	475	0.6358	0.4817
divorc_wid	475	0.1242	0.3302
primary_le~s	475	0.3832	0.4867
second_stu~s	475	0.5011	0.5005
university~s	475	0.1158	0.3203
small_area	475	0.2021	0.4020
no_relig	475	0.4442	0.4974
ideol_right	475	0.1958	0.3972
ideol_centre	475	0.2421	0.4288
ideol_left	475	0.5621	0.4967
abstenc	475	0.1032	0.3045

TABLE 4: RELATIVE RISK RATIOS OF MNLM FOR REASONS TO NOT DONATE

I haven't thought	RRR	Std.Error	z	P>z	95% conf. Interval	
Female	2.2803	0.6429	2.92	0.003	1.3122	3.9626
age_36_45	1.1496	0.5110	0.31	0.754	0.4810	2.7472
age_46_55	1.1761	0.5902	0.32	0.747	0.4398	3.1450
age_56_65	1.7491	0.9617	1.02	0.309	0.5954	5.1382
age_66_more	1.7921	1.0422	1.00	0.316	0.5733	5.6023
fair_health	0.8980	0.6530	-0.15	0.882	0.2159	3.7348
good_health	0.2604	0.1784	-1.96	0.05	0.0680	0.9976
excellent_~h	0.2720	0.2150	-1.65	0.099	0.0578	1.2800
Married	1.4441	0.5859	0.91	0.365	0.6520	3.1986
divorc_wid	0.8302	0.4757	-0.32	0.745	0.2701	2.5522
second_stu~s	1.2514	0.4421	0.63	0.526	0.6261	2.5010
university~s	2.1201	1.0943	1.46	0.145	0.7709	5.8307
small_area	1.1830	0.4657	0.43	0.669	0.5469	2.5588
no_relig	0.3586	0.1079	-3.41	0.001	0.1987	0.6469
ideol_right	0.8599	0.4204	-0.31	0.758	0.3298	2.2420
ideol_left	0.5053	0.1886	-1.83	0.067	0.2432	1.0500
Abstenc	0.9669	0.4529	-0.07	0.943	0.3861	2.4215
Free rider						
Female	1.0011	0.3185	0.00	0.997	0.5366	1.8675
age_36_45	0.5420	0.2600	-1.28	0.202	0.2117	1.3876
age_46_55	0.3675	0.2071	-1.78	0.076	0.1218	1.1092
age_56_65	0.5491	0.3374	-0.98	0.329	0.1647	1.8310
age_66_more	0.5681	0.3727	-0.86	0.389	0.1570	2.0553
fair_health	1.5836	1.6273	0.45	0.655	0.2113	11.8674
good_health	1.6583	1.5999	0.52	0.6	0.2503	10.9872
excellent_~h	1.3169	1.3944	0.26	0.795	0.1653	10.4927
Married	2.5091	1.1084	2.08	0.037	1.0556	5.9638
divorc_wid	1.0501	0.7313	0.07	0.944	0.2682	4.1118
second_stu~s	1.6566	0.6819	1.23	0.22	0.7394	3.7117
university~s	1.8121	1.0613	1.02	0.31	0.5750	5.7110
small_area	1.8526	0.7844	1.46	0.145	0.8079	4.2482
no_relig	0.2535	0.0861	-4.04	0	0.1303	0.4931
ideol_right	0.6865	0.3677	-0.70	0.482	0.2402	1.9614
ideol_left	0.4569	0.1848	-1.94	0.053	0.2069	1.0093
Abstenc	1.2312	0.6163	0.42	0.678	0.4615	3.2841
Aversion to needles						
Female	4.0724	1.6460	3.47	0.001	1.8442	8.9927
age_36_45	1.5391	0.8870	0.75	0.454	0.4974	4.7623
age_46_55	0.6164	0.4491	-0.66	0.507	0.1478	2.5704
age_56_65	1.2247	0.9202	0.27	0.787	0.2809	5.3402
age_66_more	0.8198	0.6952	-0.23	0.815	0.1555	4.3210
fair_health	0.3907	0.3908	-0.94	0.347	0.0550	2.7745
good_health	0.4348	0.3918	-0.92	0.355	0.0744	2.5428
excellent_~h	0.5091	0.5127	-0.67	0.503	0.0707	3.6639
Married	0.6634	0.3377	-0.81	0.42	0.2446	1.7991
divorc_wid	0.0783	0.0935	-2.13	0.033	0.0075	0.8139
second_stu~s	0.8122	0.3959	-0.43	0.67	0.3124	2.1115
university~s	0.9984	0.7004	0.00	0.998	0.2525	3.9483
small_area	3.0970	1.4931	2.34	0.019	1.2038	7.9675
no_relig	0.6594	0.2737	-1.00	0.316	0.2923	1.4875
ideol_right	1.6453	1.0427	0.79	0.432	0.4751	5.6976
ideol_left	0.7518	0.3842	-0.56	0.577	0.2761	2.0469
Abstenc	0.8777	0.5648	-0.20	0.839	0.2487	3.0982
nºobserv=475;Log Likelihood=-509.63;LR chi2(51)=148.82;Prob>chi2=0.0000;PseudoR2=0.1274						