Symbolic incentives can affect the frequency of blood and plasma donations: Evidence from 12 years of donors' behavior and donation awards

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Abstract

We use panel data (from 2008 to 2019) covering the entire population of blood and plasma donors affiliated to an association of donors (AVIS) in an Italian region (Tuscany) to examine how donors respond to a nonlinear scheme of symbolic incentives (medals) related to donation quotas and length of membership. The structure of the award scheme allows us to study the impact of two distinct characteristics of the symbolic awards: the private vs. public assignment, and the donation-only vs. donation-and-membership criterion (although this latter characteristic can only be distinguished for private assignments). When we control for unobservable individual characteristics potentially affecting the evolution of performance along a donor's career we find that: (i) public assignment of medals has an impact which is not appreciably different from the one with private assignment, (ii) the donation-and-membership criterion induces an ex-post increase in the frequency of donations, while the donation-only criterion does not. This evidence suggests that symbolic awards are useful if given to less performing donors, that they affect behavior after their obtainment rather than before, and that they operate when their obtainment does not exclusively depend on performance, but also on membership.

Keywords: Charity, Prosocial behavior, Blood donation, Plasma Donation, AVIS, Tuscany, Symbolic Incentives

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1 Introduction

The specific characteristics of the Italian context regarding blood and plasma donations offer a unique opportunity to study the impact of symbolic incentives on unpaid pro-social behavior, especially thanks to the rich databases collected by volunteers' and donors' associations. Indeed, these associations attempt to promote donations by means of awards for the donors recognized as most deserving, according to some criteria related to donors' careers. For instance, symbolic awards have been given on the basis of the years of membership in the association or on the basis of the number of donations made. Such award schemes are typically non-linear, possibly allowing the use of observational data to identify the impact of their distinct features (Lacetera and Macis, 2010b). In this paper, we study the impact of the symbolic award scheme currently implemented by AVIS (Associazione Volontari Italiani del Sangue - Italian Blood Volunteers Association) during the period 2008-2019. We use a large dataset documenting the behavior of the entire population of AVIS donors in Tuscany, an Italian region of about five million inhabitants. Specifically, we use panel data regarding the behavior of AVIS donors to examine how they respond to the association's scheme of symbolic awards which consists of medals having an increasing symbolic value that are given conditionally on the total number of donations or on a combination of the number of donations and the years of membership. Our analysis exploits the fact that awards are assigned in different ways along two distinct dimensions: the private vs. public assignment, and the donation-only vs. donation-and-membership criterion.

Our analysis suggests that symbolic awards increase the frequency of donations when given to less performing donors, are more likely to affect behavior after their obtainment rather than before, and operate especially when their obtainment does not depend solely on donation quotas, but also on the years of membership.

We contribute to the literature on the role of incentives in promoting blood and plasma donation (Chell *et al.*, 2018; Irving *et al.*, 2020; Lacetera *et al.*, 2013). As a matter of fact, public and private organizations related to the transfusional system strive to develop different kinds of incentives to promote donations, relying on both intrinsic and extrinsic motivations (Huis in 't Veld *et al.*, 2019), and academic research may help finding useful ways to enhance donations, as already done for other kinds of charitable activities (List and Price, 2012).

In Italy, the transfusional system is built on the Voluntary Non-Remunerative (VNR) model, whose intrinsic motivations, typically related to altruism and prosociality, are considered as the fundamental

determinant of the willingness to donate (Bani and Strepparava, 2011). While altruistic and prosocial motivations are distinguished in different mechanisms related to the pure or impure desire to help others, or to the positive emotions derived from a pro-social act (the so called warm-glow effect) (Andreoni, 1995; Ferguson and Lawrence, 2016), intrinsic motivation refers to the more general intention to pursue a behavior without the expectation to get material reward from it (Ryan and Deci, 2000). Intrinsic motivations can be triggered, for instance, by the self-identification with the role of donor (France *et al.*, 2014), which does not necessarily entail altruistic or prosocial motivations. List and Samak (2013) provide an empirical assessment of different motivations for giving, trying to disentangle between pure altruism and warm-glow effect. Ribar and Wilhelm (2002) theoretically and empirically examine altruistic and joy-of-giving motivations underlying contributions to charitable activities, while Wildman and Hollingsworth (2009) explore the complexity of altruistic motives, pointing out the non-linear relationship between frequency of donations and the establishment of a sense of duty in donors.

Extrinsic motivations derive from material incentives (Bednall and Bove, 2011; France *et al.*, 2014), but need not be monetary in nature (Chell *et al.*, 2018). The effects of monetary incentives have been extensively investigated with mixed results (Niza *et al.*, 2013; Weidmann *et al.*, 2014; Van Dyke *et al.*, 2020; Lacetera *et al.*, 2012), and the actual possibility to introduce this kind of remunerative incentives depends largely on the national legislation of the country in which the transfusional system is situated (Group, 2012; Allain, 2011). Blood centers in different countries have implemented policies encompassing both monetary and non-monetary incentives for donors, but their efficacy depend from individual characteristics, donors experience and contextual factors (Piersma *et al.*, 2017). In Italy, the possibility to introduce a compensation, such as a cash payment, is contrasted by the majority of donors (Tscheulin and Lindenmeier, 2005; Lacetera and Macis, 2010a), while other forms of non-monetary incentives - (e.g., ticket, paid time off-work, symbolic awards, etc.) - are, in general, considered more favorably by younger and new donors (Yuan *et al.*, 2011; Goette and Stutzer, 2020; Chmielewski *et al.*, 2012).

The award scheme currently implemented by AVIS can be described as relying on extrinsic and non-monetary motivations, being based on a form of acknowledgement of the donors' career that is not received at each donation but reflects the overall contribution of the donor so far (Chell *et al.*, 2018; Bednall and Bove, 2011). More precisely, the award scheme consists on the assignment of different medals with an increasing symbolic value (i.e., from the basic green medal to the top diamond one)

which progressively require more demanding conditions to be obtained.

Previous evidence on AVIS donors before 2008 for an Italian municipality (Lacetera and Macis, 2010b) suggests that the symbolic awards do play a role and that, specifically, those delivered privately to donors have a lower effect in encouraging the frequency of donation with respect to the awards which are delivered through a public ceremony. Our results are not directly comparable with those of Lacetera and Macis (2010b) because the award which was implemented by AVIS in the period covered by Lacetera and Macis (2010b) was different: awards could only be obtained on the basis of the total number of donations. So, our main finding regarding the efficacy of awards given also on the basis of the years of membership could not show up in the analysis by Lacetera and Macis (2010b). However, we can try to compare the results regarding the role of private vs. public assignment of rewards: we obtain similar results concerning the consequences of publicly delivered award but only when we do not control for the possibility that donors' behavior depend on unobservable characteristics that may also affect performance growth along donors' career.

The paper is organized as follows. Subsection 1.1 describes the Italian system for blood donations, while Subsection 1.2 introduces the specific characteristics of AVIS and its award scheme. Section 2 presents the dataset and provides descriptive statistics. Section 3 explains the empirical strategy and Section 4 reports the results. Section 5 summarizes the findings and discusses both interpretation and limitations of the analysis.

1.1 Italian voluntary blood donation system

The data of this research originate from the database collected by a regional branch of AVIS, which is the most important donors' association in Italy, with about of 1.4 million donors across the country, responsible of about the 75% of the national supply of blood (Saturni *et al.*, 2017). The practical donation activity is organized by associations at the local level that also promote related initiatives in their territories involving the community of donors (e.g. promotional sport events or artistic contest focus on donation topic) and is coordinated and regulated by a upper-level (regional and national) headquarters. To donate blood in Italy, donors are required to be a member of one of the donors' associations, like AVIS, which can even run Blood Collection Units upon the release of specific regional authorization and accreditation. These associations do not compete between each other and are coordinated by a specific department of the regional National Health System, Regional Blood Center (Centro Regionale Sangue

– CRS).¹ Donors' associations collaborate with the CRS in the practical management of blood banks and blood supplies for whole blood and other blood products (e.g., plasma and platelets). Donations are performed mostly in the public hospital closest to each donor during all week days apart from Sunday. Moreover, donors are encouraged to book an appointment for the donation, even if it is not compulsory. The Italian law sets limits to the frequency and minimum delay between two consecutive donations. Specifically, whole blood can be donated every 90 days with a maximum of 4 times per year for men and of 2 times per year for women. Plasma and platelets can be donated respectively every 14 and 30 days for a maximum of 6 times per year. Whole blood donation lasts usually 15 minutes, while performing a plasma and platelets donation requires from 40 minutes to 1 hour.

1.2 AVIS award scheme.

AVIS has established an official regulation for the assignment of associative medals that are designed to represent the achievement of specific requirements with respect to the donation activity. This kind of symbolic awards are meant to be signs of gratitude from the association, but they also represent a source of prestige for the volunteers that receives them, and donors can wear them during the associative ceremony or events. The specific levels of the awards are listed in the national statute of the association and they are applied all over the country despite the possible presence of other local form of informal non-monetary incentives (e.g., a recognition certificate for the first donation, or a specific award for younger donors). The award scheme that we analyze in the present study is however the most prestigious and acknowledged form of recognition for the career of a donor across the different local associations. It is implemented since 2007, replacing the previous award scheme and introducing a more articulated set of conditions for the obtainment of medals. The current scheme specifies two distinct conditions for the obtainment of a given medal: the total number of donations performed by the volunteer without any specific time constrain, and the frequency of donations in a specific amount of time (i.e., a minimum number of donation in a specific span of years). To obtain a specific medal is fulfill one of the two conditions. Donors can keep track of their own performance trough the AVIS membership card that reports the date and the type of each donation made by the subject. Although the material value of the different kind of medals is similar and substantially negligible, their symbolic values are different. The less valuable medals – which have the less demanding conditions to be obtained – are assigned privately

¹More references about the Italian National Blood System can be found at the [European Blood Alliance](#) webpage.

to the donors (who are notified by mail or digital communication) while more valuable medals – which have more demanding conditions to be obtained – are assigned publicly in a form that is specific to the local association, but in any case the entire community of donors is notified through the publication of the donor identity in the local bulletin or newspaper.

2 Data and descriptive statistics

We use data from an anonymized regional database called Dat@VIS, which is the digital platform service that records all donation activities in Tuscany. Data includes all donations (of whole blood or blood components) made by the volunteers who are member of AVIS from 2008 to 2019. Also, the dataset contains information relative to individual characteristics such as age, gender, where the donor donates, the donor’s residence, the type of donation (i.e. whole blood or plasma) and the donor’s blood type. The database that we use involves 87,899 donors who became members of AVIS since 2008, for a total of 867,447 donations.² We exclude donors who were members from before 2008 since they were not exposed only to the current award scheme but also to the previous one. This leaves us with a dataset involving only donors for which we observe their entire donation career until 2019. Given the existence of some missing values for some variables of interest, our final sample is reduced to 72,940 individuals and 778,148 observations. Table 1 shows descriptive statistics on donors and donations over the covered period. In this span of time, about the 38% of our 70,000 donors are females. The median donors’ age is 46 and the median number of donations is 8 (two donations per year). Considering males only, the median age is 48 years and the median number of donations is 10 (two donations per year).

The main variable of interest is a time-varying proxy of a donors’ performance: the elapsed days between two consecutive donations. Thanks to the structure of our data, we are able to sort the donations of each donor by time and to compute the elapsed time between two consecutive donations. As shown in Table 1, the observed median elapsed time between two consecutive donations is 150 days, which reduces to 140 days when we consider only males.

The database structure allows us to reconstruct the history of the awards obtained by each individual in the last twelve years. As described previously, in Section 1.1, the associative rewarding system entered in force from 2007 with an innovative and more complex set of rules. Two basic criteria are followed: the number of donations and the years of membership. AVIS established six different thresholds to obtain a

²Our dataset contains 39.9% of donors who donate only whole blood, 2.8% of donors who donate only plasma and, 57.3% of donors who donate both whole blood and plasma

Table 1: Descriptive statistics on donors and donations

Variable	Mean	St. Dev.	Min	Median	Max	Obs.
All donors						
<i>Donors</i>						
Age	45.77	13.11	19	46	84	72,940
Female	0.38	0.48	0	0	1	72,940
Number of donations	11.68	10.98	1	8	198	72,940
Number of don. per year	2.10	1.10	1	2	18	72,940
<i>Donations</i>						
Age	49.67	11.53	19	51	84	778,148
Plasma	0.27	0.44	0	0	1	778,148
Elapsed time between donations	195.78	190.11	1	150	4,147	778,148
Males						
<i>Donors</i>						
Age	46.94	12.92	19	48	84	45,150
Number of donations	13.35	11.88	1	10	188	45,150
Number of don. per year	2.24	1.15	1	2	18	45,150
<i>Donations</i>						
Age	50.30	11.18	19	51	84	556,485
Plasma	0.21	0.41	0	0	1	556,485
Elapsed time between donations	182.17	173.15	1	140	4,147	556,485

Notes: Descriptive statistics on donors and donations for all donors and male donors.

medal. As shown in Table 2,³ the first three awards can be obtained at 8, 16 or 36 donations (without any time constraint) or, alternatively, at 6, 12 or 24 donations, but only if the donor is a member of AVIS by already 3, 5 or 10 years, respectively. These specific medals are assigned and notified privately. The last three thresholds are placed at 50, 75 and 100 total donations or, alternatively, but only if the donor is already a member of AVIS for 20, 30 and 40 years, respectively. These awards are notified and assigned publicly. All the thresholds described until now have to be considered only for men. Given the Italian law described in Section 1.1, the number of donations needed to reach a medal is reduced by half when the donor is a woman. The last medal, the diamond one, is given to those donors at the end of their associative career, but only if they have reached at least 120 donations (independently from their gender). Table 3 reports the fraction of donors, in our database, who have obtained the corresponding award in the covered period.

Importantly, for the “private awards” our database allows to distinguish between the medals re-

³In Appendix A, Figure 6 represents the Italian version of the translated table presented in the text.

Table 2: Medals Award System

<i>Years of membership and minimum donations</i>		<i>Number of donations</i>	Medals
3 years and at least 6 donations	or	8 donations	“Green”
5 years and at least 12 donations	or	16 donations	“Blue”
10 years and at least 24 donations	or	36 donations	“Red”
20 years and at least 40 donations	or	50 donations	“Gold”
30 years and at least 60 donations	or	75 donations	“Ruby”
40 years and at least 80 donations	or	100 donations	“Emerald”
Last donation for age limits or health reasons and at least 120 donations			“Diamond”

Notes: Rewards system and criteria thresholds by years of membership and number of donations for males. Thresholds are reduced by half when the donor is a female.

ceived just for the total number of donations made from those received by combining the membership requirement with a lower threshold in the number of donations. Unfortunately, the same is not possible for “public awards” because the minimum number of years required for these medals is 20 while the maximum number of years of membership of the donors in the dataset is 12.

Considering the panel characteristic of our data, we are able to reconstruct the reward history of each donor. Specifically, when a donor is awarded with a green, blue or red medal because he has reached the number of donations needed, we say that he receives a *Private award for the number of donations* (*PRN*). Instead, if the donor receives one of these medals because he has reached the reduced number of donations needed thanks to the years of membership, we say that he receives a *Private award for the years of membership* (*PRM*). Lastly, when a donor reaches the total number of donations needed to be rewarded with a gold, ruby or emerald medal, we say that he received a *Public award* (*PA*). It is also important to notice that, due to the structure of our sample in which all donors started their career after 2007, the donors achieving public awards, do it by fulfilling the relatively stricter requirements on the accumulated number of donations (i.e. without benefiting from the relatively more loose requirements on the number of donations that are dedicated to donors having more than 20 years of activity).⁴

Table 4 reports information about our main variable, the elapsed time between any two consecutive donations. The average interval in the case the donation is not awarded with a medal, in the all sample, is 196 days. The average time is higher when we consider the delay immediately before a donation which grants PRM (323 days) with respect to PRN (159 days). As expected, for donation which grants PA the average time is much smaller (95 days). In the second panel of Table 4, we also report the statistics for

⁴Moreover, all donors reaching a public award performed both plasma and whole blood donations. See column 3 of Table 6 in the Appendix A for a robustness check in which we exclude from the estimation sample donors who did not donate plasma at least once.

Table 3: Medals awarded in the database.

Medals	All donors		Males	
	<i>N</i>	Percent	<i>N</i>	Percent
<i>Private awards for the years of membership</i>				
“Green Award”	24,474	33.54	19,699	43.61
“Blue Award”	20,870	28.60	15,672	34.69
“Red Award”	5,707	7.82	4,018	8.89
<i>Private awards for the number of donations</i>				
“Green Award”	26,613	36.47	10,689	23.66
“Blue Award”	11,940	16.36	3,959	8.76
“Red Award”	4,277	5.86	1,402	3.10
<i>Public awards</i>				
“Gold Award”	2,015	2.76	667	1.47
“Ruby Award”	628	0.86	176	0.04
“Emerald Award”	217	0.29	45	0.01
Unique donors	72,979		45,150	

Note: The number and percentage of donors receiving the different awards in the database during the period 2008-2019 for all donors and male donors.

the sample of male donors.

Table 4: Elapsed time between consecutive donations: descriptive statistics.

	No Awards	Private Award M	Private Award N	Public Award
<i>All donors</i>				
Mean	195.7	322.9	159.0	94.7
Median	150.0	224.0	136.0	63.0
St. Dev.	190.1	299.6	109.1	97.8
N. of Obs.	779,556	51,069	42,837	2,860
<i>Males</i>				
Mean	182.1	258.7	106.2	62.2
Median	140.0	196.0	100.0	43.0
St. Dev.	173.2	207.2	59.5	59.5
N. of Obs.	557,653	39,407	16,055	888

Note: Descriptive statistics on the number of days between consecutive donations in the cases in which donation n does not correspond to any medal (No Award), donation n corresponds to the privately awarded medals obtained for the years of membership (Private Award M), donation n corresponds to the privately awarded medals obtained for the number of donations (Private Award N), and donation n corresponds to the publicly awarded medals (Public Award).

3 Empirical strategy

To investigate the impact of symbolic awards on donors' behavior we rely on the following empirical model:

$$Elaps_{i,c,n,t} = \alpha + \sum_{k=r}^g PRN_{i,n}^k \delta_k^{PRN} + \sum_{k=r}^g PRM_{i,n}^k \delta_k^{PRM} + \sum_{k=r}^g PA_{i,n}^k \delta_k^{PA} + \gamma_{c,t} + \rho_a + \beta X_n + \lambda_{i,n} + \varepsilon_{i,c,n,t}, \quad (1)$$

where:

$$\lambda_{i,n} = \begin{cases} 0 & (OLS) \\ \alpha_i w_n & \text{with } w_n = 1 \text{ (FE)} \\ \alpha_i w_n & \text{with } \alpha_i = (\alpha_{i,1}, \alpha_{i,2}) \text{ and } w_n = (1, n)' \text{ (Random Trend 1)} \\ \alpha_i w_n & \text{with } \alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}) \text{ and } w_n = (1, n, n^2)' \text{ (Random Trend 2)} \\ \alpha_i w_n & \text{with } \alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}, \alpha_{i,4}) \text{ and } w_n = (1, n, n^2, n^3)' \text{ (Random Trend 3)} \end{cases}$$

where $Elaps_{i,c,n,t}$ is the dependent variable we consider as proxy of the performance of donor i at donation number n and it represents the elapsed time (in days) between individual i 's $n - 1$ th and n th donations; t refers to time, the calendar year and month, and c the territorial branch of the AVIS association to which donor i belongs (we observe 159 territorial branches). The variable $PRN_{i,n}^k$ is a dummy variable which is equal to one if donation n represents the donation number k after (if $k > 0$) or before (if $k < 0$) the donation in which the individual i has achieved a private award (i.e., the donation for which $k = 0$) of type PRN (i.e. those awarded following the simple rule of the number of donations made). Therefore k represents relative distance of donation n with respect to the donation for which a person receives an award. Similarly, the $PRM_{i,n}^k$ and the $PA_{i,n}^k$ are dummies indicating the relative distance with respect to the donations in which the other two types of rewards are obtained (i.e. privately awarded medals obtained for the number of donations made over a specific time frame and publicly awarded medals, respectively).

The variable $\gamma_{c,t}$ is a fixed effect specific for each calendar year and month and each territorial branch of the AVIS association, which is introduced to control for unobserved factors at the local level common to donations carried out during a given calendar time period; ρ_a is an age fixed effect and X_n is a vector of observed characteristics of the donation n : the number of the donation n , a dummy indicating whether the number of donation n is greater than 49 and a dummy indicating whether donation n is a donation of plasma (being a donation of whole blood the base category).

The error term is made up of two components: a donor specific component, $\lambda_{i,n}$, and a "white noise" $\varepsilon_{i,c,n,t}$. As summarized in the formula above we use five different specifications that differ in the way we try (or not) to take into account and to model $\lambda_{i,n}$.

Our analysis focuses on the parameters identifying the impact of the award scheme by comparing donations around the observed achievement of an award (from r donations before to g donation after the award) with the remaining donations.⁵ In equation (1) such parameters are represented by the δ_k^B : the impact of receiving the medal type B on a donor's performance k donations after (or, if k is negative, prior to) the donation in which the person receives the medal (with $B = (PRM, PRN, PA)$).

The main threat to the identification of the described effects lies in the possible correlation between obtaining different medals and the variable $\lambda_{i,n}$ which represents other unobserved determinants of performance that are specific to each individual and that could vary along the donation career. In general, the comparison of donors' performance at different stages of their careers is complicated by the fact that unobserved factors determining a given level of donors' performance could also affect its evolution over their career. In other words, donors could self-select in obtaining different types of awards also based on their underlying performance trends. For instance, one may expect that individuals who achieve the number of donations necessary to obtain the more demanding awards do so at least in part thanks to the fact that they are gifted of relatively higher intrinsic motivations; but if such motivations vary over the donation career, then the described type of correlation could arise, threatening identification. To control for this we have to allow the possibility that individuals self-select obtaining different awards also on the basis of unobserved individual characteristics that can determine both the current performance and its rate of growth (Finkelstien, 2009; Ashraf *et al.*, 2012).

We expect that estimating the above model without taking into account such unobserved individual heterogeneity – i.e. using the available panel of individual observations as it was a pooled cross-section (as in the specification we have called *OLS*) – overestimates or underestimates the influence of the award scheme depending on the correlation between obtaining the different awards and $\lambda_{i,n}$. We compare the results of this first baseline specification in which $\lambda_{i,n}$ is left in the error term to other four specifications in which we try to take into account the individual unobserved heterogeneity.

⁵Consider an individual who reaches 100 donations. In the case the donor obtains the awards for *the number of donations* (*PRN*), the donations to which are not associated awards-related dummies equal to one are: 1st-4th, 21st-32nd, 40th-46th, 55th-71st and, 80th-96th. On the other hand, if a donor obtains the award for *the years of membership* (*PRM*), the donations to which are not associated awards-related dummies equal to one are: 1st-2nd, 17th-20th, 29th-46th, 55th-71st and, 80th-96th.

Following [Lacetera and Macis \(2010b\)](#) in our second specification, which we call *FE*, we assume that unobserved heterogeneity determines a heterogeneous level of performance for each donor that is fixed along the donor's career, that is $\lambda_{i,n} = \alpha_i w_n$ with $w_n = 1$. As an extension to this standard linear model with an additive unobserved effect, in the last three specifications we employ a random trend model ([Wooldridge, 2002, 2005](#)), where each donor is allowed to possess a different performance trend (in addition to a separate level effect). In this way, unobserved heterogeneity in a donor's motivations is allowed to affect not just a donor's level of performance but also its rate of growth. In particular, in the third specification (*Random Trend 1*) we also control for a worker-specific linear trend by setting $\lambda_{i,n} = \alpha_i w_n$ with $\alpha_i = (\alpha_{i,1}, \alpha_{i,2})$ and $w_n = (1, n)'$. We can interpret the *Random Trend 1* specification as a generalization of the way in which we allow donors' efficiency to vary along their career in the *OLS* and *FE* specifications. Indeed, in *OLS* and *FE* specifications we allow donors' efficiency to change linearly as individuals accumulate donations by controlling for the number of the donation n and therefore assuming that all individuals have the same rate of growth of efficiency. Instead, in the *Random Trend 1* specification each individual is in principle allowed to have a different linear efficiency trend.⁶ Finally, in the last two specifications we allow for more flexibility in the shape of the trend: in the *Random Trend 2* specification $\alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3})$ and $w_n = (1, n, n^2)'$, and in the *Random Trend 3* specification $\alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}, \alpha_{i,4})$ and $w_n = (1, n, n^2, n^3)'$. In this last three specifications we let unobserved heterogeneity determine an initial level of individual performance that could change with each donation according to an individual-specific trend which is more and more flexible.

As it is unlikely that the performance of the donor is influenced by the future obtainment of an award if the donation we consider is sufficiently prior to the donation in which the donor will obtain that medal, we can consider the statistical and the economic significance of the estimated effects for pre-award donations as an informal empirical model specification test. In other words, estimating a sizeable influence of the medal achievement for *many* donations before the donation for which an award is obtained suggests that our empirical model is unable to distinguish between the true impact of the award and the effect of the underlying (non-observable) motivational dynamics specific to each individual.

⁶This is why the coefficient on the number of the donation n is not identified in the *Random Trend* specifications.

4 Results

In this section we present graphically the results obtained by using the empirical strategy described above and setting $r = -3$ and $g = 4$. In other words, we estimate the influence of receiving an award from three donations before to four donations after receiving the award. We concentrate on the sample of male donors to reduce heterogeneity in the rules governing donation behaviour and the assignment of medals (as explained in Section 2) and to avoid mixing them with gender specific differences in donation behaviour. Moreover, these rules reduce the number of donations between the obtainment of the different medals and therefore our ability to consider possible anticipation and post-award effects. In the Appendix B, we show the results obtained by including in the estimation sample also women, Table 7, by considering a different number of pre-award periods r , Table 8, and by reducing the estimation sample to only whole blood donors, Table 9, which are qualitatively similar to those presented here in the main text.

In the first three figures (1, 2 and 3) we compare the estimated effects for each type of award across the five considered specifications. In Table 5 of the Appendix A we report the detailed estimation results.

Let us first concentrate on the results obtained without taking into account individual unobserved heterogeneity (i.e., by using the *OLS* specification). The estimated impact for receiving a *PRM*, which is presented in Figure 1, appears to be positive, especially before and at the donation in which the awards are obtained (from $k = -3$ to $k = 0$), but also for the two donations after ($k = +1$ and $k = +2$). Instead, as shown in Figure 2, we find that for all the donations we consider around a *PRN* the performance of donors tend to be higher, with a reduction of the elapsed time between donations up to 70 days (at $k = -2$). For a *PA*, as described graphically in Figure 3, we estimate a reduction of performance for the donations before the obtainment of the award (from $k = -3$ to $k = -1$) which is (more than) compensated by a decrease in the elapsed time for the donation granting the award and the following ones (from $k = 0$ to $k = +4$). This naive specification suggests that the relatively more demanding requirements of *PRN* and *PA* tend to be associated with a higher performance with respect to *PRM*. However, although we control for donation characteristics, age of donors and time varying unobserved factors at the AVIS association local branch-level, these results (at least) in part seem to reflect the fact that donors of different performance self-select in different types of awards.⁷ Therefore, as explained

⁷The signs of the estimated impacts of the other donation-level control variables X_n are very similar to those obtained by Lacetera and Macis (2010b). As shown in Table 5, we find that elapsed time from the previous donation is lower for plasma donations, which is consistent with the higher minimum delay

Figure 1: Estimated impact of Private awards for the years of membership on donors' performance.

Notes: The different lines connect the $\widehat{\delta}_k^{PRM}$ obtained by using the specifications defined in equation 1. The x-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

above, in the other specifications we control for unobserved individual heterogeneity more and more stringently.

If we focus on the results for the pre-award donations (i.e., the donations for which $k < 0$ in Figures 1, 2 and 3) there is a pattern across specifications that is common to the three types of award: going from the *OLS* specification to the *Random Trend* specifications, the economic and the statistical significance of the impact estimated for the pre-award donations tend to progressively decrease. Our preferred specification is the *Random Trend 3* specification, for which the estimated pre-award impacts

between two consecutive donations that is allowed by law for plasma donations (with respect to whole blood donations). Moreover, the estimated negative coefficient for the number of accumulated donations n suggests that on average donors' efficiency increases with the number of donations. On the top of this linear trend, the estimated positive coefficient associated with the dummy indicating whether a donation number n is greater than 49 suggests also the existence of non-linear negative trend. The latter effect vanishes for the *Random Trend* specifications, for which we allow an individual specific growth rate of efficiency.

Figure 2: Estimated impact of Private awards for the number of donations on donors' performance.

Notes: The different lines connect the $\widehat{\delta}_k^{PRN}$ obtained by using the specifications defined in equation 1. The x-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

have practically disappeared. This suggests that sweeping away the individual-specific trends, in addition to the level effects, and allowing a relatively high degree of flexibility to these individual specific growth rates, is contributing to take into account possible selection effects stemming from unobservables.

Let us now concentrate on the estimation results across the five specifications for $k \geq 0$. Focusing on *PRM* (Figure 1) we find that, after taking into account unobserved heterogeneity, the significant and positive estimated influence on elapsed time estimated by using the *OLS* specification at $k = 0$ progressively disappears. Moreover, the post-award impacts estimated by using the other four models suggests a sizeable and persistent positive effect of *PRM* medals on donor efficiency, which is also in stark contrast with the results obtained by using the *OLS* specification: the sign of the effects tends to be reversed and/or its economic significance increases. With respect to *PRN* (see Figure 2) we see that controlling for unobserved heterogeneity (with the *FE* specification) decreases the size of the estimated

Figure 3: Estimated impact of Public awards on donors' performance.

Notes: The different lines connect the $\widehat{\delta}_k^{PA}$ obtained by using the specifications defined in equation 1. The x-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

post-award impact of receiving the award and, also in this case, reverses its sign (with the *Random Trend* specifications). According to our preferred and most flexible specification, *Random Trend 3*, receiving a *PRN* medal has a relatively low and short lived negative influence on donor efficiency which is mainly concentrated from $k = 0$ to $k = +2$. These results indicates that, among awards assigned privately, only *PRM* succeeds in boosting donors' performance. If we compare the estimated impact with the average elapsed time between two consecutive donations observed for men (which is approximately 180 days), our results suggest that after the obtainment of a *PRM* the donors' efficiency increases by about 10% ($=20/180$). Moreover, comparing the differences in the estimated impacts between the *OLS* and the *Random Trend 3* specifications also suggests that donors with relatively better (worse) performances tend to self-select in obtaining *PRN* (*PRM*) awards, which is consistent with their relatively more (less) demanding requirements. Finally, as it is shown in Figure 3, after controlling for the possibility that donors' unobserved characteristics determine individual specific performance trends, we do not detect

any impact of PA awards on elapsed time between consecutive donations.

Figure 4: Estimated impact of the three types of medals according to the *Random Trend 3* specification.

Notes: The different lines connect the $\widehat{\delta}_k^B$ (with $B = (PRM, PRN, PA)$) obtained by using the *Random Trend 3* specification defined in equation 1. The x-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

To summarize our main findings, in Figure 4 we show the estimated impacts across the three types of awards for our preferred specification, the *Random Trend 3*. First, PRN and PRM have different influences on donors' behavior. Indeed, obtaining a PRM increases significantly the post-award efficiency, while obtaining a PRN medal slightly decrease donors' performance. Second, in contrast to what found by Lacetera and Macis (2010b), there is no substantial impact due to the public assignment of awards, as opposed to the private assignment, on donors' performance. However, we can document this result only for the awards which are obtained solely on the basis of the number of donations.

To check the robustness of our results, in Figure 5 we compare the results for the *Random Trend 3* specification obtained by using our *main sample* with those obtained by using other four different samples. The results remain practically unaltered: when casual donors (persons with 5 or less donations) are

excluded from the analysis (*sub-sample a*); when both casual donors and those with an extremely positive performance (person having accumulated more than 104 donations) are excluded from the analysis (*sub-sample b*); when donors who did not donate plasma at least once are excluded (*sub-sample c*); when we just consider the first 40 donations of donors who always donated whole blood (*sub-sample d*).⁸

Finally, in order to control for the fact that individual unobserved heterogeneity could affect the rate of growth of performance also according to the dimension of accumulated years of membership (which could be especially important to check the robustness of the results obtained for PRM medals), we additionally control for individual specific random trends defined with respect to the years of membership and the results do not change.⁹

⁸The detailed results obtained for these additional samples are reported in Table 6 in the Appendix A.

⁹Results of this additional robustness check are available upon request.

Figure 5: Robustness checks. Estimated impact of the three types of medals according to the *Random Trend 3* specification applied to different samples.

Notes: The different lines connect the $\hat{\delta}_k^B$ (with $B = (PRM, PRN, PA)$) obtained by using the *Random Trend 3* specification, which is defined in equation 1, in different samples. The x-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

5 Discussion

In this paper, we have taken advantage of a unique dataset to investigate empirically the impact of symbolic awards (medals) on blood and plasma donations. The dataset consists of panel data from 2008 to 2019 regarding all blood and plasma donations made by the members of a donors' association (AVIS) in an Italian region (Tuscany). In particular, we focused on the role played by two features of the award scheme: (A) whether the assignment of medals is kept private or made public; (B) whether medals are assigned thanks to the number of donations only or also thanks to the number of years the donor has been member of the association.

We were able to study the role of awards on the frequency of donations, as measured by the time elapsed between any two consecutive donations, controlling for individual (unobserved) characteristics and their trend over the donors' career.

We found that, while the role of (A) is limited to explain the frequency of donations, the role of (B) appears to be more significant. In particular, the awards assigned on the basis not only of a given number of donations but also of the number of years of membership to the association represents a potentially effective way to increase the frequency of donations *after* the assignment of the award. We did not find evidence suggestive of such an effect for awards assigned only on the basis of the number of donations.

As concerns (A), our result might appear to be in contrast with [Lacetera and Macis \(2010b\)](#), in which the public assignment of symbolic awards is found to be more effective in increasing the frequency of donations relative to when the assignment of awards is private. This difference in the results could be due to the fact that they do not control for the possible effect of unobserved heterogeneity on performance growth over a donor's career, but it could also be connected to the differences in the award scheme (which changed in 2007, while their data refer to a prior period) or in the empirical setting (we consider an Italian region while they look at data for a single Italian town). In particular, [Lacetera and Macis \(2010b\)](#) analyze a different award scheme where the years of membership did not matter at all and in which the public delivery of awards is extremely homogeneous, consisting always in the same type of public ceremony, while in our case the way in which the delivery of the medal is implemented is heterogeneous (possibly changing across local branches of the donors' association). Future research is needed to study the possible effect of cultural factors and different delivery modes in determining the effectiveness of public awards.

As concerns (B), our results suggest that building loyalty with donors, rewarding those who are not

very active but are donors since long time, can be a better tool for increasing donations than rewarding those with a very high number of donations. This interpretation brings us close to the literature on gift exchange ([Akerlof and Yellen, 1990](#)): an individual action which is beneficial to someone else (like a gift) triggers an action back from the beneficiary to the actor, due to a perceived obligation to repay what has been received. Gift exchange may be understood as an instance of reciprocity, which is known to widely characterize human behavior ([Falk and Fischbacher, 2006](#); [Bowles and Gintis, 2013](#)).

Another possible interpretation points to the awards as tools to affect an individual self image: receiving a reward may strengthen one's own belief to be a good blood donor, and hence it may trigger actions that are consistent with such self image ([Falk, 2020](#); [Tonin and Vlassopoulos, 2013](#)). While monetary incentives can produce a crowding-out effect, undermining pro-social and intrinsic motivations in donors ([Frey and Jegen, 2001](#)), other forms of extrinsic incentives could affect positively the sense of belonging to a voluntary association and reward the time spent for its mission ([Finkelstien, 2009](#); [Ashraf *et al.*, 2012](#); [Costa-Font *et al.*, 2013](#)). Moreover, symbolic awards seem to predict retention and engagement in volunteers and charity organizations ([Walk *et al.*, 2019](#); [Gallus, 2017](#)). The assignment of an award not strictly based on behavior may also contribute to the development of a specific identity as blood donor and the personal involvement in the donation practices. In particular, the acknowledgement of the volunteer merits by the association may build up the awareness and responsibility to maintain the meritorious status acquired ([Winterich *et al.*, 2013](#)). Specifically, receiving an award derived also from a membership criterion may elicit the role-identity of the donors, that is connected to the relationship with the blood donation organization ([Finkelstein *et al.*, 2005](#); [Pavey *et al.*, 2011](#)), increasing the intention to perform the giving act thought the impact of conceptualization of themselves, more than to the social image shown by public display of the medals ([White *et al.*, 2017](#); [Grube and Piliavin, 2000](#)). As noted by [Chmielewski *et al.* \(2012\)](#) donors may prefer private than public acknowledgement because they perceived the former as a recognition of competence in blood donation by the association, while the latter seems to empathise the extrinsic nature of the incentives. The interplay between social and self-image with intrinsic motivations deserves further investigation, along the lines of [Qu *et al.* \(2019\)](#).

Overall, our empirical results urge to consider with care the effects of symbolic awards as tools to influence (prosocial) behavior, which may go against expectations ([Cheema *et al.*, 2019](#); [Robinson *et al.*, 2019](#)). Indeed, the effectiveness of awards cannot be given for granted; this may be due, for instance, to a reduction in the signaling content of donation (which, after the introduction of rewards may be

thought to be driven by the aim to get the award), or to the motivation crowding out ([Frey and Jegen, 2001](#); [Bowles and Polania-Reyes, 2012](#); [Chao, 2017](#)) of awards when donors are intrinsically motivated to donate, which is reasonably the case for our sample. Moreover, awards may affect ex-ante behavior acting as incentives, or they may affect behavior ex-post altering one's own self-image or triggering reciprocity. Finally, the public disclosure of information, which happens when rewards are assigned through a public ceremony, may increase their effects as incentives or moral obligations, but it may also exacerbate perverse consequences as the reduction of signaling content or the motivation crowding out, with an overall net effect which remains to be established case by case, as recently pointed out by [Butera and Horn \(2020\)](#), and possibly relying on data from field experiments ([List, 2011](#); [Bruhin *et al.*, 2020](#)).

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Appendix

A Figures and Tables

NUOVE BENEMERENZE PER I DONATORI			
<i>anni di iscrizione AVIS e donazioni minime</i>		<i>numero di donazioni</i>	<i>benemerenza</i>
3 anni e almeno 6 donazioni	<i>oppure</i>	8 donazioni	VERDE
5 anni e almeno 12 donazioni	<i>oppure</i>	16 donazioni	BLU
10 anni e almeno 24 donazioni	<i>oppure</i>	36 donazioni	ROSSA
20 anni e almeno 40 donazioni	<i>oppure</i>	50 donazioni	ORO
30 anni e almeno 60 donazioni	<i>oppure</i>	75 donazioni	RUBINO
40 anni e almeno 80 donazioni	<i>oppure</i>	100 donazioni	SMERALDO
cessazione donazioni per raggiunti limiti di età o per motivi di salute e almeno 120 donazioni			DIAMANTE

Figure 6: Rewards system and criteria thresholds by years of membership and number of donations for males. Thresholds are reduced by half when the donor is a female.

Table 5: Frequency of donations for males: regression results

	OLS	FE	RT1	RT2	RT3
<i>Private awards (membership)</i>					
PRM(-3)	22.57*** (1.16)	15.24*** (1.00)	3.06*** (0.93)	-0.99 (0.95)	-0.00 (0.93)
PRM(-2)	23.59*** (1.21)	10.88*** (1.02)	-0.94 (1.06)	-2.59** (1.14)	0.26 (1.18)
PRM(-1)	25.77*** (1.28)	4.60*** (1.12)	-6.85*** (1.21)	-7.34*** (1.34)	-2.27 (1.42)
PRM(0)	53.22*** (1.48)	23.74*** (1.39)	3.42** (1.35)	-1.59 (1.48)	0.31 (1.57)
PRM(+1)	14.37*** (1.31)	-14.22*** (1.32)	-30.64*** (1.29)	-31.98*** (1.44)	-26.97*** (1.56)
PRM(+2)	6.64*** (1.26)	-20.38*** (1.35)	-31.36*** (1.22)	-30.53*** (1.35)	-24.07*** (1.48)
PRM(+3)	-1.83 (1.20)	-25.72*** (1.36)	-29.68*** (1.12)	-26.19*** (1.18)	-19.29*** (1.28)
PRM(+4)	-9.74*** (1.14)	-28.62*** (1.26)	-27.03*** (1.00)	-21.76*** (1.02)	-14.75*** (1.06)

Continued on next page

Table 5 – continued from previous page

	OLS	FE	RT1	RT2	RT3
<i>Private awards (number of don.)</i>					
PRN(-3)	-66.58*** (0.99)	-13.17*** (1.00)	-3.26*** (0.65)	-4.06*** (0.78)	-1.43* (0.80)
PRN(-2)	-70.54*** (0.94)	-15.02*** (0.94)	-2.21*** (0.71)	-3.16*** (0.89)	0.24 (0.94)
PRN(-1)	-67.34*** (0.93)	-14.12*** (0.89)	0.01 (0.77)	-0.92 (0.97)	2.67** (1.05)
PRN(0)	-64.06*** (0.94)	-13.74*** (0.85)	1.49* (0.83)	0.97 (1.03)	4.96*** (1.13)
PRN(+1)	-48.00*** (1.10)	-1.96* (1.01)	11.15*** (0.98)	8.75*** (1.13)	10.95*** (1.17)
PRN(+2)	-43.51*** (1.17)	-1.19 (1.07)	9.43*** (1.01)	5.24*** (1.13)	6.43*** (1.18)
PRN(+3)	-43.34*** (1.14)	-3.79*** (0.99)	5.62*** (0.96)	0.90 (1.07)	1.93* (1.09)
PRN(+4)	-42.98*** (1.18)	-5.20*** (1.01)	3.98*** (0.98)	-0.88 (1.04)	-0.04 (1.05)
<i>Public awards</i>					
PA(-3)	40.99*** (5.16)	37.31*** (5.10)	10.39*** (2.28)	4.75** (2.36)	-1.41 (2.07)
PA(-2)	45.70*** (5.26)	41.04*** (5.24)	9.80*** (2.36)	3.96 (2.62)	0.21 (2.59)
PA(-1)	46.77*** (5.44)	42.41*** (5.57)	8.18*** (2.60)	1.42 (2.84)	-0.65 (2.85)
PA(0)	-66.40*** (5.08)	-49.70*** (2.98)	-4.06 (2.86)	5.33 (3.27)	0.76 (3.46)
PA(+1)	-59.93*** (5.24)	-44.48*** (3.06)	-3.93 (3.03)	5.17 (3.20)	1.08 (3.29)
PA(+2)	-55.92*** (5.18)	-41.20*** (2.89)	-4.04 (2.72)	3.84 (3.00)	-0.40 (3.08)
PA(+3)	-51.32*** (5.28)	-37.96*** (2.98)	-5.46** (2.59)	1.18 (2.98)	-0.52 (2.86)
PA(+4)	-47.47*** (5.18)	-33.29*** (2.77)	-3.56 (2.55)	2.29 (2.77)	0.58 (2.60)
<i>Donations characteristics</i>					
Number of donations	-5.07*** (0.16)	-5.62*** (0.36)			
Donations>50	159.21*** (3.74)	129.37*** (7.25)	17.89*** (4.21)	-5.11 (5.48)	0.43 (5.51)
Plasma	-35.28*** (0.84)	-35.95*** (0.66)	-29.49*** (0.62)	-23.72*** (0.57)	-20.47*** (0.54)
N	555,960	551,488	551,488	551,488	551,488
R ²	0.21	0.45	0.65	0.76	0.83

The dependent variable is the elapsed days between two consecutive donations. In all cases, we control for age fixed effects and year*month*territorial branch of AVIS fixed effects. The five specifications presented differ in the way $\lambda_{i,n}$ is modelled, as explained in the text. Standard errors (in parentheses) are clustered at the donor and at the year*month*territorial branch of AVIS levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Frequency of donations for males: regression results for different sub-samples

	(a)	(b)	(c)	(d)
<i>Private awards (membership)</i>				
PRM(-3)	-0.00 (0.91)	-0.08 (0.91)	1.39 (1.33)	0.35 (1.33)
PRM(-2)	0.26 (1.16)	0.17 (1.16)	-0.27 (1.57)	3.78** (1.80)
PRM(-1)	-2.27 (1.38)	-2.33* (1.39)	-2.27 (1.82)	3.50 (2.17)
PRM(0)	0.31 (1.53)	0.25 (1.53)	5.66*** (2.05)	2.59 (2.37)
PRM(+1)	-26.97*** (1.52)	-26.97*** (1.53)	-29.06*** (1.98)	-19.29*** (2.36)
PRM(+2)	-24.07*** (1.44)	-24.03*** (1.45)	-25.62*** (1.86)	-16.87*** (2.23)
PRM(+3)	-19.29*** (1.25)	-19.21*** (1.26)	-20.20*** (1.70)	-13.99*** (1.89)
PRM(+4)	-14.75*** (1.04)	-14.67*** (1.04)	-14.41*** (1.46)	-11.73*** (1.48)
<i>Private awards (number of don.)</i>				
PRN(-3)	-1.43* (0.78)	-1.57** (0.79)	-2.10** (0.83)	2.42 (1.58)
PRN(-2)	0.24 (0.92)	0.10 (0.93)	-0.92 (0.94)	5.00** (1.99)
PRN(-1)	2.67*** (1.03)	2.54** (1.04)	1.35 (1.03)	9.65*** (2.27)
PRN(0)	4.96*** (1.10)	4.91*** (1.11)	2.09* (1.09)	15.65*** (2.48)
PRN(+1)	10.95*** (1.14)	10.92*** (1.16)	8.12*** (1.15)	22.29*** (2.59)
PRN(+2)	6.43*** (1.15)	6.42*** (1.17)	4.69*** (1.16)	14.06*** (2.59)
PRN(+3)	1.93* (1.07)	1.98* (1.08)	1.34 (1.10)	5.88** (2.42)
PRN(+4)	-0.04 (1.03)	-0.03 (1.04)	-0.02 (1.10)	2.28 (2.16)

Continued on next page

Table 6 – continued from previous page

	(a)	(b)	(c)	(d)
<i>Public awards</i>				
PA(-3)	-1.41 (2.02)	-2.90 (2.27)	-0.93 (1.78)	
PA(-2)	0.21 (2.52)	-1.47 (2.89)	0.39 (2.20)	
PA(-1)	-0.65 (2.78)	-1.67 (3.23)	-1.42 (2.43)	
PA(0)	0.76 (3.37)	0.83 (4.13)	1.01 (2.95)	
PA(+1)	1.08 (3.21)	0.79 (3.90)	1.00 (2.85)	
PA(+2)	-0.40 (3.00)	-1.26 (3.64)	-0.19 (2.72)	
PA(+3)	-0.52 (2.79)	-1.28 (3.38)	-0.25 (2.49)	
PA(+4)	0.58 (2.53)	0.13 (3.02)	0.24 (2.26)	
<i>Donations characteristics</i>				
Donations>50	0.43 (5.37)	-1.06 (6.41)	-0.57 (4.45)	
Plasma	-20.47*** (0.53)	-20.67*** (0.53)	-21.45*** (0.53)	
N	525,612	521,432	291,928	255,861
R ²	0.78	0.78	0.77	0.88

The dependent variable is the elapsed days between two consecutive donations. In all cases, we control for age fixed effects and year*month*territorial branch of AVIS fixed effects and $\lambda_{i,n}$ is modeled as in column 5 of Table 5. In sub-sample (a) persons with 5 or less donations are excluded from the analysis; in sub-sample (b) persons with 5 or less donations and person having accumulated more than 104 donations are excluded from the analysis; sub-sample (c) donors who did not donate plasma at least once are excluded; sub-sample (d) just includes the first 40 donations of donors who always donated whole blood. Standard errors (in parentheses) are clustered at the donor and at the year*month*territorial branch of AVIS levels.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

B Additional Tables

Table 7: Frequency of donations for men and women: regression results

	OLS	FE	RT1	RT2	RT3
<i>Private awards (membership)</i>					
PRM(-1)	60.39*** (1.30)	20.06*** (1.09)	7.82*** (0.93)	6.76*** (0.88)	7.04*** (0.85)
PRM(0)	102.43*** (1.56)	53.25*** (1.31)	26.62*** (1.14)	20.77*** (1.05)	16.80*** (1.02)
PRM(+1)	25.79*** (1.08)	-15.33*** (1.01)	-27.99*** (0.92)	-24.00*** (0.89)	-20.36*** (0.87)
<i>Private awards (number of don.)</i>					
PRN(-2)	-64.33*** (0.89)	-8.65*** (0.59)	-0.17 (0.56)	1.63*** (0.58)	1.87*** (0.61)
PRN(-1)	-64.99*** (0.84)	-12.73*** (0.58)	-2.16*** (0.54)	-0.53 (0.59)	0.31 (0.63)
PRN(0)	-61.05*** (0.83)	-12.93*** (0.60)	-1.25** (0.58)	0.29 (0.62)	1.66** (0.65)
PRN(+1)	-36.28*** (0.98)	7.31*** (0.86)	13.25*** (0.78)	10.62*** (0.73)	9.37*** (0.71)
<i>Public awards</i>					
PA(-3)	-13.17*** (3.17)	10.31*** (2.62)	8.60*** (1.73)	6.94*** (1.75)	-0.29 (1.77)
PA(-2)	-8.79*** (3.20)	13.17*** (2.70)	8.58*** (1.76)	6.59*** (1.88)	0.10 (1.95)
PA(-1)	-5.53 (3.44)	15.13*** (2.99)	7.13*** (2.02)	4.22** (2.08)	-0.88 (2.16)
PA(0)	-50.78*** (3.38)	-13.58*** (2.23)	5.66*** (2.14)	7.00*** (2.26)	0.64 (2.37)
PA(+1)	-48.50*** (3.38)	-12.73*** (2.12)	3.42 (2.09)	4.27* (2.20)	-2.24 (2.35)
PA(+2)	-46.84*** (3.46)	-12.54*** (2.17)	0.52 (2.08)	2.09 (2.17)	-4.22* (2.27)
PA(+3)	-43.82*** (3.56)	-10.71*** (2.24)	-0.27 (1.98)	1.66 (2.11)	-2.70 (2.13)
PA(+4)	-37.32*** (3.87)	-4.47* (2.55)	4.21** (2.12)	4.76** (2.17)	0.85 (2.17)
<i>Donations characteristics</i>					
Number of Donations	-5.38*** (0.16)	-5.55*** (0.31)			
Donations>50	184.77*** (3.75)	121.31*** (5.81)	9.89*** (3.46)	-7.07* (4.17)	-1.12 (4.08)
Plasma	-47.47*** (0.81)	-41.35*** (0.64)	-31.99*** (0.60)	-25.92*** (0.55)	-21.83*** (0.51)
Gender	66.48*** (1.01)				
N	778,148	769,164	769,164	769,164	769,164
R ²	0.23	0.45	0.66	0.78	0.85

The dependent variable is the elapsed days between two consecutive donations. In all cases, we control for age fixed effects and year*month*territorial branch of AVIS fixed effects. The five specifications presented differ in the way $\lambda_{i,n}$ is modelled, as explained in the text. Standard errors (in parentheses) are clustered at the donor and at the year*month*territorial branch of AVIS levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 8: Frequency of donations for males: regression results with $r = -1$ for private medals

	OLS	FE	RT1	RT2	RT3
<i>Private awards (membership)</i>					
PRM(-1)	27.03*** (1.15)	2.94*** (0.99)	-1.47 (0.93)	0.90 (0.90)	3.28*** (0.87)
PRM(0)	56.40*** (1.35)	26.00*** (1.20)	13.07*** (1.06)	10.88*** (1.02)	9.49*** (1.01)
PRM(+1)	20.22*** (1.15)	-8.54*** (1.05)	-18.14*** (0.97)	-16.91*** (0.95)	-15.31*** (0.96)
PRM(+2)	15.03*** (1.10)	-12.24*** (1.04)	-17.53*** (0.91)	-14.55*** (0.87)	-11.16*** (0.86)
<i>Private awards (number of don.)</i>					
PRN(-1)	-58.59*** (0.81)	-11.02*** (0.61)	0.19 (0.54)	0.81 (0.57)	2.24*** (0.59)
PRN(0)	-55.56*** (0.82)	-10.50*** (0.60)	1.92*** (0.59)	2.88*** (0.63)	4.63*** (0.67)
PRN(+1)	-38.29*** (1.01)	2.23*** (0.82)	12.12*** (0.79)	10.90*** (0.79)	10.91*** (0.78)
PRN(+2)	-32.13*** (1.09)	3.93*** (0.90)	10.78*** (0.82)	7.58*** (0.78)	6.79*** (0.77)
<i>Public awards</i>					
PA(-3)	51.63*** (5.41)	36.89*** (4.80)	9.18*** (2.24)	4.43* (2.34)	-1.75 (2.08)
PA(-2)	56.40*** (5.51)	40.48*** (4.92)	8.42*** (2.32)	3.65 (2.59)	-0.10 (2.59)
PA(-1)	57.46*** (5.68)	41.69*** (5.23)	6.69*** (2.56)	1.23 (2.82)	-0.89 (2.86)
PA(0)	-68.76*** (5.30)	-45.88*** (2.87)	-3.18 (2.83)	5.40* (3.24)	0.78 (3.45)
PA(+1)	-61.88*** (5.46)	-40.83*** (2.97)	-3.09 (3.01)	5.34* (3.17)	1.14 (3.28)
PA(+2)	-57.91*** (5.39)	-37.84*** (2.81)	-3.31 (2.71)	3.98 (2.98)	-0.31 (3.08)
PA(+3)	-53.13*** (5.49)	-34.86*** (2.89)	-4.87* (2.58)	1.31 (2.96)	-0.44 (2.86)
PA(+4)	-48.86*** (5.40)	-30.40*** (2.69)	-3.03 (2.53)	2.39 (2.76)	0.65 (2.59)
<i>Donations characteristics</i>					
Number of donations	-5.25*** (0.16)	-5.17*** (0.32)			
Donations>50	176.61*** (3.94)	123.10*** (6.62)	14.45*** (4.12)	-5.48 (5.41)	0.09 (5.52)
Plasma	-40.16*** (0.89)	-36.52*** (0.66)	-29.52*** (0.62)	-23.84*** (0.58)	-20.51*** (0.54)
N	555,960	551,488	551,488	551,488	551,488
R^2	0.20	0.44	0.65	0.76	0.83

The dependent variable is the elapsed days between two consecutive donations. In all cases, we control for age fixed effects and year*month*territorial branch of AVIS fixed effects. The five specifications presented differ in the way $\lambda_{i,n}$ is modelled, as explained in the text. Standard errors (in parentheses) are clustered at the donor and at the year*month*territorial branch of AVIS levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Frequency of donations for men and only whole blood donors: regression results

	OLS	FE	RT1	RT2	RT3
<i>Private awards (membership)</i>					
PRM(-3)	6.91*** (1.44)	19.05*** (1.37)	-0.51 (1.31)	-3.83*** (1.34)	0.05 (0.95)
PRM(-2)	7.26*** (1.55)	9.40*** (1.46)	-5.00*** (1.54)	-4.25** (1.67)	0.34 (1.18)
PRM(-1)	11.15*** (1.63)	-4.33*** (1.53)	-11.60*** (1.72)	-7.73*** (1.92)	-2.20 (1.41)
PRM	37.75*** (1.85)	3.01* (1.76)	-7.59*** (1.91)	-6.42*** (2.09)	0.37 (1.57)
PRM(+1)	7.25*** (1.66)	-31.78*** (1.66)	-35.84*** (1.85)	-29.83*** (2.07)	-27.05*** (1.56)
PRM(+2)	4.62*** (1.61)	-37.66*** (1.67)	-35.29*** (1.77)	-27.03*** (1.95)	-24.13*** (1.48)
PRM(+3)	-0.00 (1.57)	-44.47*** (1.67)	-33.12*** (1.63)	-22.84*** (1.69)	-19.35*** (1.29)
PRM(+4)	-5.92*** (1.48)	-43.75*** (1.54)	-29.05*** (1.42)	-18.45*** (1.40)	-14.84*** (1.06)
<i>Private awards (Number of don.)</i>					
PRN(-3)	-89.88*** (1.87)	-38.94*** (1.41)	-2.06* (1.23)	-3.83** (1.54)	-1.65** (0.81)
PRN(-2)	-97.66*** (1.58)	-38.37*** (1.29)	0.96 (1.39)	-2.18 (1.90)	0.04 (0.95)
PRN(-1)	-93.50*** (1.57)	-33.78*** (1.27)	4.67*** (1.50)	2.48 (2.11)	2.52** (1.06)
PRN	-85.17*** (1.52)	-27.22*** (1.33)	9.70*** (1.65)	8.18*** (2.30)	4.81*** (1.13)
PRN(+1)	-60.92*** (2.08)	-11.17*** (1.79)	21.42*** (2.03)	17.83*** (2.50)	10.92*** (1.18)
PRN(+2)	-52.11*** (2.18)	-10.42*** (1.93)	17.02*** (2.10)	12.01*** (2.50)	6.34*** (1.18)
PRN(+3)	-48.85*** (2.08)	-11.97*** (1.88)	10.85*** (2.02)	5.03** (2.32)	1.92* (1.10)
PRN(+4)	-45.40*** (2.01)	-11.25*** (1.87)	8.63*** (1.95)	3.00 (2.11)	-0.14 (1.06)
<i>Donations Characteristics</i>					
Number of Donations	-8.71*** (0.12)	-22.24*** (0.45)			
N	260,107	255,972	255,972	255,972	551,861
R ²	0.18	0.46	0.69	0.81	0.83

The dependent variable is the elapsed days between two consecutive donations. In all cases, we control for age fixed effects and year*month*territorial branch of AVIS fixed effects. The five specifications presented differ in the way $\lambda_{i,n}$ is modelled, as explained in the text. Standard errors (in parentheses) are clustered at the donor and at the year*month*territorial branch of AVIS levels. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$