Economics Letters 145 (2016) 92–97

Contents lists available at ScienceDirect

Economics Letters

journal homepage: www.elsevier.com/locate/ecolet

Two-sided altruism and signaling

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HIGHLIGHTS

- Asymmetry of information about a donor's income generates a signaling game in the presence of two-sided altruism.
- Similarly, asymmetry of information regarding the donor's income generates a signaling game in the presence of two-sided altruism.
- These signaling games put upward pressure on transfers and this pressure increases with the altruism of the recipient.

ARTICLE INFO

Article history:
Received 4 March 2016
Received in revised form
13 May 2016
Accepted 27 May 2016
Available online 7 June 2016

JEL classification:
D64
F24
O15
O16

Keywords:
Asymmetric information
Remittances
Transfers
Altruism

ABSTRACT

When donors and recipients care about each other – two-sided altruism – asymmetry of information about the donor's income or about the donor's altruism leads naturally to a signaling game. The desire to signal income or altruism puts upward pressure on transfers.

"Jack's unhappy that Jill's unhappy
Jill's unhappy that Jack's unhappy
that Jill's unhappy that Jack's unhappy
that Jill's unhappy"
[Laing (1970)]

1. Introduction

The concept of altruism has a long history in philosophical and social sciences. The term was originally coined in the 19th century by the founding sociologist and philosopher of science, Auguste Comte (1874), and has become a major topic in many fields. In simple terms, altruism is caring about the welfare of other people and acting to help them (see Hammond, 1987). Altruism has an evolutionary rationale (see Hamilton, 1964 and Bergstrom, 1995), and evidence of it abounds, especially among friends and family members, (see Andreoni et al., 2008 and Curry et al., 2013). Altruism has been credited to be an important motive behind remittances and other private transfers between households (see among others Cox and Fafchamps, 2008, Foster and Rosenzweig, 2001, Kazianga, 2006, Ligon and Schechter, 2012, Mitrut and Nordblom, 2010 and Rapoport and Docquier, 2006).[1]

For the purpose of this paper, we shall consider two individuals who care about each other's welfare, one of which (the donor) is richer than the other (the recipient) and may want to financially help the latter. To fix ideas, it might help us to think of a migrant son sending remittances to his mother. The purpose of this paper is to show that two-sided altruism in the presence of asymmetry of information leads very naturally to a signaling game.

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http://dx.doi.org/10.1016/j.econlet.2016.05.027
0165-1765/

[1] There is also a large literature in public economics on the role of altruism and two-sided altruism on whether Ricardian equivalence holds (see Kotlikoff et al., 1990 among others) and how to deal with it in the context of welfare analysis (see Cremer and Pestieau, 2006 for instance).

Under full information, it is a generally understood fact that if the mother also cares for her son – two-sided versus one-sided altruism – then the son's utility increases but it does not affect the level of remittances chosen. This is because, in valuing his entire welfare, the altruistic component of the mother's utility puts the same relative weight as her son on his utility of consumption and on her utility. Hence, the son's utility or objective is just multiplied by a constant (see for instance Bourles and Bramoullé, 2013).

However, this result generally does not hold in the presence of asymmetry of information. Assume that the mother does not know her son's income. As the mother cares about her son's welfare, she would like to know that he makes a good living. As the son cares about his mother's welfare, he would like her to believe that he makes a good living, irrespective of his real standards of living. As a result, she cannot take his word for it and she will try to infer information about her son's achievement from the remittances that he sends her. This gives incentives to poorer donors to transfer more to imitate richer donors, as transfers affect beliefs. Believing the donor to be richer gives a utility boost to the recipient if she is altruistic, and this is valuable to the donor if he is altruistic. This implies that, to be informative, the transfers have to satisfy an incentive constraint. This is a standard signaling game (see Spence, 1973 and Mailath, 1987).

Uncovering this effect is the first contribution of the paper. The second is to show how this puts a pressure upward on the amounts remitted. In a separating equilibrium, all transfers, but the transfer of the poorest donor, are higher in order to satisfy the incentive constraint. This is because transfers have two distinct impacts: a direct one on the payoff of the recipient and an indirect one via the inference that the recipient makes about the wealth of the donor.

This work is related to the literature on signaling as a motive for charity contributions (Glazer and Konrad, 1996) but, crucially, the present paper does not assume that individuals want to signal their wealth, but shows that this concern arises naturally when donors and recipients care for each other.

Finally, asymmetry of information regarding the donor's level of altruism has similar results. The paper shows that our migrant son has an incentive to appear more altruistic than he is to his mother, and the more his mother cares about him, the larger this incentive is. This provides a micro-foundation for the preferences assumed by Ellingsen and Johannesson (2008) where individuals gain esteem from appearing altruistic to others and this gain increases in the level of altruism of others.

The remainder of the paper proceeds as follows. Section 2 provides the benchmark case with full information. Section 3 introduces asymmetry of information regarding the sender's income, characterizes the separating equilibrium in the resulting signaling game and derives a number of its properties. Next, Section 4 shows that similar results apply when there is asymmetry of information regarding the altruism of the donor. Finally, Section 5 concludes.

2. Full information

Consider two individuals, a recipient R and a donor D who are altruistic towards each other. They both care about their own utility of consumption but also the other's welfare. The donor's income y is drawn from a continuous distribution function $F(y)$ ($f(y)$ denotes the associated probability density function) with full support on $Y \equiv [\underline{y}, \bar{y}]$ ($\bar{y} > \underline{y} > 0$). As a benchmark, assume for now that the realization of the donor's income is known to the recipient.

Let u_i be individual i's direct utility of consumption, $i \in \{R, D\}$, and assume that $u_i'(c) > 0$, $u_i''(c) < 0$ and $\lim_{c\downarrow 0} u_i'(c) = \infty$. We denote as $\alpha_i \in (0, 1)$ the weight that individual $i \in \{R, D\}$ puts on the other's welfare. That is, for a given allocation of consumption $\mathbf{c} = \{c_D, c_R\}$, i's utility $v_i(\mathbf{c})$ is given by

$$v_i(\mathbf{c}) = u_i(c_i) + \alpha_i v_j(\mathbf{c}); \quad \text{for } i, j \in \{R, D\}. \tag{1}$$

It follows that

$$v_i(\mathbf{c}) = A[u_i(c_i) + \alpha_i u_j(c_j)] \quad \text{for } i, j \in \{R, D\}$$

where $A = \frac{1}{1-\alpha_R\alpha_D}$.

A donor with income y chooses to transfer the amount $t \in \mathbb{R}_+$ that maximizes his objective

$$A[u_D(y - t) + \alpha_D u_R(t)].$$

He transfers $t^*(y)$, the transfers that satisfies

$$u_D'(y - t^*) = \alpha_D u_R'(t^*) \tag{2}$$

if it is non-negative and zero otherwise. It is worth making a couple of observations.

Observation 1. *Under full information, transfers are independent of the altruism of the recipient.*

This observation follows directly from the first order conditions (2) that are clearly independent of α_R.

Observation 2. *Under full information, transfers increase less than proportionally with the income of the donor.*

Proof. It is easy to check that $\frac{dt^*}{dy} = \frac{-u_D''}{-u_D'' - \alpha_D u_R''} < 1$. ■

Example 1. Assume that both the migrant son and his mother have logarithmic utility, $u_i(c) = \ln(c)$ for $i \in \{R, D\}$. It is easy to see that, under full information, the son remits a constant fraction of his income:

$$t^*(y) = \beta y, \quad \text{where } \beta = \frac{\alpha_D}{1 + \alpha_D},$$

and this whether his mother cares about him or not.

3. Signaling income

Now assume that the income of the donor y is private information. The distribution from which the income is drawn is common knowledge but the actual realization is private information.

A *Perfect Bayesian Equilibrium* consists of a strategy profile $\mu : Y \to \mathbb{R}_+$, designating a strategy for each type of donor, and an inference function ϕ, characterizing the beliefs of the recipient at each information set, such that μ is sequentially rational for each player given ϕ and ϕ is derived from μ using Bayes's rule whenever possible.[2]

The *inference function* $\phi(z, t)$ is the probability that the donor is of type z if he transfers t. $\Phi(t) \equiv \{z|\phi(z, t) > 0\}$ is the support of types for transfer t.

A donor of income z who gives t has utility

$$v_D(z, t) = u_D(z - t) + \alpha_D v_R(t), \tag{3}$$

where $v_R(t)$ is the recipient's utility from receiving a transfer t:

$$v_R(t) = u_R(t) + \alpha_R \int_{z\in\Phi(t)} \phi(z, t) v_D(z, t) dz.$$

[2] The signaling game described in this paper is not fully standard. In this model, the donor cares directly about the recipient's inference as opposed to caring indirectly about the inference due to a strategic choice by the recipient. However, the difference has no formal significance and does not affect the definition of the equilibrium concept.