

**AN ECONOMIC MODEL OF BEHAVIOUR: ATTITUDES  
TOWARDS ALTRUISTIC BLOOD AND ORGAN DONATIONS**

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# An Economic Model of Behaviour: Attitudes Towards Altruistic Blood and Organ Donations

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## **Abstract**

The aim of this research is to model altruistic blood and organ donors behaviour. First, we make an analysis of the decision of to be or not to be a donor for any individual. We propose a model where individuals compare the expected utility of deciding to become a donor, with the utility of the alternative decision (not to become a donor). Second, we continue with the identification of the variables having influence over this decision, the expected effects of such a donation (positive and negative) and the importance of the expectations over individuals well-being and the subsequent decision.

We work with rational individuals that behave altruistically when making a decision. The model is specific because the goods we consider can only cover vital needs. We posed hypothesis about some variables for each kind of the donations considered (blood and organ donations). This hypothesis can be useful to identify which are the variables having influence actually over this decision. We propose a pilot survey to test our model. First results from a university students survey show the relevant variables influencing blood an organ donations, and seem to confirm the model.

**Key words:** altruism, interdependent utility functions, attitudes, blood/organ donations and behaviour

# 1 Introduction

In this research we study what are the variables affecting positively to an increase in the willingness to become a donor. This is the target of this research: to analyze altruism in the health sector, in the field of blood and organ donations. It is said that the impact of altruism in health economics has not been deeply explored (Hanson R., 2007). In fact, it is not only necessary but also very promising for mainstream economics to take the presence of other-regarding preferences into account. People often do care for the well-being of others and this has important consequences.

Under which conditions and why do some individuals decide to be donors? The reasons driving an individual to do it are not unique. We can not generalize a donor's behavior, but we can say which are the variables having a strong influence over these kind of decisions such as becoming donor. Certain researchers make reference to sense of duty, responsibility, love and other psychological rewards (Thorne, 2006).

Trust in physicians and in the process or system, solidarity, tradition, reciprocity, trust and the benefit perceived by the donors when they give blood or an organ with a transplant purpose, seem to be important factors having influence on such a decision. There is an important lack of organs and the number of blood donors does not rise nowadays. Certain investigators argue that incentives might be useful to increase the supply of organs or blood. The discussions here are about morality of the incentives proposed. We focus the research onto detect the variables that are deciding on such a behaviour. A second task, for future research, would be to think about how to increase the number of donors. This research attempts to approach us to the behavioural model of donors trying to explain why individuals decide to become blood and organ donors, in a very preliminary way.

## 2 Interdependent Utility Functions

In economics, there are assumptions about how consumers behave when they have to make choices. Individuals, when they make choices, they are defined as rational, capable of making decisions and *self-interested*.

It is typical to refer to Utility functions as a way of representing individuals preferences. Suppose that these preferences  $\succ$  are asymmetric, negatively transitive and continuous (then  $\succ$  admits a numerical representation). Given preferences  $\succ$  on a set (finite) of goods  $X$ , a numerical representation for those preferences is a function  $U$  with a domain  $X$  and range the real line, such that  $x \succ y$  if and only if  $U(x) \geq U(y)$ , being  $x$  and  $y$  two bundles of goods contained in  $X$ .

The function  $U : X \mapsto R$  measures all the objects of choice in a numerical scale, and a higher measure on the scale means the consumer likes the object more (the functions are considered non decreasing). A function is non decreasing then, if for any two bundles  $x$  and  $y$  such that  $x$  has higher quantities than  $y$  of at least one of its goods,  $U(x) \geq U(y)$ . And it is strictly increasing if  $U(x) > U(y)$ .

Property: Monotonicity on preferences  $\succ$

*If preferences are represented by  $U$ , these preferences are monotonic if and only if  $U$  is non-decreasing, and these preferences are strictly monotonic if and only if  $U$  is strictly increasing.*

Evidence shows that individuals sometimes are *other-regarding*, and not just self-interested, but show to be concerned about the other's welfare taking their preferences into account. Instead of searching to maximize his own utility, an individual is going to sacrifice part of the utility he would have

obtained behaving selfishly, because he is worried about the others' welfare. We say then that individuals have other-regarding or altruistic preferences. Some prestigious economists talked about this kind of behaviour in different contexts.

Our interest is altruism. In general, altruism is defined as *the preference for the others' welfare*. An altruist is an individual that makes a personal sacrifice to increase the well being of another person (or group of people). A formal definition for altruism is *unselfish concern for the welfare of others*.

There is not a unique definition for the concept *altruism*. In fact, there are many, such as kin altruism (also named kin-directed altruism) reflected in acts among familiars and associated to genes and biology, parochial altruism (a group of individuals where everyone is disposed to help the rest of individuals of the group, but not to those out of the group), unconditional altruism (this kind of altruism is represented by an individual who is disposed to help everybody without restrictions) and reciprocal altruism (there is an expectation of being compensated because of the action) between others.

So, we can talk about an altruist as somebody who gets rid of a certain quantity of a good(s) with the purpose of increasing the utility of another person (or group of people).

The utility function representing altruistic preferences has a characteristic that differs from the self-interested utility functions. Preferences also state the necessary conditions to be represented, even though they are specific in one aspect: they are not monotonic. The function  $U$  in these cases does not state the non-decreasing condition. This is the major difference between self-interested utility and other-regarding utility functions.

Imagine that we have an individual  $i$  that makes a donation, such that he faces two bundles:  $x_d^0 = \{x_1, x_2\}$  and  $x_d^1 = \{x_1, x_2^*\}$ . The upper index represents the moment of time, so that  $x_d^0$  represents the bundle of goods before making the donation, and  $x_d^1$  is the bundle of goods after donation. In a situation where a donation is made, (suppose that the individual gives some quantity of his initial endowment of good  $x_2$ . Then, after donation the new quantity of the good is not  $x_2$  but  $x_2^*$ , and states  $x_2^* < x_2$ ). A non decreasing function would state that  $x_d^0 \succ x_d^1$  because  $U_i(x_d^0) > U_i(x_d^1)$ . However, assuming altruism on preferences, even if the initial endowment was higher before donation, the final result (in terms of utility) for the individual, is an increase in well-being after donation actually ( $U_i(x_d^1) \geq U_i(x_d^0)$ ). That proves that preferences, if individuals are altruistic, do not satisfy monotonicity.

In the early 80's unselfishness behaviour was well established in the profession: it relies on two forms of utility interdependence. Altruism meant either the inclusion of another's satisfaction in an individual's utility function or, less frequently, the inclusion of the value of resources given away. Individuals sometimes, giving some quantity of one good, can be better than initially. The reason is that the loss in individual's utility because of the reduction of a certain quantity of a good, gets compensated by the increase in utility because of the satisfaction, either for the fact of giving or for the improvement of the recipient's utility (or for both reasons simultaneously).

In this work, we propose utility interdependence. We consider an altruist as someone who includes another's utility in his own utility function. From now to the end we will treat  $i$  as an individual who cares for the others' welfare (an altruist) and  $-i$  is the (finite) set of recipients (an individual or a society) and we do not care if they are altruistic or not. Our research is focused on the donor's behaviour.

The interdependent utility function that we propose, written in its general form is  $U_i=U_i(X_i, U_{-i}(g))$ .

Then, for this function:

1.  $X_i=\{x_{1,i}, x_{2,i}, \dots, x_{n,i}\}$  is the set of goods for the individual  $i$
2.  $U_i$  is the utility function representing the preferences of the  $i$  individual, depending on a set  $X_i$  .
3.  $g$  represents the good that  $i$  has and that would increase the utility of the  $-i$  individuals.
4.  $U_{-i}$  is the utility function for the  $-i$  individuals considered. It could be one person (in a two player's context, for example), a society, or a group of people.
5.  $U_{-i}$  depends on a set of goods  $X_{-i} = \{x_{1,-i}, x_{2,-i}, \dots, x_{m,-i}\}$  (that means that  $-i$  has his own preferences) but we consider that this is not relevant for the  $i$  individual. When  $i$  includes the utility of the  $-i$  individuals, he is only considering the utility that these individuals would obtain when they receive  $g$  (the donation from  $i$ ). So we consider just that  $U_{-i}$  depends on  $g$ . Then, the other-regarding part of the utility function for the individual  $i$  would state that  $U_{-i}(g) = \frac{\partial U_{-i}}{\partial g}$ , as other utility is not relevant for the  $i$  individual (the donor compares the utility of the recipient with the one that the recipient would have in a situation where  $g = 0$ ; that is, when no donation is made).

The number of alternatives  $n$ , in  $X_i$ , is not necessary equal for all the individuals. Each individual faces a different set of goods, and also individuals might order alternatives differently. Individuals are heterogeneous.

Giving  $g$  has two effects:

1. The gift  $g$ , from  $i$  through the other individual/s  $-i$ , implies a reduction of the utility of  $i$  as a result of getting rid of one of the goods ( $x_i$ ) which provided him of utility.
2. Second effect is an increase of the utility due to the satisfaction obtained, either because the other individual (the recipient) has more of one of the goods relevant for him, or for the only fact of giving.

We are interested in blood and organ donations, so the gift considered is going to be either blood or an organ donation. Donations we consider are special for many reasons:

- First, the gift in the situations we consider, decides if the recipient continues alive or dies. It is not a monetary transfer that implies an increase on the recipient's revenue. An individual in need of a transplant or transfusion, if there is no gift, dies. The goods we consider to be transferred are goods that serve to cover a vital necessity.
- Second, the gift is made with a specific purpose, which is to save some others' living.
- Third, with monetary transfers sometimes the recipient has to choose how to spend the money received. Here the recipient has no choice. He needs the gift for continuing living, and there is not another possible use of the gift that the lingering of life.
- Finally, sometimes more than one individual and organism are involved in the decision making. For example, in the living organ donations, the family of the donor inevitably has influence over the donor's final decision, but also physicians that are responsible of checking the compatibility between donor and recipient and of the detection if the donor is suitable for donation.

So we have a utility function  $U_i$  such that, when the utility function of the recipient ( $-i$ ) increases receiving, from a donor ( $i$ ), an extra quantity of the good  $x_i \in X_{-i}$  and also the donor gains utility because the recipient is better off after donation. As we are working with interdependent utility functions individuals include the utility of the rest of  $-i$  individuals in their own utility and this part of the utility considering the others welfare has a direct effect over the donors utility.

We represent this effect, of the recipient's utility variations over the donor's utility, with a function  $v_i(U_i(g), g)$ . This function depends directly on the others' utility gained after donation,  $v_i(U_i(g))$ , and also on the only fact of giving  $v_i(g)$  (the benefit *per se*). Giving a good  $x_i \in X_{-i}$  increases the utility of the recipient, but also increases the utility of the donor if he is able to observe that the recipient is better off after the donation of a good  $x_i$  in a quantity  $g$ .

$$\forall U_i, U_{-i} \quad \exists x_i \in X_{-i} \ni \frac{\partial U_{-i}(X_{-i})}{\partial x_i} > 0 \quad \text{and} \quad \frac{\partial v_i(\cdot)}{\partial U_{-i}} \cdot \frac{dU_{-i}(\cdot)}{dx_i} > 0 \quad (1)$$

The utility function of an individual  $i$  is divided in two parts: the *self – interested* part, and the *other – regarding* part. Each of these parts, is going to have a different weight over the total utility of an individual, and this weight is measured (in the model we are going to propose) with a parameter  $\delta_i \in [0,1]$ . This parameter  $\delta_i$  measures the importance (or weight) that an individual gives to his self-interest utility with respect to the importance given to the interest of the utility of the rest of individuals considered (measured by  $(1 - \delta_i)$ ). The condition we impose to these weights is to be complementary.

Now that we have defined all the parameters and functions we can pass to write the model.

### 3 The Model

Let us consider an individual  $i$  that has to make a decision. The choice is between becoming donor or not. We are going to write the preferences for the  $i$  individual, using a utility function that states the properties of interdependent utility function that we did mention and that are necessary.

The utility function  $U_i : (X_i, H_i(g), g, U_{-i}(g)) \mapsto R$  is a function that represents the preferences of the  $i$  individual. These preferences depend on:

- a set of goods  $X_i$  (finite but different for every individual)
- the loss of health for the individual in case of donation ( $H_i(g)$ )
- $g$ , that represents the donation made from  $i$  (the donor) through  $-i$  (the recipient)
- a function  $U_{-i}$  that represents the utility for the rest of individuals that excluding the  $i$ -one

The utility that the individual  $i$  obtains with the consumption of goods included in  $X_i$  is represented by  $\pi_i(X_i)$ , that is a portion  $\delta_i$  of the total utility (for  $\delta_i \in [0, 1]$ ). This part of the utility ( $\pi_i$ ) is the one representing the self-interested utility for the individual. That is, the individual private set of goods that satisfy individual's preferences. If there is a loss due to donation ( $\frac{\partial \pi(H_i)}{\partial g} \leq 0$ ), this would reduce the utility of the individual  $i$ . The self interest function is then  $\pi_i(X_i + \frac{\partial \pi(H_i)}{\partial g})$ .

The other regarding part of the utility is going to be measured by the function  $v_i(g, U_{-i}(g))$ . The function  $v_i(\cdot)$  represents the utility that the individual obtains when the society receives donation, and  $g$  is the quantity given (half a litre of blood, a kidney). This function has two arguments:  $g$  and  $U_{-i}(g)$ .

- The individual has a benefit per se  $v_i(g)$ , associated to the fact of giving that is strictly positive, whatever it is the result of donation (It does not matter if the donation is useful or not).
- The individual obtains utility as a result of the increase in the utility of the rest of individuals in the society. This is measured by  $v_i(U_{-i}(g))$ .

Each individual is not going to give the same importance to self-interest and to the other regarding part of the utility. Individuals are heterogeneous, and then nobody has the same preferences because every individual considers a different set of goods and has different interests. The weights given to  $\pi_i(X_i, H_i(g))$  and  $v_i(g, U_{-i}(g))$  are complementary, and these are measured by a parameter that we are going to call  $\delta_i$ . This parameter can be understood as the degree of altruism. High values of the parameter  $\delta_i$  mean that self-interest matters more than the interest, of the society, for an individual.

### 3.1 Decision context

An individual  $i$  is thinking about the possibility of becoming a donor (for instance, we do not make distinction between blood and organ donations). The individual is going to decide making a comparison between the expected gains and the he expected losses (in case of deciding to become a donor). The individual do not know certainly if the negative effect (associated to the fact of deciding to become a donor) will be compensated by the positive effect (measured by the function  $v_i(\cdot)$  as a measure of satisfaction) after deciding to become a donor.

We work under the hypothesis that after a donation is made, the effects of the donation over the recipient can be observed by the donor. However, there is uncertainty on the effects of a donation, and this must be taken into account. We introduce a probability  $p$  that measures the probability of the total effect of deciding to become a donor (over an individuals utility)

to be positive and  $(1-p)$  is the probability for this total effect to be negative.

In case of deciding to be a donor, and if physicians or any other decision organism allow the individual to donate, the individual would donate a quantity  $g$  of one of his goods to another individual  $-i$ . The individual knows that there exists a positive effect of giving  $g$  (the satisfaction obtained because it is a contribution for the society) but also a negative effect. Donating implies that the individual is obligated to get rid of a certain quantity (not necessary the totality of the good, if it can be partitioned) of one of the goods he obtains utility with his consumption. Then, after recruiting information, the individual decides if becoming donor or not.

Then, the utility function that states for the context we describe is:

$$U_i(X_i, H_i, g, U_{-i}) = \delta_i \cdot \pi_i(X_i, H_i(g)) + (1 - \delta_i) \cdot v_i(g, U_{-i}(g)) \quad (2)$$

The function is a linear combination of self-interest and other-regarding preferences. This is our benchmark. It is useful for showing that individuals are concerned about the others welfare. Anyway, this function obviously could be written in many different ways. For instance, we are supposing the relation to be linear, for simplicity (this does not mean that this is the only one).

The part of the utility called  $\pi_i(X_i, H_i)$  represents what we call the *self-interested* part that an individual considers, and depends on a set  $X_i$ , that is a set of  $n$  goods and the utility for the individual is increasing with the rise on consumption of the goods in this set and  $H_i(g)$  represents the loss of health as a result of a donation for any individual. So  $\pi_i(X_i + \frac{\partial \pi_i(H_i)}{\partial g})$  represents the benefit of the individual when making a blood/organ donation. The utility of the individual, when donating, decreases in a portion  $\delta_i \in [0,1]$ . This means that there exists a marginal loss of giving ( $\frac{\partial \pi_i}{\partial(H_i)} \cdot \frac{dH_i}{dg} \leq 0$ ). Private utility will be lesser after donation if the individual decides to be donor.

The *other-regarding* part of the utility is represented by  $v_i(g, U_{-i}(g))$ , that we have called the satisfaction function, and specifically the individual is concerned about the utility that the society has as a result of the consumption of a certain good ( $g$ ). The marginal other-regarding utility for the individual  $i$  is increasing on  $g$ . A positive gift from  $i$  through the society increases the utility of the society, and then the utility of  $i$  increases too, in a portion  $(1-\delta_i)$ . The same reasoning is made for the set of goods of the society. If the initial endowment of resources of the  $-i$  individuals is represented by  $X_{-i}$ , the society, receiving a donation of quantity  $g$  improves in welfare and so do the donor. In other words, the marginal utility when the society receives  $g$ , is increasing for a positive quantity of  $g$ . Then,  $\frac{\partial v_i}{\partial U_{-i}} \cdot \frac{dU_{-i}}{dg} > 0$ .

The total expected effect of giving blood or an organ in life over the final utility would be the difference between how much the individual expects to lose and how much he expects to gain. This is going to depend also on the values of the parameter  $\delta_i$ . Calling to  $\delta_i \cdot \frac{\partial \pi_i(H_i)}{\partial g}$  the negative effect, and to  $(1-\delta_i) \cdot v_i(g + \frac{\partial U_{-i}(g)}{\partial g})$ , the positive effect. There are three possibilities after the donation decides to become a donor:

1. The positive effect is higher than the negative effect. In such a case, the total effect is an increase in the utility for the individual.
2. The positive effect is lower than the negative effect. As a result, the individual is worst off after donation.
3. The positive effect is equal. As a result, the individual is indifferent after donation.

We usually think that individuals give more importance to their self-interest than to the others' well-being. In this research we hypothesize that this is not necessarily true. We consider that individuals can give to the others welfare the same importance than they give to their own welfare, or even

more; that is we introduce the possibility of altruistic individuals, and this assumption means that our individuals are *prepared* to sacrifice part of their utility to increase the welfare of other individuals and, even when this sacrifice supposes a cost for them, the result for the individual is that the satisfaction that he obtains due to the improvement on utility of the rest of individuals compensates the cost of giving (in terms of less utility).

Most of the decisions made by individuals are made under uncertainty. In the case we study, individuals don't know with certainty the consequences of becoming donor. The uncertainty of these consequences is represented by a probability  $p$  that is the probability for the individual to be better off after donation. As a probability,  $p \in [0,1]$ . Then,  $(1 - p)$  is the probability (complementary) of being worst off after donation. We are going to do the assumption that this probability is unknown for individuals, but the more an individual is informed, the less will be the uncertainty about the donation consequences.

As rational individuals acting under uncertainty, they are going to calculate the expected utility of becoming donors. Individuals play a lottery. An individual who is not sure about to donate, before making a choice, he must make expectations about how much he would gain and how much he would lose. Then he compares and decides what to do. Probabilities will help an individual to decide. The lottery that the individual plays is written as follows:

$$L_i = \begin{cases} \delta_i \cdot \left( \pi_i(X_i) + \frac{\partial \pi_i(H_i)}{\partial g} \right) \leq (1 - \delta_i) \cdot v_i \left( g + \frac{\partial U_{-i}(\cdot)}{\partial g} \right) & \text{with } p \\ \delta_i \cdot \left( \pi_i(X_i) + \frac{\partial \pi_i(H_i)}{\partial g} \right) > (1 - \delta_i) \cdot v_i \left( g + \frac{\partial U_{-i}(\cdot)}{\partial g} \right) & \text{with } (1-p) \end{cases} \quad (3)$$

With a probability  $p$  the individual is better off after donation because the

utility he loses when he gives a quantity  $g$  with respect to the initial endowment (called the negative effect) is lower than the utility that he gains in compensation (the positive effect). In other words,  $p$  is the probability for the total effect to be positive and  $(1 - p)$ , is the probability for the total effect to be negative. In the latter case it holds on the self-interested utility (or even lower) because, in such a situation, no gift is made.

We can see how would be written the utility function depending on the values of  $g$ :

1. For all  $g \geq 0$  and under the hypothesis that  $i$ ) there is a loss of utility if there is a loss of health for the individual as a result of donation ( $\frac{\partial \pi_i(H_i)}{\partial g} \leq 0$ ) and  $ii$ ) there is an other-regarding effect (that can be positive or negative), then:

$$U_i = \begin{cases} p \cdot \left[ \delta_i \cdot \left[ \pi_i(X_i) + \frac{\partial \pi_i(H_i)}{\partial g} \right] + (1 - \delta_i) \cdot v_i \left( g + \frac{\partial U_{-i}(\cdot)}{\partial g} \right) \right] & \forall_{Neg.Effect \leq Pos.Effect} \\ (1 - p) \cdot \left( \delta_i \cdot \pi_i(X_i) \right) & \forall_{Neg.Effect \geq Pos.Effect} \end{cases} \quad (4)$$

2. For all  $g = 0 \Rightarrow \frac{\partial \pi_i(H_i)}{\partial g} = 0$  &  $\frac{\partial U_{-i}(\cdot)}{\partial g} = 0, \Rightarrow U_i = \delta_i \cdot \pi_i(X_i)$

The expected utility will be written as follows:

$$E[U_i(\cdot); p \in [0, 1]] = p \cdot \left[ \delta_i \cdot \left( \pi_i(X_i) + \frac{\partial \pi_i(H_i)}{\partial g} \right) + (1 - \delta_i) \cdot v_i \left( g + \frac{\partial U_{-i}(\cdot)}{\partial g} \right) \right] + (1 - p) \cdot [\delta_i \cdot \pi_i(X_i)] \quad (5)$$

Simplifying, we obtain the formal expression for the expected utility of donation (for the  $i$  individual):

$$E[U_i(\cdot); p \in [0, 1]] = \delta_i \cdot \pi_i(X_i) + p \cdot \left[ \delta_i \cdot \frac{\partial \pi_i(H_i)}{\partial g} + (1 - \delta_i) \cdot v_i \left( g + \frac{\partial U_{-i}(\cdot)}{\partial g} \right) \right] \quad (6)$$

The expected utility must be higher after donation than the utility of not

to donate. Then, the individual will decide to become a donor.

If the individual expects to obtain a lower utility after donation, means the satisfaction obtained by giving does not compensate the loose (the individual is not altruistic enough). Then, the individuals best choice is the alternative solution: decide not to become a donor. It can be demonstrated that the parameter  $\delta_i$  must be  $\delta_i \geq \frac{-v_i(.)}{\frac{\partial \pi_i(X_i)}{\partial g} - v_i(.)}$

As  $\frac{\partial \pi_i(X_i)}{\partial g} \leq 0$ , and  $v_i(.) \geq 0$ , the parameter  $\delta_i$  can not be higher than 1.

Each individual knows the value of  $\delta_i$ , and also they have expectations about how much they would loose or gain in terms of utility. Every individual decides his after analyzing the situation and making a decision.

If an individual has a value of  $\delta_i$  higher than  $\frac{1}{2}$ , it is necessary that the marginal gain exceed the marginal loose of giving. Other wise, the total effect expected for the individual would be negative, and the individual finally would decide not to become donor.

A self-interested individual ( $\delta_i = 1$ ) would choose as his prescription  $g = 0$ . An individual who is self-interested is only concerned about his own utility, and his best answer is to keep everything for him, to maximize his utility. The opposite case, is the individual for whom  $\delta_i = 0$ . This individual would choose as his prescription  $g = x_i$ , because as an *other-regarding* individual, his best answer is to decide to become a donor.

The final result if the individual decides to become donor, is that the individual expects that he is going to be better off (or equal) after the donation is made, while the recipient of donation (the society) would improve on

utility too. Anyway, the theoretical concept of altruism keeps bounded in practice. When the expected costs of a donation are too high, individuals that in principle were disposed to donate can finally change their mind.

If an individual has to make a decision, like decide if becoming donor or not, the probability of a positive decision (decide to become donor) is lower when the difference between the expected loss and gains for the donor is lower too (this happens for an individual who has very high values of  $\delta$  and similar values of  $\frac{\partial \pi_i(X_i)}{\partial g}$  and  $v_i(\cdot)$ , or very high values for the marginal loss, so that the positive effect do not compensate the negative effect either way).

The individual maximizes his expected utility when the difference between the expected utility of becoming donor and the utility of the alternative is the highest. This situation happens when the marginal loss is close to zero and, simultaneously, the marginal gain tends to infinite. When both are similar, the value of the parameter  $\delta_i$  makes an individual decide. It is not how much an individual expects to gain or to lose, but how important an individual considers the gains and losses.

The reason that makes us choose this expression for the expected utility of a donation as a reference point, even if it is very general, is that we hypothesize that the behaviour of blood and organ donors could be a specific behaviour shown by this function.

- For Blood Donors, we can expect a very low probability of being worse after donation than before it. Blood donations do not have, in general, consequences over the donor in terms of a reduction of health or other negative consequences. The probability of being worse after donation may be negligible (very close to zero). Even though, the value of  $\delta_i$  keeps unknown and is going to differ for each donor. Our interest is

to know the reasons for the high values of the coefficient  $(1 - \delta_i)$

- For Organ Living Donors the probability of being worse off after donation is expected to be very high. An individual giving a kidney is going to need a treatment after donation, as a substitute of the vital functions of the kidney. He changes a healthy status for becoming a chronic patient (from the health care point of view) in need of systematic revisions. The reasons for donation for these kinds of individuals are then reflected on high values of  $(1 - \delta_i)$  or higher perceived benefits (due to satisfaction of giving an organ to somebody in need) than costs of donating, that are also expected to be high for any individual.

We think that behind the behaviour of taking a decision to donate blood, or to donate an organ, there is an altruistic motivation. In this research we are going to consider blood donors and organ living donors, but, for instance, we leave the case of deceased donors. From now on we consider the cases of blood/plasma and organ/bone marrow donations.

The main idea here is try to find which are the factors having a stronger influence when somebody makes the decision of becoming a donor. Specifically, the study will be based in recent papers all of them analyzing the impact of rational and psychological variables and their effects they have on the increase of the willingness to become an organ donor and sign a donor card.

With this information we can now start to analyze which is actually the behaviour for each of the donors considered.

We make some hypothesis about individuals behaviour for individuals. These assumptions we do are:

1. Each individual, before making the decision of donating or not, com-

compares the expected benefits (measured by the utility function) with the expected costs associated to the decision of donating.

2. Individuals are heterogeneous in preferences, having different likes and dislikes, and also individuals facing similar situations react differently.
3. Individuals preferences are not stable, but changeable with the time. This is important because if somebody, in some moment, decides to become a donor, this does not give us the certainty that he is a permanent donor.
4. The donors we consider are blood/plasma donors, and organ/bone marrow living donors.

We must distinguish two different steps in a decision-making: the first one would take until the individual makes the decision of donating or not (that could be explained by the model proposed), and the second one is from the point he has made the decision to the moment when donation is done (or not). An individual, when making a decision, has to face different factors that have an influence over his decision. The individual before deciding recruits information, ask to people close to him for advice, or thinks about the possible effects his decision could have and value them.

## **4 Influencing variables over individuals' behaviour**

In this third section of the research we identify the variables that are important for the decisions in the context we study (blood and organ donations). Some of them stand out in the literature.

The method we use for the identification is a pilot questionnaire. Asking individuals about their intentions and their opinions about different aspects, regarding blood and organ donations, we expect to identify what individuals, actually, consider to be important for making the decision of becoming donor or not.

Individuals, when they consider the possibility of becoming donor, compare what they expect to gain with what they expect to lose after donation. The idea that individuals obtain a satisfaction or a benefit perception is associated to the fact that they perceive the action of donating blood, plasma or an organ/bone marrow, as an action that improves the life of the one who receives it, or even just for the fact of giving (what we have called in this paper the *per se* benefit). For donors, we include several questions about the perceived effects that a blood or plasma donation has, and for those who are not donors, we ask them about their attitudes towards donation primordially, but also we make them put their selves on a donors feet, and answer questions like if they were donors.

We consider important to know if individuals think that information is enough about these kinds of donations. Morgan S. (2008) argued that information can be understand as a variable under the individuals control because the individual collects only the information that he is interested in remembering, or because the individual decides where to go in search of information. So, the individual decides not only how much, but also where to go in search of information. Frutos M.A (2002) found that the more information an individual has the more likely of signing a donors card an individual is.

Attitudes towards donation are also considered relevant for this research. Individuals can have shame to talk about personal details (like previous

illness or life habits they have), can have fears or other worries that may dissuade them of their intentions (for those who have) to become a donor. Frutos M.A et al (2002) concluded, in the context of deceased organ donors, that feeling fear reduces the probability of an individual to sign a donors card.

The reasons for an individual to become donor or not, can be many. What we do is to propose a list of reasons and make individuals order them. We do, either for donors or non-donors three different questions, following the new and original guessing games rule (Brañas P., 2008). Individuals have to answer three different questions about the reasons they have, and about the reasons that the rest of individuals have either to donate or to not donate. We consider important these questions because, with them, we are able to compare what individuals think, with the more important reason that makes actually each individual decide to donate.

Answering to the questionnaire, in particular, those individuals who state to be donors are asked to give their opinion about the perceived quality of the services. It is also important, for every individual, donor or non-donor, to know if they trust in the health care system, or not, in the context we are studying (Frutos et al., 2002). The hypothesis we make is that an individual who trusts in the sanitary system is more likely to be a donor.

Concerning incentives, we found many studies that do mention the common practice in some countries to compensate individuals for a blood donation. Lacetera and Macis (2008) proved that when they offered, to individuals, incentives such as a reward for reaching a certain number of blood donations (incentives based on social prestige, like a medal) leads onto an increase in the frequency of donations. Finally, they concluded that, social prestige awards (incentives like medals, public lists of blood donors and the like)

attached to being a repeated donor could work as effective incentives to increase the supply of blood. It is thought that the introduction of these economic awards creates doubts about the true reason behind pro-social behaviour, but it is also true that we need to solve the problem that there is a lack of donors to cover the needs of this people waiting for a transfusion or a transplant. Incentives seem to be a possible solution to solve such a problem.

Incentives have also importance not only on the decision but also on the results, even though, obviously, in different ways. What kinds of incentives have a positive impact on individuals decision of donating or not? Goette and Stutzer in a recent study (2008) showed the impact on blood donations, either in quality or in quantity, of monetary incentives such as a lottery ticket or a free cholesterol test. They demonstrated that material incentives have no negative effects. In the questionnaire we ask individuals about these kinds of incentives, specifically if they think that donating blood or an organ in live must be taken into account when establishing priorities in health assistance.

Finally, the same study of Lacetera and Macis (2008) detects that there is essentially no effect of incentives over blood stable donors. This is relevant for this study, because it supports the idea that these people are acting following the principles of altruistic motivation. And also it is a proof of what we have pointed before: the heterogeneity of individuals. That's the reason why in the questionnaire we make distinction between individuals that are donors but not stable and stable donors (as a remark, we consider a donor is stable when he has donate at least 4 times in the last two years, that is once each six months).

Another aspect considered is that some people donate because of the social prestige gained with donations. Bénabou and Tirole (2006) have formalized

these effects in a model where individuals perform altruistic activities to increase their social reputation and self-respect.

Destination of blood is also important to consider. Some individuals do not like that their blood goes to somebody who does not deserve it and this opens an interesting topic of discussion. Also the knowledge about compatibility requirements necessary for the living organ donations or requirements for being blood donor are relevant and attention-grabbing for this study. Being compatible or not for being an organ donor, or being selected as a suitable or not suitable for being blood donor, it is not something that the individuals can control. We ask individuals if they know the requirements because we think that is important, before making a decision, to have enough knowledge about. Uncertainty must then be taken into account, because if individuals state that they consider there is not enough knowledge, this could be an explanation of the lack of donors nowadays.

Other variables that we consider important are aspects of tradition and culture. Some studies consider it important and that's why we ask individuals if they know predecessors of donors in their families or if they think they live in an environment of solidarity. Individuals are heterogeneous and every region and country differs from the other in terms of different culture or habits.

For the questionnaire about living organ donations we consider familiar support as a factor also to be important when making such a decision (Morgan S. 2008). Their familiar circle is going to have a strong influence over the individuals decision making. Also at the beginning of this work we have talk about the different kinds of altruism. The living organ donation is an example of kin altruism. If an individual knows somebody close in need of a transplant, this individual is going to be, in principle, proactive to the idea

of donating (in terms of a positive intention). Epstein (2008) showed with a model that a strong relationship with the recipient increases an individuals disposition to face the costs of donation.

In case of living donors the satisfaction is expected to be stronger than for the blood donors. The reason is that living donations are directed, and the donor knows who is going to be the recipient (usually among familiars or relatives for compatibility reasons). Sometimes, even if he doesnt know him personally, he has some information about him. In blood donations, the donor gives his blood to a blood bank, so the donor doesnt knows who is going to be the recipient. The satisfaction then is different in each kind of donation. If the donation is among relatives, it is, by definition, non-anonymous, and it is not very well tolerated but highly valued (Hilhorst M., 2005).

How important are the donation costs perceived by individuals? We expect that individuals who donate blood/plasma do not consider important these costs because, comparing them with the benefits or the satisfaction of a donation, the costs are negligible. However, we expect to find a stronger negative effect of the costs, for the living organ donations, over individuals utility.

#### **4.1 Survey**

The pilot questionnaire was done in the Public University of Navarre the second week of May 2009, and we distributed a total of 130 questionnaires among students of the Faculty of Economics Science and Business Administration.

We consider important that individuals do the questionnaire alone on their own, and obviously this is difficult to control. That is why we gave the ques-

tionnaire to the students at the end of the lesson they were having, and they were asked to give the questionnaire back the day after. The questionnaire must be treated as a pilot questionnaire.

The questionnaire is divided into four parts:

- Part I: Personal Data. In this first part of the questionnaire, individuals have to answer questions about their sex, age, level of studies, place of residence and so on. These are general questions to describe the population we are analyzing.
- Part II: Questions for those who state to be blood/plasma donors. Individuals who state to be blood/plasma donors find here some questions where they can give their opinion about the experience of being donors. We ask them also about the reasons why they decided to be donors, and why do they think that people decide to be donor or not.
- Part III: Questions for the non-blood/plasma donors. In this part of the questionnaire, individuals who state no to be donors, answer questions about what they know about blood/plasma donations, and what they would expect (specially in terms of benefits and costs) should they become donors.
- Part IV: Questions about living organ donations (this is a common part for blood/plasma donors and non-donors). We propose to individuals a specific situation in which they have to state how likely are they to donate an organ in life if somebody closer to them needs it. We also make individuals questions about their expected effects of a hypothetical living organ donation, information and the like.

Having separated those who are donors from those who are not, we are able to detect some differences and similarities between donors and non-donors. Also we make distinction in the questions proposed for blood/plasma and organ/bone marrow donations.

## 5 Survey Results

We have a total of 97 questionnaires answered (of 130 that were distributed). This makes a percentage of response of 75%.<sup>1</sup>

**Table 1:** Socio-demographic Description of the sample (Frequencies represent the number of individuals)

	blood donors	non blood donors	TOTAL
men	3	35	38
women	9	50	59
sample size ( $N$ )	12	85	97
ranges of ages	[19, 31]	[18, 41]	[18, 41]
mean age	22.67	21.87	21.97

Table 1 shows the distribution between donors and non-donors. We have 12 individuals stating to be blood/plasma donors and 85 individuals who are not blood/plasma donors. 9 out of 12 individuals, stating to be blood/plasma donors, are women. For those who are not blood donors, we find 35 men and 50 women. All the individuals are students so the range of age is not very big, standing, for the sample, the mean age in 21.97 years old. Ages are between 18 the youngest to 41 years old.

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<sup>1</sup>We obtain 25 answered questionnaires for undergraduates of third year of Economics, 19 of the students of 1st year of the Marketing Diploma, 15 of the students of the International group (2nd year of Economics), 31 answers of students of third year of Business and Administration and 7 answers of the PhD students in Economics

Results for the blood/plasma donors (12 individuals)

The three men who are donors are stable donors. 4 women state also to be stable donors but 5 state also not to be stable donors (as a remark, we consider a stable donor an individual that has donate at least once each six months in the last two years).

For explaining the degree of individual's self interest and altruism, we ask individuals about the costs of giving blood that they perceive (this is question **P11.2a** in the questionnaire) and about the benefits and satisfaction perceived of such a donation (questions **P11.2b** and **P11.2c**)

**Table 2.** Benefits and costs of a Blood Donation (Frequencies represent the number of individuals)

	Fully Agree	Agree	Disagree	Fully Disagree
perceived costs	2	0	1	9
<i>per se</i> benefit	6	5	0	1
other regarding	8	4	0	0

Table 2 shows the results about the perceived benefits and costs of a blood or plasma donation from the point of view of the donors. 10 individuals out of 12 do not agree on that a blood/plasma donation implies costs (neither material nor intangible). 11 individuals agree on that there is a benefit *per se* of giving blood/plasma, and all the respondents agree on that there is a benefit associated to the fact that some other receive this blood and improve his health with it.

The reasons why individuals are donors can be many, and not all of them are easy to identify. We propose these individuals (donors) a list of reasons which they have to value them in order of importance (see **P8** in the ques-

tionnaire).

**Table 3:** Donors Motives for donation (Frequencies represent the number of individuals)

	1st Option	2nd Option
Info. donors' campaign	0	3
Know somebody in need of a transfusion	0	2
Familiar tradition	0	3
Without apparent reason	1	3
Conscious of necessity	11	0

Table 3 shows the reasons that motivate donors for donating blood/plasma. We have 11 donors out of 12, who think that being conscious of the donors necessity to cover the actual demand of blood is the most important reason for deciding to become donor (there is one missing value due to an individual that has not choose a second option)

For the rest of statements frequencies distribute evenly. Data show that donating as a result of familiar tradition or because having receive information in a donation's campaign are chosen as a second option by a quarter of the donors (that is 3 individuals). Only 2 individuals choose knowing somebody in need of a transfusion it as the second option.

Donors must answer two questions about which they think is the most important reason why individuals donate (question **P12** in the questionnaire), and which is the most important motive for not donating for those individuals who do not donate blood/plasma (question **P13**).

**Table 4:** Reasons for donating for any individual according to donors (Frequencies represent the number of individuals)

	1st Option	2nd Option
Info. donor's campaign	0	3
Know somebody in need of a transfusion	3	3
Familiar Tradition	3	3
Without apparent reason	0	2
Consciousness of necessity	6	1

Table 4 shows the results of the reasons for donating for any individual according to donors. There is a 50% of the donors think that the most common reason why individuals decide to be donors is because of consciousness of necessity to cover the demand of blood. Familiar tradition and knowing somebody in need of a transfusion are the second more frequent answers as first option (3 individuals choose this reason as first option and 3 more as second option) for these individuals (and they are equally distributed). Second options distributed evenly.

**Table 5:** Reasons for not donating for any individual according to donors (Frequencies represents the number of individuals)

	1st Option	2nd Option
Fear	5	3
Have not Thought	3	2
No trust H.C.S	0	1
Lack of Information	0	2
Do not want	2	0
Can not for health or other reasons	2	4

Table 5 shows the result for the motives for not donating for any individual as seen by donors. From the point of view of the donors, the most frequent reason that they have not thought about it. As a second option individuals think that the main reason is because they can not for health or other reasons.

Results for the Non-Donors (85 individuals)

Following the same schedule we have done for the donors, *firstly*, we ask individuals about the reasons why they are not donors (question **P17** in the questionnaire, and , *secondly* about the benefits and costs that they would expect to perceive about being blood/plasma donors (questions **P18.2a** and **P18.2c**), *finally* we ask them what do they think that are the most important reasons, for any individual, for being a donor (question **P19**), and the most common reasons why any individual is not a donor (question **P20**).

**Table 6:** Reasons for not donating (Frequencies represent the number of individuals)

	1st Option	2nd Option
Fear	25	12
Have not thought	24	13
No trust H.C.S	0	8
Lack of Information	20	23
Do not want	2	8
Can not (health)	10	2
Total	81	66

Table 6 shows the reasons that the non donors state to have for not donating. There are 25 individuals who think that fear is the most important reason why they are not donors. 24 state the fact that they have not though

about it, and 20 individuals think that there is a lack of information about blood donations (this is also a statement that is very frequent as a second choice, having 23 votes).

**Table 7:** Benefits and costs of a Blood Donation according to non donors (Frequencies represent the number of individuals)

	Fully Agree	Agree	Disagree	Fully Disagree	No response
soc. benefit	40	36	3	1	5
more positive	39	37	4	1	4

Table 7 shows the perceived benefits and costs of a blood donation according to the non-donors. There are 76 individuals out of 80 non-donors who answered to this question (that makes a 95%) who agree on that there is a social benefit of donating blood. Also half of the non-donors agree on that donating blood has more positive than negative aspects.

**Table 8:** Reasons for donating for any individual according to non-donors (Frequencies represent the number of individuals)

	1st Option	2nd Option
Info. donor's campaign	3	12
Know somebody in need of a transfusion	22	29
Familiar Tradition	5	12
Without apparent reason	1	16
Consciousness of necessity	54	13
Total	85	82

Table 8 shows the reasons for donation by donors as seen by non-donors. The idea of the consciousness of necessity seems important for these indi-

viduals as a reason, for donating, for those individuals who are donors. 54 individuals choose this statement as the first or the most important. The second one most frequent is to know somebody in need of a transfusion, that is chosen by 22 individuals as the most important. For the rest of statements, knowing somebody is chosen as second option with 29 votes of individuals.

**Table 9:** Reasons for any individual for not donating according to donors (Frequencies represent the number of individuals)

	1st Option	2nd Option
Fear	27	20
Have not Thought	29	20
No trust H.C.S	1	6
Lack of Information	10	17
Do not want	12	11
Can not (health)	4	5
Total	83	79

27 individuals choose fear and have not thought about the idea of donating as the more frequent and important option, for any individual, for not to donate. 29 individuals think that the most important reason may be because they have not thought about it. Both statements are also frequent as second choices, with 20 votes each.

Results for living organ donations

First question about living organ donations is to know if, in a hypothetical situation, individuals would or would not be willing to donate an organ in life

**Table 10:** Disposition to donate an organ in life (Frequencies represent the number of individuals)

	blood donors	Non Blood donors	Total
No	-	-	-
Very Unlikely	-	-	-
Unlikely	-	3	3
Likely	3	18	21
Very Likely	3	22	25
Yes	6	39	45
Total	12	82	94

Table 10 shows the willingness of individuals to donate an organ in life. 6 out of 12 of the blood donors state that they would give an organ certainly (in the hypothetical case that they are invited to do so) and the other 50% think that it is probable, or very probable to donate his organ in life if somebody closer needs it.

Those individuals who state having doubts (43 non donors and 6 donors) about such a willingness towards donation are asked about their agreement or disagreement with three statements that are proposed as costs that can dissuade individuals from donating. This statements are in the question **P22** in the questionnaire.

**Table 11 a:** Reasons for not donating an organ in life according to donors (Frequencies represent the number of individuals in agreement)

	Fully Agree	Agree	Disagree	Fully Disagree
neg. effects	1	4	1	0
deceased donor	1	2	1	1
incomplete information	2	2	1	0

**Table 11 b:** Reasons for not donating an organ in life according to non-donors (Frequencies represent the number of individuals in agreement)

	Fully Agree	Agree	Disagree	Fully Disagree
neg. effects	11	25	5	2
deceased donor	7	20	7	5
incomplete information	6	18	12	2

Tables **11 a** and **11 b** show the reasons for not donating an organ in life for those individuals who have doubts about donating. There are 5 out of 6 individuals among blood donors that agree to be worried about the negative effects that could happen on their health in the long term. There are also 36 out of the 43 non-donors who answered to this question that agree on these worries too. 3 donors and 27 non-donors think that the possibility of having organs from deceased donors could be a reason for deciding not to donate their organs in life. 24 non donors agree on that they would not donate because of the incomplete information about donors health related quality of life after donation.

In the particular case of organ donors, we ask individuals about their perceived benefits and costs that a living organ donation could have (statements **P23.4a** to **23.4c** in the questionnaire).

**Table 12 a:** Perceived effects of an organ in life according to donors (Frequencies represent the number of individuals in agreement)

	Fully Agree	Agree	Disagree	Fully Disagree
<i>per se</i> benefit	4	7	1	0
social contribution	4	5	3	0
satisf. > costs	3	6	2	1

**Table 12 b:** Perceived effects of an organ donation in life according to non-donors (Frequencies represent the number of individuals in agreement)

	Fully Agree	Agree	Disagree	Fully Disagree
<i>per se</i> benefit	39	38	4	1
social contribution	34	37	9	3
satisf. > costs	26	38	10	1

Tables **12 a** and **12 b** show the results about the perceived benefits and costs of donating an organ in life for donors and for non-donors. 39 non-donors are in full agreement on that there is a *per se* benefit associated to the only fact of giving an organ in life. 38 more (non-donors) are also in agreement. Donors show also to be in agreement, 4 of them fully and 7 in agreement.

In general there is agreement on that donating an organ in life is a social contribution, where everybody benefits (and not only the recipient). 34 non donors are in full agreement and 37 in agreement. In total, 9 donors

are in agreement (out of 12 donors this is a 75% of the donors who are in agreement) on that there is a perception of social contribution of giving an organ in life.

To end up, comparing benefits with costs of a possible organ donation, such as the one we propose, there are 26 non-donors that are in full agreement on that satisfaction of giving an organ in life may be higher than its costs. 38 more non-donors are also in agreement with this statement. However, there are 10 individuals (non-donors) that show disagreement with this feeling. 9 donors agree on this perception of higher benefits than costs of organ donations.

## 6 Discussion

Our interest is to identify which are the variables having influence over the individuals decision of becoming a donor. We know that a donation do not depends only on the individuals decision, but also on exogenous factors that determine for a donation to be done or not. An individual, when he decides to be a donor, is not sure at all that the donation is going to be done. Even though, in this work we are in the first phase of a donation procedure. The second phase will be working to identify how to increase the number of blood, organ or bone-marrow donations, but we leave this for future research, focusing this work on the decision and attitudes or motivations towards these kinds of donations, instead of in the final result (if a donation is realised or not).

Our model states that individuals decide to be donors if and only if the expected satisfaction of donation exceeds the expected costs. So, when we analyze data of individuals who state to be blood donors, we must take into account these expectations. We do not know which are the benefits and costs that these individuals perceive of donations.

It is important to stress the distinction between attitudes towards blood or organs donation and making a real donation. A positive attitude towards donation does not give certainty of an increase in the number of donors. However, if people realise or became conscious of the lack of donors nowadays, we will gain in possibilities of increasing the number of donors. Making efforts in creating the appropriate incentive policy is then important, taking into account that if the incentive is not well designed, we risk of dissuading actual donors.

The questionnaire is a pilot questionnaire and it has been done only for university students. We survey it to students because we consider that it is

important to see if the questions are easy to understand. Then, we can think about doing it for the general population to test our preliminary results.

In this work, we focus results on the variables that emerge from the model of behaviour we proposed. However there are some variables that are interesting, and that are included in the questionnaire, such as the idea of a monetary compensation, many questions about information and individuals worries about blood destination. These variables will be treated later on.

Concerning blood donations, we find general disagreement among donors with the idea of a monetary compensation for those individuals who state to be blood or plasma donors. However, non donors are divided *fifty-fifty* concerning this possibility of paying for blood donations.

We also find that information, no matter which kind of donation, seems to be not enough or incomplete for all the respondents.

Blood donors would not like their blood to go out of the region where they have donated. However, those who are not blood/plasma donors do not mind if their blood goes to another region or even another country.

## 7 Conclusions

1. In this research we study attitudes towards blood and organ donations.
2. We propose an economic model of behaviour that works under the assumption that individuals who decide to be blood or organ donors expect to be better off after donation. Each individual gives a different importance to these expected gains and losses attached to donations.

The problem that an individual solves before deciding if being donor or not is comparing the expected utility of deciding to be a donor with the alternative decision (behave selfishly).

$$E[U_i^{bedonor}(\cdot); p \in [0, 1]] \geq U_i^{selfinterest} \quad (7)$$

If the expected utility of being donor exceeds the utility obtained behaving selfishly, then the individual decides to be donor. The importance of the perceived costs of a donation is measured by the parameter  $\delta_i$ . The negative effect for an individual is measured as the difference in the benefits he has before donation and the expected benefits after the blood donation. The difference between the expected gains and losses is deciding for individuals. The decision depends on the values of  $\delta_i$ . For individuals having expectations of high losses and low gains, the probability of becoming donor is low, because it would be necessary a value of  $\delta_i$  low enough for the total gains of donation to be higher than its costs.

3. A pilot questionnaire helps us to see which variables that emerge from the model are deciding on individuals decisions. All respondents of this survey were students of the Public University of Navarre.
4. The results we obtain of these variables are that the fact of being conscious of the donor's necessity for covering the demand of blood is the most important reason for donating blood. Also donors think

that, in general, the most common reasons for donation are, precisely, this feeling of consciousness, but also knowing somebody who needs a transfusion or familiar tradition. According to donors, people do not donate because have not think about the possibility or because of fear. In fact, non donors state that fear and have not thought about it are the most important reasons for not donating, and they also think that it is the most common answer in the society, in addition to problems of health that leave some individuals (maybe with intention of being donors) out of the possibility of being donors.

5. How can we merge this results with the model of behaviour proposed? As we found that the most importante reason for donating is consciousness of the donors necessity and half of the individuals who answered the questionnaire would be disposed to give an organ in life with certainty, it seems to exist a degree of altruism among individuals ( $\delta_i < 1$ ). Also, individuals perceive a benefit because somebody improves his well-being due to a blood/organ donation ( $v_i(U_{-i}(g)) > 0$ ) or for the only fact of giving ( $v_i(g) > 0$ ). Costs seem to be negligible for individuals when they have to value blood donations. However, there is a perception of high costs for individuals when they are asked to value living organ donations ( $\frac{\partial \pi_i(H_i)}{\partial g} \leq 0$ ).
6. New ideas have emerged for future research. The model we propose is very general, and maybe the questionnaire helps us to give a formal expression for the functions  $\pi_i(X_i)$  and  $v_i(U_{-i}(g))$  finding variables that actually explain what individuals consider as losses and satisfaction when donating. We need a sample representative of the donors society.
  - Concerning to the model, including a new parameter in the model is being considered. The idea is that there must be a parameter that measures the probability of being the unique possible donor

for a recipient. When the probability of being the unique donor approaches to 1, the expected losses are lesser, and the expected gains (satisfaction) are higher. Further research will try to introduce this aspect in the expected utility function, as a way of reinforcing the model with this remark.

- Concerning to the questionnaire, next phase consists in a exhaustive revision, with the purpose of having a sample size enough for being representative. This includes not only new redaction of the questions but also including new questions and removing some others that have been detected as *not useful* for the purpose of the questionnaire, that is identifying attitudes towards blood and organ donations and the principal motives of the lack of donors.

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