DOES SELF-SERVING GENEROSITY DIMINISH

RECIPROCAL BEHAVIOUR?

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ABSTRACT

Cox, Friedman, and Sadiraj (2008) develop a model of reciprocity, „Revealed Altruism", which posits that a „more generous than" (MGT) offer elicits a „more altruistic than" (MAT) response. A MGT ordering is defined by two conditions. Condition a) states that MGT is ordered by the maximum potential increase in income of the recipient, or that the more you stand to receive from an offer, the more generous it is to you. Condition b) states that the increase in maximum potential income of the recipient cannot be less than the maximum potential increase in income of the proposers. In other words, Condition b) states that an offer cannot be self-serving, but it is not specified in Cox, Friedman, and Sadiraj (2008) precisely how b) affects the MGT ordering. I propose that a violation of b) is considered self-serving and is less MGT than when b) is not violated. I then experimentally study the empirical relevance of b) using two designs that hold a) constant, comparing MGT differences implied by responses. The first design is a variant of the Lost Wallet Game (Dufwenberg & Gneezy, 2000) with a negative outside option, and the second design is a modified Investment Game (Berg, Dickhaut, & McCabe, 1995) with elements of the Dictator Game implemented by Andreoni and Miller (2002). I find no empirical support that b) affects the MGT ordering.

1. MOTIVATION AND INTRODUCTION

To establish the informal intuition and motivation of this research, it might be helpful to start with a simple thought experiment. Consider the following situation. You are at a restaurant in a country with a tipping culture. The waiter is being exceptionally nice to you, providing good service and showing interest in your conversations with him. However, you realise that the only reason he is doing those things is an attempt to receive a much higher tip from you. How do you then decide to reward his actions, in the form of your tip? Do you tip him well, in excess of what you normally tip, because you had a very pleasant experience? Or do you tip him normally, as while he contributed to your experience, he was only doing so for his own benefit? Do you care about the motivations behind his action, which while being beneficial to you, was potentially much more beneficial to him? Or do you make your tipping decision only based on what his action meant for your dining experience? It is these sorts of behavioural tendencies that I seek to explore.[1]

The thought experiment above is an example of reciprocity, the idea that if someone does something good for you, you feel more inclined to do something good back. Reciprocity is an important economic phenomenon, as it can help to explain observed behaviour in many situations, such as wage determination, trade and decision-making. It is therefore important that we understand every facet of reciprocity, in order to provide accurate advice when questions about the aforementioned situations occur.

Most generous acts have some element in their motivations that could be considered self-serving. For example, consider the action of giving money to charity. Is such an action generous? I believe that most people would consider giving money to charity to be generous. However, what if the person in question enjoyed giving money to charity? What if the charity aligned closely to their political, religious or social beliefs? What if the person in question received public recognition for their donation, be it small, for example, being mentioned in the newspaper, or large, like having a building

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[1] An interesting psychological field experiment by Tidd and Lockard (1978) showed that waitresses that smiled received more in tips than those that did not. However, intentions are not clear in such a situation, were waitresses smiling for higher tips or just because they were happy?

named after them? Would you still consider their action to be generous, or would you question whether their generosity was self-serving? If I assume that people are economically rational, that they will not perform an action unless the benefits (both pecuniary and not) to them exceed the costs, then all generous actions are self-serving. Therefore, I believe that self-serving generosity and the response it receives is an interesting and important topic to investigate.

Cox, Friedman, and Sadiraj (2008) propose a model of reciprocity in their paper „Revealed Altruism". They posit that an offer that is more generous than another is met with a more altruistic response. They define an offer from „you" being „more generous than" (MGT) another to „me" if it meets two conditions. The first condition (hereafter Condition a)) is that the offer increases „my" potential income by more than the other offer. Condition a) is rather straightforward, if „I" am getting more money, the offer is more generous to „me". The second condition (hereafter Condition b)) is that the offer cannot increase „your" potential income by more than it increases „mine". In other words, the offer cannot be self-serving, and it is this condition and its implications that this research is focused on.

Condition a) is intuitive, and is backed up by a wealth of experimental evidence, some of which is covered in Cox et al."s (2008) paper. It is Condition b) that is less straightforward, and relates back to the questions raised in the initial thought experiment. If you only care about what an offer means to you, then it is only Condition a) that is relevant, and Condition b) can be ignored entirely. If you care about potential self-serving motivations behind the offer, then both Conditions a) and b) are relevant. Cox et al. (2008) do not elaborate in detail on Condition b) and disregard it for most of their analysis. The empirical relevance of Condition b) needs to be tested in order to determine its contribution to the Revealed Altruism model, and will be the main focus of my research.

As stated before, Cox et al. (2008) posit that an offer that is MGT another is met with a more altruistic response. Therefore, the response to an offer can determine whether said offer is MGT another. Cox et al. (2008) define a response being „more altruistic than" (MAT) another if „my" willingness to pay to reward „you" is greater. That is, „I" am more willing to reduce my earnings (to pay) to reward „you", if „your" offer is more generous to „me". So, offers can be compared where the MGT ordering is not

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clear by observing the responses to those offers, provided the described MGT to MAT relationship exists. If one offer elicits a MAT response, it can be concluded that that offer is MGT the other, and such a result can offer illumination as to what the MGT ordering is.

If an offer is of equal generosity as another according to Condition a), but differs according to Condition b), how would two such offers be ordered according to MGT? I define an offer that satisfies b) as „selfless", as the proposer does not stand to gain as much as the recipient from the offer, meaning the generous intention of the proposer is clearly revealed. Similarly, I define an offer that violates b) as „self-serving", in that the proposer stands to gain more than the recipient, meaning that the proposer's generous intentions are not clearly revealed. I posit that, holding Condition a) is constant, a selfless offer is MGT a self-serving offer. However, as suggested by the informal restaurant motivation, this may be a strong proposition to make. Individuals may only care about Condition a), and in that case identical responses would be observed. Therefore, to answer the question of the empirical importance of Condition b), I run an experiment with a design set up in such a way that Condition a) is constant while b) differs.

The rest of this thesis proceeds as follows. In Section 2 is a review of the relevant literature, with an overview of evidence for reciprocity, Revealed Altruism, other reciprocity models, and other papers that include related ideas to self-serving generosity. Section 3 discusses my conjecture and the methodology behind the data gathering of this research. Section 4 covers the first design and experiment to test the described conjecture and Section 5 covers a design implemented as a robustness check. Finally, Section 6 contains discussion on the results, what the findings mean for the theory, and potential future research.

2. LITERATURE REVIEW

2.1 Reciprocity, its existence, and its importance

Reciprocity refers to the concept of performing actions towards another in response to actions they have performed against you. A quote often featured in reviews of reciprocity is from *The Edda*, a collection of Norse Epics written down in the 13th century, to illustrate reciprocity's existence as a social norm for quite some time. The quote goes:

> *"A man ought to be a friend to his friend and repay gift with gift. People should meet smiles with smiles and lies with treachery."*

This quote illustrates both positive reciprocity, rewarding those that have helped you, and negative reciprocity, punishing those that have hurt you. There is plenty of evidence of the existence of reciprocity, both anecdotally and scientifically. Some anecdotal evidence is from the literal translation of „thank-you" from Japanese as „this will not end", implying the act will be repaid in some fashion, and from Bulgarian as „Good I'll Give" (Cialdini, 2003). The English saying "You scratch my back and I'll scratch yours" naturally refers to reciprocal relationships in which favours are exchanged.

Reciprocity has also been shown to play a large part in individual decision making processes, in both the lab and the field. A lot of the games used to study reciprocity are essentially variants of the „Prisoner's Dilemma" game, first proposed by Dresher and Flood (Flood, 1952). This game is played between two criminals suspected of committing a bank robbery, who have been placed in separate rooms for questioning.[2] The police caught the criminals in a stolen car, and can prosecute for that, but the police have no evidence that the criminals performed the bank robbery. They offer each criminal the chance to „rat" out the other for the bank robbery and in return, they will receive amnesty for the stolen car. If both criminals remain silent, then both receive a one year sentence for stealing the car. If one criminal rats on the other, then the „ratter" goes free, and the „rattee" receives a three year sentence, for both the robbery and the stolen car. If both criminals rat on each other, they both receive

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[2] However, in experiments the instructions for this game are typically neutrally framed.

a sentence of two years. The Nash Equilibrium (Nash, 1950) of the Prisoner's Dilemma is for both criminals to rat on each other regardless of what the other player does, as ratting out the other is always the most individually beneficial move. The jointly best outcome for the criminals is for both to remain silent; however, the individual incentive to rat means that this is not very likely. So how does this game relate to reciprocity? Consider the same game, except played sequentially. The subgame perfect Nash Equilbrium is for the Second Mover (SM) to always rat, and the First Mover (FM), knowing the SM will always rat, also decides to rat.[3] However, the SM may decide to remain quiet, provided the FM has remained quiet. The SM could do this in recognition that the FM remaining quiet is a beneficial move for the SM, despite the material incentive for the SM to rat. In other words, the SM can positively reciprocate the FMs kind move, depending on the relative importance the SM places on reciprocity over her own material payout.[4,5] It is in this manner that many other games with reciprocal considerations in essence reduce to a sequential Prisoner's Dilemma Game, the FM can choose to make some sort of action (kind or unkind), and the SM then decides whether to reciprocate that action by rewarding or punishing the FM.

The Public Goods Game is an example of a game with reciprocal considerations that essentially reduces to the Prisoner's Dilemma. A particular variant of the Public Goods Game, the Voluntary Contributions Mechanism (VCM), has been experimentally tested in a wide array of specifications.[6] In a VCM, subjects can choose to contribute money to a group account or to a private account. Every cent contributed to the group account earns each group member (including the contributor), some amount of money less than a cent. Amounts put in the private account are kept for that individual subject, but do not earn any additional money for the group. Contributing is socially beneficial, in that it increases total social welfare. However, an individual has the incentive to deviate from the situation where all group members contribute highly, by placing his money in the private account instead. „Free-riding" off other's contributions and investing in his own private account is a dominant strategy. This situation is similar to the Prisoner's Dilemma, except with more players and a larger strategy

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[3] This is assuming entirely self-regarding preferences.
[4] And naturally, the SM can be negatively reciprocal to a FM that chooses to rat, by choosing to rat as well.
[5] I denote the First Mover as a male, and the Second Mover as a female, for ease of explanation when using pronouns. I similarly denote a „proposer" as male, and the „responder" as female.
[6] A review of the Public Goods Game literature can be found in Ledyard (1995).

space, where „keeping quiet" is analogous to high group contributions, and „ratting" is like not contributing to the group account at all. Reciprocity is a determinant of subject behaviour in experimental tests of repeated Public Goods Games. Typically, contributions start high but diminish over rounds as „free riders" start to become apparent, leading contributors to negatively reciprocate by contributing less or none at all.[7,8] By introducing a punishment stage after each round, in which subjects could choose to assign costly punishment points to reduce other subjects payouts, Fehr and Gächter (2000a) were able to induce higher contributions. The punishment option in the VCM allowed both positive reciprocity (contributing high when others contribute high), and negative reciprocity (paying to punish those who contribute less) to impact subject behaviour, resulting in high contributions being maintained even into end periods.[9]

Berg, Dickhaut, and McCabe (1995) experimentally tested an Investment Game, which is a further example of a game with reciprocal elements that shares similarities to the Prisoner's Dilemma. The FM can choose to „invest" an amount of money from zero to ten dollars. This amount is then tripled and sent to the SM who then has the opportunity to split the tripled amount between herself and the FM. The FM investing more leads to a higher potential payout for the SM, meaning it is a MGT improving action towards the SM, who could reciprocate by returning a higher amount to the FM. Berg et al. (1995) found that approximately 40% of SMs reciprocated by returning more than what the FM invested, and this proportion increased to approximately 55% when a „social history" of different subjects past behaviour in the same experiment was provided.

Within the Investment Game, there could be other motivations for subject behaviour that are different from reciprocity. A SM could have other-regarding preferences, like altruism, meaning she would want to give money regardless, and a higher investment just gives her greater means to do so. Alternatively, she could feel guilty if she believes the FM trusted her to give at least the sent amount

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[7] See Camerer (2003) for a review of VCM results.
[8] Subjects could also be trying to appear reciprocal in early stages to induce high contributions before free-riding in latter stages, in an attempt to maximise their payout.
[9] See Chaudhuri (2011) for a survey of punishment in the Public Goods Game.

back, and subsequently does so to avoid that negative feeling.[10] Cox (2004) separates out the effects of other regarding preferences and reciprocity using a „triadic design", by comparing a standard Investment Game to a different game where the FM has no decision and his „investment" is determined by the experimenter from decisions made in a previous Investment Game. Note that in the latter game, SMs can only be motivated by altruism, as the FM had no choice in his investment decision, meaning FMs have no action for SMs to reciprocate. By comparing the results from this game to the Investment Game, where SMs could be influenced by both altruism and reciprocity, the effect of reciprocity alone can be disentangled. Any difference in SM behaviour between the games would be due to the effect of reciprocity. Cox (2004) found evidence in support of the existence of reciprocity after altruism had been removed as a factor.

Abbink, Irlenbusch, and Renner (2000) tested both positive and negative reciprocity in a variant of the Investment Game, called the Moonlighting Game. In the Moonlighting Game, both players start with twelve dollars. The FM can either take up to six dollars from the SM, or send up to six dollars to the SM. Any amount sent is tripled, and any amount taken is not transformed in any way. The SM can then choose to send money back to the FM, or to spend money to reduce the FM's earnings, in such a manner that neither player can earn a negative amount. Abbink et al. (2000) found strong evidence for negative reciprocity, with 83% of SMs punishing after having units taken from them, and a positive correlation found between amount taken and amount punished. They also found evidence for positive reciprocity, with 70% of SMs rewarding after receiving positive amounts.

Reciprocity also plays a role in other important economic situations, such as the employer/employee relationship. The first suggestion that reciprocity could be a factor in this relationship was by Akerlof (1982), who proposed a model in which a self-interested firm would offer a „gift" in terms of above market wages or better work conditions, which workers would then reciprocate with a higher expended effort on the job.

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[10] This is called „guilt aversion", and is described in more detail in Charness and Dufwenberg (2006) and Battigalli and Dufwenberg (2009).

Evidence supporting the previously described employee/employer relationship, and also further evidence of reciprocity in the lab, can be found in Fehr and Falk (1999), in a design called the Gift Exchange Game.[11] This game can be modelled as the relationship between an employer and potential employees. Fehr and Falk (1999) implemented a Double Auction market in which employers and employees can propose wages, followed by a stage in which the employee makes a costly effort decision. The Double Auction has a wealth of empirical evidence that it achieves a competitive outcome quickly (Smith, 1982; Plott, 1989), and the design implemented excess demand for labour, which would increase competitive pressures further. The channel by which employees could reciprocate was via their costly effort decision, if an employer offered a higher wage, they could respond with a higher exerted effort. Fehr and Falk (1999) found that 43% of employees exhibited reciprocity by increasing their effort for higher wages received. To test for negative reciprocity, Fehr and Falk (1999) also ran a treatment in which providing low effort was costly. This means that employees could punish employers for offering low wages by choosing a costlier low effort, or in other words, be negatively reciprocal. From this treatment, Fehr and Falk (1999) found evidence in support of negative reciprocity.

Experimental economics research has established that reciprocity does seem to be an important consideration for a significant proportion of individuals when making economic decisions in the lab. In a review of the literature of reciprocity, Fehr and Gächter (2000b) state that approximately 40 to 66% of subjects exhibit reciprocal choices, and that this proportion behaving reciprocally can influence outcomes in some designs and markets. Lab experiments provide the most direct tests of proposed theories. However, they are often criticised for low external validity due to the stylised laboratory environment. Field experiments can therefore add to the findings from the lab, by using more natural situations in which subjects do not know they are participating in an experiment. Therefore, I also review results from various field experiments relating to reciprocity.

Charities are known to reward donors with small gifts, or to send them out with solicitations, presumably to take advantage of people's reciprocal nature and receive more donations. Falk (2007)

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[11] For additional papers on the Gift Exchange Game see Fehr, Kirchsteiger, and Riedl (1993) and Falk, Gächter, and Kovács (1999).

worked with an existing charity in Zurich on a fundraising drive by mail to around 10,000 households. Falk (2007) found that sending out gifts with charity solicitations increased the relative frequency of donations by 17% in a „small gift" (a postcard) treatment, and 75% in a „large gift" (four postcards) treatment, compared to a baseline treatment of no gift.

Gneezy and List (2006) tested the previously described employer/employee reciprocal relationship in the field, by offering work either computerising library books or soliciting donations for a charity. Subjects were informed that they would earn a certain wage per hour, however in one treatment, once subjects arrived they were informed that the wage would be higher. This higher wage elicited a higher work output initially (the first 90 minutes in the library job, the first three hours in the fundraising job), but the effect diminished over time and there was no difference in work output between treatments in the later periods. The main difference between this field experiment an actual work environment was the one-off nature of the relationship, subjects could not be fired for example, which may explain why an difference in effort was not observable after the initial period.

Kube, Maréchal, and Puppe (2012) ran a similar field experiment, using a one-off employment opportunity of categorising library books. They found no increase in worker productivity when subjects were offered a cash gift, however, when offered a thermos of the same value or the cash gift folded in an ornate manner, productivity increased by 25% and 30% respectively. While the lack of result from the cash gift does not provide support for reciprocity, it may be that the additional cash amount offered was not enough to detect a significant difference. The non-monetary considerations added in the thermos and folding treatments could have added enough to detect an increase in productivity. There is some evidence in support of reciprocity, in that non-monetary considerations made the gift kinder, which subsequently induced higher worker productivity.

It is difficult to establish the empirical relevance of reciprocity in actual labour markets, as there are many factors that could confound results. Lab and field experiments offer ways of testing the relevance of the theory in specific circumstances. Surveys give an alternative way of investigating the relationship in its actual environment. Bewley (1995) conducted a survey of over 300 business-people, labour leaders, counsellors of the unemployed and business consultants in the North-Eastern

United States in the early 1990's. Of negative reciprocity in the labour market, he found that managers believe that „...punishment should rarely be used as a way to obtain cooperation..." because „…workers have so many opportunities to take advantage of employers…" (Bewley, 1995, p. 252). Also, employers „…resist cutting pay … largely out of fear that the shock … and the insult implied … would cause workers to lose their allegiance to the organization…" (Bewley, 1995, p. 252). All of this suggests that employers recognise the presence of negative reciprocity and seek to avoid invoking it. Of positive reciprocity, it seems „…employers want workers to operate autonomously, show initiative, … and workers who are scared or disheartened do not do these things", „Good morale implies a willingness to make personal sacrifices for the good of the organization", and „It is thought to be highly desirable that workers be happy in some broad sense" (Bewley, 1995, p. 252). This suggests that employers realise that high morale results in more efficient workers, however there does not appear to be evidence in the survey of employers offering „gifts" to increase morale, rather they seek to not damage morale.

If reciprocity is important to vital parts of people's lives, then it is crucial to have a deep understanding of it, so that appropriate advice can be given to mitigate hardships and increase well-being. This research investigates a specific aspect of reciprocity to add to the literature's understanding.

2.2 Revealed Altruism

The main framework that I use in my thesis to answer my research questions is Cox et al.'s (2008) „Revealed Altruism". In what follows, I provide an in-depth review of the Revealed Altruism theory, and the experimental evidence Cox et al. (2008) used to support their theory. Cox et al. (2008) developed a model of reciprocity consistent with neoclassical preference and demand theory. Suppose there are two players, „me", and „you".[12] Let „my" income be denoted m and „your" income be denoted y. „My" preferences over m and y are smooth, convex and strictly increasing in m.[13] Any particular

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[12] The theory is general (N players), however, the majority of designs are implemented with two players, and so I focus on the two player case.
[13] Smooth in this case means that the function must be twice continuously differentiable.

preference can be represented by a general utility function denoted $u(m,y)$, which has a positive partial derivative with respect to m, or $\frac{\partial u(m,y)}{\partial m} > 0$, meaning „my" utility is increasing in m. The partial derivative with respect to y, $\frac{\partial u(m,y)}{\partial y}$, could be zero everywhere if „I" am selfish, or could be positive or negative depending on „my" benevolence or malevolence, respectively. The marginal rate of substitution of m for y, is represented in Equation 1.

$$MRS_{my} = \frac{\frac{\partial u(m,y)}{\partial m}}{\frac{\partial u(m,y)}{\partial y}}, \qquad (1)$$

Equation 1 is undefined for selfish preferences (as $\frac{\partial u(m,y)}{\partial y} = 0$), and swings from $+\infty$ to $-\infty$ as preferences pass from slight benevolence to slight malevolence, so it is convenient to instead use willingness to pay, as presented in Equation 2.

$$WTP = \frac{1}{MRS} = \frac{\frac{\partial u(m,y)}{\partial y}}{\frac{\partial u(m,y)}{\partial m}} = w. \qquad (2)$$

The willingness to pay, w, represents the amount of m „I" am willing to give up in order to increase y by one unit. Note that w is intrinsic, i.e., it does not matter what form the utility function takes. A more altruistic than (MAT) preference ordering is defined as follows. Let A and B be two preference orderings over m and y. A is MAT B if, for a given domain D, $w_A(m, y) \geq w_B(m, y), \forall (m, y) \in D$, or in other words, „my" willingness to pay in A either exceeds or is equal to „my" willingness to pay in B, for any possible combination of m and y. This MAT ordering can be applied to existing models of distributive preferences, such as inequity aversion and quasi-maximin preferences, through the use of the general utility function.[14]

An offer from „you" creates an opportunity set, F. Let y_F^* be „your" maximum feasible income in F, and similarly let m_F^* be „my" maximum feasible income in F. An offer that creates an opportunity set G is considered MGT an offer that creates an opportunity set F if it meets the following two conditions presented in Equations 3 and 4:

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[14] Both of the mentioned types of preferences are described in detail later in this section.

a) $m_G^* - m_F^* \geq 0$ (3)

b) $m_G^* - m_F^* \geq y_G^* - y_F^*$ (4)

In other words, Condition a) states if G is MGT F, then G provides „me" with at least as much if not more potential income than F. Condition b) states the set G cannot increase „your" potential income by more than „mine", compared to F. Figure 2 graphically shows a situation of self-serving generosity, that is, an increase in „my" maximum potential income that increases „your" maximum potential income by more.

Figure 1 – Self-serving Generosity
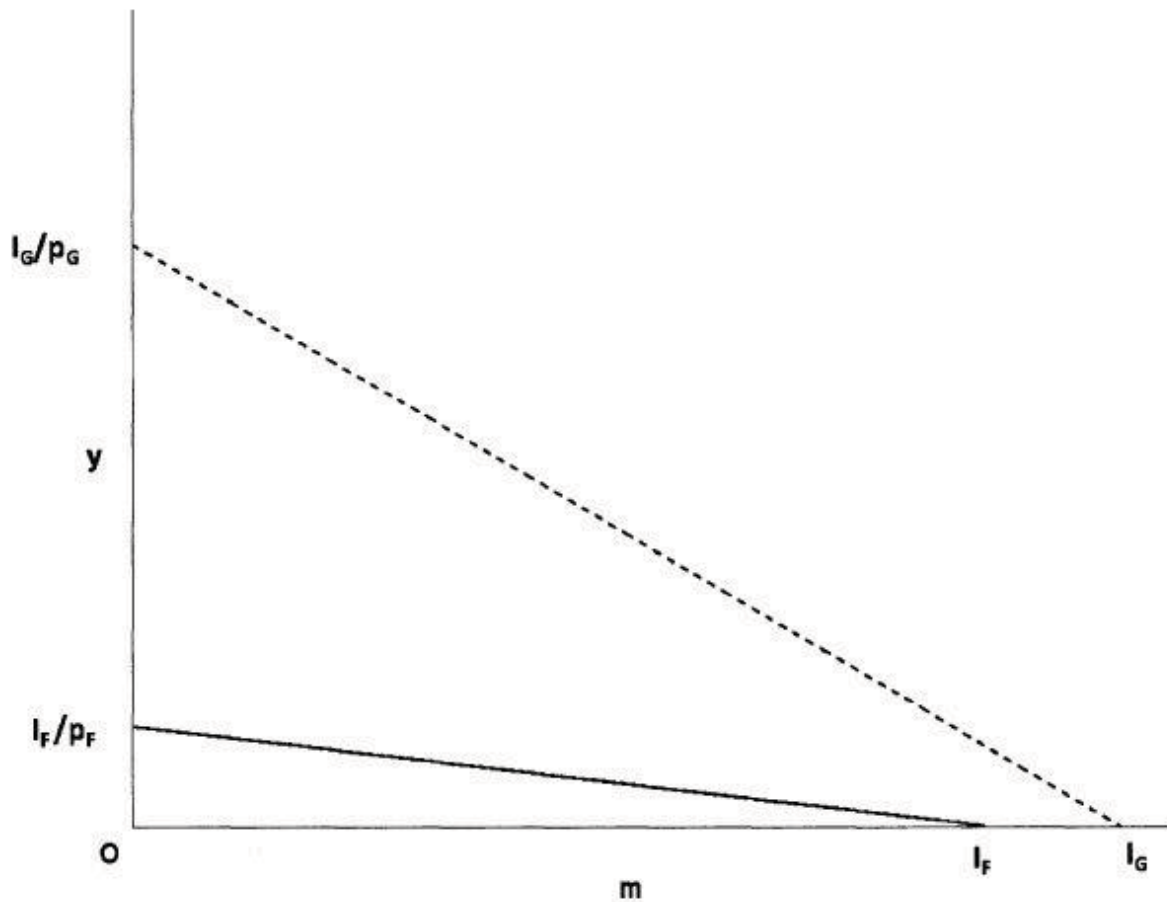
In Figure 1 „my" income is on the horizontal axis, and „your" income is on the vertical axis. By choosing G over F, „you" have provided „me" with a greater potential income (represented by the difference between I_F and I_G), making G MGT F according to Condition a). However, by choosing G

over F, „you" have increased „your" potential income (represented by the distance between I_F/p_F and I_G/p_G) by more than „my" potential income, meaning Condition b) is not satisfied, and it is not clear whether G is MGT F.

The Revealed Altruism model includes two axioms, Axiom R and Axiom S. Axiom R refers to reciprocity, the concept of rewarding (or punishing) good (bad) actions. More formally, Axiom R states:

> *"Let the first mover choose the actual opportunity set for the second mover from the collection C. If F,G $\in$ C and G is MGT F, then A_G is MAT A_F."* (Cox et al., 2008, p. 40).

Therefore, if an offer is MGT another, then it will be met with a MAT response. In other words, if an offer increases „my" potential earnings without increasing „yours" by more, then „I" will exhibit a higher w when revealing my preference over possible combinations of m and y.

Axiom S refers to the concept of the status quo. An act of commission is an act that overturns the status quo, whereas an act of omission upholds the status quo.[15] An act of commission is more likely to signal an individual"s intentions than an act of omission, and thus should elicit a stronger response. Also, both an act of commission and omission should elicit stronger responses than when an individual has no ability to act at all. Denoting the superscript C as an act of commission, the superscript 0 indicating no choice at all, and the superscript $*$ as the status quo, Axiom S is as follows.

> *"Let the first mover choose the actual opportunity set for the second mover from the collection C. If the status quo is either F or G and G MGT F then:*
>
> *1. $A_G c$ MAT A_{G*}, A_{G^0} and A_{F*}, A_{F^0} MAT $A_F c$.*
>
> *2. A_{G*} MAT A_{G^0} if G MGT C $\forall C_i$, and A_{F^0} MAT A_{F*} if C MGT F $\forall C_i$."*
>
> (Cox et al., 2008, p. 41).

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[15] What the status quo actually is could vary on the context. In some cases the status quo could refer to initial endowments (Cox, Servátka, & Vadovič, 2012). Alternatives include allocations determined by norms or habits as the status quo.

The first statement says that an act of commission results in a MAT response than an act of omission, or having no choice in the matter (a „forced" act), and also that having no choice in selecting a less generous action results in a MAT response than overturning the status quo to choose a less generous action. The second statement says that upholding the status quo will result in a MAT response compared to being forced to make that choice, if the act is MGT all other possible actions. Secondly, it states that being forced to take the least generous action will result in a MAT response compared to upholding the status quo by choosing the least generous action.

Cox et al. (2008) tested implications of their theory using existing data from various games and experiments. They utilised data from the Investment Game and a related game, essentially a Dictator Game, as implemented in Cox"s (2004) triadic decomposition, and compare SM responses. Revealed Altruism implies the following testable hypotheses. Increasing the amount invested will increase the amount returned more rapidly in the Investment Game than in the Dictator Game due to Axiom R, as the FM had actually chosen the opportunity set in the Investment Game. Cox et al. (2008) regressed the amount returned on the amount invested and an interaction term of the amount invested and a dummy variable indicating the Dictator Game treatment. By finding a statistically significant positive coefficient on amount returned (indicating the change in the Investment Game), but without finding a statistically significant coefficient on the sum of the two independent variables (indicating the change in the Dictator Game), they found evidence to support the hypothesis, as the amount invested influenced the amount returned in the Investment Game, but not the Dictator Game. Also, as the Dictator Game is essentially a forced investment act by the FM, Axiom S predicts that for each possible investment amount the SM responses in the Investment Game will exceed those in the Dictator Game. Evidence in support of this hypothesis was also found in the data.

Cox et al. (2008) also tested implications of Revealed Altruism on data from the Carrot & Stick Game (Andreoni, Harbaugh, & Vesterlund, 2003). In the Carrot & Stick Game, the FM can split $2.40 between himself and the SM, with a minimum of 40 cents being sent to the SM. The game has three variants, the Carrot Game, in which the SM can spend 1 cent to reward the FM by 5 cents, the Stick Game, in which the SM can spend 1 cent to punish the FM by 5 cents, and the Carrot & Stick Game,

in which the SM can either reward or punish the FM at the rates previously described. In particular, Revealed Altruism can make an informal cross game prediction, with the fact that opportunity sets generated in the Stick Game are MGT those in the Carrot & Stick Game, as the SM cannot reward in the Stick Game.[16] A certain investment level is of equivalent MGT ordering by Condition a) in both the Stick and Carrot & Stick Game, but as the SM cannot reward in the Stick Game, the MGT varies by Condition b) between the games, with the Stick Game being MGT the Carrot & Stick Game. In the Carrot & Stick Game, the FM always potentially stands to gain much more than the SM, hence a certain investment level in the Stick Game being MGT in the Carrot & Stick Game.[17,18] By using a panel Tobit regression, Cox et al. (2008) found that the estimated response function in the Stick Game is everywhere above that of the Carrot/Stick Game for amounts punished.[19] This means that SMs punish less in the Stick treatment, consistent with a MAT response, which would be predicted due to the difference in MGT ordering by Condition b).

Cox et al. (2008) also tested implications of Revealed Altruism on data from a Stackelberg „Mini-Game". In a standard Stackelberg duopoly game, the FM and SM represent „Leader" and „Follower" firms respectively in duopoly competition, where price is determined by the total market output. The FM makes his output decision first, which is then observed by the SM, who then makes her output decision. The Stackelberg Mini-Game restricts the FM to two possible outcome options, and varies these options between treatments with one option remaining constant. This changes the relative MGT ordering of the constant option. Axiom S predicts that responses to the common option will differ, despite the option being identical in terms of the opportunity set generated. Cox et al. (2008) found that SM responses did decrease when the common option was the least generous choice available to the FM, compared to when the common option was the most generous choice available.

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[16] It is informal, because Axiom R states that the FM must choose the outcome from a set of possible outcomes in order to make MGT comparisons. In this case, the FM would have to choose whether the Stick or Carrot & Stick Game were to be played.

[17] For example, if the FM were to send $1 to the SM, in the Stick Game the FM can at best receive nothing. In the Carrot & Stick Game, the FM can at best receive $5. Sending $1 is self-serving in the Carrot & Stick game, as the FM stands to gain $4 (considering the $1 forgone), whereas sending $1 is selfless in the Stick Game, as the FM stands to, at best, lose $1.

[18] This is relevant to the research question and will be discussed further in the Conjecture and Methodology section.

[19] As the experiment was repeated, individual effects and independence of observations must be controlled for. Therefore a panel-data approach was required.

Research outside of Cox et al. (2008) has been done on testing the Revealed Altruism model, in particular Axiom S which refers to acts of commission versus acts of omission. Recall that Axiom S predicts that an act that overturns the status quo (an act of commission) will result in a MAT response than an act that upholds the status quo (an act of omission). Cox et al. (2012) established the status quo in different treatments, by either initially endowing subjects with amounts of money, or having subjects earn money on a previous day via a math quiz.[20] Subjects were then assigned into one of two treatments. The T15,5 treatment had the FM starting with $15 and the SM starting with $5, and the FM could choose to uphold the status quo and maintain the initial endowments, or the FM could choose to Give $5 to the SM, overturning the status quo. If the FM chose to uphold the status quo, the SM could then choose to make no change to the payouts, or to decrease her own payout by $2, in order to decrease the FM's payout by $6. If the FM chose to Give $5, then the SM could either make no change to the payouts, or to decrease her own payout by $1 in order to increase the FM's payout by $2. The T10,10 treatment had both the FM and the SM starting with initial endowments of $10. The FM could choose to either Take $5, or to uphold the status quo. If the FM chose to Take $5, the SM could then either not change the payouts, or decrease her own payout by $2, in order to decrease the FM's payout by $6. If the FM chose to uphold the initial endowments, the SM could choose to make no changes in the payouts, or decrease their own payout by $1 in order to increase the FM's payout by $2. Note that the FM's choice to uphold the status quo in T15,5 provides the same opportunity set for the SM as the FM's choice to Take $5 (that overturns the status quo) in T10,10, and similarly for Give $5 in T15,5 and upholding the status quo in T10,10. Axiom S predicts that the FM overturning the status quo (either giving or taking) should elicit a stronger response from the SM, regardless of the identical opportunity sets those actions generate. Cox et al. (2012) found support for Axiom S, in that following giving or taking by FMs (overturning the status quo), SMs had a stronger reciprocal response.

Cox and Hall (2010) also tested Axiom S, using a Private Property Trust (PPT) Game and a Common Property Trust (CPT) Game. The PPT Game is like a standard Investment Game, with the exception

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[20] With the top 25% of scorers earning $15, the bottom 25% of scorers earning $5, and the 50% remaining scorers in the middle earning $10.

that the SM can also use her initial endowment to reward the FM, in order to make the decision comparable to the CPT Game. The CPT Game is the „inverse" of an Investment Game. The game starts with the maximum possible combined payout that can be generated by the Investment Game (in this case $40) in a common pool. The FM can choose to withdraw up to $10 from this pool, which reduces the common pool by $3 for every $1 withdrawn. The SM then decides how to allocate what remains of the common pool between herself and the FM. In the PPT the status quo is overturned by the FM sending amounts, and in the CPT the status quo is overturned by the FM taking amounts. The FM sending nothing in the PPT treatment results in the same opportunity set for the SM as the FM taking the maximum amount in the CPT, and vice versa. Axiom S predicts that a difference in SM responses from these identical opportunity sets should be detected. Research by Cox et al. (2009) detected no such difference, however Cox and Hall (2010) posited that this was due to the status quo not being salient enough. Cox and Hall (2010) strengthened the saliency of the status quo by having subjects earn endowments by playing a „Whack-A-Mole" game in which subjects had to hit a certain number of moles within a time limit in order to be able to participate in the experiment. Cox and Hall (2010) found highly significant differences in SM responses between the PPT and CPT treatments, when utilising the strategy method. When utilising a sequential move design, they also found weaker but still significant differences in SMs" behaviour.

2.3 Other Models of Reciprocity

In his review of the related literature, Sobel (2005) defines two main types of reciprocity, *intrinsic* and *instrumental*. Intrinsic reciprocity, as the name suggests, is the innate desire to be reciprocal. It depends on past or anticipated actions by others, with people exhibiting intrinsic reciprocity being willing to give up their own income in order to reward or punish kind or unkind actions. Instrumental reciprocity is where people act reciprocally in order to establish a profitable long-term relationship or reputation. Instrumental reciprocity describes a lot of everyday situations, in which there are opportunities for repeated interaction. While intrinsic reciprocity could still be present in these interactions, it more accurately describes reciprocity that is observed despite the fact that there is no opportunity for repeated interaction. The designs used in this research are one-shot, as the game is

only played once, and subjects" identities are kept private, meaning intrinsic reciprocity is more relevant. Introducing repeated play would result in some consideration for instrumental reciprocity, however, it complicates the analysis and required design by introducing extra strategic and reputational considerations, without necessarily increasing the intuition gained over a one-shot approach.

2.3.1 Social Preferences Models

There are three main types of approaches to modelling reciprocity, *social preferences* over outcomes, *intentions* based, and a *combination* of the previous two. With a social preferences approach, individuals have preferences over distributions of income, represented by a utility function which they seek to maximise. Their utility function may include non-zero partial derivatives with respect to other individual"s income, meaning they have other-regarding preferences. A prevalent model of social preferences is that of inequity aversion by Fehr and Schmidt (1999). Individuals exhibiting inequity aversion dislike outcomes that they think are inequitable. They are willing to use their own income in order to reduce the inequity, and thus reduce their disutility. Inequity could be specified in many ways, but for the purpose of this review and ease of explanation, inequality aversion will be used.[21] In a two-player game, an inequality-averse individual has a utility function of the form:

$$U_i(x_i, x_j) = x_i - \alpha_i . max\{x_j - x_i, 0\} - \beta_i . max\{x_i - x_j, 0\} \qquad (5)$$

In Equation 5, x_i is individual i"s payout, α_i is individual i"s parameter of disadvantageous inequality and β_i is individual i"s parameter of advantageous utility. It is assumed that $\alpha_i \geq \beta_i$, or that an individual experiences greater disutility when he is receiving a lower amount than the other individual, than when he is receiving a higher amount than the other individual. By assuming a certain proportion of the population exhibits inequality aversion, with the remainder exhibiting self-regarding preferences, Fehr and Schmidt (1999) show theoretically and provide experimental evidence that inequity aversion can explain behaviour in games both where cooperative and competitive outcomes

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[21] Inequality aversion is an aversion to non-equal payouts, suggested to be applicable to the lab environment by Fehr and Schmidt (1999), as subjects only know other"s payouts to make equity decisions on.

emerge. Bolton and Ockenfels (2000) independently developed a similar model with a more general utility function and preferences over own income and relative income, rather than absolute income.

Levine (1998) proposed a social preferences model that depends on how altruistic (or spiteful) an individual is, and how altruistic he perceives the other as being. Formally, Levine (1998) assumed that individuals maximise:

$$U_i(x_i, x_j) = x_i + \left(\frac{\alpha_i + \beta_i.\alpha_j}{1+\beta_i}\right).x_j \qquad (6)$$

In Equation 6, α_i is individual i's level of altruism, and β_i is the weight that individual i places on individual j's payout. Individuals can differ in how altruistic they are, with individuals that are more altruistic placing a higher positive weight on other's payouts. An altruistic individual prefers to be nice to another altruistic individual. However, an individual does not know how altruistic the other individual is, and must infer this from what strategy the other chooses to play. It therefore becomes a signalling game, with an individual revealing his type through his decision.

How do such models explain reciprocity? A common criticism of these models is that social preferences are fixed, and that subjects will merely distribute surplus generated based on their preferences over such distributions, regardless of how the surplus was generated. The observation that actions that generate a high amount of surplus elicit responses that send a higher amount back may look like reciprocity, however, this could also be explained by inequality aversion.[22] Fehr and Schmidt's (1999) model of inequity aversion could be specified in such a way that what amount is considered equitable depends on past actions. Such a change, however, would radically alter the model, and any such specification would be similar to an intentions based model.

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[22] Higher amounts sent leading to higher amounts returned is observed Investment Games for example, see Berg et al. (1995).

2.3.2 Intentions based Models

To explain the importance of intentions in reciprocity, consider the Ultimatum Game.[23] In the Ultimatum Game, a proposer offers a split of a pie, which the responder can either accept or reject. If the responder accepts, then the division the proposer offered is enacted, and if the responder rejects, both players receive nothing. Consider a variant of the Ultimatum Game in which the proposer must divide 100 units, and may only propose splits of 80:20 in favour of the proposer and 50:50. A typical responder is likely to reject the first split, and accept the second. Now consider an Ultimatum Game where the only available split is 80:20. Would the same responder be likely to reject the 80:20 split? Under a social preferences approach, if the outcome of both players receiving nothing is preferred to the 80:20 split, then it will remain preferred regardless of other possible actions introduced or removed, as it is based on outcomes and not how those outcomes were achieved. If intentions are important, then the 80:20 split would be roughly labelled as „unfair" when the option of a „fair" 50:50 split is available, meaning the responder is more likely to reject it. The 80:20 split can be perceived as much less unfair when the proposer had no other option, meaning the responder would be less likely to reject the split.

The first model to incorporate intentions was that of Rabin (1993). His model incorporates „Psychological Game Theory" (Geanakoplos, Pearce, & Stacchetti, 1989; Battigalli & Dufwenberg, 2009), which modifies standard Game Theory by allowing utilities to depend on beliefs in addition to payouts. It involves a situation where two players simultaneous make decisions defining a_1 and a_2 as the action played by players 1 and 2 respectively. Let b_1 be what action player 2 believes player 1 is choosing, and similarly let b_2 be the action that player 1 believes player 2 is choosing. Let c_1 be what player 1 believes that player 2 believes about what action player 1 is choosing, and vice versa for c_2. Rabin (1993) defines a „kindness function" $f_1(a_1, b_2)$, which measures how kind player 1 is being to player 2. Given some b_2, and assuming that $b_2 = a_2$ (or that player 1's beliefs are correct), player 1 has to choose a_1, which then implies the material payouts for both players, π_1 and π_2. Let π_2^H be the

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[23] See Güth (1995) and Roth (1995) for reviews of the experimental literature of the Ultimatum Game.

highest possible payout for player 2 given b_2, and let π_2^L the lowest possible payout among options that are Pareto-efficient.[24] Rabin (1993) defines an „equitable payout" as:

$$\pi_2^e = [\pi_2^H + \pi_2^L]/2 \qquad (7)$$

Rabin (1993) uses Equation 7 as a „crude reference point" against which to measure how generous player 1 is being to player 2. Finally, let π_2^{min} be the lowest possible payout player 2 can receive. The kindness function, how kind player 1 is being to 2, is formulated as follows:

$$f_1(a_1, b_2) = \frac{\pi_2(b_2, a_1) - \pi_2^e(b_2)}{\pi_2^H(b_2) - \pi_2^{min}(b_2)} \qquad (8)$$

Equation 8, the kindness function, is defined as being zero when the denominator is zero, as that would imply that $\pi_2^H = \pi_2^{min}$, meaning that kindness is not an issue as player 1 cannot influence player 2's material payouts. The kindness function is also zero when player 1 seeks to pay player 2 the equitable payout, as it defines a „neutral" choice or some sort of status quo or social norm. The kindness function is negative when player 1 is being unkind by seeking to pay player 2 less than the equitable payout, and similarly is positive when player 1 is being kind by seeking to pay player 2 more than the equitable payout. Rabin (1993) goes onto define $\tilde{f}_2(b_2, c_1)$ as how kind player 1 believes player 2 is being to him. This „believed kindness function" is dependent on b_2, or what player 1 believes player 2 is playing, and c_1, what player 1 believes player 2 believes about what player 1 is playing. In a way, it is analogous to the „kindness function" except evaluated for player 2, assuming beliefs are correct. The „believed kindness function" is defined as follows:

$$\tilde{f}_2(b_2, c_1) = \frac{\pi_1(c_1, b_2) - \pi_1^e(c_1)}{\pi_1^H(c_1) - \pi_1^{min}(c_1)} \qquad (9)$$

An individual's utility function in which they seek to maximise is as follows:

$$U_1(a_1, b_2, c_1) = \pi_1(a_1, b_2) + \tilde{f}_2(b_2, c_1).[1 + f_1(a_1, b_2)] \qquad (10)$$

If player 1 believes player 2 is being unkind to him, then $\tilde{f}_2(b_2, c_1)$ will be negative, and will subsequently want to choose a_1 that is unkind back, resulting in a low or negative $f_1(a_1, b_2)$, in order

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[24] Pareto efficiency is where nobody can be made better off without somebody being made worse off.

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to reduce the disutility associated with being treated unkindly. Note that such a formulation does not allow for player 1 to gain positive utility from punishing unkind behaviour, and ignoring material concerns, player 1 will have positive utility from kind behaviour from player 2, even if player 1 was unkind to player 2.[25] Rabin (1993) proves the existence of Nash Equilibria with the given utility function. This specification can explain the situation described with the Ultimatum Game above, as the „kindness function" would be zero when the proposer was forced to choose the 80:20 split, and negative when he chose the 80:20 split over the 50:50 split. Dufwenberg and Kirchsteiger (2004) extend Rabin"s (1993) model to sequential play games where beliefs can be updated dependent on observed histories, generalise the theory to multiple players, and slightly modify the kindness functions.

Which of the two types of models described so far is most likely to describe subject behaviour? The experimental evidence on this is mixed, and tends to lend support to both approaches.[26] Both approaches also have some merit in regards to the intuition behind them. Therefore, an approach that can combine elements of social preferences and intentions would be desirable. The next section outlines models that have attempted such a combined approach.

2.3.3 Combination Models

Falk and Fischbacher (2006) developed such a combination model, where how kind an action is dependent on both distributional and intentional factors. They conducted a questionnaire survey, where subjects were asked to assess the kindness or unkindness of divisions of money, while varying the possible strategy space those divisions could take. From these data, Falk and Fischbacher (2006) made observations on how kindness is perceived. Firstly, kindness appears to be increasing in the amount offered to the other person. Secondly, subjects seem to use an equal payout to as a reference point to determine how kind a split is, as evidenced by the equal split being the point where offers went from being unkind to kind. Thirdly, if there were no real alternatives to an unkind offer, that

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[25] It is more likely that player 1 will feel guilty that he was unkind to someone who was kind to him, and experience negative utility.
[26] Bolton, Brandts, and Katok (1996) found that only the final distribution seemed to matter, whereas evidence for reciprocity also being a factor was found in: Blount (1995), Kritikos and Bolle (2004), Charness (1997), Charness and Rabin (2002), and Gneezy, Güth, and Verboven (2000).

offer was perceived as being less unkind, but still was perceived as somewhat unkind. This finding suggests two things: 1) that intentions do matter, as the unkind offer was not intentional, and was perceived as being less unkind than an intentionally unkind offer, and 2) distributional factors also matter, as the unintentionally unkind offer was still perceived as unkind. Fourthly, if the strategy space was limited, a kind offer was still perceived at about the same kindness level if there was an unkind option that could have been chosen, but was perceived as less kind if kindness was forced, or that there were no unkind options to choose. Similarly for unkind offers, the presence or lack of kind offers available affected perceived unkindness. Finally, if a kind offer was present, how unkind an offer was perceived depended on how disadvantageous the kind offer was to the proposer. Using these stylised observations, both as a guide and as evidence that both distributional and intentional factors influence perceived kindness, Falk and Fischbacher (2006) developed a model of reciprocity.

Falk and Fischbacher (2006) define the „kindness term" φ_j, which is how kind individual i perceives individual j to be. The kindness term, φ_j, is made up of two components, the „outcome term", Δ_j, and the „intention factor", ϑ_j. The outcome term is defined as $\Delta_j = \pi_i - \pi_j$, and represents an individual"s preferences over outcomes or distributions.[27] Note the similarity of the outcome term to the inequality aversion model of Fehr and Schmidt (1999) as described previously. If Δ_j is positive, this represents an advantageous situation for i, and therefore is considered kind, and vice versa.

To calculate how kind or unkind Δ_j is, it is multiplied by the intention factor, ϑ_j, or how intentional individual j was in determining the final outcome. How intentional an outcome was depends on the other outcomes j could have induced, and whether these outcomes were feasible. Let π_i^o and π_j^o be the payouts that would eventuate given a certain belief for i and j respectively, and let $\tilde{\pi}_\iota$ and $\tilde{\pi}_J$ be potential alternative options that j could have chosen. The intention factor, ϑ_j, is a piecewise function that lies within the interval [0,1], and depends on the values of π_i^o, π_j^o, $\tilde{\pi}_\iota$ and $\tilde{\pi}_J$. When $\vartheta_j = 1$, the offer is fully intentional. One situation where $\vartheta_j = 1$ is if $\pi_i^o \geq \pi_j^o$ and $\exists \tilde{\pi}_\iota$ where $\tilde{\pi}_\iota < \pi_i^o$. In other

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[27] This model also includes considerations for multiple stage games by including the present node as a determinant, however the increase in notational complexity does not increase the relevant understanding or intuition of the model. Also, similar to Rabin (1993), beliefs are present, but these are also excluded for simplicity.

words, a kind offer is fully intentional by j if he could have chosen an offer that would be worse for i. Also, $\vartheta_j = 1$ when $\pi_i^o < \pi_j^o$ and $\exists \tilde{\pi}_\iota, \tilde{\pi}_j$ where $\tilde{\pi}_\iota > \pi_i^o$ and $\tilde{\pi}_\iota \leq \tilde{\pi}_j$, or an unkind offer is fully intentional if there was a kind offer available to be chosen that would improve i's payout but not put j in a disadvantageous position. When $\vartheta_j = \varepsilon_i$, the offer is partially intentional. The constant ε_i lies in the interval $[0,1]$, and varies amongst individuals. It represents how much an individual cares for intentions as opposed to final distributions. If $\varepsilon_i = 1$ then an individual only cares about outcomes and not intentions, and would behave in a manner consistent with the inequity aversion model proposed by Fehr and Schmidt (1999). Similarly, if $\varepsilon_i = 0$ then an individual only cares about intentions, and would act as described in pure intention models like Rabin (1993). A situation where $\vartheta_j = \varepsilon_i$ is when $\pi_i^o \geq \pi_j^o$ and $\forall \tilde{\pi}_\iota$, $\tilde{\pi}_\iota \geq \pi_i^o$, or a kind offer does not fully reveal kind intentions when all other potential offers are kinder. Also, $\vartheta_j = \varepsilon_i$ when $\pi_i^o < \pi_j^o$ and $\forall \tilde{\pi}_\iota$, $\tilde{\pi}_\iota \leq \pi_i^o$, or that an unkind offer does not fully reveal unkind intentions if all other potential offers are more unkind. Finally, there is one more situation that relates to how reasonable an alternative is. $\vartheta_j = max\left(1 - \frac{\tilde{\pi}_\iota - \tilde{\pi}_j}{\pi_j^o - \pi_i^o}, \varepsilon_i\right)$ when $\pi_i^o < \pi_j^o$, and $\exists \tilde{\pi}_\iota, \tilde{\pi}_j$ where $\tilde{\pi}_\iota > \pi_i^o$ and $\tilde{\pi}_\iota > \tilde{\pi}_j$. In other words, how intentional an unkind offer is to i when kinder options would put j in a disadvantageous position depends on how disadvantageous the kinder offer would make j compared to i. It is unreasonable to expect j to choose a kind offer if that offer was very disadvantageous to j, and therefore j not choosing that offer is considered to be less intentional, and subsequently less unkind.

The kindness term is defined as the product of the outcome term and the intention factor, or $\varphi_j = \vartheta_j . \Delta_j$. How kind i finds j's action depends on how favourable the outcome that occurs was to i, and how much was it j's intention for that outcome to occur. Falk and Fischbacher (2006) then describe a „reciprocation term" σ_i, a mechanism in which i can punish or reward j's unkind or kind behaviour. It compares the difference between what material outcome j would have obtained given beliefs prior to i's decision, and what material outcome j will obtain given beliefs after i's decision, or in other words, how i affected j's material payout. It is through this channel that i can behave reciprocally, altering j's

payout to be different than what was initially expected given beliefs. The utility function in which an individual seeks to maximise is as follows:

$$U_i = \pi_i + \rho_i.[\varphi_i.\sigma_i] \quad (11)$$

In Equation 11, ρ_i is a „reciprocity parameter" that varies between individuals. It is a positive constant that represents how strong i's preferences for reciprocity are.

Believing observations of inequity or inequality aversion are overstated due to the limited range and nature of games it has been tested on, Charness and Rabin (2000) experimentally ran many simple games, and from their results formed a model of reciprocity based on the social preference specification of *quasi-maximin* and a reciprocal factor based on how „deserving" an individual is. Quasi-maximin preferences are over an individual's own material payout, and also social welfare, depending on what weights an individual places on these considerations. Social welfare in this model is based on maximising total group payout, and on consideration for the individual with the lowest payout. Formally, an individual's utility is represented in the form:

$$U_i = (1 - \gamma_i).\pi_i + \gamma_i[\delta_i.min(\pi_k) + (1 - \delta_i).\sum_{k=1}^{K} \pi_k] \quad (12)$$

In Equation 12, γ_i is a parameter that represents an individual's concern for material self-interest compared to social interest, δ_i is a parameter that represents an individual's concern for surplus maximisation compared to the material payout of the worst-off individual, and π_k is a vector of material payouts of all other individuals in the game.

To incorporate intentions, Charness and Rabin (2000) posit that an individual is motivated by quasi-maximin preferences, but loses concern for social welfare if another is behaving too selfishly, and may even want to punish that person. They define a demerit parameter, ρ_k, which exists on the interval $[0,1]$. It represents how undeserving player i perceives player k to be. The higher ρ_k is, the less deserving i thinks k is. To determine how demeritorious k is, k's implied γ_k is calculated based on k's previous actions, which is then compared to some ideal level of selflessness, γ^*. If $\gamma_k < \gamma^*$ then animosity is generated towards k, increasing ρ_k, and if $\gamma_k > \gamma^*$ then no animosity is generated, and

ρ_k remains the same. Note that such a specification rules out positive reciprocity, which could be considered a weakness of this model.[28] With the demerit parameter included, an individual's utility function takes the form:

$$U_i = (1 - \gamma_i).\pi_i + \gamma_i.[\delta_i.\min(\pi_i, min_{m\neq i}\{\pi_m + d.\rho_m\})$$

$$+(1 - \delta_i).(\pi_i + \sum_{m\neq i}\max\{1 - g.\rho_m, 0\}.\pi_m) - f.\sum_{m\neq i}\rho_m.\pi_m] \qquad (13)$$

In Equation 13, d, g, f are non-negative parameters. The parameter d is the weight put on modifying the consideration of the worst-off individual, so if m was materially the worst-off individual but possessed a sufficiently high ρ_m, then m would not be considered the worst-off individual to i, as he considers m to be deserving of such a low payout. The parameter g is the weight associated with how ρ_m affects the consideration i places on m's payout when calculating the total payout in which to satisfy their preference for surplus maximisation. The individual i may wish to maximise everyone's payouts except for m if ρ_m was sufficiently high. The parameter f enables i to feel disutility if undeserving people get payouts. If $f > 0$, then i may wish to hurt undeserving individuals.

Finally, Cox et al. (2008) can also be considered a combination model of reciprocity, as the utility functions are general and can therefore take the most appropriate form, which could include social preferences over distributions. Intentions implicitly come into the model with the MGT ordering, which has provisions for alternative potential offers through Axiom S, and self-serving generosity through Condition b).[29]

Of the three combination models of reciprocity covered, I have decided that the Revealed Altruism model is the best framework for my research. I believe this is justified for a number of reasons. Firstly, the empirical evidence contained in Cox et al.'s (2008) Revealed Altruism paper, and the explicit tests of Axiom S (Cox et al., 2012; Cox & Hall, 2010), provide support for the model's implications. Secondly, the other two models have no consideration for self-serving generosity, and as

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[28] Charness and Rabin (2000) justify this by not finding evidence for positive reciprocity in the simple games that they ran, but positive reciprocity has been observed in other games, as noted in the Literature Review section.

[29] Cox et al. (2008) do not explicitly state that intentions are what causes the posited changes in MAT responses, however they do seem to be the most obvious explanation.

my research is exploring the existence of self-serving generosity, I need a model that considers it, making Revealed Altruism the best choice. Thirdly, Revealed Altruism is based entirely on observed outcomes, which leads to unambiguous predictions about subject behaviour. The other two theories of reciprocity rely on a subject‟s beliefs, which can vary widely between subjects for many reasons, and are difficult to truly elicit. Also, belief dependent models typically assume fixed beliefs, that means subjects cannot change their beliefs based on observed actions, leaving little room for reciprocity in these so-called „reciprocity‟ models.[30] Beliefs are also complex, especially as „second order‟ beliefs must be considered, which is essentially a belief of a belief about an action. This leads to the concept of parsimony, in particular the parsimony of models. If two models adequately explain subject behaviour, but one model is much more complex than the other, which model would be preferred? It is likely that the simpler model would be preferred, especially in the field of Behavioural Economics, as subjects are not likely to be making decisions using complex equations or other similarly intricate concepts.[31] When comparing Revealed Altruism to the other two models of reciprocity, it is the most parsimonious one, it explains subject behaviour well without being excessively complicated. For example, in Falk and Fischbacher‟s (2006) model, there at least five terms or factors that modify standard inequity aversion in order to incorporate intentions into the model, and some of those factors are quite complex, such as the intention factor. Also, the utility function in Charness and Rabin (2000) (as presented in Equation 13 on p.31) is quite complex. How likely is it that subjects are considering all of these factors when making their decision? It is with these considerations that I feel justified that Revealed Altruism is the most appropriate framework for my research.

2.4 Self-serving Generosity

A review of research that has covered related topics to self-serving generosity follows. Stanca, Bruni, and Corazzini (2009) explore whether strategic motivations influence reciprocity. They ran a symmetrical Gift Exchange Game, where the proposer and the responder receive twenty tokens as an initial endowment. In the first stage of the game, the proposer can send some number of tokens to the

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[30] With the exception of Dufwenberg and Kirchsteiger (2004), who incorporate belief updating in their model.
[31] They are more likely to be making decisions using heuristics. For a review see Kahneman (2003).

responder, and the tokens sent are tripled. In the second stage, the responder can send some number of tokens to the proposer which will also be tripled, but only using tokens from their own initial endowment. Stanca et al. (2009) ran two treatments, and varied whether the proposer knew about the second stage of the game, and by doing so, changed the potential motivations behind the proposer"s actions. If the proposer was not aware of the second stage, they can be motivated by other regarding preferences and a concern for efficiency. If proposers were aware of the second stage, they can, in addition to the motivations previously listed, be motivated by a strategic desire to induce reciprocity. Stanca et al. (2009) found evidence to suggest that responders were sensitive to the motivations of the proposers, with responders exhibiting stronger reciprocity in the treatment where strategic motivations could not be present. A proposer making a generous action when they are aware responders will observe and then subsequently make a response to that action could be perceived as being somewhat self-serving, as the reason he is doing so could be to elicit a reciprocal response. Similarly, a proposer making a generous action who does not know responders will observe that action and have an opportunity to reward him could be considered as selfless, as his only potential motivation was to be altruistic. The difference detected between the two treatments suggests that self-serving generosity could influence the reciprocal response. The „self-serving" treatment in this design however, is not considered „self-serving" by my proposed conjecture in the following section.

In a related setup, Strassmair (2009) ran a variant of the Investment Game, and varied the probability that the responder could choose a response action towards the proposer. She tested the idea that a higher probability of the responder being able to send amounts back means that the proposer is more likely to be making his investment decision on the expected return rather than kindness towards the proposer. A generous offer may therefore be perceived as self-serving when there is a high probability of a response. Strassmair (2009) ran two treatments, one in which the responder has an 80% chance to respond, and another in which the responder has a 50% chance to respond. She finds no difference in responder behaviour between those two treatments, and only some evidence for differences in

perceived emotions that were elicited in a post-experiment questionnaire.[32] Using a Revealed Altruism approach could explain the lack of a result between the two treatments. The treatments are of the same MGT ordering by Condition a), as the amount generated for the responder does not differ between treatments, and also by Condition b), as the maximum potential income for the proposer is also invariant, as the changes in probability do not alter the maximum potential income, rather it alters the expected income. Perhaps the maximum potential income is not a good metric by which to judge how self-serving an offer is in this game. If Condition b) is instead calculated by expected maximum potential income, then MGT does vary between identical investment amounts in the two treatments.[33] I will explore this issue further in the Conjecture and Methodology section.

Another tangentially related paper is that of Malmendier and Schmidt (2012), who ran a principal/agent delegation game. In this game there are four players, two of which are competing firms who are selling products that a represented by lotteries of differing expected values. A client is paired with an agent, who makes the decision on which lottery to buy on behalf of the client. The firms get a certain payout if their lottery is chosen by the agent. The agent is instructed to choose the lottery that is best for the client and is paid a fixed wage, and the client receives the eventuating payout from the lottery chosen. One firm may choose to offer a small gift to the agent that is costly to the firm. After receiving a gift from a firm, agents were twice as likely to choose that firm''s lottery compared to a baseline treatment in which no gifts could be sent, and this behaviour somewhat persisted even when the gift-giving firm''s lottery was absolutely worse. In a post-experimental questionnaire, agents were asked how much they agreed with various statements. In particular, they tended to agree that the firm wanted to influence their behaviour by sending the gift, and tended to disagree that the firm sent the gift in an attempt to be nice. This is related to the idea of self-serving generosity, as sending the gift is generous but perceived as self-serving. What is interesting is that despite the identification that gifts were intended to influence behaviour, is that gifts still actually influenced behaviour. This could suggest that how self-serving a generous gift or offer is does not

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[32] In particular, Strassmair (2009) found a difference in perceived kindness of responders at the 10% level for two of the five potential investment amounts, and differences in experienced anger of responders at the 10% level for four of the five potential investment amounts.
[33] By expected, I mean an expected value as relating to probability. I am not referring to what an individual is expecting the other to do, like a belief.

influence reciprocity. However, Malmendier and Schmidt (2012) ran a further treatment where the size of the gift to the agent was tripled, but at the same cost to the firm. These gifts should have more of an effect as they are more beneficial to the agent. However, while an effect of gift-giving was still detected, it was statistically smaller compared to the treatment where the gift was of less benefit to the agent. This could suggest that as the gift becomes more salient to the agent, the self-serving intentions of the firm become more obvious, and as a result the gift has less of an effect.

Bénabou and Tirole (2006) created a theory of „prosocial behaviour", in an attempt to explain various observations of the behaviour of charitable organisations. They proposed that an individual choosing the level of a prosocial action, a, to contribute derives a benefit of: $(v_a + v_y . y). a - c(a)$. The variable v_a is the individual's intrinsic value of contributing, or the utility they derive purely from performing the prosocial act. The variable y is the monetary reward for contributing the level a, v_y is the individual's intrinsic value for money, and $c(a)$ is the cost to the individual of performing a.[34] In addition, the individual receives a reputational benefit of the form: $x. [\gamma_a . E(v_a|a, y) - \gamma_y E(v_y|a, y)]$. The variable x is how visible or well known the individual's action is going to be to others, γ_a represents the individual's desire to appear prosocial, and $-\gamma_y$ represents the individual's desire to not appear greedy. The terms $E(v_a|a, y)$ and $E(v_y|a, y)$ are what outside observers think the individual's true values of v_a and v_y are, given the individual's choice of a. Self-serving generosity is present in this theory in two ways. Firstly, the individual being monetarily rewarded for their prosocial action could be perceived as self-serving but generous. Secondly, the potential reputational benefits gained from the prosocial action could also be perceived as self-serving, but this benefit would decrease based on the self-serving perception. An individual has three potential motivations behind his prosocial action. He gains *intrinsic* benefit because he likes to contribute, he gains *extrinsic* benefit because of the money he received, and he gains a *reputational* benefit, because others now perceive him as being prosocial and/or not greedy. How does one determine which motivation was the main reason the individual performed the prosocial action? Such a question is important to my research, as someone may want to reward an individual that performed a prosocial action for „selfless"

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[34] Examples of compensation for prosocial behaviour include (but are not limited to); tax breaks on charitable contributions, charities offering gifts, and offering money for blood donations.

intrinsic reasons rather than self-serving extrinsic ones. Such a response is tied to reputational benefits, which includes expectations of the individual's true reasons behind contributing. The issue of determining motivations is a signal extraction problem. If y were to increase, it would decrease the value of the signal that the action was taken for intrinsic reasons, and increase the value of the signal that the action was taken for extrinsic ones. Such changes would subsequently alter reputational benefits, which would alter both the initial decision to undertake the prosocial action, and how others respond to that action. How subjects react to self-serving generosity could be determined by how they respond to changes in the quality of the signal of intrinsic or extrinsic motivations, and this will be explored further in the Discussion section.

3. CONJECTURE AND METHODOLOGY

3.1 Conjecture

Cox et al. (2008) specify that a MGT offer elicits a MAT response. An offer is MGT another if it satisfies two conditions; Condition a), that the offer increases the benefit to the responder, and Condition b), that the offer does not benefit the proposer more than the responder. Condition a) changes the MGT ordering across all potential responder incomes, for example, the more an offer benefits the responder, the more generous it is. Cox et al. (2008) do not specify how Condition b) affects the MGT ordering, instead focusing on Condition a), and a so-called „MGT Light" ordering. MGT Light refers to an MGT ordering that only considers Condition a). Condition b) could be interpreted as a domain in which, when it is satisfied, predictions from the Revealed Altruism model are defined. Outside of this domain, predictions are not offered, and therefore I must posit how Condition b) affects the MGT ordering.

Does it matter by how much the inequality in Condition b) is satisfied or violated? It does matter for Condition a), as the more an offer benefits the responder, the more generous it is. Therefore, it may matter for how Condition b) affects the MGT ordering. The inequality of Condition b) is that the responder's maximum potential income must be greater than or equal to the proposer's maximum potential income. If it does matter by what degree this inequality is satisfied or violated, then how much the responder's maximum potential income exceeds the proposer's maximum potential income (or vice versa) will influence the MGT ordering. Consider situations where Condition b) is satisfied, for example, the design of Strassmair (2009) as described in the Literature Review. If I assume that it is the expected maximum potential income that is relevant, her two treatments both satisfy Condition b), but differ in the amount by which it is satisfied. However, she found no difference in responder behaviour between these treatments. For further empirical evidence, I consider the Lost Wallet Game (Dufwenberg & Gneezy, 2000). The proposer can choose IN or OUT. If the proposer chooses OUT, he receives x and the responder receives nothing. If the proposer chooses IN, then $20 is made

available for the responder to split. By varying x, the amount by which the inequality of Condition b) is satisfied varies, however the empirical evidence from the Lost Wallet Game shows that varying x does not influence responder behaviour. I therefore conclude that how much Condition b) is satisfied by does not matter. If Condition b) is not satisfied, I cannot make any judgements on whether the degree of violation of the inequality affects the MGT response, as no previous designs have focused on such a situation.

Regardless, a violation of Condition b) could potentially affect the MGT ordering. I define an offer that satisfies Condition b) as a *selfless* offer. A selfless offer potentially benefits the responder at least as much as the proposer, if not by more, and it is unambiguous that the offer is generous. I define an offer that violates Condition b) as a *self-serving* offer. In a self-serving offer, the proposer potentially stands to gain more than the receiver, so kind intentions of any generous but self-serving offer are not clearly revealed. I posit that if both offers are equal in MGT ordering according to Condition a), a selfless offer is considered MGT a self-serving offer. If a MGT offer elicits a MAT response, I therefore posit that a selfless offer will elicit a MAT response than a self-serving offer.

3.2 Methodology

3.2.1 Laboratory Experiments

This research utilises laboratory based economic experiments in order to gather empirical evidence. Why take this approach compared to a field-based experimental approach, or acquire data from naturally occurring situations? The main reason is that the situation of self-serving generosity and the setup needed to test such an effect does not easily manifest itself in nature in a manner that is sufficiently observable. And if there were a relevant situation, it would be unlikely that the required changes would be observed in order for the desired treatments to emerge, whereas in the lab, ceteris parabus changes to conditions are possible to implement. Lab research is required to ensure that posited hypotheses accurately describe subject behaviour, and whether posited effects actually exist. A lab experiment provides the most direct test of the theory. Furthermore, there are many confounds that exist outside the laboratory, most importantly repeated interaction. This can be controlled for in

the lab by having random anonymous pairing in experiments, so that subjects do not know with whom they were paired with, and therefore will not be considering future interactions when making their decisions. This is what is desired as we are testing a simple model focusing on intrinsic reciprocity rather than a more complex model that includes instrumental reciprocity. Field experiments could be useful after the main intuition is established and found to exist in the lab, but as no prior experimental research has covered self-serving generosity explicitly, my research is undertaken in a lab environment.

A survey or questionnaire could be used to investigate self-serving generosity, but such an approach may result in biased results. To explain why, consider the following situation. Someone asks you a hypothetical question; if you were to receive a sum of money, how much of it would you donate to charity? You may report a high amount to appear charitable, as the cost of appearing charitable is essentially free in this situation. However, if you were actually given the sum of money, and asked how much of it you would like to donate to charity, your answer is likely to be different as it actually affects how much money you will have. In essence, as it is a real decision, you are more likely to put thought into it, and you are less likely to distort your answer to appear charitable.[35] The Induced Value Theory (Smith, 1976) states that incentives should be calibrated in a certain way in order to maintain control, to ensure considerations as described above, for example, do not affect decision making.[36] Incentives should satisfy three conditions; monotonicity, salience and dominance. Monotonicity is that an individual must prefer more of the reward currency than less. Salience is that an individual must understand how actions alter payouts and that an individual's actions actually impact payouts. Dominance is that an increase in the reward currency is more important to the individual than other considerations that you want to have control over. In the charity question described, asking a hypothetical question violates all three conditions of Induced Value Theory. An individual has no preference over hypothetical money distributions, his decision does not impact payouts, and as he derives no utility from hypothetical own payouts, his decision is likely to be made

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[35] Although you may still distort your answer somewhat, especially if your answer was visible to whoever is running this experiment or you thought that the situation was designed to show how generous people are. This is called the Experimenter Demand Effect, and a review of how it pertains to Experimental Economics can be found in Zizzo (2010).

[36] Unless you would like to test the effects of those considerations directly.

considering other factors, like trying to appear charitable to the questioner. A properly incentivised experiment should induce subjects to make decisions over considerations the experimenter deems relevant, whereas a survey or questionnaire might be confounded by other considerations.

An advantage of lab experiments is that incentives that are hard to quantify in practice can be implemented precisely through an appropriate design. This is particularly useful when studying self-serving generosity, as how self-serving a generous action is can be specified. As mentioned in the Motivation and Introduction section, giving money to charity could be motivated by self-serving recognition considerations, for example, having a building named after oneself. How much benefit a person derives from such recognition is difficult to calculate, but in a lab experiment I can calibrate a design that specifies that benefit by using Induced Value Theory.

3.2.2 Design Considerations

What kind of design would be required in order to test the empirical relevance of Condition b)? Cox et al. (2008) posit that a MGT offer results in a MAT response. Therefore, if no difference in response is detected, it can be concluded that the offers are of the same MGT ordering. The MGT ordering is determined by two main conditions, and in order to observe the effect a particular condition has on the MGT ordering, anything else that affects the MGT ordering must be held constant. Therefore, in order to test my conjecture, Condition a) must be held constant between treatments, while Condition b) must vary. An acceptable general design would be a proposer making some generous offer to the responder, that regardless of treatment is of the same benefit to the responder. Between the treatments, however, the potential payout of said offer to the proposer varies, so that in one treatment it is more beneficial to the proposer than the receiver, or it is a self-serving offer. In the other treatment the offer is less beneficial to the proposer than the receiver, or it is a selfless offer.

Axiom R states: *"Let the first mover choose the actual opportunity set for the second mover from the collection C. If $F, G \in C$ and G is MGT F, then A_G is MAT A_F"* Cox et al. (2008, p. 40). Axiom R explicitly states that the proposer must choose between offers in order for a MGT ordering to exist over those offers. This is a problem, as including two offers in a design where both are invariant on

Condition a), but variant on Condition b), means that the selfless of the two offers may not make sense for the proposer to choose. However, in Cox et al. (2008), they propose that an informal comparison of MGT ordering on offers can be made between treatments, rather than within one treatment, suggesting that such a comparison can be appropriate. Intuitively, if two different treatments have an identical proposer option of *B*, with the treatments differing in the alternate option either *F* or *G* which differ in their MGT ordering in relation to *B*, then a comparison can be made of the change in behaviour induced in responders to *F* or *G* over *B*. Such a change can be indicative of the relative MGT ordering of *F* and *G*.

To elaborate further, the issue that occurs in an explicit test of Axiom R is how one keeps Condition a) constant, while varying Condition b), and in addition making the proposer‟s decision sensible. Consider the following informal design with three options, an outside option and two other options that vary in Condition b) but not Condition a). As Condition a) is invariant, the responder will not care if the proposer chooses the option that benefits themselves the most, and will probably be perplexed if the proposer does not choose that option. Assume the proposer has to decide whether to increase the responder‟s income by $10, and his own by $5, or to increase the responder‟s income by $10 also, but increase his own income by $15. Why would the proposer choose the former option, and why would the responder care if the proposer chose the latter? In essence, if subjects are thinking „Why would someone ever do that?‟, then subjects may not consider that option when making their decisions. In order to test Condition b) by the explicit wording in Axiom R, such an extraneous option must be included, in that it would not make sense to make that offer. This described issue is similar to the concept of an „efficient strategy‟ in Dufwenberg and Kirchsteiger (2004, p. 276). An inefficient strategy is one there exists another strategy that for at least one player increases material payout without reducing the payout of other players, regardless of what occurs. The concept of efficient strategies is related to dominated strategies and Pareto efficiency. The existence of inefficient strategies in explicit tests of Axiom R means that my „implicit‟ approach is more appropriate.

Cox et al. (2008) do test Condition b) in the informal between-subjects way proposed earlier, comparing data from the Stick Game compared to the Carrot & Stick game, run by Andreoni et al.

(2003). Investment offers between the two games are identical in MGT ordering by Condition a), as they generate the same amount for responders, but they vary by Condition b), as in the Stick Game it is only possible for responders to punish proposers, meaning offers are selfless Whereas, in the Carrot & Stick Game responders can reward (and punish), meaning offers are potentially self-serving. Cox et al. (2008) found that the estimated response function differed between treatments in such a way that was consistent with Condition b) altering the MGT ordering of an otherwise identical offer. Is this finding enough to answer my proposed research question? There are a few reasons as to why it is not sufficient. Firstly, the finding is for negative reciprocity, and Condition b) may not influence positive reciprocity in the same manner as negative reciprocity. Secondly, the finding could be an artefact of the game itself. For example, in the Stick Game, the actions available to SMs are to punish some amount or do nothing, whereas in the Carrot & Stick Game, SMs can reward some amount, punish some amount, or do nothing. This could be relevant to the „active participation hypothesis" proposed by Lei, Noussair, and Plott (2001), where subjects may want to participate rather than „do nothing", because they believe they have not been recruited to do nothing, or think that doing nothing is boring. Such an effect could explain why SMs punish more in the Stick Game, as punishing is their only way of participating. Therefore, the differences in the estimated response functions could be due to the game itself, and not due to Condition b) affecting the MGT ordering. Finally, the evidence provided is a by-product of an experimental design that was not created with the intention of testing the hypothesis. Therefore, the evidence is not as strong as a direct test of the conjecture, a design that is explicitly formulated to test for the existence of the effect and nothing else. It is direct tests of this conjecture that I will contribute to the literature.

4. EXPERIMENT 1

4.1 Design

The previous section discussed that an appropriate design would compare some equally generous action by Condition a) that varies via Condition b). The Lost Wallet Game (LWG), first experimentally studied by Dufwenberg and Gneezy (2000), can fit this criteria. In the LWG, presented in Figure 2, a FM can choose either IN or OUT. If OUT is chosen, the FM receives his outside option x, and the SM receives nothing. If the FM chooses IN, then $20 is made available for the SM to split between the pair. As the surplus generated by choosing IN is constant in the LWG, it satisfies the requirement for Condition a) to remain constant, and Condition b) may be varied by changing x.

Figure 2 – The Lost Wallet Game Tree
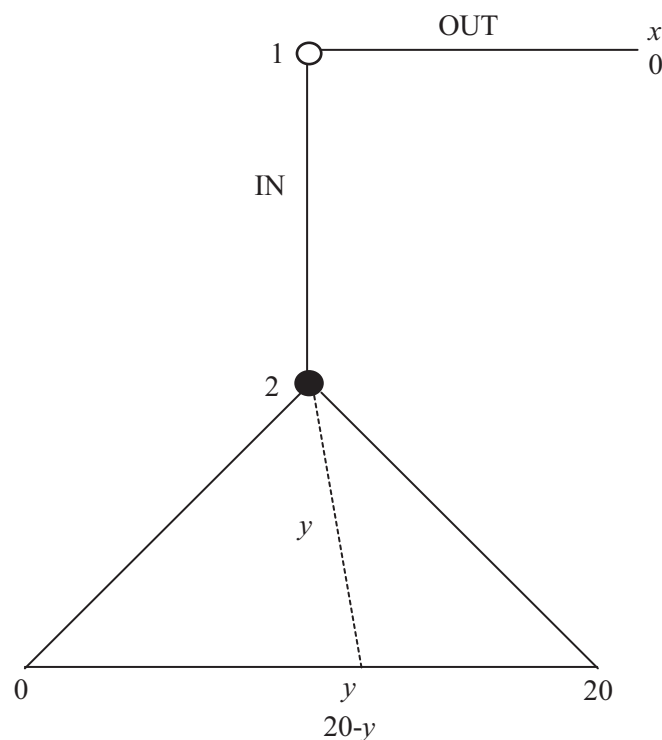
The behaviour observed in the LWG presents an empirical puzzle, in that the outside option forgone by the FM, x, does not influence the amount returned to the FM by the SM, y. This result was found to be robust to increases in saliency of x to SMs by both utilising paper money certificates and using a sequential-move game instead of a simultaneous-move game (Cox, Servátka, & Vadovič, 2010), and to making the outside option equal, so that the SM would also receive x (Servátka & Vadovič, 2009). This result was also found to not be due to a failure of Psychological Forward Induction, in particular that SMs update their beliefs appropriately after observing the FMs decision (Woods, 2010).

The empirical „puzzle" observed in the LWG could be explained if my conjecture appropriately describes subject behaviour, that the level of selflessness in Condition b) does not matter. Considering that the LWG has only been conducted with positive values for x means that in all versions of the game, choosing IN has been selfless. This is because the amount forgone by the FM implies the increase of the SM"s maximum potential income will always exceed the increase of the FM"s maximum potential income. It is just a matter of how much the SM"s maximum potential income exceeds the FM"s maximum potential gain, which depends on x. Observing experimental evidence on the LWG, that changes in positive values of x do not influence y, it can be proposed that the level of selflessness, or how by much the inequality of Condition b) is satisfied, does not matter for MGT ordering, and subsequently SM"s responses.

The LWG can be used to answer the question: does a violation of the inequality of Condition b) change the MGT ordering as revealed by differences in reciprocal responses? Or in other words, what are the implications for reciprocity of an otherwise equally generous offer being selfless or self-serving? One way to make IN self-serving in the LWG is to make x negative, and it is through implementing a negative x that this design becomes novel and unique.[37,38] Comparing the responses of SMs between a selfless (positive x) and self-serving (negative x) IN will test if such a change that violates the inequality of Condition b) affects the MGT ordering.

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[37] It is to my best knowledge that such a LWG has not been run before.
[38] Technically, a negative x makes OUT an inefficient strategy according to Dufwenberg and Kirchsteiger (2004). However, inefficient strategies are based on material payouts, rather than utilities. If x is not too negative, then it could be considered efficient if considerations for, e.g., inequality are introduced.

The experiment consists of two treatments. The selfless treatment is a LWG with $x=4$, which was chosen for comparability and consistency with previous experiments on the LWG. The self-serving treatment is a LWG with $x=-2$. Previous research on the LWG has tested values of x that are three units apart, and $x=-2$ is the first negative instance when counting down from $x=4$ in steps of three. The negative outside option is enforced by a reduction in a subject''s show-up fee. The game was played using the strategy method (Selten, 1967), in that all SMs were asked to make a decision conditional on the FM choosing IN, as opposed to sequential play where the SM would be asked to make a decision only if the FM chose IN. It could be argued that the strategy method influences behaviour through being psychologically „cold", in that it is not a response to another''s actual action (Brandts & Charness, 2000). However, the results from Brandts and Charness (2000) and more relevantly Cox et al.''s (2010) finding that sequential play does not alter subject behaviour in the LWG, suggest that using the strategy method is appropriate for this design.[39] Using the strategy method for this experiment increases the number of observations, with no increase in costs (either pecuniary or by changing subject behaviour), therefore it is desirable. The design is between-subjects, meaning subjects will only participate in either the $x=-2$ or $x=4$ treatment. If subjects were to participate in both treatments, as in a within-subject design, it may bias their decisions to differ between treatments, as they could either detect what the experimenter is trying to test, or feel like they should give differing answers to different questions.[40]

Subjects were asked how generous they perceived a FM choosing IN to be. This perception was elicited on a five-point Likert scale (Likert, 1932), with one being the least generous, and five being the most generous. This generosity perception was elicited as a further check of Revealed Altruism, and also as a confirmation of appropriate calibration of the design. Recall that Revealed Altruism predicts that a MGT offer induces a MAT response, but why does an offer that is more generous elicit a response that is more altruistic? Reciprocity refers to the desire to be generous to those that have been generous to you. Therefore, I propose that the reason why a MGT offer receives a MAT

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[39] For a review of the effects of using the strategy method compared to sequential play, see Brandts and Charness (2011).

[40] For a review and discussion of potential effects of within and between-subject designs, see Charness, Gneezy, and Kuhn (2012).

response is because the offer is more generous, and so the reciprocal response is more altruistic in return. Such a statement is not explicitly mentioned in Cox et al. (2008), but I believe it is implied from denoting MGT as „more generous than". Without eliciting generosity perceptions, how generous an individual perceives IN to be must be induced from his response. However, this misses a vital step in how a MGT offer induces a MAT response, and for a comprehensive analysis of the mechanisms driving the model of Revealed Altruism, subjects" perception of generosity is elicited.

Subjects were paid $5 for the generosity perception elicitation, in addition to a subsequent belief elicitation and demographic questionnaire. Subjects were aware that they would be answering a questionnaire prior to making their decisions, but were not aware of the type of questions that would be asked, and they were not aware that they would be receiving an additional $5 for doing so. The $5 payment was intended to increase subject engagement and cognitive effort, in particular for the generosity perception, which was presented first. The elicitation is therefore non-salient, but can provide a reasonable measure to illuminate this aforementioned step in Revealed Altruism. The beliefs (of other subject"s actions and beliefs) were elicited in an attempt to examine competing models of reciprocity, and for replication of certain findings in Dufwenberg and Gneezy (2000).

4.2 Procedures

The experiment was run in the New Zealand Experiment Economics Laboratory at the University of Canterbury. 154 subjects participated, with 74 subjects in the x=-2 treatment (meaning 37 observations), and 80 subjects in the x=4 treatment (40 observations). Subjects participated in either the x=-2 or x=4 treatment, but not both, making this design between-subjects. Subjects were largely University of Canterbury students.[41] Subjects were on average paid NZ$18.78, with all sessions lasting approximately 50 minutes.[42] Human Ethics Approval was sought and obtained from the University of Canterbury Human Ethics Committee as a Low-Risk proposal.[43] Subjects were recruited using the online recruitment system ORSEE (Greiner, 2004). In a session, subjects were checked-in,

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[41] There were some Lincoln University and CPIT students that participated. Demographics were elicited.
[42] For reference, minimum wage in New Zealand was NZ$13.50 per hour at the time of the experiments.
[43] The acceptance letter confirming this is included in the Appendix.

signed a consent form, and then handed neutrally framed instructions.[44,45] If there were an uneven number of subjects, then prior to handing out the instructions a subject was elicited to leave in exchange for their $5 show-up fee. Subjects were given approximately three minutes to read the instructions themselves, after which the instructions were read aloud. The instructions were also projected onto a screen at the front of the lab. Subjects made their decisions in a program implemented in z-Tree (Fischbacher, 2007). Each terminal was randomly assigned a pair and role using the z-Tree software. FMs chose IN or OUT by selecting the relevant radio button on the computer screen. If a FM chose OUT, he would receive x (x=4 or x=-2 depending on treatment) and the SM would receive nothing. The $-2 outside option was enforced by reducing the FM's $5 show-up fee to $3. As the FMs were making their decision, SMs chose how much money to allocate to the FM, y, conditional on the FM choosing IN. If a FM chose IN, then the division of the $20 the SM decided on would be enacted. After all subjects had completed their decisions, they were informed they were to receive $5 for answering some questions about the decisions they made, and a demographic questionnaire.[46] All subjects were asked how generous they perceived a FM's IN decision to be on a five-point scale. All subjects were then asked for their relevant beliefs about y.[47] Subjects then completed demographic questionnaires. Finally, subjects were asked to come to the payout room one by one to receive their earnings in private, and then left the lab. The experimenter was aware of an individual's payout, and could somewhat deduce the individual's actions from that, making this design single-blind.

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[44] Subjects were checked in to both count numbers and ensure they do not participate in more than one session.
[45] Instructions are included in the Appendix.
[46] The questions asked in the questionnaire are included in the Appendix.
[47] Beliefs will be discussed in the Exploration of Beliefs subsection.

4.3 Results

4.3.1 A Description of Statistical Tests

Before proceeding to the results, I describe the statistical tools used and what statistical properties they are testing for.

Fisher‟s exact test can be used to compare proportions between treatments, which is particularly useful when a subject only has two options, like the FMs in the LWG. Fisher‟s exact test is more appropriate than the Chi-squared test for small samples, which are more likely to eventuate with the typical number of observations from experiments. Regardless, Fisher‟s exact test is valid for any sample size. Fisher‟s exact test is, as the name implies, exact, in that the assumptions of distribution of the test statistic do not rely on a sufficiently large sample size.

The two-sample t-test is used to compare the equality of two independent samples. Such a test is useful when comparing behaviour that can take on a range of values between treatments, such as SM behaviour in the LWG. The two-sample t-test statistic is calculated by comparing the means of the samples divided by a weighted average of the standard deviations of the samples. The standard t-test assumes that the variances of the sample are equal, but there is a specification that does not assume this, therefore it is important to test whether the variances are equal prior to running the t-test. Also, the basic t-test assumes that the two samples are normally distributed, unless the sample is large, neither of which are likely to be satisfied by experimental data. In the case of non-normal samples, a „bootstrap‟ technique can be used, which utilises computing power to generate samples from the data.

The Mann-Whitney rank sum test is a common test in Experimental Economics that compares two samples. It is a non-parametric test, which means that it assumes nothing about the samples, unlike the two-sample t-test which assumes normality. It ranks data from both samples by value, and sums the ranks of each sample, which are then compared and tested to see if the ranksums of the samples are sufficiently different. The Mann-Whitney test is based on the ordinality of the data, i.e., the order the data are in, and does not take into account things like standard deviation, which the two-sample t-test

does. Therefore, it is not really possible to conclusively say that one test is absolutely better than the other, and results from both tests will be provided.

The Kolmogorov-Smirnov test compares the cumulative distribution function of the two samples, and calculates the test-statistic by the largest vertical distance between these two functions. However, the Kolmogorov-Smirnov test assumes the distributions are continuous, so is therefore not applicable when the distributions have discrete options, which is common in economic experiments. The Epps-Singleton test is related to the Kolmogorov-Smirnov test, but instead compares empirical characteristic functions, and can be used with discrete distributions (Goerg & Kaiser, 2009). The advantage that these approaches have over the Mann-Whitney test is that they can detect differences in distributions by more than by location, for example, the distributions may be located around the same point and possess similar ranksums, and yet the distributions may possess differing shapes.

The Spearman rank-order correlation test can be used to examine whether two variables are statistically dependent on each other. It assumes there exists a monotonic relationship between the two variables, or in other words a simple strictly positive or negative correlation. The data is ranked, much like in the Mann-Whitney test, from which a correlation coefficient and test statistic is generated, by comparing each rank to the average rank of that variable. This test may be more appropriate when both variables take on more than two options, unlike this design, however it will still be reported for comparability where appropriate to Dufwenberg and Gneezy (2000).

4.3.2 First Mover Behaviour

Does FM behaviour differ between treatments? In the $x=-2$ treatment, 95% of FMs chose IN, whereas in the $x=4$ treatment, 78% of FMs chose IN. Fisher's exact test reports a $p=.049$, so the null hypothesis of no treatment effect can be rejected. Individual rationality predicts that more FMs will choose OUT when they stand to gain \$4 instead of losing \$2. This result is comforting to the design, as it was explicitly tailored for one offer to be self-serving and the other to be selfless. From the point of view of the FMs, they are more likely to choose IN if IN is self-serving.

The generosity perception elicited from the FMs is also explored, to check the calibration of the design and whether FMs fully understood their decision. Recall they were asked for their generosity perception on a five-point scale, with five being the most generous.[48] Since this design was crafted as such that $x=4$ is selfless, and $x=-2$ is self-serving, I predict that FMs perceive the $x=4$ treatment as being more generous. Does that turn out to be the case?

H1: FMs' generosity perception in the $x=4$ treatment is greater than in the $x=-2$ treatment.

The average of the FMs elicited generosity, were 3.14 for $x=-2$, and 3.83 for $x=4$, which is in the direction posited by H1. Statistical tests of H1, using the various two-sample tests, are reported in Table 1, and a graph of the distributions by treatment is presented in Figure 3.[49]

Figure 3 – Distributions of First Movers' Generosity Perception by treatment

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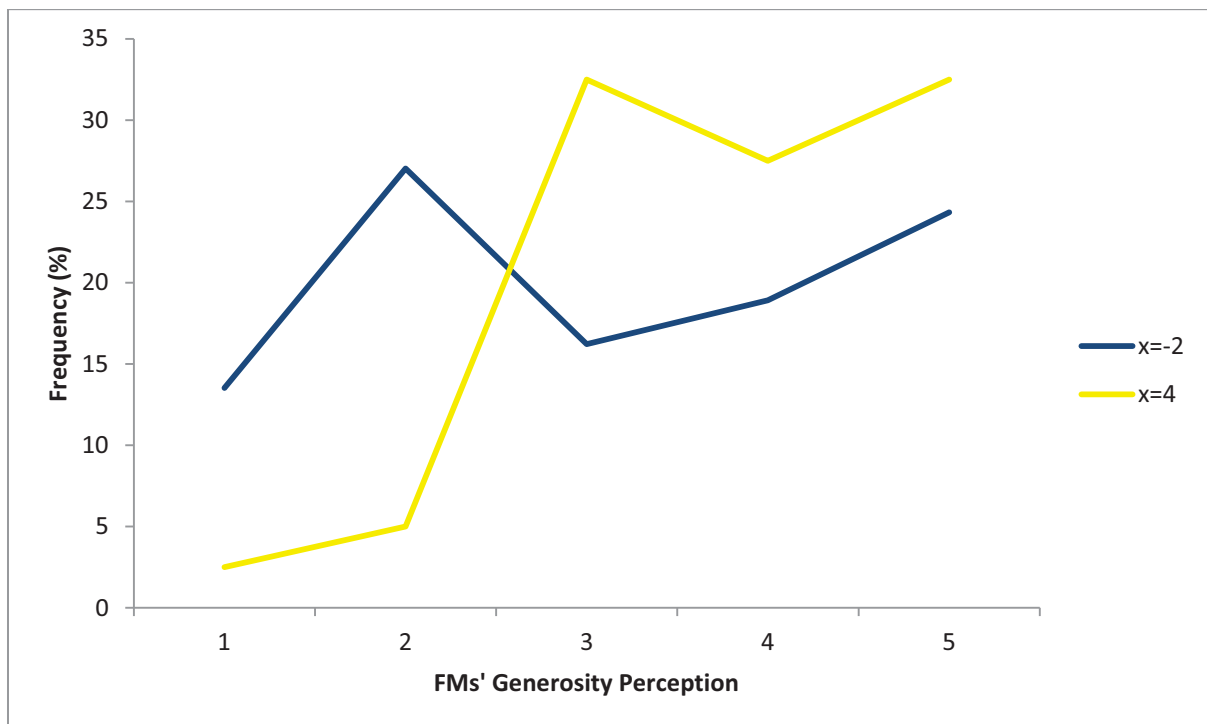
[48] The exact wording of this elicitation can be found in the Appendix.
[49] As the elicited generosity perception is on a discrete scale, a line graph like Figure 3 is not technically correct to use. I believe however, that it better shows the distributions visually, and in particular comparison between two distributions. Therefore, for this Figure and the rest of my thesis, I will use line graphs exclusively despite their technical incorrectness.

Table 1 – Summary Statistics and Statistical Tests on First Movers' Generosity Perception between treatments

Panel A: Summary Statistics of FMs" Generosity Perception		
Treatment	$x=-2$	$x=4$
Mean	3.14	3.83
Standard Deviation	1.42	1.03

Panel B: Statistical Tests on FMs" Generosity Perception	
Test	p-value
Mann-Whitney	.029
Bootstrapped t-test	.021
Epps-Singleton	.008

As all tests are statistically significant ($p \leq .029$), the respective null hypotheses can be rejected, giving evidence that FMs perceive that choosing IN in the $x=4$ treatment is more generous than in the $x=-2$ treatment, and providing support for H1. This provides evidence that the experiment was calibrated correctly, as the designed selfless offer ($x=4$) is considered more generous than the designed self-serving offer ($x=-2$).

4.3.3 Second Mover Behaviour

The analysis now turns to the behaviour of SMs. The first step in the process of a MGT offer from the FM inducing a MAT response in the SM is that SMs perceive the FM"s IN offer as being more generous. My conjecture predicts that SMs will consider a FM"s IN offer as being less generous when $x=-2$, as IN is self-serving, compared to $x=4$, where IN is selfless.

H2: SMs' generosity perception in the x=4 treatment is greater than in the x=-2 treatment.

The averages of SMs" elicited generosity perception of the FM"s IN offer were 2.73 for $x=-2$, and 3.30 for $x=4$. Table 2 reports p-values for the various two-sample statistical tests performed, and Figure 4 presents a graph displaying the distributions of SM"s generosity perceptions.

Figure 4 – Distributions of Second Movers' Generosity Perception by treatment
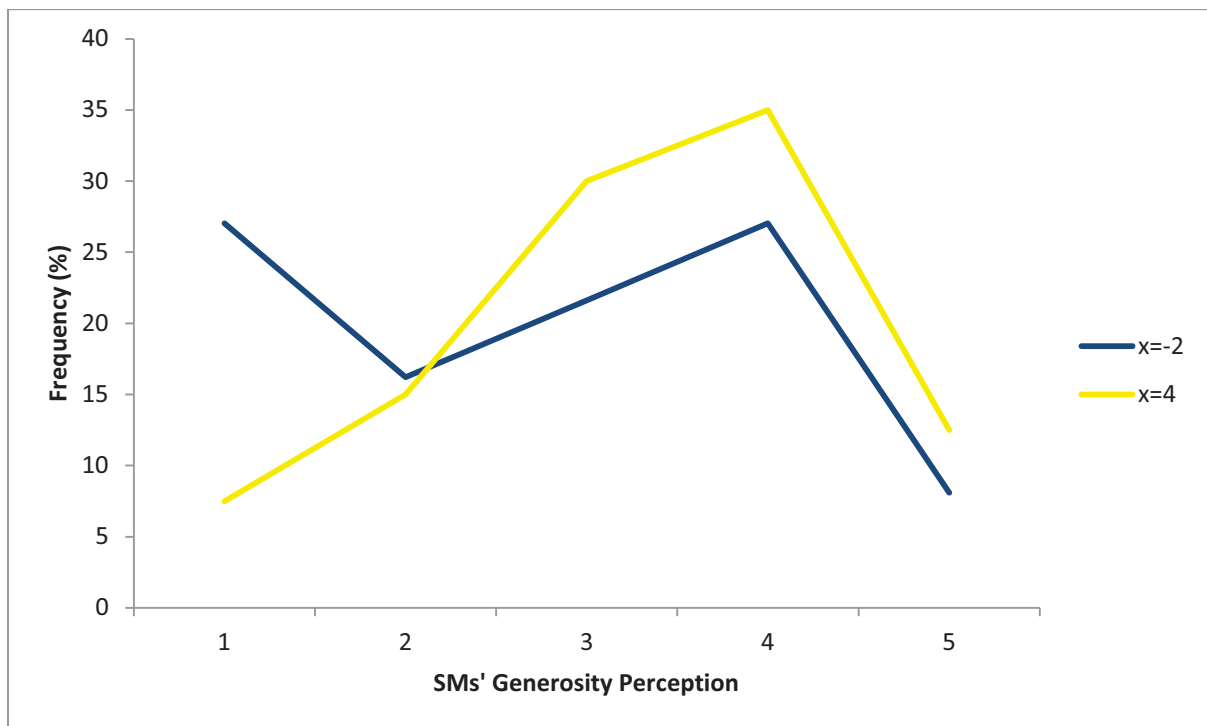
Table 2 – Summary Statistics and Statistical Tests on Second Movers' Generosity Perception between treatments

Panel A: Summary Statistics of SMs" Generosity Perception		
Treatment	x=-2	x=4
Mean	2.73	3.30
Standard Deviation	1.35	1.11

Panel B: Statistical Tests on SMs" Generosity Perception	
Test	p-value
Mann-Whitney	.064
Bootstrapped t-test	.052
Epps-Singleton	.209

The Mann-Whitney test and the Bootstrapped t-test report p-values of p=.064 and p=.052 respectively, which provides mild evidence for H5.[50] The Epps-Singleton test is not statistically significant, but I posit that that is because the distributions possess similar shapes. Figure 6 shows that there are more SMs considering the IN offer to be not generous (particularly at 1) when x=-2, and more SMs considering it to be generous (particularly at 3 and 4) when x=4. There is mild evidence here that suggests SMs do perceive a FMs choice of IN as being more generous in the self-serving x=-2 treatment than in the selfless x=4 treatment, in support of H2.

As there is some evidence for H2, the first step of a MGT offer inducing a MAT response has been found to likely hold in this design. Following from this, my conjecture predicts that y should be greater when x=4 as a FM choosing IN is perceived as being more generous by the SM, compared to when x=-2, where a FM choosing IN is perceived as being less generous by the SM.

H3: y in the x=4 treatment is greater than in the x=-2 treatment.

The average y in the self-serving x=-2 treatment is \$5.42 and the average y in the selfless x=4 treatment is \$5.45. Statistical analysis of the comparison of the two treatments follows in Table 3, and a graph of SMs responses is presented in Figure 5.

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[50] All p-values reported in this research are two-sided, as a conservative test. If the hypothesis predicts a clear direction of a difference, one-sided p-values could be used. One-sided p-values can be obtained by simply dividing the two-sided p-value by two.

Figure 5 – Distributions of Second Mover Behaviour (*y*) by treatment

Table 3 – Summary Statistics and Statistical Tests on Second Mover Behaviour (*y*) between treatments

Panel A: Summary Statistics of SM's *y*		
Treatment	*x*=-2	*x*=4
Mean	$5.42	$5.45
Standard Deviation	3.64	3.52

Panel B: Statistical Tests on SM's *y*	
Test	p-value
Mann-Whitney	.992
Bootstrapped t-test	.970
Kolmogorov-Smirnov	1.00
Epps-Singleton	.697

With such high p-values reported in Table 3, and nearly identical distributions as displayed in Figure 5, H3 can be rejected. SMs have not changed their behaviour in response to a self-serving or selfless

action. This result is surprising, as there is some evidence for H2, that SMs perceive IN offers of higher generosity in the selfless treatment compared to the self-serving treatment. Despite SMs perceiving a FM IN offer being of different levels of generosity in response to the change in Condition b), it has not affected SM behaviour, suggesting that Condition b) may not be empirically relevant for reciprocal actions.

4.4 An Exploration of Beliefs

To shed additional light on potential motivations behind subject behaviour, I followed Dufwenberg and Gneezy (2000) who also ran a LWG, and elicited beliefs. I start by describing notation which will be utilised to describe beliefs for the rest of this thesis. I follow the convention established in Dufwenberg (2002). Let τ be the distribution of probabilities over a SM's strategy space. Let τ' be the FM's expectation of the τ distribution. Finally, let τ'' be the SM's expectation of the τ' distribution. In other words, τ'' is a second order belief, as it is a belief about beliefs, compared to τ', which is a first order belief, that is, it is a belief about actions.

In the context of this experiment, τ represents the distribution of SM's y behaviour, which is presented in Figure 5. The practicality of eliciting τ', the expectation of how y is distributed, led me to instead elicit τ' as a FM's expectation of the average y.[51] A FM's expectation of the average of y is effectively a summary statistic of a FM's τ' distribution, and therefore is sufficiently appropriate to use. Subsequently, τ'' is the SM's expectation of the FM's expectation of the average y.

4.4.1 First Movers

In a post-experiment questionnaire, FMs were non-saliently asked how many dollars of the $20 they expected SMs on average to return to FMs.[52] Firstly, I explore whether FMs only choose IN when τ', their expectation of y, is greater than their outside option x. Psychological Forward Induction posits that if a FM chooses IN, then τ' is at least x, and knowing this, a SM subsequently updates τ''. This process combined with guilt aversion predicts that x affects y, of which no support was found in

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[51] Such an approach was also used by Dufwenberg and Gneezy (2000).
[52] The exact wording of this elicitation can be found in the Appendix.

Dufwenberg and Gneezy (2000). It is therefore important to investigate the individual steps of Psychological Forward Induction to examine if a particular step is failing, which could explain the lack of findings in support of the conjecture.

H4: FMs choose IN only if τ' is at least x.

This is always the case in the *x*=-2 treatment, as SMs cannot choose a negative *y* therefore FMs cannot be expecting a negative *y*. Restricting the analysis to the *x*=4 treatment, only 12.9% of subjects were found to violate H4. I therefore conclude that H4 mostly seems to hold.

Were there any differences in τ" between treatments? If FMs predict or believe that Condition b) has an effect on SM behaviour, then τ" will differ between treatments. If FMs" expectations of SM behaviour line up with my proposed conjecture, then τ" will be higher in the *x*=4 treatment, as it is selfless, compared to *x*=-2, which is self-serving.

H5: τ' in the x=4 treatment is greater than in the x=-2 treatment.

Table 4 – Summary Statistics and Statistical Tests on First Movers' Beliefs (τ') between treatments

Panel A: Summary Statistics of FMs" τ"		
Treatment	*x*=-2	*x*=4
Mean	$5.97	$6.63
Standard Deviation	3.69	3.95

Panel B: Statistical Tests on FMs" τ"	
Test	p-value
Mann-Whitney	.662
Bootstrapped t-test	.455
Kolmogorov-Smirnov	.995
Epps-Singleton	.644

The average of the elicited FM beliefs in the x=-2 treatment was $5.97 and in the x=4 treatment the average was $6.63. As none of the p-values reported in Table 4 are statistically significant ($p \geq .455$), I conclude that FMs did not expect SMs to send back different amounts to FMs between the treatments, and that H5 can be rejected. What has been observed so far is that FMs perceive their IN offers to be of a higher level of generosity in the selfless x=4 treatment than in the self-serving x=-2 treatment (see H2 and Table 2), however they do not expect SMs to behave any differently towards them. This seems like a paradox, but only from the perspective of the posited theory. FMs could be predicting that Condition b) does not influence SM behaviour, despite perceiving changes along Condition b) to be of differing levels of generosity.

4.4.2 Second Movers

I also elicit SMs'' second order beliefs, τ'''', or what SMs believe that FMs believe about SMs choice of y. SMs are asked about this belief considering only FMs that chose IN and OUT separately, in order for comparability with the findings of Woods (2010). For the between-treatment analysis, it makes more sense to focus on τ'''' considering FMs that went IN, as it is those FMs the SMs will be considering when they make their y decision.

Does τ'''' differ between treatments? SMs may believe that FMs expect to receive more back in the x=4 treatment, because FMs have had to forgo a larger outside option than in the x=-2 treatment, or due to FMs expectations of SM behaviour in regards to Condition b).

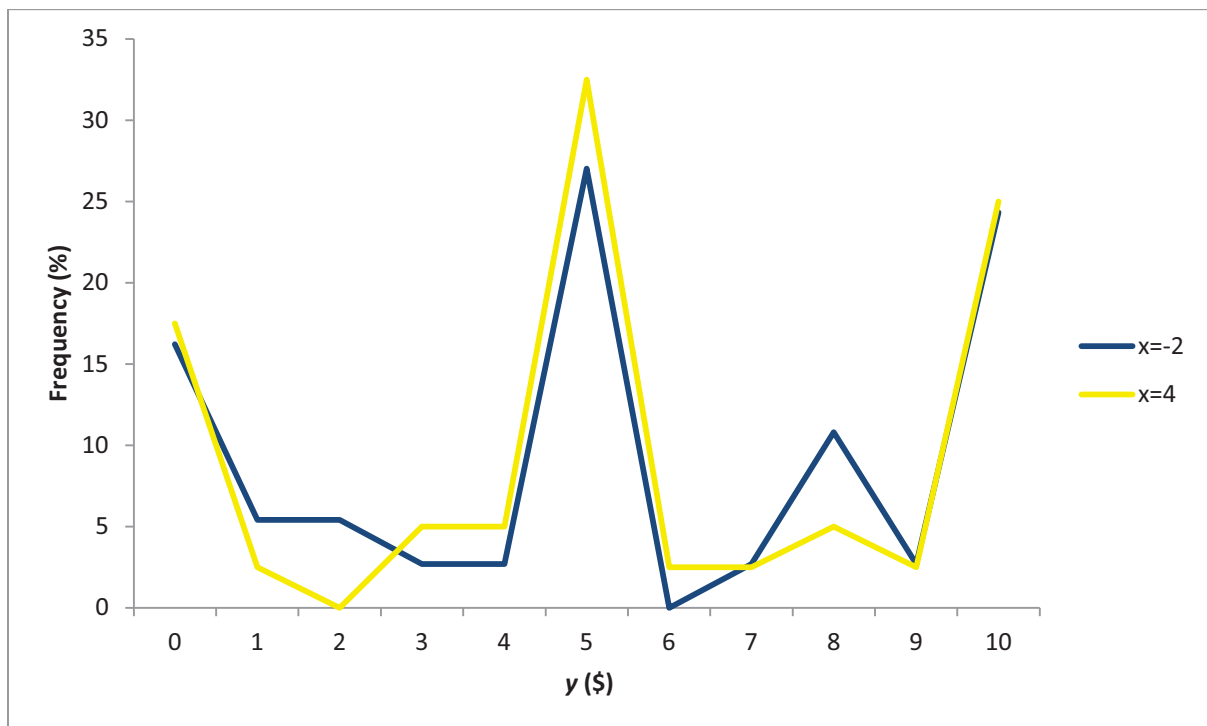*H6: τ'' in the x=4 treatment is greater than in the x=-2 treatment.*

Table 5 – Summary Statistics and Statistical Tests on Second Movers' Beliefs (τ'') between treatments

Panel A: Summary Statistics of SMs" τ'''		
Treatment	x=-2	x=4
Mean	$7.22	$8.28
Standard Deviation	3.68	2.34

Panel B: Statistical Tests on SMs" τ'''	
Test	p-value
Mann-Whitney	.182
T-test	.071
Kolmogorov-Smirnov	.286
Epps-Singleton	.068

The average of τ''' in the x=-2 treatment was $7.22, and the average in the x=4 treatment was $8.28. Statistical tests from Table 5 provide mixed evidence for H6. The t-test and Epps-Singleton test detect a statistically significant difference (p=.071 and p=.068 respectively). This suggests that there is some mild evidence that τ''' is larger when x=4.

Compare these results to Table 4, which was about FMs" expectation of y, where their existed no detectable difference between treatments. SMs are trying to predict the FMs" expectation of y, yet there is some mixed evidence of a difference in SMs" predictions. This suggests that SMs may be predicting that FMs are expecting SMs to behave differently when Condition b) varies, but FMs do not expect such difference in SM behaviour. SMs seem to be incorrectly predicting what FMs expect, and if this belief is important in their y decision, then it would have implications on SM behaviour.

Dufwenberg and Gneezy (2000) found that τ''' and y were correlated, so if there were a difference in τ''' between treatments, as potentially implied by Table 5, that would imply that there could be a difference in y as well. Is it also the case from the current data that τ''' and y are correlated? Table 6 reports Spearman rank-coefficient tests on the data.

H7: τ''is correlated with y

Table 6 – Spearman correlation tests between τ'' and y

Treatment	Spearman coefficient	p-value
Pooled (*x*=-2 and *x*=4)	.265	.020
x=-2	.291	.080
x=4	.218	.177

The Spearman correlation coefficient varies between .218-.291, which means there is a small positive relationship between τ'''and *y*. When all observations are pooled, the coefficient is statistically significant (p=.020), however, as the distribution of τ''' may differ between treatments (see Table 5), it is prudent to test for correlation in each treatment separately. The statistical significance becomes weaker in the x=-2 treatment (p=.080) and in the x=4 treatment the coefficient is statistically insignificant (p=.177). There is some evidence that supports H7.

To explain the findings of τ''' and *y* being correlated (H7), and mixed evidence for difference in τ''' between treatments (H6), and *y* not differing between treatments (H3), one of the following situations must be true. It is either there is no difference in τ''' between treatments, or there is no correlation between τ''' and *y*, or finally that there is a small difference in τ''' between treatments, and low correlation between τ''' and *y* but that the combination of the two are not enough to detect a difference in *y*. Of these options, I find the latter the least likely, as the statistical rejection of any difference in *y* was unambiguous. Considering previous findings from other LWGs with elicited beliefs, more support can be given to the correlation between τ'''and *y* existing.[53] It is most likely that H6 is rejected, in that there is no difference in τ''' between treatments.

SMs should be able to realise that FMs that choose IN generally expect to receive back more than those that choose OUT, and subsequently update their beliefs. This was the main finding relating to Psychological Forward Induction from Woods (2010), and can be tested for replicability with the current data. The differences between the elicitation of this research and Woods (2010) are: that

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[53] The previous findings are from Dufwenberg and Gneezy (2000) and Woods (2010).

beliefs were elicited after decisions were made, that the beliefs were not elicited in a salient manner, and that the comparison is within-subjects instead of between-subjects. Monetary salience could alter the results by inducing increased cognitive effort by subjects on the question at hand. In a review of experiments with various levels of monetary incentives, Camerer and Hogarth (1999) found that higher incentives improves subject performance in tasks where effort is important. The use of a within-subjects approach for this elicitation could change behaviour through the presence of both questions influencing subjects to give different answers, when their true response would be to answer the same in both cases. For example, Charness, Haruvy, and Sonsino (2007) run a LWG where SMs are asked their response to IN offers of varying levels of x, making changes in x within-subject.[54] They found a weak relationship between x and y, in contrast to the findings of between-subject LWGs, where no such relationship was found. I test whether SMs update their beliefs under different circumstances than in Woods (2010) as a robustness check of his findings.

H8: τ'' considering FMs that chose IN is greater than τ'' considering FMs that chose OUT

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[54] It should be noted that the focus of their research was on social distance and not changes in x.

Table 7 – Summary Statistics and Statistical Tests on Second Movers' Beliefs (τ'') between considerations of a First Mover's choice

Panel A: Summary Statistics of SMs' τ'' conditional on a FM's choice				
Treatment	x=-2 | IN	x=-2 | OUT	x=4 | IN	x=4 | OUT
Mean	$7.22	$3.70	$8.28	$4.40
Standard Deviation	3.68	3.81	2.34	5.42

Panel B: Statistical Tests on SMs' τ'' conditional on a FM's choice		
Test	x=-2 p-value	x=4 p-value
Mann-Whitney	.000	.000
Bootstrapped t-test	.002	.002
Kolmogorov-Smirnov	.001	.000
Epps-Singleton	.000	.000

In the x=-2 treatment, the average of τ'' considering FMs that went IN was $7.22 and considering FMs that went OUT the average was $3.70. In the x=4 treatment, the average of τ'' considering FMs that went IN was $8.28 and considering FMs that went OUT the average was $4.40. Tests reported in Table 7 support H8, with all tests reported being strongly statistically significant (p≤.002). These results are much stronger than those reported in Woods (2010), but this could be due to the within-subject approach. SMs do indeed identify that FMs who choose IN expect to receive more than those who choose OUT, replicating the finding of Woods (2010), that the lack of relationship between x and y was not caused by a failure to update beliefs in the process of Psychological Forward Induction.

4.5 Demographics

There is a current trend in Experimental Economics to elicit demographics, both for replicability (Gächter, 2009) and for posited behaviour differences from those possessing different demographics, for example, gender.[55] It may, therefore, be interesting to observe the effects of demographics on the SMs y decision. Demographics were elicited in a post-experiment questionnaire. It should be noted

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[55] For a review of various gender differences found in economics experiments, see Croson and Gneezy (2009).

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that as I have made no prior conjecture as to the effects of demographics, I could be finding relationships by coincidence. Variables were selected using a variety of model selection techniques, including forward, backward and backward stepwise processes with rejection at the 10% level which are built into Stata, and also by comparing the Akaike information criterion corrected for small sample sizes using a Stata program by Lindsey and Sheather (2010). All utilised model selection algorithms resulted in the same model, and this final model is reported in Table 8, both as an OLS regression and a 1-sided Tobit regression.[56]

Table 8 – Demographic Regression Analysis on Second Mover Behaviour

Variable	OLS Coefficient (p-value)	1-sided Tobit Coefficient (p-value)
τ''' IN	.208	.234
	(.088)	(.100)
NonNZ	1.69	2.15
	(.026)	(.013)
Econ	-1.64	-2.07
	(.030)	(.017)
NoOthersLivedWith	-.570	-.621
	(.037)	(.047)
Rely	-.428	-.503
	(.032)	(.025)
Constant	9.88	10.2
	(.000)	(.000)

The variables in Table 8 represent the following data. τ''' IN is the SMs'' τ''' considering FMs that chose IN, NonNZ is a dummy variable that takes on the value one when subjects nominated a nationality of a country that was not New Zealand, Econ is a dummy variable that takes on the value

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[56] The Tobit regression was one-sided on the lower bound of $0, as there were no observations at the upper bound of $20.

one when subjects nominated an area of study that was either „Economics" or „Business Economics",
NoOthersLivedWith is the number of people that currently live in the same household as the subject,
which includes the subject, and finally Rely is a nine point measure of how much a subject thinks the
experimenter should rely on their data, where nine is the most reliable.

The coefficient and statistical significance of τ^{IN} confirms the findings from Table 6, and provides
further support for H7, that τ^{IN} and y are correlated. The coefficient on NonNZ is positive and
statistically significant in both regressions ($p \leq .026$), suggesting that subjects that nominated their
nationality as being different than New Zealand are more reciprocal than those who nominated New
Zealand, electing to return somewhere between $1.69 to $2.15 more when other variables are fixed. I
can only guess why this is the case, but it may possibly be related to the weight they put upon
reciprocation. Potentially, non-NZers place a higher weight on reciprocity while in New Zealand, in
some instrumentally reciprocal way of gaining acceptance, or perhaps their culture places a higher
social weight on reciprocity in general.[57] The idea that Economists behave differently is most
famously identified in the journal article title „Economists Free Ride, Does Anyone Else?" by Marwell
and Ames (1981). Students of Economics are likely to have learnt about concepts such as rationality
and backwards induction, and therefore tend to be more likely to play strategies closer to what
standard game theory would predict.[58] In this game it would therefore be predicted that students of
Economics will play closer to $y=0$, and the negative and statistically significant coefficient confirms
this. Holding other factors constant, students of Economics tend to return somewhere in the order of
$1.64 to $2.07 less than their non-Economist counterparts. An interesting result of this analysis of
demographics is the negative and statistically significant coefficient related to the variable
NoOthersLivedWith. This suggests that the more people that live in the same household as the subject
tends to reduce the amount returned, or that subjects that live with more people are less reciprocal.
Asked prior to observing this regression on any relationship existing between these two variables, one
might posit that the more people living in one house would increase reciprocal behaviour, due to the
increased importance of reciprocal relationships when living with more people. Perhaps instead, this

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[57] Of the NonNZ group, approximately 66% selected Asian nationality, and approximately 14% selected
European nationality.
[58] Or Economics could just tend to attract selfish people.

variable is acting as a proxy for income, with those having lower incomes needing to live with more people, be it students still living with their families, or requiring many flatmates in order to afford rent. The coefficient associated with the Rely variable is negative and statistically significant (p≤.032), meaning that the more reliable a subject thinks the data they have provided is, the less they tend to return. This could be related to the explanation given as to why students of Economics behave differently, that subjects perceive a *y* nearer to zero to be a more „correct" or „appropriate" answer, or it could be related to general cognitive ability, smarter subjects are more confident in their answers and have greater rationality, backwards induction, etc. and thus tend to return a *y* closer to zero.

5. EXPERIMENT 2

The purpose of Experiment 2 is to provide a robustness check of the finding an offer is self-serving or selfless has no impact on the reciprocal response. Recall the LWG „puzzle", that no correlation has been found between x and y, even though intuitively, one may expect to observe some relationship. It may be an artefact of the LWG itself that x does not affect y. From the beginning, Experiment 1 was always a very conservative or tough-to-pass test of the conjectured theory, based on previous experimental observations. It is good practice to run robustness checks on findings if possible. In this section I present a new design that tests the same theory but in a different decision making environment.

5.1 Design

Recall that in order to test for the existence of Condition b), Condition a) must be kept fixed, or in other words, the amount generated for the SM by a certain FM action must remain constant between treatments in order for comparisons of Condition b) to be made. In the second design, I use an Investment Game for two reasons. Firstly, because the existence of reciprocity has previously been documented in the Investment Game. Secondly, significant variation of behaviour between different implementations of the Investment Game has also been documented, which means that the Investment Game setting can be better calibrated to detect hypothesised effects of self-serving generosity.[59] If the framework of an Investment Game is utilised, then a way to hold Condition a) constant while varying Condition b) is to implement different exchange rates on amounts kept by the SM and amounts returned by the SM to the FM. To implement this challenging design, I make use of an elegant procedure developed by Andreoni and Miller (2002). They implement a Dictator Game in which tokens are split which then subsequently earns varying amounts of points. For example, tokens that are kept by a SM for herself may earn her three points each, whereas tokens she sends to a FM may earn him four points per token. The first stage of an Investment Game is typically to choose some amount to „invest", however, such an approach would not necessarily add anything to testing the

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[59] Please see the Literature Review for a discussion of the Investment Game and related papers.

proposed hypothesis.[60] Instead, for simplicity, a binary decision will be offered to invest all or nothing, to be labelled IN or OUT. The game tree of the proposed design is presented in Figure 6 below.

Figure 6 – Game Tree of a binary first-stage Investment Game with variant First Mover redemption rates
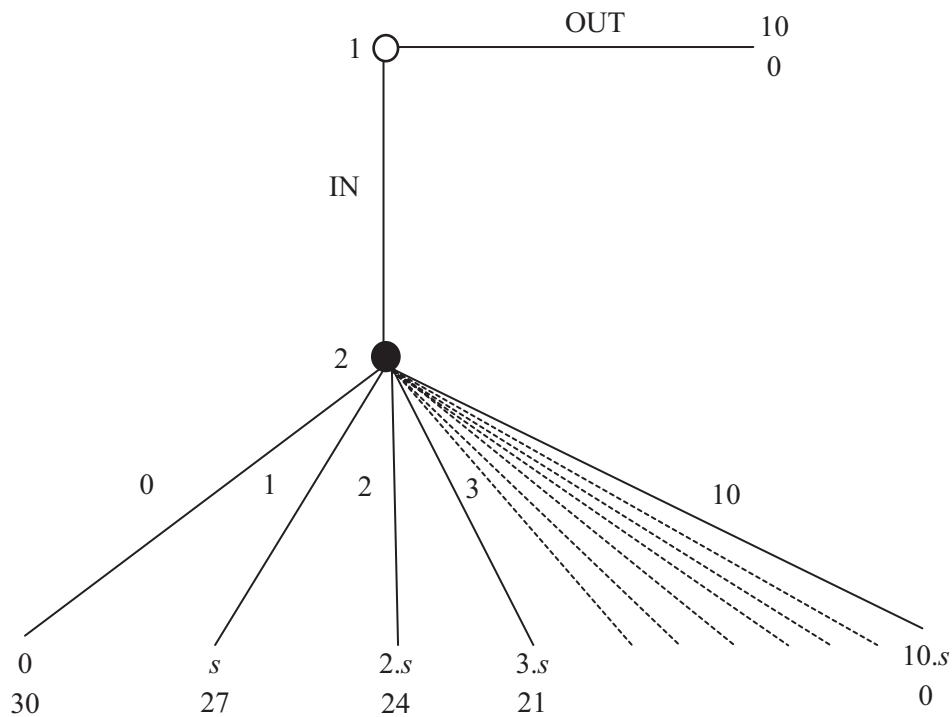
Andreoni and Miller (2002), show that a non-trivial proportion of the population exhibit a desire to maximise surplus, i.e., some subjects follow a law of demand based on the cost of giving. For example, a subject that earnt one point for each token kept and one point for the other subject for each token sent is likely to send less than a subject that earnt one point on each token kept and four points for the other subject for each token sent. This is due to sending tokens being „cheaper" in the latter case, with the „cost" of giving one point changing from 1 point in the former case to ¼ of a point in the latter case. This has the potential to change behaviour in this design, as it is via changing the amount of points earnt on tokens sent that Condition b) varies. However, in Andreoni and Miller

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[60] If a standard approach was taken, one could estimate and compare response functions, however if there exists such a difference, it should manifest itself in the proposed design as well.

(2002) a Dictator Game is played. In the Dictator Game, subjects have no strategic considerations, as only the proposer moves. As this design adds an initial investment stage, strategic considerations are introduced, which may „crowd out" cost considerations. A potential example of this is from the Gift Exchange Game in Fehr and Falk (1999). Effectively, the SM or „worker" faces an analogous decision as a dictator in Andreoni and Miller"s (2002) Dictator Game, in that higher costly effort levels chosen (more tokens sent back) results in higher profits for the FM or „firm" (more points earnt). If surplus maximisation or cost of giving was sufficiently important to subjects, then some workers should choose maximum effort levels, however in Fehr and Falk (1999) this was never observed. Also, Karlan and List (2007), using a field experiment mailing out solicitations for a charity, found that offering to match donations increased giving, but that increasing the matching rate did not help, which provides mixed evidence for a „cost of giving" effect. Therefore, the „cost of reciprocity" may have some effect on behaviour, but then again, it may not. Regardless, some sort of control should be put in place to account for this potential effect.

It is with these issues in mind that I calibrate the design as follows. FMs start with ten tokens, and can choose IN or OUT. If the FM chooses OUT, then he earns ten points. If the FM chooses IN, then the ten tokens are made available for the SM to split. In all treatments, tokens that the SM holds for herself earns her three points per token, which holds Condition a) constant across treatments. Note the deliberate similarity to the Investment Game, where amounts invested by the FM are typically tripled for the SM to split. Tokens that the SM decides to send back to the FM earns the FM two points per token in the *selfless* offer treatment, and six points per token in the *self-serving* offer treatment. By the FM earning two points per token, choosing IN has a maximum potential gain to the FM of $2 * 10 - 10 = 10$, compared to the SM who stands to gain $3 * 10 = 30$, meaning that the IN offer is selfless by Condition b). Similarly, the FM earning six points per token means the IN offer is self-serving by Condition b), as the FM potentially stands to gain 50 points compared to the SM"s maximum potential gain of 30 points. The SM may wish to send more tokens back to the FM when the cost of doing so is lower as it is in the self-serving treatment, whereas the conjectured theory posits that the SM will want to send fewer tokens back as the FM"s offer was self-serving. If there is such a cost of

reciprocity effect, it must be controlled for. In order to do that, a third treatment (termed the „chance"

treatment) will be implemented, in which the value of tokens sent back will be determined by random

chance. There will be a 50% chance that tokens sent back will earn the FM two points, as in the

selfless treatment, and there will be a 50% chance that tokens sent back will earn the FM six points, as

in the self-serving treatment. The FM does not know what state has occurred prior to making his IN or

OUT decision, which makes their IN decision neither selfless nor self-serving. The SM does know

what state has occurred prior to making her decision. It is through such an implementation that the

consideration for an offer being selfless or self-serving is removed, meaning that any differences in

SM behaviour between the chance treatment and the „pure" treatments will be due to FM's selfless or

self-serving intentions alone.[61] The value of points on tokens sent back is set up in such a way that the

expected value in the chance treatment makes the FMs offer neither selfless nor self-serving, meaning

that the inequality in Condition b) is exactly equal.[62] As the expected value of points per token sent

back is four for the FM, compared to three for tokens held by the SM, this may intuitively appear self-

serving by the FM. However, the amount the FM forgoes must be considered in this calculation. The

maximum expected potential increase of choosing IN for the FM is $4 * 10 - 10 = 30$, compared to

the maximum potential increase for the SM $3 * 10 = 30$, so these maximum potential gains are

exactly equal.

I refer to the selfless and self-serving treatments as „pure" treatments, similar to the terminology used

in Game Theory with pure strategies, in that no chance is used to decide strategies. The third

treatment I refer to as the „chance" treatment.

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[61] Subjects might be considering other motives, such as pure altruism, in both treatments, but as the only consideration that differs between treatments is the selfless or self-serving intention, differences detected will be due to that alone.

[62] It should be noted that Cox et al. (2008) do not consider expected values in their model, but the extension of applying expected values in this manner seems logical and straightforward in order to deal with the presence of chance.

5.2 Procedures

The experiments were run in the New Zealand Experiment Economics Laboratory at the University of Canterbury. 222 subjects participated, with 64 subjects in the selfless (s=2) treatment (32 observations), 64 subjects in the self-serving (s=6) treatment, and 94 subjects in the chance treatment (23 SM observations for s=2 and 24 SM observations for s=6).[63,64] Subjects only participated in one treatment, making the design between-subjects. Subjects were mostly University of Canterbury students. Subjects were on average paid NZ$17.69, with all sessions lasting approximately 50 minutes. Human Ethics Approval was sought and obtained from the University of Canterbury Human Ethics Committee as a Low-Risk proposal.[65] Subjects were recruited using the online recruitment system ORSEE (Greiner, 2004). In a session, subjects were checked-in, signed a consent form, and then handed neutrally framed instructions.[66] If there were an uneven number of subjects, then prior to handing out the instructions a subject was elicited to leave in exchange for the $5 show-up fee. Subjects were given approximately three minutes to read the instructions themselves, after which the instructions were read aloud. Subjects were then required to complete control questions assessing their understanding of the instructions.[67,68] The instructions were also projected onto a screen. The experiment was computerised using a program implemented in z-Tree (Fischbacher, 2007). Each terminal was randomly assigned a role and a group using the software. FMs made their IN or OUT decision by selecting the relevant option on their screen. If a FM chose OUT, then he would earn 10 points and his paired SM would earn 0 points. While the FMs were making their decisions, SMs were deciding how many of the 10 tokens to send to the FM and how many to keep for themselves, provided the FM chose IN. Tokens sent to the FM earns him s points and tokens kept by the SM earns her 3 points. If a FM chose IN, then the proposed division of tokens by the SM would be implemented. After all subjects had completed their decisions, they were informed they were to

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[63] The subjects were different than the ones who participated in Experiment 1.
[64] More subjects were required for the chance treatment as a similar number of observations to the other treatments were needed in each state that could occur.
[65] The acceptance letter confirming approval is included in the Appendix.
[66] Instructions are included in the Appendix.
[67] The control questions and their answers are in the Appendix.
[68] Subjects could not proceed until they had answered all of the control questions correctly.

receive \$5 for answering some questions about the decisions they made, and a demographic questionnaire.[69] All subjects were asked how generous they perceived a FM‟s IN decision to be on a five-point scale. All subjects were then asked for their relevant beliefs about the number of tokens SMs would choose to send to FMs on average.[70] Subjects then completed demographic questionnaires. After subjects had completed the questionnaires, they were asked to come one by one to the payout room to receive their earnings in private, where the points earnt in the experiment were exchanged at the preannounced rate of \$.60NZD per point. As the experimenter was aware of an individual‟s payouts, this design is single-blind. After receiving their individual payout, the subject left the lab.

5.3 Results

5.3.1 First Mover Behaviour

First I investigate whether FM behaviour differed between treatments, which could provide some support for the calibration of the self-serving and selfless offers. Of the „pure‟ treatments, $s=2$ was designed to be selfless and $s=6$ was designed to be self-serving, so FMs should be more willing to choose IN in the pure $s=6$ treatment. The chance treatment was designed to be neither selfless nor self-serving, so FMs should tend to choose IN more compared to the selfless treatment, and choose IN less compared to the self-serving treatment. Hypotheses 9-11 formally summarise the above predictions. Table 9 reports summaries and results from Fisher‟s exact tests of FM behaviour.

H9: FMs choose IN more frequently in the pure s=6 treatment than in the pure s=2 treatment.

H10: FMs choose IN more frequently in the chance treatment than in the pure s=2 treatment.

H11: FMs choose IN more frequently in the pure s=6 treatment than in the chance treatment.

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[69] The questions asked in the questionnaire are included in the Appendix.
[70] Beliefs will be discussed in the Exploration of Beliefs subsection.

Table 9 – Fisher's exact test on First Mover Behaviour between treatments

Treatment	Proportion IN	*s=2*	*s=6*	Chance
s=2	14/32 (43.8%)		.131	.001
s=6	21/32 (65.6%)			.187
Chance	38/47 (80.9%)			

There is some support for H9, with 65.6% of FMs choosing IN in the pure *s=6* treatment and 43.8% of FM choosing IN in the pure *s=2* treatment. This difference is marginally insignificant (p=.131), but FM behaviour is in the direction posited by H9.[71] Table 8 reveals support for H10, with 80.9% of FMs choosing IN in the chance treatment, and 43.8% of FMs choosing IN in the pure *s=2* treatment, with this difference being highly statistically significant (p=.001). H11 can be rejected, as a higher proportion of FMs chose IN in the chance treatment than in the *s=6* treatment (80.9% and 65.6% respectively), which is in the opposite direction that H11 predicts. However, there is no statistically significant difference detected (p=.187). This observation is perplexing, why would more FMs want to choose IN when there is only a chance of *s=6* occurring, compared to when *s=6* is guaranteed? Perhaps subjects anticipated higher expected returns in the chance treatment, due to a cost of reciprocity effect, or a diminished self-serving effect, or some combination of the two. But again, the result was not statistically significant.

FMs were asked about how generous they thought an offer of IN was in each treatment. This can provide an alternative measure by which to check the calibration of the design. By intuition, *s=2*, the selfless offer, should be perceived as the most generous, *s=6*, the self-serving offer, as the least generous, and the chance treatment somewhere in-between. Generosity was elicited on five point scale, with five being the most generous. The averages of FMs" generosity perceptions of an IN offer were 3.94 in the *s=2* treatment, 3.70 in the chance treatment, and 3.59 in the *s=6* treatment.

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[71] Recall that this is a two-sided p-value, so the one-sided p-value would be statistically significant (p=.066).

H12: FMs' generosity perception of IN in the pure s=2 treatment is greater than in the pure s=6 treatment.

H13: FMs' generosity perception of IN in the pure s=6 treatment is greater than in the chance treatment.

H14: FMs' generosity perception of IN in the chance treatment is greater than in the pure s=6 treatment.

The statistical analysis of H12, H13 and H14 is reported in Table 10.

Table 10 – Summary Statistics and Statistical Tests on First Movers' Generosity Perception between treatments

Panel A: Summary Statistics of FMs" Generosity Perception			
Treatment	Pure *s*=2	Pure *s*=6	Chance
Mean	3.94	3.59	3.70
Standard Deviation	1.01	1.13	.954

Panel B: Statistical Tests on FMs" Generosity Perception			
Test	Pure *s*=2 vs Pure *s*=6 p-value	Pure *s*=2 vs Chance p-value	Pure *s*=6 vs Chance p-value
Mann-Whitney	.205	.249	.702
Bootstrapped t-test	.212	.315	.324
Epps-Singleton	.760	.503	.519

While the averages of the perceived generosity do fit the conjecture of H12, H13 and H14, the differences between treatments were statistically insignificant. This result is in contrast to the findings of Experiment 1, in that a difference in perceived generosity was detected in FMs between treatments. This could be due to the increase in complexity of the design.

5.3.2 Second Mover Behaviour

SMs were asked how generous they perceived a FM‟s offer of IN to be. As discussed in the previous section, this is a test of the first step in the process by which a MGT offer elicits a MAT response. How self-serving the IN offer was in each treatment may induce different perceptions of how generous that IN offer is, with $s=2$ being selfless it should be perceived as the most generous, and similarly, with $s=6$ being self-serving, it should be perceived as the least generous. The chance treatment, being neutral, or neither selfless nor self-serving, should be considered a level of generosity somewhere between the $s=2$ and $s=6$ treatments. Hypotheses 15-17 formally summarise the above conjecture.

H15: SMs' generosity perception in the pure s=2 treatment is greater than in the pure s=6 treatment.

H16: SMs' generosity perception in the pure s=2 treatment is greater than in the chance treatment.

H17: SMs' generosity perception in the chance treatment is greater than in the pure s=6 treatment.

The average of the SMs perception of generosity of a FM‟s IN decision in the pure $s=2$ treatment was 4.03, in the pure $s=6$ treatment it was 3.56, and in the chance treatment it was 3.72, which are in the directions proposed by the above hypotheses.

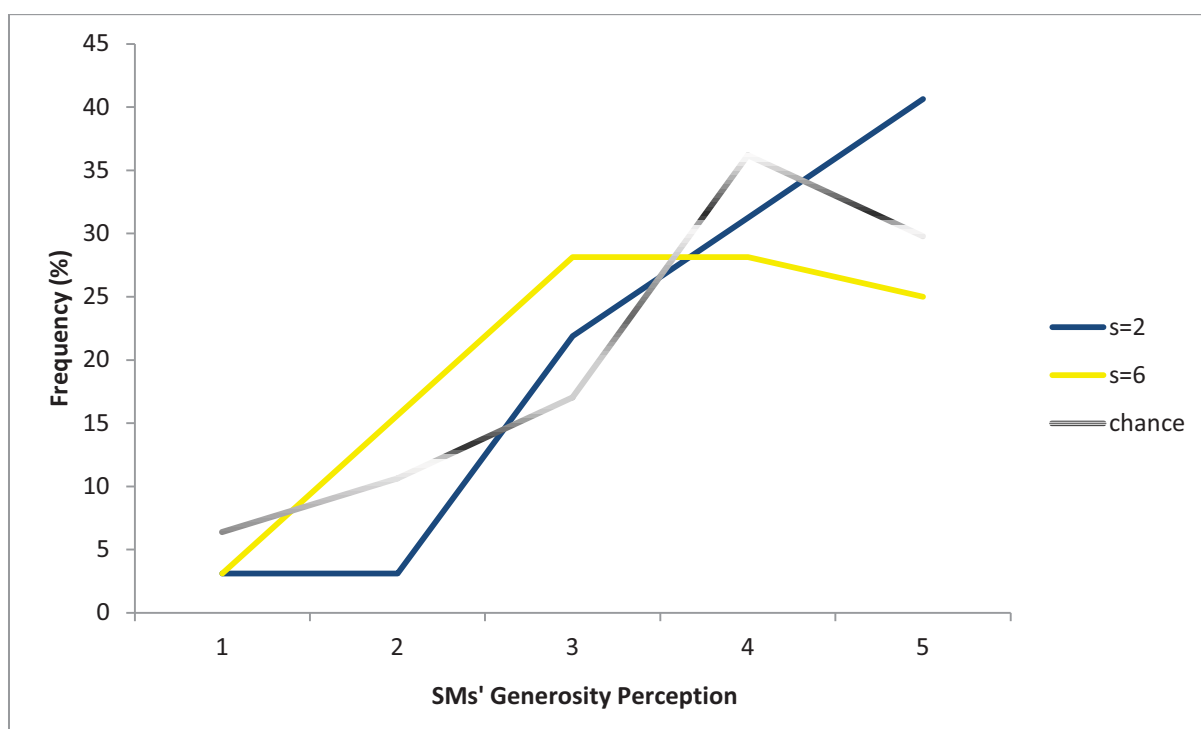**Figure 7 – Distributions of Second Movers' Generosity Perception by treatment**

Table 11 – Summary Statistics and Statistical tests on Second Movers' Generosity Perception between treatments

Panel A: Summary Statistics of SMs" Generosity Perception			
Treatment	Pure s=2	Pure s=6	Chance
Mean	4.03	3.56	3.72
Standard Deviation	1.03	1.13	1.19

Panel B: Statistical Tests on SMs" Generosity Perception			
Test	Pure s=2 vs Pure s=6 p-value	Pure s=2 vs Chance p-value	Pure s=6 vs Chance p-value
Mann-Whitney	.082	.277	.855
Bootstrapped t-test	.103	.226	.740
Epps-Singleton	.054	.507	.751

Statistical tests reported in Panel B of Table 11, provide evidence supporting H15, that SMs"
perception of how generous IN is greater in the s=2 treatment than in the s=6 treatment, with all

reported tests being statistically significant (p≤.103). However, there is no evidence for H16 and H17, or that there was any difference in SMs generosity perception between either of the pure treatments and the chance treatment. Figure 7 illustrates these findings, with the *s*=2 distribution being larger than the *s*=6 distribution at maximum generosity of five, and smaller at the less generous options of one and two. The chance distribution appears to be an amalgamation of the other two distributions.[72] Compare these findings to that of the FMs, where there was no difference found in any of the comparisons. This may be because through actually making their decision, SMs gain more insight into what an IN offer means for the FM in terms of how selfless or self-serving an offer is in the pure treatments, which subsequently affects their generosity perception.

There are three potential effects that could be responsible for changes in SMs reciprocal responses between treatments: a FM"s self-serving intentions, a FM"s selfless intentions, and the cost of reciprocity. These effects could be confounded in the data and the chance treatment was designed to separate them from one another. In other words, comparing SM responses from the pure *s*=2 treatment to the pure *s*=6 treatment will investigate the difference between a selfless and self-serving offer, but will be confounded by the cost of reciprocity. As a FM"s choice of IN is designed to be neither selfless nor self-serving, comparing the pure treatments and the chance treatment can investigate the effects of FM selflessness or „self-servingness" on SM responses, while holding the cost of reciprocity constant. The selflessness effect should increase the number of tokens returned to FMs by SMs, as a reciprocal response to being selfless. Similarly, the „self-servingness" effect should decrease the number of tokens returned to FMs by SMs, as a reciprocal response to being self-serving. Table 12 shows what effects could be influencing subject behaviour when making comparisons between different treatments. The cells highlighted in bold are tests for effects that are not confounded by other potential effects.

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[72] This could be due to SMs either reporting their generosity perception based on the *s* outcome that occurred for them, or alternately SMs used some sort of expected value, either way, it would be expected to result in a distribution that is some combination of the other two.

Table 12 – Separation of Effects in Experiment 2

	Pure $s=6$	Chance $s=2$	Chance $s=6$
Pure $s=2$	Selflessness effect „Self-servingness" effect Cost of Reciprocity	**Selflessness effect**	Selflessness effect Cost of Reciprocity
Pure $s=6$	---	„Self-servingness" effect Cost of Reciprocity	**'Self-servingness' effect**
Chance $s=2$	---	---	**Cost of Reciprocity**

5.3.2.1 Joint Selfless/Self-serving and Cost of Reciprocity Effect

A direct comparison of the pure $s=2$ (selfless) and $s=6$ (self-serving) treatments could reveal differences in reciprocal responses, but such differences could be biased by a potential cost of reciprocity effect. Regardless, it may be worthwhile to compare these two treatments directly because there is evidence in support of H15, that SMs perceive IN offers as being of different levels of generosity in these two treatments. A difference in perceived generosity was not detected between the pure and chance treatments that were analysed in H16 and H17. The detected difference in perceived generosity may influence SM behaviour between the $s=2$ and $s=6$ treatments. In addition, the difference in a FM's IN offer between these treatments includes both the selflessness and „self-servingness" effects. The combined effects should have a larger impact on SM behaviour than just one of the effects, potentially making any differences easier to detect. In comparing the pure treatments of $s=2$ and $s=6$, there are two potential effects that could be driving SM behaviour. The first is whether the offer is selfless or self-serving, which would predict that SMs return less tokens in the $s=6$ treatment. Secondly, SMs could be responding to the cost of reciprocity, which would predict that SMs return more tokens in the $s=6$ treatment. Note that these posited effects are in opposing directions, and they could potentially cancel each other out.

H18a: The number of tokens sent to the FM by the SM in the pure s=2 treatment is greater than in the

pure s=6 treatment.

H18b: The number of tokens sent to the FM by the SM in the pure s=6 treatment is greater than in the

pure s=2 treatment.

In the pure *s*=2 treatment, SMs sent back on average 3.38 tokens, and in the pure s=6 treatment, SMs sent back on average 2.84, suggesting that the potential self-serving consideration dominates the cost of reciprocity effect, favouring H18a, if such effects exist. Statistical analysis is presented in Table 13, and the distributions are presented graphically in Figure 8.

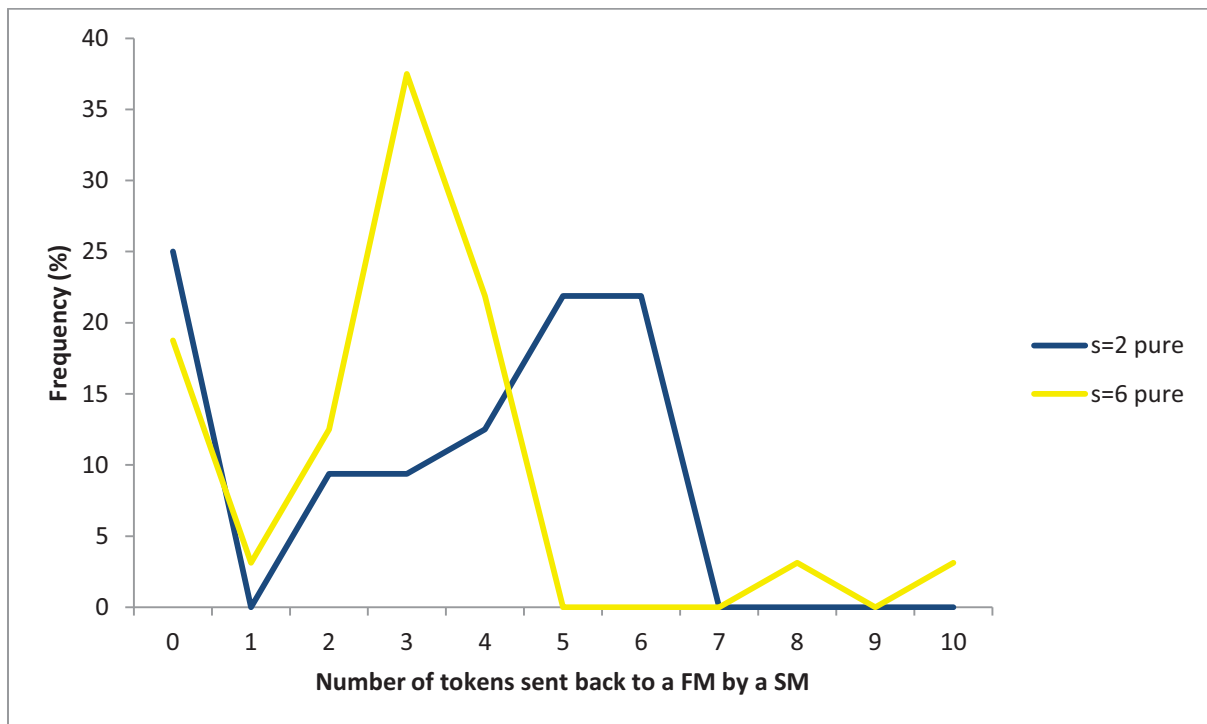**Figure 8 – Distributions of Second Mover Behaviour by *s* in pure treatments**

Table 13 – Summary Statistics and Statistical Tests on Second Mover Behaviour between *s* in pure treatments

Panel A: Summary Statistics of SM Behaviour		
Treatment	Pure *s*=2	Pure *s*=6
Mean	3.38	2.84
Standard Deviation	2.31	2.14

Panel B: Statistical Tests on SM Behaviour	
Test	p-value
Mann-Whitney	.113
Bootstrapped t-test	.371
Epps-Singleton	.000

Table 13 reports the Epps-Singleton test detecting a difference in SM behaviour (p=.000), but the Mann-Whitney test being marginally insignificant (p=.113). Figure 8 shows why this may be the case. By observation, there is a difference between the distributions, with the *s*=6 distribution peaking at around three tokens, and the *s*=2 distribution being a more spread out, with five or six tokens being modal. The Epps-Singleton considers the entire distribution, including the shape, and the two distributions possess different shapes, with *s*=6 being „taller" and narrower than the „short" and wide *s*=2 distribution, which could explain the highly significant p-value reported for this test. As such, there is some mild mixed evidence for H18a, and subsequently, self-serving generosity diminishing reciprocity.

Could the above analysis be considered evidence for the empirical importance of Condition b)? The first point to consider is that this joint test is confounded with the cost of reciprocity. It is posited that the cost of reciprocity would increase the number of tokens sent back to FMs by SMs in the *s*=6 treatment, and the „self-servingness" of a FM's IN offer in the *s*=6 treatment would decrease the number of tokens. As these two effects are in the opposite direction, finding even mixed evidence could be reassuring. On the other hand, the observed difference could be driven by either a preference

for equality or to return the FMs outside option. Both explanations would indicate the exchange rates causing a difference in the opposite direction than originally posited. Instead of the concept being „it is cheaper for me to reciprocate, so I will reciprocate more", it could be „it is now cheaper for me to equalise payouts/repay amount invested, so I will do that and receive more for myself". This effect could be termed as the „cost of equality". It is possible that a preference for equality is driving this result.

5.3.2.2 Direct Cost of Reciprocity Effect

To provide a perspective on whether there exists a cost of reciprocity effect, I compare the outcomes of the chance treatment (s=2 and s=6) to each other. The main consideration for SMs when deciding on how many tokens to send back to the FM between the two possible outcomes is the cost of reciprocity. SMs cannot be considering the „self-servingness" or selflessness of the FM, as s was determined by chance prior to the FM's decision, meaning this is an unconfounded test of the potential cost of reciprocity effect. If the demand for reciprocity follows the law of demand, then SMs will return more tokens when s=6 eventuates, as it is cheaper to be reciprocal. The „cost" of rewarding the FM one point is ½ a point when s=6 eventuates, and 1 ½ points when s=2 eventuates.

H19: The number of tokens sent to FMs by SMs when s=6 eventuates in the chance treatment is greater than when s=2 eventuates in the chance treatment.

When s=2 eventuated in the chance treatment, SMs on average sent back 2.61 tokens, and when s=6 eventuated in the chance treatment, SMs on average sent back 3.67 tokens. Statistical analysis of these distributions is reported in Table 14, and Figure 9 provides a graphical representation.

Figure 9 – Distributions of Second Mover Behaviour by *s* in the chance treatment
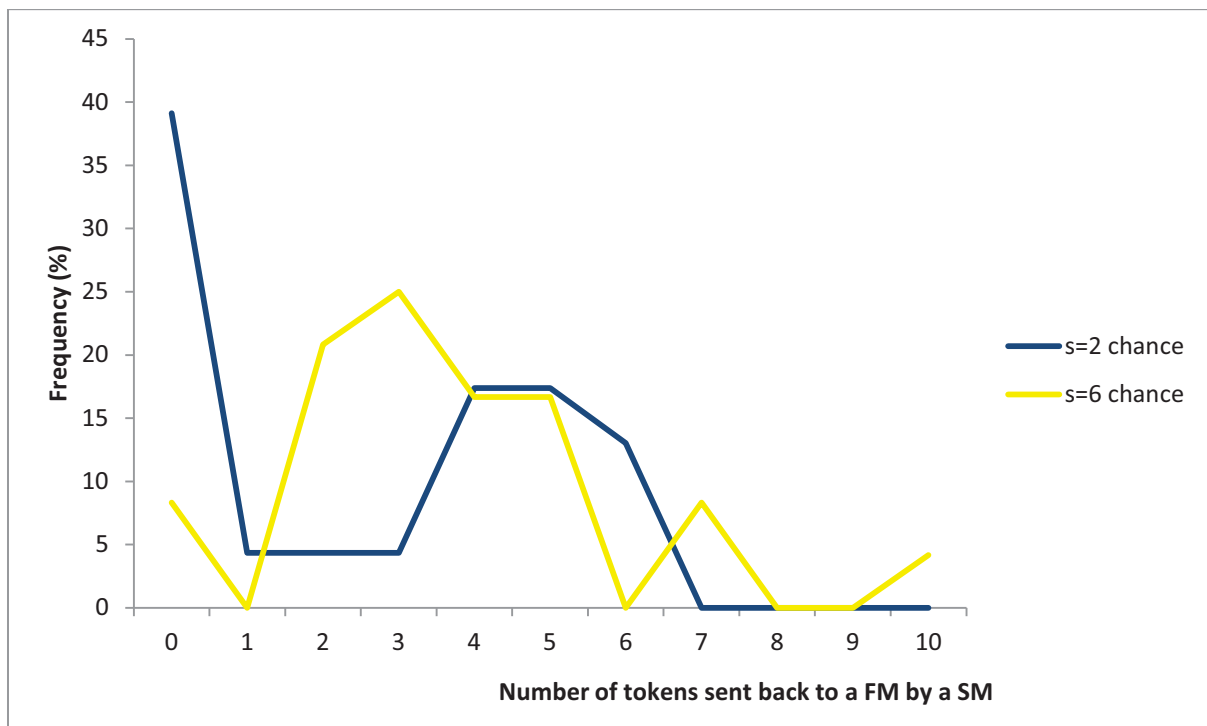

Table 14 – Summary Statistics and Statistical Tests on Second Mover Behaviour between *s* in the chance treatment

Panel A: Summary Statistics of SM Behaviour		
Treatment	Chance *s*=2	Chance *s*=6
Mean	2.61	3.67
Standard Deviation	2.43	2.22

Panel B: Statistical Tests on SM Behaviour	
Test	p-value
Mann-Whitney	.266
Bootstrapped t-test	.122
Epps-Singleton	.020

The Epps-Singleton test is statistically significant (p=.020), but the Mann-Whitney and t-test are not statistically significant (p=.266 and p=.122 respectively). From the Epps-Singleton test, there is some evidence for H19, that the cost of reciprocity effect may exist, but it is not conclusive. Figure 9

reveals that the largest difference between the distributions is at zero tokens, with the $s=2$ treatment being approximately the $s=6$ treatment, lending some informal evidence that the cost of reciprocity may be a factor, as SMs seem to be hesitant to return zero tokens when $s=6$ eventuates, or when it is quite „cheap" to send tokens. A Fisher"s exact test provides support that the proportion of SMs sending zero tokens back is higher when $s=2$ eventuates in the chance treatment, than when $s=6$ eventuates ($p=.017$). A cost of reciprocity effect may exist, as the SMs decision is similar to the Dictator Game in Andreoni and Miller (2002), where the cost of giving was found to impact behaviour, and due to the limited evidence presented here in favour of it. On the other hand, the cost of reciprocity effect may not exist, as the considerations for reciprocity and intentions that have been introduced by the initial „investment" stage could dominate or crowd out a subjects consideration of the cost of reciprocity. Theoretically and empirically, it is not possible to conclude whether the cost of reciprocity has an impact in this game. However, to err on the side of caution it needs to be controlled for, and so I separate out self-serving and selfless effects from the cost of reciprocity.

5.3.2.3 Direct Selfless or Self-serving Effect

Following the findings of the previous subsection, the potential cost of reciprocity effect must be controlled for in order to test the effects of selfless or self-serving intentions on reciprocal behaviour. Any differences in SM behaviour between when a certain points value of tokens is determined by chance after the FM has made his decision and when the points value is already known by the FM must be due to the SMs responding to how intentionally self-serving or selfless the FM"s offer is. If SMs are concerned with the „self-servingness" or selflessness behind a generous action, then she will return more in the pure $s=2$ treatment than when $s=2$ eventuates by chance, as the action in the pure treatment was selfless, but not necessarily so in the chance treatment. Similarly, SMs will return less in the pure $s=6$ treatment than when $s=6$ eventuated by chance, as in the pure treatment the offer was self-serving. In the chance treatment, FMs did not know what points value would eventuate, only that there was an equal chance that either could eventuate. Therefore, a FMs intention when choosing IN in the chance treatment cannot be selfless or self-serving by the proposed conjecture.

H20: The number of tokens sent to the FM by the SM in the pure s=2 treatment is greater than when s=2 is determined by chance.

H21: The number of tokens sent to the FM by the SM when s=6 is determined by chance is greater than in the pure s=6 treatment.

Statistical analysis on H20 and H21 is presented in Table 15, and Figure 10 and Figure 11 graphically show the distributions of SM behaviour.

Table 15 – Summary Statistics and Statistical Tests on Second Mover Behaviour between treatments

Panel A: Summary Statistics on SM Behaviour				
Treatment	Pure $s=2$	Chance $s=2$	Pure $s=6$	Chance $s=6$
Mean	3.38	2.61	2.84	3.64
Standard Deviation	2.31	2.43	2.14	2.22

Panel B: Statistical Tests on SM Behaviour		
Test	$s=2$ p-value	$s=6$ p-value
Mann-Whitney	.245	.142
Bootstrapped t-test	.259	.184
Epps-Singleton	.722	.515

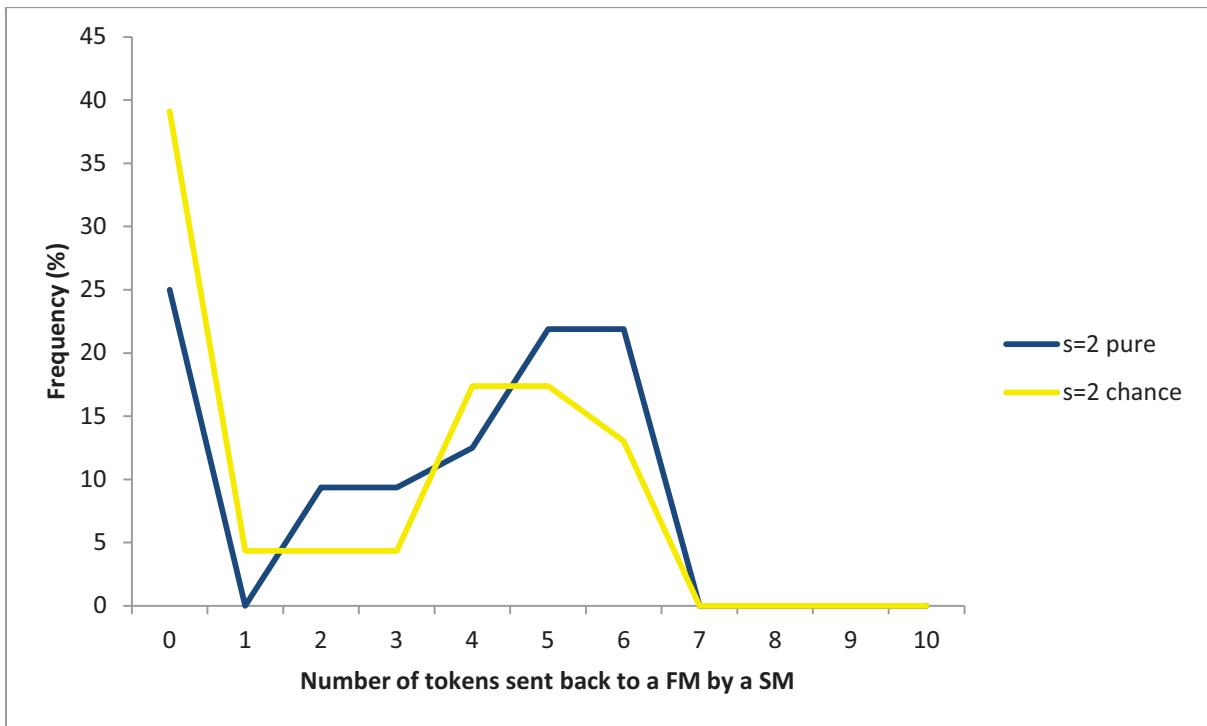**Figure 10 – Distributions of Second Mover Behaviour when *s*=2 by treatment**
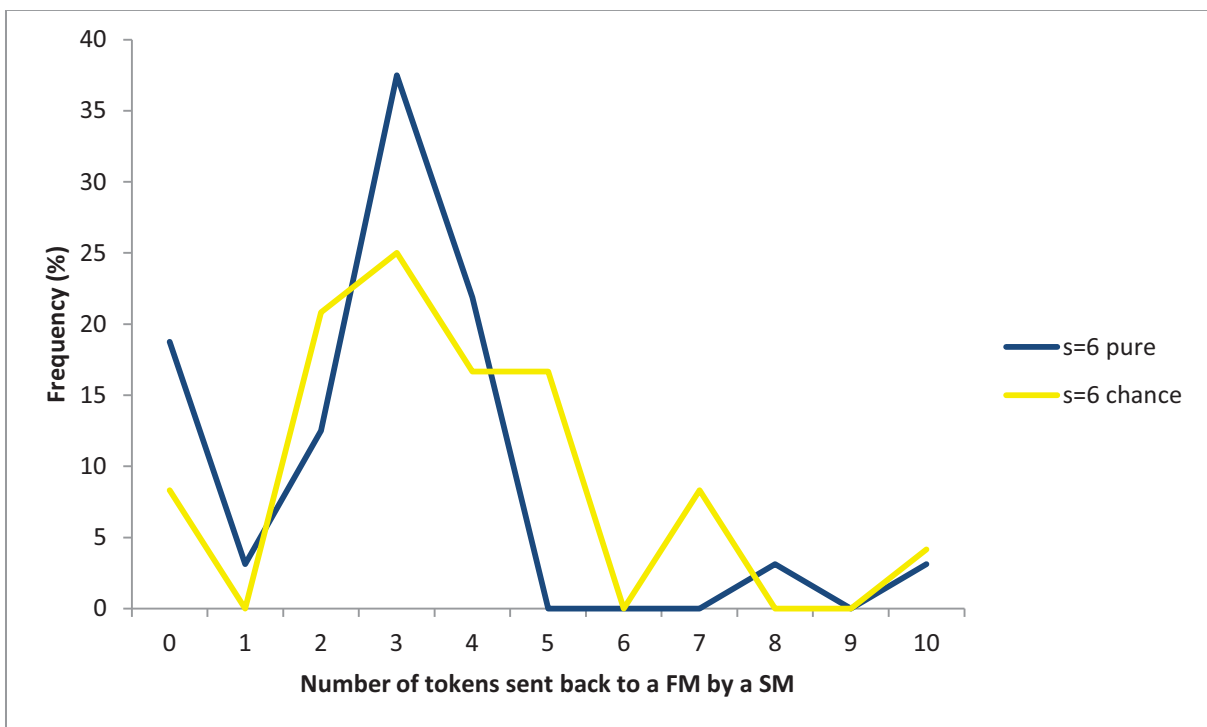

Figure 11 – Distributions of Second Mover Behaviour when *s*=6 by treatment

In the pure *s*=2 treatment SMs on average sent back 3.38 tokens, and 2.61 tokens when *s*=2 was determined by chance. In the pure *s*=6 treatment SMs on average sent back 2.84 tokens, and 3.67 tokens when *s*=6 was determined by chance. The direction of SM behaviour is as posited by H20 and H21. However, the statistical analysis has not borne that out, according to the statistical tests reported in Panel B of Table 15. The distributions presented in Figure 10 appear similar, although divergences do exist. Around 15% more SMs gave zero tokens in the chance treatment, suggesting that SMs are less likely to give zero when the FM is being more selfless. There is also a small divergence near six tokens, with the pure distribution being greater, suggesting SMs are more willing to reward selfless offers. The distributions in Figure 11 also seem similar but with divergences at zero and three tokens returned, with the pure distribution being larger at these points. It seems from Figure 11 that SMs are more likely to return zero when the offer is self-serving, as opposed to being determined by chance and therefore neutral. SMs seem to otherwise try and return enough just so the FMs outside option is covered, which in this case makes three tokens focal, whereas the chance distribution seems to be more spread out. The statistical rejection of any difference in SM behaviour is not as strong as in Experiment 1 with some of the tests coming close to statistical significance, in particular the two-sided Mann-Whitney test in Table 15 (p=.142).

5.4 An Exploration of Beliefs

5.4.1 First Movers

For consistency and comparability to Experiment 1, I again elicit beliefs from subjects. FMs were asked how many tokens they expected SMs to return to FMs on average in each treatment. Conjecture on the direction of any potential difference τ" are confounded by the cost of reciprocity. FMs could be expecting more tokens in the *s*=2 treatment due to the offer being selfless, or they could be expecting less due to the high cost of reciprocity, depending on which effect they think is relevant or dominates. The relevant hypotheses therefore can be stated as follows:

H22a: τ' in the pure s=2 treatment is greater than in the pure s=6 treatment.

H22b: τ' in the pure s=6 treatment is greater than in the pure s=2 treatment.

H23a: τ' in the pure s=2 treatment is greater than in the chance treatment.

H23b: τ' in the chance treatment is greater than in the pure s=2 treatment.

H24a: τ' in the chance treatment is greater than in the pure s=6 treatment.

H24b: τ' in the pure s=6 treatment is greater than in the chance treatment.

The averages of these responses were 3.66 tokens in the pure *s*=2 treatment, 3.17 tokens in the chance treatment, and 2.66 tokens in the pure *s*=6 treatment, giving support for the „a" set of hypotheses. Figure 12 presents the distributions in a graph, and statistical analysis of H22, H23 and H24 is reported in Table 16.

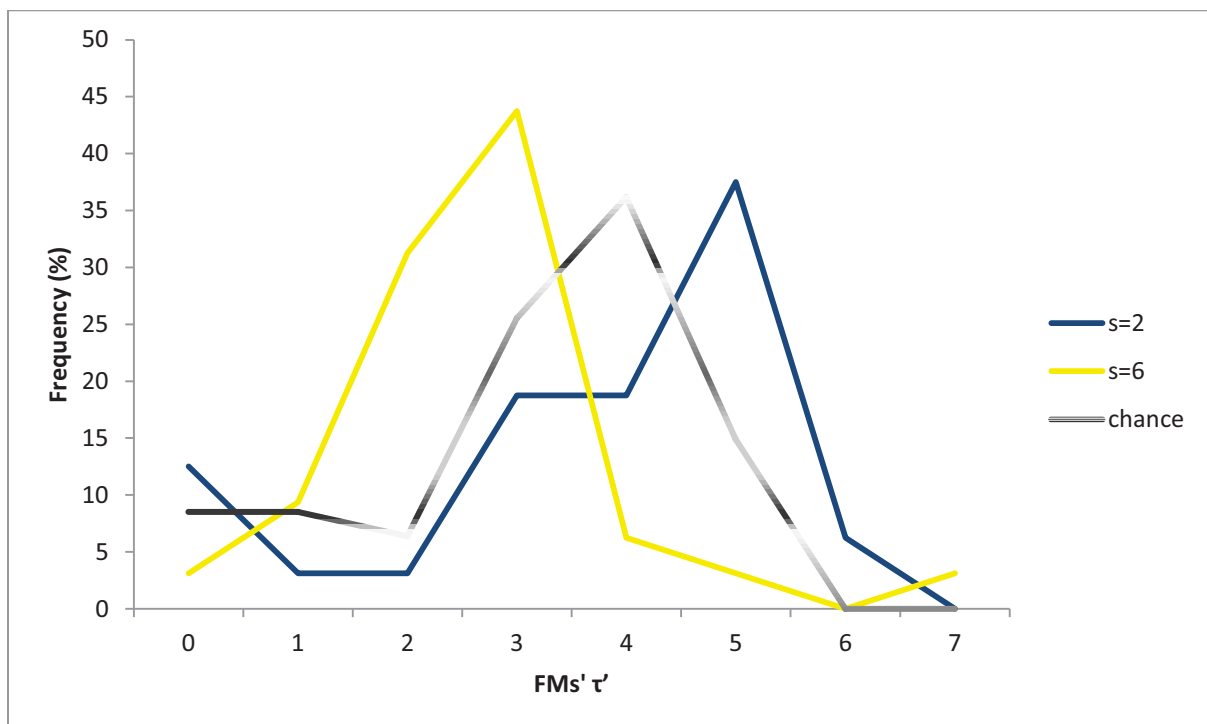**Figure 12 – Distributions of First Movers' Beliefs (τ') by treatment**

Table 16 – Summary Statistics and Statistical tests on First Movers' Beliefs (τ') between treatments

Panel A: Summary Statistics of FMs'' τ''			
Treatment	Pure *s*=2	Pure *s*=6	Chance
Mean	3.66	2.66	3.17
Standard Deviation	1.79	1.26	1.46

Panel B: Statistical Tests on FMs'' τ''			
Test	Pure *s*=2 vs Pure *s*=6 p-value	Pure *s*=2 vs Chance p-value	Pure *s*=6 vs Chance p-value
Mann-Whitney	.002	.067	.012
Bootstrapped t-test	.042	.224	.136
Epps-Singleton	.000	.069	.000

There is evidence that FMs expect SMs to send back less tokens in the pure *s*=6 treatment compared to the pure *s*=2 treatment, giving support for H22a, with all of the reported statistical tests being statistically significant (p≤.042). Whether FMs expect SMs to send back a different amount between the *s*=2 and chance treatments is less clear, with the Mann-Whitney and Epps-Singleton tests being weakly significant (p=.067 and p=.069 respectively), but not the t-test (p=.224), so therefore there is mixed evidence for H16a. Also, when comparing the *s*=6 treatment and the chance treatment, the Mann-Whitney and Epps-Singleton tests are strongly significant (p=.012 and p=.000 respectively), but the t-test marginally insignificant (p=.136), and so there is some support for H23a. From these results, it is reasonable to assume that some differences in τ'' do exist between the treatments.

If FMs expect to receive less tokens in the pure *s*=6 treatment compared to the pure *s*=2 treatment, is that consistent with FMs believing that self-serving generosity affects SMs behaviour? Not necessarily, as the points those tokens earn must be taken into account. For example, the average number of tokens FMs expect to receive back is 2.66 in the *s*=6 treatment and 3.66 tokens in the *s*=2 treatment, which translates in points earnt by the FM of 16.00 and 7.32 respectively, meaning that FMs are technically expecting to receive a higher payout in the pure *s*=6 treatment, making IN seem

quite self-serving. On the other hand, the amount of points sacrificed by the SM in order to reward the FM with a token is constant, so FMs are expecting SMs to sacrifice more points in the pure *s*=2 treatment, or when the offer is selfless.

Note the difference in findings from Experiment 1, where FM's perceived generosity of IN differed between treatments, but not their expectations of SM behaviour. In this experiment, the opposite has been found, that FMs perceived generosity does not differ, but their expectations of SM behaviour do. The perceived generosity of an action could be centred on the amount sacrificed in order to take that action, which would explain why it differed in Experiment 1 but not in this experiment.[73] The differences in FMs expectations of SM behaviour in this experiment might be due to FMs anticipating some sort of cost of reciprocity effect, which was not present in Experiment 1.

5.4.2 Second Movers

SMs were to guess how many tokens on average FMs expected SMs to return to FMs, or in other words, τ^{e} was elicited. The averages of τ^{e} considering FMs that went IN, were 4.00 tokens in the *s*=2 treatment, 3.63 tokens in the *s*=6 treatment, and 4.13 tokens in the chance treatment. Table 17 reports statistical analysis of SMs' beliefs.

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[73] In Experiment 1, the FM either „gave up" $4 or -$2, whereas in Experiment 2, the FM always gives up 10 points in order to choose IN, regardless of treatment.

Table 17 – Summary Statistics and Statistical Tests on Second Movers' Beliefs (τ'') between treatments

Panel A: Summary Statistics of SMs' τ''			
Treatment	Pure s=2	Pure s=6	Chance
Mean	4.00	3.63	4.13
Standard Deviation	1.63	1.72	1.53

Panel B: Statistical Tests on SMs' τ''			
Test	Pure s=2 vs Pure s=6 p-value	Pure s=2 vs Chance p-value	Pure s=6 vs Chance p-value
Mann-Whitney	.016	.959	.020
Bootstrapped t-test	.438	.725	.236
Epps-Singleton	.027	.240	.007

The Mann-Whitney and Epps-Singleton tests detect a difference in τ'' between the s=2 treatment and the s=6 treatment (p=.016 and p=.027 respectively), and between the chance treatment and the s=6 treatment (p=.020 and p=.007). This suggests that SMs believe that FMs expect SMs to send back less tokens in the s=6 treatment, compared to the other treatments, which is consistent with the conjecture of a self-serving offer receiving a lower reciprocal response.

In the LWG, SMs' τ'' and the amount sent back is correlated, but this has no impact on SM behaviour, which is puzzling. I test whether this is also the case in the current design. In particular, does there exist a correlation between a SMs τ'' and the number of tokens they decide to send back to FMs?

H25: τ'' and the number of tokens SMs sent back to FMs are correlated.

Table 18 – Spearman correlation tests between τ'' and Second Mover Behaviour

Treatment	Spearman coefficient	p-value
Pooled (all treatments)	.408	.000
$s=2$	.266	.141
$s=6$	.551	.001
Chance	.380	.008

Table 18 shows a positive correlation between these two variables except when only observations from the $s=2$ treatment are considered, giving some evidence for H25. If τ''' differs in a certain treatment, as was found to be the case previously with respect to the $s=6$ treatment (see Table 17), and τ''' is correlated with the amount of tokens they decide to send back, then SMs should behave differently in that treatment. There is mixed evidence that SMs do send back a different amount of tokens in the pure $s=6$ treatment than in the pure $s=2$ treatment (see H20a and Table 13), however this evidence is far from conclusive. Also, no difference in SM behaviour was detected between the pure $s=6$ treatment and the chance treatment (see Table 15).

SMs were asked to consider τ''' considering FMs that chose IN and FMs that chose OUT separately. Therefore, for similar reasons as described in Experiment 1, a robustness check of the main finding of Woods (2010) can be performed.

H26: τ'' considering FMs that choose IN is greater than τ'' when considering FMs that chose OUT.

Table 19 – Statistical Tests on Second Movers' Beliefs (τ'') between considerations of a First Mover's choice

Test	$s=2$ p-value	$s=6$ p-value	Chance p-value
Mann-Whitney	.327	.000	.000
Bootstrapped t-test	.362	.000	.000
Epps-Singleton	.029	.000	.000

The finding that SMs can anticipate that FMs that choose IN expect to receive more than FMs that choose OUT has been replicated in the *s*=6 and chance treatments, giving support for H26. Curiously, this finding was not replicated well in the *s*=2 treatment, with only the Epps-Singleton test being statistically significant. Because of the within-subjects design, this particular specification is an easier test of the theory than in Woods (2010), so this result is particularly surprising. Perhaps SMs in the *s*=2 treatment thought that choosing IN was so selfless that FMs choosing IN did not expect to receive much back, making them not too different from those that went OUT.

5.5 Demographics

Demographics were also collected in Experiment 2, and I analyse whether any of the elicited demographics affected SMs reciprocal response. An identical variable selection approach was implemented as described in the Experiment 1 Demographic section. The approaches did not report the same variables this time, and I elected to use the model selection process based on the corrected Akaike information criterion. This final specification is reported in Table 20.

Table 20 – Demographic Regression Analysis on Second Mover Behaviour

Variable	OLS Coefficient (p-value)	2-sided Tobit Coefficient (p-value)
Age	.049	.071
	(.131)	(.085)
$\tau^{\epsilon\epsilon\epsilon}$ IN	.575	.713
	(.000)	(.000)
Constant	-.270	-1.63
	(.769)	(.182)

Compared to Experiment 1, the demographics that were elicited had much less of an effect on SM behaviour. The only demographic variable that could be considered weakly statistically significant was the Age variable (p=.131 in OLS and p=.085 in Tobit), which measured a subject's age in years.

Holding other variables constant, increasing a subject's age by one year tends to increase the number of tokens they send back by .049-.071 tokens. The demographic analysis was less interesting in this experiment compared to Experiment 1. However, this can also be seen as a positive thing, as it is mostly game or design related features that are changing subject behaviour.

5.6 Comparison to Andreoni and Miller (2002)

As this design utilised a part of the design of Andreoni and Miller (2002), findings from that paper can be compared to the current data. The introduction of the initial IN/OUT stage of the FM in this design could impact SM behaviour compared to the Dictator Game implemented in Andreoni and Miller (2002). They found that approximately 43% of their subjects could be characterised by one of three simple utility functions, that 22.7% behaved perfectly selfishly, 14.2% equalised payouts, or behaved according to a Leontief utility function, and 6.2% put all of their tokens into whatever had the highest redemption rate, implying perfect substitutes. The comparison will not be as strict as Andreoni and Miller elicited data over many different token endowments and redemption rates for each individual, whereas this research does not.[74] Of SMs in this experiment, 22.5% behaved perfectly selfishly, in that they kept all tokens for themselves, which is quite similar to the 22.7% found by Andreoni and Miller. However, there is a confound, in that some of those that seem to be acting selfishly in the *s*=2 treatment may be instead putting their tokens to whatever the highest redemption rate is. Looking at SMs from the *s*=6 treatment where this is not an issue reveals that 14.2% of SMs act selfishly, which is less than the percentage of selfish subjects reported by Andreoni and Miller. It would be expected that less people act selfishly in a Investment style game than in the Dictator Game, as the FM has had to undertake some costly action in order to make the split possible in this game, whereas in the Dictator Game the „FM" has not, and does not, choose an action. To equalise payouts in the *s*=2 treatment, a SM would have to send six tokens back, and in the *s*=6 treatment, a SM cannot perfectly equalise payouts, but the closest to doing so is to either send back three or four tokens. 35.1% of SMs chose to send tokens back in such a manner, which is consistent with Leontief

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[74] As this experiment is not, and was never designed to be, a direct test of what types of preferences subjects exhibit.

preferences. This is more than double the percentage reported by Andreoni and Miller (14.2%), meaning that the introduction of the investment stage has, as would be expected, increased SMs consideration of the FMs.[75] As for SMs revealing utility functions consistent with perfect substitutes, only observations from $s=6$ can be used, because those returning zero tokens in the pure $s=2$ treatment or when $s=2$ eventuates in the chance treatment could just be acting selfishly. In the $s=6$ treatment 3.6% of SMs sending back all ten tokens. This is less than the 6.2% reported by Andreoni and Miller, but perhaps not significantly so, and their results may inflate the number of subjects behaving in such a manner due to the within-subjects approach, possibly due to an experimenter demand effect.

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[75] Although Andreoni and Miller's (2002) metric for payout equalisation is more strict, as a subject must be equalising payouts in every decision they make, whereas in this research they only have to once, this effect is likely not that large.

6. DISCUSSION/CONCLUSION

I set out to study whether self-serving generosity diminishes reciprocal behaviour. Condition b) of Cox et al.'s (2008) Revealed Altruism model describes self-serving generosity, and so I investigated its empirical relevance. This condition stated that for one offer to be considered MGT another, it must not benefit the proposer by more than the receiver. I developed a conjecture on how this condition would influence the MGT ordering, proposing an extension of the Revealed Altruism model. I defined an offer that satisfied the inequality of Condition b) as being selfless, as it means the maximum potential income of the proposer was less than that of the receiver, and conversely, an offer that violated Condition b) as self-serving, as the proposer potentially stood to gain more than the receiver. Exploring data from previous research, I posited that the level of selflessness itself did not influence the MGT ordering, and that it may be whether an offer is selfless or self-serving that would impact the MGT ordering. Using novel designs that varied Condition b) while keeping Condition a) constant, I found that whether an offer was selfless or self-serving did not influence the MGT ordering through the channel of the MAT response, but that subjects did perceive selfless and self-serving offers of differing levels of generosity. Subjects appear to recognise that an offer is less generous when it is self-serving, but it did not impact their reciprocal response. It seems to be that it is not through perceived generosity that MGT offers elicit MAT responses, once one moves outside of the domain specified by Cox et al. (2008). Instead, it appears that subjects may be responding to how generous an offer is to them, rather than how generous an offer is overall. Alternatively, the non-salience of the generosity perception elicitation may be driving the findings of a difference in responder's generosity perception but not in responder behaviour. Responders could be using the generosity elicitation as some sort of costless disapproval of self-serving actions, in that responders do recognise whether an offer was self-serving or selfless, only it does not influence their actions that have monetary consequences. Therefore, a salient elicitation using a proper scoring rule might result in different findings.

Removing Condition b) from the Revealed Altruism model through the support of this research simplifies the model, but in doing so removes a channel for intentions to be considered, as subjects

will base their MAT response on the amount that they gained, without consideration for self-serving or selfless intentions. Intentions still implicitly exist in the model through Axiom S, which deals with overturning or upholding the status quo and potential lack of alternative options. Cox et al. (2008) do not explicitly mention intentions in relation to Axiom S, however intentions seem to be the most appropriate explanation of the channel by which Axiom S has an effect.

6.1 Alternative Explanations

6.1.1 Alternative Metrics to determine Self-Serving Generosity

It may be that the maximum potential payout is not an appropriate metric by which to determine whether an offer is self-serving or not. Such an approach was chosen for consistency with the Revealed Altruism model. Why would the maximum potential payout of a proposer impact a responder's decision, when it is the responder that determines the actual payout to the proposer, which is rarely the maximum potential?[76] Perhaps it would be more appropriate to measure how self-serving a responder perceives an offer by how much she expects the proposer expects to receive, or her second order belief, τ'''. How self-serving an offer is could then be defined by how high τ''' is, and if self-serving offers have a negative impact on reciprocity, then a negative correlation should exist between τ''' and the amount a responder returns. However, Table 6 from Experiment 1 and Table 18 from Experiment 2 suggest that there is a statistically significant positive correlation between these two variables, which is more consistent with guilt aversion.[77] However, such a correlation may be due to a "false consensus effect", proposed by Ellingsen, Johannesson, Tjøtta, and Torsvik (2010), in which subjects may believe that other subjects behave, or would behave, like themselves, which would explain why their beliefs are closely tied with their actions. By eliciting a proposers belief and simply giving this belief to the responder, Ellingsen et al. (2010) find that the correlation between the given belief and responder behaviour is not statistically significant from zero, in both the Dictator

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[76] Such a situation was not observed in Experiment 1, and was observed twice in Experiment 2, with one such subject revealing while collecting his payout that he had made a mistake.

[77] The concept that a responder may feel guilty for not meeting the proposers expectations, and will make a transfer closer to the expected amount in order to reduce the guilt that they feel. See Charness and Dufwenberg (2006) and Battigalli and Dufwenberg (2009) for further reference.

Game and the Investment Game.[78] Therefore, less weight can be placed on the observation of a positive correlation in the current experiments, due to the potential „false consensus effect". Another way of testing whether τ'' affects how self-serving responders think an offer is, is by testing for correlation between τ'' and the elicited generosity measure. In this situation, if a higher τ'' is indicative of considering an offer more self-serving, then a negative correlation between the two variables should be observed. Table 21 reports Spearman correlation tests on these two variables in both experiments.

Table 21 – Spearman correlation tests between τ'' and a Second Mover's Generosity Perception

Panel A: Experiment 1		
Treatment	Coefficient	p-value
Pooled ($x=-2$ and $x=4$)	-.123	.289
$x=-2$	-.312	.060
$x=4$	.075	.646
Panel B: Experiment 2		
Treatment	Coefficient	p-value
Pooled (all treatments)	-.013	.889
$s=2$	.222	.222
$s=6$	-.387	.029
Chance	-.031	.834

Only the $x=-2$ observations from Experiment 1 and the $s=6$ observations from Experiment 2 are statistically significant, (p=.060 and p=.029 respectively), and both have a negative coefficient. The lack of evidence from the other observations, however, indicates that τ'' is not necessarily a good measure to determine how generous an offer is perceived to be.

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[78] Such a design requires not informing proposers that their beliefs will be passed on to responders, as this would bias responses, particularly if proposers believe responders are guilt averse. Ellingsen et al. (2010) do not explicitly tell the proposers that his beliefs will not be given to the responder, so incomplete information is used.

Finally, perhaps it is the minimum potential income that determines how self-serving an offer is. A by-product of the design in Experiment 1 gives a way to test this hypothesis, with the minimum potential gain of choosing IN in the $x=-2$ treatment being \$2 (as the worst the responder can do is choose \$0, which is compared to the outside option $x=-2$), and the minimum potential „gain" of choosing IN in the $x=4$ treatment is -\$4. By this measure $x=-2$ is self-serving and $x=4$ is selfless, but note that the labelling of selfless and self-serving treatments is the same as using the maximum potential income. Recall that there existed no difference in responder behaviour between those treatments, but a difference between the perceived generosity elicitations between the treatments. To compare the appropriateness of using the maximum or minimum to determine whether an offer is self-serving or not, Experiment 2 can be utilised, as it varies the maximum but not the minimum. As similar results were found, i.e., no difference in subject behaviour but a difference in perceived generosity, it cannot be concluded that the minimum is an appropriate measure to use. It should be noted that neither experiment was designed to test the appropriateness of these metrics. A design testing these metrics could be interesting, but outside of the scope of this research, and is left for future explorations. Despite not necessarily being the most intuitive option, the maximum potential income from the offer still seems to be the most appropriate metric with which to determine how self-serving an offer is, at least of the variants proposed.

6.1.2 Other Models of Reciprocity

What do the other combination models discussed in the Literature Review predict in regards to self-serving generosity, in particular in the designs that were implemented in this paper? Firstly, Charness and Rabin's (2000) model only incorporates negative reciprocity, therefore it has nothing to say about positive reciprocity. If some of the general ideas behind Charness and Rabin's (2000) model are modified to include positive reciprocity, then more relevant predictions can be made. In the model, a subject has a desire to behave consistently with quasi-maximin preferences, in that they somewhat care about maximising surplus and the worst-off subject's payout in addition to their own material payout. A subject loses this desire, however, if the other person behaves in a manner inconsistent with quasi-maximin preferences. In order to include positive reciprocity, the Revealed Altruism framework

could be utilised, substituting quasi-maximin preferences as the utility function. Such an approach would yield identical predictions for Experiment 1, as the surplus generated is constant and the SM is not able to alter that with her decision. Therefore, her only quasi-maximin consideration is for that of the worst-off individual, which is most likely to be the FM, so if the difference in MGT via Condition b) alters that consideration, then a difference in SM behaviour should be observed. This Revealed Altruism approach is more complicated for Experiment 2, as the SM now has an opportunity to alter the surplus generated through her decision. Here a MGT offer would result in a greater weight being placed on both considerations for the worst-off individual and surplus maximisation. In the $s=2$ treatment, the SM could increase the surplus generated by holding more tokens for herself, but this obviously makes the FM worse off, and as a result it would come down to the individuals relative preferences as to which effect dominates. Subsequently, if the $s=2$ treatment is MGT via Condition b), one would expect to see a larger weight on both of the described considerations, but it would depend on the population to determine whether an increase, decrease, or no change in the number of tokens returned would be predicted. If quasi-maximin is a good description of a subject's utility function, the lack of clear results arising from Experiment 2 could be because of the described effect, and that subjects are heterogeneous in their preferences.

Perhaps using the Revealed Altruism approach is not appropriate when considering the model of Charness and Rabin (2000). An alternative extension of the model to positive reciprocity is to state that the more a proposer behaves in a manner consistent with quasi-maximin preferences, the greater weight the responder places on welfare preferences, somewhat of an inverse of the demerit profile described for negative reciprocity. A FM choosing IN always represents an improvement according to quasi-maximin preferences, as it increases total surplus, and as the SM can choose the division of the surplus, she can ensure that the worst-off individual at least does not become even worse-off. As the division of surplus is determined by the SM, exact predictions on how quasi-maximin IN is cannot be determined.[79] The most interesting situation from this approach is from Experiment 2. A FM choosing IN in the $s=6$ treatment may more clearly reveal a desire to act in accordance with quasi-maximin

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[79] Without using beliefs, which as described earlier the elicited beliefs may not be very informative due to the „false consensus effect".

preferences, as it generates a greater potential total surplus, without necessarily making anyone worse off. Again, the issue of trade-off between surplus maximisation and concern for the worst-off individual arises. This issue suggests that an approach using quasi-maximin preferences will not necessarily have clear, testable hypotheses, which may be considered a weakness of such an approach.

The other combination model described in the Literature Review was that of Falk and Fischbacher (2006). The manner in which intentions enter the model is through the intention factor, a measure of how intentional an offer is revealed to be. None of the described cases that make up the intention factor include a situation analogous to self-serving generosity, therefore this explicit model would not predict differences in behaviour between any of the treatments. It is quite intuitive, however, that if someone chose the best offer available to you, but that it was also the best offer available to them, that the kind offer may not be considered fully intentional. In addition, Falk and Fischbacher (2006) based their considerations of how intentional an offer is based on observations from perceived kindness elicited over many situations in a questionnaire style survey. This is somewhat analogous to the elicited generosity in this research, and as a statistically significant difference was found between treatments, such a consideration could be added to the intention factor quite reasonably.[80] However, it was found that despite the difference in perceived generosity that no difference in SM behaviour arose. This potentially places doubt on some of the other posited influences on intentionality as reported in Falk and Fischbacher (2006), as their existence was derived from a similar elicitation that may not actually affect subject behaviour.

The theory of Bénabou and Tirole (2006) gives an interesting environment in which to explore the results from my two experiments. By altering how self-serving a FM's IN offer is between treatments, I have altered the signal that a SM receives about the FM's kind or greedy intentions.[81] A SM may want to reward FMs that she thinks chose IN for kind reasons, but not FMs that she thinks chose IN for self-serving reasons. Consider Experiment 1, and what kind of FMs would choose IN in the $x=4$ treatment. FM's that are sufficiently kind will choose IN, whereas FMs that are sufficiently self-

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[80] If anything, the result found in my research is stronger evidence than that used by Falk and Fischbacher (2006), as this result is from a between-subjects approach rather than a within-subjects approach.

[81] Technically, the SM does not receive a signal in my designs, as the FM's decision is not revealed until after the SM has made her decision. However, SMs should be able to consider what types of FM will choose IN.

centred will choose OUT.[82] Therefore, a SM receives a signal that a FM choosing IN is somewhat kind in the $x=4$ treatment. In the $x=-2$ treatment, FMs that are self-centred will now choose IN, as well as kind FMs. The signal of a FM choosing IN, whether a FM is kind or self-centred is worse in the $x=-2$ treatment, as both self-serving and kind FMs are choosing IN. Similarly, in Experiment 2, in the pure $s=2$ treatment, relatively kind FMs will choose IN, and in the pure $s=6$ treatment, more self-centred FMs will be induced to choose IN as well.[83] Again, the quality of the signal of the FM choosing IN has decreased, with more self-serving FMs choosing IN as well as kind FMs. How have SMs responded to this decrease in signal quality of a FM's intentions? To recap the results; there was no difference in SM behaviour between treatments, but SMs did perceive IN offers to be of different levels of generosity. The explanation proposed previously, that SMs simply care about what an IN offer means for them, could also apply for this model. A SM's signal of kindness would then be based on what the offer meant for her. An alternate explanation relating to SMs' responses to the quality of the signal could also be proposed. Perhaps SMs are simply giving FMs the benefit of the doubt when the signal quality of intentions degrade. Without a clear signal, SMs could decide that sufficiently rewarding a kind FM is more important than not rewarding a self-serving FM, and subsequently SMs choose to reward the same amount as when the signal is clearer.[84] By reporting differing generosity perceptions between treatments, SMs could have revealed that they understand that more self-centred FMs have chosen IN, but that their desire to sufficiently reward a kind FM is stronger.

6.1.3 On the Employee/Employer Relationship

Using a justification provided earlier as to why reciprocity is important, the employer/employee relationship, a more practical observation can be made. When a firm makes a decision to hire a worker, it will only do so if the profits from doing so exceed the wages they must pay to the worker. The difference between the wage and the profit, or the net profit to the firm from that worker may not

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[82] A FM's decision would also depend on his beliefs and a potential reputational benefit from appearing to be kinder than he actually is. Such considerations are assumed constant for ease of illustration.

[83] The chance treatment will also induce self-centred FMs to choose IN compared to the pure $s=2$ treatment, but less than the pure $s=6$ treatment.

[84] An alternate specification could be that the SM would employ some sort of weighted average depending on what proportion she believes FMs are kind and self-centred, but this would imply a difference in SM behaviour that was not detected in the results.

exceed the wages paid to the worker, and in this case the firm is being selfless. It is not difficult to imagine a situation where the firm will be making more profit than the wages the worker is receiving, or in other words, the firm is being self-serving by employing the worker. The question is, does the worker care if the firm is being self-serving, or does he just care about his wages? The findings of this research are that the worker will only care about his wages, and that firms can focus on wages to receive the benefits of reciprocation, rather than the proportion of the distribution of surplus generated. However, it is also not difficult to imagine a situation where the firm is making extremely more off the worker than the worker is receiving in compensation, and the worker resents the firm for this and subsequently does not reciprocate, or reciprocates negatively. Very extreme self-servingness may still influence the reciprocal response, and will be discussed further in the Future Research section.

6.2 Future Research

As is often the case in Experimental Economics research, more experiments can always be proposed to explore the issue at hand. There are a number of avenues for future research onto this topic, in particular increasing the robustness of the lack of empirical relevance of Condition b). This research only covered positive reciprocity, which might function differently than negative reciprocity, so therefore to more conclusively reject Condition b) as an influence on subject behaviour, a direct test of it should be conducted with negative reciprocity. The analysis done by Cox et al. (2008) on the Carrot & Stick Game (Andreoni et al., 2003) found some evidence to suggest that Condition b) may affect negative reciprocity. A direct test of Condition b) affecting negative reciprocity would therefore be desirable to run. A simple way of doing this would be to have the proposer offer a self-serving but generous offer, and instead of giving the responder the ability to reward, to instead give them the ability to punish. However, the inclusion of punishment, especially as the responder's only option, may prime subjects into looking for things to punish, which could bias results towards finding evidence for Condition b). Such designs are left for future research.

While statistically analysing the results in Experiment 2, an interesting question arose while considering the cost of reciprocity effect. In Experiment 2, tokens that are held by the SM earn three points, and tokens sent to the FM earn the FM either two or six points, depending on the treatment. The cost to the SM of rewarding the FM one point is ½ a point when $s=6$ and 1 ½ points when $s=2$, meaning it is cheaper for the SM to reward the FM points when $s=6$. However, the SM does not make her decision in points, she makes them in tokens. For every token sent to the FM, the SM forgoes three points, regardless of treatment, meaning the amount sacrificed by the SM to reward the FM one token is constant across treatments. By sending fewer tokens on average to the FM in the $s=6$ treatment, and sending more tokens on average in the $s=2$ treatment, have SMs revealed a higher willingness to sacrifice to reward the FM in the $s=2$ treatment? Or should the analysis instead be on the number of points generated, which was higher in the $s=6$ treatment despite the fact that fewer tokens were sent? The discrete nature of the tokens system, and the constant amount of points needed to be forgone by the SM per token, could have diminished the ability to be able to detect a cost of reciprocity effect in this research. It may be interesting to compare the token based system used in this research, to a points based system that would be based off the aforementioned costs, to see if that changes subject behaviour. Having to sacrifice three points to reward one token (of varying points value) could elicit different behaviour than having to sacrifice either ½ a point or 1 ½ points to reward a point, despite these two situations being technically the same. This potential methodological issue is left for future research.

As mentioned previously, very extreme self-serving but generous offers may influence the reciprocal response. It may be that a sufficiently high level of violation of Condition b) affects the MGT ordering. For example, in Experiment 1, if the negative outside option were to be much larger, say -$20 instead of -$2, would responders still return the same amount? The problem here is the challenge of implementing such a design, in the given example one cannot expect subjects to walk out of an experiment with negative payouts, so implementing such an extreme design is not feasible.[85] Similarly, the more extreme you make how self-serving an offer to the proposer is in a positive way

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[85] Such a design is not feasible as subjects are recruited to earn money, and having subjects lose money may damage the reputation an Experimental Lab has with its subject pool, making future experiments more difficult to acquire subjects for.

increases the costs of running experiments, which would also make it infeasible. Perhaps the experiment could be run in a country where the exchange rates and relative living standards makes it cost-efficient to implement extreme stakes, which I leave for future research.

Direct experimental tests of the theory present in Bénabou and Tirole (2006) could provide an interesting avenue for future research. There were many design features that make my experiments inappropriate direct tests of their theory.[86] Firstly, the reward for performing a prosocial action depended on beliefs, which brings further uncertainty to why a prosocial action was taken. A direct test would explicitly implement this reward, and vary it to see if actions change in the manner posited by the theory. Secondly, reputational benefits were only implied through the potential reward, which confounds it with the extrinsic reward.[87] Actual reputational benefits can be hard to quantify, but a lab experiment could implement this by using an incentive scheme that rewards based on what belief a proposer instils through his action. Thirdly, the focus of my research was on the response to self-serving prosocial actions, whereas the theory of Bénabou and Tirole (2006) focuses more on the decision to undertake a prosocial action. I posit that, if the response to a self-serving action does not change, then the reputational considerations from how self-serving an action is should not influence the decision to undertake that action. I leave all of the discussed points and potential designs for future research.

Finally, I have put great emphasis on the need to hold Condition a) constant while varying Condition b), in order to test for the empirical relevance of Condition b). Having concluded that violations in Condition b) do not affect the reciprocal response, the next step is to vary Condition a) as well as Condition b) in order to confirm that Condition b) is irrelevant. There may be an interaction effect between the two conditions, which may mean that Condition b) is irrelevant when considered in isolation, but relevant when considered jointly with Condition a). If Condition b) is irrelevant, then a response to a certain change in Condition a) should be the same regardless of whether Condition b) is

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[86] Note my designs were never intended to be direct tests of this particular theory.
[87] Also, decisions were anonymous, which would result in a near zero x, how well-known a prosocial action is, lowering the importance of reputational considerations in my designs.

satisfied or not. Such a design would further confirm the empirical irrelevance of Condition b), and is

left for future research.

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8. APPENDIX

8.1 Experiment 1 Instructions (*x*=-2)

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be divided randomly into two groups, called Group 1 and Group 2. Each person in Group 1 will be anonymously paired with a person in Group 2. No one will learn the identity of the person he/she is paired with.

Structure of the experiment

This experiment is computerised, meaning you will be entering your decisions on the computer in front of you. If you have any trouble entering your decisions, please raise your hand to alert the experimenter who will assist you.

The Group 1 Decision Task

Each person in Group 1 will have two options:

To choose OUT and receive $-2, meaning that $2 will be subtracted from their show up fee. In this case the paired Group 2 person with whom he/she is paired makes no decision.

To choose IN. In that case the paired person in Group 2 will get to split $20 between the pair. That is, the person in Group 2 will decide how much of the $20, between $0 and $20, to give to the person in Group 1, and how much to keep.

Group 1 persons enter their decision by selecting the relevant option on the screen, followed by clicking OK.

The Group 2 Decision Task

If the Group 1 person chooses IN, then $20 will be made available to split between the two paired persons. The split will be determined by the Group 2 person. Each Group 2 person will be asked to decide how much money out of $20 to give to the Group 1 person with whom he/she is paired. Group 2 persons enter their decisions in the relevant text box, followed by clicking OK. Note that this decision by the Group 2 person will only be relevant if the Group 1 person chose IN.

Payment of Show up Fees and Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once everybody has made their decisions, you will be presented with a screen instructing you to wait. Do not click OK until the experimenter asks you to do so. You will then answer a questionnaire, followed by a summary of your earnings, and finally another questionnaire. Once this is complete, you will be asked one by one to enter the payment room at the back of the lab for the payment of your earnings. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

8.2 Experiment 1 Instructions (*x*=4)

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be divided randomly into two groups, called Group 1 and Group 2. Each person in Group 1 will be anonymously paired with a person in Group 2. No one will learn the identity of the person he/she is paired with.

Structure of the experiment

This experiment is computerised, meaning you will be entering your decisions on the computer in front of you. If you have any trouble entering your decisions, please raise your hand to alert the experimenter who will assist you.

The Group 1 Decision Task

Each person in Group 1 will have two options:

To choose OUT and receive $4. In this case the paired Group 2 person with whom he/she is paired makes no decision.

To choose IN. In that case the paired person in Group 2 will get to split $20 between the pair. That is, the person in Group 2 will decide how much of the $20, between $0 and $20, to give to the person in Group 1, and how much to keep.

Group 1 persons enter their decision by selecting the relevant option on the screen, followed by clicking OK.

The Group 2 Decision Task

If the Group 1 person chooses IN, then $20 will be made available to split between the two paired persons. The split will be determined by the Group 2 person. Each Group 2 person will be asked to decide how much money out of $20 to give to the Group 1 person with whom he/she is paired. Group 2 persons enter their decisions in the relevant text box, followed by clicking OK. Note that this decision by the Group 2 person will only be relevant if the Group 1 person chose IN.

Payment of Show up Fees and Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once everybody has made their decisions, you will be presented with a screen instructing you to wait. Do not click OK until the experimenter asks you to do so. You will then answer a questionnaire, followed by a summary of your earnings, and finally another questionnaire. Once this is complete, you will be asked one by one to enter the payment room at the back of the lab for the payment of your earnings. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

8.3 Generosity perception elicitation

How generous do you think the action of a Group 1 person choosing IN is?

Please give your answer on a scale of 1-5, with 1 being not generous at all, and 5 being very generous   Not Generous 1 ○ ○ ○ ○ ○ 5 Very Generous

8.4 First Mover Belief (τ') elicitation

We ask you to guess what was the average amount that persons in Group 2 chose to give to the persons in Group 1

8.5 Second Mover Belief (τ'') elicitation, considering First Mover's that chose IN

We asked the persons in Group 1 to guess how much persons in Group 2 chose to give to them.

We now ask you to guess what was the average of the guesses of the persons in Group 1, but to consider only the persons that chose IN

In other words, do not consider the guesses of those who chose OUT.

Your guess about this average:

8.6 Second Mover Belief (τ'') elicitation, considering First Mover's that chose OUT

We asked the persons in Group 1 to guess how much persons in Group 2 chose to give to them.

We now ask you to guess what was the average of the guesses of the persons in Group 1, but to consider only the persons that chose OUT.

In other words, do not consider the guesses of those who chose IN.

Your guess about this average:

8.7 Demographic questionnaire

Your name

First name

Surname

Continue

Questionnaire

Please answer each of the following questions as accurately as possible. Of course, your answers will be treated confidentially. Your honest answers will be of immense value for our scientific investigation. Thank you in advance for your cooperation.

Continue

Background data

Your gender?	F M
How old are you?	
Nationality	New Zealand European Asian Other
How many siblings do you have?	
If you are a student, what is your subject?	Humanities Natural sciences Engineering Medical science Economics Business economics Political economics Law Other Social sciences
When you were 16 years of age, what was the income of your parents in comparison to other families in New Zealand?	Far below average, Below average Average Above average Far above average
How large was the community where you have lived the most time of your life?	up to 2'000 inhabitants 2'000 to 10'000 inhabitants 10'000 to 100'000 inhabitants more than 100'000 nhabitants
How many people live in your household (please include yourself)?	
How large is your monthly budget (without expenses for accommodation) ?	
What share of your monthly expenses do you finance yourself?	0% 50% 100%

Continue

How many participants of the experiment do you know by name?

You can rely on my data   You can not rely on my data

Continue

8.8 University of Canterbury Human Ethics Approval

HUMAN ETHICS COMMITTEE

Secretary, Lynda Griffioen
Email: human-ethics@canterbury.ac.nz

Ref: HEC 2013/04/LR

1 February 2013

Daniel Woods
Department of Economics and Finance
UNIVERSITY OF CANTERBURY

Dear Daniel

Thank you for forwarding your Human Ethics Committee Low Risk application for your research proposal "Does self-serving generosity diminish reciprocal behaviour?".

I am pleased to advise that this application has been reviewed and I confirm support of the Department's approval for this project.

With best wishes for your project.

Yours sincerely

Lindsey MacDonald
Chair, Human Ethics Committee

8.9 Experiment 2 Instructions (*s*=2)

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be divided randomly into two groups, called Group 1 and Group 2. Each person in Group 1 will be anonymously paired with a person in Group 2. No one will learn the identity of the person he/she is paired with.

Structure of the experiment

This experiment is computerised, meaning you will be entering your decisions on the computer in front of you. If you have any trouble entering your decisions, please raise your hand to alert the experimenter who will assist you.

Tokens and Points

The currency used in this experiment are Tokens. As you make decisions with these Tokens, you and your paired person will earn points. Every point that people earn in this experiment will be worth 60 cents. For example, if you earn 8 points you will make $4.80 from the decision part of the experiment.

The Group 1 Decision Task

Each person in Group 1 will have two options:

To choose OUT and receive 10 Tokens, earning 10 points. In this case the paired Group 2 person with whom he/she is paired makes no decision, and earns 0 points.

To choose IN. In that case the paired person in Group 2 will get to split 10 Tokens between the pair. That is, the person in Group 2 will decide how many of the 10 Tokens, to pass to the person in Group 1, and how many to hold for themselves. Tokens that are passed or held will earn different amounts of points, which is explained in the Group 2 Decision Task.

Group 1 persons enter their decision by selecting the relevant option on the screen, followed by clicking OK.

The Group 2 Decision Task

If the Group 1 person chooses IN, then 10 Tokens will be made available to split between the two paired persons. The split will be determined by the Group 2 person. Each Group 2 person will be asked to decide how many Tokens out of 10 to pass to the Group 1 person with whom he/she is paired, and how many Tokens to hold for themselves. Each Group 2 person must distribute all 10 Tokens, that is, the number of Tokens they pass and the number of Tokens they hold must sum to 10.

Tokens that are passed will earn their paired Group 1 person 2 points per Token.

Tokens that are held (i.e. the remainder of the 10 Tokens that are not passed) will earn the Group 2 person 3 points per Token.

Group 2 persons enter their decisions in the relevant text box, followed by clicking OK. Note that this decision by the Group 2 person will only be relevant if the Group 1 person chose IN.

Payment of Show up Fees and Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once everybody has made their decisions, you will be presented with a screen instructing you to wait. Do not click OK until the experimenter asks you to do so. You will then answer a questionnaire, followed by a summary of your earnings, and finally another questionnaire. Once this is complete, you will be asked one by one to enter the payment room at the back of the lab for the payment of your earnings. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

8.10 Experiment 2 Instructions (s=6)

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be divided randomly into two groups, called Group 1 and Group 2. Each person in Group 1 will be anonymously paired with a person in Group 2. No one will learn the identity of the person he/she is paired with.

Structure of the experiment

This experiment is computerised, meaning you will be entering your decisions on the computer in front of you. If you have any trouble entering your decisions, please raise your hand to alert the experimenter who will assist you.

Tokens and Points

The currency used in this experiment are Tokens. As you make decisions with these Tokens, you and your paired person will earn points. Every point that people earn in this experiment will be worth 60 cents. For example, if you earn 8 points you will make $4.80 from the decision part of the experiment.

The Group 1 Decision Task

Each person in Group 1 will have two options:

To choose OUT and receive 10 Tokens, earning 10 points. In this case the paired Group 2 person with whom he/she is paired makes no decision, and earns 0 points.

To choose IN. In that case the paired person in Group 2 will get to split 10 Tokens between the pair. That is, the person in Group 2 will decide how many of the 10 Tokens, to pass to the person in Group 1, and how many to hold for themselves. Tokens that are passed or held will earn different amounts of points, which is explained in the Group 2 Decision Task.

Group 1 persons enter their decision by selecting the relevant option on the screen, followed by clicking OK.

The Group 2 Decision Task

If the Group 1 person chooses IN, then 10 Tokens will be made available to split between the two paired persons. The split will be determined by the Group 2 person. Each Group 2 person will be asked to decide how many Tokens out of 10 to pass to the Group 1 person with whom he/she is paired, and how many Tokens to hold for themselves. Each Group 2 person must distribute all 10 Tokens, that is, the number of Tokens they pass and the number of Tokens they hold must sum to 10.

Tokens that are passed will earn their paired Group 1 person 6 points per Token.

Tokens that are held (i.e. the remainder of the 10 Tokens that are not passed) will earn the Group 2 person 3 points per Token.

Group 2 persons enter their decisions in the relevant text box, followed by clicking OK. Note that this decision by the Group 2 person will only be relevant if the Group 1 person chose IN.

Payment of Show up Fees and Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once everybody has made their decisions, you will be presented with a screen instructing you to wait. Do not click OK until the experimenter asks you to do so. You will then answer a questionnaire, followed by a summary of your earnings, and finally another questionnaire. Once this is complete, you will be asked one by one to enter the payment room at the back of the lab for the payment of your earnings. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

8.11 Experiment 2 Instructions (chance)

No Talking Allowed

Now that the experiment has begun, we ask that you do not talk. If you have a question after we finish reading the instructions, please raise your hand and the experimenter will approach you and answer your question in private.

Show up Fee

Every participant will get $5 as a show up fee, and in addition you may earn money in the experiment. All the money will be paid to you in cash at the end of the experiment.

Anonymity

You will be divided randomly into two groups, called Group 1 and Group 2. Each person in Group 1 will be anonymously paired with a person in Group 2. No one will learn the identity of the person he/she is paired with.

Structure of the experiment

This experiment is computerised, meaning you will be entering your decisions on the computer in front of you. If you have any trouble entering your decisions, please raise your hand to alert the experimenter who will assist you.

Tokens and Points

The currency used in this experiment are Tokens. As you make decisions with these Tokens, you and your paired person will earn points. Every point that people earn in this experiment will be worth 60 cents. For example, if you earn 8 points you will make $4.80 from the decision part of the experiment.

The Group 1 Decision Task

Each person in Group 1 will have two options:

To choose OUT and receive 10 Tokens, earning 10 points. In this case the paired Group 2 person with whom he/she is paired makes no decision, and earns 0 points.

To choose IN. In that case the paired person in Group 2 will get to split 10 Tokens between the pair. That is, the person in Group 2 will decide how many of the 10 Tokens, to pass to the person in Group 1, and how many to hold for themselves. Tokens that are passed or held will earn different amounts of points, depending on which Situation occurs, which is explained in the Group 2 Decision Task.

Group 1 persons will not be informed which Situation has occurred prior to making their decision. Group 1 persons enter their decision by selecting the relevant option on the screen, followed by clicking OK.

The Group 2 Decision Task

If the Group 1 person chooses IN, then 10 Tokens will be made available to split between the two paired persons. The split will be determined by the Group 2 person. Each Group 2 person will be asked to decide how many Tokens out of 10 to pass to the Group 1 person with whom he/she is paired, and how many Tokens to hold for themselves. Each Group 2 person must distribute all 10 Tokens, that is, the number of Tokens they pass and the number of Tokens they hold must sum to 10.

The software will generate a random number to determine which Situation will occur. There is a 50% chance of Situation A occurring, and a 50% chance of Situation B occurring.

Please turn over.

If Situation A occurs, then tokens will earn points in the following way:

Tokens that are passed will earn their paired Group 1 person 2 points per Token.

Tokens that are held (i.e. the remainder of the 10 tokens not passed) will earn the Group 2 person 3 points per Token.

If Situation B occurs, then tokens will earn points in the following way:

Tokens that are passed will earn their paired Group 1 person 6 points per Token.

Tokens that are held (i.e. the remainder of the 10 tokens not passed) will earn the Group 2 person 3 points per Token.

Group 2 persons will be informed which Situation has occurred, and then asked to enter their decisions in the relevant text boxes, followed by clicking OK. Note that this decision by the Group 2 person will only be relevant if the Group 1 person chose IN.
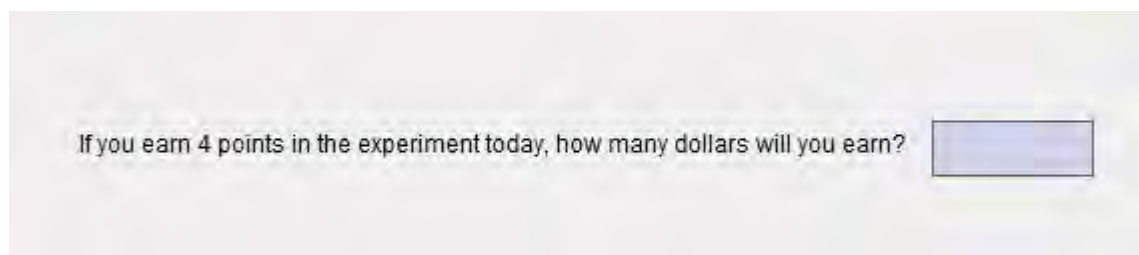
Payment of Show up Fees and Experiment Earnings

All participants are asked to sit patiently until the end of the experiment. Once everybody has made their decisions, you will be presented with a screen instructing you to wait. Do not click OK until the experimenter asks you to do so. You will then answer a questionnaire, followed by a summary of your earnings, and finally another questionnaire. Once this is complete, you will be asked one by one to enter the payment room at the back of the lab for the payment of your earnings. Because your decision is private, we ask that you do not tell anyone your decision or your earnings either during or after the experiment. We also ask you to not gather near the lab after you receive your payment.

Are there any questions?

8.12 Experiment 2 Control Questions

Control Question 1 (all treatments)

If you earn 4 points in the experiment today, how many dollars will you earn?

Answer: Number of points * exchange rate = 4 * .6 = $2.40 (alternatively, $7.40 was accepted as it includes the $5 show-up fee).

Control Question 2 (all treatments)

If a Group 1 person chooses OUT, how many points will they earn?

Answer: 10 points

Control Question 3 (pure treatments)

If a Group 1 person chooses IN and a Group 2 person chooses to pass 4 tokens, how many points will the Group 1 person earn?

Answer: Pass rate on tokens * Number of tokens passed = $s*4$, so when $s=2$, the answer is 8, and when $s=6$, the answer is 24.

Control Question 4 (pure treatments)

If a Group 1 person chooses IN and a Group 2 person chooses to hold 4 tokens, how many points will the Group 2 person earn?

Answer: Hold rate on tokens * Number of tokens held = 3*4 =12 in both pure treatments

Control Question 5 (pure treatments) and Control Question 7 (chance treatment)

Will you be making more than one set of decisions in this experiment?   ○ YES   ○ NO

Answer: No. This question was to reinforce that the game was played one-shot.

Control Question 3 (chance treatment)

Situation A has occurred.

If a Group 1 person chooses IN and a Group 2 person chooses to pass 4 tokens, how many points will the Group 1 person earn?

Answer: Situation A pass rate * number of tokens passed = 2*4=8

Control Question 4 (chance treatment)

Situation B has occurred.

If a Group 1 person chooses IN and a Group 2 person chooses to pass 4 tokens, how many points will the Group 1 person earn?

Answer: Situation B pass rate * number of tokens passed = 6*4=24

Control Question 5 (chance treatment)

Situation A has occurred.

If a Group 1 person chooses IN and a Group 2 person chooses to hold 4 tokens, how many points will the Group 2 person earn?

Answer: Hold rate * number of tokens held = 3*4=12

Control Question 6 (chance treatment)

Situation B has occurred.

If a Group 1 person chooses IN and a Group 2 person chooses to hold 4 tokens, how many points will the Group 2 person earn?

Answer: Hold rate * number of tokens held = 3*4=12

Control Question 8 (chance treatment)

Does a Group 1 person know which Situation will occur before they make their decision? ○ YES
                                                                                        ○ NO

Answer: No. This question was to reinforce that FMs did not know what state had occurred when making their decision.