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A Price Theory of Altruistic Identity

Kevin Corinth*

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Abstract

Why do people behave altruistically? Economists' traditional explanations have focused on direct care for others, a “warm glow” from the act of giving itself, and a desire for fairness. An emerging view, however, is that people simply wish to maintain an altruistic identity. In this paper, I develop a price theory of altruistic identity that allows for analysis of previously unexplored market outcomes. The key simplifying assumption is that individuals care about how generous they are conditional on being solicited, so that the number of times a person is solicited is the price of expressing a given level of altruistic identity. There are two main results. First, restricting entry among solicitors of altruistic acts increases the welfare of individuals who are solicited and increases aggregate giving net of solicitation costs. Second, collusion among solicitors is a Pareto improvement over competition even when entry is unrestricted. Thus, in markets where individuals are motivated by altruistic identity, policies that restrict entry may be helpful, and policies that restrict collusion may be harmful.

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1 Introduction

Economists have long been interested in human behavior that escapes the bounds of narrow self-interest. Models of altruistic behavior have taken several forms. Becker (1974) posited that altruism reflects direct care for others by entering the utility of others into an individual’s own utility function. Later, Andreoni (1990) argued that altruistic acts often reflect a “warm glow” from the act of giving itself. Fehr and Schmidt (1999) suggested that individuals have an aversion to outcomes that deviate from what they consider fair. And recently, economists have focused on identity as a primary driver of altruism as well as other behavior (Akerlof and Kranton 2000; Bodner and Prelec 2003; Benabou and Tirole 2006; Benabou and Tirole 2011; Dillenberger and Sadowski 2012; Gino, Norton and Weber 2016). Individuals prefer to view themselves and have others view them as altruistic beings, and they only act altruistically in order to uphold this identity.

While identity-based models of altruism can help explain a number of aspects of other-regarding behavior, the implications for solicitation markets in which identity is the dominant motivation for giving have for the most part been unexplored.¹ This leaves unresolved the question of what effect competition among solicitors has on aggregate giving (or otherwise altruistic acts) as well as the welfare of individual donors and potential solicitors. This paper examines these questions by analyzing a simple model of altruistic identity in which the number of times an individual expects to be asked to give is taken as the price of expressing a given level of generosity. More precisely, I assume that an individual who is asked to give to some cause $A \geq 0$ times and gives $\$X$ each time reaps the same utility from giving regardless of the value of A , although she is certainly worse off as A grows since she will be $\$AX$ poorer relative to the case in which $A = 0$. Indeed, she would prefer to be solicited 0 times so that she can maintain an unbound altruistic identity for free. While this model of altruistic identity is simplistic and abstracts from adjustment and other higher-

¹In one exception, Benabou and Tirole (2006) consider how competition among charities can lead to excessive extrinsic incentives to act altruistically.

order cognitive processes, it captures the essential notion of identity as a choice that responds to the price of that choice, and it allows for straightforward analysis of market outcomes.

Meanwhile, I model each solicitor of altruistic deeds as attempting to maximize the aggregate value he raises for a particular cause (potentially himself), recognizing that as the number of times an individual is asked by him or competing solicitors increases, the individual's generosity falls. I also allow for entry into the market. Potential entrants face a fixed cost of entry and they are assumed to care about how much value they personally contribute to a cause as well as how much they raise from others. These assumptions follow from a "warm glow" conception of altruism as postulated by Andreoni (1990), or alternatively, from selfish ends if solicitors themselves are the recipients of altruistic deeds. An alternative "public good" conception of altruism, in which solicitors care only about how much value is raised in aggregate for a particular cause, is discussed as well.

From analysis of the altruistic identity market, I show that donor welfare and aggregate giving decrease with the number of solicitors. This is because each solicitor does not internalize the cost that each solicitation of a donor has on the level of generosity of that donor when approached by other solicitors. Thus, donors are over-asked to give and their generosity levels fall such that total giving decreases. I also show that collusion among solicitors makes donors better off, increases aggregate giving, makes solicitors better off, and makes all potential entrants no worse off. These results suggest that policies that restrict entry could be helpful, and policies that restrict collusion could be harmful.

This model of altruistic identity and its implications do not apply to all contexts in which altruistic behavior is important. For the model to be applicable, altruistic behavior must occur solely as a result of some form of solicitation, and independent solicitors must have control over how many solicitations are made. Also, for the preference structure to be realistic, in which individuals only care about how altruistic they behave on any occasion they are asked, individuals must be capable of suppressing knowledge of need except when solicited, and relatedly, individuals should not derive fulfillment based on the frequency of

giving as a response to multiple solicitations. Multiple gifts or altruistic acts in response to a single solicitation, however, are permissible.

In what real world contexts might this model apply? An important context is charitable giving that responds to solicitation rather than self-motivated action. This may include giving to charities only on instances when they ask, or it can include planned giving spread out over regular intervals based on a single solicitation. Fundraising by friends or relatives on social networks for charitable causes may be a particularly relevant example. In this case, social signaling mechanisms are likely to play an especially important role in determining generosity levels, and competition among a large number of potential solicitors is likely. Another relevant charitable giving context may be giving to panhandlers, especially if potential donors suppress knowledge of the visibly poor except when they are made visible. Contexts outside of charitable giving could be important as well. For example, potential mentors may care about how much effort they invest in any given mentee but little about how many mentees they assist. Friends may behave similarly in friendships, especially those relegated to social networks in which users gauge their friendliness by the effort they put into responding to any given post or status update. In this case, each post or status update can be thought of as a solicitation.

The remainder of the paper proceeds as follows: Section 2 discusses the related literature, Section 3 presents the model and results, Section 4 discusses policy implications, and Section 5 concludes.

2 Related Literature

Traditional models of altruism have postulated that the relevant good is the utility of others (Becker 1974) or “warm glow” from the act of giving itself (Andreoni 1990). Some have considered the effects of competition among charities and government crowding out of private giving under traditional formulations of altruistic preferences (Rose-Ackerman

1982; Andreoni and Payne 2003; Mungan and Yoruk 2012). More recently, economists have developed models in which giving behavior is a costly signal of one's generosity. Beginning with the seminal Akerlof and Kranton (2000) paper on identity in economics, there have been many attempts to use identity to explain a variety of economic outcomes, particularly altruism.² Bodner and Prelec (2003) consider a self-signaling model in which individuals infer their identity from past actions and choose these actions accordingly. Their model implies that commitments to act generously will become more generous as the probability of actually being asked to carry out such an act falls. Benabou and Tirole (2006) focus on how external incentives can affect altruistic behavior in the context of self and social signaling, Benabou and Tirole (2011) explicitly model the process of investing in altruistic identities, and Gino, Norton and Weber (2016) argue that individuals process information relevant to their altruistic identity in a self-serving way. This paper builds on the work of identity as an explanation for altruism, not by extending it or generalizing it to new settings, but rather, to capture its fundamental premise in order to analyze market outcomes.

The simple model of altruistic identity in this paper is also related to the model of expressive voting in the public choice literature, in which voters are postulated to express altruistic (or other) preferences through their voting behavior (Tullock 1971, Brennan 1984, Carter and Guerette 1992). Because the probability of a voter being pivotal is generally quite small or negligible in most elections, individuals can signal to themselves or others that they prefer altruistic outcomes at no effective cost to themselves. The expressive voting model is a special case of the model of altruistic identity considered in this paper, where the probability of being pivotal is the price or number of solicitations. Of course, the price of generosity is exogenous in expressive voting models so results derived in this paper regarding entry and competition do not apply.

Finally, a series of laboratory and field experiments have tested models of altruistic identity. In the laboratory, Dana, Weber and Kuang (2007), Andreoni and Bernheim (2009) and

²For a review of the identity literature see Benabou and Tirole (2016).

Grossman (2015) find evidence of social signaling by varying the extent to which recipients of altruistic behavior can observe the intentions of givers. Ariely, Bracha and Meier (2009) find that extrinsic incentives to behave altruistically only increase altruistic behavior when they are private, implying that public incentives crowd out giving by diluting the signal to others of one’s identity. In the field, DellaVigna, List and Malmendier (2012) find that people are willing to incur a cost to avoid being asked to give to a charitable cause, consistent with solicitations acting as a cost of maintaining an altruistic identity. Several studies based on observational data also confirm that donors are more likely to give and give significantly more when they are asked to do so, although such evidence is not necessarily inconsistent with other models of altruism (Schervish and Havens 1997; Meer and Rosen 2011; Yoruk 2009).

3 The Model

Suppose there is a single altruistic cause, a finite set of potential solicitors that can enter the solicited giving market to raise donations (in the form of money, time or other resources) for the cause, and a representative donor who may be asked by solicitors to give. The representative donor consumes a private good x and generosity g (how much she will give on any time she is asked) over the cause. She maximizes a quasilinear utility function in these two goods,

$$\max_{x,g} x + u(g) \tag{1}$$

$$\text{subject to } x + gA \leq w$$

where w is wealth and A is the expected number of times she will be solicited to give. I assume that A is determined prior to the donor’s choice and can take on non-integer values as solicitors can commit to asking with some probability. Finally suppose that $u'(\cdot) > 0$ and

$u''(\cdot) < 0$. The first order condition for a maximum is

$$u'(g^*) = A \tag{2}$$

Thus a donor consumes generosity until the marginal utility of the last dollar she commits is equal to the number of times she will be asked to donate. The resulting demand function can be written as

$$g(A) = u'^{-1}(A) \tag{3}$$

Now consider potential solicitors. Potential solicitors consume the private good x and warm glow. Warm glow can be produced from giving directly to the cause, denoted by g_d , or from raising funds from the donor, denoted by g_s . A preference parameter α is applied to funds raised from the donor in order to allow the amount of warm glow obtained from each activity to differ. Each potential solicitor must decide how much of the private good to consume, how much he wishes to donate directly to the cause, and whether he wishes to enter the market for soliciting donations at a personal cost of p_j . Let \mathcal{J} denote the finite number of potential solicitors. Each maximizes a quasilinear utility function in x and warm glow.

$$\max_{x, g_d, e} x + v_j(g_d + \alpha_j g_s) \tag{4}$$

subject to $x + g_d + ep_j \leq w_j$,

$$g_s = \begin{cases} 0, & e = 0 \\ \pi^*, & e = 1 \end{cases}$$

Here, $e = 1$ if he enters the solicitation market and $e = 0$ otherwise, and π^* denotes the equilibrium value raised net of variable soliciting costs in the solicitation market. The maximization problem can be rewritten as

$$\max \left[\max_{g_{d1}} \{w_j - g_{d1} + v_j(g_{d1})\}, \max_{g_{d2}} \{w_j - g_{d2} - p_j + v_j(g_{d2} + \alpha_j \pi^*)\} \right] \quad (5)$$

The first order condition for the first term implies $v'_j(g_{d1}^*) = 1$, or $g_{d1}^* = v_j'^{-1}(1)$, and the first order condition for the second term implies $v'(g_{d2} + \alpha_j \pi^*) = 1$, or $g_{d2}^* = v_j'^{-1}(1) - \alpha_j \pi^*$ assuming $g_{d1}^* > 0$ and $g_{d2}^* > 0$. We can replace the optimal amount of direct giving in the maximization problem to obtain

$$\begin{aligned} & \max \left[w_j - v_j'^{-1}(1) + v_j(v_j'^{-1}(1)), w_j - v_j'^{-1}(1) + \alpha_j \pi^* - p_j + v_j(v_j'^{-1}(1) - \alpha_j \pi^* + \alpha_j \pi^*) \right] \\ & = w_j - v_j'^{-1}(1) + v_j(v_j'^{-1}(1)) + \max [0, \alpha_j \pi^* - p_j] \end{aligned}$$

Thus, the potential solicitor enters the market if $\alpha_j \pi^* \geq p_j$ and $v'(\alpha_j \pi^*) > 1$ since this guarantees $g_{d1}^* > 0$ and $g_{d2}^* > 0$. If $v'(\alpha_j \pi^*) \leq 1$ which implies $g_{d2}^* = 0$, then he enters if

$$v(\alpha_j \pi^*) - p \geq \max [v(v'^{-1}(1)) - v'^{-1}(1), 0] \quad (6)$$

This provides the optimal entry strategy.

$$e_j^* = \begin{cases} 1, & v'(\alpha_j \pi^*) > 1 \text{ and } \alpha_j \pi^* \geq p_j \\ 1, & v'(\alpha_j \pi^*) \leq 1 \text{ and } v(\alpha_j \pi^*) - p \geq \max [v(v'^{-1}(1)) - v'^{-1}(1), 0] \\ 0, & \text{else} \end{cases} \quad (7)$$

We see that $e_j^*(\pi^*, \alpha_j, p_j)$ is weakly increasing in π^* and α_j , and weakly decreasing in p_j .

The number of entrants J can now be written as $J = \sum_{j=1}^J e_j^*(\pi^*, \alpha_j, p_j)$. Each entrant maximizes the value it raises from the donor net of variable solicitation costs, where we assume a constant marginal cost of solicitation c . Solicitors choose how many solicitations to make prior to the decision of the donor over how generous to be, and solicitors make solicitation choices simultaneously. The Nash equilibrium solution concept is adopted.³ Also, note that $A = \sum_{j \in J} a_j$, where a_j is the number of solicitations made by solicitor j . Each solicitor $j \in J$ solves

$$\max_a a(g(A) - c) \tag{8}$$

The first order condition for a maximum is

$$ag'(A) + g(A) = c \tag{9}$$

This condition implies that a solicitor asks for donations until the revenue received from the last solicitation, $g(A)$, minus the loss in generosity experienced over all other solicitations due to asking more, $ag'(A)$, is equal to the marginal cost of asking, c .

However, it is not innocuous to simply assume that the second order condition for a maximum holds. Differentiating the first order condition with respect to a , we see that we must have

$$ag''(A) + 2g'(A) < 0 \tag{10}$$

³Andreoni and Payne (2003), in their model of fundraising, also assume that firms simultaneously choose their fundraising levels before individuals decide on how much to donate. After all, someone cannot give in response to being asked until after he is asked. While the context in this model is different because solicitors are committing to solicitations over time, the psychological framework implies little to no bargaining power for donors which would give us the same result as giving solicitors the first-mover advantage.

If $g''(A) \leq 0$ then this condition must hold. If $g''(A) < 0$, then $Ag''(A) \geq ag''(A)$ and so a sufficient condition for the second order condition to hold is

$$Ag''(A) + 2g'(A) < 0 \tag{11}$$

We will suppose for now that this condition holds. We will show that there is a unique Nash equilibrium where all solicitors make the same number of solicitations, industry wide solicitations are increasing in the number of solicitors, and finally conclude that total giving net of costs is decreasing in the number of solicitors.

Let $\pi_j(a, A_{-j}; J)$ denote the value raised net of costs for solicitor j when making a solicitations when the $J - 1$ other solicitors make A_{-j} solicitations in aggregate. Note that we are able to ignore the how many solicitations are made by each individual solicitor since only aggregate solicitations enter the objective function and these are taken as given when selecting an optimal strategy. Denote an equilibrium as $\{a_1^*, a_2^*, \dots, a_J^*\}$, and let $A^* = \sum_{j=1}^J a_j^*$. Also, write total giving in the market net of costs as $\Pi(A) = A(g(A) - c)$.

Lemma 1. *Suppose $Ag''(A) + 2g'(A) < 0$ for all $A \geq 0$. Then there is a unique equilibrium that satisfies $\{\frac{A^*}{J}, \frac{A^*}{J}, \dots, \frac{A^*}{J}\}$.*

Proof. See appendix. □

We now have an equation that implicitly determines the number of industry-wide solicitations as a function of the number of solicitors.

$$\frac{A^*}{J}g'(A^*) + g(A^*) = c$$

Let $A^*(J)$ denote the equilibrium number of solicitations as a function of J , which as we have shown, when defined by the above equation is injective. We can now show that solicitations are strictly increasing and total giving net of costs is strictly decreasing in the number of solicitors.

Lemma 2. *Suppose $Ag''(A) + 2g'(A) < 0$ for all $A \geq 0$. Then $A^*(J) < A^*(J+1)$ for $J \geq 1$.*

Proof. See appendix. □

Proposition 1. *Suppose $Ag''(A) + 2g'(A) < 0$ for all $A \geq 0$. Then $\Pi(A^*(J)) > \Pi(A^*(J+1))$.*

Proof. See appendix. □

We now relax the concavity of total donations assumption (inequality 11). In this case there may exist equilibria in which solicitors make varying numbers of solicitations from one another. Furthermore, we are not guaranteed uniqueness even when considering only symmetric equilibria and as a result it is not possible to make conclusions about how total giving net of costs changes with the number of solicitors. Thus, we focus on the best symmetric Nash equilibrium because we may think an equilibrium in which solicitors are best off individually (and collectively) is intuitively appealing and because it is unique as Lemma 3 will demonstrate. Because we are limiting discussion to symmetric equilibria in the forthcoming analysis, as a shorthand we let aggregate solicitations $A^*(J)$ denote the equilibrium $\{\frac{A^*(J)}{J}, \frac{A^*(J)}{J}, \dots, \frac{A^*(J)}{J}\}$. Also for notational convenience, redefine $\pi_j(a, a_{-j}; J)$ as the value raised net of costs by solicitor j when making a solicitations when each of the $J-1$ other solicitors make a_{-j} solicitations individually, where we impose that all other solicitors make the same number of solicitations because we are considering only symmetric equilibria.

Definition 1. *Let $A^{SE}(J)$ denote any equilibrium such that $a_1^* = a_2^* = \dots = a_J^*$. A best symmetric Nash equilibrium, $A^{BSE}(J)$, is a symmetric Nash Equilibrium with maximal value raised net of costs, that is, $A^{BSE} \in \arg \max_{A^{SE}(J)} \Pi(A^{SE}(J))$.*

Lemma 3. *For all $A^{SE}(J) \neq A^{BSE}(J)$,*

1. $A^{BSE}(J) < A^{SE}(J)$, and
2. $\Pi(A^{BSE}(J)) > \Pi(A^{SE}(J))$

Proof. See appendix. □

We have now shown that $A^{BSE}(J)$ is unique and that any other symmetric equilibrium has a higher number of aggregate solicitations. The next lemma characterizes $A^{BSE}(J)$ in a way that will help us determine how aggregate giving net of costs is affected by the number of solicitors. It states that if the number of solicitations is smaller than in the best symmetric equilibrium, then one solicitor must strictly prefer to increase its number of solicitations rather than match the solicitations of all other solicitors.

Lemma 4. *Suppose $\forall A < A^*$, $\pi\left(\frac{A}{J} + \epsilon(A), \frac{A}{J}; J\right) > \pi\left(\frac{A}{J}, \frac{A}{J}; J\right)$ for some $\epsilon(A) > 0$, and suppose $\pi\left(\frac{A^*}{J} + \epsilon, \frac{A^*}{J}; J\right) \leq \pi\left(\frac{A^*}{J}, \frac{A^*}{J}; J\right)$ for all $\epsilon > 0$. That is, A^* is the smallest value of A such that there is no profitable positive deviation. Then $A^* = A^{BSE}$.*

Proof. See appendix. □

The next lemma proves the intuitive idea that over all symmetric equilibria, total giving net of costs must be decreasing in solicitations since otherwise one solicitor would prefer to deviate and receive a bigger share of a weakly larger amount of total giving net of costs.

Lemma 5. *If A and A' are symmetric equilibria with $A < A'$, then $\Pi(A) > \Pi(A')$.*

Proof. See appendix. □

We now have the results that allow us to prove that total giving net of costs in the best symmetric equilibrium is decreasing in the number of solicitors.

Proposition 2. $\Pi(A^{BSE}(J)) \geq \Pi(A^{BSE}(J + 1))$ for $J > 1$.

Proof. See appendix. □

To this point, we have shown that a greater number of solicitors decreases total giving net of costs to the altruistic cause, and so in a welfare sense, the beneficiaries of the cause are made worse off. We can also consider the effect of the number of solicitors on the welfare of the representative donor. We have shown that the number of solicitations, or the price of generosity, is increasing with the number of solicitors which should therefore make the donor worse off. This is considered more formally in the following proposition.

Proposition 3. *Suppose $Ag''(A) + 2g'(A) < 0$ for all $A \geq 0$ or that the best symmetric equilibrium is always reached. Then donor welfare is decreasing with J .*

Proof. See appendix. □

For potential entrants, it is not sensible to analyze the effect of entry on welfare since for them entry is a choice. It is clear that any single potential entrant would at least weakly prefer to be granted exclusive rights to enter the solicitation market as this would maximize the value they raise should they decide to enter; of course, such a policy would at least be weakly opposed by all other potential entrants, and likely strictly opposed by some.

Aside from the effect of the number of solicitors on net donations and welfare, the model can also address the effects of collusion and whether we should expect solicitors to engage in collusive behavior.

Definition 2. *An outcome A is collusive if $A = \arg \max_{A'} \Pi(A')$. Denote the collusive level of solicitations A^C .*

Note that for a fixed number of solicitors $J > 1$, $\frac{\Pi(A^C)}{J} \geq \frac{\Pi(A^*(J))}{J}$ since $\Pi(A^C) \geq \Pi(A^*(J))$ by definition. Therefore, if additional entry is prohibited then collusion is always preferred by the existing solicitors to any symmetric competitive equilibrium. Furthermore, potential entrants who would not have entered absent collusion are indifferent between (i) a collusive outcome with entry restricted to potential entrants who would have entered absent collusion, and (ii) a noncollusive outcome. But does the incentive to collude remain when entry is free, and what is the effect on welfare? The following proposition answers these questions.

Proposition 4. *Suppose $Ag''(A) + 2g'(A) < 0$ for all $A \geq 0$ or that the best symmetric equilibrium is always reached, and let $J > 1$. Relative to the competitive outcome $A^*(J)$, the collusive outcome A^C*

1. *increases net donations*
2. *increases donor welfare*

3. *increases the welfare of potential entrants who would have entered absent collusion, and*
4. *increases the welfare of some and does not change the welfare of other potential entrants who would not have entered absent collusion.*

Proof. See appendix. □

Thus, there still exists an incentive for solicitors to collude when entry is unrestricted, although it is weaker than if the number of firms were exogenous since the collusive level of net donations will need to be shared with potential entrants induced to enter as well. On the basis of efficiency, Proposition 4 suggests that policies that help sustain collusion among solicitors can help a market reach a Pareto-dominating outcome.

4 Discussion

In contexts in which altruistic identity is the driving force of altruistic behavior, it is important to understand how market outcomes are determined. The model analyzed in this paper begins to explore this question by considering a simple formulation of altruistic identity that abstracts from complex cognitive processes. As a result, there may be some contexts in which altruistic identity motivates giving behavior but in which the results of this paper do not apply. The model is most likely to apply to contexts in which giving only occurs as a result of solicitation and in which awareness of need is in some form suppressed except during solicitation.

For relevant contexts, the results pertaining to entry among solicitors and competition are important. Total giving net of costs and donor welfare decrease with the number of solicitors. And even when entry is unrestricted, collusion increases total giving net of costs, increases donor welfare, and increases the welfare of potential solicitors. These conclusions have clear policy implications: Restricting entry among potential solicitors can make donors better off while at the same time increasing resources provided for a cause. However, restricting entry

may not be necessary as long as collusion among solicitors is not discouraged or forbidden. Whether collusive behavior is actually sustainable or even implementable in the first place, however, depends on the context.

For traditional charitable giving markets, solicitation is an important determinant of giving behavior (Yoruk 2009; Meer and Rosen 2011). And although direct solicitation can only explain a fraction of giving behavior, past and indirect solicitations may be important as well. For example, a charity might ask donors to make annual commitments for donations, or it may advertise itself at community events. Restricting entry among charities that rely heavily on solicitation for raising funds could take the form of entry fees into the market, although this form of regulation could also discourage innovation in either fundraising practices or programming. Policies that encourage collusion, or at least do not discourage it, may be superior. Similarly, excessive entry into the panhandling market could potentially be discouraged through licenses for soliciting money in specific areas, although constitutional issues regarding freedom of speech may lead to legal difficulties. Relying on collusive arrangements among panhandlers may be the better approach.

For other contexts, regulation may be easier. In mentorship markets, management or other administrative personnel can formalize mentor-mentee relationships and impose strict limits on the number of mentees matched to a given mentor. In contexts based on social networks, platforms could hide or otherwise “demote” charitable solicitation requests beyond the number which maximizes donations. Given the vast amount of data captured by social networks, such an algorithm that calculates the optimal number of solicitations may be achievable. When friendship itself is the altruistic act and posts or status updates by friends are the solicitations, social network platforms might display the optimal number of solicitations that maximizes engagement by default, and require the user to actively opt in to viewing additional posts or status updates.

Finally, it should be noted how results would change if we relaxed the assumption that potential solicitors are motivated by the “warm glow” view of altruism, or alternatively,

self-interest if they are raising funds for themselves. If instead potential solicitors are better classified under the “public good” view of altruism such that they derive utility from the total amount given to the cause regardless of who gave it, then the conclusions of the analysis would change. It is clear that in any pure strategy equilibrium, there can never be more than one entrant since otherwise, all but one solicitor could profitably deviate by exiting the market and recouping their personal cost of entry. As a result, total giving net of costs would not fall since the remaining solicitor would still wish to maximize giving net of costs. There may very well be no entrants in equilibrium, however, just as the usual public good theory of altruism predicts inefficiently low giving.

5 Conclusion

This paper has proposed a simple price theory of altruistic identity that allows for analysis of market outcomes. Abstracting from higher order cognitive processes and other complicating features, individuals are assumed to care about how generous they would be conditional on being asked. The model shows that, under this assumption about altruistic preferences, total net donations and donor welfare decrease with the number of solicitors. Also, collusion among solicitors Pareto dominates competition; total net donations are higher, donor welfare is higher, and the welfare of each potential solicitor does not fall. These results represent an important first step in exploring market-level questions in markets driven by altruistic identity.

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Appendix

Proof of Lemma 1: First note that $a_j^* = \frac{A^*}{J}$ for all $j \in \{1, 2, \dots, J\}$ if and only if $a_1^* = a_2^* = \dots = a_J^*$. Suppose instead that $a_i^* < a_j^*$ for some $i, j \leq J$. Since the second order condition for a maximum holds, each solicitor makes solicitations according to the first order condition taking the solicitations of all other firms as given. Then

$$c = a_i^* g'(A^*) + g(A^*) > a_j^* g'(A^*) + g(A^*) = c$$

This contradiction proves that any equilibrium must be of the form $\{\frac{A^*}{J}, \frac{A^*}{J}, \dots, \frac{A^*}{J}\}$. It then follows that $\frac{A^*}{J} g'(A^*) + g(A^*) = c$. Differentiating with respect to A^* , we get

$$\frac{1}{J} [A^* g''(A^*) + g'(A^*)] + g'(A^*) \leq \frac{1}{J} [A^* g''(A^*) + 2g'(A^*)] < 0$$

and therefore, there is a unique A^* and thus a unique equilibrium. □

Proof of Lemma 2: With the assumption that $A g''(A) + 2g'(A) < 0$, recall that we must have $\frac{A^*}{J} g'(A^*) + g(A^*) = c$. Implicitly differentiating this equation, we get

$$A^*(J) = \frac{\frac{A^*}{J} g'(A^*)}{A^* g''(A^*) + (J+1)g'(A^*)} > 0$$

since the numerator is clearly negative and the denominator is negative since

$$A^* g''(A^*) + (J+1)g'(A^*) \leq A^* g''(A^*) + 2g'(A^*) < 0$$

It immediately follows that $A^*(J) < A^*(J+1)$. □

Proof of Proposition 1: Differentiating $\Pi(A^*(J))$ with respect to J , we get

$$\frac{\partial \Pi(A^*(J))}{\partial J} = A'^*(J) [A^*(J)g'(A^*(J)) + g(A^*(J)) - c] < 0$$

since

$$A^*(J)g'(A^*(J)) + g(A^*(J)) - c < \frac{A^*(J)}{J}g'(A^*(J)) + g(A^*(J)) - c = 0$$

by the first order condition and because $A'^*(J) > 0$ by Lemma 1.2. It immediately follows that $\Pi(A^*(J)) > \Pi(A^*(J+1))$. \square

Proof of Lemma 3: First we show (1). Suppose to the contrary that $A^{SE}(J) < A^{BSE}(J)$ for some A^{SE} , and let $a = A^{BSE}(J) - A^{SE}(J) > 0$. By the definition of the best symmetric Nash Equilibrium, $\Pi(A^{BSE}(J)) \geq \Pi(A^{SE}(J))$. But then

$$\pi\left(\frac{A^{SE}(J)}{J} + a, \frac{A^{SE}(J)}{J}; J\right) > \pi\left(\frac{A^{SE}(J)}{J}, \frac{A^{SE}(J)}{J}; J\right)$$

and so $A^{SE}(J)$ is not a symmetric equilibrium as we assumed. Now we show (2). Suppose instead that $\Pi(A^{BSE}(J)) = \Pi(A^{SE}(J))$ (the best symmetric Nash equilibrium cannot have giving net of costs strictly less than any other symmetric equilibrium) for some A^{SE} , and let $a = A^{SE}(J) - A^{BSE}(J) > 0$ by part (1). Then

$$\pi\left(\frac{A^{BSE}(J)}{J} + a, \frac{A^{BSE}(J)}{J}; J\right) > \pi\left(\frac{A^{BSE}(J)}{J}, \frac{A^{BSE}(J)}{J}; J\right)$$

and so $A^{BSE}(J)$ cannot be a symmetric equilibrium as we assumed. \square

Proof of Lemma 4: First, note that for any $A < A^*$, A is not a symmetric Nash equilibrium since by assumption there exists a profitable positive deviation. Thus, if A^* is a

symmetric equilibrium, then $A^* = A^{BSE}$ by Lemma 2.1. Suppose to the contrary that A^* is not a symmetric equilibrium. Then, since there is no profitable positive deviation at A^* by assumption, there must exist a profitable negative deviation, and so

$$\begin{aligned} \pi\left(\frac{A^*}{J} - (A^* - \bar{A}), \frac{A^*}{J}; J\right) &> \pi\left(\frac{A^*}{J}, \frac{A^*}{J}; J\right) \\ \frac{\frac{1}{J}A^* + \bar{A} - A^*}{\bar{A}}\Pi(\bar{A}) &> \frac{1}{J}\Pi(A^*) \end{aligned}$$

for some $\bar{A} < A^*$. Let

$$A = \arg \max_{\bar{A}} \pi\left(\frac{A^*}{J} - (A^* - \bar{A}), \frac{A^*}{J}; J\right)$$

where we are assured that $A < A^*$ because no positive deviations are profitable. Therefore, there must exist a profitable positive deviation at A , and so

$$\begin{aligned} \pi\left(\frac{A}{J} + (A' - A), \frac{A}{J}; J\right) &> \pi\left(\frac{A}{J}, \frac{A}{J}; J\right) \\ \frac{\frac{1}{J}A + A' - A}{A'}\Pi(A') &> \frac{1}{J}\Pi(A) \\ (A' - A)\frac{\Pi(A')}{A'} &> \frac{1}{J}A\left(\frac{\Pi(A)}{A} - \frac{\Pi(A')}{A'}\right) \end{aligned}$$

for some $A' > A$. Consider the difference in payoff when a solicitor deviates to A' instead of A from A^* :

$$\begin{aligned}
& \pi\left(\frac{A^*}{J} - (A^* - A'), \frac{A^*}{J}; J\right) - \pi\left(\frac{A^*}{J} - (A^* - A), \frac{A^*}{J}; J\right) \\
&= \frac{\frac{1}{J}A^* + A' - A^*}{A'} \Pi(A') - \frac{\frac{1}{J}A^* + A - A^*}{A} \Pi(A) \\
&= (A' - A) \frac{\Pi(A')}{A'} + \left(\frac{1}{J}A^* - A^* + A\right) \frac{\Pi(A')}{A'} - \left(\frac{1}{J}A^* - A^* + A\right) \frac{\Pi(A)}{A} \\
&= (A' - A) \frac{\Pi(A')}{A'} + \left(\frac{1}{J}A^* - A^* + A\right) \left(\frac{\Pi(A')}{A'} - \frac{\Pi(A)}{A}\right) \\
&> \frac{1}{J}A \left(\frac{\Pi(A)}{A} - \frac{\Pi(A')}{A'}\right) + \left(\frac{1}{J}A^* - A^* + A\right) \left(\frac{\Pi(A')}{A'} - \frac{\Pi(A)}{A}\right) \\
&= \left(\frac{1}{J}A - \frac{1}{J}A^* + A^* - A\right) \left(\frac{\Pi(A)}{A} - \frac{\Pi(A')}{A'}\right) \\
&= \left(1 - \frac{1}{J}\right) (A^* - A) \left(\frac{\Pi(A)}{A} - \frac{\Pi(A')}{A'}\right) \\
&> 0
\end{aligned}$$

The first term is positive since $J > 1$ and the second term is positive by assumption. The third term is positive since $A < A'$ by assumption and $\Pi(A) > \Pi(A')$ because otherwise A could not possibly have been the most profitable deviation from A^* (deviating to A' would have resulted in a larger share of more total giving net of costs). This demonstrates that the payoff from deviating to A' from A^* is larger than the payoff from deviating to A from A^* , which contradicts A being the optimal deviation from A^* . This proves that A^* is a symmetric Nash equilibrium and therefore the best symmetric Nash equilibrium, that is, $A^* = A^{BSE}$. \square

Proof of Lemma 5: Suppose A and A' are symmetric equilibria with $A < A'$ and $\Pi(A) \leq \Pi(A')$. Then

$$\begin{aligned} \pi\left(\frac{A}{J} + (A' - A), \frac{A}{J}; J\right) &= \frac{\frac{1}{J}A + (A' - A)}{A'} \Pi(A') \\ &\geq \frac{\frac{1}{J}A + (A' - A)}{A'} \Pi(A) \\ &> \frac{1}{J} \Pi(A) \\ &= \pi\left(\frac{A}{J}, \frac{A}{J}; J\right) \end{aligned}$$

Thus A is not a symmetric equilibrium, and this contradiction proves the result. \square

Proof of Proposition 2: It is sufficient to show that $A^{BSE}(J) \leq A^{BSE}(J+1)$ since by Lemma 2.3 this implies that $\Pi(A^{BSE}(J)) \geq \Pi(A^{BSE}(J+1))$. Suppose to the contrary that $A^{BSE}(J) > A^{BSE}(J+1)$. Then by Lemma 2.2, there exists some $A' > A^{BSE}(J+1)$ such that

$$\begin{aligned} \frac{\frac{1}{J}A^{BSE}(J+1) + A' - A^{BSE}(J+1)}{A'} \Pi(A') &> \frac{1}{J} \Pi(A^{BSE}(J+1)) \\ \frac{A^{BSE}(J+1) + J(A' - A^{BSE}(J+1))}{A'} \Pi(A') &> \Pi(A^{BSE}(J+1)) \end{aligned}$$

And because $A^{BSE}(J+1)$ is an equilibrium, we must have

$$\begin{aligned} \frac{\frac{1}{J+1}A^{BSE}(J+1) + A' - A^{BSE}(J+1)}{A'} \Pi(A') &\leq \frac{1}{J+1} \Pi(A^{BSE}(J+1)) \\ \frac{A^{BSE}(J+1) + (J+1)(A' - A^{BSE}(J+1))}{A'} \Pi(A') &\leq \Pi(A^{BSE}(J+1)) \end{aligned}$$

But this contradicts the previous inequality, which proves our result. \square

Proof of Proposition 3: We know from Proposition 1 and 2 that solicitations are increasing in J , and because $g'(A) < 0$, generosity is decreasing in solicitations. We therefore

only need to show that donor welfare is increasing in g . Suppose $g < \hat{g}$, which implies that $u'(g) > u'(\hat{g})$ since u is concave. It then follows that

$$\begin{aligned} u'(\hat{g})\hat{g} - u'(\hat{g})g &> u'(\hat{g})\hat{g} - u'(g)g \\ u'(\hat{g})(\hat{g} - g) &> u'(\hat{g})\hat{g} - u'(g)g \end{aligned}$$

We also have that $u(\hat{g}) - u(g) = \int_g^{\hat{g}} u'(x)dx > \int_g^{\hat{g}} u'(\hat{g})dx = u'(\hat{g})(\hat{g} - g)$ by concavity and so we can write

$$\begin{aligned} u(\hat{g}) - u(g) &> u'(\hat{g})\hat{g} - u'(g)g \\ u(\hat{g}) - u'(\hat{g})\hat{g} &> u(g) - u'(g)g \\ u(\hat{g}) - \hat{A}\hat{g} &> u(g) - Ag \\ w + u(\hat{g}) - \hat{A}\hat{g} &> w + u(g) - Ag \end{aligned}$$

where \hat{A} and A are the equilibrium amounts of solicitations corresponding to \hat{g} and g respectively. Welfare is therefore increasing in equilibrium generosity and decreasing in J . \square

Proof of Proposition 4: Part (1) follows directly from the definition of A^C . Part (2) is implied by recognizing that $A^C = A^*(1)$ and Proposition 3. Now consider part (3). Let π^C denote the giving net of costs raised by any entering solicitor under collusion and let J^C denote the number of solicitors that enter under collusion. Suppose $\pi^C < \pi^*$. Since $e_j^*(\pi, \alpha_j, p_j)$ is weakly increasing in π ,

$$J^C = \sum_{j=1}^{\mathcal{J}} e_j^*(\pi^C, \alpha_j, p_j) \leq \sum_{j=1}^{\mathcal{J}} e_j^*(\pi^*, \alpha_j, p_j) = J$$

But this implies that $\Pi(A^*(J^C)) \geq \Pi(A^*(J^*))$ by Lemmas 1.2 and 2.3, and given symmetry, $\pi^C \geq \pi^*$, which contradicts our previous assumption, and so this proves part (3). Since we have shown $\pi^C \geq \pi^*$, we must have $J^C \geq J$. Any potential solicitor that did not enter absent collusion but enters with collusion could have maintained the same welfare by not entering, but he chose to enter, and therefore, he must be better off having done so. Any potential solicitor that did not enter with or without collusion is unaffected by the collusion and thus his welfare does not change. This proves part (4). \square