Status-Seeking by Voluntary Contributions of Money or Work*

by

Norman J Ireland

Abstract

An informal club has members who contribute to the production of a public good to achieve status. Contributions are either in the form of money or work. A signalling equilibrium is found where full separation occurs. In this equilibrium, efficient choices are made whether to contribute in terms of work or money. The quantity of public good supplied has no consitent relationship to the optimal quantity, but is more than in a simple Nash equilibrium without status-seeking.

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Department of Economics
University of Warwick
Coventry CV4 7AL
UK

N.J.Ireland@warwick.ac.uk

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1. Introduction

The issue of the provision of public goods is central to many economic problems. Some public goods have limited appeal so that general provision by the state is inappropriate and other ways of organizing supply have to be found. Provision of excludable public goods can be within formal or informal clubs. Meeting the cost either requires an enforced subscription (usually lump-sum since information on more selective criteria may be missing [1]) or has to rely, at least in part, on voluntary contributions. It is central to this paper that it is untrue that clubs with an enforced subscription might just as easily be organized as entrepreneurial profit-seeking firms rather than mutual associations. This is because of the particular value attached to the club as a social group. People join clubs not only to consume some public or club good[2] but also to consume it in the (repeated) company of like-minded individuals with whom they may form on-going social relationships. Despite this social enhancement, economic theory suggests the need for enforced rather than voluntary subscriptions, since the latter suffer from a free-rider problem in that the individual subscriber would not take account of the value of the public good provision to others. Wanting to swim with friends is not the same as being willing to pay the whole cost of the swimming pool alone, or be willing to contribute anything if others offer to pay the cost. Hence a Nash equilibrium may be dogged by under-supply. A Nash equilibrium in voluntary contributions may have the property that many users - or indeed all users - make no contributions, while any that do contribute would substitute private consumption until private consumption was equalized across contributors (Bergstrom, Blume and Varian, 1986, Warr, 1983). Better outcomes may be achieved if contributions form a repeated game, or if individuals are altruistic and include others' utilities

[1] See Scharf (2000) for possibilities of more general contribution schemes when they can be embodied within a legal framework.

[2] A good provided by the club exclusively for its members and that has public good aspects is often termed a club good. Many aspects of this paper do not relate specifically to club rather than public goods and so this term

in their utility (e.g. the concept of sympathy, Sen 1966) or if individuals' benefit from a "warm glow" effect (Andreoni, 1990). The latter all arise as possible solutions to the free-rider problem. They all relate to the club as a social group or at least as a social compact.

Our current paper considers a Nash equilibrium in voluntary contributions but takes a very different approach to render the free-rider problem irrelevant. First, the size of the individual's contribution is taken as a signal of the individual's income or ability type, which is otherwise unobservable, and this transfer of information determines the individual's satisfaction over how others in the group perceive his/her status. The satisfaction may be from avoiding others thinking of you as a lower type or it may be a gain from possible opportunities within the social group of the club, where this gain relies on others' beliefs about your type. Either interpretation is possible and both will be expanded on below. The status effect specifically relates to the role of the club as a social group.

A second difference in approach is to allow for contributions to take the form of either money or work as chosen by the contributor. Thus three kinds of club contributions will be possible outcomes. Some clubs will have all (voluntary) contributions of work, some all of money, and some will have a mixture with some members contributing money and others work. The issue of whether to supply work or cash as a contribution is very important and raises a number of interesting questions. Many organizations rely on voluntary work. For example, manning stalls in money-raising events, taking on voluntary duties in catering provision at club functions, house-to house charitable collections, etc. Similarly, cash gifts are often in the form of significant contributions to buy a particular good (for example a park bench, sports wear for school teams, etc.). Both forms of contribution are far more conspicuous than the

has not been adopted here.

anonymous contribution via a cash donation box. We put forward the notion that the level of contributions in a number of clubs is driven by the need to make observable contributions, and our explanation for this need for observability is the contest for status among the club's membership. A further point is of interest. If contributions were limited to cash or money-purchased gifts then family membership of a club relies on the approval of the financial head of the family to make expenditures and thus obtain status for other family members within the club. If contributions can be made by gifts of work time rather than money then these gifts may not require such approval, and lesser members of the family may attempt to mitigate the loss of their status, due to having no access to cash, by making gifts of their time. Again however their ability to donate more time may signify higher family wealth since their potential leisure time would then be greater. If lesser members of the family had to work for wages to support the family budget (rather than to have discretion over their wage, and to be able to use this income to make cash donations to the club) then the provision of time to the club would be more difficult.

With these extensions, we use simple refinements to find an equilibrium where all but the lowest type of member will make positive contributions, and where there is an efficient supply of contributions in terms of whether they take the form of work or cash. We take a simple starting point. We assume that a Nash equilibrium in the traditional voluntary contribution model would imply zero supply. This is because a single dollar's contribution by any individual has no measurable effect on his/her utility from public goods, since the quantitative effect that one individual can have on the level of public goods within the club is too small. Essentially this is an assumption that the club membership is large.

Our model is an adaptation of earlier work (Ireland 1994,1998,2000). It is a signalling model where a role is played by the relative level of donations as relative signals. It thus has common features with Bagwell and Bernheim (1996) and indeed with other work where relative rather than absolute consumption is key (for instance, many papers by Robert Frank, for example Frank, 1985). The model is described in section 2 and the equilibrium is derived as Proposition 1, with the formal proof in the Appendix. Further results and extensions are presented in section 3. Conclusions are summarized in a final section, and the broad results are assessed in the light of some evidence on charitable donations of time and money reported in Freeman (1997).

2. The Model

Although much more general analyses are possible, it will suit our purpose to define underlying preferences, which would be a sufficient definition in a full information world. For a typical individual of type x, preferences are given by the utility function

$$U^x = U(c , G), \tag{1}$$

We assume $U_1 > 0$, $U_2 > 0$, $U_{11} < 0$, and we also assume that the concavity with respect to private consumption is sufficient for[3] $R(c) \equiv -U_{11}\, c / U_1 > 1$.

In (1), private consumption is given by

$$c = (1-v)x - g \tag{2}$$

[3] R(c) is the coefficient of relative risk aversion with respect to private consumption. The assumption yields sufficient concavity for second order conditions to hold in our equilibrium when contributions are made in the form of voluntary work. See Appendix.

where x is both the individual's type and wage rate, v is (the proportion of) the available time allocated to the provision of the public good, so that 1-v is outside labor supply at wage x, and g is the cash gift for this provision. Thus (2) represents the maximum wage income x less voluntary club contributions of time and money. We assume that possible types are in the closed interval $L \leq x \leq H$, and for the most part we take the sub-case where $L < 1$, $H > 1$. The amount of public good is given by

$$G = \gamma \left[\sum v(x) + \sum g(x)\right] \qquad (3)$$

where the summation is over all members of the club, that is all realizations of x within the club. Note that the different types in terms of outside wage are all assumed homogeneous in terms of the productivity of work time producing the public good within the club (for example, the lecturer is no better – and possibly worse - than the road sweeper at serving tea!). The marginal rate of technical substitution in the production function of the public good is assumed constant for simplicity and set to 1 by choice of money unit. Thus the club values a unit of work as one unit of money. However, across clubs different relative values may be observed. The parameter γ may depend on the nature of the public good (how congested it can become) and the size of the club (assumed to be N individuals). We assume that N is large and that $\gamma \approx 0$ [4], so that the direct utility for any individual of supplying public goods is less than the opportunity cost of lost private consumption. Hence no public good is supplied in a Nash equilibrium of contributions (all individuals are below their extensive margin). Thus the conventional model has an extreme prisoners' dilemma outcome. Indeed in what

[4] For example, γ could be of the order of $1/N^{\eta}$ where $\eta>0$ indicating a reduction of the benefit of a given G if N increased. If N were large then γ would be (virtually) zero. If $\eta = 1$ then G relates to average contributions. This latter case has the simple property that the optimal amount of the public good does not change with N.

follows we ignore for simplicity the private incentive for making contributions via the direct effect of γ. This is purely for simplicity: our model extension to encompass a signalling role for contributions will resolve the need for another incentive to make contributions. We will also be able to examine the nature of these contributions, in terms of whether they are in money or in work.

We assume that neither the individual's type x, nor his/her consumption level c, are directly observable by others. An individual knows his/her own type but other members can only infer it through observing the contribution level g or v. The particular signalling equilibrium that we will analyze has the property that it is only the sum v+g that constitutes the signal. However this reflects the efficiency properties of the refinement we apply and is not a general property. All individuals' preferences are the same, and so individuals differ only by their types x. An individual's objective function under this asymmetric information about the individual's type is of the form

$$Z^x = (1-\alpha)\ U((1-v)x - g, G) + \alpha\ U((1-v)f(v,g) - g, G) \qquad (4)$$

The value of the function f(v, g) is the inference that observers, within the social group of the club, make as to the x-individual's type from observing v and g. If the correct inference about type is made (as it will be in equilibrium), then x = f(v, g) for all equilibrium choices v and g and for all x.[5] The parameter α can relate to the proportion of social encounters with those who are uninformed of your type. Then the function Z reflects the probability of a signal being extracted: those with exogenous information as to your type do not need to consider the signal; those without such information extract the signal to provide the missing information.

[5] An alternative view would be to define (1-v)f(v,g) - g as ϕ(v,g). Observing v and g then signals the

Apart from the general argument that a member will seek to achieve esteem from others, there may be opportunities arising within the club, and the profile of contributions may determine the extent and value of these opportunities. A simple example may make this point. Suppose within the club, small sub-groups of size 2 or more, form and carry out an economic process (such as a partnership or business contract or skill enhancement) which leads to a lifetime income for *each* member equal to the *minimum* x of all other members of the subgroup. With probability 1-α your own type is known within the club and with probability α it is inferred by your donations. In a signalling equilibrium all types become common knowledge and the subgroups are composed of (virtually) homogeneous members (otherwise if sub-groups existed with one member in each having a higher type than the remaining individuals then the higher types could do better by forming their own sub-group). This matching equilibrium of individuals into sub-groups gives a motivation for individuals to make the inference about others' types, and can be generalized to take account of larger or variable-size sub-groups and subgroups where the lowest type only in part determines the others' outcomes.[6] Essentially if you signal a higher than true type then you might (with probability α) be able to join a better sub-group and obtain f(v, g); in equilibrium the shape of f(v, g), that is the donation levels to qualify for different ability sub-groups, must make signalling the truth incentive compatible.

More generally, α can be considered as the importance attached by the x-individual to the incomplete information of others about his or her type, and thus the importance of making impressive signals. Obviously a combination of the importance of having others aware of

consumption level ϕ(v,g). Moving from f to ϕ does not change the analysis.

[6] For example, suppose the sub-group is of size 2 and the pay-off is an equal share of the sum of the individual types. Then each individual will anticipate an outcome of the average of the matching partner f(v, g) (since this would be the inference of the membership of the individual's own type and hence the type of the matching partner) and the individual's true type x. Equations (5) and (6) can be adjusted appropriately but the structure is

your type, and the need to inform those who do not otherwise know your type can be accommodated quite naturally as a convex combination of actual and inferred utilities.

In this paper we will assume for simplicity that α is the same for all x. [7] If α is zero for all types then no signals will be forthcoming and consequently no public good will be produced in equilibrium. If α shifts upwards, then status becomes more important to everybody, that is the club's membership has become unambiguously more status-conscious. Of course, individuals may try to present themselves as of higher types than is true. However, the cost of making such a departure from equilibrium will be sufficient deterrence to prevent it happening.

Given the function f, a typical individual will maximize (4) by choice of v from the closed interval [0, 1] and choice of $g \geq 0$. We will look for a separating equilibrium where no two types make the same contributions, no type would wish to change his/her contribution, and his/her type is correctly inferred by others from his/her contribution. We write U_1 as the marginal utility of consumption evaluated at the true x, and U_1^* as the marginal utility of consumption evaluated at the inferred f(v, g). First-order conditions are

$$v: \; -(1-\alpha)U_1 x - \alpha U_1^* f + \alpha U_1^*(1-v) f_1 \leq 0 \qquad \text{complementary with } v \geq 0 \qquad (5)$$

$$g: \; -(1-\alpha)U_1 - \alpha U_1^* + \alpha U_1^*(1-v) f_2 \leq 0 \qquad \text{complementary with } g \geq 0 \qquad (6)$$

Dividing both (5) and (6) through by U_1 and considering an equilibrium where $x \equiv f(v,g)$, so

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not changed. A more sophisticated application of a matching process to justify the notion of status-seeking is given in Cole, H. L., G.J. Mailath and A. Postelwaite, (1992)

[7] The implications of dropping this assumption are discussed in Ireland (1999).

that $U_1 = U_1^*$, we have the simpler expressions:

$$- f + \alpha(1-v)\, f_1 \leq 0 \qquad \text{complementary with } v \geq 0 \qquad (7)$$

$$- 1 + \alpha(1-v)\, f_2 \leq 0 \qquad \text{complementary with } g \geq 0 \qquad (8)$$

and at least one inequality binds for each type to enable signalling to take place. As with all signalling equilibria, a large number of solutions (that is functions f) exist. We look to two refinements for efficiency. First, we adopt Mailath's (1987) initial value condition so that type L (and only type L) makes zero signals. The intuitive argument here is that this type will be revealed as type L in any equilibrium so would do better by not wasting consumption on signalling by either money or work. The second efficiency condition concerns the choice of signal (money or work). We argue that money-only contributions will be made by types $x \geq 1$. That is these types will prefer to make money by working outside the club and contributing money than working within the club with a lower productivity. The intuition is straightforward. Suppose that a total contribution $v^* + g^*$ is required to signal a type $x^* \geq 1$. A similar size contribution, all in money, would be equivalent or easier for the x^* type but more difficult to replicate by a type $x<1$. With these refinements, the signalling equilibrium is almost unique (unique apart from a choice of signal instrument by the type 1 individuals). The behavior of each type is defined by

for types $x<1$

$$g = 0, \qquad v = 1 - (L/x)^{\alpha}, \qquad (9)$$

for type x = 1

$$g = 0, \qquad v = 1 - (L)^{\alpha}, \tag{10}$$

or

$$g = 1 - L^{\alpha}, \qquad v = 0 \tag{10'}$$

for types x>1

$$g = \alpha\,(x - 1) + 1 - L^{\alpha}, \quad v = 0 \tag{11}$$

and the inference function has the form

$$f(v,g) = L(1-v)^{-1/\alpha} \qquad \text{if } v + g < 1 - L^{\alpha} \tag{12}$$

$$f(v,g) = \max\{ L(1-v)^{-1/\alpha}, 1 + (g - 1 + L^{\alpha})/\alpha \} \qquad \text{if } v + g = 1 - L^{\alpha} \tag{13}$$

$$f(v,g) = 1 + (g - 1 + L^{\alpha})/\alpha \qquad \text{if } v + g > 1 - L^{\alpha} \tag{14}$$

We can state

Proposition 1: Given the restrictions on the utility function (1), a signalling equilibrium exists with behavior defined by (9)-(11) and inferences of type given by (12)-(14).

Proof: see Appendix

The relationship between total contribution and type, and the inverse of this relationship in terms of social inference over type from the level of total contribution, is unique and is shown in Figure 1. The two regions of different signalling instruments are clearly seen since signalling with cash is linear while signalling with labor is concave. The intuition behind the latter is that successively higher types have higher opportunity costs of contributing labor, and hence contribute less additional labor to achieve separation. The graph is continuous, and has a kink at the cross-over point between signalling with labor and with cash. Since separation is driven from below, an increase in L will cause the schedule to shift to the right, reducing contributions from all types (see Figure 2). On the other hand, an increase in H will only extend the graph. In any finite-size club, the actual types can be seen as a random draw from a continuous distribution of possible types. Members of the club have to establish their type within the continuum of possible types, not simply their rank in the set of actual members. In our model it is the exact inference of type that affects utility, not the ranking of type within the membership.

The importance of status is given by the parameter α. If α increases to α' then greater contributions are made by all members (other than L-types). This shift in the equilibrium is shown in Figure 1. It represents either a move to a more status-conscious club (which would therefore have greater concentration of public goods) or an increase in the importance of how individuals are perceived by their actions. For instance, this might occur if the membership of a club is disturbed, so that past reputations and close relationships are supplanted by new social contacts.

{Figures 1 and 2 about here}

3. Results and Extensions

Club Welfare

We begin our analysis of the model and its equilibrium by discussing the optimum outcome from the limited perspective of the club's membership. We do not take account of external benefits or costs of the public good outside the club membership, although this would be a straightforward extension. We simply consider the amounts of members' contributions of labor and money that would maximize a utilitarian objective function of the whole membership in a world of complete information. Thus expected welfare per member is

$$W = \int_L^H U^x f(x)\, dx \qquad (15)$$

Where f(x) is the density function of types. Obviously the club would be composed of a finite number of realizations of types, but this complication is ignored. Define x* as a type which satisfies

$$\text{Min}\{x^*U_1(x^*, G), U_1(x^*, G)\} = N \int_L^H \gamma\, U_2^x(c(x), G)\, f(x)\, dx \qquad (16)$$

We have assumed that R(c) > 1 in (1) and this assumption is equivalent to assuming that $xU_1(x, G)$ is decreasing in x (that is the marginal utility of consumption decreases at a rate faster than the increase in consumption). Then a unique x* exists (unless it is outside the limits of [L, H] in which case either all individuals or no individuals should contribute to the public good). If $x^*>1$ then the min{.,.} in (16) is clearly $U_1(x^*, G)$. Then the left-hand side of (16) is the marginal utility of a dollar's consumption by an x*-type individual who makes no donations and enjoys the public good G. The right hand side is the expected additional utility generated for all members of the club by transferring that consumption to a club donation. For $x < x^*$ no contribution to the public good is required in the social optimum, that is the maximization of the utilitarian expected welfare function (15). If $x^*<1$ then the min{.,.} in

(16) is $x^*U_1(x^*, G)$ which is the marginal utility of consumption financed from a unit of work, since this is a more efficient way of donating to the club. The social optimum behavior of types higher than x* is

$$xU_1((1-v^*)x, G) = N \int_L^H \gamma\, U_2^x(c(x), G)\, f(x)\, dx \qquad \text{for all types } x,\ x^*<x \le 1 \qquad (17)$$

$$U_1((x - g^*, G) = N \int_L^H \gamma\, U_2^x(c(x), G)\, f(x)\, dx \qquad \text{for all types } x,\ x \ge 1 \qquad (18)$$

And of course (3) defines G. The social optimum can have the configuration (if $L < x^*<1<H$) that the lowest types do not contribute, the next band contributes labor, while the top types contribute money. If $x^* > 1$ then only (18) is relevant and for $L < 1 < x^*<H$, only money is contributed, but low types contribute nothing. In either case, the money contributions are such as to reduce the consumption of each member making a money contribution to the same level. The political economy of the decision-making process for delivering such an extreme redistribution is obviously very demanding.

Our starting point here was that no contributions would be forthcoming in a Nash equilibrium of voluntary contributions in the absence of status-seeking, since the pay-off to each member of a one unit donation by that member was only 1/Nth of the social pay-off. Given this degree of free-rider problem there would be obvious difficulties in identifying types and collecting contributions by rule, even if top-type club members could be persuaded or forced to remain in the club. Furthermore, a common concern within all social groups and clubs is that common ownership and respect for the public good is thought to require that all members make some contribution towards funding the public good.

Equilibrium Properties

We suggest that the equilibrium described in section 2 has a number of acceptable features in relation to club welfare given the informational asymmetries. These features include

i. A higher type makes a higher contribution.

ii. Only type L makes zero contribution.

iii. The choice of signalling by labor or cash is efficient for all members.

iv. Only "large" cash contributions are made. Small contributions of money are replaced by labor time contributions since low types supply these more efficiently.

v. The comparative statics of the equilibrium with respect to L, H and α lead to clear changes in the supply of the public good.

The model is sufficiently simple to ask questions arising from a number of extensions. First, consider the assumptions. We have taken the case that $L<1<H$, so that some members contribute labor while higher types contribute money. If $1<L<H$ then the labor supply part of the answer disappears and all contributions are of cash. Any L-types make zero cash donations while near-L-types make very small donations. The solution varies from that given in Proposition 1 with the level of donations of money $g = \alpha(x - L)$, and of time $v=0$. If $L<H<1$, then only labor donations are made, with $v = 1 - (L/x)^{\alpha}$. Thus clubs composed of relatively low-type members (in relation to the cost of externally-hired labor) would signal predominantly by contributions of time rather than money. Clubs composed of relatively high-type members would signal predominantly by contributing money. The interest of the case in Proposition 1 is that members will choose efficient signalling instruments within a signalling equilibrium.

One of the key assumptions in any equilibrium where L<1 is that the coefficient of relative risk aversion (R) satisfies R > 1 (see Appendix). This assumption is necessary for the utility function to have sufficient concavity such that cheating by pretending to have a higher type by supplying more "cheap" labor is not attractive. If this condition does not hold, then the part of the proposition relating to labor supply does not hold since second-order conditions fail. The possibility then arises for the club to adopt only money donations as signals. Then inefficient labor/cash donation choices arise in order to achieve complete separation, since no labor will be supplied, even by members with low opportunity costs. Alternatively a semi-pooling equilibrium might result, but this again would not be efficient in the labor/cash choice. Suppose there were no signalling by work donations, either because the technical conditions failed, or because too little value is put on work donations in the expression for G.[8] Then the signalling equilibrium would be as shown by the simple linear graph in Figure 1. Essentially v=0 and $g = \alpha(x\text{-}L)$ for all types x. From Figure 1 or a simple proof we can report:

Proposition 2: If L<1<H, then (i) the graph of donations is always higher if work donations can be made than if they cannot be made, and (ii) higher types will make smaller effective donations if they are forced to donate in work rather than money.

Proof: (i) Since $1\text{-}L^{\alpha} > \alpha(1\text{-}L)$ for all L in (0,1) and $0<\alpha<1$ (by Taylor's expansions), the graph of v+g is higher for all x>L if v>0 is permitted.

(ii) The derivative with respect to x of (9) is less than that of (11) for x>1.

Hence part (i) shows that the opportunity for signalling by providing time rather than money increases donations of all members of the club, even those who choose to donate by money

[8] The higher relative value for money would imply L larger and if L>1 then no contributions would be in the

alone! This result has a more general implication. If signals are beneficial to the group and under-provided relative to the group's welfare, then expanding the technology of signalling for low types forces up the equilibrium signals of high types. Part (ii) is a further example of this. If high types are not allowed to signal with money then their increasing opportunity cost of signalling with work implies that lower effective donations are a sufficient signal. Similarly if donations are over-provided relative to the group's welfare then contracting the signalling technology by removing signalling instruments would reduce the quantity of donations.

Finally, a key issue relates to the amount of public good supplied. In fact as the supply of public good has everything to do with status and nothing to do with the actual value of the public good, nothing can be said. For example, the utility from the public good can be very small (U_2 always low) while a large α promotes very large contributions. Thus over-supply of the public good could occur, and in the reverse case the traditional prediction of an under-supply is also possible. The addition to the model of a facility for the club to set a minimum level of contribution permits all contributions to be ratcheted up, and hence the overall level of supply could be increased. Thus under-supply (in the sense of the club's decision-making criteria) could be corrected by a minimum level of contribution, although this would decrease the utility of low types more than high types.

4. Conclusions

The properties of the equilibrium we have described should be related to evidence. The closest that I have been able to find is that related to charitable donations and volunteer work.

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form of work.

However, comparisons have to be qualified by the obvious differences between “club” activity and charitable contributions. The former would include the latter if clubs are defined very generally, but only where the involvement with charities had some social interaction element. Thus volunteer working for the local Red Cross might qualify for our model, as would engaging in local fund raising for an international appeal, while occasional donations to national charities would not. These problems apart, it is interesting to apply the results of Freeman (1997) who considers US sample survey results from the Current Population Survey (1989) and the Gallup Survey of Giving and Volunteering (1990). Here the exact nature of volunteer activity is indeed ambiguous: the Current Population Survey (1989) for example asks about voluntary work done such as “at hospitals, churches, civic, political and other organizations”. Broadly, Freeman finds that there is a (fairly weak) positive relationship between voluntary work and human capital or the value of time. In our model a positive relationship between v and x is indeed predicted in the lower part of the x distribution (in the v-segment in the figures). On the other hand, Freeman finds (Table 5, pS160) that the difference between (logs of) voluntary hours and money donations (log of v/g in our notation) is negatively related to the individual or family wage. This again could be predicted from our model since the increase in either v or g with x in their respective “sectors” (see figures) can offset by the switching from time to money contributions at critical x-values (normalized to 1 in our analysis of a single club). The switching points would of course appear at different critical values of x across a set of heterogeneous clubs. A third striking result that arises in Freeman’s analysis is that people are more likely to volunteer if they are actually asked to. One reason why our model might predict this is that signalling has to be observable behavior. It certainly ensures that others know that you are volunteering if they ask you first. More importantly frequent refusals to volunteer or to give money within the same community or club implies others will hold you in low status. Freeman gives other explanations for the observed behavior. Most notably he argues that giving may be a “conscience good”, and that reciprocal altruism is important. These explanations will often be nearer the truth than the signalling explanation we have advanced. However we would argue that there will be other situations where the signal, and the need for the status it produces, is paramount.

Turning the argument around, the analysis we have presented offers a justification for the existence of clubs. This is that they might channel conspicuous donations of labor or money into the most valued public goods, whereas otherwise conspicuous consumption to generate status would result in a wasteful contest with little social gain. There may be warm glow effects attached to contributions and these could be added to the model. Also, the “bad taste” view of competition in conspicuous consumption (for example gold-plated taps), which might bring about a collapse of signalling status due to too many individuals rejecting participation, might be replaced by social acceptance and approval when signalling leads to positive social gains. This would be true if competition is in terms of supplying a public good which is the raison d’etre of the club’s existence.

Appendix: Proof of Proposition 1

The proof essentially ensures that Z^x only has a maximum when the true type is revealed for any x. We consider three cases in turn.

(iii) For a type x<1, we show that the behavior given by (9) is optimal for the individual given the inference function (12), and $v+g < 1 - L^{\alpha}$. We then show that this behavior is better than choosing any other (v,g) pair. If f(v,g) is defined as (12) then $f_1 = f/((1-v)\alpha)$. The Kuhn-Tucker conditions (7) and (8) clearly hold. For the second-order conditions to hold for any $x<1$ we need the derivative of (5) with respect to v to be negative, that is

(iii) $\partial\{(1-\alpha)(U_1 x - U_1^* f)\}/\partial v < 0$

which is equivalent to

(iii) $(1-\alpha)\{-U_{11}x^2 + U_{11}^* f^2 - U_{11}^* f^2/\alpha - U_1^* f/(\alpha(1-v))\} < 0$

and when x = f, as given by (5) as an equality:

$x(1-\alpha)/((1-v)\alpha)\{ U_{11}^* x(1-v) + U_1^*\} < 0$

or

$x(1-\alpha)/((1-v)\alpha)\{(1-R)U_1\} < 0$ (A1)

where R is the coefficient of relative risk aversion and R>1 by assumption. Thus since $0<\alpha<1$, $v<1$, and $U_1>0$, (A1) is satisfied and the second-order conditions for a maximum hold. The behavior also has to be optimal relative to mimicking types equal to 1 or higher by choosing $v+g \geq 1 - L^{\alpha}$. The argument above extends to preferring not to mimic x=1 by choosing behavior (10). Clearly behavior (10') yields lower utility than behavior (10) since with the former $c' = x - 1 + L^{\alpha}$ while with the latter $c = xL^{\alpha}$, and both give the same status. Finally, it is not optimal for the type $x<1$ to mimic a type $x>1$ since (6) is not satisfied. To see this note that $f_2 = 1/\alpha$ (using (14) and so the left-hand-side of (6) takes the form

(iii) $(1-\alpha)U_1 - \alpha U_1^* + \alpha U_1^*(1-v)/\alpha$

$\equiv - (1-\alpha)(U_1 - U_1^*) > 0$ (A2)

The inequality in (A2) holds since x<f. Hence all types x<1 signal their type to the membership using (9) and their types are correctly inferred by the membership using (12).

(ii) For a type x>1, the Kuhn-Tucker conditions (5) and (6) hold if behavior is described by (11) so that (14) infers the correct type. Second-order condition for (6), using $f_2 = 1/\alpha$, is:

$$(1-\alpha)U_{11} + \alpha U_{11}^* - \alpha U_{11}^*/\alpha + \alpha U_{11}^*/\alpha^2 < 0$$

or

$$(1-\alpha)(U_{11} - U_{11}^*) + U_{11}^*/\alpha < 0 \quad \text{(A3)}$$

and (A3) holds when x= f since $U_{11} < 0$ by assumption. To simply adopt (10) rather than (10') in mimicking x=1 is utility-reducing by a converse argument to that used in case (I). We again need to check that pretending to be some x<1 is not better than the behavior (11). Consider the sign of the left-hand-side of (5) as

(iii) $(1-\alpha)(U_1x - U_1^*f) \equiv - (1-\alpha)(U_1c - U_1^*c^*)/(1-v)$

where c*<c is the wrongly inferred consumption level. Now U_1c is decreasing in consumption since R>1, and so

(iii) $(1-\alpha)(U_1c - U_1^*c^*)/(1-v) > 0$

as c>c*. Hence mimicking 1 is better than mimicking x<1, and the truth is better than mimicking 1.

(iii) For a type x=1, a combination of arguments from cases (I) and (ii) suffice.

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Figure 1: The Signalling Equilibrium - shift in a, and the case where only money is contributed.

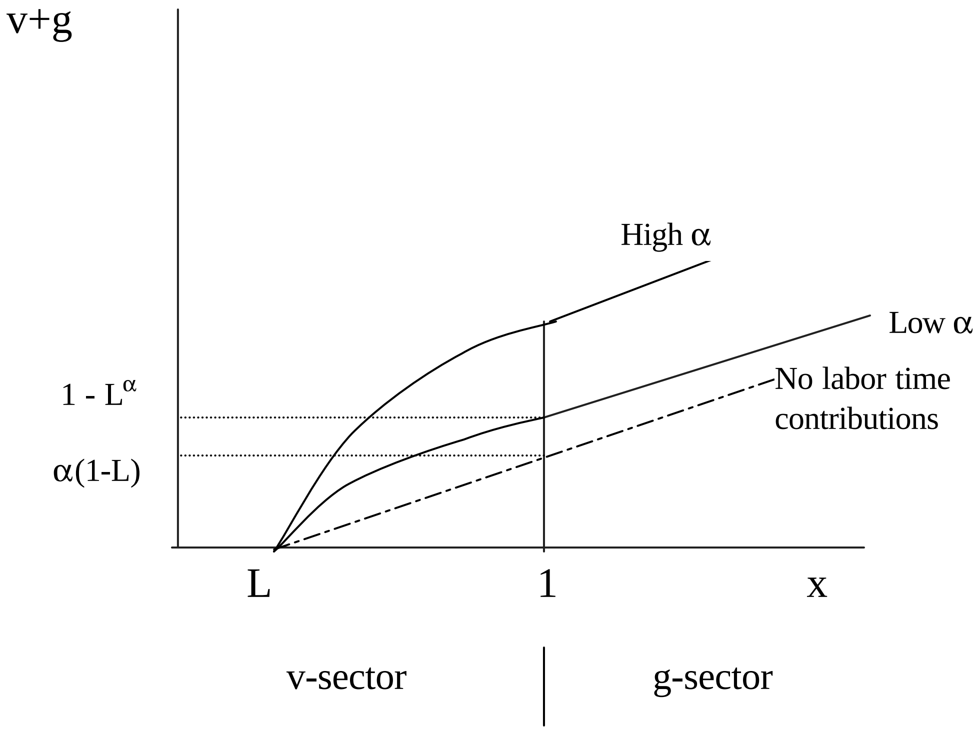

Figure 2: The Signalling Equilibrium - the effect of an increase in L