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Symbolic Incentives Can Affect the Frequency of Blood and Plasma Donations: Evidence From 12 Years of Donors' Behavior

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ABSTRACT

We investigate how donors respond to symbolic incentives, specifically medals, tied to donation intensity and duration. To this aim, we employ panel data encompassing the entire population of blood and plasma donors affiliated with the primary donor association (AVIS) in Tuscany, Italy, covering the period from 2008 to 2019. The structure of the award scheme adopted by AVIS enables us to examine the impact of two distinct characteristics of the symbolic incentives: the assignment as either private or public and the criterion of assignment based exclusively on the number of donations (donation-only) or, under less demanding donation requirements, also on the years of membership (donation-and-membership). After controlling for time-constant unobservable individual traits that may influence the level and the evolution of performance over a donor's career, we find that (i) these symbolic awards do not affect behavior before their obtainment, (ii) receiving an award through the donation-and-membership criterion leads to a subsequent increase in donation frequency, and (iii) receiving an award through the donation-only criterion, regardless of whether it is announced publicly or privately, does not boost donors' performance. These findings suggest that symbolic awards are effective when bestowed upon less accomplished donors by making their attainment not solely contingent on performance but also on membership, and are related to community identification and self-image concerns rather than status-seeking behavior.

JEL Classification: D12, D64, I18

1 | Introduction

Ensuring a stable and voluntary blood supply is a central challenge for health systems. In most European countries and in many health systems globally, blood donation is non-remunerated and managed by non-profit organizations or public institutions. Given the legal and ethical constraints on monetary compensation, non-monetary incentives, such as symbolic awards, have emerged as a widely implemented alternative mechanism for encouraging blood donations (Chell et al. 2018, 2022; Graf et al. 2024). While intrinsic motivation plays a pivotal role in donor engagement, caution is required when introducing extrinsic rewards to avoid the 'crowding-out' of prosocial behavior (Titmuss 1970; Mellström and Johannesson 2008; Wollbrant et al. 2022). However, recent literature suggests that symbolic awards, unlike monetary payments, act as a form of social recognition that can bolster intrinsic motivation rather than undermining it (Gallus 2017).

In the present paper, we study the impact of the symbolic award scheme currently implemented by AVIS (Associazione

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Volontari Italiani del Sangue—Italian Blood Volunteers Association) from 2008 to 2019. We employ a unique administrative dataset documenting the behavior of the entire population of AVIS donors in Tuscany, an Italian region of about five million inhabitants. We analyze the donors' response to AVIS's scheme of symbolic awards consisting of medals, with an increasing symbolic value, that are given depending on the total number of donations or on a combination of the number of donations and the years of AVIS membership. Our analysis crucially exploits the fact that awards are assigned according to a non-linear scheme along two distinct dimensions: the private versus public assignment and the donation-only versus donation-and-membership criterion.

The main results of our analysis suggest that (i) these symbolic awards do not affect behavior (immediately) before their obtainment, (ii) being awarded through the donation-and-membership criterion leads to a subsequent increase in donation frequency, and (iii) receiving an award through the donation-only criterion, regardless of whether it is announced publicly or privately, does not enhance donors' performance. These facts survive after controlling for several potential confounding factors and implementing various robustness checks. Therefore, our findings suggest that a key underlying mechanism is linked to community identification and self-image concerns, which appear to be mostly effective for less established donors. By contrast, status-seeking and reputational signaling, which would typically manifest as a surge in donations before receiving the award (especially when recipients' identities are publicly disclosed), do not appear to play a significant role.

Our results 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).[1] As a matter of fact, public and private organizations related to the transfusion 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 find valuable ways to enhance donations, as already done for other kinds of charitable activities (List and Price 2012). Previous evidence on AVIS donors, collected 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 that AVIS implemented in the period covered by Lacetera and Macis (2010b) was different: awards could only be obtained based on 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 compare the results regarding the role of private versus public assignment of rewards: we obtain similar results concerning the effectiveness of publicly delivered awards only when we do not control for the possibility that donors' behavior depends on unobservable characteristics that, beside affecting the performance level, may also affect performance growth along donors' career. More recent contributions emphasize that symbolic and non-monetary forms of recognition can affect donation behavior by reinforcing donors' self-image, community identity, and social motivations, while avoiding the crowding-out effects often associated with monetary incentives (Chell et al. 2022; Goette and Tripodi 2024; Chell et al. 2023). At the same time, recent evidence suggests that the effectiveness of symbolic recognition crucially depends on its design, with mixed findings regarding the role of public versus private acknowledgment and potential reputational concerns among highly motivated donors (Meyer and Tripodi 2021; Goette and Tripodi 2024). Despite this growing body of work, there is still limited evidence based on long panels of administrative data that jointly examines different award criteria and accounts for unobserved heterogeneity in donors' performance dynamics over their entire donation careers.

The paper is organized as follows. Subsection 1.1 describes the motivations in a voluntary non-remunerative (VNR) context, while Subsections 1.2 and 1.3 introduce the specific characteristics of the Italian blood donations system and the AVIS award scheme, respectively. 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 the interpretation and limitations of the analysis.

1.1 | Motivations Toward Donation in VNR Context

In countries adopting a Voluntary Non-Remunerative (VNR) model, such as Italy, blood donation is primarily based on intrinsic and prosocial motivations (Bani and Strepparava 2011). In Italy, the possibility to introduce a compensation, such as a cash payment, is contrasted by the majority of donors, while other forms of non-monetary incentives (e.g., vouchers) are considered more favorably (Lacetera and Macis 2010a). However, a growing literature shows that non-monetary and symbolic incentives may interact with intrinsic motivations through several distinct psychological and behavioral channels (Chell et al. 2025). This section reviews the main mechanisms through which symbolic awards may affect donation behavior, providing the theoretical background for our empirical analysis.

A first channel operates through identity formation and self-image concerns. Individuals may derive utility from perceiving themselves as prosocial and from acting consistently with this self-concept (Edwards et al. 2025). In the context of blood donation, the development of a donor identity has been shown to strengthen commitment and persistence over time (France et al. 2014; Finkelstein et al. 2005). Symbolic awards may reinforce this mechanism by formally recognizing individuals' contribution and by strengthening their sense of belonging to the donor community (Bove et al. 2021; Gallus 2017). In this perspective, awards function as relational incentives that acknowledge sustained engagement rather than short-term performance (Chell et al. 2023).

A second channel emphasizes social image, reputational concerns, and goal-attainment motives. When prosocial actions are observable, individuals may be motivated by the desire to signal generosity, commitment, or moral character to others (Bénabou

and Tirole 2006). Moreover, when symbolic awards are tied to salient thresholds, donors may increase effort as they approach the target, consistently with goal-gradient mechanisms. Awards may therefore generate anticipation effects, leading individuals to increase effort prior to receiving the award, and stronger responses when recognition is public rather than private. Previous evidence in the context of blood donation showed mixed results on the relevance of this mechanism (Lacetera and Macis 2010b; Goette and Tripodi 2024; Luo and Gao 2023).

The AVIS award scheme allows us to empirically distinguish between these two channels. By varying both the publicity of the award and the eligibility criteria—based either solely on donation intensity or also on years of membership—the scheme provides a natural setting to assess whether symbolic incentives primarily operate through reputational signaling or through identity and community recognition.

1.2 | The Italian 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 1.4 million donors across the country, responsible for about 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 sports events or artistic contests focusing on the donation topic) and is coordinated and regulated by upper-level (regional and national) headquarters. More than 90% of Italian donors are affiliated with 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).[2] 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 weekdays 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 usually lasts 15 minutes, while plasma and platelet donation requires 40 minutes to 1 hour.

1.3 | The AVIS Award Scheme

The award scheme currently implemented by AVIS can be described as relying on extrinsic and non-monetary motivations, being based on a form of acknowledgment 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 of assigning different medals with an increasing symbolic value (i.e., from the basic green medal to the top diamond one), progressively requiring more demanding conditions to be obtained.

AVIS has established an official regulation for the assignment of associative medals that are designed to represent the achievement of specific requirements concerning donation activity. These kinds of symbolic awards are meant to be signs of gratitude from the association. Still, they also represent a source of prestige for the volunteers who receive them, and donors can wear them during the associative ceremony or events. The specific levels of the awards are listed in the association's national statute and applied all over the country, despite the possible presence of other local forms 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 the most prestigious and acknowledged form of recognition for the career of a donor across the different local associations. It has been implemented since 2007, replacing the previous award scheme and introducing a more articulated set of conditions for obtaining 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 constraint and the frequency of donations in a specific amount of time (i.e., a minimum number of donations in a specific span of years). To obtain a specific medal, a donor has to fulfill one of the two conditions. Donors can keep track of their performance through 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 kinds of medals is similar and substantially negligible, their symbolic values differ. The less valuable medals—which have less demanding conditions to be obtained—are assigned privately 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 members 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.[3] We exclude donors who were members 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, 638 individuals and 770, 700 observations.[4] Table 1 shows descriptive statistics on donors and donations over the covered

TABLE 1 | Descriptive statistics on donors and donations.

Variable	Mean	St. Dev.	Min	Median	Max	Obs.
All donors						
Donors						
Age	51.14	13.11	24	51	89	72,628
Female	0.38	0.48	0	0	1	72,628
Number of donations	11.63	10.89	1	8	198	72,628
Number of don. per year	2.09	1.09	1	2	23	72,628
Donations						
Age	55.04	11.54	24	56	89	770,700
Plasma	0.27	0.44	0	0	1	770,700
Elapsed time between donations	196.45	190.37	14	151	4147	770,700
Males						
Donors						
Age	52.30	12.92	24	53	89	44,919
Number of donations	13.27	11.77	1	10	188	44,919
Number of don. per year	2.23	1.13	1	3	23	44,919
Donations						
Age	55.66	11.19	24	56	89	550,338
Plasma	0.21	0.41	0	0	1	550,338
Elapsed time between donations	182.85	173.45	14	140	4147	550,338

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

period. In this span of time, about 38% of our 72, 638 donors are females. The median donors' age is 51, and the median number of donations is 8 (two donations per year). Considering males only, the median age is 52 years, and the median number of donations is 10 (three donations per year).

The main variable of interest is a time-varying proxy of a donor's performance: the elapsed days between two consecutive donations (looking at days before a donation, i.e., the number of days since the last donation).[5] Thanks to the structure of our data, we can sort the donations of each donor by time and compute the elapsed time between two consecutive donations. As shown in Table 1, the observed median elapsed time between two successive donations is 151 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 12 years. As described previously in Section 1.1, the associative rewarding system entered into force in 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 medal. As shown in Table 2, the first three awards can be obtained at 8, 16, or 36 donations (without any time constraint) or with at least 6, 12, or 24 donations, but only if the donor has been a member of AVIS for at least 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 donations or, alternatively, with at least 40, 60, or 80 donations but only if the donor has been a member of AVIS at least 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 us to distinguish between the medals received just for the total number of donations made and 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 and the maximum number of years of membership of the donors observed in the dataset is 12.[6] Considering the panel characteristics of our data, we can reconstruct the reward history of each donor. Specifically, when a donor is awarded 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)*.

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, that is, considering all the other donations, is 196 days passing from the last donation. The average time is higher when we consider the delay immediately before a donation that grants a PRM

TABLE 2 | Medals award system.

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

Note: 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 3 | Medals awarded in the database.

	All donors		Males	
Medals	***N***	**Percent**	***N***	**Percent**
Private awards for the years of membership				
"Green award"	24,358	33.53	19,592	43.61
"Blue award"	20,721	28.53	15,544	34.60
"Red award"	5638	7.76	3960	8.81
Private awards for the number of donations				
"Green award"	26,371	36.30	10,531	23.44
"Blue award"	11,809	16.25	3881	8.64
"Red award"	4216	5.80	1364	3.10
Public awards				
"Gold award"	1973	2.71	642	1.43
"Ruby award"	610	0.83	166	0.04
"Emerald award"	208	0.29	42	0.01
Unique donors	72,628		44,919	

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.

TABLE 4 | Elapsed time between consecutive donations: descriptive statistics.

	No awards	Private award *M*	Private award *N*	Public award
All donors				
Mean	196.5	323.2	159.5	95.1
Median	151.0	224.0	137.0	63.0
St. Dev	190.4	299.8	109.1	98.3
N. Of Obs.	770,700	50,717	42,396	2791
Males				
Mean	182.9	258.8	106.5	62.2
Median	140.0	196.0	101.0	43.0
St. Dev.	173.5	207.3	59.3	59.6
N. Of Obs.	550,338	39,096	15,776	850

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).

(323 days) with respect to a donation that grants a PRN (159 days). The average time for donations that grant a PA, is much shorter (95 days). The fact that donation speed is relatively higher when medals with stricter requirements (PRN and PA) are obtained could be due to a selection effect, by which "better" donors tend to obtain more demanding rewards, and to an incentivizing effect of the medals.[7] Our empirical strategy aims to purge the data from this possible selection effect to understand if these awards affect donors' performance.

3 | Empirical Strategy

To establish if, and under what conditions, symbolic awards can motivate donors' contribution one would like to observe donors' behavior under a symbolic award scheme and its counterfactual (List and Rasul 2011). However, a proper counterfactual is often unavailable because awards are typically offered to the whole population of potential donors and are given to all who show outstanding behavior. So, obtaining an award systematically correlates with good performance as a donor, but a causal relationship cannot be easily established. One empirical strategy is to run a field experiment where some potential donors are randomly assigned to the award scheme, and some are not. Unfortunately, this approach is hard to implement in voluntary organizations since they often oppose such disparity of treatment, expecting some crowding-out effect on motivations or being afraid of deteriorating reputation.[8]

An alternative to actual randomization is the use of longitudinal research designs. In event studies, as in the empirical analyses presented in this paper, the available panel structure of the data is exploited to control for unobserved determinants of performance that are specific to each individual and are correlated to the assignment of the symbolic award.[9] To investigate the impact of symbolic awards on donors' behavior we rely on the following empirical models:

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

where $Elaps_{i,c,n,t}$ 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 $i's$ $n-1th$ and nth 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 that 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 the 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 models that differ in how we try (or not) to take into account and 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.[10] 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 $\lambda_{i,n}$ that represents other unobserved determinants of performance that are specific to each individual.

$$\lambda_{i,n} = \begin{cases} 0 & (Baseline) \\ \alpha_{i} w_{n} & \text{with } w_{n} = 1 (Level\ Effect) \\ \alpha_{i} w_{n} & \text{with } \alpha_{i} = (\alpha_{i,1}, \alpha_{i,2}) \text{ and } w_{n} = (1, n)' (Random\ Trend\ 1) \\ \alpha_{i} w_{n} & \text{with } \alpha_{i} = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}) \text{ and } w_{n} = (1, n, n^{2})' (Random\ Trend\ 2) \\ \alpha_{i} w_{n} & \text{with } \alpha_{i} = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}, \alpha_{i,4}) \text{ and } w_{n} = (1, n, n^{2}, n^{3})' (Random\ Trend\ 3) \end{cases}$$

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 careers. In other words, donors could self-select in obtaining different types of awards based on their underlying performance trends, not only on their performance levels. For instance, one may reasonably 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 with a relatively higher level of intrinsic motivations. However, it is also possible that this is partly because their intrinsic motivations increase relatively more over the donation career. To control for this, we have to allow individuals to self-select in obtaining different awards based on unobserved individual characteristics that could affect both the current performance and its growth rate.

Using the above model that does not take into account unobserved individual heterogeneity, that is, the model we have called *Baseline*, which amounts to considering the available panel of individual observations as it was a pooled cross-section, will overestimate or underestimate the effect of the award scheme on the elapsed time between donations depending on the sign of the correlation between obtaining the different awards and $\lambda_{i,n}$. By comparing the results of this first baseline model, in which $\lambda_{i,n}$ is left in the error term, to the other four models, in which we try to take into account the individual unobserved heterogeneity, it is possible to evince the sign of this self-selection effect. Given that, as described above, the requirements to obtain *PRM* medals are less strict than those for obtaining *PRN* medals, one could expect that people who self-select into obtaining *PRM* awards have relatively lower intrinsic motivations with respect to those obtaining a *PRN* medal. Indeed, in our sample, donors receiving a public award, for which the requirements are the highest (and therefore the intrinsic motivations), are in practice a selected group of persons among those receiving *PRN* medals (i.e., only around 3% of donors receiving a PA medal receives at least a *PRM* medal).

Following Lacetera and Macis (2010b), in our second model, which we call *Level Effect*, 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 models we employ a random trend model (Wooldridge 2002, 2005; Miller 2023), 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 model (*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* model as a generalization of the way in which we allow donors' efficiency to vary along their career in the *Baseline* and *Level Effect* models. Indeed, in *Baseline* and *Level Effect* models 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* model each individual is in principle allowed to have a different linear efficiency trend.[11] Finally, in the last two models we allow for more flexibility in the shape of the trend: in the *Random Trend 2* model $\alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3})$ and $w_n = (1, n, n^2)'$, and in the *Random Trend 3* model $\alpha_i = (\alpha_{i,1}, \alpha_{i,2}, \alpha_{i,3}, \alpha_{i,4})$ and $w_n = (1, n, n^2, n^3)'$. In these last three models 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 sizable effect of the medal achievement well before the donation for which the 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.

Finally, we test the robustness of our main findings using several strategies. First, we rerun our preferred model on alternative subsamples: excluding casual donors, excluding both casual and extremely frequent donors, considering only plasma donations, and restricting the sample to whole-blood donations. Second, we perform a placebo test by randomly assigning award timings while maintaining medal types. Third, we apply the imputation estimator by Borusyak et al. (2022), which avoids bias related to the OLS weighting scheme in the presence of heterogeneous treatment effects (Goodman-Bacon 2021; Goldsmith-Pinkham et al. 2024). Fourth, we verify that modeling individual performance trends with respect to years of membership instead of donation count yields similar results.

4 | Results

4.1 | Main Results

In this section, we graphically present 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 behavior and the assignment of medals (as explained in Section 2) and to avoid mixing them with gender-specific differences in donation behavior. Moreover, for women, 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.[12]

The results of the *Baseline* model, which does not account for individual unobserved heterogeneity, detect an impact of the awards also for all the considered pre-award donations (i.e., the donations for which $k < 0$) and indicate that the relatively more demanding requirements of *PRN* and *PA* are associated with higher donor performance than *PRM*. However, these patterns are at least in part driven by donors with different performance self-selecting into different award types, as suggested by the

results of the other models, which control for unobserved individual heterogeneity in increasingly stringent ways. Indeed, if we focus on the results for the pre-award donations there is a pattern across models that is common to the three types of award: going from the *Baseline* model to the *Random Trend* models, the economic and the statistical significance of the impact estimated for the pre-award donations tend to decrease progressively. Our preferred model is the *Random Trend 3* model, whose results are shown in Figure 1, for which the estimated pre-award impacts 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.[13]

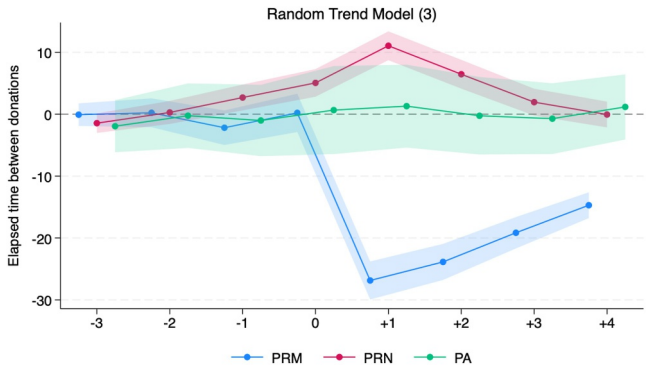

FIGURE 1 | Estimated impact of the three types of medals according to the *Random Trend 3* model. The different lines connect the $\widehat{\delta_k^B}$ (with $B = (PRM, PRN, PA)$) obtained by using the *Random Trend 3* model defined in Equation (1). The *x*-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

Let us concentrate on the estimation results for $k \geq 0$ (see Figure 1). Focusing on *PRM*, we find that, after taking into account unobserved heterogeneity, receiving the award has no immediate effect on elapsed time, with the estimated effect at $k = 0$ not statistically or economically significant. However, the estimated post-award impacts suggest a sizable and persistent positive effect of *PRM* medals on donor efficiency. According to our preferred and most flexible model, *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 indicate 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).[14] Finally, as it is shown in Figure 2, 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.

To summarize our main findings, in Figure 1 we show the estimated impacts across the three types of awards for the *Random Trend 3* model. 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 decreases donors' performance. Second, in contrast to what was 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 that are obtained solely on the basis of the number of donations.

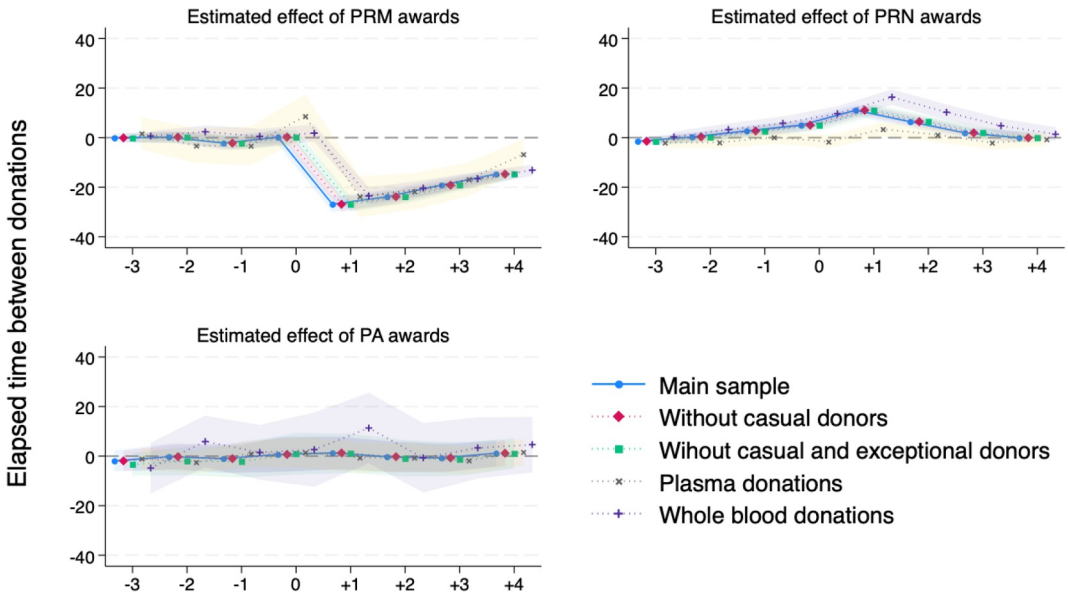

FIGURE 2 | Robustness checks. Estimated impact of the three types of medals according to the *Random Trend 3* model applied to different samples. The different lines connect the $\widehat{\delta_k^B}$ (with $B = (PRM, PRN, PA)$) obtained by using the *Random Trend 3* model, which is defined in Equation (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.

4.2 | Robustness Checks

To check the robustness of our results, in Figure 2 we compare the results for the *Random Trend 3* model 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 five 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 only plasma donations are included (*sub-sample c*); when only whole blood donations are included (*sub-sample d*).[15]

As an additional robustness check, we conduct a "placebo" analysis in which we randomly re-assign the donation number at which each medal is awarded to each donor. In other words, if an individual is awarded a medal, we still maintain that medal for that donor, but we randomly change the donation number at which it is awarded. In this way, we maintain alive possible selection effects, but we shut down possible genuine effects of the awards that are arguably concentrated around the donation at which the medal is awarded. Figure 3 shows that the *Baseline* model without donors' fixed effects still detects an effect for the private awards, while for the public awards it disappears. This estimated zero effect for public awards might be due to the fact that, by choosing the awards' thresholds randomly, we are randomly distributing the effects found in the main analyses, and so, given that for public awards these effects estimated by using the *Baseline* model are for a half positive and the other half negative, the curve becomes flat at zero. Looking at the *Level Effect* model, on the one hand, it wrongly estimates some effects for the PRM awards, especially after obtaining the medal; on the other hand, for the PRN and PA awards, the estimated effect disappears, most probably due to the same reason suggested above in the case of the *Baseline* model for the public awards. Instead, for all medals, the *Random Trend* model does not find significant effects, supporting the choice of this model as our preferred one.

The recent literature has shown a possible lack of robustness of traditional linear two-way fixed effects regressions in the presence of treatment effect heterogeneity. In practice, fixed effect regressions may lead to biased results because the estimated average effect turns out to be a weighted average of heterogeneous treatment effects with non-convex weights (even negative, implying sign reversals) (e.g., Goodman-Bacon (2021)). Goldsmith-Pinkham et al. (2024) describe the consequences of this heterogeneous treatment effects weighting for OLS regressions with multiple treatments. The estimated coefficient on treatment j estimates the sum of two terms: a weighted average of treatment j effects (with convex weights) plus a non-convex combination of effects from other treatments ("contamination bias").

The recently proposed imputation estimator of Borusyak et al. (2022) is robust to the presence of unrestricted heterogeneity in the treatment effects, also in presence of multiple treatments. This alternative approach estimates average treatment effects on the treated by directly imputing counterfactuals to treated units, thus avoiding the use of OLS weights to reweight heterogeneous treatment effects. The results obtained by using this estimator are reported in Figure 4.

In the first step, a model of the outcome in case of no treatment is estimated on the untreated observations. We use the models stemming from Equation (1): $Elaps_{i,c,n,t}(0) = \alpha + \gamma_{c,t} + \rho_a + \beta X_n + \lambda_{i,n} + \varepsilon_{i,c,n,t}$. Following our assumption of setting $r = -3$ and $g = 4$ in Equation (1), we estimate Equation (1) on the observations that are not contained in the interval from three donations before to four donations after receiving the

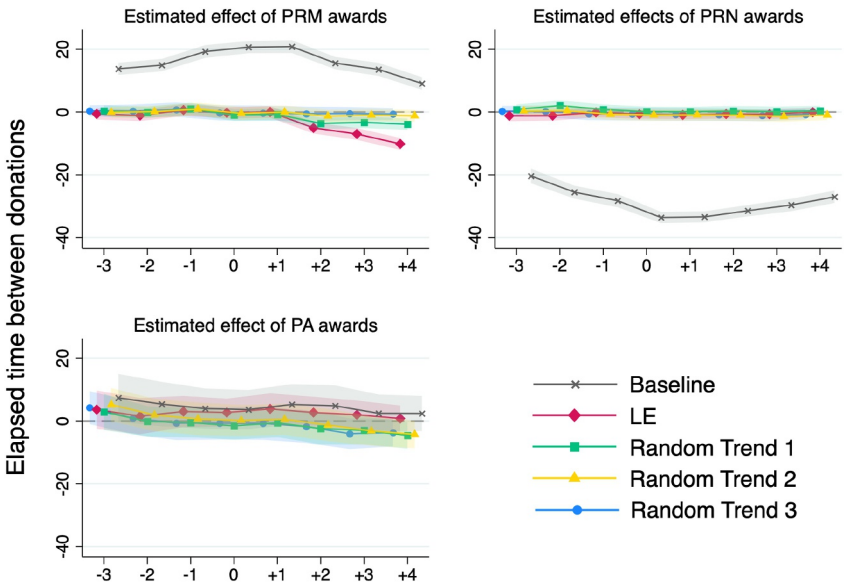

FIGURE 3 | Robustness checks. Estimated impact of the three types of medals (Private awards for the years of membership (PRM), Private awards for the number of donations (PRN) and Public awards (PA)) with randomly picked thresholds to obtain each medal. The different lines connect the $\widehat{\delta_k^B}$ (with $B = (PRM, PRN, PA)$) obtained by using the model 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.

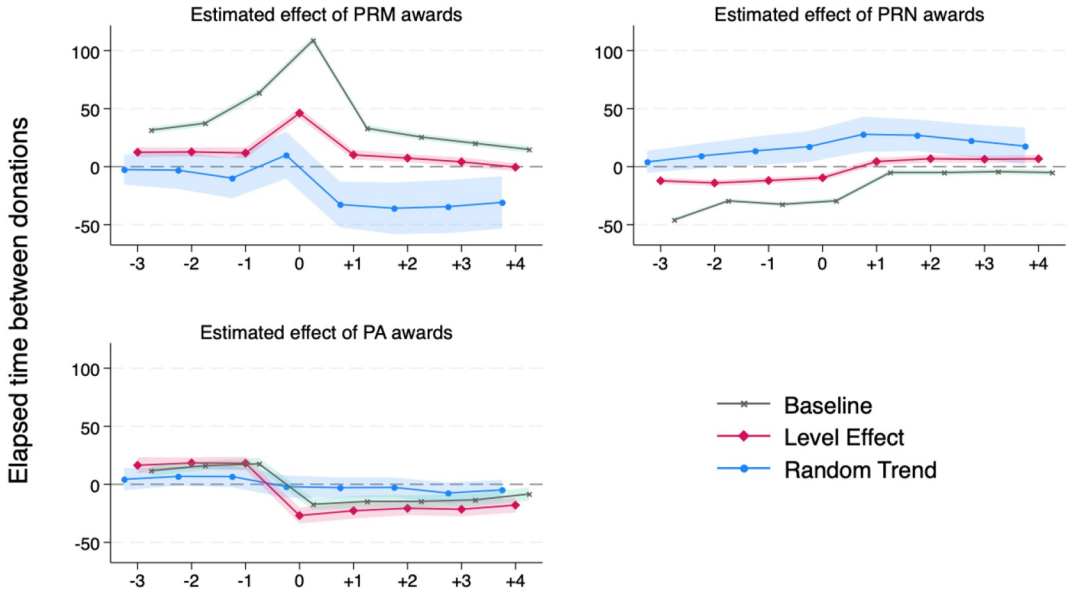

FIGURE 4 | Robustness checks. Estimated impact of the three types of medals (Private awards for the years of membership (PRM), Private awards for the number of donations (PRN) and Public awards (PA)) obtained by applying the estimator recently proposed by Borusyak et al. (2022). Shaded areas refer to the 95% CI computed via a block-bootstrap procedure.

award. Using the estimated coefficients, we predict a counterfactual outcome $\widehat{Elaps}_{i,c,n,t}(0)$ for the treated observations, that is, for those observations left out of the sample in the first stage. Finally, we estimate the average treatment effects δ_k^B as averages of the individual specific treatment effects $Elaps_{i,c,n,t} - \widehat{Elaps}_{i,c,n,t}(0)$ for treated observations of individuals receiving the medal type B at different distances k from the donation for which the persons receive the award (remember that k represents the relative distance of donation n with respect to the donation for which a person receives the award). We use nonparametric bootstrap to obtain confidence bands for the treatment effect estimates (Liu et al. 2022). The results obtained following this procedure are very similar to those presented in the previous paragraph.[16]

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.[17]

5 | Discussion

Non-profit organizations, particularly those dependent on volunteer contributions, strategically employ symbolic incentives such as awards and honors to stimulate and sustain participation and commitment.

In this paper, we have leveraged a unique dataset containing detailed individual donor profiles to evaluate the impact of the symbolic reward system implemented by AVIS (Associazione Volontari Italiani Sangue), the primary Italian blood donors' association, on the frequency of blood donations, as measured by the time elapsed between any two consecutive donations. We have focused on the role played by two features of the award scheme, whether the assignment of medals is kept private or made public and whether medals are assigned thanks to the number of donations only or also thanks to the number of years the donor has been a member of the association. Benefiting from the longitudinal nature of the dataset, encompassing the entire donor population of Tuscany from 2008 to 2019, we are able to account for individual time-constant unobserved characteristics that influence the heterogeneous performance levels and trends of donors and are linked to their self-selection into the different awards. By comparing the results of the different models, in which we have taken into account unobserved heterogeneity in a progressively more stringent fashion, we have investigated whether these self-selection effects conform to what one would expect given the structure of the medal scheme, namely, increasing selection on unobservables as the requirements to obtain the award become more demanding. Finally, the event study methodology we have used has allowed us to investigate the temporal dynamics of the awards' impact, discerning whether their impact materializes prior or subsequent to their attainment.

These are the main findings we have uncovered. First, the comparison between the results obtained without considering individual unobserved heterogeneity and those obtained by our preferred models controlling for such heterogeneity suggests that donors with a relatively higher performance tend to obtain PA and PRN medals, while less-performing donors self-select in PRM medals. This is consistent with the relatively less demanding requirements to obtain PRM medals. Second, these symbolic awards do not affect behavior (immediately) before their obtainment. Third, medals positively affect donation behavior after their achievement when their attainment does not depend solely on donation quotas, but also on the years of

membership (i.e., in the case of PRM awards), therefore being accessible also to less-performing donors. Instead, obtaining a PRN medal has a relatively low and short-lived negative influence on donor efficiency, which is concentrated immediately after the achievement of the medal. Fourth, whether the assignment of medals is kept private or made public does not seem to make a difference. However, we acknowledge that the design of this symbolic award system prevents us from examining the effectiveness of award publicity for less-performing donors, as it is limited to individuals who achieve a very high number of donations and because the membership requirement, 20 years, surpasses the maximum time frame we can observe for any single individual.[18]

Overall, the main practical implication of our results is that building loyalty with donors by rewarding those who are not very active but have been donors for a relatively long time can be a better tool for increasing donations than rewarding donors only on the basis of the number of donations. From the point of view of the psychological mechanisms underlying the effectiveness of symbolic incentives for blood donors, our results suggest that motivations linked to status aspirations or reputational signaling, which would imply a surge in donations leading up to the receipt of an award and when the assignment of medals is made public, do not appear to play a significant role. Our results instead point to community belonging and self-perception as the key drivers. Awards may act as tools that affect an individual's 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 prosocial and intrinsic motivations in donors (Frey and Jegen 2001), other forms of extrinsic incentives could positively affect 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). The assignment of an award not strictly based on behavior may also contribute to developing a specific identity as a blood donor and personal involvement in donation practices. In particular, the association's acknowledgment of the volunteer merits may build up the awareness and responsibility to maintain the meritorious status acquired (Winterich et al. 2013). Specifically, receiving an award also derived from a membership criterion may elicit the role-identity of the donors, which 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 through 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 to public acknowledgment because they perceived the former as a recognition of competence in blood donation by the association, while the latter seems to emphasize the extrinsic nature of the incentives.

Finally, our empirical findings also underscore the importance of carefully considering the effects of symbolic awards as tools to influence (prosocial) behavior, which may deviate from initial expectations (Cheema et al. 2019; Robinson et al. 2019). While symbolic awards have been shown to predict retention and engagement in volunteers and charity organizations (Walk et al. 2019; Gallus 2017), their effectiveness cannot be taken for granted. For example, symbolic awards might diminish the signaling content of donations (as recipients may be perceived as donating solely to receive the award), or even lead to motivation crowding out (Frey and Jegen 2001; Bowles and Polania-Reyes 2012; Chao 2017), particularly among donors who are highly intrinsically motivated to donate (which is likely the case for our sample, especially for donors receiving PA and PRN medals). Publicly disclosing information on prosocial behavior, such as when rewards are presented during a public ceremony or when subjects are asked in public whether they would like to pledge a donation, may stimulate prestige and social recognition concerns (Lacetera and Macis 2010b; Meyer and Tripodi 2021). However, it could also exacerbate other unintended consequences, such as established donors' apprehension about being seen as overly image-focused, as suggested by Goette and Tripodi (2024).

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from AVIS Toscana. Restrictions apply to the availability of these data, which were used under license for this study. Data are available by contacting https://www.avistoscana.it/, AVIS Toscana.

Endnotes

[1] More in general, symbolic incentives have a strategic role in non-profit organizations, especially in the voluntary sector (Gallus and Frey 2016; Frey and Gallus 2017). A great variety of awards and honors are provided by many and diverse non-profit organizations (Frey 2005): for example, Caritas and Amnesty International provide awards to contributors, the International Committee of the Red Cross assigns the Florence Nightingale Medal to nurses and nursing aides, National Red Cross organizations assign Blood Donation Medal or the Service Medal, the UN recognizes the Order of the Smile assigned for exemplary engagement for children, and many others can be found out (see also examples in Ginsburgh 2003; Besley 2005; Frey 2007; Rablen and Oswald 2008; Malmendier and Tate 2009).

[2] More references about the Italian National Blood System can be found at the European Blood Alliance webpage.

[3] Our dataset contains 42.7% of donors who donate only whole blood, 2.7% of donors who donate only plasma and, 54.6% of donors who donate both whole blood and plasma.

[4] About 300 donors with at least one donation interval of fewer than 14 days between two consecutive donations, as well as donors with more than 24 donations per year, are excluded from the final sample. These intervals and frequencies do not comply with the rules governing donation intensity.

[5] This is the same dependent variable used by Lacetera and Macis (2010b). Employing as a dependent variable the log of elapsed days leaves unaltered the main results.

[6] Therefore, 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). Moreover, all donors reaching a public award performed both plasma and whole blood donations.

[7] In the second panel of Table 4, we also report the same statistics for the sample of male donors.

[8] Outside the health sector, this is done effectively in Gallus (2017), who studies the effects of purely symbolic awards for contributions to Wikipedia, revealing that such awards have a sizeable effect on newcomer retention. The findings are explained by enhanced self-identification with the community and the role of status and reputation, recognition, and evaluation potential in online communities. Notably, Gallus (2017) is the first field experiment that tests the impact of an official, systematic, and purely symbolic award system, where awards are assigned by a jury of senior community members.

[9] Outside the health sector, this is done in Neckermann et al. (2014) where the approach is applied to estimate the effect of symbolic awards to the workers of a call center, finding that the assignment of a symbolic award increases the core call center performance for some time. The evidence provided by Neckermann et al. (2014) suggests that this effect may be due to the desire to live up to the honor, a motivation related to the maintenance of a satisfying self-image.

[10] Consider 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.

[11] This is why the coefficient on the number of the donation n is not identified in the *Random Trend* models.

[12] In the Appendix B, we show the results obtained by including in the estimation sample also women, Table A4, and by considering a different number of pre-award periods r, Table A5. They are qualitatively similar to those presented here in the main text.

[13] The estimation results of all five models are reported and compared in detail in Appendix A (Figures A1, A2, A3, and Table A1). Table A2 in Appendix A reports joint pre-trend tests for the lead coefficients for the Random Trend Model 3. Each row tests the null hypothesis that the indicated set of pre-award coefficients is jointly equal to zero. The test using only the most distant lead, three donations before the award, does not reject the null of no pre-award effects across PRM, PRN, and PA awards. When donations closer to the award are included, especially the -2 and -1 leads, some joint tests reject the null, mainly for PRN awards. However, the statistically significant lead coefficients are economically small: their magnitude is at most about 3 days, compared with an average elapsed time between donations of 151 days. This pattern suggests that behavior sufficiently far from the award is not affected by future award receipt. The tiny deviations closer to the award for PRN awards reflect economically insignificant anticipatory behavior as donors approach the award threshold.

[14] Interestingly, the differences in the estimated impacts between the *Baseline* and the *Random Trend 3* models indicate that donors with relatively better (worse) performances tend to self-select in obtaining *PRN* (*PRM*) medals, which is consistent with their relatively more (less) demanding requirements. See Appendix A (Figures A1, A2, A3, and Table A1).

[15] The detailed results obtained for these additional samples are reported Table A3 in Appendix B.

[16] Table A6 in Appendix B reports joint pre-trend tests for the lead coefficients for the imputation DID estimator.

[17] Results of this additional robustness check are available upon request.

[18] 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.

[19] The 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 A1, we find that elapsed time from the previous donation is lower for plasma donations, which is consistent with the higher minimum delay 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 top of this linear trend, the estimated positive coefficient associated with the dummy indicating whether a donation number n is greater than 49 also suggests the existence of a nonlinear negative trend. The latter effect vanishes for the *Random Trend* models, for which we allow an individual specific growth rate of efficiency.

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Appendix

A Additional Figures and Tables for Main Results

In the first three Figures A1, A2 and A3, we compare the estimated effects for each type of award across the five considered models. We report the detailed estimation results in Table A1.

Let us first concentrate on the results obtained without considering individual unobserved heterogeneity (i.e., by using the *Baseline* model). The estimated impact for receiving a *PRM*, which is presented in Figure A1, 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

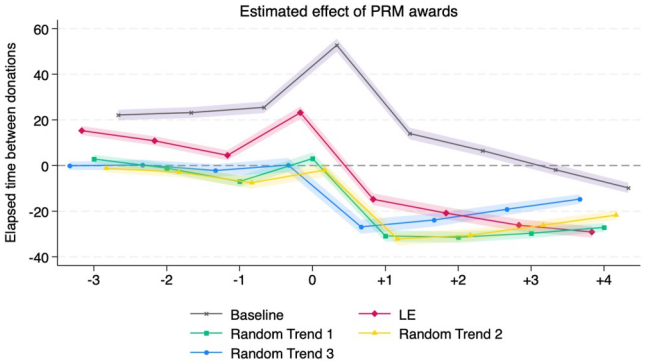

FIGURE A1 | Estimated impact of Private awards for the years of membership on donors' performance. The different lines connect the $\widehat{\delta_k^{PRM}}$ obtained by using the models defined in Equation (1). The *x*-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

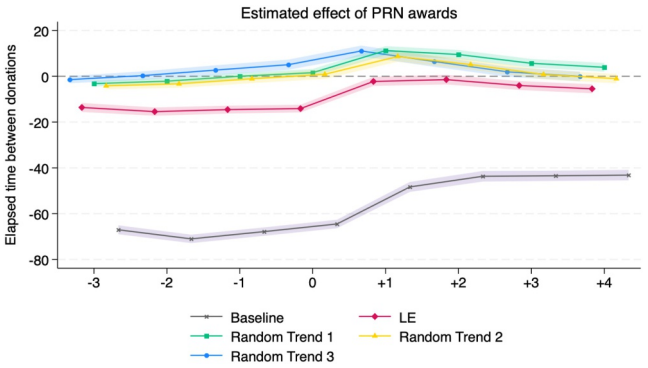

FIGURE A2 | Estimated impact of Private awards for the number of donations on donors' performance. The different lines connect the $\widehat{\delta_k^{PRN}}$ obtained by using the models defined in Equation (1). The *x*-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

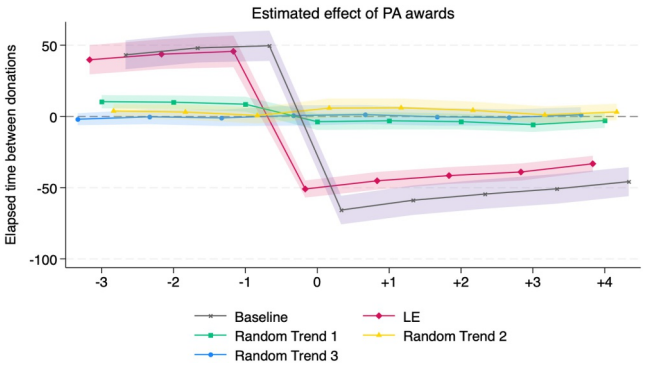

FIGURE A3 | Estimated impact of Public awards on donors' performance. The different lines connect the $\widehat{\delta_k^{PA}}$ obtained by using the models defined in Equation (1). The *x*-axis measures the relative distance of donation n with respect to the donation in which the award is obtained. Shaded areas refer to the 95% CI.

TABLE A1 | Elapsed days since last donation for males: regression results.

	Baseline	LE	RT1	RT2	RT3
Private awards (membership)					
PRM(−3)	22.17***	15.28***	2.87***	−1.21	−0.08
	(1.16)	(1.00)	(0.94)	(0.96)	(0.93)
PRM(−2)	23.20***	10.83***	−1.14	−2.84**	0.23
	(1.21)	(1.02)	(1.07)	(1.14)	(1.19)
PRM(−1)	25.48***	4.47***	−6.97***	−7.51***	−2.18
	(1.28)	(1.12)	(1.21)	(1.35)	(1.42)
PRM	52.72***	23.15***	3.05**	−1.98	0.22
	(1.47)	(1.39)	(1.35)	(1.48)	(1.58)
PRM(+1)	14.04***	−14.78***	−30.83***	−32.12***	−26.86***
	(1.31)	(1.32)	(1.29)	(1.44)	(1.57)
PRM(+2)	6.53***	−20.84***	−31.40***	−30.51***	−23.86***
	(1.25)	(1.35)	(1.22)	(1.35)	(1.49)
PRM(+3)	−1.82	−26.15***	−29.68***	−26.14***	−19.15***
	(1.20)	(1.36)	(1.13)	(1.19)	(1.29)
PRM(+4)	−9.78***	−29.12***	−27.11***	−21.71***	−14.70***
	(1.14)	(1.26)	(1.00)	(1.02)	(1.06)
Private awards (number of don.)					
PRN(−3)	−67.03***	−13.61***	−3.20***	−4.18***	−1.44*
	(0.99)	(1.00)	(0.65)	(0.78)	(0.81)
PRN(−2)	−71.00***	−15.44***	−2.13***	−3.29***	0.29
	(0.94)	(0.93)	(0.71)	(0.89)	(0.95)
PRN(−1)	−67.83***	−14.55***	0.02	−1.09	2.70**
	(0.94)	(0.89)	(0.77)	(0.98)	(1.07)
PRN	−64.49***	−14.10***	1.56*	0.88	5.06***
	(0.95)	(0.85)	(0.83)	(1.04)	(1.14)
PRN(+1)	−48.31***	−2.25**	11.22***	8.64***	11.06***
	(1.11)	(1.01)	(0.99)	(1.14)	(1.19)
PRN(+2)	−43.67***	−1.45	9.51***	5.10***	6.46***
	(1.18)	(1.07)	(1.02)	(1.14)	(1.19)
PRN(+3)	−43.44***	−4.03***	5.68***	0.79	1.95*
	(1.14)	(0.99)	(0.96)	(1.08)	(1.10)
PRN(+4)	−43.15***	−5.47***	3.92***	−1.05	−0.05
	(1.18)	(1.01)	(0.98)	(1.05)	(1.06)
Public awards					
PUB(−3)	43.22***	39.76***	10.37***	3.84	−1.94
	(5.17)	(5.21)	(2.36)	(2.41)	(2.15)
PUB(−2)	48.08***	43.70***	10.00***	3.08	−0.24
	(5.22)	(5.32)	(2.41)	(2.67)	(2.66)
PUB(−1)	49.61***	45.65***	8.60***	0.69	−1.01
	(5.41)	(5.67)	(2.68)	(2.89)	(2.94)
PUB	−65.69***	−50.92***	−3.67	5.86*	0.67
	(5.11)	(3.07)	(2.96)	(3.43)	(3.63)
PUB(+1)	−58.77***	−45.16***	−3.02	6.06*	1.30
	(5.28)	(3.17)	(3.09)	(3.30)	(3.42)
PUB(+2)	−54.47***	−41.50***	−3.62	4.32	−0.25
	(5.24)	(3.01)	(2.81)	(3.10)	(3.19)

(Continues)

TABLE A1 | (Continued)

	Baseline	LE	RT1	RT2	RT3
PUB(+3)	−50.79***	−38.98***	−5.75**	1.12	−0.72
	(5.31)	(3.05)	(2.62)	(3.02)	(2.92)
PUB(+4)	−45.75***	−33.21***	−2.84	3.15	1.18
	(5.19)	(2.86)	(2.66)	(2.92)	(2.69)
Donations characteristics					
Number of donations	−5.15***	−5.84***			
	(0.15)	(0.36)			
Donations > 50,160.68***	134.07***	17.70***	−6.86	0.21	
	(3.76)	(7.28)	(4.31)	(5.61)	(5.77)
Plasma	−34.93***	−36.12***	−29.57***	−23.80***	−20.50***
	(0.84)	(0.66)	(0.62)	(0.57)	(0.54)
N	549,807	545,333	545,333	545,333	545,333
R^2	0.21	0.45	0.65	0.76	0.83

Note: 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 modeled, 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 A2 | Joint pre-trend tests for the RT3 specification.

Tested coefficients	Medal group	F-statistic	Degrees of freedom	*p*-value
−3 only	All medals	1.42	(3, 18397)	0.2355
−3 and −2	All medals	2.45	(6, 18397)	0.0228
−3, −2, and −1	All medals	6.15	(9, 18397)	< 0.001
−3 and −2	PRM	0.05	(2, 18397)	0.9483
−3 and −2	PRN	6.25	(2, 18397)	0.0019
−3 and −2	PA	0.67	(2, 18397)	0.5111
−3, −2, and −1	PRM	2.14	(3, 18397)	0.0929
−3, −2, and −1	PRN	15.25	(3, 18397)	< 0.001
−3, −2, and −1	PA	0.48	(3, 18397)	0.6973

Note: The table reports joint Wald tests from the RT3 specification presented in Table A1. The dependent variable is days since the last donation. The specification absorbs age fixed effects, seat-by-month-by-year fixed effects, and donor-specific cubic trends in donation number. Standard errors are clustered by donor and by seat-by-month-by-year. Each test evaluates whether the listed pre-treatment coefficients are jointly equal to zero.

two donations after ($k = +1$ and $k = +2$). Instead, as shown in Figure A2, we find that for all the donations we consider around a *PRN* the performance of donors tends 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 A3, 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 model 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.[19] Therefore, as explained above, in the other models we control for unobserved individual heterogeneity more and more stringently.

Let us concentrate on the estimation results across the five models for $k \geq 0$. Focusing on *PRM* (Figure A1) we find that, after taking into account unobserved heterogeneity, the significant and positive estimated influence on elapsed time estimated by using the *Baseline* model at $k = 0$ progressively disappears. Moreover, the post-award impacts estimated by using the other four models suggest a sizable and persistent positive effect of *PRM* medals on donor efficiency, which is also in stark contrast with the results obtained by using the *Baseline* model: the sign of the effects tends to be reversed and/or its economic significance increases. With respect to *PRN* (see Figure A2) we see that controlling for unobserved heterogeneity decreases the size of the estimated post-award impact of receiving the award and, also in this case, reverses its sign (with the *Random Trend* models). Moreover, comparing the differences in the estimated impacts between the *Baseline* and the *Random Trend 3* models 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 A3, 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.

B Additional Tables for Robustness Checks

TABLE A3 | Elapsed days since last donation for males: regression results for different sub-samples.

	(a)	(b)	(c)	(d)
Private awards (membership)				
PRM(−3)	−0.08	−0.14	1.69	0.68
	(0.91)	(0.91)	(3.30)	(1.03)
PRM(−2)	0.23	0.17	−3.23	2.35*
	(1.16)	(1.16)	(3.54)	(1.32)
PRM(−1)	−2.18	−2.22	−3.29	0.53
	(1.39)	(1.39)	(3.96)	(1.58)
PRM	0.22	0.18	8.67**	1.83
	(1.54)	(1.54)	(4.41)	(1.75)
PRM(+1)	−26.86***	−26.84***	−23.74***	−23.49***
	(1.53)	(1.53)	(4.21)	(1.71)
PRM(+2)	−23.86***	−23.81***	−21.70***	−20.33***
	(1.45)	(1.46)	(3.72)	(1.62)
PRM(+3)	−19.15***	−19.08***	−16.78***	−16.59***
	(1.26)	(1.26)	(3.43)	(1.41)
PRM(+4)	−14.70***	−14.62***	−6.71**	−13.13***
	(1.04)	(1.04)	(3.10)	(1.16)
Private awards (number of don.)				
PRN(−3)	−1.44*	−1.54*	−2.01*	0.36
	(0.79)	(0.79)	(1.21)	(1.06)
PRN(−2)	0.29	0.19	−1.95	3.31***
	(0.93)	(0.94)	(1.22)	(1.25)
PRN(−1)	2.70***	2.62**	0.15	5.83***
	(1.04)	(1.05)	(1.33)	(1.39)
PRN	5.06***	5.05***	−1.62	9.71***
	(1.11)	(1.13)	(1.32)	(1.51)
PRN(+1)	11.06***	11.05***	3.45**	16.34***
	(1.16)	(1.17)	(1.47)	(1.59)
PRN(+2)	6.46***	6.49***	1.18	10.26***
	(1.16)	(1.18)	(1.49)	(1.59)
PRN(+3)	1.95*	2.02*	−2.02	4.80***
	(1.08)	(1.09)	(1.39)	(1.50)
PRN(+4)	−0.05	−0.01	−0.63	1.40
	(1.04)	(1.05)	(1.40)	(1.41)
Public awards				
PA(−3)	−1.94	−3.33	−1.02	−4.83
	(2.09)	(2.33)	(2.20)	(5.22)
PA(−2)	−0.24	−2.00	−2.48	5.91
	(2.59)	(2.94)	(2.30)	(5.29)
PA(−1)	−1.01	−2.15	1.00	1.51
	(2.87)	(3.30)	(2.68)	(5.63)
PA	0.67	0.96	1.45	2.63
	(3.54)	(4.28)	(3.11)	(7.62)
PA(+1)	1.30	1.12	−0.60	11.33
	(3.33)	(4.01)	(3.13)	(7.25)

(Continues)

TABLE A3 | (Continued)

	(a)	(b)	(c)	(d)
PA(+2)	−0.25	−0.90	−0.64	−0.69
	(3.12)	(3.74)	(2.84)	(7.13)
PA(+3)	−0.72	−1.24	−1.75	3.32
	(2.84)	(3.41)	(2.85)	(6.29)
PA(+4)	1.18	1.09	1.63	4.62
	(2.62)	(3.09)	(2.66)	(5.70)
Donations characteristics				
Donations > 50	0.21	−1.60	−1.00	3.24
	(5.62)	(6.61)	(4.35)	(9.65)
Plasma	−20.50***	−20.68***		
	(0.53)	(0.54)		
N	519,489	515,716	110,401	425,796
R^2	0.79	0.78	0.85	0.85

Note: 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 A1. In sub-sample (a) persons with 5 or fewer 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. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

TABLE A4 | Elapsed days since last donation for men and women: regression results.

	Baseline	LE	RT1	RT2	RT3
Private awards (membership)					
PRM(−1)	63.48***	20.08***	7.80***	6.73***	7.06***
	(1.35)	(1.09)	(0.93)	(0.88)	(0.85)
PRM	104.54***	52.88***	26.35***	20.49***	16.62***
	(1.63)	(1.31)	(1.14)	(1.05)	(1.02)
PRM(+1)	25.88***	−15.69***	−28.17***	−24.10***	−20.38***
	(1.11)	(1.01)	(0.92)	(0.89)	(0.87)
Private awards (number of don.)					
PRN(−2)	−35.90***	−8.64***	−0.08	1.70***	1.92***
	(0.92)	(0.59)	(0.55)	(0.59)	(0.62)
PRN(−1)	−36.59***	−12.81***	−2.14***	−0.57	0.30
	(0.81)	(0.58)	(0.54)	(0.59)	(0.63)
PRN	−32.67***	−13.01***	−1.20**	0.28	1.70***
	(0.78)	(0.60)	(0.58)	(0.62)	(0.66)
PRN(+1)	−8.70***	7.27***	13.31***	10.59***	9.37***
	(0.97)	(0.86)	(0.78)	(0.73)	(0.72)
Public awards					
PA(−3)	27.95***	11.16***	8.79***	6.82***	−0.46
	(3.30)	(2.66)	(1.75)	(1.78)	(1.80)
PA(−2)	32.72***	13.88***	8.58***	6.31***	−0.20
	(3.34)	(2.72)	(1.79)	(1.91)	(2.00)
PA(−1)	36.79***	16.27***	7.43***	4.18**	−0.93
	(3.57)	(3.03)	(2.07)	(2.13)	(2.20)
PA	−12.06***	−13.21***	5.72***	7.14***	0.43
	(3.69)	(2.28)	(2.17)	(2.30)	(2.43)
PA(+1)	−9.98***	−12.23***	3.53*	4.54**	−2.33
	(3.69)	(2.16)	(2.11)	(2.24)	(2.40)

(Continues)

TABLE A4 | (Continued)

	Baseline	LE	RT1	RT2	RT3
PA(+2)	−8.71**	−12.05***	0.38	2.30	−4.29*
	(3.81)	(2.23)	(2.12)	(2.23)	(2.32)
PA(+3)	−5.24	−10.07***	−0.28	2.03	−2.54
	(3.94)	(2.29)	(2.01)	(2.13)	(2.15)
PA(+4)	1.31	−3.82	4.35**	5.16**	0.98
	(4.26)	(2.59)	(2.12)	(2.22)	(2.20)
Donations characteristics					
Number of donations	−6.11***	−5.71***			
	(0.17)	(0.31)			
Donations > 50	199.73***	124.71***	10.19***	−8.31**	−0.85
	(3.96)	(5.84)	(3.51)	(4.23)	(4.20)
Plasma	−34.97***	−41.50***	−32.03***	−25.97***	−21.81***
	(0.79)	(0.64)	(0.59)	(0.55)	(0.51)
Gender	66.57***				
	(0.50)				
N	770,700	761,717	761,717	761,717	761,717
R^2	0.21	0.45	0.66	0.78	0.85

Note: 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 modeled, 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 A5 | Elapsed days since last donation for males: regression results with $r = -1$ for private medals.

	Baseline	LE	RT1	RT2	RT3
Private awards (membership)					
PRM(−1)	26.82***	2.88***	−1.47	0.91	3.37***
	(1.15)	(0.99)	(0.93)	(0.90)	(0.87)
PRM	55.99***	25.56***	12.83***	10.67***	9.39***
	(1.34)	(1.20)	(1.06)	(1.02)	(1.01)
PRM(+1)	19.96***	−8.90***	−18.21***	−16.90***	−15.22***
	(1.15)	(1.05)	(0.97)	(0.95)	(0.96)
PRM(+2)	14.96***	−12.46***	−17.47***	−14.43***	−10.99***
	(1.09)	(1.04)	(0.91)	(0.87)	(0.86)
Private awards (number of don.)					
PRN(−1)	−59.01***	−11.27***	0.20	0.77	2.26***
	(0.82)	(0.61)	(0.54)	(0.57)	(0.59)
PRN	−55.91***	−10.69***	2.01***	2.92***	4.73***
	(0.82)	(0.60)	(0.59)	(0.63)	(0.67)
PRN(+1)	−38.52***	2.13***	12.20***	10.93***	11.01***
	(1.02)	(0.82)	(0.80)	(0.79)	(0.78)
PRN(+2)	−32.24***	3.86***	10.87***	7.56***	6.81***
	(1.09)	(0.90)	(0.82)	(0.78)	(0.77)
Public awards					
PA(−3)	54.04***	39.19***	9.09***	3.53	−2.29
	(5.42)	(4.91)	(2.32)	(2.38)	(2.15)
PA(−2)	58.99***	42.96***	8.54***	2.78	−0.57
	(5.48)	(4.99)	(2.36)	(2.64)	(2.66)
PA(−1)	60.53***	44.75***	7.03***	0.52	−1.28
	(5.65)	(5.31)	(2.64)	(2.86)	(2.95)

(Continues)

TABLE A5 | (Continued)

	Baseline	LE	RT1	RT2	RT3
PA	−67.94***	−46.99***	−2.76	5.91*	0.69
	(5.33)	(2.95)	(2.93)	(3.40)	(3.62)
PA(+1)	−60.64***	−41.45***	−2.17	6.19*	1.37
	(5.50)	(3.07)	(3.07)	(3.28)	(3.41)
PA(+2)	−56.32***	−38.03***	−2.87	4.46	−0.14
	(5.44)	(2.93)	(2.80)	(3.07)	(3.19)
PA(+3)	−52.44***	−35.81***	−5.15**	1.23	−0.63
	(5.51)	(2.96)	(2.61)	(3.00)	(2.91)
PA(+4)	−46.98***	−30.25***	−2.29	3.24	1.25
	(5.41)	(2.78)	(2.64)	(2.91)	(2.68)
Donations characteristics					
Number of donations	−5.34***	−5.37***			
	(0.16)	(0.32)			
Donations > 50	178.08***	127.43***	14.12***	−7.19	−0.17
	(3.97)	(6.64)	(4.23)	(5.54)	(5.77)
Plasma	−39.82***	−36.71***	−29.60***	−23.91***	−20.54***
	(0.89)	(0.66)	(0.62)	(0.58)	(0.54)
N	549,807	545,333	545,333	545,333	545,333
R^2	0.20	0.44	0.65	0.76	0.83

Note: 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 modeled, 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 A6 | Joint pre-trend tests for the imputation DID random-trend specification.

Tested coefficients	Medal group	χ^2 statistic	Degrees of freedom	*p*-value
−3 only	All medals	1.73	3	0.6296
−3 and −2	All medals	8.23	6	0.2215
−3, −2, and −1	All medals	14.93	9	0.1130
−3 and −2	PRM	0.17	2	0.9170
−3 and −2	PRN	3.09	2	0.2129
−3 and −2	PA	3.78	2	0.1509
−3, −2, and −1	PRM	1.42	3	0.7015
−3, −2, and −1	PRN	5.70	3	0.1274
−3, −2, and −1	PA	5.14	3	0.1616

Note: The table reports joint Wald tests for the imputation DID estimator with the random-trend specification. The dependent variable is days since the last donation. Untreated potential outcomes are estimated using observations outside all award event windows, absorbing age fixed effects, seat-by-month-by-year fixed effects, and donor-specific linear trends in donation number. The reported tests evaluate whether the listed pre-treatment imputed effects are jointly equal to zero. Test statistics are reported as chi-squared statistics because the variance-covariance matrix is based on the bootstrap estimates.