Online Appendix for "The Importance of Being Marginal: Gender Differences in Generosity"

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This appendix describes the structural estimation procedure underlying the quantitative estimates of gender-specific social preferences presented in the main paper. The estimation procedure generalizes DellaVigna et al. (2012) to allow for gender-specific parameters. In the theoretical model, we suppress gender indicators for notational simplicity; we then spell out in the description of the estimation procedure which estimates are gender-specific. We also report the reduced form results by gender of completion of an unpaid survey.

Completion of an unpaid survey. Figure 1 reports the reports the share completing an unpaid 5-minute survey in 2009 for the three treatments – baseline, flyer, and flyer with opt-out. The bars for each gender report the share of all households contacted which answer the door, agree to compete the survey and are of a specific gender. Hence, the sum of the male and female bars equals (up to a small share of respondents with unreported gender) the unconditional share completing the survey. The patterns in Figure 1 indicate that in the control group women are less likely to complete the survey then male, but are somewhat more likely to complete the survey in the flyer treatment, indicating a higher share of women sorting in. Finally, in the opt-out treatment the share of women completing the survey is lower than the share of men, consistent with the results of the charitable giving fund-raising. This latter result indicates higher sorting out by women when the cost of doing so is small (checking a box).

Theoretical Framework

We consider a two-stage game between a potential giver and a solicitor. In the first stage, the giver may receive a flyer of the upcoming visit and, if so, notices the flyer with probability $r \in (0, 1]$. In the second stage, the solicitor visits the home. The giver opens the door with probability h. If she did not notice the flyer (or did not receive one), h is equal to a baseline probability $h_0 \in (0, 1)$. If she noticed the flyer, she can adjust the probability to $h \in [0, 1]$ at a cost $c(h)$, with $c(h_0) = 0$, $c'(h_0) = 0$, and $c''(\cdot) > 0$. That is, the marginal cost of small adjustments is small, but larger adjustments have an increasingly large cost.

Charity donation solicitation. If the giver is present, she donates an amount $g \geq 0$. If she is absent, there is no donation ($g = 0$). A giver j of gender $i \epsilon \{male, female\}$ has utility

$$U^i(g_j) = u(W - g_j) + a^i_j v^i\left(g_j, G^i\right) - s^i(g_j). \tag{1}$$

In the discussion that follows, we suppress the indices for individual as well as gender. The utility of private consumption, u, is derived from the pre-giving wealth W minus the donations given to the solicitor (g). The private utility satisfies standard properties: $u'(\cdot) > 0$ and $u''(\cdot) \leq 0$.

The utility from giving to the charity is $av(\Gamma + g)$, where the parameter Γ governs the concavity of the altruism function. In the case of pure altruism, $\Gamma \equiv G$ is the amount given by others to the charity. Then, we can think of $v(G + g)$ as the production function of the charity, which is increasing in the donation g but has decreasing returns: $v'_g(\cdot, \cdot) > 0$, $v''_{g,g}(\cdot, \cdot) < 0$, and $\lim_{g \to \infty} v'(g, \cdot) = 0$.

The parameter $a \geq 0$ denotes the level of altruism, and the overall utility from giving is $av\left(G+g\right)$. More generally, in the case of impure altruism (warm glow), Γ need not equal G.

The third element in the utility function is social pressure. The giver of gender i pays a utility cost $s(g) = S \cdot (g^s - g) \cdot 1_{g<g^s} \geq 0$ for not giving or only a giving small amount to the solicitor. The cost is highest for the case of no donation ($s(0) = Sg^s$), decreases linearly in g, and is zero for donations of g^s or higher. The giver does not incur a social pressure cost if she is away from home during the visit. The special case of $S = 0$ (no social pressure) and $a = 0$ (no altruism or warm glow) represents the standard model. We further assume that the giver is aware of her own preferences and rationally anticipates her response to social pressure.

Survey solicitation. Individuals receive a utility sv (which could be positive or negative) from completing a 10-minute survey for no monetary payment. In addition, individuals receive utility from a payment m for completing the survey, and receive disutility from the time cost t of the survey, both of which are deterministic. Assuming (locally) linear utility, we add these terms to obtain the overall utility from completing a survey: $sv + m - t$. We denote by S^{sv} the social pressure cost of saying no to a survey request. The agent undertakes the survey if $sv + m - t$ is larger than $-S^{sv}$. The threshold $\bar{sv}^{m,t} = -S^{sv} - (m-t)$ is the lowest level of sv such that individuals will agree to complete the survey if asked. An increase in the social pressure S^{sv} or in the pay m, or a decrease in the cost of time t will lower the threshold and hence increase the probability of survey completion. The decision problem of staying at home conditional on receiving a notice is

$$\max_{h\in[0,1]} h \max\left(sv + m - t, -S^{sv}\right) - \frac{\left(h-h_0\right)^2}{2\eta}. \tag{2}$$

Taking into account corner solutions for h^*, this leads to a solution for the probability of being at home: $h^* = \max\left[\min\left[h_0 + \eta \max\left(sv + m - t, -S^{sv}\right), 1\right], 0\right].$

Assumptions. To estimate the model, we impose the following additional assumptions.

1. We assume that the homes approached are of either male or female "type", with a share p of female homes. Thus, we abstract away from the presence of multiple household members who might engage in collective decision making about who should answer the solicitor's knock. The parameter p is identified as the share of females answering the door when the solicitor's visit is unanticipated. This same share p is assumed to apply to homes in all the treatments - in the opt-out flyer treatment, for example, we assume that a share p of the homes to which the flyer is delivered are of the female type.

2. The private utility of consumption is linear, $u(W - g) = W - g$. This assumption is justified by the local linearity implied by a model of expected utility.

3. The parameter for altruism towards the charities, a, comes from a normal distribution with mean μ and variance σ^2. In the estimation, the distributions are allowed to differ across genders by mean (reflecting the different nature of the two charities) and variance; however, we impose that the variance of altruism be the same for the two charities.[1]

4. The utility sv of completing a 10-minute survey is assumed to be normally distributed with parameters μ^{sv} and σ^{sv}. We allow sv to be negative for households that dislike doing surveys without compensation. Both the mean and the variance are allowed to differ across genders.

[1] Results of estimations allowing the variance of altruism to also differ across charities are available upon request. The results for La Rabida are similar to those reported below, but the variance for ECU is imprecisely estimated.

5. The altruism function for charitable giving is $av(g,G) = a\log(\Gamma + g)$, where the parameter Γ governs the concavity of the altruism function for $a > 0$: a large Γ implies that the marginal utility of giving, given by $a/(\Gamma + g)$, declines only slowly in the individual giving g, consistent with pure altruism–the individual cares about the overall donation and her individual giving is only a small part. A small Γ instead indicates that the marginal utility diminishes steeply with the individual giving, more consistent with warm glow. For the results presented here, we fix the value of $\Gamma = 10$, close to the estimated value in DellaVigna et al (2012), and assumed identical across men and women.

6. The social pressure cost S incurred from saying no to the solicitor is allowed to differ across genders and charities, but is assumed to be homogeneous within genders.

7. The level of giving g^S from which on there is no social pressure cost is \$10 (the median donation), for both men and women.

8. The cost of leaving home $c(h)$ is symmetric around h_0 and quadratic: $c(h) = (h - h_0)^2/2\eta$. For the estimates presented in the paper, the elasticity η in assumed to be equal across genders.[2]

Estimated Parameters. The vector of parameters ξ that we estimate are: (i) p, the share of female homes; (ii) h_0^{2008} and h_0^{2009}–the probabilities of opening the door in the 2008 and 2009 no-flyer treatments; (iii) r–the probability of observing (and remembering) the flyer, assumed equal across genders; (iv) η–the responsiveness of the probability of opening the door to the desirability of being at home, assumed equal across genders; (v) μ_a^{ch} and σ_a (where $ch = LaR, Ecu$)–the mean and standard deviation of the normal distribution F from which the

[2] Preliminary estimations available upon request suggest that allowing η to vary across gender does not change the main conclusions.

altruism parameter a is drawn; we allow the mean μ_a^{ch} to differ across genders; (vi) Γ–the curvature of the altruism function, which is assumed to be the same for the two charities and for men and women; (vii) S^{ch} $(ch = LaR, Ecu)$–the social pressure cost associated with a donation request, allowed to differ by gender; the table displays the social pressure cost associated with giving zero, $Sg^S = 10S$; (viii) μ^{sv} and σ^{sv}–the mean and standard deviation of the utility of completing an unpaid 10-minute survey, which differ across genders; (ix) v^{sv}–the value of one hour of time spent completing a survey, assumed equal across genders; and (x) S^{sv}—the social pressure associated with saying no to the survey request, differing across men and women.

Estimation Method. To estimate the model, we use a minimum-distance estimator. Denote by $m(\xi)$ the vector of moments predicted by the theory as a function of the parameters ξ, and by $\hat{m}$ the vector of observed moments. The minimum-distance estimator chooses the parameters $\hat{\xi}$ that minimize the distance $(m(\xi) - \hat{m})' W (m(\xi) - \hat{m})$, where W is a weighting matrix. As a weighting matrix, we use the diagonal of the inverse of the variance-covariance matrix. Hence, the estimator minimizes the sum of squared distances, weighted by the inverse variance of each moment.[3] To calculate the theoretical moments for the probability of opening the door and the probability of giving, we use a numerical integration algorithm based on adaptive Simpson quadrature, implemented in Matlab as the *quad* routine.

Moments. As moments $m(\xi)$ we use the probabilities of taking the various actions (answering the door, giving, completing the survey), each broken down by gender. Note that we do not observe the gender for households who do not answer the door, or who check the opt-out box. Therefore, as empirical moments we use the share that has a certain gender, out of the whole population contacted

[3] Given the large number of moments, weighting the estimates by the inverse of the full variance-covariance matrix is computationally difficult.

in that treatment. For example, the probability of a female answering the door in treatment i is the number of households in which a female answered the door out of all households contacted in treatment i. [4]

The moments are as follows (where $j = F, NF, OO$ and $ch = LaR, Ecu$): (i) the probability of opening the door in the various charity treatments $(P(H)_j^{ch})$; (ii) the probability of checking the opt-out box in the Opt-Out treatment $(P(OO)_{OO}^{ch})$; (iii) the unconditional probability of giving in the various charity treatments $(P(G)_j^{ch})$; (iv) the probability of giving an amount of money in different ranges $(P(0 < G < 10)_j^{ch},\ P(G = g^s = 10)_j^{ch},\ P(10 < G \leq 20)_j^{ch},\ P(20 < G \leq 50)_j^{ch}$, and $P(G > 50)_j^{ch})$; (v) the probability of opening the door in the various survey treatments k (with varying dollar amounts, minutes, and flyer conditional), $P(H)_k^{sv}$, run in 2008 and in 2009; (vi) the unconditional probability of completing the survey in the various survey treatments, $P(SV)_k^{sv}$, run in 2008 and in 2009; and (vii) the probability of checking the opt-out box in the survey Opt-Out treatments $(P(OO)_k^{sv})$. The corresponding empirical moments $\hat{m}$ are estimated in a first stage model using the same controls as in the reduced form regressions in DellaVigna et al. (2012), including solicitor fixed effects and day-time fixed effects.

To calculate the method of minimum distance estimate, we employ a common sequential quadratic programming algorithm (Powell, 1983) implemented in Matlab as the *fmincon* routine. We impose the following constraints: $S^{ch}, S^{sv} \geq 0$ (social pressure non-negative), $\sigma^{ch}, \sigma^{sv} > 0$ (positive standard deviation of altruism), $h_0^{2008}, h_0^{2009}, r \in [0, 1]$ (probabilities between zero and one), and $\eta \in [0, 9999]$ (finite elasticity of home presence). We begin each run of the optimization routine by randomly choosing a starting point, drawn from a uniform

[4] Since we do not observe the share opting out disaggregated by gender, the moment $P(OO)$ is not split by gender. Theoretically, it is calculated as the sum of the shares of females and males choosing to opt out, weighted by the estimated shares p and $1 - p$ of female and male households.

distribution over the permitted parameter space. The algorithm determines successive search directions by solving a quadratic programming sub-problem based on an approximation of the Lagrangian of the optimization problem. To avoid selecting a local minima, we choose the run with the minimum squared distance of 500 runs.[5]

Under standard conditions, the minimum-distance estimator using weighting matrix W achieves asymptotic normality, with estimated variance

$$\text{Var}=(\hat{G}'W\hat{G})^{-1}(\hat{G}'W\hat{\Lambda}W\hat{G})(\hat{G}'W\hat{G})^{-1}/N$$

where $\hat{G} \equiv N^{-1}\sum_{i=1}^{N}\nabla_{\xi}m_i(\hat{\xi})$ and $\hat{\Lambda} \equiv Var[m(\hat{\xi})]$ (Wooldridge, 2002). We calculate $\nabla_{\xi}m(\hat{\xi})$ numerically in Matlab using an adaptive finite difference algorithm.

Identification. While the parameters are estimated jointly, it is possible to describe the main sources of identification of individual parameters. The share of female households p together with the baseline probabilities of answering the door, h_0^{2008} and h_0^{2009}, are identified by the observed probabilities of opening the door in treatments without flyer. The probability of observing and remembering the flyer, r, is identified by two moments in the Opt-out treatment: the fraction of households checking the opt-out box, and the fraction opening the door. The elasticity of opening the door η with respect to incentives is identified by the fraction opening the door in the survey treatments for different payments and survey durations. In addition, η is identified by the amounts given in the different charity treatments.

The survey parameters are identified using the survey moments. The survey completion rates for varying amounts of compensation identify the heterogeneity in the willingness to complete the survey, and hence σ^{sv}. The survey completion

[5]For the results presented here, the best estimate is achieved in about 18 percent of all runs.

rate also identifies the mean willingness to complete a 10-minute survey, μ^{sv}. The value of time v^{sv} is identified from the comparison between pay increases for the survey (from \$0 to \$5 to \$10) and duration decreases (from 10 to 5 minutes). Finally, the social pressure S^{sv} is identified by the share of people answering the door in the survey treatments. To see this, consider a respondent who dislikes answering a survey and hence will say no and incur the social pressure cost S^{sv}. In the flyer treatment, she will choose to be at home with probability $h_0 - \eta r S^{sv}$ (barring corner solutions for h). Hence, knowing h_0, η, and r, it is possible to identify S^{sv}.

Turning to the charity parameters, the information on the amounts given identify the standard deviation of altruism σ_a^{ch}, mean altruism μ_a^{ch}, and the curvature parameter Γ. This is clearest for donations of $g > g^S$, where social pressure plays no role. Without social pressure, an individual with altruism a will give exactly g dollars if the marginal utility of giving, $av'(g) = a/(\Gamma + g)$, equals the private marginal utility of consumption, 1, and hence $a = \Gamma + g$. Thus, in this example without social pressure, the mass of households with altruism higher than $\Gamma + g$, i.e., $1 - F(g + \Gamma)$, has to equal the observed share of households that give at least g. This pins down the empirical distribution of a for a given Γ. The identification of Γ depends on two sets of moments: the sorting in of givers of larger amounts, and the giving of smaller amount. The more concave the altruism function is (that is, smaller Γ), the more altruistic individuals sort in because of higher infra-marginal utility of giving, and the more frequent are small donations. Finally, the social pressure S^{ch} is identified from two main sources of variation: home presence in the flyer treatment (which, to a first approximation, equals $h_0 - \eta r S$) and the distribution of small giving (the higher the social pressure, the more likely is small giving and in particular bunching at g^S).

Estimates. Table 1 reports the benchmark estimates of the parameters along with standard errors. The probability of being at home h_0 is precisely estimated to be 39.2 percent in 2008 and 38.6 percent in 2009. The share r of households that have read (and remember) the flyer is precisely estimated at 34.6 percent. While this estimate may appear low, many households may have just disregarded the flyer, or another household member may have seen it, but not informed the person opening the door. The elasticity of home presence η is estimated to be 0.034 (s.e. 0.008), implying that the cost of increasing the probability of being at home and answering the door by 10 percentage points is $0.1^2/2\eta = \$0.15$.

We find that women and men have a very similar mean altruism for the first charity, La Rabida ($\mu = -12.26$ for women vs. $\mu = -11.35$ for men). However, women are substantially more altruistic on average towards the second charity, ECU ($\mu = -10.29$ (s.e. 1.31) for women vs. $\mu = -22.42$ (s.e. 2.01) for men), with the difference statistically significant at conventional levels.

We estimate that women have a lower variance in their altruism distribution ($\sigma^{char} = 17.42$ for women vs. $\sigma^{char} = 19.54$ for men), with the difference statistically significant due to the highly precise estimates (p=0.02).

The social pressure parameters are also quite precisely estimated. For women, turning down a door-to-door giving request is associated with a social pressure cost of \$5.01 (s.e. \$0.39) for La Rabida and \$1.28 (s.e. \$0.68) for ECU. For men, the corresponding estimates are \$3.02 (s.e. \$0.34) for La Rabida and \$2.38 (s.e. \$1.31) for ECU. Thus, we do not see a systematic relationship between gender and social pressure: women experience higher social pressure when faced with solicitors for La Rabida (the children's hospital), while men face higher pressure when they encounter solicitors for ECU (the out-of-state research facility).

Finally, we construct a measure of "marginality" - the probability distribution function of the altruism distribution, evaluated at the threshold of altruism above which the solicitee chooses to donate a positive amount, if asked. We find that women have insignificantly higher marginality for La Rabida than men (0.014 vs. 0.013), but substantially higher marginality for ECU (0.013 vs 0.006), with the latter difference being highly statistically significant.

Turning to the survey estimates, the average utility for survey completion is estimated to equal $-\$23.57$ for women and $-\$31.96$ for men, although the difference between the two is not statistically significant. There is significant heterogeneity in survey completion utility for both genders ($\hat{\sigma}^{sv} = \$26.36$ for women and $\hat{\sigma}^{sv} = \$34.01$ for men). While the difference in standard deviations is not statistically significant by itself, the point estimates are consistent with men having greater variance in their utility for a doing a pro-social task (completing an unpaid survey for a researcher). The value of time for one hour of survey completion is imprecisely estimated to be \$124.10, indicative of the wealthy neighborhoods we reached.[6] The social pressure cost of turning down a survey request, S^{sv}, is estimated to be \$4.25 for women and \$10.49 for men, sizable magnitudes. Interestingly, men are estimated to incur significantly *greater* social pressure than women when faced with a surveyor. Finally, we again show a measure of estimated "marginality" of men and women: the probability distribution function of the utility of completing the unpaid 10 minute survey, evaluated at the threshold $\bar{sv}^{m,t}$ above which the solicitee agrees to complete the survey, when asked. We estimate a higher marginality for women than men (0.012 vs 0.010), but the difference is not statistically significant.

[6] At an average income of about \$100,000 per year, the implied hourly wage is \$50.

Figure 1. Frequency of Completing the Unpaid Survey: Male versus Female

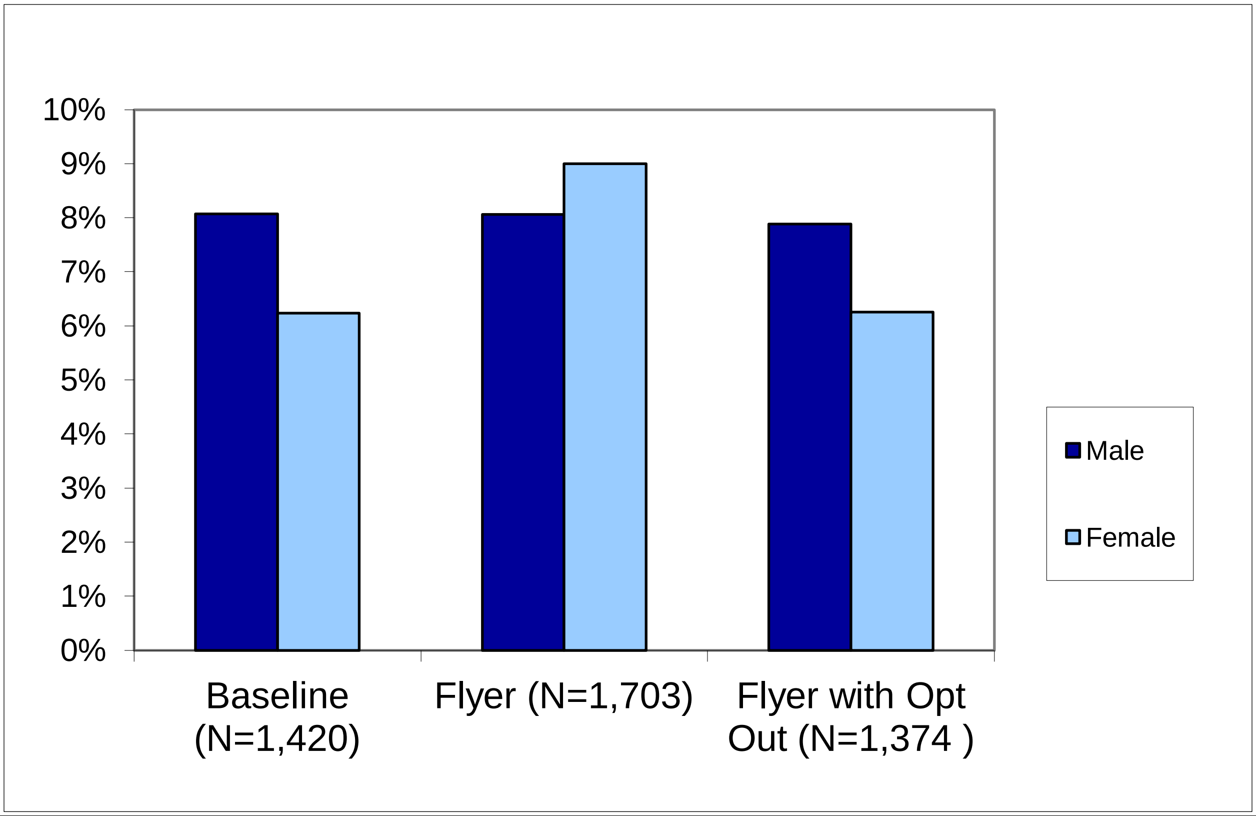

Table 1. Minimum-Distance Estimates

Common Parameters	**Females**		**Males**	
Share of Female Households	0.481			
	(0.006)			
Prob. of Home Presence (*h*) - Year 2008	0.392			
	(0.005)			
Prob. of Home Presence (*h*) - Year 2009	0.386			
	(0.007)			
Prob. of Observing Flyer (*r*)	0.346			
	(0.016)			
Elasticity of Home Presence (*eta*)	0.034			
	(0.008)			
Implied Cost of Altering Prob. Home by 10 pp.	0.147			
Survey Parameters				
Mean Utility (in $) of Doing 10-Minute Survey	-23.573		-31.961	
	(4.438)		(6.17)	
Std. Dev. of Utility of Doing Survey	26.356		34.007	
	(5.971)		(8.493)	
Test of equality across gender: Svy Std Dev (p value)	*0.440*			
Social Pressure Cost if Saying No to Survey	4.255		10.491	
	(1.303)		(2.347)	
Value of Time of One-Hour Survey	124.100			
	(46.998)			
	0.012		0.010	
"Marginality" (pdf at altruism threshold for completing survey)	(0.003)		(0.002)	
Test of equality across gender: Svy "Marginality" (p value)	*0.580*			
Charity Parameters	La Rabida	ECU	La Rabida	ECU
Mean of altruism distribution, μ	-12.265	-10.292	-11.351	-22.419
	(0.996)	(1.31)	(0.951)	(2.011)
Standard deviation of altruism, σ	17.422		19.540	
	(0.764)		(0.746)	
Test of equality across gender: Std. Dev. Of Altruism (p value)	*0.04 ***			
Social Pressure Cost of Giving 0 in Person	5.016	1.286	3.020	2.380
	(0.394)	(0.686)	(0.336)	(1.31)
Curvature of Altruism Function, Γ	10.000			
	0.014	0.013	0.013	0.006
"Marginality" (pdf at altruism threshold for donating	(0.001)	(0.001)	(0.001)	(0.001)
Test of equality across gender: "Marginality" (p value)	*0.48*	*0.00 ****		
SSE	178.330			

Notes: Estimates from minimum-distance estimator with weights given by inverse of diagonal of variance-covariance matrix. Standard errors are in parentheses. SSE reports the Weighted Sum of Squared Errors. "Marginality" for survey is reported for an unpaid survey of length 10 min. A solicitee will be willing to do such a survey if the utility of doing the survey exceeds the social pressure cost of saying no, i.e. $s > -S^s$. The marginality is thus defined as $f(-S^s, \mu^s, \sigma^s)$, where $f(x; \mu, \sigma)$ is the pdf of the normal distribution with mean μ and variance σ^2. Similarly, DellaVigna et al (2012) show that a solicitee will donate a positive amount of money if she has altruism $a > (1-S^{char})*\Gamma$. Marginality is thus measured as $f((1-S^{char})*\Gamma, \mu^{char}, \sigma^{char})$, where *char*={la rabida, ecu} and f(.) is again the pdf of the normal distribution.