EC331
Research in Applied Economics

Do individuals display risk aversion when deciding whether to donate?

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ABSTRACT

Despite a large volume of literature on the determinants of charitable giving, there has been little analysis of whether individuals display risk aversion when deciding whether to donate. Using survey data from students at the University of Warwick, this paper examines whether students would be willing to hypothetically donate 10 marks to their closest friend at a cost of 2 marks from their final module grade. Responses were collected from 334 students and a significant proportion of individuals (149 or 44.6%) were willing to donate marks. This paper finds that students do appear to exhibit risk aversion when deciding whether to donate marks: students who are fairly certain about achieving their predicted grade are 15.8% more likely to donate than those who are uncertain. However, when the dataset is split according to gender we see that only female students are significantly likely to display risk aversion.

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I. Introduction

This paper analyses whether individuals display risk aversion when deciding whether to donate. I have chosen this topic as I am intrigued by the fact that individuals do not always appear to maximise their expected utility. Many people perform actions such as donating to charity which involves a cost but where there is no obvious personal benefit.

This paper sets out to answer three questions:

1. Will students be willing to hypothetically increase the mark of their closest friend from 45 to 55 at a cost of 2 marks from their own final module grade?
2. Do students exhibit risk aversion when deciding whether to donate marks?
3. What effect does reducing the cost of donating have on a student's propensity to donate?

A questionnaire is used to collect data from students at the University of Warwick. To determine whether risk aversion influences the decision to donate marks, students are asked for their expected grade and how likely they think it is that they will achieve it. This is used to determine whether students who are fairly certain about achieving their expected grade are more willing to donate marks than those who are uncertain.

This paper can add value as, to the best of my knowledge, the economics of donating have never been analysed in this context. Furthermore, current research does not investigate whether individuals display risk aversion when deciding whether to donate; this paper will examine this in more detail.

Of the 334 students surveyed, 149 (44.6%) chose to donate marks. This paper finds that students do appear to exhibit risk aversion when deciding whether to donate marks: students who were fairly certain about achieving their predicted grade were 15.8% more likely to donate than

those who were uncertain. However, when the dataset is split according to gender we see that only female students are significantly likely to display risk aversion. Finally, reducing the cost of donating has little effect on a student's propensity to donate marks: of the 185 students who declined to donate when it cost them 2 marks, only 24 (13.0%) changed their mind when the cost of donating was halved to 1 mark.

In the next section the conceptual framework is outlined. Section III examines relevant literature and section IV contains the methodology. The data outline is in section V and the results are in section VI. Section VII concludes the paper.

II. Conceptual framework

II.1. The economics of charitable donations

Several rationales have been proposed to explain why individuals donate to charity. These include altruistic models (both the pure altruistic model [Becker 1974] and the impure altruistic model [Feldstein 1975]), evolutionary biology models (kin selection [Hamilton 1964] and reciprocal altruism [Trivers 1971]), and prestige motives (Harbaugh 1998). These rationales are discussed in more detail in Appendix A.

II.2. Rational donation

If students are rational they will compare the costs and benefits of donating marks when deciding whether to donate. Students obtain utility from donating (for example, due to altruism). However, donating involves a cost (in the case of this paper, 2 marks). There is also a chance that a student will achieve a lower final grade boundary as a result of donating marks. Suppose that a student does not expect to fall a grade boundary after donating with probability p and expects to fall a grade boundary with probability (1-p). Then,

Benefit from donating marks = utility from donating 10 marks to closest friend

Cost of donating marks = 2 marks + (1-p)disutility from falling a grade boundary.

Students will donate marks if the benefit from doing so is greater than the cost. Nevertheless, it is impossible to test this mathematically as the benefits and costs of donating marks cannot be quantified. Consequentially, this paper cannot determine whether students behave rationally when donating marks.

It is reasonable to assume that students who are fairly certain about achieving their expected grade will have a high p while students who are uncertain will have a lower p. As a result, the cost of donating for students fairly certain of achieving their target grade will tend to be lower and so they should be more willing to donate marks.

Additionally, as the cost of donating marks falls, the likelihood of donating should increase. This will be tested by asking students who declined to donate 10 marks when it cost 2 marks whether they would donate if the cost was halved to 1 mark.

II.3. Expected utility function

An alternative approach to determine whether a student will donate marks is to use an expected utility function.[1] The first order condition for rational donation can be derived which can be solved for the optimal donation amount.

Suppose that students can donate as many marks as they choose but for every mark

[1] This is based on the *expected utility theory* which states that individuals choose between risky or uncertain prospects by considering their utility in each state and constructing a weighted average using their estimates of the probability of each state. Individuals then choose the option that maximises their expected utility. Different individuals may have different utility functions *u(x)*. Usually the function *u(x)* is concave (that is to say, $u'' < 0$) which implies risk aversion (Mongin 1997).

donated, it costs the student π marks.[2] There is also a risk that donating could cost the student a grade boundary. The utility that the student obtains from donating marks varies positively with the number of marks donated and negatively with the costs of donating. A student's maximisation problem is to choose the number of marks to donate so as to achieve the highest *ex ante* expected utility. For this model the following notation will be used:

d	=	number of marks that the student chooses to donate
p	=	probability of not falling a grade boundary after donating marks (it is assumed that students who are fairly certain about achieving their expected grades have a higher value of p than students who are uncertain)
(1-p)	=	probability of falling a grade boundary after donating marks
x	=	student's expected final module grade
πd	=	cost of donating marks where d is the number of marks donated and π is the cost per mark donated
f	=	disutility from falling a grade boundary
u(x + d – πd)	=	*ex ante* utility from donating marks if the student does not fall a grade boundary
u(x + d – πd – f)	=	*ex ante* utility from donating marks if the student does fall a grade boundary

The expected utility from donating marks is

$$EU = pu(x + d - \pi d) + (1 - p)u(x + d - \pi d - f).$$

Students will choose *d* to maximise this expression. Differentiating with respect to *d*, we find the way utility changes as the number of marks donated changes:

$$EU' = pu'(x + d - \pi d)(1 - \pi) + (1 - p)u'(x + d - \pi d - f)(1 - \pi).$$

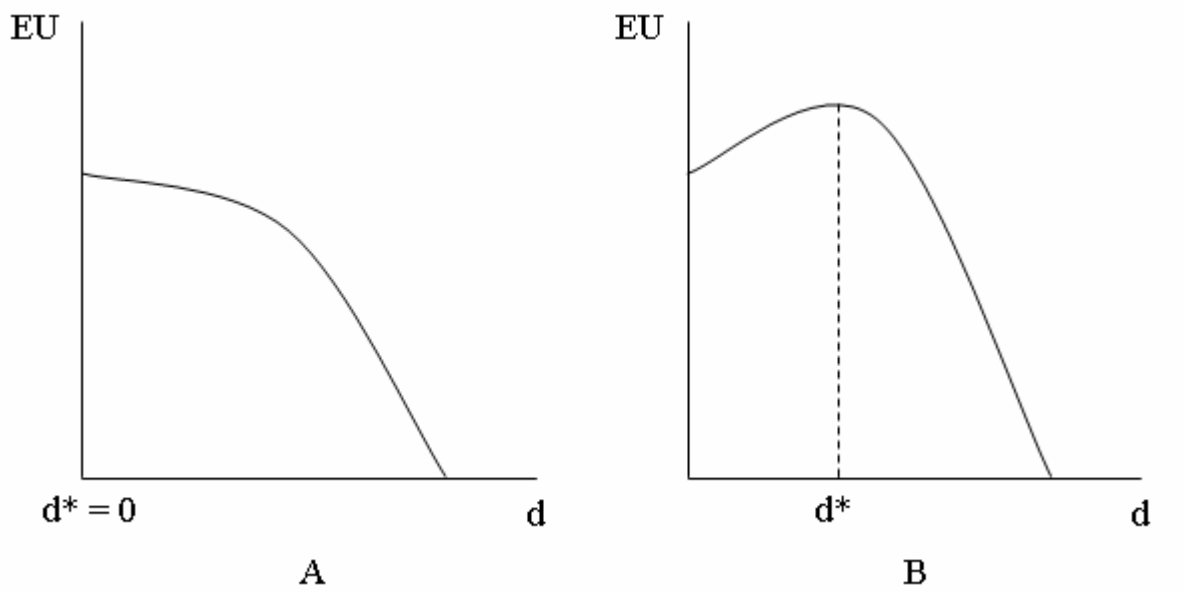
Assuming that students are risk averse,[3] their utility functions will be concave. By setting the

[2] In the case of this paper, π = 0.2. Students are asked whether they would donate 10 marks to their friend at a cost of two marks (cost = number of marks donated*π = 10*0.2 = 2).
[3] Risk aversion is discussed in more detail in Appendix A.

previous equation equal to zero we can determine a student's optimal choice of *d*, *d**.

Expected utility as a function of *d* is illustrated in Figure 1. In Figure 1.A the expected utility from donating marks is negative and the optimal choice is *d** = 0. In Figure 1.B the expected utility from donating marks is positive over some range so the student will donate some positive number of marks.

Figure 1: Expected utility as a function of *d*



In this paper, students are asked to donate 10 marks. Thus, if a student's *d** is equal to or higher than 10 marks they should donate. As students who are fairly certain about achieving their expected grade will tend to have a higher p than students who are uncertain, these students will have a higher *d** and so should be more likely to donate marks.

III. Literature Review

Several papers have been published on the determinants of charitable donating. These use different methods to collect data but generally use Probit or Logit models to analyse the data.

Smith, Kehoe and Cremer (1995) attempted to find the characteristics of a household that influenced their decision to donate to a local health care facility. They were pioneers in this area as the determinants of voluntary giving to an individual charity had been examined in only one previous study (Kingma 1989). Furthermore, this paper was the first to examine whether a "household's 'altruistic history' affects its current giving decisions".

A mail survey was used to collect the data which generated 308 responses. The authors used "Tobit estimation techniques to compute the parameters of the models which were then re-estimated using Heckman's two-step method". They found that the probability that a household donates is higher if it has a history of donating to charities**.** However, the probability that a household donates is unrelated to previous decisions to donate to religious organisations, supporting the idea that religious giving is motivated by reasons other than altruism (Clotfelter 1985; Aziz & Ehrenberg 1975).

Strikingly, the authors found that a household's income level did not affect the likelihood of donation, although it did influence the value of the gift once the decision had been made. This implies that once the problem of free riding (not donating) was overcome, "easy riding" (paying a small amount) was less likely.

However, the conclusions were undermined by the fact that solicitation was arranged so that households were contacted by people they knew which may have put pressure on them to donate. Additionally, households donating more than $100 had their name printed in a local newspaper, providing prestige motives for giving. Finally, by studying households, the authors failed to discover the characteristics that influence an individual's decision to donate.

In another paper, Belfield and Beney (2000) examined the determinants of alumni giving at a UK university. 23.6% (4,476) of the 18,998 graduates solicited donated and a logit regression was used to analyse the data. The independent variables used in this paper's regressions are based to a degree on the ones used by Belfield and Beney.

The authors found that female graduates were more likely to donate than male graduates which supports the findings of Andreoni, Brown and Rischall (2001) and differs from the gender neutrality findings of Okunade, Wunnave and Walsh (1994). The authors also found that age is positively related to propensity to donate but the quadratic term shows that the function is concave: the probability of an alumni donating increased with age but at a decreasing rate. A graduate's subject was another factor (as with Okunade and Beri 1997): Law graduates were the most likely to donate while Education graduates were least likely.[4]

However, the results were undermined as the methods and intent of solicitation differed between students. While most students were contacted by telephone, some were contacted by direct mailing. Additionally, some individuals were contacted more than once and graduates were asked to give for different reasons, all of which may have influenced the results. This paper will avoid this problem by using one method of data collection (a questionnaire).

Golle *et al.* (2001) analysed whether individuals exhibit risk aversion when deciding whether to share files. They studied sharing on a peer-to-peer (P2P) file sharing network when a micro-payment mechanism was used. This mechanism charges users for every downloaded file and rewards them for every upload which means that users "directly control their number of downloads, but only indirectly control their number of uploads through the number of files shared". Thus, "depending on the nature and degree of agents' risk aversion they may prefer to reduce their downloads to reduce their worst-case payments".

Using empirical evidence the authors found that the more risk averse an agent, the fewer files they share, suggesting that individuals display risk aversion when deciding whether to share files. However, the paper failed to determine whether different subgroups exhibit the same level of risk aversion. Thus, this paper builds on the findings of Golle *et al.* by examining whether

[4] This result controlled for income.

men and women display the same level of risk aversion.

A number of papers have set out to determine whether there are gender differences in risk taking. Empirical evidence that women invest more conservatively than men has been interpreted to indicate that women are more risk-averse (Jianakoplos & Bernasek 1998; Sundon & Surette 1998). Nevertheless, this conclusion has been criticised as this behaviour may simply reflect differences in income, employment or life expectancy. Laboratory studies have been inconclusive: while many find that women make more risk-averse choices than men (Powell & Ansic 1997; Levin *et al*. 1988), others find no difference (Schubert *et al.* 1999).

In conclusion, although many papers have been written on the determinants of charitable donating, to the best of my knowledge no paper directly analyses whether individuals display risk aversion when deciding whether to make a donation. This paper's contribution to the literature will be to examine this in more detail.

IV. Methodology

In this paper regression analysis is used to estimate the relationship between a student's decision to hypothetically donate marks and the student's confidence in achieving his or her expected grade. As students can either donate marks or not, the dependent variable can only take one of two values.[5] Thus, the ordinary least squares (OLS) measure of regression cannot be used.[6]

There are a number of ways to develop a probability model for a binary variable. The first is the linear probability model (LPM) which can be estimated by OLS[7] but suffers from a

[5] The regressand is a binary, or dichotomous, variable.
[6] This is because OLS is used to explain a quantitative event but the regressions in this paper explain a qualitative event.
[7] Or in some cases, weighted least squares.

number of problems.[8] As a result, the cumulative distribution function (CDF) is commonly used. The most common CDFs are the logistic and the normal which give rise to the logit model and the probit model respectively.[9] This paper uses the probit model as this enables marginal effects to be easily calculated (as per Andreoni, Brown and Rischall 2003).[10] However, interpreting the probit model output is not very intuitive. As a result, the LPM is initially used to analyse the data (an approach suggested by Johnston (1997)).[11]

The following regression is run using the LPM to understand the general relationship between a student's propensity to donate marks and the student's confidence in achieving his or her expected grade:

$$Donate = \beta_0 + \beta_1 FairlyCertain + \varepsilon \qquad (1)$$

The dependent variable, *Donate*, is a dummy variable that takes the value 1 if the student would donate marks, and 0 otherwise. The independent variable is *fairly certain* which is a dummy variable that takes the value 1 if the student is fairly certain about achieving his or her grade, and 0 otherwise. β_0 is the intercept and ε is the error term. As students are assumed to be risk averse, the *fairly certain* term is predicted to be positive. If students do display risk aversion when donating marks then the null hypothesis that $\beta_1=0$ should be rejected.

Regression (1) does not control for other factors that may influence a student's decision to donate marks and that may be correlated with the *fairly certain* variable. As a result, the

[8] Problems with LPM include the non-normality and heteroscedasticity of the error term (ε), and that the fitted probabilities can be less than zero or greater than one. Nevertheless, these problems can be overcome. The most serious problem is that LPM assumes that the marginal effect of the independent variable remains constant.
[9] The logistic distribution has slightly flatter tails than the normal distribution but the models give very similar results.
[10] STATA can calculate marginal effects for the probit model but not the logit model.
[11] The LPM serves as a diagnostic tool. If the LPM produces nonsensical results then it is likely that the probit model would too. Furthermore, comparing the LPM outputs to the probit outputs serves as a specification check. If the specification of the regressions is correct then the two models should produce similar results.

following regression is run to determine a more precise relationship:[12]

$$\begin{aligned} Donate = {} & \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade:2.1 + \beta_3 ExpectedGrade:2.2 \\ & + \beta_4 ExpectedGrade:3 + \beta_5 Year2 + \beta_6 Year3 + \beta_7 Year4 + \beta_8 Arts + \beta_9 Science \\ & + \beta_{10} Male + \beta_{11} EU_i + \beta_{12} International + \beta_{13} Charity + \beta_{14} VeryReligious \\ & + \beta_{14} FairlyReligious + \beta_{15} 1Sibling + \beta_{16} 2Siblings + \beta_{17} 3Siblings + \varepsilon. \end{aligned} \quad (2)$$

This regression includes a number of control variables. For a full description of these dummy variables please refer to Appendix B.

Regression (2) is then rerun using the probit model. The insignificant variables are excluded and the following stripped-down regression is run:

$$\begin{aligned} Donate = {} & \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade:2.1 + \beta_3 Year2 + \beta_4 Male \\ & + \beta_5 Charity + \beta_6 Religious + \varepsilon. \end{aligned} \quad (3)$$

It is important to note that when the dependent variable is binary there can be a problem of heteroscedasticity (non-constant variance of the error term). A consequence of heteroscedasticity is that the standard errors will be systematically underestimated. If the probit model is run without recognising this fact then insignificant coefficients could be interpreted as significant (Dougherty 2002).

One solution to this is to report robust standard errors. The STATA software package will do this with its *robust* command. However, Smith (2007) states that this strategy lacks "logical consistency" because if there is heteroscedasticity then "the estimated conditional mean function is inconsistent". An alternative approach is to "estimate a version of the model that parameterizes the variance to be a function of observables". STATA can estimate this using the *hetprob*

[12] *Uncertain*, *ExpectedGrade*:1, *Year1*, *SocialScience*, *Female*, *UK*, *NotReligious*, and *0Siblings* are base dummies.

command. Thus, equation (3) is rerun using this command which acts as a sensitivity check and ensures that the results are robust to heteroscedasticity.

Next, to test for interaction between a student's expected grade and his or her confidence in achieving this grade the following regression is run:

$$\begin{aligned} Donate = {} & \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade:2.1 + \beta_3 ExpectedGrade:2.2 \\ & + \beta_4 ExpectedGrade:3 + \beta_5 FairlyCertain*2.1 + \beta_6 FairlyCertain*2.2 \\ & + \beta_7 FairlyCertain*3 + \beta_8 Year2 + \beta_9 Male + \beta_{10} Charity + \beta_{11} Religious + \varepsilon \end{aligned} \quad (4)$$

where *fairly certain*2.1, fairly certain*2.2, fairly certain*2.3* are interaction dummy variables.[13] If there are expected grade variations in the effect of a student being fairly certain about achieving his or her expected grade on the student's decision to donate marks then $\beta_5 \neq 0$, $\beta_6 \neq 0$ and $\beta_7 \neq 0$.

Finally, to determine whether male and female students exhibit the same degree of risk aversion when deciding whether to donate marks, regression (3) is rerun separately for both subgroups.

V. Data outline

V.1. Questionnaire design

The target population was students at the University of Warwick. The questionnaire is included in Appendix C and the responses are in Appendix D.[14] Responses were collected by distributing the questionnaire at the end of lectures. This method was chosen after a cost-benefit

[13] This regression includes the significant control variables from the previous regression.
[14] Advice on how to undertake a successful questionnaire was obtained from the websites, www.surveysystem.com and www.statpac.com.

analysis of the alternatives (see Appendix E). To ensure that the sample accurately reflected all subgroups a quota system was established.[15]

To prevent students' answers being influenced by the format of the questionnaire, emotive language was avoided and a plain layout was used. A pilot survey was used to test the questionnaire and, as a result, the spacing between questions was increased. As it was not possible to randomise the question order, habituation may have been a problem.[16] However, it is unlikely that this will be a significant issue. A non-response problem was encountered as three questionnaires were incomplete; as a result, these were discarded.

V.2. Definition of variables

Dependent variable:

Variable	Description
Donate marks	Students were asked whether they would hypothetically increase the mark of their closest friend from 45 to 55 at a cost of 2 marks from their final module grade.

Independent variables:

Variable	Description
Expected grade	Students were asked for their expected module grade and were given the options 1st, 2.1, 2.2, and 3rd or worse. This paper predicts that the higher a student's predicted grade, the more willing they will be to

[15] A target of collecting 300 responses was set of which at least 130 were male students and 130 were female students. Additionally, quotas of 80 students from each department and 70 students from each of the first, second and third years, and 25 from the fourth year were set.

[16] This occurs when a number of consecutive questions have the same answer choices. Students my give the same answer without really considering each question in turn.

	donate marks as it is relatively less costly to for them to do so.
Confidence in achieving expected grade	Students were asked how confident they were about achieving their expected grade and were given the options fairly certain and uncertain. This variable is hypothesised to be significant as Golle *et al.* (2001) found that individuals exhibit risk aversion when deciding whether to share files on a P2P file sharing network. This paper predicts that students who select not certain will be less likely to donate marks than students who are fairly certain as they may feel that there is a higher risk that donating could cost them a grade boundary.
Department of study	Students selected their department from three options: Arts, Social Studies/WBS, and Science. This was included as a control variable.
Year of study	Students selected their current year of study (first, second, third, or fourth). Different years count for a different proportion of a student's degree classification. For the majority of students, first year marks do not count towards their final grade. Thus, the cost of donating is effectively zero. A student's second, third and fourth year marks normally count for an equal proportion of their degree.[17] As a result, this paper predicts that students in their first year are likely to be more willing to donate marks than students in any other year. Additionally, there should be no difference in responses from students in their second, third and fourth year.

[17] For a number of subjects (such as Mathematics) a student's first year mark does count towards their final degree classification and their third year mark counts for more than the second year mark. However, this only true for a minority of courses and so it is unlikely to have a significant effect on the final results.

Gender	This variable was included to see whether a student's gender had any effect on their decision to donate marks. Past empirical studies on this topic have been inconclusive. For instance, Belfield and Beney (2000) found that female graduates were more likely to donate to their university than male graduates whereas Okunade, Wunnave and Walsh (1994) found that there was no difference between the genders.
Origin of student	Students were asked where they were originally from and were given the options "the UK", "the EU", or "international". This was included as a control variable.
Previous donations to charity	Students were asked if they have donated at least £5 to charity over the last 6 months.[18] Smith, Kehoe and Cremer (1995) found that an individual's 'altruistic history' is a strong indicator of future altruistic behaviour. As a result, this paper hypothesises that students who have previously donated to charity will be more likely to donate marks.
Religious belief	Students were asked for their level of religious belief and could select very religious, fairly religious, or not religious. Altruistic behaviour is central to the world's major religions and so it is reasonable to assume that religious students will be more likely to donate marks than students who are not religious.
Number of siblings	Students selected the number of siblings they have from the options 0, 1, 2, and 3+. Newman (1996) outlines the widespread belief that large families offer a superior social environment for children than

[18] This is a significant sum for most students.

	families with fewer children which enables these children to develop better personal-social characteristics. As a result, this paper predicts that the more siblings a student has, the more likely it will be that they donate marks.

Additional variable:

Variable	Description
Donate 1 mark	Students who declined to donate marks when it cost them 2 marks were asked whether they would donate if the cost was reduced to 1 mark. This variable was included to determine what effect reducing the cost of donating has on a student's propensity to donate marks.

V.3. Summary statistics

Table D.1 in Appendix D presents summary statistics on characteristics of the 334 students who took part in the survey. In this section, the most interesting features of the dataset are highlighted.

149 students (44.6%) chose to donate marks. Figure 2 shows the percentage of students who were fairly certain and uncertain about achieving their expected grade who donated marks, split according to their expected grade. Students who were fairly certain were more likely to donate marks than students who were uncertain from every expected grade boundary except 3rd or worse.[19] Overall, students do appear to exhibit risk aversion when deciding whether to donate marks. This supports the findings of Golle *et al.* (2001) who found that individuals display risk

[19] Reasons that students expecting to achieve a 3rd or worse do not appear to display risk aversion when deciding whether to donate marks are discussed later.

aversion when deciding whether to share files on a P2P network.

There are differences in the behaviour of students with different expected grades. This paper forecast that the higher a student's predicted grade, the more willing they would be to donate marks. However, it appears that students who are expecting to achieve a 1st are less likely to donate than predicted. This could be because a 1st is the most prestigious result that a student can achieve and so carries a number of potential benefits such as enabling a student to obtain a job more easily and/or start on a higher salary. As a result, students expecting to achieve a 1st may be less willing to donate marks than other students as the cost of failing to achieving this grade is higher than the cost of failing to achieve any other grade.

An interesting result is that any students expecting to achieve a 3rd or worse were willing to donate marks as this would give their friend a better mark than they themselves would achieve. Of these students, more uncertain students donated marks than students who were fairly certain which indicates that these students do not display risk aversion when deciding whether to donate marks. This may be because they value their friendship more than their grades or because they feel that they do not have much to lose from donating the marks. It may also be an anomaly due to the small number of students involved.

Figure 2 – Relationship between a student's confidence in achieving his or her expected grade and the student's propensity to donate marks.

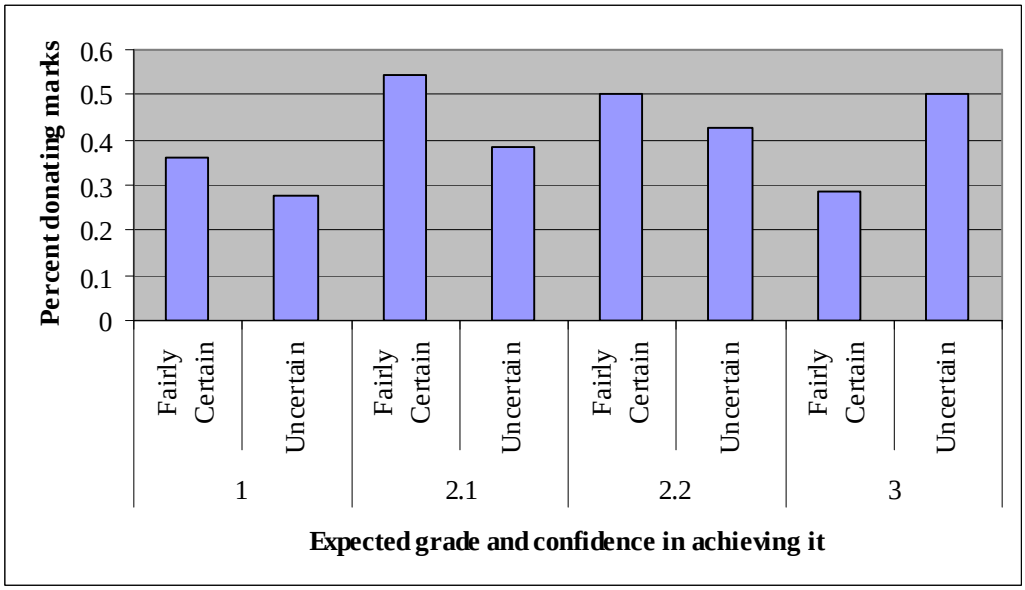


Figure 3 shows the relationship between a student's gender and their decision to donate marks. While only 35.2% of male students donated marks, 55.1% of female students donated indicating that female students are more likely to donate marks than male students. This supports the findings of Belfield and Beney (2000) and conflicts with the gender neutrality findings of Okunade, Wunnave and Walsh (1994).

Figure 3 – Relationship between gender and the decision to donate marks.

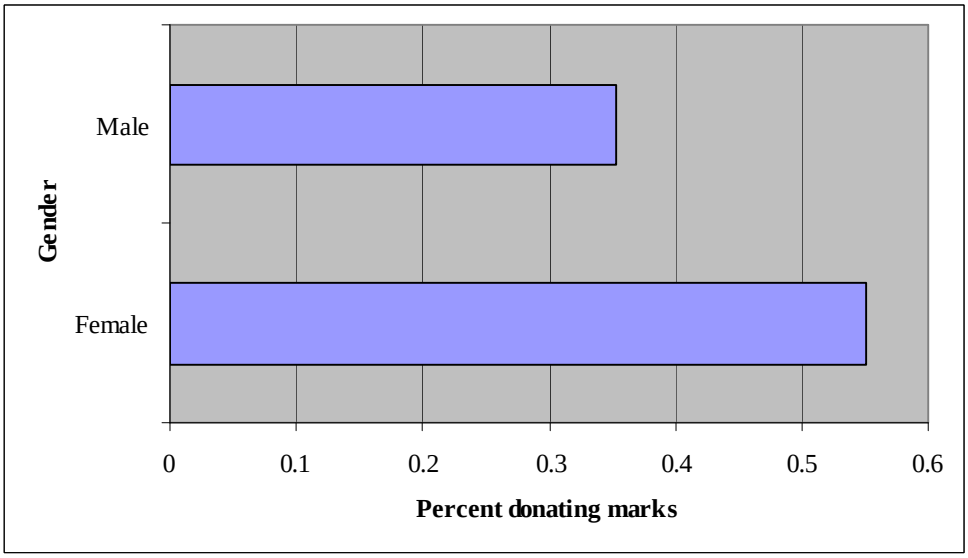


Table 1 shows the cross-tabulation of university year and decision to donate marks. This paper predicted that students in their first year should be more willing to donate marks than students in any other year as their final grade does not count towards their final degree classification. Table 1 contradicts this: only 39.2% of students in their first year were willing to donate marks which is only slightly higher than the percentage of third year students who donated marks (29.5%) and slightly lower than the percentage of fourth year students who donated marks (41.4%).

This could be because students in their first year had been at university for less than six months when they took part in the survey meaning that close friendships may not have formed. Alternatively, while first year students' final grades do not count towards their degree, students may still wish to make as good an impression as possible.

Students in their third and fourth years appear to be less likely to donate marks than students in their second year even though they tend to count equally towards a student's final degree classification. This may be because final year students are more focused on trying to

achieve as good a degree classification as possible and so are less inclined to donate marks.

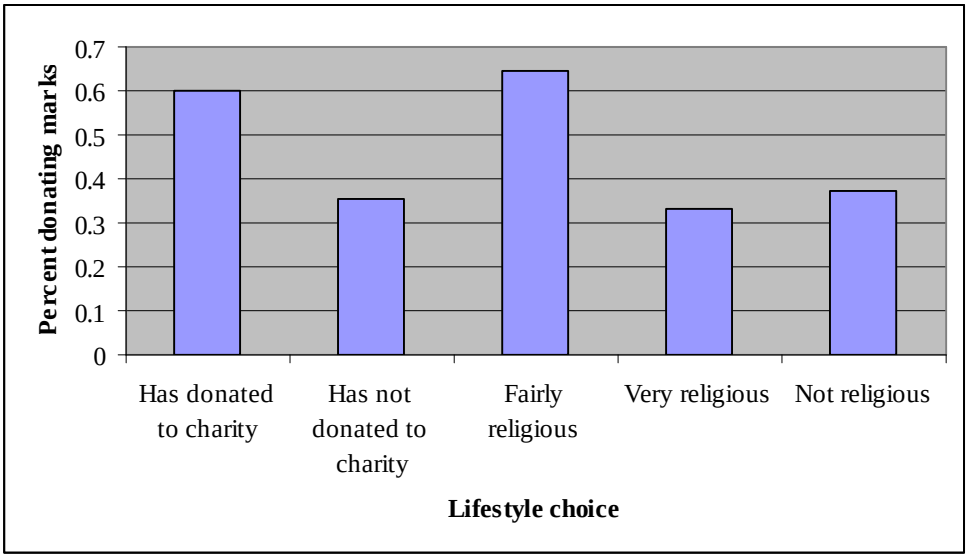
Table 1 – Cross-tabulation.

	University year			
Donate	First	Second	Third	Fourth
Yes	38 (39.2%)	71 (62.8%)	28 (29.5%)	12 (41.4%)
No	59 (60.1%)	42 (37.2%)	67 (70.2%)	17 (58.6%)

Figure 4 shows the relationship between a student's lifestyle choices and the likelihood that they will donate marks. 59.8% of students who have recently donated to charity would donate marks while only 35.3% of students who have not donated to charity were willing to donate. This corresponds with the findings of Smith, Kehoe and Cremer (1995) who found that an individual's 'altruistic history' is a strong indicator of future altruistic behaviour.

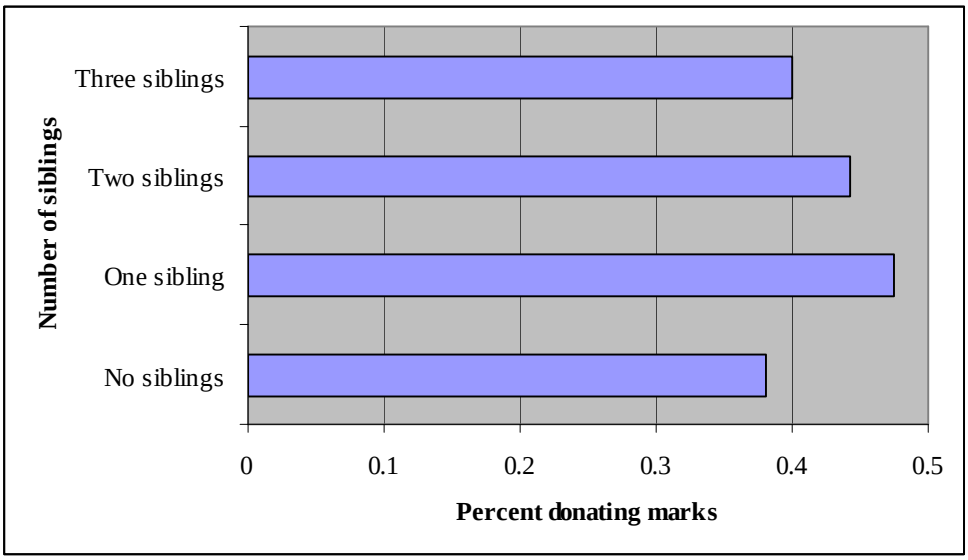
Additionally, 65.5% of fairly religious students would donate marks while only 37.2% of students who are not religious would donate marks. This indicates that students who are religious are more likely to donate marks than those who are not, as predicted. However, the responses of very religious students did not follow this relationship: only 33.3% of very religious students stated that they would donate marks. Nevertheless, this result may not be significant due to the small number of students involved.

Figure 4 – Relationship between lifestyle choices and propensity to donate marks.



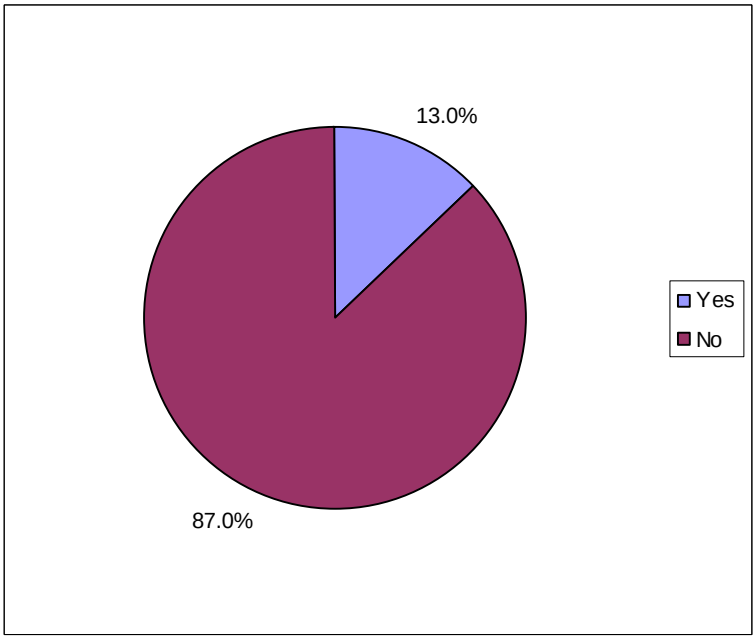
This paper predicted that the more siblings a student had, the more likely they should be to donate marks. However, this appears to not be the case: while students with no siblings were the least likely to donate marks (only 38.1% donated), students with only one sibling were more likely to donate than students with two or three or more siblings (47.6% versus 44.2% and 40.0% respectively) as Figure 5 illustrates.

Figure 5 – Relationship between a student's propensity to donate marks and the number of siblings that they have.



Finally, Figure 6 shows the percentage of students who chose not to donate marks when it cost them 2 marks, who changed their mind when the cost was reduced to 1 mark. Only 24 students (13.0%) changed their mind indicating that once a student has made the decision not to donate marks, even a significant reduction in the cost of doing so does not affect their decision. These students may have decided that either they would not donate marks on principle or that their closest friend's academic performance was none of their concern.

Figure 6 – The percentage of non-donating students who would donate marks if the cost was reduced to 1 mark.



These are preliminary findings and the data will be analysed more rigorously using regression analysis in the following section.

VI. Results

VI.1. Regression analysis

As discussed in the methodology section, the following regression is run using the LPM in order to determine the general relationship between a student's propensity to donate marks and the student's confidence in achieving his or her expected grade:

$$Donate = \beta_0 + \beta_1 FairlyCertain + \varepsilon \qquad (1)$$

Next, to determine a more precise relationship, regression (2) is run:[20]

$$\begin{aligned} Donate = {} & \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade: 2.1 + \beta_3 ExpectedGrade: 2.2 \\ & + \beta_4 ExpectedGrade: 3 + \beta_5 Year2 + \beta_6 Year3 + \beta_7 Year4 + \beta_8 Arts + \beta_9 Science \\ & + \beta_{10} Male + \beta_{11} EU_i + \beta_{12} International + \beta_{13} Charity + \beta_{14} VeryReligious \\ & + \beta_{14} FairlyReligious + \beta_{15} 1Sibling + \beta_{16} 2Siblings + \beta_{17} 3Siblings + \varepsilon. \end{aligned} \quad (2)$$

The output from these regressions is shown in Table 2.

Table 2: LPM regression results

Variable	(1) Coefficient	t-stat	(2) Coefficient	t-stat
Fairly certain	0.1468*** (0.0551)	2.67	0.1298*** (0.0535)	2.42
Expected grade: 2.1			0.1817*** (0.0694)	2.62
Expected grade: 2.2			0.1256 (0.0983)	1.28
Expected grade: 3			0.1522 (0.1519)	1.00
Male			-0.2009*** (0.0516)	-3.90
Second year			0.1723*** (0.0673)	2.56
Third year			-0.0761 (0.0703)	-1.08
Fourth year			0.0360 (0.1017)	0.35
Science			-0.0340 (0.0620)	-0.55
Arts			0.0277 (0.0613)	0.45
EU			-0.0665 (0.0748)	-0.89
International			0.0226 (0.0782)	0.29
Donated to charity			0.1877*** (0.0558)	3.36

[20] A full list of dummy variables can be found in Appendix E

Very religious			-0.1271 (0.1140)	-1.11
Fairly religious			0.1749*** (0.0606)	2.89
One sibling			0.0395 (0.0800)	0.49
Two siblings			0.0516 (0.0957)	0.54
Three siblings			0.0539 (0.0961)	0.56
Constant	0.3582*** (0.0426)	8.41	0.1519* (0.1107)	1.37
No. of obs.	334		334	
Adj. R2	0.0180		0.1824	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.

The *fairly certain* term is positive and significant at the 1% significance level in both regressions indicating that students do exhibit risk aversion when deciding whether to donate marks. Students who are fairly certain about achieving their expected grade are more likely to donate marks than students who are uncertain by 14.7% and 13.0% respectively, *ceteris paribus*.[21] Other significant variables include *expected grade: 2.1*, *second year, male*, *donated to charity*, and *fairly religious.*

Regression (2) is then rerun using the probit model.[22] The insignificant variables are excluded and regression (3) is run:[23]

$$Donate = \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade: 2.1 + \beta_3 Year2 + \beta_4 Male + \beta_5 Charity + \beta_6 Religious + \varepsilon. \quad (3)$$

[21] Hereafter, *ceteris paribus* is assumed when interpreting marginal effects.
[22] The output from this regression is included in Appendix F, Table F.1.
[23] When regression (2) was run using the probit model, the *very religious* term was insignificant while the *fairly religious* term was significant. As a result, these terms were combined when regression (3) was run. A single dummy variable was used that took the value 1 if the student was religious, and 0 otherwise.

Following this, regression (4) is run to test for interaction between a student's expected grade and their confidence in achieving this grade.

$$\begin{aligned} Donate = {} & \beta_0 + \beta_1 FairlyCertain + \beta_2 ExpectedGrade: 2.1 + \beta_3 ExpectedGrade: 2.2 \\ & + \beta_4 ExpectedGrade: 3 + \beta_5 (FairlyCertain * 2.1) + \beta_6 (FairlyCertain * 2.2) \\ & + \beta_7 (FairlyCertain * 3) + \beta_8 Year2 + \beta_9 Male + \beta_{10} Charity + \beta_{11} Religious + \varepsilon \end{aligned} \quad (4)$$

The output from these regressions is shown in Table 3.

Table 3: Probit regression results

Variable	Coefficient	(3) Marginal effect	z-stat	(4) Coefficient	z-stat
Fairly certain	0.4059*** (0.1529)	0.1579	2.65	0.4766** (0.1892)	2.52
Expected grade: 2.1	0.3394** (0.1593)	0.1243	2.00	0.3211 (0.2663)	1.21
Expected grade: 2.2				0.2249 (0.5798)	0.39
Expected grade: 3				0.9578 (0.6976)	1.37
Fairly certain*2.1				-0.3532 (0.3940)	-0.90
Fairly certain*2.2				-0.0790 (0.6194)	-0.13
Fairly certain*3				-0.9740 (0.8692)	-1.12
Male	-0.5552*** (0.1486)	-0.2167	-3.74	-0.5503*** (0.1506)	-3.65
Second year	0.6016*** (0.1590)	0.2361	3.78	0.5877*** (0.1613)	3.64
Donated to charity	0.6003*** (0.1540)	0.2351	3.68	0.6503*** (0.1600)	4.06
Religious	0.3255** (0.1614)	0.1287	2.02	0.3422** (0.1639)	2.09
Constant	-0.8529*** (0.1926)		-4.43	-0.9193*** (0.2534)	-3.63
No. of obs.	334			334	
Pseudo R2	0.1513			0.1603	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.

The *fairly certain* term is again positive and significant across both regression specifications. According to the regression (3) output, students who are fairly certain about achieving their expected grade are 15.8% more likely to donate marks than uncertain students. This supports this paper's hypothesis and the findings of Golle *et al.* (2001).

Furthermore, students expecting to achieve a 2.1 are 12.4% more likely to donate marks than students expecting any other grade. It is understandable that students expecting to achieve a 2.1 are more likely to donate marks than students expecting a 2.2 or 3rd or worse. However, we also see that students expecting a 2.1 are more likely to donate than students expecting a 1st. This may be because relatively few students attain a 1st. As a result, these students my be less willing to donate marks as the cost of failing to achieving this grade is higher than the cost of failing to achieve any other grade.

Students in their second year are 23.4% more likely to donate than students in any other year. This may be because these students have had enough time to forge strong friendships and are not yet worrying about their final degree classification. This variable has the biggest marginal effect and so is the most economically significant variable.

Male students are 21.7% less likely to donate than female students. This supports the findings of Belfield and Beney (2000) and conflicts with the gender neutrality findings of Okunade, Wunnave and Walsh (1994). Students who have recently donated to charity are 23.5% more likely to donate than students who have not. Additionally, students who are religious are 12.9% more likely to donate marks than students who are not religious, as predicted.

The variables regarding a student's department, their origin and their number of siblings were not significant and so were not included in these regressions. This paper hypothesised that

the more siblings a student has, the more likely it will be that they donate marks. However, these variables were insignificant even when combined.[24] Thus, a student's family size does not affect their propensity to donate marks.

According to the regression (4) output, the interactive variables are all insignificant. As a result, the null hypothesis that the interaction terms are zero cannot be rejected. Thus, it appears that the effect that a student's expected grade and their confidence in achieving this grade has on the decision to donate marks is additive but not multiplicative.

To determine whether risk aversion affects male and female students to the same degree regression (3) is rerun separately for both subgroups. Table 4 shows the results of these regressions.

Table 4: Probit regression (3) results for male and female students

Variable	(3) Male			(3) Female		
	Coefficient	Marginal effect	z-stat	Coefficient	Marginal effect	z-stat
Fairly certain	-0.0820 (0.2149)	-0.0300	-0.38	0.9280*** (0.2349)	0.3563	3.95
Expected grade: 2.1	0.5726** (0.2318)	0.1962	2.47	0.1406 (0.2324)	0.0556	0.60
Second year	0.6527*** (0.2160)	0.0809	3.02	0.6953*** (0.2457)	0.2641	2.83
Donated to charity	0.4076* (0.2167)	0.1511	1.88	0.7262*** (0.2289)	0.2778	3.17
Religious	0.4192* (0.2162)	0.1556	1.94	0.0747 (0.2598)	0.0294	0.29
Constant	-1.2638*** (0.2727)		-4.63	-1.0455*** (0.2587)		-4.04
No. of obs.	176			158		
Pseudo R2	0.1164			0.1941		

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical

[24] A regression was run that included a dummy variable that took the value 1 if a student had at least one sibling, and 0 otherwise in place of the separate sibling variables. The output from this regression is included in Appendix F, Table F.2.

significance at 10% level using two tailed tests.

The *fairly certain* term is insignificant for male students[25] but significant for female students at the 1% significance level indicating that only female students display risk aversion when deciding whether to donate marks. A female student who is fairly certain about achieving her expected grade is 35.6% more likely to donate than a female student who is uncertain. This supports the findings of Jianakoplos and Bernasek (1998), Sundon and Surette (1998), Powell and Ansic (1997), and Levin *et al*. (1988) who found that women exhibit relatively more risk aversion than men. However, it conflicts with the findings of Schubert *et al.* (1999).

VI.2 Evaluation

When the LPM and probit outputs are compared we see that the signs and significance of the coefficients are consistent across models which serves as a specification check. Regression (2) is also rerun with different base dummies using both the LPM and the probit model and the same results are found, implying that the results are robust.[26] Additionally, when regression (3) is rerun using the *hetprob* command, the *fairly certain* term remains significant meaning that the results are robust to heteroscedasticity.[27] [28]

The goodness-of-fit of the probit regressions can be determined using the pseudo (also know as McFadden's) R-squared values. The R-squared values for the regressions run in this paper are relatively low (ranging from 0.1164 to 0.1941). Nevertheless, for the probit model, goodness-of-fit is usually less important than statistical and economic significance of the independent variables (Wirjanto n.d.).

[25] This result could potentially be due to the fact that so few male students chose to donate marks. This is discussed further in the conclusion.
[26] See Appendix F, Tables F.3 and F.4.
[27] See Appendix F, Tables F.5.
[28] It is interesting to note that two variables becomes insignificant when the *hetprob* command is used: *donated to charity* and *religious*. Thus, these result are not robust to heteroscedasticity.

VII. Conclusion

VII.1. Conclusion

This paper presents an analysis of whether students exhibit risk aversion when deciding whether to hypothetically donate marks to their closest friend. The questions outlined at the start of this paper will now be answered.

Will students be willing to hypothetically increase the mark of their closest friend from 45 to 55 at a cost of 2 marks from their final module grade?

Of the 334 students who completed the questionnaire, a significant number (149 or 44.6%) said they would donate marks. Thus, assuming that students are rational, for a large proportion of students the benefit that they derive from donating marks is greater than the cost. Reasons to donate marks could include altruism, reciprocal altruism and prestige motives.

Do students exhibit risk aversion when deciding whether to donate marks?

There is strong evidence that students exhibit risk aversion when deciding whether to donate marks as the *fairly certain* variable was positive and significant in every regression. This supports the findings of Golle *et al.* (2001). Students who are fairly certain about achieving their expected grade are 15.8% more likely to donate marks than students who are uncertain according to the regression (3) probit output.

Interestingly, when the dataset was split according to gender we saw that only female students display risk aversion when deciding whether to donate marks. A female student who is fairly certain about achieving her expected grade is 35.6% more likely to donate marks than a female student who is uncertain. Nevertheless, the fact that the *fairly certain* term for male students was insignificant could potentially be because so few male students chose to donate

marks. However, this result is consistent with the results of majority of papers on this topic which indicates that the result is robust (see Jianakoplos & Bernasek 1998, Sundon & Surette 1998, Powell & Ansic 1997, and Levin *et al*. 1988).

Additional factors that are related to a student's decision to donate marks are their expected grade, university year, gender and lifestyle choices.

What effect does reducing the cost of donating have on a student's propensity to donate marks?

Students who declined to donate when it cost 2 marks were asked whether they would donate if the cost were reduced to 1 mark. Only 24 students (13.0%) changed their mind which indicates that once the decision to not donate marks has been made, even a significant reduction in the cost of doing so does not influence a student's decision. These students may have decided that either they would not donate marks on principle or that their closest friend's academic performance was none of their concern.

VII.2. Criticisms

The most serious criticism is that a student's statement that they are fairly certain or uncertain about achieving their predicted grade is being treated as being endogenous. However, this is likely to be exogenous and related to personality characteristics correlated with the decision to donate marks. A further criticism is that students are asked to answer a hypothetical question. Knowing that they would never face this question in real life, students may have lied when completing the questionnaire.[29] However, there is no way to avoid this problem as it would be impossible to actually give students the chance to donate marks to their closest friend.

The dataset that this paper analyses is relatively small and a larger dataset would enable

[29] This could have been either intentionally (for example, to imply that they are more generous than they really are) or unintentionally (for example, students may like to think that they would donate marks but would not if actually offered the opportunity).

more robust conclusions to be drawn. Additionally, although a balanced sample was obtained, the sampling method was not very scientific. More accurate results could have been achieved if a more technical sampling method were used.[30] A criticism with the method of data collection is that students who do not attend lectures are not included in the dataset. These students may have answered some questions differently which could have affected the results. Nevertheless, it would be difficult to avoid this problem as these students are unlikely to respond to any other method of data collection.

Another criticism is that not all modules are worth the same number of CATS.[31] Some students were asked to donate at a cost of 2 marks from a 30 CAT module while others were asked to donate at a cost of 2 marks from a 6 CAT module which is a lower cost. With hindsight, an extra question should have been included in the questionnaire where students selected the number of CATS that their module was worth. It would have then been possible to control for this in the regressions. Furthermore, a 'don't know' response option should have been included when asking students whether they would donate marks as this may have been some students' honest answer.

Finally, students often sat next to their friends when answering the questionnaire. This may have put pressure on them to donate marks, distorting the results. Nonetheless, there was no practical way to allow students to complete their questionnaires in privacy.

Overall, it is unlikely that any of these criticisms are significant enough to challenge the validity of the results.

VII.3. Extensions

There are a number of potential extensions to this paper. Graduate students could be

[30] For instance, stratified random sampling or cluster sampling.
[31] CATS stands for Credit Accumulation and Transfer Scheme. It is a measure of the weight of a module.

included to obtain a greater age range and a larger dataset. Students could also be surveyed at different times of the year to determine whether they display more risk aversion the closer to exams they are. Additional studies at different institutions in the UK could also be undertaken to see if similar results are found at universities with different rankings on the national league tables. Further studies at universities in different countries could also be carried out to see if there are country specific effects.

It would also be interesting to vary the cost of donating marks to a greater degree. This information could then be used to calculate the implied price elasticity of donating marks. This was beyond the scope of this paper but would be an interesting topic for future research.

Finally, the fact that only female students appear to display risk aversion when deciding whether to donate marks is an interesting result and merits further research. Charities, in particular, could find this information useful.

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Appendix A

The economics of charitable donations

Traditional economic theory is based on three assumptions: individuals have rational preferences, individuals behave in a way so to maximise their expected utility, and individuals act independently on the basis of full and relevant information (Weintraub n.d.).[32] According to this theory, no students should be willing to donate marks as it involves a cost but no direct benefit. However, many economists criticise this concept and the following rationales have been proposed to provide a more realistic model of human behaviour.

Altruism

There are two models of altruistic behaviour: the pure altruistic model and the impure altruistic model. The pure altruistic model is based interdependent preferences (Becker 1974).[33] Alternatively, the impure altruistic model argues that altruistic agents derive utility from the act of giving itself (Feldstein 1975). Andreoni (1985) termed this the '*warm glow of giving*'. It is likely that altruism will be an important reason to donate marks.

Evolutionary biology models

Evolutionary biology models argue that the propensity for humans to undertake altruistic behaviour has evolved due to its adaptive benefits. Theories here include kin selection (Hamilton 1964) and reciprocal altruism (Trivers 1971). Campbell (2005) defines kin selection as "the evolutionary mechanism that selects for those behaviours that increase the inclusive fitness of the donor". An example of this is the high level of altruistic behaviour found in the social insects such as ants which are genetically very closely related.

Alternatively, reciprocal altruism involves an organism providing a benefit to another genetically unrelated organism in the expectation of future reciprocation. An example of this is blood-sharing by vampire bats: well fed bats supply regurgitated blood to unrelated bats under the assumption that they will benefit from blood-sharing in the future. To provide an incentive not to abuse this system, cheaters are punished by being expelled from this scheme. This is similar to the tit-for-tat strategy in game theory.

Kin selection is not relevant to this paper as it is unlikely that any student will be genetically related to their closest friend at university. Reciprocal altruism should not be relevant either as students are told that their decision to donate is private information. However, as students will be sitting next to their friends when completing the questionnaire they may be aware of each others' answers. Thus, there might be reciprocal altruistic motives to donate marks.

Prestige motives

Harbaugh (1998) suggested that donors can receive a "prestige benefit" from giving. He

[32] This is known as the neoclassical paradigm. *Homo economicus* is the term used to describe this model of human behaviour.

[33] An economic agent has interdependent preferences when his utility depends not only on his own payoff but also on that of other agents. This interdependence can be positive (that is, because of altruism or group identity) or negative (for example, because of envy, spite or feelings of unfairness).

discovered that before many donors are willing to give to a charity, they demand that the charity enters into a legal contract which details the type of recognition that they will receive. Harbaugh examined gifts from lawyers to their law school and concluded that "a substantial portion of donations can be attributed to it [prestige motives]". As students may be aware of their friends' answers there may be prestige motives to donate marks.

Risk aversion

Risk aversion is a concept that explains an individual's behaviour under uncertainty. Agents are risk averse if they favour receiving a certain payoff with a given expected value rather than an uncertain payoff with the same (or possibly higher) expected value (Theory of Risk Aversion n.d.). In terms of this paper, students are asked to sacrifice marks from a final module grade that they do not yet know. If students are unsure about achieving their expected grade then they might be less willing to donate marks than students who are fairly sure. This is because they may feel that there is a greater risk that it could cost them a grade boundary.

Prospect theory (Kahneman and Tversky 1979; Tversky and Kahneman 1992) illustrates how individuals can 'overweight' small probabilities when making decisions. Thus, even if the chance of falling a grade after donating marks is very low, the fact that it may happen could still deter a significant number of students. The primary goal of this paper is to determine whether students display risk aversion when deciding whether to donate marks.

Appendix B

Table E.1: Explanation of dummy variables

Variable	Explanation
Fairly Certain	1 if student is fairly certain about achieving their expected grade, 0 otherwise
Uncertain	1 if student is uncertain about achieving their expected grade, 0 otherwise
Expected Grade: 1	1 if student expects to achieve a 1st, 0 otherwise
Expected Grade: 2.1	1 if student expects to achieve a 2.1, 0 otherwise
Expected Grade: 2.2	1 if student expects to achieve a 2.2, 0 otherwise
Expected Grade: 3	1 if student expects to achieve a 3rd or worse, 0 otherwise
Year1	1 if student is in the first year, 0 otherwise
Year2	1 if student is in the second year, 0 otherwise
Year3	1 if student is in the third year, 0 otherwise
Year4	1 if student is in the fourth year, 0 otherwise
Science	1 if student is from the Faculty of Science, 0 otherwise
Social Science	1 if student is from the Faculty of Social Studies, 0 otherwise
Arts	1 if student is from the Faculty of Arts, 0 otherwise
Male	1 if student is male, 0 otherwise
Female	1 if student is female, 0 otherwise
UK	1 if student is from the UK, 0 otherwise
EU	1 if student is from the EU, 0 otherwise
International	1 if student is international, 0 otherwise
Donated to charity	1 if student has donated at least £5 to charity over the last 6 months, 0 otherwise
Not Religious	1 if student is not religious, 0 otherwise
Very Religious	1 if student is very religious, 0 otherwise
Fairly Religious	1 if student is fairly religious, 0 otherwise
Religious	1 if student is religious, 0 otherwise
0 Siblings	1 if student is an only child, 0 otherwise
1 Sibling	1 if student has one sibling, 0 otherwise
2 Siblings	1 if student has two siblings, 0 otherwise
3 Siblings	1 if student has three or more siblings, 0 otherwise
1+ Siblings	1 if student has one or more siblings, 0 otherwise

Appendix C

Questionnaire

Please take a few moments to complete the following questionnaire:

- What grade do you expect to achieve for this module?
  □ 1st □ 2.1 □ 2.2 □ 3rd or worse

- How certain are you that you will achieve this grade?
  □ Fairly certain □ Uncertain

- The following question is hypothetical:

  Assume that your closest friend at university does badly in one of his or her modules and achieves a final mark of 45.

  Would you be willing to increase the mark of your closest friend from 45 to 55 at a cost of 2 marks from your final module grade?
  □ Yes □ No

- What is your year of study?
  □ First □ Second □ Third □ Fourth

- What is your department of study?
  □ Arts □ Science □ Social Science / WBS

- What is your gender?
  □ Female □ Male

- Are you religious?
  □ Very □ Fairly □ Not

- Have you donated at least £5 to charity over the past 6 months?
  □ Yes □ No

- Are you a
  □ UK student? □ EU student? □ International student?

- How many siblings do you have?
  □ 0 □ 1 □ 2 □ 3+

Appendix D

Table D.1: Summary statistics

	No. of students	%
Total no. of students	334	
Donate marks		
Yes	149	44.6
No	185	55.4
Expected grade		
1st	65	19.5
2.1	219	65.6
2.2	39	11.7
3rd or worse	11	3.3
Confidence		
Fairly certain	200	59.9
Uncertain	134	40.1
Year		
1st	97	29.0
2nd	113	33.8
3rd	95	28.4
4th	29	8.7
Department		
Social Science / WBS	112	33.5
Arts	116	34.7
Science	106	31.7
Gender		
Male	176	52.7
Female	158	47.3
Student Origin		
UK	244	73.1
EU	49	14.7
International	41	12.3
No. of siblings		
0	42	12.6
1	185	55.4
2	52	15.6
3+	55	16.5
Donated to charity		
Yes	127	38.0
No	207	62.0
Level of religious belief		
Very religious	18	5.4
Fairly religious	93	27.8
Not religious	223	66.8

Appendix E

Data collection methods:

Option 1: Hand out questionnaire at the end of lectures

Advantages:

- Can collect a large number of responses in a short time.
- Can directly control the number of students completing the questionnaire from different departments and across different years.

Disadvantages:

- Students will complete the questionnaire whilst sitting next to their friends. Thus, the information is not private which may influence the results.

Option 2: Use e-mails to distribute questionnaire

Advantages:

- Students' responses are private.

Disadvantages:

- Cannot directly control the number of students responding from each department and each year. This may have led to a biased sample.
- Cannot guarantee how many responses I will receive.
- Students may dislike unsolicited email.
- Must obtain a list of e-mails.

Option 3: Face-to-face interviews

Advantages:

- Students' responses are private.
- Can directly control the number of students completing the questionnaire from different departments and across different years.

Disadvantages:

- Very time consuming.

Conclusion

Option 1 seems to offer the greatest benefit at the lowest cost.

Appendix F

Table F.1: Probit regression (2) results

Variable	(2) Coefficient	Marginal effect	z-stat
Fairly certain	0.3954** (0.1601)	0.1538	2.47
Expected grade: 2.1	0.5713*** (0.2142)	0.2184	2.67
Expected grade: 2.2	0.3783 (0.3091)	0.1500	1.22
Expected grade: 3	0.4672 (0.4682)	0.1843	1.00
Male	-0.6045*** (0.1581)	-0.2353	-3.82
Second year	0.4873** (0.2023)	0.1920	2.41
Third year	-0.2456 (0.2147)	-0.0956	-1.14
Fourth year	0.1027 (0.3073)	0.0407	0.33
Science	-0.1233 (0.1905)	-0.0484	-0.65
Arts	0.0851 (0.1864)	0.0336	0.46
EU	-0.2167 (0.2328)	-0.0840	-0.93
International	0.0630 (0.2340)	0.0249	0.27
Donated to charity	0.5646*** (0.1682)	0.2215	3.36
Very religious	-0.4033 (0.3612)	-0.1512	-1.12
Fairly religious	0.5505*** (0.1817)	0.2167	3.03
One sibling	0.1521 (0.2464)	0.0598	0.62
Two siblings	0.1805 (0.2933)	0.0716	0.62
Three siblings	0.2118 (0.2935)	0.0840	0.72
Constant	-1.0721*** (0.3499)		-3.06
No. of obs.	334		
Pseudo R2	0.1830		

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical

significance at 10% level using two tailed tests.

Table F.2: Probit regression (2) with one dummy variable for number of siblings

Variable	(2) Coefficient	z-stat
Fairly certain	0.3915** (0.1594)	2.46
Expected grade: 2.1	0.5598*** (0.2075)	2.70
Expected grade: 2.2	0.3718 (0.3079)	1.21
Expected grade: 3	0.4673 (0.4668)	1.00
Male	-0.5983*** (0.1555)	-3.85
Second year	0.4846** (0.2022)	2.40
Third year	-0.2544 (0.2123)	-1.20
Fourth year	0.0960 (0.3055)	0.31
Science	-0.1242 (0.1902)	-0.65
Arts	0.0813 (0.1859)	0.44
EU	-0.2176 (0.2322)	-0.94
International	0.0655 (0.2338)	0.28
Donated to charity	0.5641*** (0.1679)	3.36
Very religious	-0.4103 (0.3607)	-1.14
Fairly religious	0.5458*** (0.1810)	3.02
1+Siblings	**0.1690 (0.2372)**	**0.71**
Constant	-1.0569*** (0.3421)	-3.09
No. of obs.	334	
Pseudo R2	0.1828	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.

Table F.3: LPM regression (2) with different base dummies

Variable	(2) Coefficient	t-stat
Uncertain	-0.1313*** (0.0535)	-2.45
1	-0.1719*** (0.0695)	-2.47
2.2	-0.0631 (0.0812)	-0.78
3	-0.0133 (0.1443)	-0.09
Female	0.2044*** (0.0516)	3.96
First year	0.0731 (0.0703)	1.04
Second year	0.2424*** (0.0662)	3.66
Fourth year	0.0993 (0.1004)	0.99
Science	-0.0619 (0.0623)	-0.99
Social Science/WBS	-0.0282 (0.0613)	-0.46
EU	-0.0356 (0.0889)	-0.40
UK	0.0487 (0.0699)	0.70
Donated to charity	0.1910*** (0.0559)	3.42
Fairly religious	0.3033*** (0.1184)	2.56
Not religious	0.1226 (0.1140)	1.08
No siblings	-0.0571 (0.0961)	-0.59
One sibling	-0.0161 (0.0744)	-0.22
Two siblings	-0.0028 (0.0916)	-0.03
Constant	0.1078 (0.1576)	0.68
No. of obs.	334	
Adj. R2	0.1847	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.

Table F.4: Probit regression (2) with different base dummies

Variable	(2) Coefficient	z-stat
Uncertain	-0.3996** (0.1602)	-2.49
1	-0.5399** (0.2140)	-2.52
2.2	-0.2146 (0.2630)	-0.82
3	-0.0431 (0.4399)	-0.10
Female	0.6175*** (0.1585)	3.90
First year	0.2357 (0.2148)	1.10
Second year	0.7125*** (0.2018)	3.53
Fourth year	0.3145 (0.3077)	1.02
Science	-0.2073 (0.1911)	-1.09
Social Science/WBS	-0.0819 (0.1864)	-0.44
EU	-0.1262 (0.2710)	-0.47
UK	0.1510 (0.2115)	0.71
Donated to charity	0.5807*** (0.1686)	3.44
Fairly religious	0.9578** (0.3776)	2.54
Not religious	0.3916 (0.3640)	1.08
No siblings	-0.2299 (0.2942)	-0.78
One sibling	-0.1681 (0.2192)	-0.31
Two siblings	-0.0391 (0.2730)	-0.14
Constant	-1.1686** (0.4956)	-2.36
No. of obs.	334	
Pseudo R2	0.1840	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.

Table F.4: Hetprob regression (3) results

Variable	(3) Coefficient	z-stat
Fairly certain	1.3534*** (0.4768)	2.84
Expected grade: 2.1	0.7706** (0.3635)	2.12
Male	-1.2557*** (0.7222)	2.60
Second year	1.1270* (0.4341)	-1.74
Donated to charity	3.3082 3.2088	1.03
Religious	0.8186 (0.6933)	1.18
Constant	-1.9846*** (0.5284)	-3.76
No. of obs.	334	

Notes: The standard errors are given in parentheses. Dependent variable = binary choice, taking the value 1 if the student chose to donate marks, and 0 otherwise. *** denotes statistical significance at 1% level. **denotes statistical significance at 5% level. *denotes statistical significance at 10% level using two tailed tests.