EXPERIMENTS ON FINANCIAL AND DONATION BEHAVIOUR:

DECISION-MAKING PROCESSES

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To my family

Acknowledgements

When I began my Master's studies, I did not even intend on getting to this point. The lively academic environment of UPF, many interesting people I met and the city of Barcelona convinced me to stay. In hindsight, it was a great decision and I will always remember those years.

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Abstract

The three chapters of this thesis investigate the decision-making processes behind financial and donation behaviour of individuals. Chapter One studies the impact of prior learning and competition on the presence of the disposition effect in a venture capital setting. It reveals that prior learning leads to better venture choices and confirms competition as the most efficient form of resource allocation and management. Chapter Two addresses the empirical finding of a negative relationship between income and charitable giving as a proportion of that income. As the first study to replicate this downward relationship in an experiment, it exposes income rank information as one of the factors causing the relationship. Using a unique dataset from a natural experiment in Chapter Three, I explore the effect of increased publicity via additional visibility and information on the household donation behaviour. The results show that donations increase with public announcements and the announcement order.

Resumen

Los tres capítulos de esta tesis investigar los procesos de toma de decisiones que describen la conducta financiera y la donación de los individuos. Capítulo I estudia el impacto de la formación previa y la competencia en la presencia del efecto de la disposición en un entorno de capital de riesgo. El estudio confirma que la formación previa favorece el proceso de selección y que la competencia permite la asignación más eficaz de recursos y gestión. Capítulo II investiga la presencia de una relación negativa entre los ingresos y las donaciones (representados en proporción de esos ingresos). El capitulo presenta los resultados del primer estudio que examina esta relación con un experimento y propone que entre los factores que explican esta relación es la información sobre los ingresos personales comparado con los de sus compañeros. Capítulo III utiliza una base de datos única que contiene los resultados de un experimento natural y presenta resultados empíricos sobre el efecto de una mayor publicidad a través de la visibilidad e información adicional sobre el comportamiento de la donación de los hogares. Los resultados muestran que las donaciones aumentan con los anuncios públicos y el orden de estos anuncios.

Foreword

This dissertation consists of three chapters. Each chapter is self-contained and explores a different research topic. However, there are three common threads running through all the chapters and these are reflected in the thesis title *"Experiments on Financial and Donation Behaviour: Decision-Making Processes"*. The first thread refers to the shared experimental methodology. The experiments for the first two chapters were carried out in the LeeX laboratory of Universitat Pompeu Fabra (Laboratori d'Economia Experimental), while the natural experiment in the third chapter was conducted almost two decades ago in my home neighbourhood. This event in essence spurred in me the interest in altruistic behaviour, in its limits and drivers. This leads to the second thread that finds an empirical phenomenon as the origin of my research topics. In each chapter the documented field behaviour diverges from the predictions of the standard rational choice theory. The first chapter deals with the disposition effect, a phenomenon within the field of behavioural finance that describes the behaviour of investors who hold on to their bad investments significantly longer than their good investments. The following two chapters look into phenomena within the realm of charitable giving and donation behaviour. In the second chapter I seek to explain why the poorest households donate the highest proportion of their incomes to charity when it is more costly for them to do so from an economic point of view. The third chapter considers the effect of different levels of publicity of donations on donation decisions. Though the donors are facing the same decision from a strictly economic perspective, fundraisers often employ these mechanisms to influence the donation behaviour of their donors and increase giving.

The third and final thread linking the chapters relates to level of analysis and the type of decisions under study. In all three chapters I examine the behaviour and the decision-making processes at the individual level and more specifically consider the decisions that individuals make and consequently "lose" money. In the first chapter they stick to their bad investments for too long, even in the context of financial markets that swiftly punish such "irrationality", while in the other two chapters they donate and "throw money away" instead of free riding as the theory predicts. In order to explore the factors in the environment of individuals that make them more prone to these biases, to act irrationally or in contrast, more pro-socially and generously, I employ the experimental methodology due to its control in gauging causal relationships that are confounded and impossible to

control for in the field, and for providing an environment where data on individual performances, expectations and decisions can be collected with ease.

The first chapter *"The Disposition Effect in the Venture Capital Decision-Making Processes: An Experimental Approach"* extends the study of the disposition effect, one of the most prominent biases in behavioural finance, to the venture capital market, an industry that has grown into a crucial intermediary in financial markets. The tendency of investors to retain losing investments in their portfolios relatively longer than winning investments has been labelled the disposition effect (Shefrin & Statman, 1985) and documented in a variety of economic situations. I created a new experimental setting simulating venture capital markets and introduced two important features, prior learning and varying levels of competition. To date no study has looked at the disposition effect in the context of venture capital markets, or at the effect of prior learning and different competitive situations representative of the current market environment on the presence of the disposition effect.

Participants chose, competed for or were assigned a set of ventures that they needed to manage by further investing or selling in the market. Prior to managing their investments, half of the participants were trained how to distinguish differential quality of ventures using a multiple cue probability learning task. The experimental design of this study enables detailed analysis of participants' behaviour in terms of learning, venture choices and management. In this setting, participants did not exhibit the disposition effect and there were no effects of training. However, training did teach participants to make better venture choices. The findings highlight the significance of prior learning and competitiveness of the environment on the selling decisions of individuals. When overall portfolio performance (i.e. earnings) is decomposed into elements involving learning, choice of investments, and management of holdings, it is shown that competition proved to be a better environment for reaching optimality in management compared to choosing freely or being assigned. The findings also point to different dimensions of expertise, specifically, learning to choose and learning to manage and emphasise a positive relationship between learning and subsequent experimental performance.

The second and third chapters aim to illustrate the role of social influence on donations and to forecast how alterations in the economic and social environment shape the altruistic behaviour of individuals. In the process of making donation decisions, people are often not guided solely by altruism. Alternative motives, such as social approval, respect, prestige,

desire for "warm glow", signalling, conditional cooperation and social comparisons, positive self-image, avoidance of scorn and other social and psychological objectives come into play (Andreoni, 1990; Fehr & Schmidt, 1999; Sugden, 1984; Vesterlund, 2006). Acquiring a better understanding of the multifaceted motivations for pro-social behaviour endow us with better insight into the nature of human altruism as well as the knowledge of institutional design and the optimal behaviour of charities that could foster donations of time and money to public goods, the non-profit sector, various beneficial causes and needs in local and other societies.

Recent debates on the relationship between income and charitable giving as a proportion of that income have found it to follow either a linear downward trend or a U-shaped curve. Both sides of the debate concur that this relationship is negative and significant for the majority of the population. The relatively poorest households are donating the highest percentages of their income. Empirical studies so far have not identified the reasons behind such a pattern of giving. By manipulating the factor of social comparisons in the second chapter *"Incentives for Giving: The Effect of Social Comparison Processes on Individual Donation Behaviour"*, I successfully replicate this empirical finding in an experimental setting and expose income rank information as one of the factors causing this relationship. The participants earned their payoffs in a difficult or an easy task. The conditions varied the payoff information given to them by detailing the amount earned, payoff rank in the treatment group, and/or the full payoff distribution of participants in the treatment group. After receiving the payoff, they were invited to give part as a donation to a specified charity organisation (UNICEF). When participants in the difficult task were aware of their ranking (and the income distribution), those with lower rankings donated a higher relative amount of their payoff to charity. Such circumstances approximate most closely the real money-earning conditions. Without rank information or in the easy task condition this relationship did not emerge.

People tend to act more generously when their contributions are announced publicly and their identities are revealed. What are the limits of publicity in encouraging people to give more? The third chapter *"Making the Headlines: Evidence from a Donation Field Experiment"* contributes to the literature on charitable giving by taking a step further from the "public vs. anonymous donations?" issue and explores the effect of varying degrees of publicity in a natural field experiment. A unique household dataset includes individual weekly donations

of 1597 households to a fundraising campaign for a new neighbourhood church over the 1994-2000 time period. Individual donations collected the previous week were first publicly announced by the fundraiser at the end of each Sunday mass (117 weeks spanning from June 1994 until August 1996). In the following 106 weeks, from September 1996 until August 1998, the donations were only posted on a board on the church wall. Finally, both individual and total amounts donated so far by the household were announced publicly (112 weeks, September 1998 – October 2000).

Announcing the donations publicly significantly increased the number of donors, donations and the aggregate weekly donations compared to only posting them. However, the average household donations remained unchanged. Households had an option to donate anonymously, still the vast majority preferred to donate publicly. Moreover, two thirds of donors contributed exclusively in the public conditions. Significantly more donations were raised during holidays, but the holiday effect does not explain the increased public giving. Interestingly, the announcement order affected the average donations in the last and most public condition. Household donations were announced according to the alphabetical order of the street names. Donations from households living in the streets that are placed earlier in the alphabet were announced earlier and those households donated more on average than did the households from streets placed later in the alphabet.

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Chapter 1

The Disposition Effect in the Venture Capital Decision-Making Process: An Experimental Approach

1. 1. INTRODUCTION

The tendency of investors to keep losing investments in their portfolios longer than their winning investments is one of the examples that extend prospect theory (Kahneman & Tversky, 1979) to investments. This discrepancy from economic theory is called the disposition effect (Shefrin & Statman, 1985) and describes the preference of investors for realizing their winners rather than their losers, thus lowering their future earnings[1]. The disposition effect (DE henceforth) has been documented in a variety of economic situations (Genesove & Mayer, 2001; Locke & Mann, 1999; Odean, 1998; Shapira & Venezia, 1998) and also tested experimentally (Chui, 2001; Oehler et al., 2002; Summers & Duxbury, 2005; Weber & Camerer, 1998; Weber & Welfens, 2006). To date, however, no study has looked at the DE in the context of the venture capital (VC henceforth) market, a young industry that has expanded as a relevant intermediary in financial markets. Nor has account been taken of different competitive situations that are representative of today's market environment. Allocating investments in the market by means of competition among investors, free selection or by simple assignment might have very different implications for the level of optimality in their management. In addition, although the effect of expertise on

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[1] The disposition effect can also be explained by a belief in mean reversion. Investors might believe today's winners will underperform and hence become tomorrow's losers and vice versa. However, this view has been contested by Odean (1998), who showed that later on the winning stocks investors sell still outperform the losing ones they keep. See also Weber and Camerer (1998).

the DE has been an object of discussion in field studies (Chen et al., 2004; Dhar & Zhu, 2005; Feng & Seasholes, 2005), it has not yet been studied experimentally.

The DE has been detected in both individual and professional investors (Odean, 1998; Shapira & Venezia, 1998) and demonstrated in several types of markets, financial assets and commodities involving, *inter alia*, company stock options of employees (Heath et al., 1999), real estate (Genesove & Mayer, 2001), futures trading (Locke & Mann, 1999), large stocks (Ranguelova, 2001) and IPO aftermarket trading (Kaustia, 2004). Moreover, the effect has been used to explain the behavior of traders taking above-average risks after experiencing losses (Coval & Shumway, 2005), the profitability of a momentum trading strategy (Grinblatt & Han, 2001) and post-earnings announcement drift in stock returns (Frazzini, 2006). In contrast, a recent study by Ivkovic and Weisbenner (2007) exhibits evidence of a negative relation between the probability of sale and past mutual fund performance that can be explained by tax-motivated trading. If investors hold mutual funds in taxable accounts, they tend to keep the funds that appreciated in value since purchase and to sell ones that accumulated losses[2].

Empirical studies of the DE bear the risk of noise and incompleteness of real data, as investors' expectations and individual decisions cannot be observed nor controlled. Related research has thus tested the effect experimentally. Weber and Camerer (1998) have documented participants exhibiting the DE, but the effect was significantly reduced when their share positions were automatically closed after each period. Chui (2001) has located an even stronger effect conducting the same experiment in Macau and it has also persisted in several experimental markets with different trading mechanisms in Oehler et al. (2002). There is too a claim that the DE is a personality trait, stable across tasks and time at the individual level (Weber & Welfens, 2006).

The goal of this study is to test the extent and limits of the DE in the VC setting. Venture capitalists fund enterprises of high potential returns primarily at the start-up and expansion stages of their business cycle that otherwise have difficulties in attracting financing. They appear more skilful at identifying potentially successful firms than other providers of

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[2] Moreover, later theoretical studies by Hens and Vlcek (2011) and Barberis and Xiong (2009) challenge the prevailing prospect theory explanation and indicate that prospect theory can only explain ex-post disposition behaviour, i.e., once the initial stock investment has taken place. An investor with prospect-theory preferences and respective risk aversion would not have invested in stocks to begin with. Barberis and Xiong (2009) specify that the DE is increasing in the investment's time horizon and decreasing with its expected return. With few trading periods and a high-expected return of a stock, they claim that prospect theory actually predicts trading behaviour opposite to the DE.

financing (Shepherd et al., 2000). Their decision criteria for screening investment opportunities have thus received considerable attention and several studies have suggested that VC-backed firms outperform and have higher survival rates than firms not backed by VC (Zacharakis & Meyer, 1998). Considering the fact that venture capitalists spend significant amount of time on screening, selecting and monitoring their investments compared to brokers or traders[3], the presence of the DE could be even more pronounced in this market[4]. On the other hand, taking into account their field expertise, they might be aware of the risk and investment failure probability and as a result less prone to such decision-making bias.

In addition, the study aims to investigate the effects of varying levels of competitive environment and learning on the presence of the DE. In markets today, firms change managers, people inherit financial assets or give bequests, certain markets are easier to access and "conquer" than others where there is fierce competition over a scarce set of resources. The type of asset allocation can have an important impact on investors' behavior towards realizing winners and realizing losers[5]. The experimental design of this study enables detailed analysis of participants' behavior in terms of learning, venture choices and management.

Although neglected in experiments, the evidence in empirical studies on the relation between the DE and learning, approximated by the investors' level of financial sophistication, is at odds. In Feng and Seasholes (2005), sophistication and trading experience of investors in a brokerage firm eliminated their reluctance to realize losses, but only partially reduced the propensity to realize gains. Dhar and Zhu (2005) have presented results of lower DE among wealthier and older individuals, professionals and those with higher trading frequency. Similarly, owner-occupants demonstrated stronger effects compared to real estate investors who are expected to be wealthier and more experienced (Genesove & Mayer, 2001). On the contrary, in the Chinese emerging market more experienced investors have been more prone to the DE and other related biases (Chen et al., 2004).

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[3] Contrary to most intermediaries, venture capitalists play a more active governance and control role in companies once the funds are committed.

[4] Moreover, selling winners sooner than losers could be linked to the grandstanding hypothesis (Gompers, 1996), where young VC firms take firms in their portfolio to market earlier than older venture capitalists to signal their quality to investors, establish a reputation and successfully raise follow-on funds.

[5] See Arkes and Blumer (1985), Jin and Scherbina (2011), Oehler et al. (2002) and Summers and Duxbury (2007).

To meet these research goals, I created a new experimental setting with basic features of investment situations in the VC market. Two important features, prior learning and different competitive environments were introduced by means of a 2x3 between-subjects experimental design. The experiment involved two conditions concerning learning. The Learning condition included a learning stage where participants were trained how to select appropriate ventures using a multiple cue probability learning task (MCPL) prior to making investment decisions. In the No-Learning condition, participants made investment decisions without such training. The next, investment, stage involved three treatments that varied in terms of competitiveness of the venture selection process. In the No Competition treatment, participants chose the ventures without restraints, while in the Competition treatment they were randomly paired with a competitor and competed for ventures. In the Assignment treatment, participants were directly assigned the ventures selected by the No-Competition participants on a one-one correspondence basis. After selecting their ventures, they managed them over periods by making further investments or selling them in the market. In all treatments, the objective was to maximize the profits of the venture funds. Participants' remuneration depended on their funds' performance.

The findings highlight the importance of prior learning and competitiveness of the environment on the selling decisions of individuals. Overall, participants do not exhibit the DE in this VC setting. Their decisions to "hold or leave" losing compared to winning investments differ significantly conditional on the degree of competitive framing of their environment. Including prior learning proved successful in training participants to make better venture choices, which is visible from their portfolio compositions. However, participants' behavior in subsequent venture management points to different dimensions of expertise, specifically, learning to choose and learning to manage. (The learning stage contained no information on optimal venture management.) In case of trained participants, competing proved a better environment for reaching optimality in management than choosing freely or being assigned. The participants who competed for ventures had portfolios of inferior quality compared to the other two treatments, but they invested most in winning investments and had better venture management strategies. After learning they invested less in losing investments and realized them faster, while holding the winning investments the longest among the three treatments. On the other hand, participants that freely selected their portfolios improved their strategies after learning by investing more in winning and less in losing investments. However, they significantly underfunded their best

ventures and tended to sell them prematurely. Prior learning did not have any effect on the investment behavior of participants with the assigned choices. Moreover, findings robustly indicate the positive relation between the degree of participants' learning and their performance in terms of earnings in the investment stage.

The paper is organized as follows. First, the Method section elaborates on the experimental design. The main findings are presented in the Results section. The Discussion concludes the paper with potential implications and suggestions for further research.

1. 2. METHOD

1. 2. 1. Experimental Design

The two conditions differed only regarding the first, learning, stage of the experiment. The No Learning condition consisted of only the investment stage, while the Learning condition included both the learning and investment stages (Figure 1). Both conditions are described in detail below.

Figure 1. Experimental Design of the No-Learning and Learning condition

	No Learning	Learning
Learning Stage		
* MCPL Task	☒	☑
* Cue Importance Ranking	☒	☑
Investment Stage		
* Venture Selection[a]	☑	☑
* Venture Management	☑	☑

[a] Difference with respect to three treatments - free selection for No Competition treatment, pair-wise competition for Competition and venture assignment for the Assignment

1. 2. 1. 1. No-Learning Condition

Participants assumed the responsibility of a senior manager in a VC fund that was going to exist for 5 more years[6]. The fund invested in potentially profitable ventures and made profit by subsequently selling them in the market. There were three rounds, each including six periods (t=0 to t=5). At the beginning of each round (t=0), participants in all treatments were given a 4x7 matrix of ventures and their attributes (number of attributes x number of ventures, Figure 2). The matrices varied over rounds with respect to venture attributes, but were always of the same size. The attributes and their values were described in the experimental instructions. Their order was alphabetical (in Spanish). The four attributes were those assessed as most important for future venture profitability in individual interviews and previous studies with venture capitalists and industry experts (Shepherd et al., 2000; Zacharakis & Shepherd, 2005). In order of relative importance, they are market growth (percentage growth in revenues over the last years), management capability (the level of resources, skills and experience of management in the industry being entered or a related industry), timing of entry (entering an industry as a pioneer or a late follower) and competitive rivalry (the level of competition among industry members during industry development).

Figure 2. Example of Venture Attribute Matrix

Venture Selection

Invest up to ECU 1,000,000 in the ventures according to your preferences.

	A	B	C	D	E	F	G
				VENTURE			
Management Capability	2	8	5	3	7	4	6
Market Growth	-6%	2%	8%	-4%	-10%	4%	0%
Timing of Entry	Pioneer	Late Follower	Middle	Late Follower	Late Follower	Pioneer	Middle
Competitive Rivalry	4	7	3	9	2	6	8
INVESTMENT							

TOTAL INVESTMENT [   ]   CASH [   ]

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[6] VC partnerships usually last for ten years with an option of extension up to three years. The fund is then liquidated and the proceeds distributed to fund's investors (Berlin, 1998). Venture capitalists, generally, plan to start a new fund roughly five years into the life of their previous one. Consequently, no new firms are added to the portfolio after this point and the fund harvests the returns on its existing investments.

The three treatments differed only with respect to the first part of the investment stage, venture selection in t=0. In the No Competition and Competition treatment, participants were endowed with ECU 1,000,000 (ECU=Experimental Currency Units) to invest in ventures based on their assessment of future venture profitability or to put it in a cash balance receiving no interest[7]. The number of undertaken ventures and the amounts invested in each were discretionary (minimum 0 firms, maximum 7 firms). There was only a lower bound on the individual investment amount of ECU 50,000 and an upper bound of ECU 600,000[8]. After the initial venture selection, there were no new venture opportunities. If not chosen in t=0, a venture was foregone for the participant's fund.

In the No Competition treatment participants could choose freely in which ventures they wanted to invest in. Those in the Competition treatment were matched randomly in pairs at the beginning of each round and had to compete for ventures. In case both wanted the same venture, the one offering the higher amount obtained it. If there was a tie (both offering the same amount), the venture was given to the participant who made the first offer. If after competing the participant still had money left to invest (that she did not put in the cash balance), she proceeded to the next phase and competed again for the ventures still available. In the Assignment treatment the venture selection table was already decided for the participants. It contained the ventures chosen and amounts invested by the No-Competition participants, i.e. by the previous manager of the fund, on the basis of one-one correspondence. That is, the first participant in the Assignment treatment received the ventures selected by the first participant in the No Competition treatment, and so forth. The next five periods in each round (t=1 to t=5) were identical for all treatments. In every period participants received the rates of return for all ventures (including those they had not invested in) and the profits (losses) of ventures they had invested in, as the difference between the value of the venture and its cost of investment that was equal to the amount of ECU invested (Figure 3). No other information was available.

The cumulative performance of a venture was positively correlated with its attribute values according to the cue abstraction (environmental) model[9]. The functional form of cue-

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[7] With the options at hand, participants were facing a purchase task rather than an allocation task (if there was no cash balance and money had to be invested only in ventures), which might have reduced the commitment to the ventures selected. I thank Barbara Summers and Darren Duxbury for suggesting this design feature.

[8] In order to replicate the VC market, these investment bounds were put so that it was not possible underfund a venture or to invest the endowment in only one venture.

[9] The cue abstraction model is specified in the Learning condition section 1.2.1.2.

criterion relations in the model remained unchanged throughout the experiment. To generate venture returns across periods, 20% of the variance in the model was left unexplained ($R^2 \approx .80$) in the attempt to approximate more closely actual VC industry conditions, but without adding excessive noise to the model. The three rounds replicated different market conditions, upward, stable and downward market and differed only in the intercept value of the environmental model. The intercept increased (decreased) in the case of upward (downward) market or stayed constant in the stable market compared to the model. All other model relationships remained equal.

Figure 3. Example of Venture Performance Matrix in Period t=1

Venture Performance

Invest up to ECU 800,000 in your ventures. It is possible to exit, invest between ECU 50,000 and 600,000 in each venture and/or deposit the money in cash.

t=1

	A	B	C	D	E	F	G
				VENTURE			
Rate of Return	-6%	1%	6%	-6%	-14%	14%	-4%
Value/Selling Price	0	1515000	318000	47000	0	2850000	1920000
Cost of Investment	0	1500000	300000	50000	0	2500000	2000000
Profit/Loss	**0**	**15000**	**18000**	**-3000**	**0**	**350000**	**-80000**
New Investment							
Exit							
Payoff							

TOTAL INVESTMENT   CASH

TOTAL PAYOFF

In periods t=1 to t=4, participants were again given funds (ECU 800,000 in t=1, ECU 600,000 in t=2, ECU 400,000 in t=3 and ECU 200,000 in t=4) (Figure 4). They had the possibility to invest further (ECU 50,000 to 600,000) in each of the ventures they have undertaken in t=0, deposit the money in cash or exit a venture, i.e. sell it in the market[10]. In case of exit, the fund earned the amount of profits or suffered the amount of losses the venture incurred up to that period. As managers of their funds, participants earned 20% of

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[10] Average duration of venture capitalist involvement in portfolio companies is up to five years (Gompers, 1996). Exit strategy (IPO, trade sale or a write off) is of their primary concern, since its success is critical for securing commitments from investors and remaining active in the industry.

these profits or losses that had a conversion rate of €1 = ECU 30,000[11]. After exiting a venture, it was not possible to buy it back in later periods or to reinvest the realized profits in the remaining portfolio ventures. In period t=5 the fund was closing and exit was mandatory.

Figure 4. Experiment Investment Process

t=0	t=1	t=2	t=3	t=4	t=5
Venture Selection	Investment or Exit	Investment or Exit	Investment or Exit	Investment or Exit	Fund Closing
ECU 1,000,000	ECU 800,000	ECU 600,000	ECU 400,000	ECU 200,000	Payoff
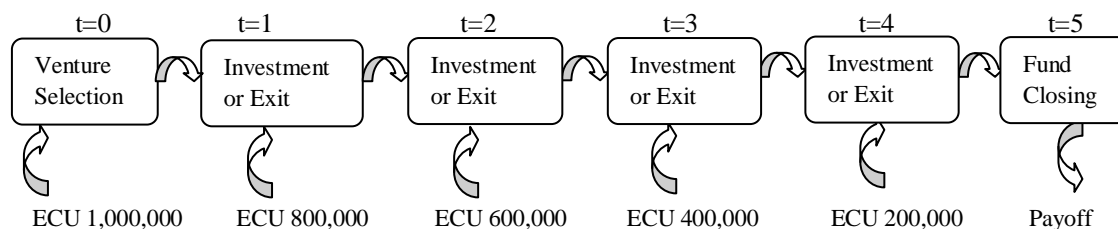
The payoffs in each round depended on participants' performance as fund managers and they were informed of their payoffs at the end of each round. Participants' remuneration was based on their average payoff from all three rounds. In the follow-up questionnaire, they shortly explained their investment decisions, attributes they deemed important in venture selection, reasons for exiting and possible changes of strategy across rounds.

1. 2. 1. 2. Learning Condition

In this condition, the learning stage preceded the investment stage described above, where participants assumed the position of a junior manager in the same VC fund. In order to learn how to choose profitable ventures and estimate the significance and relative importance of the venture attributes presented above, in all treatments participants underwent a MCPL task. Experiments with MCPL tasks typically study how participants given a particular pattern of cues learn to estimate criterion values that are probabilistically related to the set of cues. According to previous studies, people perform well when cues are few in number, generally up to four cues (Hoffman & Murphy, 2006), have a positive linear relationship to the criterion, when there are no cue interactions nor redundancies

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[11] The compensation of venture capitalists mostly has a fixed (management fee) and a variable component, the latter being around 20% of fund's profits paid out after the investors have recovered their investment (Gompers & Lerner, 1999). Though not universal, this compensation scheme was taken as an approximation. For simplicity, it was also assumed that when exiting, participant sells 100% stake in the venture, while in reality funds often retain a sizeable stake in the portfolio firm.

(Lindell & Stewart, 1974), the content of the task is meaningful (Camerer, 1981) and participants receive adequate number of trials and suitable feedback (Brehmer & Brehmer, 1988; Karelaia & Hogarth, 2008)[12].

The task at hand consisted of 30 trials. The order of trials was randomized across participants to avoid possible order effects and communication among participants[13]. In each trial, participants were given one fictitious venture characterized by a combination of four attributes (cues) and required to assess its future return (criterion) for a 10-year horizon (by choosing within a [-100%, 100%] interval in 10% increments) (Figure 5). After each judgment, outcome feedback with the correct criterion value was provided and remained on the screen until the participant decided to proceed to the next trial. Participants were supposed to use the feedback to reach a more precise model of how criterion and cue values are related. There was no time pressure for reaching judgments and no incentives were offered for performance during the learning stage.

Figure 5. Example of Multiple Cue Probability Learning Task

VENTURE **7**	
Estimate the future return of this venture.	
Management Capability	3
Market Growth	-6%
Timing of Entry	Pioneer
Competitive Rivalry	5
FUTURE RETURN	

Based on the aforementioned research, the environmental model used to generate the criterion values was constructed in the following way. The criterion Y (venture return in the next 10 years) was a linear additive function of four cues, namely X_{MG} (market growth), X_{MC} (management capability), X_{TE} (timing of entry) and X_{CR} (competitive rivalry):

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[12] For an excellent meta-analysis of lens model studies, see Karelaia and Hogarth (2008).
[13] The number of trials was not excessive to avoid fatigue and possibly limit participation.

$$Y = \alpha + \beta_1 X_{MG} + \beta_2 X_{MC} + \beta_3 X_{TE} + \beta_4 X_{CR} + \varepsilon \qquad (1)$$

where α (=-25), β_1 (=8), β_2 (=2.5), β_3 (=3.5) and β_4 (=1) were the model parameters and ε a random error term, indicating a strong, but imperfect correlation between the criterion and cue values. The venture's rate of return is an appropriate dependent variable for venture capitalists' decisions, used in several previous studies (Shepherd, 1999; Zacharakis and Shepherd, 2005), where the time horizon of 10 years was recommended to define sustainable venture profitability. The model included only important cues. For learning purposes only 5% of variance was unexplained in the model ($R^2 \approx .95$). The return was thus probabilistically and imperfectly related to cue values, which were not redundant or correlated[14]. The task presented a challenge; it did not stipulate what information to use and how to translate it into a particular judgment.

After completing the 30 trials, participants were asked to assign 100 points among the four attributes (cues) according to their importance in the judgments they had just made. This was done to distinguish between their insight into the structure of the task (task knowledge) and into their own process of judgment (self-insight) (Lagnado et al., 2006). Task knowledge represents the similarity in cue importance ranking between the stated cue ranking (according to the 100 points division) and the environmental model, whereas self-insight compares the cue importance ranking between the stated cue ranking and the ranking in their decision policy derived from the 30 trials completed. Participants then proceeded to the investment stage of the experiment, which was equivalent to that of the No Learning condition.

1. 2. 1. 3. Optimal Investment Strategy

The success of participants in the experiment depended on their skill in choosing the profitable ventures and timing the exit from their ventures as in real VC situations. Since there was an upper bound to individual venture investment, the optimal strategy was to invest the full amount provided in period t=0 (cash balance had zero interest) in the two ventures with the best attribute values, according to the environmental model. These

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[14] Although certain interactions among these attributes were found significant (Shepherd et al., 2000; Zacharakis & Shepherd, 2005), their relative importance was inferior to the main effects. Due to required simplicity of the task design to promote learning, they were excluded from the attribute list.

ventures had the best cumulative returns in the subsequent periods. To obtain the highest final payoffs, participants should have invested maximally in the more profitable venture and kept both ventures in the portfolio until t=5 in each round.

1. 2. 2. Experimental Measures

1. 2. 2. 1. Disposition Effect Measures

The presence of DE is detected by comparing the selling behavior of participants after gains and after losses. The analysis covers periods t=1 to t=4 of each round[15], marking a loss (gain) whenever a participant sold a venture below (above) its cost of investment. This cost, as the sum of all investments made by the participant over periods (Figure 3), represents the purchase price of a venture and has served as a reference point. The DE is observed when the proportion of gains realized (PGR) is significantly higher than the proportion of losses realized (PLR). The mentioned proportions are calculated as follows (Odean, 1998):

$$\frac{Realized\ Gains}{Realized\ Gains + Paper\ Gains} = Proportion\ of\ Gains\ Realized\ (PGR) \tag{2}$$

$$\frac{Realized\ Losses}{Realized\ Losses + Paper\ Losses} = Proportion\ of\ Losses\ Realized\ (PLR) \tag{3}$$

$$Proportion\ of\ Gains\ Realized\ (PGR) - Proportion\ of\ Losses\ Realized\ (PLR) = DE \tag{4}$$

Realized gains and losses are the investments sold for a gain or a loss compared to their purchase price, while paper gains and losses are appreciated or depreciated investments still held in the portfolio. The proportions are hence computed based on the number of times a participant sold a venture at a gain or at a loss, and take into account all her selling opportunities. The DE represents the difference between the two proportions and varies between –1 and 1. If the participant only sold at a gain, the DE value would be equal to 1 signifying the strongest DE.

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[15] In period t=0 the participants purchase their ventures (there are no selling opportunities), while in period t=5 the fund closes and all outstanding ventures are sold automatically.

1. 2. 2. 2. Lens Model

Brunswik's (1955) lens model is utilized as a framework to analyze judgmental performance of participants in the MCPL task. In the model the predictions of participants (Y_s) of the correct criterion value (Y_e) are deduced through a given set of cues. Overall performance, namely judgment achievement (r_a), is defined as the correlation between the criterion value (Y_e) and its predictions (Y_s). According to Tucker (1964), judgment achievement can be decomposed as follows:

$$r_a = G R_e R_s + C\sqrt{(1-R_e^2)}\sqrt{(1-R_s^2)} \tag{5}$$

where G is usually referred to as linear knowledge or matching and measures the correlation between the best linear prediction of the criterion from the environmental model ($\hat{Y}_e$) and the best linear prediction from the model of participant's judgments ($\hat{Y}_s$). R_e represents the predictability of the environment as the correlation between the criterion value (Y_e) and its best linear prediction $\hat{Y}$ ($_e$), while R_s (linear consistency or cognitive control) refers to the correlation between participant's judgments (Y_s) and their best linear predictions ($\hat{Y}_s$). The value of residual achievement (C) reflects the relationship between the residuals of the best linear model of the environment (Y_e - $\hat{Y}_e$) and those of the participant's judgments (Y_s - $\hat{Y}_s$).

Attaining higher values of achievement indicates participants' ability to discover the predictive power of cues and to perceive accurately the cue-criterion relations. This ability to forecast venture return can aid their venture choices in the investment stage of the Learning condition and hence increase performance measured by experimental earnings.

1. 2. 3. Experimental Participants

Experimental participants were undergraduate students of Universitat Pompeu Fabra from various fields of studies. In each of the three treatments, there were 18 participants in the No Learning and 20 participants in the Learning conditions, with approximately equal numbers of male and female participants as well as from economics-related and non-related studies. The experiment was programmed with the software z-Tree (Fischbacher, 1999) and conducted in the LeeX (Laboratori d'Economia Experimental). The participants were randomly assigned to the two conditions and three treatment groups, and their

respective instructions were given and read aloud to them. These included a full description of all experimental stages. Participants were thus familiar with the experimental design within their respective treatment from the outset and all their questions were addressed individually. The entire experiment was conducted in Spanish; it lasted for about 1.5 hours. The participants in the No Learning condition earned €9.32 on average and those in the Learning condition €9.75.

1. 3. RESULTS

1. 3. 1. Disposition Effect Analysis

Acting in accordance with the optimal strategy would imply not having a DE value, i.e. holding in one's portfolio the two best ventures and not selling them until the end of each round (no sale would take place to calculate the PGR and PLR proportions). Since this behavior entails flawless choices in venture selection, negative or low values of DE can be taken as an approximation for rational selling behavior. Participants may choose to invest in an unprofitable venture at t=0, but in line with rational strategy they should sell it before round end (t=5) and realize a loss. At the same time, they should keep the two most profitable ones they have (given they are profitable) and thus not realize gains. This especially holds for participants in the No Learning condition who were not trained beforehand to assess venture profitability.

Table 1 displays the PGR and PLR proportions across rounds for the three treatments in both conditions. A venture is categorized as a winner (loser) if its cumulative return in a round is positive (negative). The significance of their mean difference was tested by a t-test for paired sample means[16]. PLR was significantly higher than PGR across periods in most treatments of the two conditions[17]. Participants sold losing ventures from their portfolios more rapidly than their winning ventures. In both conditions there was no evidence of the DE. Since there is no disparity between the conditions in this respect, learning did not have a significant effect on the "winner vs. loser" selling decisions of participants.

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[16] When calculating the proportions, portfolios of participants with exclusively losers or winners were excluded from the calculation since these participants did not make an actual choice between selling losers or winners. Portfolios of participants were also excluded if no sale occurred during the period.

[17] In period t=3 of the Assignment and t=4 of the Competition treatment it was not possible to calculate the p-value due to lack of variance in the observations. There was no effect of round on the DE values.

Table 1. Proportions of Gains Realized (PGR) and the Proportions of Losses Realized (PLR) by Experimental Conditions and Periods

Treatment	No Learning			Learning		
	PGR	PLR	p-Value[a]	PGR	PLR	p-Value[a]
No Competition						
t=1	0.02	0.67	0.00	0.01	0.82	0.00
t=2	0.01	0.76	0.00	0.00	0.94	0.00
t=3	0.07	0.92	0.00	0.08	1.00	0.00
t=4	0.12	0.95	0.00	0.06	1.00	0.00
Mean	0.05	0.83		0.04	0.94	
Competition						
t=1	0.00	0.78	0.00	0.00	0.71	0.00
t=2	0.07	0.70	0.00	0.05	0.70	0.00
t=3	0.03	0.89	0.00	0.00	0.88	0.00
t=4	0.00	1.00	-	0.17	0.75	0.07
Mean	0.02	0.84		0.05	0.76	
Assignment						
t=1	0.05	0.73	0.00	0.05	0.86	0.00
t=2	0.06	0.73	0.00	0.25	0.75	0.13
t=3	0.07	0.80	0.00	0.00	1.00	-
t=4	0.23	0.81	0.02	0.47	0.53	0.44
Mean	0.10	0.77		0.19	0.79	

[a] Entries indicate statistical significance of difference between the proportions of gains realized (PGR) and the proportions of losses realized (PLR)

Given that the exact choices of the No-Competition participants were allocated to the participants of the Assignment treatment, significant differences in their selling behavior would point to the presence of the sunk-cost effect. The selling pattern in the two treatments was similar and the aversion to realize losses was not stronger in case of the self-chosen as opposed to the assigned portfolio. Therefore, there was no sign of the sunk-cost effect[18].

As the theory does not specify the exact benchmark against which respective gains and losses should be defined, in several recent studies the DE has also been tested with the market return and the last period prices as benchmarks. Ivkovich et al. (2007) have shown a negative relation between the stock's absolute performance and the investors' propensity to sell, evidence contrary to Odean (1998). Taking the relative performance of the stock, reflected in its return relative to the market, the DE trading pattern emerged and the propensity to sell became positively related to the stock's return. Related experimental

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[18] In contrast, a study of the DE among mutual fund managers has shown that funds with recent managerial change are more prone to exit their momentum losers than funds that have not changed managers (Jin & Scherbina, 2011). See also Arkes and Blumer (1985) and Summers and Duxbury (2007) on the role of emotions and commitment on the DE and other decision-making biases.

results demonstrated the DE presence when participants were given information on the market returns in addition to the individual asset returns (Shafran et al, 2009). Without this information, there was no effect of assets' past performance on the selling behavior. If the present DE analysis is modified along these lines and the market return defined as the average return of the seven ventures, the ones having a higher (lower) return than the market's would be considered winners (losers). This DE calculation provides findings almost identical to the previous; however the participants were not explicitly provided this information to make any direct comparisons.

1. 3. 1. 1. Price Trends

The DE can also be tested taking the last period price as the relevant reference point. Using this approach, I find strong support for importance of prior learning and treatment type on the selling behavior. Table 2 shows for all treatments the number of times participants exited ventures and the percentages of ventures sold after their value gained in two consecutive periods (GG), lost and gained (LG), gained and lost (GL), lost twice (LL), or gained (-G) or lost (-L) once for exits in period t=1.

Table 2. Number of Exits in Period t Depending on the Venture Value Gain (G) or Loss (L) in Periods t-1 and t-2

Panel A. No Learning

Price Trend		No Learning					
		No Competition		Competition		Assignment	
t-2	t-1	Exits	%	Exits	%	Exits	%
G	G	43	26.7	10	11.5	46	28.9
L	G	2	1.2	2	2.3	4	2.5
-	G	2	1.2	0	0.0	7	4.4
G	L	29	18.0	10	11.5	13	8.2
L	L	39	24.2	41	47.1	32	20.1
-	L	46	28.6	24	27.6	57	35.8
After G		47	29.2	12	13.8	57	35.8
After L		114	70.8	75	86.2	102	64.2

Panel B. Learning

Price Trend		Learning					
		No Competition		Competition		Assignment	
t-2	t-1	Exits	%	Exits	%	Exits	%
G	G	52	44.4	10	13.3	55	47.4
L	G	4	3.4	0	0.0	9	7.8
-	G	2	1.7	0	0.0	9	7.8
G	L	14	12.0	9	12.0	9	7.8
L	L	12	10.3	29	38.7	6	5.2
-	L	33	28.2	27	36.0	28	24.1
After G		58	49.6	10	13.3	73	62.9
After L		59	50.4	65	86.7	43	37.1

Without prior learning (Panel A) the proportions of sales after losses were significantly higher than the proportions of sales after gains in all treatments, in line with previous findings. Going through the learning stage notably changed these differences for the No Competition and Assignment treatments. By taking the last period price as the reference point, the DE is found in the Assignment treatment of the Learning condition (t=4.10, p<.001) and the difference between the proportions of sales after gains and after losses is not significantly different from zero for the No Competition treatment (t=.32, p=.62). This is due to a significant increase in the proportion of sales after gains between the two conditions (No Competition: t=-2.74, p<.01; Assignment: t=-3.02, p<.001). The reasons for the No Competition - Assignment divergence in the sales after gains lie in the higher selling tendency of the Assignment treatment in the upward market (round 2) and their better sales timing. On average, they were more patient in waiting for the ventures to start gaining in value before selling them. On the other hand, Competition participants were disinclined to exit their ventures after gains regardless of prior learning (Wilcoxon signed-rank test[19]: No-Learning: p<.001; Learning: p<.001) and compared to the other two treatments at .001 significance level (13.8% vs. 29.2% and 35.8%; 13.3% vs. 49.6% and 62.9%)[20]. These findings are consistent with those of Boebel and Taylor (2000) whose study of investors in New Zealand found no DE when the average purchase price served as the reference point and a minor effect with the previous period price.

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[19] Wilcoxon signed-rank test is used due to non-normality of the sales after losses and sales after gains distribution in the Competition treatment.
[20] The opposite holds for the proportions of sales after losses.

1. 3. 1. 2. Individual Level Effects

So far, we investigated the aggregated data from all participants. At the individual level, the DE coefficient describes the effect for each participant (Weber and Camerer, 1998). It is defined as the difference in sales of winning and losing ventures normalized by the total number of sales by a participant, i.e. $\alpha = (S_+ - S_-) / (S_+ + S_-))$. S_+ (S_-) is the number of sales of winners (losers) if the venture gained (lost) in value in the last period. The coefficient assumes values between –1 and 1 and is an increasing function of the DE. Its cumulative distribution across participants for the three treatments is given in Figure 6, separately for the No Learning (Panel A) and Learning condition (Panel B).

Figure 6. Cumulative Distributions of Disposition Coefficients

| **Panel A. No Learning** | **Panel B. Learning** |
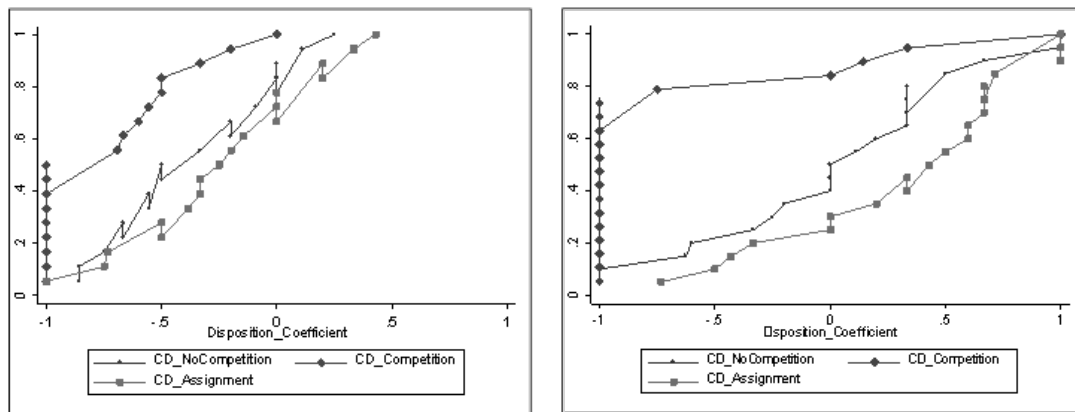
Comparing Panels A and B, a significant shift towards more positive DE coefficient values in Panel B is already noticeable. In the No Learning condition the DE coefficients were on average α (No Competition) =-.35, α (Competition) =-.73 and α (Assignment) =-.22, all significantly lower than zero (No Competition: t=-4.32, p<.001; Competition: Wilcoxon signed-rank test: p<.001; Assignment: t=-2.39, p<.01). In contrast, the coefficients in the Learning condition were on average α (No Competition) =.04, α (Competition) =-.66 and α (Assignment) =.34. As before, the DE coefficient value for the Competition

treatment was significantly negative (Wilcoxon signed-rank test: p<.001)[21]. In case of the Assignment treatment the value was positive signaling the DE presence (t=2.38, p<.01), while in the No Competition it was not different from zero (t=.51, p=.69). A t-test showed a significant rise in the coefficient value of the No Competition and Assignment treatment after learning (t=-2.82, p<.001, and t=-3.33, p<.001, respectively). The Kolmogorov-Smirnov test confirmed that the cumulative distribution of the Competition treatment was different from the other two treatments in both conditions (p<.01). Moreover, the DE coefficient values for the Competition treatment were significantly lower than the coefficients of the other two treatments (Wilcoxon signed-rank test: No-Learning: p<.001; Learning: p<.001).

In sum, there is no clear evidence of the DE in this VC setting. The results point to a general agreement among participants in exiting losers and heterogeneity regarding realization of winners induced by both initial venture competition and prior learning[22]. To grasp fully the exact factors underlying these selling patterns, the participants' investment and exit decisions are explored in depth through an optimal strategy analysis in section 1.3.3.

1. 3. 2. Learning Stage Analysis

1. 3. 2. 1. Task Knowledge and Self-Insight

Participants in all treatments of the Learning condition effectively comprehended the MCPL task and demonstrated accurate knowledge of their own judgment process. Their policy equations were all statistically significant at the .01 level or better (F-test), with adjusted R-squares ranging from .29 to .94. To make the distinction between the level of task knowledge and self-insight of participants, Table 3 specifies the importance of each cue in the environmental model, the actual decision policy originating from the 30 trials they completed and the stated decision policy according to the division of 100 points among the four cues.

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[21] In the Learning condition 13 out of 20 Competition participants had the DE value $\alpha=-1$, whereas the participants of the other two treatments were faster on the "exit button".
[22] There was no sign of gender effect or effect of (non-) economic studies on the realisation of winners or losers.

Table 3. Comparison of Environmental Model, Actual and Stated Decision Policies

Cues	Environmental Model		Actual Decision Policy		Stated Decision Policy	
	Mean[a]	Rank	Mean[b]	Rank	Mean[c]	Rank
Market Growth	0.416	1	0.422	1	45.52	1
Management Capability	0.006	2	0.034	2	20.97	2
Timing of Entry	0.004	3	0.001	4	15.42	4
Competitive Rivalry	0.002	4	0.009	3	18.10	3

[a] omega squared values for each cue based on the cue abstraction model
[b] omega squared values for each cue based on the 30 trials completed in the MCPL task
[c] according to the division of 100 points among the cues in line with their judgment importance

The cues in the environmental model and actual decision policy were ranked in line with their omega-squared values (ω^2). All attributes affected the decision process significantly, but were not of equal importance. On average, participants had strong self-insight, given that the cue rank orders of actual and stated decision policies are identical. Comparing the stated decision policy with the environmental model, we can assess the level of task knowledge. The rank order was generally the same, with the exception of two cues (timing of entry and competitive rivalry) being reversed in order[23]. Participants displayed a clear discrimination between strong and weak cues, and high rank order correlations between policies suggest mainly good insight into the task structure and their own judgment process.

1. 3. 2. 2. Lens Model Analysis

The lens model perspective offers insights into individual decision-making and is used to analyze the judgment processes of participants (Table 4). The judgment achievement (r_a) was computed by correlating participants' predictions (Y_s) with the associated correct criterion values (Y_e) for each participant. Since the initial level of task knowledge of participants was modest, the first 10 trials out of 30 were left out of the analysis to ensure the learning performance measures would be the result of predictions that were not randomly given[24]. Linear regression equations of cue utilization were formed for each

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[23] In the case of actual decision policy, 24 out of 60 participants had the attribute ranking equivalent to the one in Table 3 (4 had the ranking of the environmental model), whilst for the stated policy 19 participants divided the 100 points consistent with the above ranking and 20 according to the environmental model.
[24] The lens model analysis was also done with all 30 trials included. The results remained the same, but as expected, the significance levels were lower in several cases due to certain outlier observations.

participant to obtain the linear predictions of their judgments ($\hat{Y}_s$) and to compute the correlations of linear knowledge (G) and linear consistency (R_s). The linear prediction of the criterion $\hat{Y}_e$) and the predictability of the criterion (R_e) were equivalent across participants (R_e= .97). The residual achievement (C) was found not significantly different from zero for all participants.

Table 4. Lens Model Components

Measure	Mean[a]	Standard Deviation	Minimum	Maximum
Judgment Achievement (r_a)	0.84	0.17	0.32	0.98
Linear Knowledge (G)	0.97	0.13	0.46	1.00
Linear Consistency (R_s)	0.93	0.09	0.65	0.99
Residual Achievement (C)	-0.03	0.18	-0.41	0.33

Note: Predictability of the criterion (R_e) = 0.97. Sample size N=60.
[a]after the Fisher's z transformation

As there were no significant differences between treatments in the computed correlation values, the observations were aggregated for further analyses. Correlation coefficients, r_a, G, R_s and C were also transformed to Fisher's z values to ensure the normality of their sampling distributions. Participants on average demonstrated a high degree of judgment achievement (r_a=.84) due to both linear knowledge (G=.97) and linear consistency (R_s=.93). When describing our subject pool by characteristics of gender and field of studies, significant correlations arise with the values of judgment achievement and its components (Table 5). Male participants performed better than their female counterparts in terms of higher consistency in applying their linear policy (p<.01). Economic students, on the other hand, surpassed the participants of non-economic studies as a result of their elevated linear knowledge (p<.05) and linear consistency (p<.01).

Table 5. Pairwise Correlation Coefficients between Judgment Achievement Components and Participant Demographics

	Judgment Achievement $(r_a)^a$	Linear Knowledge $(G)^a$	Linear Consistency $(R_s)^a$	Residual Achievement $(C)^a$
Gender	-0.22	-0.02	**-0.33**	-0.20
Economics-related studies	**0.33**	<u>0.25</u>	**0.31**	-0.11
Financial Experience[b]	0.21	0.18	0.14	-0.01

Note: correlation coefficients significant at p<0.01 are in bold, significant at p<0.05 are underlined. Sample size N=60.
[a]after Fisher's z transformation
[b]self-assessed on a 1-10 scale

1. 3. 2. 3. Expertise Effect

In order to test the relation between the degree of learning and the experimental performance (expertise effect), a pairwise correlation matrix was constructed using the judgment achievement components and several experiment performance measures, such as final earnings and individual PGR and PLR proportions and the DE values across rounds (Table 6). Participants with higher levels of learning, reflected in judgment achievement (p<.01), linear knowledge (p<.01) and consistency (p<.05), did have higher earnings in the experiment than the participants with respective lower levels[25]. The level of learning in the first stage did not have a significant impact on other performance measures, except for a surprising relation between the residual achievement and the DE values (p<.05), that is difficult to interpret. The findings are identical if tested with median values of the components of judgment achievement. By splitting the participant sample into an above and below median group concerning judgment achievement (r_a), linear knowledge (G) and consistency (R_s), the above (below) median group was still reaching higher (lower) performance levels in terms of earnings than the below (above) median group (t=-2.16, p<.01; t=-1.77, p<.05; t=-2.29, p<.01, respectively)[26].

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[25] Earnings exclusively depended on the performance in the investment stage.

[26] To check the robustness of the results, the judgement performance was also measured in terms of mean squared error (MSE), as the squared deviation between the criterion and the predicted value divided by the total number of predictions made $(\Sigma(Y_e-Y_s)^2/n)$ for each participant. The results were effectively the same as the aforementioned.

Table 6. Pairwise Correlation Coefficients between Judgment Achievement Components and Performance Measures

	Judgment Achievement (r_a)[a]	Linear Knowledge (G)[a]	Linear Consistency (R_s)[a]	Residual Achievement (C)[a]
Experimental Earnings	**0.37**	**0.32**	<u>0.31</u>	-0.05
Proportion of Gains Realized (PGR)	-0.13	-0.04	-0.06	-0.18
Proportion of Losses Realized (PLR)	-0.09	-0.14	-0.06	0.25
Disposition Effect	0.01	0.09	-0.02	<u>-0.28</u>

Note: correlation coefficients significant at $p<0.01$ are in bold, significant at $p<0.05$ are underlined. Sample size N=60.
[a] after Fisher's z transformation

1. 3. 3. Optimal Strategy Analysis

Participants generally held more diversified portfolios than optimal thereby lowering their earnings below the maximum possible of €13.27 (Table 7). Although the participants in the Learning condition earned more on average, this increase was not statistically significant (Wilcoxon signed-rank test: p=.27). In the No Learning condition, Competition participants earned the least (Wilcoxon signed-rank test: p<.05). With prior learning, their earnings were only significantly smaller than those of the No Competition counterparts (Wilcoxon signed-rank test: p<.1).

Table 7. Portfolio Composition and Experimental Earnings

	No Learning				Learning			
Treatment	Earnings	Ventures	Winners[a]	Losers[a]	Earnings	Ventures	Winners[a]	Losers[a]
No Competition	9.91	4.85	0.70	0.30	10.38	3.62	0.82	0.18
Competition	8.09	3.02	0.59	0.41	8.70	2.68	0.68	0.32
Assignment	9.97	4.85	0.70	0.30	10.18	3.62	0.82	0.18

[a] proportions of winning (losing) investments in the portofolios of participants (averages across rounds)

The participants in the Competition treatment also acquired fewer ventures than the No Competition participants in both conditions (Wilcoxon signed-rank test: No Learning: p<.001, Learning: p<.001)[27]. There is a clear learning effect evident in venture choices after

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[27] The initial portfolio composition of the No Competition and Assignment treatment was identical.

learning[28]. Participants in the Learning condition had proportionally more winners and fewer losers in their portfolios than without learning (No Competition: t=2.64, p<.01; Competition: t=1.48, p<.1). Portfolios of the No Competition also contained less ventures after training (Wilcoxon signed-rank test: p<.01). At the same time, the Competition participants had a significantly lower (higher) proportion of winners (losers) in their portfolios compared to No Competition participants (No Learning: t=2.14, p<.05; Learning: t=2.60, p<.01).

The specific design of this study makes it possible to decompose the earnings of the participants and answer exactly where and why have they earned less than maximally possible. The optimal strategy analysis unravels the divergences of their learning, investment and selling behavior from the optimal one described in section 1.2.1.3. (Table 8). The total decrease is obtained by comparing the actual earnings of participants with the optimal, i.e. highest possible earnings achieved by investing in each round in the two best ventures (according to the environmental model) and managing them optimally[29]. This decrease can be decomposed into three components (two in the No Learning condition): (i) lack of learning, if the individual cue models of participants from the learning stage did not correspond to the environmental model (Learning condition), (ii) suboptimal choices, if they did not choose the optimal ventures according to their individual cue model (or the environmental one in No Learning), and (iii) flawed management, where losing ventures are not exited immediately, two best winning ones not kept until t=5 and/or investment amounts not allocated optimally.

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[28] In both conditions profitable ventures comprised a major proportion of the portfolio (70% and 82% of the No Competition and 59% and 68% of the Competition treatment in the No-Learning and Learning, respectively).

[29] Optimal management implied spending the full endowment in every period on these two ventures, investing maximally in the more profitable one and keeping both in the portfolio until t=5. The amount of optimal earnings is equal in both conditions. The total decrease components are calculated as averages across the three rounds.

Table 8. Components of Total Decrease in Earnings

Treatment	Total Decrease in Earnings[a]	Decrease due to		
		Learning[b]	Choices[c]	Management[d]
No Learning				
No Competition	0.25	-	0.17	0.09
Competition	0.39	-	0.30	0.09
Assignment	0.25	-	-	0.08
Learning				
No Competition	0.22	0.05	0.04	0.13
Competition	0.34	0.10	0.18	0.07
Assignment	0.23	0.07	-	0.14

Note: Sample size N=60.

[a] comparison between the optimal and actual earnings of participants

[b] comparison between the optimal earnings and maximal earnings according to the participants' models from the learning stage (given optimal venture choices)

[c] comparison between the optimal earnings (maximal earnings given optimal venture choices according to the participants' models) and maximal earnings given their actual venture choices in No Learning (Learning). The comparison cannot be calculated for Assignment treatment due to venture assignment feature in period t=0.

[d] comparison between the maximal earnings given actual venture choices of participants and their actual final earnings

The decrease due to learning (i) is calculated by weighing the optimal earnings against the maximal earnings obtained from investing in the two best ventures according to the participant's individual cue model and managing them optimally. In case participants did not choose the initial venture set in line with their cue models (or the environmental model in No Learning), this is detected by comparing the maximal earnings from the optimal (cue model) choices and the maximal earnings from the actual venture choices (both are assumed to be managed optimally). This component, decrease due to choices (ii), cannot be estimated for the Assignment treatment as they did not choose the ventures themselves. Finally, by removing the assumption of optimality in management it is possible to assess the quality of participants' venture management (iii) by contrasting the maximal earnings from managing the actual venture choices optimally and their actual earnings.

The total drop in earnings was significantly the largest for the Competition treatment in the No Learning condition (Wilcoxon signed-rank test: $p<.05$). This difference can be attributed to venture choices being less consistent with the environmental model (drop of 0.30 compared to 0.17 of No Competition; $t=-2.96$, $p<.001$). Facing competition in the venture selection process, participants could not always get a hold of their first-choice ventures. There was no significant difference in the quality of venture management between the treatments. In the Learning condition, the total earnings drop of Competition

participants was only larger than the one of No Competition (Wilcoxon signed-rank test: $p<.1$). There was no difference in the degree of learning between treatments[30] and Competition participants again suffered a larger drop in earnings due to venture choices ($t=-2.71$, $p<.01$). However, they proved far better at management than the No Competition ($t=2.40$, $p<.01$) and Assignment participants ($t=-1.95$, $p<.05$). No significant difference was found between the latter two ($t=-.38$, $p=.35$).

There was an interesting interaction between training and different types of competitive situations on how participants managed their ventures. Specifically, a factorial analysis of variance of the earnings decrease due to venture management reveals a marginally significant main effect for competition, $F(1, 110)=3.33$, $p=.07$, such that the decrease was significantly lower for Competition participants ($M=7.9\%$, $SD=.059$) than for the other two treatments ($M=11.1\%$, $SD=.097$). The main effect for prior learning is not significant, $F(1, 110) = .51$, $p=.47$. However, the interaction term between competition and prior learning is significant, $F(1, 110)=4.80$, $p<.05$, indicating that the effect of competition was stronger in the Learning condition. Training thus helped Competition participants in managing their ventures and it had an adverse effect on the No Competition and Assignment participants. As a result, without training the No Competition participants made most mistakes in their choices ($t=4.16$, $p<.001$), but after learning they erred most regarding venture management ($t=-2.22$, $p<.01$).

1. 3. 3. 1. Holding Periods and Investment Amounts

To determine the reasons for inadequate venture management, it is important to look into the main determinants of the quality of management. First, in terms of holding periods, winners should be kept in the portfolio until round end ($t=5$), unless there are more than two, and losers sold as soon as possible (in $t=1$). Second, participants ought to exhaust the endowments provided in each period and invest them in winners and not in losers. Finally, the endowment should be spent on the two best portfolio ventures that will generate the highest final return.

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[30] 72% of No Competition and 62% of Competition and Assignment participants had correct individual cue models. Further details on the learning analysis are available upon request.

The holding periods are examined separately for winning and losing investments in Table 9[31]. In No Learning, there was no significant difference in the holding periods per winner or per loser across treatments[32]. Training participants up front considerably changed their holding decisions[33]. Across treatments holding periods per loser stayed generally equal. Participants still had a common agreement to exit them. The holding periods per winner were now significantly longer in the Competition treatment than in the No Competition (t=-1.65, p<.05) or the Assignment treatment (t=1.61, p<.1). This underlines the previous finding of attachment to winners if one has completed the learning stage and competed for the ventures. The No Competition and Assignment participants did not change their holding strategy in any significant manner. In contrast, the Competition participants behaved more rationally with their losers after training and sold them earlier (t=3.43, p<.001).

Table 9. Holding Periods of Winning and Losing Investments

Treatment	No Learning		Learning	
	Winners	Losers	Winners	Losers
No Competition	4.10	2.91	4.07	2.52
Competition	4.24	3.21	4.35	2.08
Assignment	4.01	2.72	4.03	2.44

In terms of investment amounts, participants in all treatments failed to invest in their ventures the full endowment provided (Wilcoxon signed-rank test: p<.001) and they invested positive amounts in losing ventures (Wilcoxon signed-rank test: p<.01). However, total investments in winners were always higher than in losers (Wilcoxon signed-rank test: p<.001)[34]. Competition induced participants to invest the most per winner in both conditions, more than the No Competition (No Learning: t=-3.00, p<.001) and

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[31] Looking at the holding periods of winners and losers is especially important for the behaviour of participants with only winning or losing ventures in their portfolios. They did not have to choose between selling winners or their losers, but did need to decide whether to sell or hold them.

[32] Due to different numbers of ventures in participants' portfolios (Table 7), average holding periods across rounds are divided by the number of respective ventures to obtain the holding periods per winner or loser.

[33] Rationally, in both conditions holding periods of winners were longer than of losers in all treatments (Wilcoxon signed-rank test: p<.001).

[34] Further details on the investment analysis are available upon request.

Assignment treatments (No Learning: t=2.07, p<.05; Learning: t=1.47, p<.1)[35]. Between the No Competition and Assignment treatment there were no differences in investments per winner without training. After the learning stage the No Competition participants changed their investment behavior considerably. They invested more per winner owned (t=2.86, p<.01), while spending less per loser (t=-1.84, p<.05). Competition participants only invested slightly less per loser (t=1.27, p<.1). Learning had no effect on investments per winner (t=0.51, p=.69) or loser (t=-.21, p=.42) in the Assignment treatment.

Finally, considering only the investments in the two best ventures, all treatments invested similar amounts in the No Learning condition. In the Learning condition, however, the No Competition participants invested less in their two best ventures compared to both Competition (Wilcoxon signed-rank test: p<.01) and Assignment (Wilcoxon signed-rank test: p<.001) and their counterparts in No Learning (Wilcoxon signed-rank test: p<.001). Inclusion of the learning stage did not alter the behavior of the other two treatments in this respect.

1. 4. DISCUSSION

The DE has been used to explain the tendency to hold losing investments in portfolios relatively longer than winning investments. In this VC experimental setting there was no clear evidence of the DE, and on average, participants' behavior was consistent with the predictions of standard economic theory (see also evidence concerning mutual fund sales by Ivkovich & Weisbenner, 2007). The results indicate a general consistency across participants in realizing losses and an apparent heterogeneity regarding realization of gains. Participants across treatments and conditions concurred in their belief that losing ventures should be sold due to their detrimental effect on final earnings. I find strong support for treatment importance in selling behavior of participants and show that it is influenced by the underlying return trends of the portfolio ventures. After going through competition to acquire ventures, participants were unwilling to sell their winning ventures. On the contrary, in the No Competition and Assignment treatment they sold their profitable ventures prematurely, behaving contrary to the optimal investment strategy. The initial

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[35] Except for winners in comparison to No Competition in the Learning condition, but the direction was identical (t=-.90, p=.19).

venture competition and interaction between participants thus gave incentives for a more rational management of the acquired holdings.

This finding sets forth certain managerial implications. It confirms the prevalent view of microeconomic theory that appoints competition as the most efficient form of resource allocation and management. As seen here, competition has its costs and its benefits. When there is fierce competition over a small number of resources (ventures), it can be expensive and can lead to wasted effort (not getting hold of the first-choice ventures). Nevertheless, its beneficial effects lie in the enhanced innovation, efficiency and lower prices (enhanced strategies in venture management regarding winning and losing ventures) compared to other forms of resource allocation (free selection or direct assignment).

Prior learning enabled participants to discriminate better between the ventures offered to them and to make superior venture choices. In the Learning condition No Competition and consequently Assignment participants had better and less diversified portfolios, including less winners and losers, but with higher proportions of winners and lower of losers. Competition participants held portfolios of similar size in both conditions (their portfolios were smaller already in the No Learning) and learning made only a marginal improvement in their portfolio quality. Despite this, they have fared better at management with inferior portfolios after completing the learning stage compared to the other two treatments. They enhanced their strategy by investing less per loser owned and selling them faster from their portfolios than in No Learning. As before, they invested most per winner and held them, scarcely selling them (Table 2), but after learning they held onto them the longest among treatments (Table 9). Due to unchanged portfolio quality, this was reflected only in a minor increase in the final earnings[36].

On the other hand, with prior learning No Competition and Assignment participants became worse managers of their higher-quality portfolios. In case of No Competition, as trained experts they invested more per winner and less per loser owned and exhausted more of the endowment given, but this investment was ill directed. The two best ventures were significantly less funded and participants tended to sell them thinking they had reached their maximum value (explained in the follow-up questionnaire). Thus, the winner selling choice was different than in the No Learning condition, as more profitable winners were sold. Since the holding time of winners was kept the same, the quality of venture

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[36] Portfolio choice had always bigger weight in the earnings drop than venture management.

management dropped accordingly. Consequently, regardless of the superior initial portfolio composition, final earnings rose insignificantly. Training had no effect on the investment or exit strategies of the participants with assigned choices. Paired with receiving smaller portfolios from the No Competition that comprised of fewer winners (in absolute terms), this fact yielded roughly the same profit per venture, but declining total profit and hence worse venture management. Both No Competition and Assignment participants, therefore, failed to profit additionally from the enhanced choices and applied the same premature selling strategy. They neither kept their winners longer nor invested fully in their best performing ventures and with smaller portfolios there was more per venture endowment available for investment (the No Competition solely improved on their per winner investment).

Examination of the explanation sheets offers additional clarifications of participants' decisions. The majority demonstrated understanding of the experimental setting (especially in the Learning condition) and were guiding their investment decisions according to the venture rate of return, "maximizing profits" and supplying more funds to the high-performing ventures. Participants in No Learning claimed more often to have changed their investment strategy over rounds and so did the Competition participants compared to the other two treatments. More importantly, when explaining their exit decisions, in the Competition there was only one comment (in Learning) for selling winners ("I thought the venture was at its highest"). The participants sold mostly to avoid further losses. On the contrary, in the No Competition and Assignment treatment in the Learning condition four and seven participants, respectively, mentioned explicitly they decided to sell due to "high venture value" and "to obtain secure profits". In contrast, no participant in the No Learning condition stated these reasons to explain her exit behavior.

The MCPL task provided grounds for successful learning. Participants were allowed to take notes[37], given immediate outcome feedback and the task involved a limited number of variables that were all linearly and positively related to the criterion. It proved beneficial to learn how to make decisions before dealing with actual payoffs, since participants' choices show signs of discrimination between the ventures according to the quality of their attribute values. This way, the lack of understanding of the experimental setting they invest

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[37] Participants taking notes might have made their judgements not based on the environmental model, but on an exemplar-based model, i.e. on the similarity between the new venture and the most similar previous one (Juslin et al., 2003).

in can be ruled out as a possible reason for the DE emergence that was brought up in previous related studies.

Despite the fact that an experiment has an edge in terms of the controlled conditions and the information provided to participants, it can often be challenged by its external validity. The stakes at risk were small and there was no possibility of incurring real losses, even in the investment stage alone. To deal with this limited liability concern, future experiment extensions may include a stage preceding the present ones, where participants would have an opportunity to earn some money that will also be at stake in the investment stage. This could change the starting reference point and possibly influence the results. Participants could also be provided the information on the market return as the average return of all the ventures that also might change their reference point in labeling winners and losers and would allow comparisons with the findings of Ivkovich et al. (2007) and Shafran et al. (2009).

Consequently, presence of the DE can be a product of different information and conditions granted in experiments. As in most related studies, participants could be offered only a certain number of ventures (e.g. A-G) not specified by any attribute. In addition, the fact that economic framing can change the risk behavior of participants in this context was already mentioned by Weber and Zuchel (2005), while in Rubatelli et al. (2005) relative format of asset returns (in %) decreased the DE notably compared to the absolute one (in euros). Further design improvements could include an increase in the number of trading periods per round (affecting the investments' time horizon and portfolio rebalancing)[38], and as well the removal of the minimum investment level (from ECU 50,000 to 0). The latter feature was especially pronounced in the No Learning condition where several participants wanted to keep the losing ventures, but without additional costs to further investments.

This study puts forward the relevance of prior learning and competitive environment on the selling behavior of individuals that were previously not included in the experimental studies of the DE. In this new VC setting, the decisions on holding or leaving the losing compared to winning ventures differ significantly conditional on the degree of competitive framing of the environment. The venture competition induced a more rational behavior in

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[38] In the models of Barberis and Xiong (2009) the DE was increasing in the time horizon of the investment, where for sufficiently short time horizons only the reverse DE was observed.

participants regarding profitable ventures. These factors should, therefore, be taken into account when examining experimentally the causes of the DE and prescribing possible counteractive measures to this financial decision-making bias.

1. 5. EXPERIMENTAL INSTRUCTIONS

(translation from Spanish)

(Differences between treatments are indicated in *italics* and parentheses)
(Additional parts for the Learning condition are indicated in grey)

This is an experiment about venture capitalists' investment decision making. The experiment will consist of two parts. Your task will be explained in detail below, so please read carefully.
During the experiment you are not allowed to communicate with other participants.

FIRST PART

In the first part, you will be appointed as a junior manager in a venture capital fund. The fund invests in potentially profitable ventures and makes profit by subsequently selling them in the market. Your task is to learn how the fund chooses profitable ventures for investment.

There will be 30 trials. In each trial you will see a fictitious venture that will be described by 4 attributes. The attributes have high and low values and are explained in the attached sheet. You will need to do your best to estimate the return of this venture in the next 10 years. The return is in the interval [-100%, 100%] in 10% increments (e.g. [-100%, -90%, …, 90%, 100%]).

This return is probabilistically related to the given venture attributes. This correlation is strong, but imperfect. At first you will need to guess the return, but in time you will get better in this estimation. After each prediction feedback will be provided to you. Then you will find out whether your guess was correct and what the correct return was. Your success in this part will not affect your payoff in the experiment, but it will help you to earn a higher payoff in the second part.

You will proceed to the next trial after clicking OK. You are permitted to take notes.

When you have completed all 30 trials, you will be asked to divide 100 points between the attributes according to their importance in your judgements. The attribute you give more points to was more important for your judgement of the venture return.

After finishing the first part and learning how the fund works, you will proceed to the second part.

SECOND PART

In the second part, You will assume the responsibility of a manager of a venture capital fund. The fund is going to exist for 5 more years. Your goal is to maximise the profits of the fund during this time. The fund invests in potentially profitable ventures and makes profit by subsequently selling them in the market. Your payoff in the experiment will depend directly on the fund's profits. As in real life, you can learn from experience, but this cannot be a perfect predictor of the future.

(Competition) *Market resources are limited, so at the beginning of each round you will be paired with a random manager to compete for these ventures. You will not know the identity of the other person.*

The experiment will consist of 3 rounds, each having 6 periods (t=0 to t=5). The instructions for each round will be the same. Rounds are independent and will differ in venture attributes and rates of return over periods.

PERIOD t=0
- You will be offered 7 potential ventures that are described by 4 attributes as in the first part. (The attributes are explained in the attached sheet)
- **(Assignment)** *Previous fund manager was offered 7 potential ventures described by 4 attributes as in the first part.*
- As a manager you will be given ECU 1,000,000 of funds to invest in these ventures (ECU=experimental currency unit). Their future profitability is related only to their attribute values (it does not depend on the amount of your investment!).
- **(Assignment)** *He was given ECU 1,000,000 of funds to invest in these ventures (ECU=experimental currency unit) or to put the money in a cash balance with zero payoff (not giving any payoff in the experiment).*
- Number of ventures undertaken and the amounts invested in each will be discretionary to you (minimum 0 firms, maximum 7 firms).
- **(Assignment)** *Number of ventures undertaken and the amounts invested in each were discretionary to him (minimum 0 firms, maximum 7 firms) and his choices will be shown on your screen.*
- The minimum you can invest in an individual venture is ECU 50,000 and the maximum is ECU 600,000.
- The amount of ECU funds you decide not to invest will be put in your cash balance. This cash will earn you no payoff and cannot be transferred to later periods. Therefore, it will not give you any payoff in the experiment.
- After initial investment selection in t=0, there will be no new venture opportunities.

- **(Assignment)** *Thus, you need to maximise the profits of the fund by managing these existing ventures. If a venture was not chosen in t=0, it is foregone for you.*

- **(Competition)** *In case you and your competitor want to invest in the same venture, the one offering the higher amount will acquire it.*
- **(Competition)** *If there is a tie (both offering the same amount), the venture will be given to the participant that makes the offer first.*
- **(Competition)** *If after competing you will still have money left to invest (written on the screen and equal to ECU 1,000,000-money invested), you will proceed to the next phase where you will compete again for the ventures still available.*

PERIOD t=1
- Certain market scenario concerning venture profitability will occur.
- You will receive rates of return for all ventures (including those you/*your fund* **(Assignment)** have not invested in) and the profits (losses) of your ventures/*ventures in your portfolio* **(Assignment)** (difference between their

value/selling price and the investment). These returns are now annual and in the interval [-20%, 20%] in 1% increments.

- You will be given ECU 800,000 to invest in ventures you *(successfully,* **Competition***) /your fund* **(Assignment)** invested in t=0.
- Now you can decide to:
    o Invest in your ventures (again from ECU 50,000 up to ECU 600,000 in an individual venture),
    o Put the money in the cash balance (giving you zero payoff) or
    o Exit some of them, i.e. you have an option to sell a venture in the market.
- If you have not chosen a certain venture in t=0, it is foregone for you (you cannot invest in this venture anymore in this or in the remaining periods).
- If you decide to exit, your fund will earn the amount of profits or suffer the amount of loss the venture incurred up to this period (written on the screen). You as a manager will earn 20% of these profits or incur 20% of losses (payoff).
- After exiting a venture, it will not be possible to buy it back later on or to reinvest profits.

PERIOD t=2, t=3 & t=4
- You will get the same information and the same opportunities as in t=1.
- Now you will be given ECU 600,000 in t=2, ECU 400,000 in t=3 and ECU 200,000 in t=4.
- You can decide to further invest ECU 50,000 to 600,000 in the ventures you hold, put the money in your cash balance or exit some of your ventures.

PERIOD t=5
- The fund is closing and exit is mandatory.
- You will receive your final payoff according to your performance as a fund manager equal to 20% of the sum of all ventures' exit profits and losses.

As payoff, you will receive the average payoff of the 3 rounds. The conversion rate will be €1 = ECU 30 000.
If you have any questions, the experimenter will address them individually. Good luck!

EXPERIMENAL VARIABLES (attached sheet)

- **<u>VENTURE RETURN</u> =** rate of return in the next 10 years / previous year (in %)
    - o Interval **[-100%, 100%]** in **10% increments**
    - o Interval **[-20%, 20%]** in **1% increments**

- **<u>VENTURE ATTRIBUTES</u> (ordered alphabetically)**
    - ▪ **TIMING OF ENTRY**
        - o **PIONEER =** enters a new industry first
        - o **MIDDLE** = enters an industry after pioneers
        - o **LATE FOLLOWER =** enters an industry late in the industry's stage of development

    - ▪ **COMPETITIVE RIVALRY =** level of competition in the market among industry members during industry development (**scale 1-10**)

1	2	3	4	5	6	7	8	9	10
very intense competition									very little competition

    - ▪ **MANAGEMENT CAPABILITY =** amount of resources, skills and experience in the industry being entered or a related industry that are available to management (**scale 1-10**)

1	2	3	4	5	6	7	8	9	10

    - o **1 =** very few resources and skills, management has no prior industry-related experience and knowledge
    - o **10 =** considerable resources and skills, management has extensive prior industry-related experience and knowledge (able to more rapidly develop links to shareholders, reduce customer uncertainty and engender trust)

    - ▪ **MARKET GROWTH =** average annual growth in revenues over the last 5 years (in %)
        - o Interval **[-10%, 10%]** in **2% increments**

-10%	-8%	-6%	-4%	-2%	0%	2%	4%	6%	8%	10%

PERIOD	ECU	OPTIONS
t=0	1,000,000	• CHOOSE VENTURES / COMPETE FOR VENTURES • INVEST (in 1 venture ECU 50,000-600,000) • CASH
t=1	800,000	• INVEST (in 1 venture ECU 50,000-600,000) • CASH • EXIT (sell venture for profit or loss)
t=2	600,000	• INVEST (in 1 venture ECU 50,000-600,000) • CASH • EXIT (sell venture for profit or loss)
t=3	400,000	• INVEST (in 1 venture ECU 50,000-600,000) • CASH • EXIT (sell venture for profit or loss)
t=4	200,000	• INVEST (in 1 venture ECU 50,000-600,000) • CASH • EXIT (sell venture for profit or loss)
t=5	0	• EXIT (sell remaining ventures for profit or loss)

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Chapter 2

Incentives for Giving: The Effect of Social Comparison Processes on Individual Donation Behaviour

> "The value of a dollar is social, as it is created by society."
>
> Ralph Waldo Emerson

2. 1. INTRODUCTION

Generosity is spread unequally across the income categories. Households donate their hard-earned income to beneficial causes and charitable organisations in an economically significant extent at the individual and aggregate level (Andreoni, 2001; Bekkers & Wiepking, 2011; Vesterlund, 2006), but they do not do so equally[39]. For the majority of the population the relationship between the household income and the percentage of that income donated to charity is significant and negative (Andreoni, 1990, 2001; Breeze, 2006; James & Sharpe, 2007; McClelland & Brooks, 2004; Schervish & Havens, 1995a; 1995b; Wiepking, 2007)[40]. Households tend to donate smaller shares of their income, as their respective income grows. These shares give better ground for generosity comparisons

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[39] In the U.S. alone, total contributions to charitable organisations surpassed $307 billion in 2008 and giving by individuals accounted for 74.5% of this amount. Percentage of households donating to charity was higher than the percentage voting or reading the Sunday newspaper (Giving USA 2009 report).
[40] U.S. households with incomes below $150,000 in 2009 (91.7% of households, US Census 2009 Economic Survey).

among donors than the absolute amounts as donating the same absolute amount of money does not represent the same sacrifice for donors across income categories.

To the best of my knowledge, this is the first study to test empirically for one of the factors behind this pattern and to replicate it successfully in a controlled environment. Philanthropy researchers still cannot agree on the exact nature of this income-giving relationship and give only ad hoc explanations for its occurrence. One side of the dispute claims this relationship is a U-shaped curve, labelling the relatively poorest and richest households as the most generous in giving the highest income share to charity (Andreoni, 1990, 2001; James & Sharpe, 2007; Schervish & Havens, 1995a; 1995b). Households in the middle of the income scale donate the smallest share of their income. More specifically, low-income households (under $10,000 of after-tax income) give around 4.5% of their incomes to charity. This percentage drops for households between $50,000 and $100,000 of after-tax income to an average of below 1.5%, while the rich (with after-tax incomes over $150,000) give almost 2.2% of that amount (James & Sharpe, 2007). Other studies argue there is a linear downward trend that describes this income-giving behaviour, with households donating smaller shares of their income as their income increases (Breeze, 2006; McClelland & Brooks, 2004; Wiepking, 2007)[41]. According to them, the poorest households are still the most generous, but the richest are now the least generous.

In this paper I provide an alternative explanation for this downward income-giving trend that both sides of the debate have in common. Income is the variable with most predictive power for explaining charitable giving (McClelland & Brooks, 2004), but itself may not be the primary cause of this discrepancy in generosity across income categories. The cause could be found in other variables that co-vary with income. The explanation I put forth lists rank information as one such variable. Rank position in the income distribution is naturally strongly correlated with income and has been shown to influence the level of pro-social and competitive behaviour of individuals. Richer households might not donate proportionately less because they are richer, but because they know they are richer and want to stay richer. To replicate the downward income-giving trend from the field and disclose rank information as one of the factors causing this trend, I created an experimental setting where both the knowledge of ranking position and the task difficulty varied.

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[41] Cited studies predominately describe giving in the U.S. due to the availability and comprehensiveness of data. The latest studies, however, also tackle giving in the UK (Breeze, 2004) and The Netherlands (Wiepking, 2007) and find similar giving patterns.

The two features were introduced via 2x3 between-subjects experimental design. The task difficulty varied across the two conditions as participants earned their payoff either in an easy (E) or difficult (D) task condition. They answered 40 questions of varying difficulty in an individual quiz game. The easy task represented a quasi-endowment task where participants could obtain their earnings with significantly less effort than in the real-effort or difficult task[42]. An alternative to this quasi-endowment task was to introduce a pure endowment task with windfall incomes and ranks (for instance, given to participants based on their height or the order in which they entered the lab). I opted for an easy task instead to make the conditions only differ in the level of task difficulty and not to punish participants by randomly endowing them with low incomes (and probably significantly diminishing their willingness to give money away). This way, they spent an equal amount of time on the task and in the lab, which made their donation decisions more comparable.

After completing the task, participants were given different payoff information. In the no-information condition (NI) they received only the amount they earned in the task. Rank information condition (RI) supplied them with the amount earned and their rank position in the treatment group. In the distribution information condition (DI) comparison information was even more amplified as participants were fully informed of the amount they earned, of their rank in the treatment group and were given the entire distribution of payoffs of all participants in the group. After learning their payoffs (and ranks), they were invited to donate part of their payoff to charity (UNICEF)[43].

Previous studies found higher ranks to have a detrimental effect on the level of cooperation and individual contributions. In charitable giving experiments and public good games participants with higher incomes gave smaller relative donations to charity and voluntary contributions to the public good, respectively, compared to those with lower incomes (Buckley & Croson, 2006; Cherry et al, 2005; Reinstein & Riener, 2011). Participants behaved less cooperatively and more competitively as they moved up in their relative performance (Duffy & Kornienko, 2010; Garcia et al, 2006; Garcia & Tor, 2007). Comparisons in the task performance alone did not have such an effect. According to an array of social comparison studies, individuals are generally more concerned about their

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[42] Proofs of significant differences in task difficulty can be found in the Results section.
[43] Participants made donations to a charity and not to another participant or a public good to resemble the empirical scenario more closely. Also, they have more experience with such decisions as we regularly face appeals from charity organisations. The "power of asking" is an established technique among fundraisers as active solicitation significantly raises the probability of giving (Wiepking, 2007; Yörük, 2006).

relative than absolute position in a society or their reference group, particularly when it came to income (Festinger, 1954; Solnick & Hemenway, 1998). Income is regarded as a strong positional good and the competitive drive increases at higher income levels, where individuals feel more strongly about preserving their better relative position (Garcia et al, 2006; Solnick & Hemenway, 2005). None of the studies so far examined the effect of knowledge of own rank on giving behaviour. How might the donation decisions change if individuals have not only the information on their payoff, but also their payoff rank in the reference group?

Moreover, the origin of the endowment, i.e. exerting real effort or not in attaining it, affected generosity. When individuals invest significant effort in earning their income, they assign property rights to it, hold the rank position important and show less propensity to share it with others or charities (Carlsson et al., 2009; Cherry et al., 2002; Hoffman & Spitzer, 1985; Konow, 2000; Reinstein & Riener, 2011). When the income is received as a windfall, they tend to share it more generously, even equally. The effect of task difficulty was also not tested in combination with varying degrees of knowledge of rank information. How will the level of effort participants exert interact with the rank information they receive to affect their donation decisions?

I hypothesise that the social comparison information induced through the presence of ranks in income levels after a real-effort task (not only information on the task payoff) will induce the empirically-found downward pattern in giving behaviour. The participants that exerted effort in earning their payoffs will tend to keep more of it and give less to charity the higher their relative position is. The lower-ranked participants will tend to do the opposite. When rank information is either absent or irrelevant (i.e. after a low-effort task), this downward pattern is not expected to appear. According to common beliefs, effort and performance determine the level of wealth and position in the society. Such giving behaviour can then be a product of living in a success-craving society, an individuals' awareness of their relative income position in the society and the need to preserve it.

The results confirm our expectations. The participants with lower earnings did give a higher share of their earnings to charity, but only if they earned them in the difficult task and were given rank information. This downward pattern in giving was the same in both D-RI and D-DI conditions. These circumstances of real-effort task and rank awareness correspond the most to real-life empirical settings. For the participants in the easy task

condition or in the absence of rank information, the percentage of earnings donated was unrelated to the amount earned in the task. Thus, rank information (if the rank position was earned in a real-effort task) can be identified as one of the determinants behind the giving pattern found in the field.

The paper proceeds as follows. Section 2 reviews the literature on the income-giving relationship, the importance of ranks and endowment origin on cooperative and competitive behaviour and introduces the concept of social comparison processes. Section 3 presents the experimental design, Section 4 reports on the results and discusses the findings. Section 5 concludes the paper.

2. 2. RELATED LITERATURE

2. 2. 1. Income-Giving Relationship

There are a number of ad hoc explanations listed in the studies that report on the income-charitable giving relationship. However, they have so far not identified and tested for them empirically. The negative relationship between income and giving can be explained by a "giving standard" that indicates the "right" amount of money a household should donate in a specific situation (Harbaugh, 1998; Wiepking, 2007). This amount is dictated by social norms that are shared by all income groups and by amounts other people are believed to donate. As the standard is generally expressed in absolute terms, it guides low-income households to contribute higher proportions of their income to charity. More generous giving by the poor is also often explained by their religious affiliation (so-called "sect effect") as they donate significantly more to the church and religious causes (Andreoni, 2001; James & Sharpe, 2007; Schervish & Havens, 1995a). Among the low-income households we could as well track down young people, currently in this income group, but expected to climb up the income ladder in the future (Andreoni, 2001). Consequently, they might believe that at the moment they can meet the expense of assigning a relatively higher income percentage to charity. Furthermore, the low-income group hosts considerably more highly-committed households that donate 10% or more of their income (James & Sharpe, 2007). They predominantly belong to the retirement-aged households. Though having a low income, these households hold more assets and are hence wealthier than comparable others in their income set ("wealth effect").

Generosity on the other end of the income spectrum can be explained by large disposable incomes of the very rich and the "price of giving" that represents the effective cost of donations (Bekkers & Wiepking, 2007; Wiepking, 2007). The price of giving falls as we move upwards the income levels due to progressive tax systems and respective income tax deductions that encourage donations.

This puzzling empirical finding also contradicts predominant economic models of rational choice and inequality aversion. If we take into account the basic assumption of standard rational choice theory, it is in each individual's financial interest to free ride and hence avoid giving away either their endowed or hard-earned income. Furthermore, according to the inequality aversion models (Fehr and Schmidt, 1999), individuals dislike inequality in earnings and will exert efforts to equalise them. Those with higher earnings are expected to contribute higher proportions of their income to finance public goods or donate to charity than are the individuals with lower incomes. But they do not.

2. 2. 2. Effect of Rank on Competitive and Cooperative Behaviour (Information Effect)

In public good games with heterogeneous endowments wealthier individuals gave smaller proportions of their incomes as voluntary provisions (Buckley & Croson, 2006; Cherry et al, 2005). Chan et al (1996) found that high-income participants had the propensity to undercontribute, relative to conventional Nash equilibrium predictions, and low-income participants overcontributed to the public good. However, this study fell short in replicating the downward income-giving relationship. The high-income participants still gave a larger income portion to the public good compared to the low-income ones. Informing participants of their rank in earnings in the public good game of Andreoni (1995) led to less cooperative behaviour, lower contributions and more free riding relative to the outcomes in a standard setup. This finding was even more pronounced when participants were also paid according to their rank.

In the charitable giving experiment of Reinstein and Riener (2011) participants with higher incomes, both endowed and earned, had a lower propensity to donate and gave lower relative donations to charities if paid in cash before donating. Social class as a rank-based variable, both actual and experimentally altered, was found to bring about large differences

in the level of generosity (Piff et al., 2010). Lower-class individuals displayed more prosocial behaviour, trust and support for charities despite reduced resources compared to their upper-class counterparts. The model of Cox et al. (2007) explains such behaviour given that individual's relative performance (rank) boosts her relative status, but shrinks the importance she places on others' monetary payoffs.

Such lower relative giving might be a way of preserving the same superior relative position and competitive concerns do grow stronger as we get closer to a standard or a top rank (Garcia et al, 2006). Participants became more competitive and less willing to maximise joint gains when they and their rivals held high ranks (e.g. #3 and #4) than when they were both ranked lower (e.g. #103 and #104). Comparisons in ranks generated such competitive behaviour, but not comparisons in task performance alone (Garcia & Tor, 2007). When it comes to giving, different competitive frames have been successful at both stimulating and discouraging altruistic behaviour of participants (Duffy & Kornienko, 2010). Participants tended to give less in dictator games when ranked according to the money they kept (earnings tournament) than when they were ranked based on the money they gave away (generosity tournament), even though there was no prize to be won.

2. 2. 3. Social Comparison Processes

Why do people care about the relative income and the rank they attain, even when they bring no direct economic consequences? Social comparison processes are the most often mentioned mechanism through which ranks affect individual behaviour. These processes were first put forward by Festinger (1954), who proposed that, in the absence of an objective standard, people compare themselves in terms of their opinions and abilities to similar others or others in a similar situation, i.e. their reference group. To date, the impact of these processes on individual behaviour has been exposed in various settings and the ones related to income, wealth and rank are among the most prominent and economically significant in our literature. Social comparison studies point out that people care more about their relative income position in the society i.e. in their reference group, than they do about the absolute level of income they are earning.

Solnick and Hemenway (1998) labelled income as a strong positional good. Individuals preferred to live in a world where they have less real purchasing power, but a higher

relative income, to a world where everyone's income level is higher, but theirs is below the average[44]. Such positional competitive concerns were again the strongest at higher income levels (Solnick & Hemenway, 2005). Higher relative income of neighbours ("lagging behind the Joneses") was related to lower levels of happiness, individual utility, well-being and social capital measures (Alpizar et al., 2003; Daly & Wilson, 2009; Fischer & Torgler, 2006; Luttmer, 2005; Medvec et al, 1995)[45]. The study of Ferrer-i-Carbonell (2005) revealed this comparison effect to be asymmetric with predominantly upward comparisons. Individuals experience a negative impact on their well-being if their income is below that of their reference group, but the opposite impact does not occur if their income surpasses the reference group level. The effect of rank in the income distribution was even more important than the level of relative income. Participants experienced more pain of being surpassed in rank the higher that rank was, alluding to the role social comparison processes play in inducing competitive behaviour (Garcia et al, 2006). In ultimatum game experiments, social comparisons given via the information on the average offers across the proposers and respondents and the size of the pie to be divided boosted the offers and offer-specific rejection probabilities (Bohnet & Zeckhauser, 2004). Directing the attention to rank in donations, Shang and Croson (2006) increased the level of contributions by upward social comparison information (a high amount of donation by another donor) given to donors in a public radio campaign.

2. 2. 4. Relevance of Endowment Origin and Distributive Justice (Task Effect)

The origin of participants' endowment and rank position affect the other-regarding behaviour as well. Individuals relate themselves with their relative position in the reference group if they have invested sizeable effort in this position as opposed to when it simply came as a windfall. In dictator games participants act more selfishly when they earned their endowment and allocate less to the recipients (Cherry et al., 2002) or charity organisations (Carlsson et al., 2009; Reinstein & Riener, 2011). The dictators also keep more of the

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[44] Positional answers were also the most frequent regarding own and own child's physical attractiveness, intelligence and education, number of praises from a supervisor. The opposite held for vacation time and number of papers to write.

[45] Interestingly, the performance level of German soccer players was decreasing with larger income differences within a team (Torgler et al., 2006).

endowment when they earn the position of the first mover (Hoffman et al., 1994) or keep less when the recipients' effort and performance increases the endowment to be distributed (Ruffle, 1998). In a related experiment, Erkal et al. (2011) found that when participants earn their endowments in a real-effort task, those ranked first are less likely to transfer money to their group members than those ranked second. If they are unaware of this subsequent giving stage or if their endowments are determined randomly, this difference vanishes.

Participants are hence assigned higher allocations when they are considered more deserving. This is the case when the larger amount eligible for distribution or their role of dictator or proposer was a product of factors they had control over (Konow, 2003; Rode & Le Menestrel, 2011)[46]. In such situations proportionality (to effort) is the standard. If these factors are yet external to a participant or the distribution amount is determined randomly, equal sharing is perceived as a fair choice. Participants thus behave consistently with the earnings-based notion of justice or the accountability principle and only regard an unequal income distribution as fair when the endowments are earned (Hoffman & Spitzer, 1985; Konow, 2000; Rutström & Williams, 2000). They show less generosity and less equal sharing when they attribute stronger property rights to their wealth and they will do so when endowments are determined by the size of their inputs (e.g. time, effort). Relative performance is rewarded and it affects the sense of fairness and entitlement in distribution games and subsequently generosity. Furthermore, in line with the efficacy of effort, the relative performance on an equivalent task matters. The participants that performed the same task with more success reason they deserve their better position and to keep more of the endowment earned (Hoffman & Spitzer, 1985).

2. 3. METHOD

2. 3. 1. Experimental Design

The experiment consisted of six stages. Participants were given instructions for each stage just before it began. They were not aware of the type or number of tasks facing them and most importantly, that the experiment would involve an opportunity to make a charitable

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[46] Eckel & Grossman (1996) also directed giving towards a more "deserving" recipient (Red Cross) and the level of giving increased compared to the standard dictator game.

donation[47]. The experiment was implemented as a 2x3 between-subjects design. The conditions only differed in the level of task difficulty in stage 1 (easy and difficult task) and in the payoff information given to participants in stage 3 (Figure 1).

Figure 1. Experimental Stages
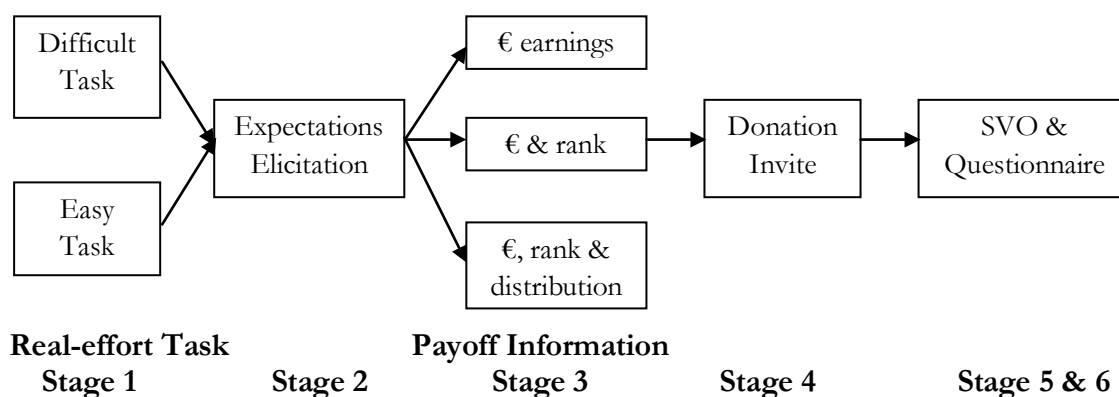
Stage 1 – Real-effort Task. The participants earned their payoffs in an individual quiz game. They answered 40 questions and their earnings depended directly on their performance (number of correct answers)[48]. Following previous work (Gneezy & Rustichini, 2000), the questions were taken from psychometric tests typically used to discriminate university applicants and involved computation and reasoning (verbal and numerical parts). The probability of a correct answer depended highly on the participant's effort and not on luck or general knowledge. Participants solved the questions under time pressure. For 30 questions they had 30 seconds to answer each and for 10 questions they had 60 seconds for each (25 minutes in total). They were allowed to take notes, but could not use any calculators, only the instructions sheets and paper sheets provided by the experimenter. The participation fee was €4 and for each correct answer they earned €0.3 (the earnings equation was given to them from the outset). For 40 questions they could then earn as high as €16 (all answers correct) or as low as €4 (all answers wrong).

The task complexity was varied so that exerting high effort in the difficult task was decisive for participants in order to achieve high levels of earnings compared to the easy task (for

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[47] Knowing they will have the opportunity to donate part of their earnings might have biased their effort level and subsequently their task performance (Erkal et al., 2011).
[48] Task and survey questions are available upon request.

instance, dealing with integer numbers vs. fractions, making logical inferences vs. counting the frequency of a letter O). High performance could not result from sheer luck. Examples of easy and difficult task questions are given in Appendix B.

Stage 2 – Expectations Elicitation. Before seeing their task earnings, participants were asked to give their expectations on the number of questions they answered correctly (in all conditions) ("How many questions out of 40 do you think you answered correctly?") and of their rank position in the treatment group (in RI and DI)[49] ("Out of 20 participants in your group, how many do you think got more questions right than you did?").

Stage 3 – Performance and Payoff Information. The factor of social comparisons was introduced by varying the earnings information provided to participants. The conditions varied this information by presenting the participant with:

> **No Information (Control) condition (NI)** - the amount earned
>
> **Rank Information condition (RI)** - the amount earned and the participant's rank in the treatment group[50]
>
> **Distribution Information condition (DI)**[51] - the amount earned, the participant's rank in the treatment group and the full earnings and rank list of participants in the group (by the number of their computer in the lab)

Stage 4 – Donation Invite. After receiving their earnings (and rank) information, participants were invited to give voluntarily part as a donation to a specified charity organisation, UNICEF, in €0.1 increments. They had the possibility to donate any amount from zero to their entire earnings. This organisation was chosen as a result of a prior pilot survey conducted among UPF students that elicited their preferences among charitable organisations[52]. A short description of UNICEF and its main missions were shown on the screen and read by the experimenter (see Appendix A)[53]. We avoided imposing any kind of

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[49] Participants were not given monetary incentives for correct assessments of their absolute and relative performance (see Grieco & Hogarth (2009), Camerer & Hogarth (1999)).

[50] In case of a tie (equal number of correct answers), the participant who solved them faster got a higher rank.

[51] Besides strengthening social comparisons, the purpose of supplying participants with the distribution information was to add some external validity to the experiment. Most individuals know their relative wealth in comparison to other members of their reference group (Buckley & Croson, 2006).

[52] 69 students completed the survey. They were presented with a list of 10 renowned charities and had to chose (i) the one they would most like to donate to and (ii) how to distribute (or keep) €10 among them.

[53] United Nations International Children's Emergency Fund (UNICEF) is the most successful UN agency in collecting donations from individuals. It has a strong brand name as an organisation that "does things" and is the only UN agency with established presence at the country level. More specifically, it is well-known in Spain

social pressure on the participants to donate. The wording of the instructions and the conduct of the experimenter were neutral, not to make the participants feel obliged to donate any of their endowment to charity. The anonymity of donations was guaranteed (donors were not identifiable). All participants were exposed to the same form of solicitation (there was no variability in wording, solicitation method or solicitors) and they were at no point told the purpose of the experiment.

The participants decided how much (if anything) of their task earnings to donate. Once the donation decisions were made, the total amount donated was transferred to UNICEF online at the end of the experiment (Rode et al., 2008). The participant who was the fastest in filling out the questionnaire at the end of the experiment observed the transfer. To add further credibility, a printout of the "Thank you" note from UNICEF's webpage was put on the lab door for participants to see on their way out.

Stage 5 – Social Value Orientation (SVO) Questionnaire. Participants completed a Triple Dominance Measure of the SVO questionnaire (Van Lange et al., 1997). The questionnaire is a series of decomposed games that classifies individuals as prosocials, individualists or competitors[54]. The participants had to make nine choices by selecting one of the three different monetary divisions between self and another random participant in the experiment they preferred the most. For example, one set of choices was:

	A	B	C
You get	480	540	480
Other gets	80	280	480

The allocation tasks contained prosocial (equal division and maximising joint outcomes; option C), individualistic (maximising own outcome, option B) and competitive divisions (maximising the difference between own and other's outcome, option A). The questionnaire was found predictive of individual differences in other-regarding preferences, with prosocials exhibiting stronger tendencies towards cooperation and helping behaviour than individualists and competitors (Cornelissen et al., 2011; McClintock & Allison, 1989; Van Lange et al., 2007). The participants completed a trial allocation task to understand fully the rules and divisions in the SVO questionnaire. They were randomly paired with another participant in the treatment group. After making the nine choices the role of the

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due to its sponsorship deal with FC Barcelona. According to the familiarity hypothesis, donors are more generous to recipients they have more information about and organisations they trust (Konow, 2010).

[54] In line with the economic classification prosocials are labelled social welfare maximisers, individualists as selfish and competitors as competitive types.

dictator (whose choices will be implemented) and the exact game (which of the nine choices is implemented) were determined by random draw with equal probabilities. The amount received in this stage varied between 80 (€0.16) and 580 points (€1.16) (500 points equalled €1) and was added to their final experimental payoff:

Final Earnings = Earnings from stage 1 – Donation amount + Earnings from stage 5

Stage 6 – Questionnaire. In the last stage participants filled out a questionnaire with basic demographic information and questions related to their prior donation and volunteering behaviour, preferences among charities (concerning their origin and purpose), attitudes and beliefs about the behaviour of other participants in their treatment group (how many participants they think donated, the average amount given by participants that donated and whether a participant should donate more or less if s/he earned more (less) than them in the experiment).

2. 3. 2. Experimental Measures

As the aim of this study is to replicate the empirical finding of the negative income-giving pattern and to draw a causal link to rank information, the main variable of interest is the relative donation amount. This is defined as the ratio of the absolute amount of donation (from stage 4) to the experimental task earnings representing participants' income (from stage 1). The rank stands for the relative placement of participant in the treatment group (higher rank number signalling worse relative placement). The participants were classified as belonging to one of the three SVO types (prosocial, individualist or competitor) if their choices from stage 5 were consistent in six or more of the nine choice situations.

2. 3. 3. Experimental Participants

117 undergraduate students of Universitat Pompeu Fabra participated in the experiment. They were randomly assigned to one of the six experimental conditions. There were 20 participants in each group, except for 18 participants in E-DI and 19 in D-DI conditions, an approximately equal number of male and female participants from various fields of

study[55]. Each condition was run in an independent experimental session. The experiment was conducted using the z-Tree software (Fischbacher, 1999) in the LeeX (Laboratori d'Economia Experimental). The participants were recruited through the ORSEE online recruitment system (Greiner, 2004). They were given no information on the objectives or procedure of the experiment and had not taken part in similar experiments in the past. Instructions were given at the beginning of each stage, read aloud to the participants and all their questions were addressed individually. The experiment was conducted in Spanish and lasted for about 50 minutes. Participants earned on average €9.8 in the difficult and €13.7 in the easy task condition.

2. 4. RESULTS

I start the discourse of the findings by presenting the descriptive statistics of the participants' task performance and donation decisions across different conditions, followed by the analysis of the income-giving relationship. The negative relationship found in the field was replicated in the difficult task condition and only if the rank information was present. This main finding will be demonstrated by linking the participants' task earnings and the relative donation amounts across conditions and examined in a more consistent manner via regression analysis of the participants' donation decisions. In addition, several supplementary results and a discussion will complement and wrap up the analysis.

2. 4. 1. Task Performance and Donation Amounts

Participants in the easy task condition solved more questions correctly (mean=32.3) and earned significantly more in stage 1 (mean=€13.6) than the ones in the difficult task (mean=19.2; €9.8, respectively) (Mann-Whitney rank test - MWR: z =-8.83, p<0.001). Regarding the total time spent on the task, participants were also faster in completing the easy task (MWR: z = 6.70, p<0.001)[56].

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[55] All participants were of Spanish and Catalan origin, so the cultural differences in attitude towards giving are controlled for (Alesina & Angeletos, 2005).
[56] Descriptive statistics on the participants' task performances and donation decisions across conditions can be found in Appendix C (Table A1, Figures A1 and A2). There was no difference in the performance of participants between the three groups in the easy or difficult task conditions.

The proportion of participants donating positive amounts to charity did not vary significantly across conditions. Its mean value was equal to 90.6% (Appendix C, Table A1). Only 11 participants in total (9.4%) did not donate and there was no effect of task earnings on the probability of donating (Smith et al., 1995, Wiepking, 2007)[57]. Before analysing the relationship between income and donations in detail, Figure 2 presents the mean absolute and relative donation amounts in the difficult and easy task conditions.

Figure 2. Mean Absolute and Relative Donation Amounts Across Conditions
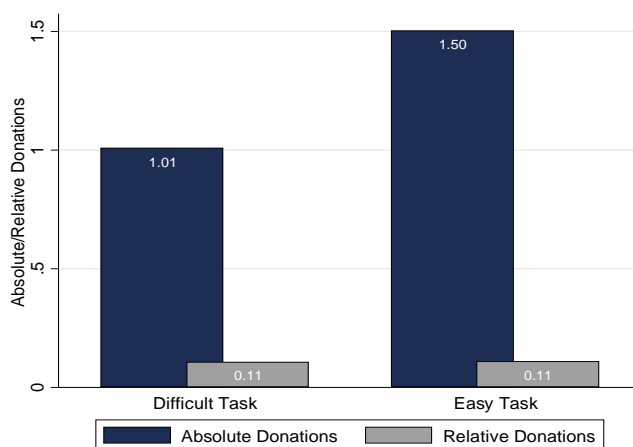
Comparing the level of donations between the two conditions, the mean absolute donation was higher in the easy task (€1.01 vs. €1.50; t=-2.07, p<0.05)[58]. Similarly, factorial analysis of variance shows a significant main effect for task difficulty when explaining the level of absolute donation amounts ($F(1,114)=4.29$, $p<0.05$), but not relative ones ($F(1,114)=0.00$, $p=0.98$). With higher task earnings in the easy task condition, the participants on average gave more to charity than in the difficult task. On the other hand, the level of relative donations did not change significantly with the level of task difficulty and its mean value remained at around 11% in both conditions.

Examining the level of donations between different payoff information conditions, I find that providing the participants with the amount earned and their ranking in the group brought about the highest level of donations (RI condition), though this increase was not always significant (Figure 3). The main effect of having ranking information (without the

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[57] The proportion of donors was higher than the empirically found ones due to the "power of asking" (Wiepking, 2007; Yörük, 2006). People are more likely to give when actually asked to do so.
[58] To normalise their sampling distributions, absolute and relative donation amounts were transformed to their square root values.

distribution information) was marginally significant for the relative donation amounts ($F_{(1,114)}=3.16$, $p=0.08$), but not sufficiently so for the absolute ($F_{(1,114)}=2.55$, $p=0.11$). The added interaction term between the task difficulty and ranking information was insignificant for both relative ($F_{(1,113)}=0.49$, $p=0.49$) and absolute donation levels ($F_{(1,113)}=0.12$, $p=0.73$).

Figure 3. Mean Donation Amounts across Conditions

A. Absolute Donations   **B. Relative Donations**
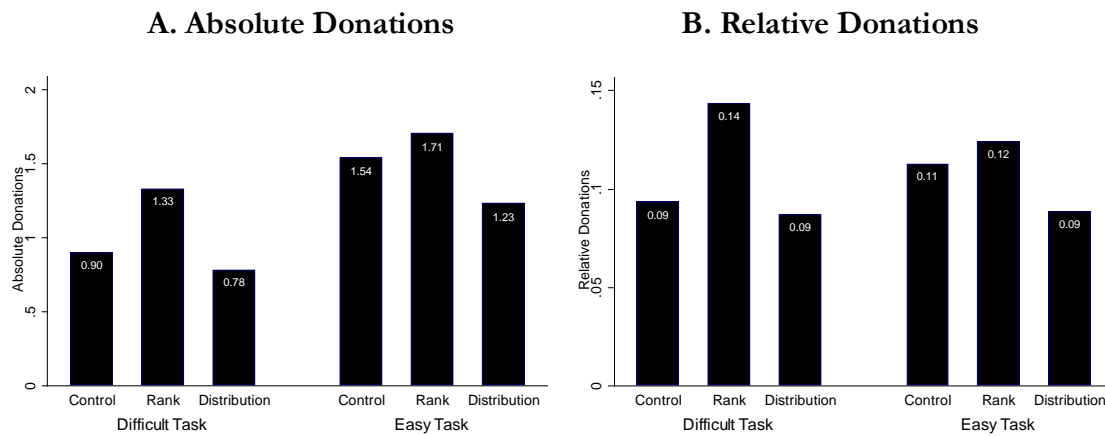
The significance of the ranking information stems from the difficult task condition. The mean absolute donation of €1.33 in the D-RI condition was higher than €0.78 in the D-DI ($t=2.42$, $p<0.05$), but not significantly than €0.90 in the D-NI condition ($t=-1.27$, $p=0.21$). Similarly, the mean relative donation of 14.4% was the highest again in D-RI compared to 8.7% in D-DI ($t=2.28$, $p<0.05$) and 9.3% in D-NI ($t=-1.31$, $p=0.21$). In the easy task there were no differences in the absolute or relative donation levels between the conditions. This finding pinpoints a positive impact of social comparison processes on individual behaviour. They increased the level of average donations as the maximum level was reached after giving the participants their rank information in the difficult task[59].

2. 4. 2. Income-Giving Relationship

Income (experimental task earnings) had a negative effect on the percentage of income participants donated to charity (relative donations), but only in the difficult task condition

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[59] Our current state of the affairs is somewhere between D-RI and D-DI. Since providing participants with the entire earnings distribution lowered the mean donation level and erased this impact, though insignificantly, one should bare this in mind when advocating full information on all incomes and wealth.

and only when they had at least the ranking information at hand (Figure 4). Participants with higher earnings (number of questions solved correctly) donated a lower share of their earnings in the D-RI (t=-1.84, p<0.09) and D-DI conditions (t=-2.52, p<0.05). The relationship between relative donation amounts and task earnings is significant and negative in these two conditions (Figure 4.A). In contrast, the income-giving relationship was insignificantly different from zero in the D-NI condition (t=-1.01, p=0.33) and in all the easy task conditions (t=.39, p=0.70). The level of task earnings had no effect on the percentage participants decided to donate in the experiment without the ranking information (Figure 4.B) or after earning their income in the easy task (Figure 4.C).[60]

Figure 4. Donations as Proportions of Task Earnings

A. Difficult Task (RI & DI)[61]

B. Difficult Task (NI)

C. Easy Task (NI, RI & DI)

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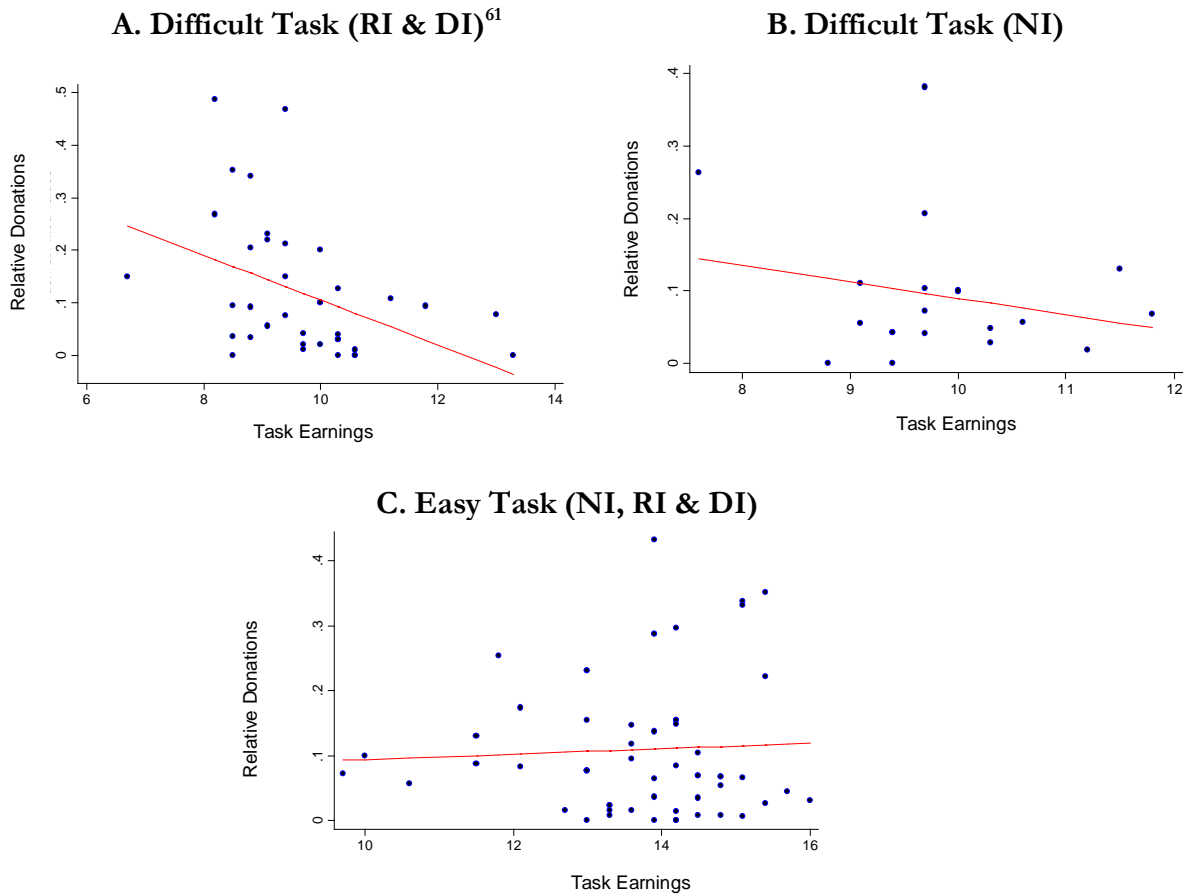
[60] The proportion of non-donors was relatively small and equally distributed across conditions (9.4% of participants did not donate in the experiment). The OLS regression analyses results as such are not biased and are presented here. As a robustness check, the results of the Heckman Two-Stage regression analyses did not significantly differ. There were also no non-linearities in the regression model (β_2 coefficient was insignificant): Relative Donation$_i$ = α + β_1*Earnings$_i$ + β_2*Earnings$_i^2$ + ε_i

[61] Data from D-RI and D-DI are aggregated as the magnitude of the effect was not significantly different.

The results of regression analyses are reported in Table 1[62]. The relative donation amount (ratio of absolute donation amount and task earnings) is the dependent variable in Models (1)-(5) that control for different explanatory variables[63]. The negative income-giving relationship is only found in the difficult task condition with rank information present (D-RI and D-DI conditions), where each additional €1 of income on average reduced participants' donations by 4.3% (t=-2.84, p<0.01) (Table 1, Model (1)). Considering how there was no significant link between the income and relative donation amount in the D-NI condition, the rank information after a difficult task was the key variable causing this negative trend. Relating rank and not earnings to the proportion of income donated produces stronger results in terms of explained variance and causation (Table 1, Model (2)). Lower rank (placement in the treatment group) led to higher relative donations of the participants in the D-RI (t=2.38, p<0.05) and D-DI conditions (t=3.12, p<0.01). More specifically, if a participant ranked one place lower in his treatment group, he subsequently donated on average 1.2% more of his task earnings.

The same regression analyses were performed for the D-NI and all the easy task conditions and the relationship was again insignificantly different from zero (t=0.21, p=0.84; t=-0.18, p=0.85, respectively) (see also Appendix C, Table A3). Therefore, in the presence of real task effort, rank position represented a relevant piece of information for participants. When such comparative information was provided, they replicated the pattern of giving found in the field. Without the rank information, even if the earnings were gained in the difficult task, there was no significant relation, positive or negative, between the earnings and the percentage of them donated to charity. In the absence of real effort (in the easy task condition), participants' donations did not react to rank information and they all gave away approximately the same relative amount of their earnings[64].

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[62] Correlation matrix between relative donations and its determinants is given in the Appendix C (Table A2), along with the complete Table 1 for all the conditions (Appendix C, Table A3).

[63] A number of explanatory variables were included in the initial regressions analyses, but were subsequently dropped if insignificant.

[64] The findings were identical if tested with median values. After the difficult task the above-median earning participants donated significantly less of their earnings in the D-RI (t=2.54, p<.05) and D-DI condition (t=2.08, p=.05) than the below-median earning ones. No such effects were found in the D-NI or the easy task conditions.

Table 1. Relative Donation Determinants

		Relative Donation Amounts				
		(1)	(2)	(3)	(4)	(5)
Difficult Task	Task Earnings	-0.043***			-0.033**	
RI & DI Conditions		(0.015)			(0.016)	
(N=39)	Rank[1]		0.012***			0.010***
			(0.003)			(0.003)
	SVO Type			0.101**	0.080**	0.072*
				(0.039)	(0.039)	(0.037)
	Constant	0.534***	-0.004	0.054*	0.396**	-0.021
		(0.148)	(0.036)	(0.029)	(0.171)	(0.037)
	R-squared	0.179	0.277	0.181	0.281	0.362
Difficult Task	Task Earnings	-0.023			-0.030	
NI Condition		(0.023)			(0.025)	
(N=20)	Rank[1]		0.001			0.003
			(0.004)			(0.004)
	SVO Type			-0.024	-0.018	-0.018
				(0.049)	(0.048)	(0.051)
	Constant	0.318	0.085*	0.117***	0.416	0.087
		(0.223)	(0.045)	(0.035)	(0.244)	(0.060)
	R-squared	0.054	0.002	0.016	0.113	0.043

Note: Standard errors are in the parentheses.

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

[1] Higher rank number represents lower relative placement.

2. 4. 3. Supplementary Results

SVO Type and Donation Amounts. According to the choices participants made in the SVO questionnaire, they were classified as pro-social (46.2%), individualistic (35.9%) or if they made less than 6 consistent choices they could not be classified as either type (17.9%)[65]. There was a positive relation between the participants' SVO type (pro-social vs. individualistic) and the level of donations that was only set in motion when the earnings were received with rank information after performing a difficult task (Table 1, Model (3)). If classified as pro-social, participants in the D-RI and D-DI conditions were engaged in more other-regarding behaviour and donated on average 10.1% more of their task earnings (t=2.01, p=0.05). No such significance was found in the easy task condition or the D-NI condition. The SVO type alone (without rank information) or in the easy task was

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[65] The percentages correspond to those found in Van Lange et al (2007). There were no gender or field of study effects among the different types.

irrelevant for the donation decisions. The correlation between SVO type and rank or task earnings was not significant in any condition (Appendix C, Table A2)[66].

Combining the effects of task income, ranks and SVO types on the amount of relative donations, we can see that participants, that earned €1 less in the D-RI and D-DI conditions, have later on donated 3.3% more of their income (t=-2.02, p=0.05) (Table 1, Model (4)). In addition, those classified as pro-social have then donated in total 11.3% more (t=2.06, p<0.05). More importantly, participants donated on average 1% more for each decrease in their rank (t=2.87, p<0.01), and if pro-social, this additionally increased their relative donations by 7.2% (t=1.97, p=0.06) (Table 1, Model (5)). In the D-NI and the easy task conditions these variables had no explanatory power for the relative donation amounts and such models were insignificant (Appendix C, Table A3).

Earnings And Rank Expectations. Participants gave the estimates of their absolute (all conditions) and relative performance (RI and DI conditions) in both tasks before receiving the results. Interestingly, while the estimate of the number of questions correct was irrelevant for the subsequent donation decision, the estimate of the expected rank was not. In the difficult task, participants that expected to be relatively bad (had lower expected rank) were also more generous in terms of relative donations (t=2.57, p<0.01)[67]. No such significance was found within the easy task.

Overconfidence Measures. As in the overconfidence literature, participants differed in their assessments of relative and absolute task performance conditional on the level of task difficulty (Grieco & Hogarth, 2009; Moore & Healy, 2008). After performing an easy task, they were underconfident when it came to guessing the number of questions solved correctly (t=1.86, p<0.05)[68]. However, they were overconfident about their expected rank (t=2.83, p<0.01) though this standing did not depend on the task difficulty but on the performance of other participants in the treatment group (Appendix C, Table A4). On the other hand, after a difficult task, participants had good judgement about their relative

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[66] In Erkal et al (2011) selfish participants self-selected to the group of high earners when they were informed that the second stage will involve giving. Here the participants were unaware of the stages following the task and the pro-social and selfish participants performed equally well in the task.

[67] The participants' expectations on the number of questions correct and their rank in the treatment group were aggregated within conditions as there were not significantly different across conditions. Up to that point, all participants in easy or difficult task did the same tasks and were not aware of the experimental stages ahead of them.

[68] Observations were normally distributed and the differences were tested with one-sided t-test assuming the directions found in previous studies.

standing (t=-0.65, p=0.26), but were overconfident about their absolute performance (t=-1.72, p<0.05). There were no significant relationships between relative donation amounts and overconfidence levels (regarding absolute performance or relative standing) in any condition[69].

2. 4. 4. Discussion of the Results

Why would rank position or having the rank information determine the percentage of income participants donate to charity? And only after earning this income in a difficult task? This generosity of the "hard-working experimentally poor" that replicated the behavioural pattern of the philanthropic poor in the empirical studies can be discussed in the light of the studies reviewed earlier.

In the difficult task participants invest considerable effort in earning their endowment and they assign stronger property rights to their relative placement in the group. Their donation decisions are reflections of principles in theories of equity and distributive justice where rewards should be proportional to the individual's investment in the task (Burrus & Mattern, 2008; Cherry et al., 2002; Hoffman & Spitzer, 1985; Ruffle, 1998). The participants that performed the task with more success might feel they deserved their better position and to keep more of the endowment earned. On the other hand, equality can emerge as a distribution principle when individual contributions and rewards (ranks) are judged unimportant or assigned randomly (Konow, 2003). This is also the case when individuals are behind a "veil of ignorance", unaware of their social status, effort or performance levels. These circumstances resemble those in the easy task condition where effort level is minor and ranks basically irrelevant, but as well as those in the NI conditions where participants are unaware of their relative performances and rank positions. Participants gave away equal shares of their earnings in those conditions.

Information on the ranks and task performance was the only salient information given in the experiment and so the only dimensions on which participants could compare themselves with one another. This possibly directed their attention towards maximising exactly these dimensions and finishing first (Garcia et al., 2007). Competitive behaviour is

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[69] The only exception was the D-NI condition where participants that solved more questions correctly than expected donated less in the next stage.

the strongest at the top and when topped with performance visibility as in D-DI it can lower generosity and willingness to cooperate (Dufwenberg & Muren, 2006; Duffy & Kornienko, 2010; Solnick & Hemenway, 2005). With the payoff distribution at hand, three highest-earning participants in D-DI donated zero amounts and so preserved their very visible dominant relative standing. Commensurability of comparison dimension and closeness of the comparison counterpart can enhance the intensity of the social comparison processes. As income is a strong positional good, such competitive concerns can distract from maximising donations, an invisible dimension.

Alternatively, low-performing participants might have attempted to restore their utility level by donating more money as helping increases happiness levels (Konow & Earley, 2002)[70]. This way they would be doing a good thing after performing badly and getting a negative utility shock from observing the low-rank feedback.

Belief Elicitations. The participants' responses to the questionnaire at the end of the experiment offer further insights into the motivations and beliefs behind their donation decisions. Participants needed to give their view on whether one earning more (less) than they did should donate more (less) in the experiment or not. According to the Spearman rank correlation coefficients these two opinions were dependent ($\rho=0.78$, $p<0.01$) and most participants had a symmetric view on this. If they thought the one earning more should also donate more, they were more likely to think that if someone earned less, one should donate less as well (91.5% of participants). However, the opinions depended on their level of earnings. Logit regressions depicting the effect of earnings on such opinions show that with increasing earnings, the participants were more likely to think that all should give approximately the same, i.e. irrespective of their earnings ($z=2.17$, $p<0.05$). In contrast, with decreasing earnings, they were more likely to say that if somebody earned more (less) than you did, she should also donate more (less). So their fairness considerations were partial to their relative performance as the "right thing to do" with donations was not clear. Across conditions participants showed strong signs of self-serving bias, rewriting what is fair or right to benefit their own interests (Babcock & Loewenstein, 1997; Dahl & Ransom, 1999; Rode & Le Menestrel, 2011; Offerman, 2002). For high earners it was keeping the rank position and for low earners giving money away and doing

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[70] This would not be in accordance with the standard economic theory where donations only decrease utility levels or have no utility-augmenting effect as they decrease the donor's income.

a "good thing". Hence high earners preferred no redistribution of income, while the low earners were inclined to equality in income distribution, catering to their self interest (Rutström & Williams, 2000).

The participants also revealed signs of conditional cooperation (Frey & Meier, 2004; Sugden, 1984). Social comparison processes underpin the conditional cooperation theory that suggests that a person's willingness to cooperate depends on her expectations of how many others from her reference group will also cooperate. Expectations have a crucial role here and individuals typically aim to correlate their own behaviour with the behaviour of others (Shang & Croson, 2006). If the participants donated in the experiment themselves, they tended towards a higher estimate of how many participants in the group donated ($p<.05$, but insignificant in D-RI, E-RI and E-DI). Moreover, the average donation they predicted was given in their group was positively related to their level of relative donations. The more you donated yourself the more you estimated others have given on average ($p<0.01$ in all conditions except $p<0.1$ in D-DI and $p=0.41$ in E-DI). Yet in line with self interest, the average donation estimate of participants was significantly higher than their absolute donations ($p<0.05$ except in D-RI and E-RI). This discrepancy is in opposition to the "Holier than thou" belief where people usually (wrongly) gauge themselves as more honest or generous than the average other (Epley & Dunning, 2000; Kogut & Beyth-Marom, 2008). However, it is in line with public good game contributions where participants undercut their contributions compared to the average. The empirical findings of Wiepking and Heijnen (2010) show a similar pattern. People in their field study believed others to donate a higher amount from the one they thought it was appropriate to give themselves[71].

2. 5. CONCLUDING REMARKS

The current pattern of giving in society presents a puzzle. The predictions of the economic models diverge from the behaviour observed in empirical studies. From an economic point of view, the better-off should be donating relatively more as it is less costly for them to do so. Moreover, if positive utility is received by donating, then presumably the rich can also

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[71] Of the demographic variables only gender had influence on the relative donations level. After a difficult task, females donated a higher share of their task earnings ($t=2.04$, $p<.05$). There were no gender differences in an easy task. On aggregate, participants that have donated or volunteered before donated more now ($t=2.12$, $p<.05$; $t=2.73$, $p<.01$; respectively) (Smith et al., 1995; Wiepking, 2007).

get far more utility by donating than the poor. But the lowest income category takes first place in being the most generous. As the relation between charitable giving and income continues to be under debate, this study provides an alternative explanation to the source of this puzzle. The reasons for its occurrence are stripped down to basic concepts of social comparisons and ranking information. By manipulating the fact whether the participants are aware of their relative placement in an experimental task and the level of task difficulty, I successfully replicated the downward income-giving finding in an experimental setting that most resembles the real-money earning conditions. Only the participants aware of their rank (and the income distribution) achieved after a difficult (real-effort) task donated smaller shares of their earnings as those earnings grew. Moreover, with the earnings distribution at hand, highest-earning participants ceased to donate completely. Without the ranking information or in the easy task condition, there was no relationship between income and giving as percentage of that income. Pro-social tendencies of participants (according to the social value orientation questionnaire) were only activated in the presence of ranks. Then the more pro-social contributed relatively higher amounts to charity.

By uncovering the relevance of ranks on the donation behaviour, this study puts forth several features that should not be neglected in future studies of such behaviour, especially ones examining the relationship between income and giving[72]. Ranks, though neglected so far, matter for charitable giving. To test for this hypothesis, the experimental approach had several advantages. Firstly, it is impossible to create a separate world without ranks and test for the importance of rank information in the field. We cannot deprive people of such information that they naturally acquire from living in their environment. All of us know where we stand income-wise in our communities. As the downward giving trend was ascertained in the field studies, it was imperative to approximate real-money earning conditions in the laboratory. In the field incomes are mostly earned and not received as endowments. External validity was hence improved by determining the endowments of participants in a real-effort task since the source of endowments matters for other-regarding behaviour[73]. As control, half of the participants participated in the easy task (quasi-endowment) condition. Giving was also directed towards an actual charitable

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[72] Standard models in economics that assume selfish behaviour and consequently free-riding behaviour regard social comparison information as irrelevant and not affecting subsequent actions of participants.
[73] Additionally, to rank the participants according to their relative performance in the task, it was necessary to have variance in the number of questions solved correctly. Though this was not difficult to achieve in the difficult task, I added time pressure as well in both tasks.

organisation instead of towards other participants in the experiment thus excluding concerns for reciprocity and different strategic implications.

Secondly, the reference group was defined a priori as the group of participants in the respective condition and was given the rank information directly. We do not need to assume they know what the others are earning or what their ranking is. And we can consider a reference group was actually formed in the laboratory, as individuals usually take the group that is most proximate, salient and sufficiently similar to compare themselves with (Konow, 2003). Moreover, social comparisons emerge during experiments as effortless and unintentional responses to other participants' performances (Gilbert et al., 1995). Thus it is reasonable to assume that the experimental participants formed an endogenous reference group when comparative income information was provided to them. Even without this assumption, the differences in their subsequent donation behaviour hold and are significantly different.

Thirdly, participants made decisions that are costly. As such, experiments do not have the concern of self reports on philanthropic behaviour that are potentially inaccurate. Finally, the experimental approach provides the greatest control in gauging causal relationships that are in this case confounded and impossible to control for in the field, and an environment to collect data on individual performances, expectations and donations. What is more, prior research has demonstrated field pro-social behaviour to be measurable rather precisely in the laboratory setting (Benz and Meier, 2006).

As the behaviour of individuals seems to be highly context-dependent, future research should explore further the different conditions that benefit or extract pro-social behaviour in the field or experimental settings. Potential extensions of the experiment could attempt to disentangle the effects of effort and earnings, making ranking order independent of task performance. By assigning rank independently after a real-effort task, we can determine if only the rank position or also the "deservingness" of this position is responsible for the negative income-giving relationship. On the other hand, paying the participants in cash before making the donation decision, instead of them just seeing the earnings on the screen, might reinforce this pattern even further (Reinstein & Riener, 2011). Participants could also be asked to make the donation decision before seeing their earnings (but knowing the earnings interval) or donating in percentages and not in absolute amounts to

see whether they in fact assign decreasing shares of their earnings purposely with the increase in their earnings.

Participants' considerations for other-regarding behaviour would potentially be altered with the change in the earnings calculation and inequality in the income distribution. By calculating the earnings in a reverse order, i.e. subtracting money for each incorrect answer (top-down) instead of adding for each correct answer (bottom-up), they would anchor their earnings expectations differently and could be more risk averse to "losing" additional money to charity. Thus far, experimental studies have not captured the effects of social comparisons and diverse income distributions on charitable giving. Changing the income distribution, we would affect the level of effort necessary to reach the highest payoffs and increase the inequality of participants' task earnings. It would be interesting to observe whether less inequality actually entails more generosity. Moreover, would redistributions of income to poorer individuals that are found more altruistic increase the level of public goods, welfare and donations available (Andreoni, 1990)? Knowing how prone we are to self interest and the self-serving bias, would we still be unequal but more equally generous if our incomes move closer?

As competitive behaviour is one of the economically most relevant manifestations of social comparison processes, the competitive frame could be moved toward donations by publicising not only earnings, but the donation amounts as well. This way, both variables would be salient and participants could compete on both dimensions (Duffy & Kornienko, 2010). Would they then care more about preserving their income ranking or about how their donations rank to others'? Regarding anonymity, larger groups bring along higher anonymity of individual contributions. Thus, in the small four-participant groups in Erkal et al. (2011) when participants were unaware of the following donation stage, they gave away similar amounts to other participants in the group. The small groups might not have given as strong competitive push and consequent sense of accomplishment for being among the top players as in a larger group in this experiment.

There are likely multiple explanations for the observed downward or U pattern in giving and why poor donate relatively more. This study points to one and calls for further research, experimental and field, on the rest. Rank matters, yes, but it also has multiple layers. It is not only a product of success on a single task. In future philanthropic research it will be essential to account for all the factors underlying the observed giving behaviour to

be able to encourage people to give more and suggest ways to improve the efficiency of fundraisers' efforts.

Unequally distributed generosity only aggravates the growing inequality in our society today. Hence motivating individuals and households to give at least equal shares of their incomes would be a helpful start. As seen here and previously, people are prone to social comparisons that are predominantly directed upwards. But people are also competitive in nature and respond to competitive frames. So far most rank lists evolve around yearly salaries, bonuses and total wealth. "The value of a dollar is social." Thus, if we made the ranks about something else, for instance, amounts individuals donated, this could precipitate a move in the right direction. It might make us less concerned about "keeping up with the Joneses" and more about "reaching out to the Smiths".

2. 6. APPENDIX

A. EXPERIMENTAL INSTRUCTIONS (translation from Spanish)

Thank you for participating in this experiment on individual decision making! The experiment is part of a research project and it will consist of 3 stages. At the beginning of each stage, we will give you the instructions on what you will need to do, the relevant information that you can use and how your decisions can affect your earnings.

Your task will be explained in detail, so please read these instructions carefully. During the experiment you are not allowed to communicate with other participants. For any questions, please raise your hand and the experimenter will come and answer them. Thank you very much! You are allowed to use paper and pencil and take notes. You cannot use a calculator.

Your earnings will depend on your decisions and the decisions of the other participants. By participating in this experiment you have already earned 4 Euros.

FIRST STAGE

Here we will give you 40 questions to answer. They are multiple-choice questions and you need to choose either answer A, B, C or D.

There are two blocks of questions, one numerical and one verbal block. Each block consists of 20 questions. For the first 15 questions of each block you will be given 30 seconds to answer. For the last 5 questions you will have 60 seconds to answer. Therefore, for questions 1-15 and 21-35 you will have 30 seconds per question to answer and for questions 16-20 and 36-40 you will have 60 seconds per question.

You will receive each question on a separate screen. After you have selected your answer, proceed to the next question by clicking OK. You are allowed to take notes. The remaining time you have will be shown on the timer in the upper right corner of the screen. The maximum total time spent is hence 25 minutes.

Use the time wisely, read the questions carefully and concentrate! Work efficiently as with every correct answer you can earn 0.30 Euros. Your earnings in this stage will be calculated in the following way:

Earnings from stage 1 = € 4 + 0.3 * Number of correct answers

Thus, the maximum you can earn in this stage is € 16 (all 40 questions correct) and the minimum is € 4 (all questions wrong).

If you have any questions, the experimenter will address them individually. **Good luck!**

SECOND STAGE

LeeX (Laboratori d'Economia Experimental) is currently participating in a UNICEF fundraising campaign.

UNICEF (acronym for United Nations International Children's Emergency Fund ó Fondo Internacional de Emergencia de las Naciones Unidas para la Infancia) is a permanent part of the United Nations System in charge of promoting the health and well-being of children and protecting their rights.

It was created by the United Nations General Assembly in 1946, to provide emergency food and healthcare to children in Europe that had been devastated by World War II. Since then the protection of all children regardless of their race, belief, nationality or religion has become its universal mission that now has over 50 years of tradition.

UNICEF provides long-term humanitarian and developmental assistance primarily in areas of extreme poverty, in Africa and in other countries all over the world. UNICEF is currently focused on five main priorities:

1. Child Survival and Development

2. Basic Education and Gender Equality (including girls' education)

3. HIV/AIDS and children

4. Child protection from violence, exploitation, and abuse

5. Policy advocacy and partnerships for children's rights

UNICEF was awarded the Nobel Peace Prize in 1965 and the Prince of Asturias Award of Concord in 2006.

Would you be willing to join LeeX by donating some of your earnings to UNICEF?

State the amount you would like to donate in the box below. Any amount you decide to donate will be deducted from your earnings in the experiment. It will be transferred online to UNICEF at the end of the experiment and the total amount donated will be made visible to all participants.

Thank you in advance for your support!

THIRD STAGE

In the third stage you will have a short task. We will ask you to make 9 choices. You will be randomly paired with another participant ("Other") for all 9 choices. Both you and the "Other" participant will be making choices by circling either option A, B, or C. Your own choices will produce points for both yourself and the "Other" participant. Likewise, the "Other" will make the same choices in this task that will produce points for him/her and for you. Every point has value: the more points you receive, the better for you. The same is

true for the "Other": the more points s/he receives, the better for him/her. Here is an example on how this task works:

	A	B	C
You get	500	500	550
Other gets	100	500	300

In this example, if you choose A, you will receive 500 points and the "Other" will receive 100 points; if you chose B, you will receive 500 points and the "Other" 500; and if you chose C, you will receive 550 points and the "Other" 300. So, your choice influences both the number of points you receive and the number of points the "Other" receives. The points have the following conversion rate:

500 points = € 1   →   1 point = € 0.002 (0.2 cents)

Before you begin, please keep in mind that <u>there is no right or wrong answer</u> – <u>choose the option that you prefer most</u>. As said before, you will make 9 choices. However, <u>after you both have made all the choices only 1 of these choices will be chosen randomly and realised</u>.

What will also be <u>randomly chosen is whether you will have the decision power in this choice or not</u>. You can be selected to be either in the role of "You" (having the decision power) or the "Other" (not having the decision power). In case you are chosen to have the decision power in this particular choice, your decision will be realised. If the "Other" is given the decision power, his/her decision will be realised.

For example, assume the choice above was the one selected from 9 choices. In this choice you decided for option C and the "Other" chose A. If you are drawn to have the decision power, you will get 550 points. The "Other" will get 300. In case the "Other" is given the decision power, you will receive 100 points and the "Other" 500.

To test your understanding of the task, we will give you now one more example on the screen. Please answer the questions below.

	A	B	C
You get	460	560	460
Other gets	460	320	120

Assume this choice was selected randomly and realised. Here you preferred option A and your "Other" preferred B.

If you were given the power to decide, how many points would you receive?   _____

How many points would the "Other" receive?   _____

If the "Other" was to decide, how many points would you receive?   _____

How many points would the "Other" receive?   _____

If you have any questions, the experimenter will address them individually.

The amount that you receive in this stage will be added to your current experimental earnings. Your final payoff is hence calculated as follows:

Final Payoff = Earnings from stage 1 – Donation amount + Earnings from stage 3

B. EXAMPLES OF EASY AND DIFFICULT TASKS

Difficult task -- numerical

$9\ 7/8 - 3\ 1/2 = ?$ **A**   **B**   **C**   **D**

6 3/8   6 2/3   7 3/8   5 3/8

Difficult task -- verbal

If Judy comes to the party, then Sally leaves the party. If Sally leaves, then either Christine or Clara asks Philip to dance. If Philip is asked to dance by either Christine or Clara, and Sally leaves the party, Philip accepts. If Philip is asked to dance by either Christine or Clara, and Sally does not leave the party, Philip does not accept.

If Sally does not leave the party, which of the following statements can be logically deduced from the information above?

    A Christine asks Philip to dance.
    B Clara asks Philip to dance.
    C **Judy does not come to the party.**
    D Philip dances with either Christine or Clara.

Easy task -- numerical

$1/4\ + ? = 3/4$ **A**   **B**   **C**   **D**

1/3   1/5   **1/2**   1/4

Easy task -- verbal

How many times does the letter A appear in the text below?

If Judy comes to the party, then Sally leaves the party. If Sally leaves, then either Christine or Clara asks Philip to dance. If Philip is asked to dance by either Christine or Clara, and Sally leaves the party, Philip accepts. If Philip is asked to dance by either Christine or Clara, and Sally does not leave the party, Philip does not accept. If Sally does not leave the party, then Judy does not come to the party.

     A   **B**   **C**   **D**

28   25   **32**   30

C. TABLES AND FIGURES

Table A1. Descriptive statistics for task performance and donation decisions

	Difficult Task			Easy Task		
	NI	**RI**	**DI**	**NI**	**RI**	**DI**
Questions correct	19.5 (3.19)	19.25 (4.52)	18.95 (3.91)	32.2 (4.55)	32.5 (4.61)	32.28 (4.25)
Task earnings	9.85 (0.96)	9.78 (1.36)	9.68 (1.17)	13.66 (1.36)	13.75 (1.38)	13.68 (1.28)
Donation decision	0.9 (0.31)	0.95 (0.22)	0.79 (0.42)	0.95 (0.22)	0.95 (0.22)	0.89 (0.32)
Absolute donation	0.9 (0.88)	1.33 (1.24)	0.78 (0.90)	1.54 (1.30)	1.71 (1.78)	1.23 (1.44)
Relative donation	0.09 (0.09)	0.14 (0.14)	0.09 (0.10)	0.11 (0.09)	0.12 (0.13)	0.09 (0.10)

Table A2. Pairwise Correlation Matrix between Relative Donation Amounts and Its Determinants (correlation coefficients and p-values)

	Relative Donation	Task Earnings	Rank[1]
Task Earnings	-0.08		
	0.37		
Rank[1]	0.19**	-0.50***	
	0.04	0.00	
SVO Type	0.09	-0.02	0.11
	0.36	0.83	0.27

* p<0.1; ** p<0.05; *** p<0.01

[1] Higher rank number represents lower relative placement.

Table A3. Relative Donation Determinants

		Relative Donation Amounts				
		(1)	(2)	(3)	(4)	(5)
Difficult Task All Conditions (N=59)	Task Earnings	-0.039*** (0.012)			-0.036*** (0.013)	
	Rank[1]		0.008*** (0.002)			0.008*** (0.003)
	SVO Type			0.057* (0.031)	0.045 (0.030)	0.048* (0.029)
	Constant	0.487*** (0.122)	0.027 (0.029)	0.076*** (0.023)	0.443*** (0.137)	0.007 (0.031)
	R-squared	0.147	0.149	0.067	0.195	0.222
Difficult Task RI & DI Conditions (N=39)	Task Earnings	-0.043*** (0.015)			-0.033** (0.016)	
	Rank[1]		0.012*** (0.003)			0.010*** (0.003)
	SVO Type			0.101** (0.039)	0.080** (0.039)	0.072* (0.037)
	Constant	0.534*** (0.148)	-0.004 (0.036)	0.054* (0.029)	0.396** (0.171)	-0.021 (0.037)
	R-squared	0.179	0.277	0.181	0.281	0.362
Difficult Task NI Condition (N=20)	Task Earnings	-0.023 (0.023)			-0.030 (0.025)	
	Rank[1]		0.001 (0.004)			0.003 (0.004)
	SVO Type			-0.024 (0.049)	-0.018 (0.048)	-0.018 (0.051)
	Constant	0.318 (0.223)	0.085* (0.045)	0.117*** (0.035)	0.416 (0.244)	0.087 (0.060)
	R-squared	0.054	0.002	0.016	0.113	0.043
Easy Task All Conditions (N=58)	Task Earnings	0.004 (0.011)			0.002 (0.012)	
	Rank[1]		-0.000 (0.002)			0.000 (0.003)
	SVO Type			-0.191 (0.034)	-0.019 (0.034)	-0.020 (0.034)
	Constant	0.053 (0.146)	0.114*** (0.029)	0.126*** (0.026)	0.104 (0.168)	0.122*** (0.038)
	R-squared	0.003	0.001	0.007	0.008	0.008

Note: Standard errors are in the parentheses.

* p<0.1; ** p<0.05; *** p<0.01

[1] Higher rank number represents lower relative placement.

Table A4. Overconfidence (overestimation) across conditions

	Difficult Task		Easy Task	
	Number of Questions Correct (N=59)	Rank (N=39)[1]	Number of Questions Correct (N=58)	Rank (N=38)
Mean Performance	19.24	10.26	32.33	10.03
Mean Estimated Performance	20.58	10.87	31.19	7.53
Overconfidence[2]	-1.34	-0.61	1.14	2.5
t-statistics	-1.72	-0.65	1.86	2.83
	p<0.05	p=0.26	p<0.05	p<0.01

[1] Excludes subjects in the NI condition

[2] Positive values indicate overconfidence (overestimation) and negative underconfidence (underestimation)

Figure A1. Relative frequencies of earnings amounts – individual data across conditions

Difficult task

Easy task
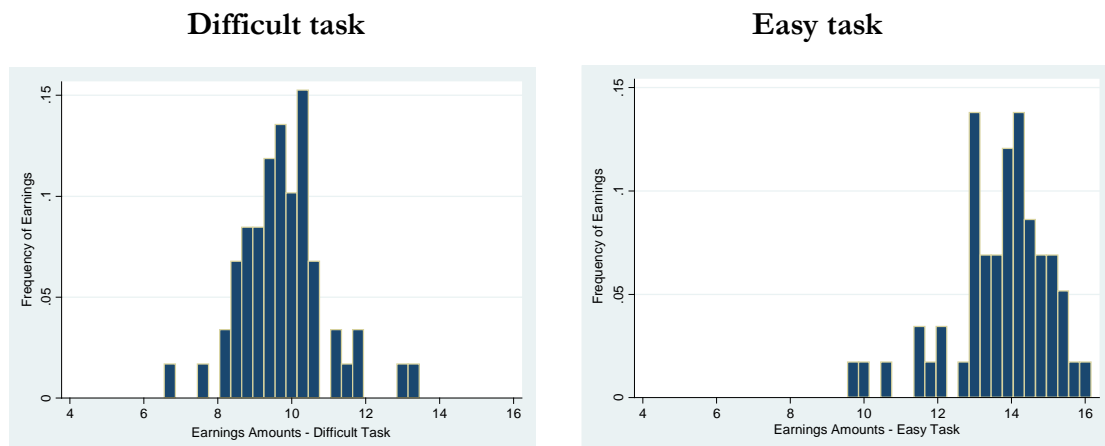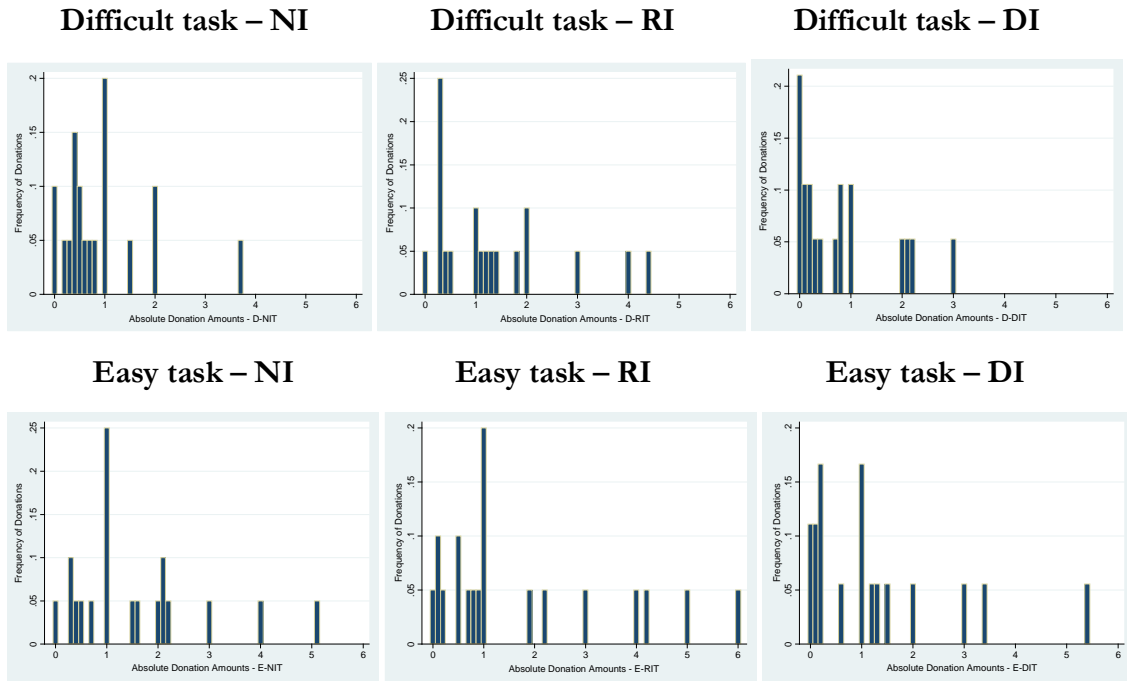
Figure A2. Relative frequencies of absolute donation amounts – individual data across conditions

Difficult task – NI

Difficult task – RI

Difficult task – DI

Easy task – NI

Easy task – RI

Easy task – DI

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Chapter 3

Making the Headlines: Evidence from a Donation Field Experiment

"There is an extraordinary amount of money available. The lack is of good ideas on how to get the basket under the apple tree."

Fund-raising consultant Tony Kneer, *The Economist*, 31 July 2004

3. 1. INTRODUCTION

When doing good, donating money to charity or participating in a Terry Fox Run, how public do people want their good deeds to be? Understanding the motivations behind the charitable acts of individuals is instrumental to elevating the number of donors and the total contributions[74]. In the attempt to uncover these motivations and increase giving, fundraisers have played with a number of incentive mechanisms and offered their benefactors from thank-you gifts, organised events, wrist bands, categorised donors' lists, and names on buildings to personalised coffee mugs. While people dislike receiving pecuniary rewards for pro-social activities, that can crowd out the intrinsic motivation

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[74] In the U.S. alone, total contributions to charitable organisations surpassed $307 billion in 2008 and giving by individuals accounted for 74.5% of this amount (Giving USA 2009 report).

inherent in the activity (Ariely et al., 2009; Gneezy & Rustichini, 2000), they do prefer their acts to be known. The level of pro-social behaviour rises as we move from private to public settings (Alpizar et al., 2003; Andreoni & Petrie, 2004; Bohnet & Frey, 1999; Harbaugh, 1998; Hoffman et al., 1996; Rege & Telle, 2004; Vesterlund, 2006). People tend to act more generously in the laboratory and in the field, when their identities are revealed and contributions made public.

This paper takes a step further from the dichotomy of the "public vs. anonymous donations?" issue and contributes to the literature on charitable giving by exploring the effect of different degrees of publicity on the donation behaviour of individuals. How public should the charity organisations make the good deeds of their benefactors to motivate them to still give more? Behaving pro-socially and donating to worthy causes in a public setting is a device for signalling goodness, wealth or status (Glazer & Konrad, 1996; Harbaugh, 1998), cooperation and adherence to social norms of the reference group (Frey & Meier, 2004; Haley & Fessler, 2005; Martin & Randal, 2005), reciprocity (Fehr & Schmidt, 2003; Sugden, 1984) or simply a way to sustain the perception of a positive self-image with others (Ariely et al., 2009). Such signals are stronger and the related image value of the pro-social activity is higher the more observers of the activity there are. People care about others seeing them as generous and cooperative and they will exert higher effort in their pro-social behaviour in front of a larger audience, even if the same amount of information on their behaviour is provided. For instance, if the name of the donor and his contribution to charity is broadcasted on the national television, he will get a higher social recognition and status than if the same information is published in the local newspapers.

On the other hand, if the means of communication remain the same, how will the donors react to an extra piece of information being communicated on their donation activity or on the history of their donation behaviour? With more information on the donors or their donations, such as the total amount of money or the number of times they have contributed, the level of publicity they gain by donating rises. If this information is relevant and related to a positive (pro-social) activity, donors will direct their efforts towards improving their performance in this dimension. If they have donated a significant amount up to that point, they will send a stronger signal of their cooperation and generosity and receive a higher public recognition and value of their image with others. However, if they were mostly free-riding on the contributions of others and seldom donated themselves,

their behaviour will be more evident to others and they might donate more to improve their public image.

Increasing the level of publicity, either by adding more visibility or more information will also have an effect on the observers, the other donors. Receiving a louder or a more complete signal of the cooperative behaviour of others, the donors will too increase the level of their contributions not to be viewed as selfish or less generous and to avoid social disapproval.

I develop two behavioural hypotheses to test for the effect of increased publicity via increased visibility and via additional information on the donation behaviour. A natural field experiment related to a fundraising campaign within a district in Zagreb, Croatia (Harrison & List, 2004), provided a serendipitous opportunity to test these hypotheses. A unique, hand-collected, longitudinal household dataset was compiled that includes individual weekly donations of 1597 households over the 1994-2000 time period[75]. During this period donations were raised to build a new neighbourhood church and all households were asked each Sunday to donate funds towards the cause. The option to contribute was given to every household in the neighbourhood regardless of their association with the organisation or their church attendance. Household donations were reported on a weekly basis. In the first condition, that lasted from June 1994 until August 1996, individual household donations collected during the previous week were announced publicly at the end of each Sunday mass (4 masses in total) as part of the parish notifications. The fundraiser, the pastor of the parish read out loud the names of all the donor households of the previous week and the amounts they had donated. This list of donors was then put on the board on the side wall within the church and it stayed posted until the following Sunday, when a new list was put up. The following, more anonymous, condition (September 1996 – August 1998), was identical except that there was no public announcement of donations. The donations received the previous week were posted on the board on the side wall and the pastor reminded the parishioners they could find the list of donors on the board. In the final condition (September 1998 – October 2000), the fundraiser again publicly announced the donations at the end of each Sunday mass as in the first condition. However, now both the individual and total donations the household had donated up to that week were publicly announced.

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[75] The identity of donors and all other identifying information in the database is kept confidential to protect their privacy.

In every condition, households had to make two decisions regarding their donations. First, they needed to decide whether to donate or not in a certain condition under specific publicity circumstances described above and in a certain week. Second, if the household decided to participate and donate, in every condition they could opt for making a public or an anonymous donation. Thus, besides the actual donation amount, they needed to decide on the publicity of their own donation.

I examine how donors in their natural setting, among people and in an environment they are familiar with, reacted to different levels of visibility and information regarding their donations. The study makes several contributions to the existing literature. The specific feature of this campaign provided an opportunity to study the phenomenon of publicity in the field and with scrutiny. Information on the household donation behaviour was provided directly by the fundraiser, on a consecutive weekly basis and by specifying the exact donation amount of each household that donated that week. The panel data covers a longer time period than any previous study of giving behaviour and provides donation data on the household level throughout the time period under observation. The same households were observed multiple times and their donation decisions recorded in the dataset, enabling control of their individual heterogeneity. There was one constant donation cause throughout the period, whose quality was well-known. Households were given regular updates during Sunday masses on the progress of the building process to underline the quality and the legitimacy of the cause. None of the factors differed during the entire duration of the campaign except for the degree of the visibility and information concerning the donation behaviour.

The results strongly support the visibility hypothesis. An increase in the visibility of donations encouraged people to give more. Announcing the donations publicly entailed a significant increase in the aggregate weekly donations and the number of donors. Publicly read lists served as a strong signal of cooperativeness of others in the community and encouraged conformity of households. The more announced and known their good deeds were the households performed them more often. On the other hand, the average donations of households did not change across the conditions. The implied social norms were strong and people agreed on the mean amount to donate ("giving standard" of Andreoni, 2001). In each condition the households had an anonymous donation option, but the vast majority preferred to make the donations publicly. Two thirds of the donors

exclusively donated in the two announcement conditions. Households also donated significantly more during the holiday weeks (Christmas, New Year's and Easter weeks).

Regarding the information hypothesis, results were mixed but some interesting patterns emerge. Announcing also the total amount donated did not raise the total weekly donations, but the composition of this total varied between the two announcement conditions. A higher percentage of households donated in the first condition, while the households donated more frequently in the last condition. Interestingly, the announcement order raised the average donations in the last condition adding a fourth dimension of publicity to the experimental setting. Household donations were listed in the announcement according to the alphabetical order of the household street name, so that the donations of households from streets placed earlier in the alphabet were announced prior to those of households living in later streets. The alphabetical order of the street names in the district was random. Controlling for other determinants of giving, households from streets placed earlier in the alphabet donated more on average. Households thus not only preferred their donations to be announced publicly and known to others, but when both current and total donations were announced and done so first, they donated more.

The paper proceeds as follows. Related literature on the effects of publicity on charitable giving are reviewed in Section 2 and hypotheses are presented. Section 3 outlines the experimental design of the field study. The main findings are reported and discussed in Section 4. Section 5 concludes.

3. 2. RELATED LITERATURE AND HYPOTHESES

Changing the setting from private to public and removing anonymity from individuals themselves or their actions has increased pro-social behaviour both in the laboratory and in the field. Previous studies have not examined the effect of different degrees of publicity on pro-social behavior, but have listed a number of motives that lead individuals to behave more pro-socially in environments of higher visibility or information content.

Laboratory participants were more generous in dictator games when they knew the family name of their counterparts (Charness & Gneezy, 2003) or when the social distance between the players was decreased by one-way identification (Bohnet and Frey, 1999; Hoffman et al., 1996). Rege and Telle (2004) and Andreoni and Petrie (2004) show that in laboratory

public good games participants also responded positively to increased visibility. They increased their contributions when they were asked to write them on the blackboard in front of other participants (Rege & Telle, 2004) and also preferred to reveal their identities and gave the highest contributions when given this choice (Andreoni & Petrie, 2004).

People are conditionally cooperative. They are more likely to contribute and contribute more when they receive information that others have contributed as well (Bardsley & Sausgruber, 2005). Announcing the donations of others publicly is a clear signal of their cooperation. Students contributed more often to a social fund at the University of Zurich when they were told that a large portion of their peers has done so (Frey & Meier, 2004). Similarly, Shang and Croson (2006) saw an increase in the donations to a fundraising telethon for a public radio station when the callers were informed that the previous caller had donated a large sum. Such conditional cooperation was also found in the natural field experiment of Martin and Randal (2005) where the social information was provided indirectly. Visitors to an art gallery changed their propensity to donate and the amount donated to the gallery based on the amount of donations (bills and coins) they saw in the donation box in the gallery foyer. In a most closely related field experiment, Soetevent (2005) alternated the use of closed collection bags and open collection baskets when collecting offerings in 30 Dutch churches. When the open baskets were used, the attendees could see the contributions of their direct neighbours and the total amount collected so far and this had a positive effect on their contributions.

Besides the feeling of warm glow (Andreoni, 1990), reputational concerns come into play when the donations are made in the actual or perceived presence of others[76]. Individuals expend greater effort performing pro-social activities in public than in private as this increases their image value with others (Ariely et al., 2009; Bereczkei et al., 2007). Self image or how the donors view themselves is assumed to be independent of the level of publicity if the donation cause remains unchanged. Visitors to a national park in Costa Rica gave higher contributions to the park if they were making the contributions in front of the solicitor than in private (Alpizar et al., 2003). Cues of being watched raised cooperation levels in paying for coffee and tea in the university coffee room by placing an image of a pair of eyes above the honesty box (Bateson et al., 2006). A similar effect was present in an experiment when dictators made their decisions while subtle cues in the shape of watching

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[76] Reputation as the prime mechanism underlying charitable giving acts more strongly when donations are solicited personally (Landry et al, 2006).

eyes were on the screen. The transfers to recipients significantly increased even under the double-blind procedure (Haley & Fessler, 2005; Rigdon et al., 2009).

Receiving social prestige is another incentive for engaging in pro-social behaviour. By means of category reporting plans that provide prestige to donors, charities additionally augment their funds compared to reporting the exact amounts they receive (Harbaugh, 1998). In a field experiment at Yale University the alumni were more likely to donate when offered recognition in a newsletter (Karlan & McConnell, 2009). They also donated more if they were separated in giving circles. The same outcome was found with blood donors in Italy (Lacetera & Macis, 2008). Awarding the donors bronze, silver and gold medals depending on the number of times they donated blood, had an effect on the donation frequency only when such results were published in the newspapers. Moreover, in all the above studies donors tended to cluster just above the cut-off points for each category.

Considering pro-social activity sends a positive signal to the public about the generosity and cooperation of a household, granting it higher reputation and prestige, households will tend to donate more in the presence of a higher number of observers. This reasoning points towards the first hypothesis on donation visibility:

> Visibility Hypothesis – The level of pro-social activity will increase with higher visibility, i.e. with more effective means of communication and more observers, ceteris paribus.

Contributions by others trigger the social comparison processes that are particularly strong in reference groups (Festinger, 1954). Contributions to the public good were greater when participants had the information on the individual contributions of each group member compared to receiving only the aggregate or no information on the group contributions (Sell & Wilson, 1991). Individuals like to be perceived as fair by others (Andreoni & Bernheim, 2009) and even more generous than others. Large donations are a means of signalling wealth in a socially acceptable way, and this requires disclosing the donations and such information publicly (Glazer & Konrad, 1996). Although anonymous donations are viewed as the most admirable, only a very small percentage of donors donate money anonymously.

Charitable organisations often try to use the position of major donors strategically. In particular, leadership giving and seed money assist in signalling credibility and quality of the charity (Andreoni, 1998, 2005), increasing contributions both empirically (List and Lucking-Reiley, 2002) and experimentally (List and Rondeau, 2003). The rest of contributors receive signals of large donations and follow with their contributions (Potters et al., 2005). In Kumru and Vesterlund (2005) participants earned a high or low status in a task played before the public good experiment. Aggregate contributions increased when high-status participants made the contributions first. The low-status participants mimicked the contributions of the high-status participants, which encouraged them to act as leaders and give more.

Receiving more relevant information on the donation behaviour of oneself and others strengthens the social comparison processes, increases transparency of behaviour and indicates confidence of others in an organisation. As a result, we will observe less free riding and more donations. The effect of information on donations is hypothesised to be the following:

Information Hypothesis – The level of pro-social activity will increase with greater amount of information on the donation behaviour of oneself and others, ceteris paribus.

Before moving on to the details of the experimental design, the specificity of the religious settings should be mentioned. In religious settings the level of pro-sociality is elevated due to augmented reputational concerns (Norenzayan et al., 2008), implicit activation of God concepts (Shariff & Norenzayan, 2007), increased need for positive self-image and social pressure to contribute due to stronger social bonds (Bekkers & Schuyt, 2005; Yinon&Sharon, 2006). When a donation opportunity arises individuals have the chance to confirm their membership in the respective group.

3. 3. METHOD

3. 3. 1. Experimental Design

The experiment was conducted in one of the neighbourhoods of Zagreb, Croatia (Figure 1). A new church needed to be built for the neighborhood community, consisting of approximately 6000 people and 1600 households. The pastor of the parish, which was founded in June 1993, started raising the money for the new church in 1994 and acted as a fundraiser. Starting from June 1994 he began the plea for donations by saying at the end of every Sunday mass: "As you know, we are raising money to build a new church for our parish. We invite you, parishioners, to respond." People could give donations either through a bank transfer or directly in cash to the priests, after any mass or during their "office hours" twice a week[77]. The new church was for the most part financed by household contributions. The remainder of the contributions came from the Dehonian priest order (to which the priests of the parish belonged), companies and donors outside of the parish[78].

Figure 1. Experimental Setting and Donation Cause (New Church in 2010)

The first Announcement (Donation Only) (ADO) condition started in June 1994 and lasted for 117 weeks until August 1996. At the end of every Sunday mass (4 masses in total) the priest would read out the list of all the households that donated the previous week by saying "The following households donated for the new church: ..." (Translation from

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[77] There were no other major causes that the parish was raising donations for during the same time period.
[78] The city of Zagreb supplied the infrastructure and gave the land for the building site for free.

Croatian). The announcements would include the full name of the donor or the family name of the household, their street name and the exact donation amount. For instance, "Family Smith, Main Street, 100 dollars". He would read the list as the last part of the weekly announcements and before the final blessing, so that people would not leave before. They needed to stay a bit longer, listen, get blessed and then leave the church. The list was then put up on the ad board situated on the side wall of the church where the mass took place. It stayed posted until the next Sunday when the new list of donors was posted. All the parishioners knew where the board was as all the important notices and information were usually posted there. Approximately 2000 people or 35% of the parish on average attended the Sunday masses. The attendance during Christmas and Easter holidays was much higher (around 80%).

In the second (Board) condition that included 106 weeks from September 1996 to August 1998 the announcements were identical, but not read in public. At the end of each Sunday mass the pastor would say that "The list of all the donors for the new church can be found on the ad board". The list of donors had always the same central position on the board as in the previous condition and read the following: "The following households donated for the new church: ...", e.g. "Family Smith, Main Street, 100 dollars".

The condition changed in September 1998 when the pastor started again publicly announcing the list of the households that donated in the previous week at the end of every Sunday mass. The additional information provided in this condition was the total amount that the household had donated for the new church up to that week (including the current donation). In this Announcement (Cumulative Donation) (ACD) condition, the announcement had the same phrasing "The following households donated for the new church: ...", but now the households were listed as "Family Smith, Main Street, 100 dollars, total of 500 dollars". The condition includes 112 weeks up to October 2000. The donation collection continued as described in the last ACD condition, but the period under observation was cut off at this point to in order to have conditions of similar time length[79].

During the entire period the plea for donations and the sentence announcing the household donations collected in the previous week did not change. The households received regular updates on the progress of the building process during the announcement

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[79] Moreover, the 1st mass was celebrated at that point in the new church. (The building of the new church started in 1997). This might bias any further observations given that the location of the fundraising campaign changed.

time at Sunday masses. This served to reduce the uncertainty and asymmetry of information and increase trust in the efficacy of organization's efforts, its transparency and accountability among the households.

3. 3. 2. Experimental Data and Measures

The confidential documents on the household donations provided by the pastor of the parish included the announcements that were read each Sunday and the church archives with all the households living in the neighborhood and their respective donations for the new church. Using these documents, I identified all the households and obtained their donation history for the dataset, all the donations they had made and whether they made these donations publicly or anonymously.

Each family listed in the archives was designated as a separate household and assigned a unique household ID, even if the families were listed on the same street number. The demographic and economic characteristics of the households in the sample are representative of the Croatian urban population. During the 1994-2000 time period the neighborhood did not grow significantly in area or in size.

Donations were collected both in the domestic currency, Croatian Kuna (HRK), and in several foreign currencies (DEM, ATS, USD, CHF, ITL, AUD and CAD)[80]. Donations in foreign currencies accounted for 44.03% of all donations (1905 out of 4327 donations). This percentage was approximately equal across conditions. They were all converted to HRK amounts using the exchange rate of the respective time period. Since the panel dataset spans a multi-year period, all donations were corrected for inflation measured by the Retail Price Index (base month of June 1994). Donations by companies and donors outside of the parish, comprised less than 0.1% of total donations, and were dropped from the analysis.

The holiday weeks are included as a (0, 1) dummy variable due to increased church attendance and charitable giving during the Christmas and Easter weeks. They include 3 weeks around Easter (1 week before Easter Sunday and 1 week after) and 4 weeks around Christmas (1 week before and after Christmas and New Year's). The street size in terms of number of households living in the street and the street number (given according to the

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[80] The average USD/HRK exchange rate was around 6.3 HRK/USD during the 1994-2000 period.

alphabetical order of the street name as listed in the church archives) were also included in the dataset. The donating households were listed in the announcements following the alphabetical order of the streets and their house numbers. There are 55 streets in the neighborhood (mean=30.56) and the street size spans from 2 households in a street to 104 households (mean=46.29).

3. 4. RESULTS

I examine the effect of different degrees of publicity on the donation behavior of households in the following way. First, the summary statistics present information on the number of donations, total and average donation amounts raised and the household participation in each of the three experimental conditions (Table 1)[81]. Using non-parametric tests, I compare these figures across conditions to test the above hypotheses and find significant differences among the total donation amounts, but not the average ones. Second, I elaborate further on how (publicly or anonymously) and when the households chose to donate. Finally, a regression model is estimated that identifies the determinants of the household donations across the different conditions.

Table 1. Summary Statistics

	All	Announcement (Donation Only)	Board	Announcement (Cumulative Donation)
Number of weeks	335	117	106	112
Total amount raised (nominal HRK)	2,491,200.0	1,012,153.7	370,905.0	1,108,141.3
Total amount raised (real HRK)[1]	2,226,808.6	985,990.5	332,224.2	908,593.9
Number of donating households	1,078	845	382	680
Percentage of donating households[2]	67.5%	52.9%	23.9%	42.6%
Number of donations	4,327	1,860	686	1,781
Total donation per donating household	2063.8	1165.5	869.7	1334.2
Average donation per donating household	514.6	530.1	484.3	510.2
Number of donations per household per condition		2.2	1.8	2.6
Minimum donation	9.9	9.9	18.5	16.0
Maximum donation	14889.8	7304.1	4659.9	14889.8

[1]Retail Price Index (base: June 1994)

[2] Total of 1597 households in the sample.

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[81] See Appendix (Figure A1) for relative frequencies of donation amounts in all three conditions.

During the 335 weeks under observation, the total nominal amount raised was 2,491,200 HRK[82]. The amount was collected from the 4327 donations given by 1078 households. Thus, 67.5% of the 1597 households in the sample have donated at least once and were classified as donors[83]. Households on average (conditional on donating) gave a total of 2063.77 HRK during the 1994-2000 period for the new church. The average donation was 514.63 HRK. Looking at the figures for total donations raised across the three conditions (Figure 2), we can already see differences that we compare in the following table (Table 2.).

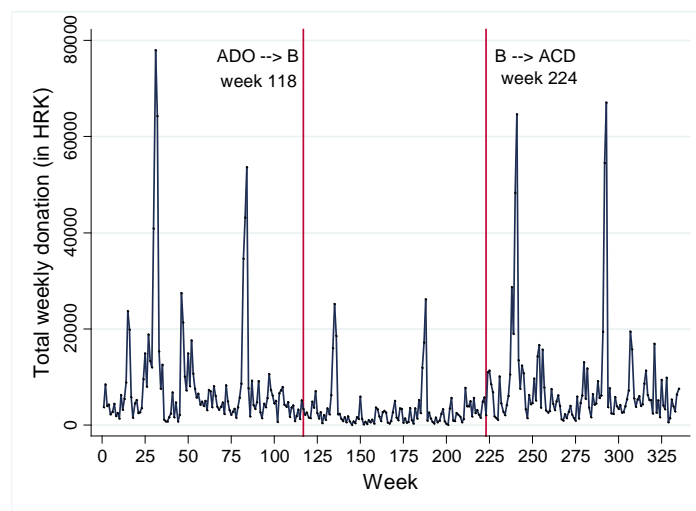**Figure 2. Total weekly donations across conditions**

Table 2. Comparison of total weekly donation amounts across conditions

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	117	8427.3	1095.6
Board (B)	106	3134.2	432.6
Announcement (Cumulative donation) (ACD)	112	8112.5	1036.8
	Difference in Means	Wilcoxon z-value	
ADO vs. B	5293.1	7.44***	
B vs. ACD	-4978.3	-7.57***	
ADO vs. ACD	314.8	-0.22	

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

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[82] This is not the final amount of all the donations raised for the new church as the collection period continued beyond October 2000.
[83] There is no tithing of income in Croatia, so households also had the option of not giving anything to the church.

The total weekly donations were significantly higher in the two announcement conditions (ADO and ACD) compared to the Board condition (Mann-Whitney rank-sum test (MWR): $p<0.001$). The amounts raised in the ADO and ACD condition did not differ significantly[84]. The spikes in the total weekly amounts that can be seen in Figure 2 are attributable to increased giving during holiday weeks around Christmas and Easter and will be analyzed in the next section. Publicly read lists at Sunday masses served as a much stronger signal of cooperation of other households in the community than the posted lists in the Board condition. The effect of social comparisons was augmented in those occasions by inducing the feelings of prestige in frequent donors. The donors also had an enhanced feeling of "warm glow" by having their names read in front of their friends and neighbors (Andreoni, 1990) or a feeling of social pressure for not contributing (Bekkers & Schuyt, 2008). The increased visibility of donations thus pushed up their level, while the additional information did not have a significant effect on the total donations.

The jump in total weekly donations is already visible in the one month window before and after the change from ADO-B conditions (week 117-118; Panel A) and B-ACD conditions (week 223-224; Panel B) (Figure 3). The total donations increased faster after the donations switched from being posted on the board to being publicly announced. Households adjusted their donation decisions more rapidly after such "good news", since they favored public conditions when donating.

Figure 3. Total weekly donations in the 4-weeks window

Panel A. ADO-B Change   **Panel B. B-ACD Change**

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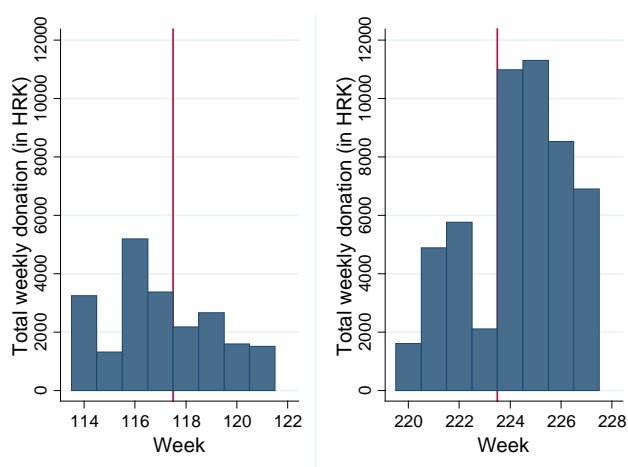
[84] The differences in the total weekly amount or subsequently in the average amounts are not due to movements in the GDP growth rates in Croatia. The rates for the 1994-2000 time period can be found in the Appendix (Table A1).

The differences observed in the total donation amounts can either stem from differences in the average donation amounts, donation frequency or the number of donating households. The average donations of households only differed between the ADO and Board conditions (Table 3). They were higher in the ADO condition compared to the Board condition (MWR: p<0.001) exclusively due to the initial impetus in the average donations during the first 6 months of the fundraising campaign. Households were significantly more generous during the first 26 weeks (Figure 4). The average donations thereafter fell and stabilized at the level of 450HRK during the year and 630HRK during the holidays giving an average of just over 500HRK for the entire 7-year period.

Table 3. Comparison of average weekly donations across conditions

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	1860	530.1	16.3
Board (B)	686	484.3	21.2
Announcement (Cumulative donation) (ACD)	1781	510.2	17.1
	Difference in Means	Wilcoxon z-value	
ADO vs. B	45.8	2.64***	
B vs. ACD	-25.9	1.14	
ADO vs. ACD	19.9	1.24	

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* p<0.1; ** p<0.05; *** p<0.01

Figure 4. Average weekly donations across conditions
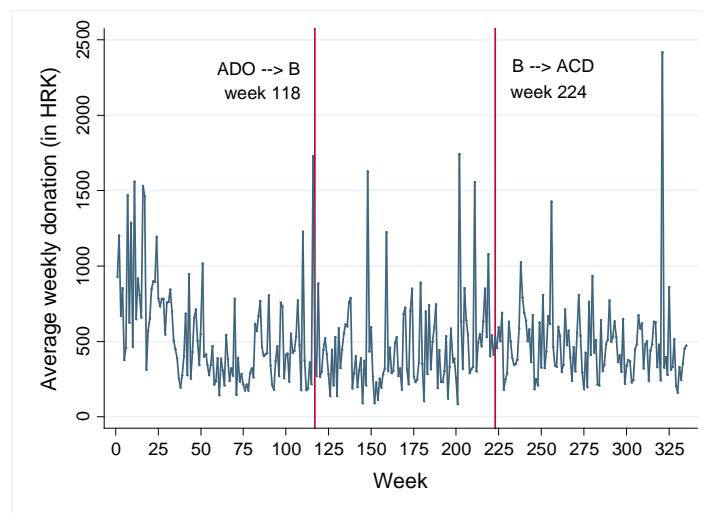
The differences in the total weekly donations between the conditions come from the increased number of donors and higher donation frequency. 845 households out of 1597 (52.9%) donated in the first ADO condition. This percentage was significantly higher than 23.9% (382 out of 1597) in the Board condition and 42.6% (680 donating households) in ACD condition (Two-sided Sign test: $p<0.001$). On the other hand, households on average donated 2.6 times during the ACD condition. This is significantly higher than the donation frequency of 2.2 times in the ADO (MWR: $p<0.05$) and 1.8 times in the Board condition (MWR: $p<0.001$). Households also made donations more frequently in the ADO condition than in the Board condition (MWR: $p<0.001$).

Though there was no significant difference between the total donations in the two announcement conditions, there was a smaller number of committed households donating in the ACD condition that donated more frequently than the larger group of households in the ADO condition. Consequently, there was also a higher number of donations collected per week in the ADO and ACD conditions (both 15.9 donations per week) compared to the Board treatment with 6.5 raised donations per week (MWR: both $p<0.001$). Higher donation visibility resulted in an increase in the number of donors and the donation frequency. With more information on donations households contributed more frequently[85]. The average donations also exhibited lower variance in the Board condition than in the ADO and ACD conditions (Two-tailed variance ratio test: $p<0.001$; ADO vs. ACD: $p=0.36$). When the donations were publicly announced households engaged in more signaling and differentiation via their donation amounts (Appendix, Figure A2).

3. 4. 1. When and How do households decide to donate?

Households could decide to donate in any particular week during the campaign and then make a public or an anonymous decision. 68.65% of households donated at least once during the holiday season, when the visibility of the donation is higher due to higher church attendance. Out of those households 60.45% donated exclusively in the holiday period. In all conditions the total donations were significantly higher during the holidays (Christmas, New Year's and Easter weeks) compared to the rest of the year (MWR tests all

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[85] The smaller number of donors in the ACD condition is possibly a product of the length of the campaign. The ADO and ACD condition are over 2 years apart and only the committed donors might continue donating. An interesting test of this effect would be to conduct the conditions in a between-subject design.

significant at p<0.001 level) (peaks in Figure 5). Accounting for the additional publicity due to higher number of people present during the holiday Sunday masses, Table A2 in the Appendix compares the total weekly donations excluding the holiday weeks and Table A3 including only holidays. The total weekly donations were again higher in the ADO and ACD conditions than in the Board condition both during the year and during the holidays (MWR: p<0.001), and there was no difference between the amounts in the ADO and ACD conditions.

**Figure 5. Total weekly donations across conditions with holidays**
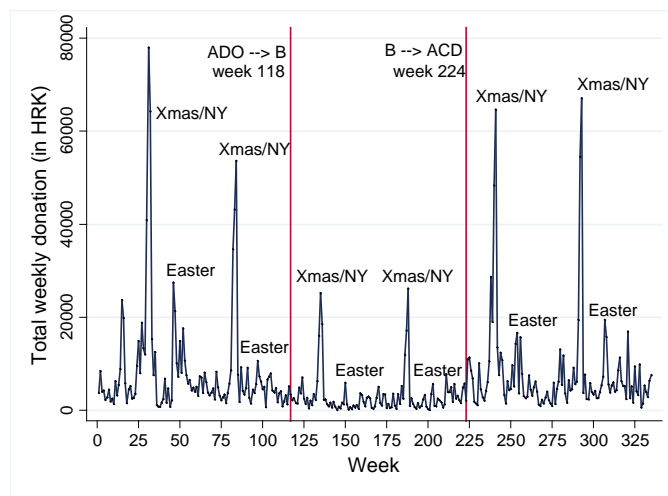
On the other hand, in all conditions the average donation was significantly higher during the holidays (Christmas, New Year's and Easter weeks) than in the rest of the year (MWR tests all significant at p<0.001 level). There was no difference in the average donations given during the holiday season (Tables A4 and A5 in the Appendix), i.e. there was no difference in the generosity of households in times of "enhanced visibility".

As stated earlier, 1078 households in the sample or 67.5% donated at some point during the experimental period, while 519 households or 32% never did (Table 1). Donors strongly preferred donating in the conditions with more publicity. Out of 846 households (79% of all donors) that started donating in the ADO condition only 27% continued to do so in the Board condition, that gave the donors much less publicity (Figure 6). Besides the committed 21% of households that contributed throughout, there are only an additional 14% of households that participated in the Board condition. After this less public condition "was over", 38% of donating households either joined (13%) or rejoined (25%)

the fundraising campaign, making up a total of 63% of donors that contributed in the ACD condition. Therefore, almost two thirds or 65% of donors exclusively donated and hence preferred to contribute only in the conditions that gave them more visibility and public exposure (ADO and ACD conditions).

Figure 6. When do households donate?
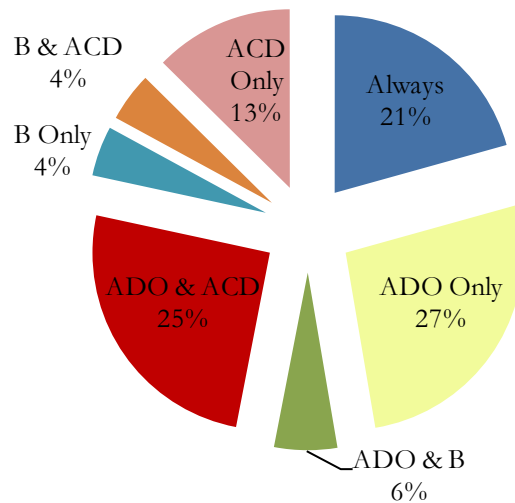
Households predominantly chose to make public donations (Figure 7). When faced with the choice whether to reveal their identity as donors, people opted for the public option in 91.24% of the cases. Only 8.76% donations (379 out of 4327) were made anonymously. This percentage was only higher in the ACD condition at 12.58% compared to 6.34% in the ADO and 5.39% in the Board condition. Significantly less households decided to donate anonymously during the holidays than during the rest of the year (3.38% vs. 7.83% in ADO; 1.93% vs. 6.89% in B; 7.77% vs. 15.13% in ACD; MWR tests all significant at p<0.01 level). If a household donated publicly in the ADO and ACD conditions, they donated more frequently and more on average than the household making an anonymous donation in the same conditions. There were no differences in the frequency or the average amount between the public and anonymous donations in the Board condition.

I group the donors in the categories of donors that always donate publicly (Public Donor), always anonymously (Anonymous Donor) or make both kinds of donations (Switching Donor). The vast majority, 978 out of 1078 donating households (90.7%), prefer to make

their donations only publicly (regardless of the condition in place) (Table 4). 97.32% of the households that started donating publicly on average continued to do so in all three conditions. On the other hand, making anonymous donations was a more difficult decision to adhere to. Only 19 households or 1.76% always donated anonymously. In the Board condition 91.67% of the households that donated anonymously stuck to the decision to always donate anonymously (15 households), while in the ADO and ACD conditions, the publicity pressure was stronger and only 61.2% (ADO, 27 households) and 69.3% (ACD, 21 household) of households managed to remain anonymous donors. The rest switched to making their donations publicly at some point during the period.

Table 4. How do households donate?

	Non Donors	Public Donors	Anonymous Donors	Switching Donors[1]
Announcement (Donation Only) (ADO)	233	775	27	43
Board (B)	696	364	15	3
Announcement (Cumulative donation) (ACD)	398	635	21	24
Overall		978	19	81

Note: Total of 1078 donating households in the sample.

[1] Switching donors made the donations both publicly and anonmymously during the respective condition

More households made their donations both publicly and anonymously in the two announcement conditions (43 and 24 "switching" households or 5.1% and 3.5%, respectively) compared to the Board condition (only 3 or 0.8% of "switching" households). When the household made a public donation in the Board condition, the family name was written on the list and displayed on the board. Such "announcement" and hence the decision is much less relevant than having the family name and the donation amount announced out loud. Most switching occurred during the first ADO condition (43 households) that can be attributed to learning. Curiously, the highest two donations (3000 and 5000 DEM) were given anonymously, both during the ACD condition. In a situation where one's donation is significantly higher than those of other donors, one might choose to donate anonymously after weighing the potential negative reactions of envy against attaining status and prestige for his/her generosity.

3. 4. 2. What factors affected how much on average the households donated?

We can estimate more precisely the determinants of the household donation decisions by performing regression analyses of the individual donation amounts given by the households in each condition on the observable household characteristics (Table 5). As the donation decisions of households can be related over time, the possible autocorrelation issue is resolved by employing the clustering method around the individual households that permits limited correlation over the household observations within clusters and hence controls for their unobservable heterogeneity[86].

The regression analyses estimate the following empirical model:

$$\text{Donation}_{i,t} = \alpha + \beta_1 * \text{Public} + \beta_2 * \text{Street No} + \beta_3 * \text{Street Size} + \beta_4 * \text{Holidays}$$

$$+ \beta_5 * \text{Currency} + \gamma_t + \phi_n + \varepsilon_{i,t} \qquad (1)$$

In the model the dependent variable *Donation* is the amount of individual donation by household *i* in time *t*, *Public* is a dummy variable equal to 1 if the donation is made publicly and 0 otherwise, *Street No* is the number of the street the household is living in (given according to the alphabetical order of the street name), *Street Size* is number of households living in the respective street, *Holidays* is a dummy variable equal to 1 if the donation is made during holiday weeks and 0 otherwise, while *Currency* is a dummy variable equal to 1 if the donation is made in domestic currency and 0 otherwise. γ_t and ϕ_n are vectors of year and family dummies and the error term is clustered at the household level allowing for autocorrelation and arbitrary heteroskedasticity. Table 5 reports the results of the regression models for the three conditions[87].

Households that decide to donate publicly in the ADO and ACD conditions donate 112.42 HRK and 180.59 HRK more on average. Their average donations are 21.2% and 35.4% higher in the ADO and ACD conditions, respectively, than the donations made

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[86] Examining the factors that affect the donation decision is beyond the scope of the paper. The focus is on the population of donors and the aim is to uncover the factors that affect the level and frequency of donations under different degrees of publicity. Therefore, the Heckman two-stage regression model is not employed.

[87] The individual donation amount as the dependent variable in the above regression analyses enters in levels. Analyses with the natural logarithm of the variable that would report the relative effects and assure the results are not affected by outliers give qualitatively similar results. A number of interaction variables were included in the initial analyses, but were subsequently dropped if insignificant. These results are available upon request.

anonymously. In the Board condition households that opt for anonymous and public donations gave the same amount on average.

Table 5. Average Donations and Household Characteristics

	Announcement (Donation Only) (1)	Board (2)	Announcement (Cumulative Donation) (3)
Public Donation (=1)	112.42**	37.80	180.59***
	(50.25)	(97.42)	(56.04)
Street Number	-0.86	1.00	-3.56*
	(1.91)	(2.44)	(1.94)
Street Size (#Households)	-19.10**	-6.04***	2.37**
	(8.85)	(1.97)	(1.12)
Holidays (=1)	47.73	111.65**	91.29***
	(34.96)	(49.78)	(31.94)
Currency (Domestic=1)	-525.23***	-347.90***	-439.22***
	(35.33)	(52.96)	(40.68)
Constant	3083.76***	1623.92***	693.30***
	(902.29)	(115.22)	(92.95)
Year Dummies	Yes	Yes	Yes
Family Dummies	Yes	Yes	Yes
Clustered Standard Errors	Yes	Yes	Yes
Number of Observations	1,853	686	1,618
R-squared	0.27	0.25	0.23

Notes: Dependent variable: individual donation amount (corrected for inflation by 1994 RPI). Pooled OLS regressions. Robust standard errors are in the parentheses and clustered around individual households.
* $p<0.1$; ** $p<0.05$; *** $p<0.01$

The results for the street number (the alphabetical order of the street the household lives in), give an interesting fourth dimension of publicity. Higher street number (going down the alphabet) entailed lower average donations in the ACD condition. Donations of households from streets with higher numbers are listed and read later on the announcement list. In contrast, donations from households in street "A" are read first and those households on average donated more than the households from "Z" street, after taking into account other variables. With each additional number the households gave on average 3.56 HRK less. The households did not care about being at the top of the list put

on a board or being announced first with only the individual donation was announced. Similarly, the factorial analysis of variance shows a significant main effect of street number in explaining the level of donations ($F_{(54, 3570)}=8.73$, $p<0.001$) and the interaction term between the street number and a dummy variable that equals 1 if the condition is ACD and 0 if it is ADO ($F_{(54, 3570)}=1.52$, $p<0.01$).

This AZ street effect relates to the paper by van Praag & van Praag (2008) where economics Professor A was found to have a faster productivity rate and more publications in her career than Professor Z due to reputation and increased visibility[88]. As the first authors listed on a paper get more attention in the academic circles, the households in street A received more attention from the audience in the church when both their current and cumulative donations were announced. These two pieces of information conveyed in essence the donation history of a household to the audience. If we split the ACD condition in half and perform the same regression analysis, the AZ effect is not significant in the first ($t=-0.29$, $p= 0.774$), but is highly significant in the second part ($t=-3.03$, $p<0.01$). The donors noticed the increased attention if they were from street A or lack thereof if from street Z and started signalling their generosity accordingly. Households from street A begin donating more on average, which consequently increased their cumulative donations as well. Households from street Z did the opposite as with less attention their less generous behaviour was less detectable by the audience. Households in street A also decided to donate publicly more often than those in street Z ($p<0.01$).

Accounting for the number of households in a street we can see that the households in smaller streets were more generous and gave 19.10 HRK and 6.04 HRK more on average in ADO and Board conditions[89]. The social costs from free riding are higher in smaller groups due to lower level of anonymity (Zaleski&Zech, 1994). The free-riding households are more easily detected in smaller streets even when only current donations are announced. In the last ACD condition the cumulative donations are announced as well. By now the free-rider problem has already been put under control in smaller streets, so the households in larger streets now start donating 2.37 HRK more on average to increase their generosity and curbing free riding behaviour. The interaction term of the change of

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[88] In Einav & Yariv (2006) faculty members with earlier surnames were significantly more likely to receive tenure at the top 10 economics departments, to become fellows of the Econometric Society, receive the Clark Medal and the Nobel Prize, after controlling for various fixed effects. The effect is due to the norm in economic profession of alphabetical ordering of credits on co-authored publications.
[89] There was no difference in the level of wealth between the smaller and larger streets in the district.

condition and street size in the analysis of variance is significant in each change ($F_{(35, 2541)}=1.69$, $p<0.01$ from ADO-B; $F_{(35, 2400)}=1.40$, $p=0.06$ from B-ACD; $F_{(37, 3570)}=1.90$, $p<0.001$ from ACD-ADO). The change of condition affects significantly the donation behaviour of households in small and large streets.

Holidays are as expected a strong predictor of average donations. The effect is only not significant in ADO due to the high average donations in the first 26 weeks. If those weeks are excluded from the regression analysis, the holidays' variable becomes significant in all conditions. Households gave 111.65 HRK and 91.29 HRK more on average during the holiday weeks in ADO and Board conditions, respectively[90].

Currency choice when making a donation is used as a proxy for the level of savings and income of households[91]. The effect of currency choice is significant in every condition. Households that donated in foreign currencies gave notably higher average donations than the ones donating in the domestic currency (HRK) regardless of the publicity of donation process. Though this difference could also be explained by the fact that the equivalent amounts in foreign currency are in general nominally of smaller value than the ones in the domestic currency (e.g. 100DM = 375 HRK), the difference observed is too large to just be explained by the "visual" factor[92].

3. 5. DISCUSSION

Donors prefer to donate publicly and more publicity motivates them to donate more. The findings shed additional light on the motivations of donors when making charitable donations and strongly underline publicity as one of the key factors in raising donations. If the underlying motives were only pure altruism or the warm glow (Andreoni, 1990), the donation behavior would remain unchanged despite the visibility and informational changes across the conditions.

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[90] The increased giving during holidays can be related to the effect of confession on altruism. People were more likely to give prior to confession and they usually confess around the holidays (Harris et al., 1975).

[91] During the 1994-2000 period households were saving predominantly in foreign currencies that were viewed as more stable than the domestic one. Moreover, household members working abroad were generally earning higher salaries and those households were then donating in foreign currencies.

[92] Average and total donations in foreign currencies were significantly higher than the ones in domestic currency across all conditions. This holds for the weeks during the year and the holiday weeks. The effect is hence not due to the members of households working abroad and visiting for holidays.

Announcing the donations entailed a significant increase in the number of donors, number of donations and the total weekly level of donations compared to only posting them. Visibility works well in raising donations. Average donations of households however did not change across the conditions. While there is not much difference on the surface between the ADO and ACD conditions and additional information does not seem to work to boost donations, the forces that make them distinct are particularly interesting. By announcing the donations publicly, such generous acts are given more attention (from a wider audience) and convey a stronger positive image of the donor (Ariely et al., 2009). Image value is gained by performing a pro-social act and with the rise in the number of observers such value grows. In the ACD condition that reveals the full donation history of a household, households not only prefer being announced, but will donate more if they make the headlines when everybody is listening. In the ADO condition their donation levels did not react to the announcement order.

On the other hand, households in smaller streets were more generous than in the larger streets in the Board and ADO conditions. This can be explained by the effect of group size on helping behavior. In larger groups there is more free riding and putting the responsibility for helping onto someone else. In these conditions only the current donations were announced or posted. However, when also the cumulative donations were announced, larger streets started donating more on average. Why? Now it was publicly announced how much each household in a specific street gave so far. The signal of what a household should do was stronger and potential for free riding in a larger group lower. Better monitoring devices via better information increased the level of helping behavior in larger groups. Without such mechanisms group members have difficulties in keeping track on how much each member contributed to the cause up to that point. In small groups, due to the small number of group members this is not an issue. Even with our bounded rationality we can recall the free riding or generous history of 5-10 of our group members or households in our small street. But if the number of households rises to 50 or a 100, processing that amount of information (on each household's donation history) becomes cumbersome. Donor households might focus more or only on the information provided at that moment. Households in larger streets with free-riding tendencies might take advantage of this situation and donate less on average. When the information on cumulative donations was given, there was no more need to gather that information, it was readily given. Checking the donation behavior of households in different conditions we might find

a threshold level of the number of households in a street after which the monitoring devices put in place supplement our own bounded capabilities for monitoring the behavior of our group members over time. Moreover, the households in smaller streets are clustered closer together while the ones in larger streets are more spread out. Is it the number of households and the amount of information on their donation history or the distance between them and the availability of information that makes the processing of such information more difficult?

The analysis could also focus on the anonymity side of the donation behavior and examine the donation levels. When making donations, some households that opt for anonymous donations reveal their street name and get read as "Anonymous donor, Main Street, XX dollars", while others do not reveal anything and do not want any information to be announced about them (just "Anonymous donor, XX dollars").

Examining the donation behavior of a non-standard subject pool without sample selection bias in a naturally occurring setting not only contributes to the existing literature on charitable giving, but also addresses the concerns regarding the external validity of findings from laboratory experiments that were raised by several scholars. As all the households in the neighborhood were included in the analysis, it provides findings on the behavior of a more representative and larger sample, especially considering that the donors to charitable organizations are typically not college students. It is critical to use contexts that are relevant for answering the research question. In order to study the influence of social exposure on donation decisions, the decisions need to have social and monetary consequences. In this setting the stakes were real, information provided to individuals was clear and they knew exactly to what they were contributing. The issue of possible communication and interactions among donors that take place in the course of their everyday life could not be controlled, but there is no reason why this interaction should be different or more intense during the different conditions.

Acquiring a better understanding of the multifaceted motivations for pro-social behaviour would endow us with an enhanced insight into the nature of human altruism as well as the knowledge of institutional design and the optimal behaviour of charities that could foster donations of time and money to public goods. This study adds to the scarce empirical field evidence on the factors influencing charitable behaviour.

The sample of households contributing to the building of a new neighbourhood church in this study may not have the same attitude towards giving as the population at large. While keeping this caveat in mind when giving policy recommendations, the positive effects of publicity on the level of donations are still indicative of the possible effect in the general population. Besides, across all charity types, religious organisations receive the highest amount of money and households are most likely to donate to them. 48% of all households donate to religious causes and 59% of all donations are given to religious organisations (Andreoni, 2001).

As donations from individuals account for the largest fraction of total donation amount (corporate donations are far smaller in the aggregate), understanding the motivations behind their charitable and benevolent acts is instrumental to increasing the number of donors and total contributions. What encourages people to give more and what deters them from giving? Publicity and the lack of publicity is one of the answers.

3. 6. APPENDIX

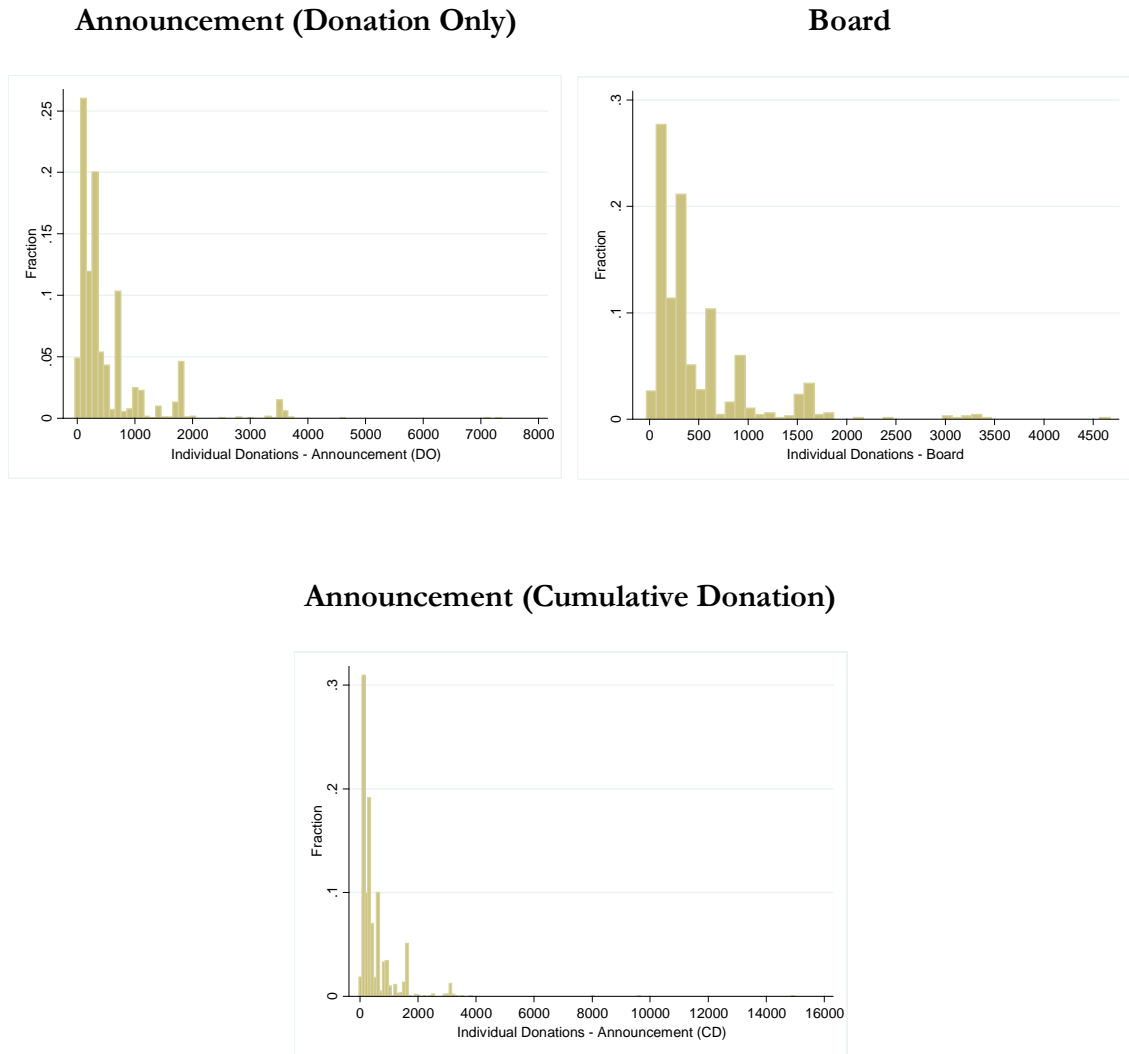**Figure A1. Relative frequencies of donation amounts across conditions**

Announcement (Donation Only)   **Board**

Announcement (Cumulative Donation)

Figure A2. Box Plot Diagrams of Total (Panel A) and Average Weekly Donations (Panel B) across Conditions

Panel A.   Panel B.
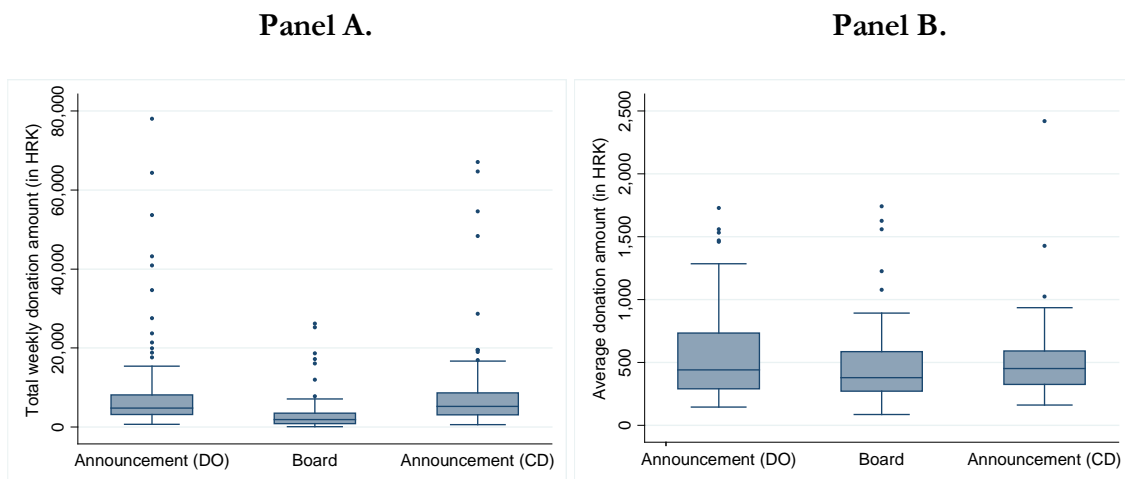
Table A1. Real GDP Growth Rates in Croatia for 1994-2000

	Real GDP Growth Rate (in %)
1994	5.90
1995	6.80
1996	5.92
1997	6.54
1998	1.98
1999	-1.04
2000	3.75

Table A2. Comparison of total weekly donations across conditions excluding holidays

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	103	5591.6	425.1
Board (B)	94	2174.1	174.3
Announcement (Cumulative donation) (ACD)	98	5342.1	350.0
		Difference in Means	Wilcoxon z-value
ADO vs. B		3417.4	7.57***
B vs. ACD		-3168.0	-7.64***
ADO vs. ACD		249.5	-0.08

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* p<0.1; ** p<0.05; *** p<0.01

Table A3. Comparison of total weekly donations across conditions including only holidays

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	14	29290.0	6406.6
Board (B)	12	10654.7	2823.5
Announcement (Cumulative donation) (ACD)	14	27504.9	5828.1
		Difference in Means	Wilcoxon z-value
ADO vs. B		18635.3	2.26**
B vs. ACD		-16850.2	-2.26**
ADO vs. ACD		1785.1	0.05

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* p<0.1; ** p<0.05; *** p<0.01

Table A4. Comparison of average weekly donations across conditions excluding holidays

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	1239	464.8	18.2
Board (B)	479	426.7	22.3
Announcement (Cumulative donation) (ACD)	1163	450.2	20.9
	Difference in Means	Wilcoxon z-value	
ADO vs. B	38.2	2.31**	
B vs. ACD	-23.5	1.53	
ADO vs. ACD	14.7	0.83	

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* p<0.1; ** p<0.05; *** p<0.01

Table A5. Comparison of average weekly donations across conditions including only holidays

	# Observations	Mean	Standard Error
Announcement (Donation Only) (ADO)	621	660.3	32.1
Board (B)	207	617.7	46.4
Announcement (Cumulative donation) (ACD)	618	623.1	25.1
	Difference in Means	Wilcoxon z-value	
ADO vs. B	42.7	1.13	
B vs. ACD	-5.4	0.47	
ADO vs. ACD	37.2	1.25	

Note: Two-sample Wilcoxon rank-sum (Mann-Whitney) test.
* p<0.1; ** p<0.05; *** p<0.01

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