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Deciding to Delegate: On Distributional Consequences of Endogenous Delegation

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Abstract:

We allow for principals to self-select into delegating (or not) the allocation decision to an agent in a modified dictator game. The standard dictator game is obtained when they choose not to delegate. Nearly half the subjects choose to be a dictator and make the allocation themselves. Dictators thus obtained transfer lower amounts to receivers, relative to when the decision making is passed to an agent (or the standard dictator game). Subjects self-selecting into the role of a dictator give less relative to those that pass the allocation decision to an agent. Finally, the distributional consequences of delegating, or not, vary with less inequality obtained when the delegation decision is delegated.

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1. Introduction

Delegation is an important management tool in organizations and is desirable for efficiency reasons, leader formation, nurturing of talent and to pass decision making to outside sources. Lately, the experimental literature has studied delegation in scenarios such as hierarchical structures (Hamman et al. 2010; Bartling and Fischbacher, 2012; Oexl and Grossman, 2013; Gawn and Innes, 2019), bargaining (Ferhrstman and Gneezy, 2001) or labour markets (Charness et al. 2012). The results from this experimental literature (Hamman et al. 2010, Bartling and Fischbacher, 2012 and Oexl and Grossman, 2013) point towards delegation being used as a tool to hide behind unfair decisions. That is, a principal may hire an agent *to make self-interested or immoral decision that the principal would be reluctant to take more directly (Hamman et al., 2010).*

Hamman et al. (2010) studied allocation decisions under compulsory delegation and find that the amount redistributed to recipients is significantly lower than in the standard dictator game. In their structure principals do not make allocation decisions and need only to select agents for that decision. They find that principal's choose agents that transfer lower amounts to recipients thereby increasing their payoffs. Principals select agents to maximize own payoffs. Bartling and Fischbacher (2012) employ a dictator game with four players: a principal, an agent and two recipients. They wanted to understand the responsibility attribution of delegated decisions by observing who is punished for unfair distributions. In their setting principals' can divide own and recipients' endowment themselves or pass the choice to an agent. Endowment can only be divided in two ways: fair or unfair (with unfair benefitting the principal). After observing the division of the endowment, one of the two recipients can punish the rest of the players by lowering their final earnings after the division of the endowment has been made. They find that delegation is effective at avoiding principals being held responsible for the unfair decision as recipients also punish agents for unfair decisions.

In this paper we run experiments with a variant of the standard dictator game (Hamman et al., 2010) where the principals can decide on making the allocation themselves or pass the decision to an agent. An interesting outcome of endogenizing the delegation decision is that if the dictators decide on making the allocation decision themselves then we revert to the standard dictator game, that is, dictators directly decide on the transfer amount. If principals, however, decide to delegate then we have the decision making delegated to an agent and the delegation version of the game is implemented a la Hamman et al. (2010).

Even though a-priori non-consequential, as we know from prior experiments, self-selecting in this way can impact decision making. There are two classic contributions along these lines. First are Hoffman et al. (1996), in what was a procedural variation, where they find that increasing social distance resulted in outcomes closer to the game theoretic prediction. Second are Cherry et al. (2002), where the allocation decision is over earned wealth, they obtain lower allocations with 95% of the dictators playing according to game theoretic predictions. Self-selecting into being a dictator is a procedural variation in our framework that could significantly impact allocations in our setting relative to the standard dictator game. In the delegation version of the game, following Hamman et al (2010), we can hypothesize that when agents delegate the allocation decision then we should expect significantly lower allocations relative to the standard dictator game.

We proceed as follows; given that we are interested in the consequences of endogenous delegation, we first replicate the standard dictator game and the treatments in Hamman et al (2010) obtaining qualitatively similar results. As in Hamman et al (2010) we replicate that subjects redistribute less under compulsory delegation than under the standard dictator game.[1] We also replicate their alternating delegation structure where players first play eight rounds of compulsory and then endogenous delegation. Again, we replicate their results obtaining qualitatively similar results. That is, once a lower social norm is established (in the form of lower transfers) in the prior compulsory delegation stage, it carries over to the endogenous delegation scenario.[2]

In our experiments we find that dictators who decide on the allocation transfer significantly less to recipients compared to the standard dictator game. There is a clear significant effect when the role is *self-selected* with those taking on the role of dictator being less prosocial. Note that the amount transferred to recipients by principals who decide not to delegate in endogenous delegation (3.14 vs 3.84) is significantly greater than when the decision is delegated. Additionally, this amount (3.84) is significantly lower than what is obtained in the standard dictator game. Finally, and if delegation serves to pass on the responsibility of "immoral" decisions, we find that when the allocation decision is passed on to an agent the amounts are greater than when the principals

[1]This difference is significant using a Mann-Whitney test: z=8.234, p=0.00.

[2] Hamman et al. (2010) also run an endogenous delegation treatment with no competition amongst agents. That is, one can choose between delegating to the only agent available (the same for all the rounds) or not delegating and making the decision. In order to do this, they vary the payoff structure of agents since each agent can only work for one principal. They obtain that the majority of principal's delegate and the amount shared with the recipients is similar to what was observed under the compulsory delegation treatment.

themselves decide and is not significantly different from the standard dictator game. Clearly, endogenizing the choice to delegate or not sorts agents into two types, ones that assume the role of a dictator and others that delegate[3].

Comparing our results with compulsory delegation we find that (as in Hamman et al., 2010) lowest allocations are obtained under this framework. When the principal´s choice is reduced to *only* choosing an agent they choose the agent that maximizes their own payoffs resulting in lower allocations. This amount is lower than that obtained under a principal self-selecting into making their own allocation decision, delegating the decision, or in the standard dictator game. The relationship between low amounts transferred and being selected for an agent is clear under compulsory delegation. This relationship is, however, weaker under endogenous delegation. Why this occurs is not clear.

Ours is a procedural variation (a la the double-blind procedure in Hoffman et al., 1996) of the standard dictator game that results in the distribution shifting towards lower allocations. This is also along the lines of Cherry et al. (2002) where 95% of the outcomes are according to game theory predictions when the dictator bargains over earned wealth. Our manipulation is "milder" than either and the results are still striking with the average allocation made by principals who do not delegate being 2.6 in the last four periods (relative to 3.5 when the decision is passed to an agent). Even though in a different environment, the sorting argument put forth by Lazear et al. (2012) may also be applicable here. While, in Lazear et al. (2012) individuals sort into those who share reluctantly, i.e. avoid the opportunity to share, in our case those that want to share less may sort into making the allocation decision themselves.

One can look at our endogenous delegation experiment as a procedural manipulation where the dictator game is obtained as an outcome of individuals self-selecting into the role. There are no features such as anonymity or earned wealth in our design where one earlier obtained stronger outcomes in favor of the game theoretic predictions. Given this our result is interesting as it shows that seemingly small variations can result in significantly different outcomes in the dictator game. One can say that by self-selecting the dictators may feel empowered, or individuals with certain characteristics (e.g., less pro-social) are likely to self-select into the role. One explanation

[3] Note, this could also be related to other aspects such as confusion or lack understanding of the game. However, in our repeated framework this should not be a problem.

could be that under endogenous delegation the principal can keep the right to make the decision. Along similar lines are Collins et al. (2018) where entitlement over the power to divide an endowment affects the result. In our environment we could have that principals under endogenous delegation feel more entitled to share less than principals in the baseline or, as earlier mentioned, feel empowered when they self-select into the role.

Finally, the knowledge of having an extra competitor (the principal) may also affect agent behavior and result in lower competition (Garcia and Tor, 2009). We can, however, rule this out. In our first treatment we inform the agents that the "*Principals may make the choice themselves or delegate*." This suggests that the agents may view themselves as competing with the principals. To see if this was important to our results we made a subtle change in the instructions by running another endogenous delegation treatment (informationally closer to compulsory delegation) in which agents did not know that there is an alternative to choosing an agent. That is, they are only informed that "*Agent A has to decide to delegate or not the decision*". They are not explicitly informed that the principals may make the decision themselves. We find no differences between these two endogenous delegation treatments. We can thus conclude that an agents' decisions cannot be explained by differences in information or expectations of competing with the principal and has to do with the game structure.

2. **Literature Review**

The meta-study of Engel (2010) (data from more than 120 studies) shows that the average amount redistributed to recipients in dictator games represent 28% of the total[4]. The average amount allocated is sensitive to procedural variations. For example, it can increase if we vary social distance and dictators are identified by their surname (Charness and Gneezy, 2008) or if anonymity is not ensured (Hoffman et al. 1996). Furthermore, framing effects also vary the amounts transferred to recipients (Brañas-Garza, 2007; List, 2007). Brañas-Graza (2007) shows that emphasizing the dictators' responsibility over the outcome increases dictators' generosity. List (2007) shows that framing affects the outcome by changing the instructions and asking dictators to take money from recipients instead of asking them to split the endowment. Finally, in their classic paper Cherry et al (2002) show that a large proportion of the outcomes are as predicted if the endowment is earned by the dictators. It is clear that procedural variations (social distance, framing or

[4] Similar average amounts are obtained by Cardenas and Carpenter (2008) who perform a similar analysis with dictator games conducted in developing counties.

earned money) can significantly impact the allocations dictators make, with some increasing allocations while, others significantly decrease them.

Some of the delegation literature has also used the dictator game (Forsythe et al., 1994) to study distributional consequences of hierarchical delegation (Hamman et al. 2010; Bartling and Fischbacher, 2012; Gawn and Innes, 2019). The main result from this literature is that delegation results in less egalitarian outcomes than the standard dictator game. In addition, Gawn and Innes (2019) try to understand the effect of endogenous delegation in a one-shot dictator game with no punishment option nor agents where principals can choose to delegate or not, knowing that if you delegate the decision of another dictator playing in another session will be randomly implemented. They find that those who delegate are the more generous dictators in a simple dictator game with no delegation option. Others have studied delegation using the ultimatum game (Fershtman and Gneezy, 2001) and labor market environments (Fehr et al. 2010; Charness et al. 2012 and Maximiano et al. 2013). The bargaining literature also finds that compulsory delegation increases the proposers share.

Besides the studies mentioned above Oexl and Grossman (2013), Coffman (2011) and Garofalo and Rott (2017) extend previous results. The first ones find that intermediation reduces principal's punishment. Oexl and Grossman (2013) find that by delegating to an intermediary, a principal can effectively shift blame onto the agent even when doing so necessarily eliminates the possibility of a fair outcome. Coffman (2011) studies punishment in a scenario in which the punisher is not affected by the endowment decisions made by principals and agents finding that when delegation is implemented principals are punished less and obtain higher profits. Finally, Garofalo and Rott (2017), also find that recipients punish both principals and agent for unfair decisions when the agents' only role is to communicate the decision made by the principal.

Fershtman and Gneezy (2001) use an ultimatum game in which proposers can delegate the offer made to the recipient to an external agent. They find that when delegation is chosen the payoffs of the proposers' increase. Choy et al. (2015) also use the ultimatum game to compare exogenous and endogenous delegation in a bargaining environment and find that proposals are higher under compulsory delegation. They also find a difference between endogenous and exogenous delegation. Overall there is a common theme in all these papers, *delegation increases payoffs of the proposer/sender under delegation*.

There are other papers that have studied the joint effect of delegation and other factors such as dishonesty, corruption, information, gender[5] or bargaining. Erat (2013), Drugov et al. (2014) and Sutan and Vranceanu (2016) examine dishonesty in environments with endogenous delegation of decisions. Sutan and Vranceanu (2016) use a dictator game in which proposers can lie about delegating to a third party. They find that imperfect information increases proposer profits by shifting blame[6]. Similarly, Erat (2013) showed that agents are more frequently hired when they have to lie in a sender receiver game[7]. Drugov et al. (2014) find that intermediaries facilitate corruption not by reducing the responsibility for the outcome but rather by lowering the moral cost of cheating in a bribery game.

Overall the literature finds that allocations under delegation favour the principal (Hamman et al. 2010; Bartling and Fischbacher, 2012; Oexl and Grossman, 2013) and that principal's select agents that maximize own payoffs (Hamman et al. 2010; Bottino et al. 2016). We also know that procedural variation such as the double blind (Hoffman et al, 1996) and earned money (Cherry et al, 2002) result in outcomes closer to the game theoretic prediction. Based on this our main hypotheses are:

- **Hypothesis 1**: *Overall, we expect transfers under Endogenous delegation to be greater than Compulsory and lower than the standard dictator game allocations.*
- **Hypothesis 2**: *Self-selecting into making the allocation decision themselves will give us lower allocations than in the standard dictator game.*
- **Hypothesis 3**: *Self-selecting into passing the allocation decision will give the same outcomes as in the compulsory delegation game and consequentially lower allocations than in the standard dictator game.*
- **Hypothesis 4**: *Agents making allocation decisions favorable to the principal will be selected more often under endogenous delegation.*

[5]Bottino et al. (2016) show that in a compulsory delegation game female and male principals behave similarly while as agents' females show greater redistributive concerns relative to their male counterparts (even though it is detrimental to them as they are selected less often).

[6]Lai and Lim (2012) study the effect of information and communication on delegation (without the cheating option) and find that generally principals under-delegate even when it is more profitable to do so. Furthermore, Cettolin and Riedl (2010), use delegation to prove that under uncertainty there is a violation of rationality in decisions.

[7]Surprisingly dishonesty in the sender-receiver game with agent is prevalent even when the identities of cheaters are revealed to other players (Van de Ven and Villeval, 2015).

The rest of the paper is organized as follows. Section 3 describes our experimental design in detail. Section 4 presents our main results. Section 5 concludes.

3. Experimental design

Our design follows Hamman et al (2010). A total of 236 subjects were recruited via ORSEE (Greiner, 2015) for the experiments at Middlesex University London[8].Each subject participated in one treatment only. In addition to the experimental earnings, subjects were paid a £5 show-up fee plus £2 for completing a series of questionnaires after the experiment. The experiment lasted for approximately 45 minutes and subjects earned on average £12 in total. We conducted a total of 15 sessions (see Table 1 for a summary of the experimental design).

The experiment consisted of four treatments. Besides the standard dictator game, each delegation treatment involved playing a modified dictator game with or without the delegation option. Each session had 8 or 10 subjects[9]. Upon arrival participants were randomly allocated their roles and seats, read the instructions in their computer screen and were informed of their role in the experiment. Hereafter, we refer to the principal (player P), agent (player A) and recipient (player R).[10]The experiment lasted for 12 rounds. Each participant was assigned a role and an identification number for the entire experiment. The identification number guaranteed anonymity to each participant. They were also told they would be randomly re-matched in each round. At the end of the 12th round subjects were asked to fill two brief questionnaires. The first one included some socio-demographic questions while the second was related to the decisions taken during the experiment[11]. They were paid £2 for completing the questionnaires.

Our payment scheme is a variation of the one in Hamman et al. (2010)[12]. Both principal and recipient were paid in cash for one randomly selected round drawn at the end of the experiment. Agents were given a £5 show-up fee and £5 as starting capital at the start of the experiment. Their payment was calculated as follows:

[8]Instructions can be found in Appendix E.
[9]The group size depended upon show up.
[10]To avoid framing, in the instructions we referred to the participants as "A", "B" and "C" instead of "principal", "recipient" and "agent" respectively.
[11]See Table 1 in Appendix B for a summary of the answers to the second questionnaire.
[12] We modified the coefficients of the payment equation to adapt it to the amount of players that we had per session.

$$\pi_i = -0.30 + 0.15 * n_i$$

Where, 0.30 represents the fixed costs that agents face in each period regardless of being selected by a principal. n_i is the number of principals choosing agent *i*. At the end of the experiment, each participant received a sealed envelope with their identification number and the amount they earned. We have a total of four treatments and three different delegation mechanisms (See Figure 1).

Baseline (BS)

The BS treatment is the standard dictator game. An initial endowment of £10 is assigned to each pair formed by one principal and one recipient. Each principal decides how much of the endowment to allocate to the recipient. Once the decision is taken recipients are informed of their earnings. In each round, principals are told that they have to divide an endowment of £10 between themselves and a randomly matched recipient. The treatment had 40 participants participating in 4 sessions.

Endogenous Delegation (ED-1)

In this treatment we had 96 participants in 11 sessions. A third player, the agent (A), is introduced (Hamman et al., 2010). Principals can pass on the allocation decision to one of the two available agents, A1 or A2, or make it themselves.[13] The agents *are informed that the principals can delegate or make the decision themselves*. The two agents thus know that they are competing amongst themselves and the principal.

Note that, the knowledge of this extra competitor may generate beliefs (of agents) on the principal affecting agent's behavior and resulting in diminished competition (Garcia and Tor, 2009). We thus ran another treatment where we made the ED treatment informationally closer to the CD experiments. That is, we only inform the agents that the "*Each principal has to decide to delegate or not the decision of dividing the endowment on one of the two agents"*. Informationally, this treatment lies between CD and ED-1. This is the treatment ED-2 below. [14]

[13] Following Hamman et al. (2010) we also run an ED treatment with 15 participants (3 agents, 7 principals and 7 recipients) and found that our main results remain constant when the size of the market is bigger. The results of this extra treatment can be found in Appendix D.

[14] Following Hamman et al (2010) we also ran a treatment in which subjects participate in a CD treatment for 6 rounds and ED-1 during the last 6 rounds. We replicated this treatment for consistency reasons. Our results replicate those of Hamman et al. (2010) where they observe that the behaviour in CD and ED rounds

Endogenous Delegation without Information (ED-2)

As mentioned earlier in this treatment the agents were only informed that the *principal chooses to delegate or not to them* (see instructions in Appendix E). Recall that in ED-1 agents knew that compared to compulsory delegation, they had an extra competitor, the principal. We ran this treatment in order to test whether the explicit knowledge of having an extra competitor, affects agent behavior. We had 56 participants participating in 6 different sessions.

Treatment 4: Compulsory Delegation (CD)

This is a replication treatment (Hamman et al., 2010). The agent makes the decision regarding the division of the endowment between the principal and the recipient. Each session has two agents: A1 and A2. The principals select one of the two agents to divide the endowment in each round.[15] We run five sessions with a total 44 participants.

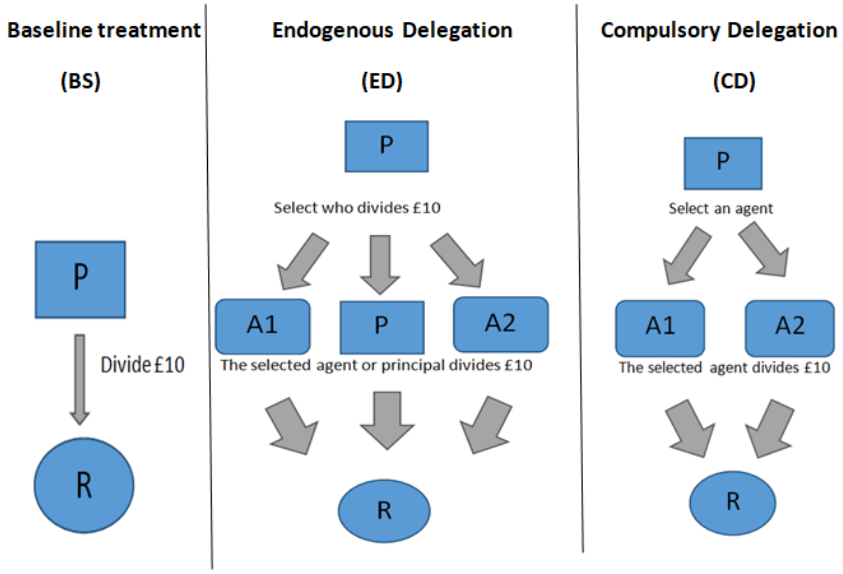
Table 1: Summary of the experimental design

	Baseline (BS)	Endogenous Delegation (ED-1)	Endogenous Delegation (ED-2)	Compulsory Delegation (CD)
Divides the endowment	Principal	Agent/ principal	Agent/ principal	Agent
Sessions	4	11	6	5
Number of subjects	40	96	56	44
Principals/Agents /Recipients	20/-/20	37/22/37	22/12/22	17/10/17

is similar. In both cases the amounts given to the recipient are low and decrease over time. The results of this treatment are in Appendix C.

[15]In Hamman et al. (2010), principals were randomly allocated to an agent at the beginning of period 1, introducing the possibility of choosing one agent or the other from round 2 onwards. This study will differ as principals choose an agent on every possible round, including round 1. We chose not to impose one round of compulsory delegation before making delegation optional in order to avoid any effect from the initial round.

Figure 1: Summary of the experimental design



4. Results

4.1. Overall results:

We use the pooled data from the two ED treatments (-1 and -2) in this analysis. Recall, that the ED-2 was run to test whether the explicit knowledge of having an extra competitor (the principal) affects agent behavior. We find that agents reallocate similar amounts in both treatments, ED-1 where agents know that the principal can select an agent or not delegate and ED-2 where agents do not know the alternative to not choosing them. We found no significant differences between the two treatments (ED-1: average transfer 3.47 and ED-2: average transfer 3.49; Mann-Whitney test, z= 0.383, p= 0.701)[16]. We refer to the pooled data as ED henceforth. Further, we refer to those who delegate under ED as ED-D and those who do not as ED-N.

We now compare allocations under Endogenous Delegation with Compulsory Delegation and the dictator game. We find that the overall allocations under the standard dictator game is 3.56. Meanwhile, for the CD and ED treatments the average amounts shared are, 2.55 and 3.48, respectively (Table 2 below). A Mann-Whitney (rank-sum) test (Table 3) confirms that the distributions obtained under the standard dictator game and ED treatments are not different (z=0.982, p=0.326). The outcomes under the standard dictator game (BS) and CD are however significantly different (z=8.23, p=0.00) with the

[16] Appendix A contains a more detailed comparison between ED treatments

average allocations in the BS being significantly greater. Our main result is the comparison between the CD and ED treatments. We find that the average allocation under the ED treatment is significantly higher than under the CD treatment and the results are significantly different (z=-7.32, p=0.00).

Table 2: Mean and standard deviations per treatment

	Mean	SD
Baseline	3.566	2.095
CD	2.558	2.793
ED	3.481	3.062
ED1	3.474	2.869
ED2	3.494	3.368

Table 3 - Mann Whitney Test

	z	p
BS-CD	8.234	0.000
BS-ED	0.982	0.326
CD-ED	-7.320	0.000

We find that Hypothesis 1 is confirmed for the ED-CD comparison but, weakly confirmed for the ED-BS comparison. We summarize our findings below.

Result 1: Overall, allocations under endogenous delegation are significantly higher than under compulsory delegation. The outcomes under endogenous delegation, however, are not significantly different than under the standard dictator game in the baseline treatment.

4.2. Delegators (ED-D) and Non-Delegators (ED-N):

Under endogenous delegation individuals self-select into making the allocation decision (as a dictator) or passing it to an agent. As mentioned earlier, if one does not delegate then the game reverts to the standard dictator game (with the procedural difference that individuals *choose* to make the allocation decision). If they, however, decide to delegate then it is similar to the delegation game in Hamman et al. (2010) (again with the caveat of *self-selecting* into a role). The predictions regarding what we expect under the two scenarios are given by Hypothesis 2 and 3.

A priori, self-selecting into playing the role of the dictator should give us the same allocations as under the standard dictator game experiments (BS treatment) and

delegating the decision to an agent will give the same outcomes as under the CD treatment. However, we know from the many experiments with procedural variations that the allocations can go one way or another. In our case, self-selecting into the role empowers the dictator and hence we conjecture that allocations should decrease.

We will first look at the outcomes under no delegation, ED-N. Hypothesis 2 predicts that amounts allocated under ED-N will be the *smaller* relative to the standard dictator game. Note that even though we have no reason to assume a-priori that we should observe any other result, we know that procedural (Hoffman et al, 1996) double-blind experiments and earned-money (Cherry et al, 2002) manipulations do matter. Further, from the recent work by Lazear et al (2012) we know that individuals can sort out into different types. Given this we hypothesize that those self-selecting into the dictator role will allocate lower amounts.

Outcomes under ED-N are significantly different both from the DG *(*z=2.07, p=0.04*)* and ED-D *(*z*=2.83*, p=0.00*)*. Also note that the amount allocated by principal´s acting as dictator´s (3.84 on average in ED-N) is significantly higher than the amounts allocated under CD *(*z=-7.92, p=0.00*)*.[17] We thus find lower allocation relative to delegation (ED-D, 3.14 on average) and the standard dictator game, however, allocations are higher than under CD. Though it still results in lower allocations to the DG this may be due to the fact that our procedural manipulation was not as strong as that observed under Hoffman et al (1996) or Cherry et al (2002). However, the result is surprising given the mild variation we implemented.

Figure 2 shows the amount transferred to recipients by round in each of the treatments: BS, CD and for those who delegate and don´t (ED-D and ED-N). We find that the DG follows a similar pattern to those that delegate under endogenous delegation (ED-D). A Mann-Whitney (rank-sum) test of distributions confirms that the populations of BS and ED-D are not significantly different (z=0.00, p=0.99).[18] We find that both Hypothesis 2 holds meanwhile, hypothesis 3 does not hold. This gives us our Results 2 and 3.

Result 2:

[17]The amounts allocated to recipients are also higher in BS (z=8.23, p=0.00) than in CD.

[18] Finally, a comment on the distributional outcomes. One can easily check for inequality across periods and treatments using the Gini index. We obtain that the Gini coefficient has a higher value in CD (0.44) than in BS (0.29), ED-N (0.43) or ED-D (0.41). This shows that, CD generates more inequality, while BS creates the lowest inequality among the treatments. Meanwhile, the standard dictator game and ED results are similar.

Under endogenous delegation (ED), those that self-select into dictators (ED-N) transfer significantly less to recipients relative to the standard dictator game.

Result 3:

Under endogenous delegation, those that pass the allocation decision to an agent (ED-N) allocate similar amounts compared with the standard dictator game (Baseline treatment), and significantly higher amounts compared with Compulsory Delegation.

One interpretation of our results could be that sorting results in splitting the sample among those that are less or more pro-social. That is, those that decide (not) to delegate are (less) more pro-social than the others. This has to be treated with caution as most participants switch between roles. We can, however, look for the relationship between the number of times the role of dictator is chosen and allocations henceforth. We find that the average amount transferred by individuals who delegate in more than half of the rounds is statistically higher than the quantity transferred by those who choose to delegate in less than half of the rounds (z=-3.76, p=0.00). We find that those who delegate less, i.e. decide themselves, earn more. This may suggest that self-selecting may sort individuals into the less and more prosocial.

In Table 4 we present the results for what proportion of principals' delegate and the average amount allocated by principals (ED-N) and agents (ED-D). We find that delegation occurs in roughly 50% of the cases.[19,20]

Figure 2: Amounts earned by the recipient by round and treatment

[19]We ruled out potential informational asymmetries affecting our results by running ED-1 and ED-2 and obtaining the same results.

[20] One potential explanation for this result could be that the size of the market was too small (8 or 10 participants in this experiment while Hamman et al. (2010) had 15), that is why we run an ED treatment where we had 15 participants per session. The results do not substantially vary as we can see in Appendix D.

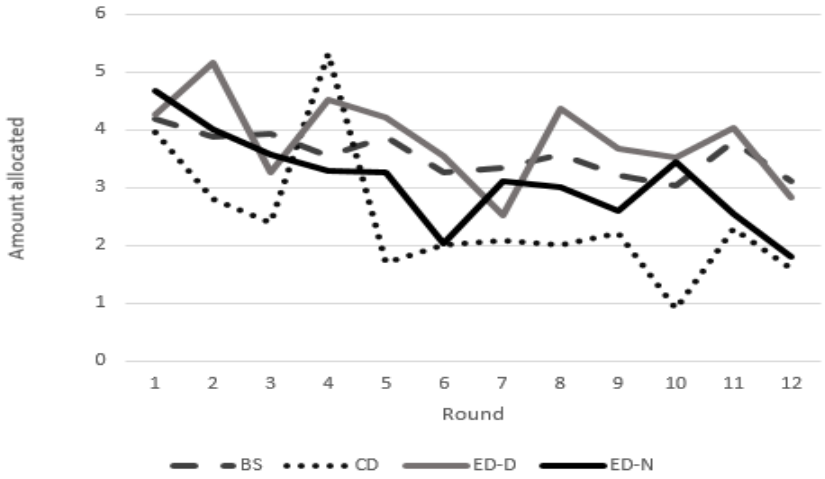


Table 4: Percentage of delegated decisions and amount redistributed by rounds

	Proportion of Delegated decisions	Average amounts allocated	
		Agent	Principal
(1-4)	51%	4.32	3.91
(5-8)	48%	3.66	2.97
(9-12)	47%	3.50	2.60

4.3. Agent selection

Now, we look at Hypothesis 4 that states that agents making decisions that are favorable to the principal will be selected more often in the (delegation) treatments CD and ED-D. We find that the average amount shared by agents that are not chosen by principals in the next round in CD is 3.89. This is well above the average amount shared by those who are selected again, 1.81. Clearly agents that allocate smaller amounts to the receiver are selected more often. The same behavior carry over to ED but principals "react" less to lower amounts redistributed to recipients. Principal's switch the decision maker when the amount allocated is on average 4.12 and they do not change their delegation strategy when the amount is 2.86 (the difference is lower but still significant

t=-5.70, *p*=0.00). Moreover, principals switch the decision maker more often in ED (49%) than in CD (37%).[21,22]

To better understand the mechanism by which agents are chosen by principals we performed a series of logistic regressions (with subjects fixed effects) for CD and ED treatments (Table 5).[23,24] Model 1 and Model 2 analyze the CD data, their dependent variable is a dummy with value one if the principal decides to switch agents after that round and zero otherwise. In Models 3, 4, 5 and 6 the data examined is from ED. Model 3 and 4 have as dependent variable a dummy with value one if principals switch from delegating to not delegating and zero otherwise. The dependent variable in Model 5 and 6 is a dummy with value one if the agent changes the decision maker in any way (from agents to principal, principal to agents or from one agent to another) from one round to another, and zero otherwise. The explanatory variables are the same for all the models: the amount allocated to recipients in the previous period and a variable to control for the round after which they decide to switch the decision maker (only on models 2, 4 and 6).

Looking at CD, models 1 and 2, the variable amount allocated to recipients in the previous round is positive and significant (0.23 and 0.24 respectively) at a 1% level. This indicates that in CD principals switch agents in a round when the previously selected agent allocated higher amounts to the recipient. Agents that are selected are those allocating lower amounts to recipients. Models 3 and 4 provides us a lower coefficient associated with the amount given in previous periods by agents (0.11 and 0.10), this coefficient is also significant at a 1% level. Principals, in this case, switch from delegating to not delegating when the amount allocated in the previous round is low. Meanwhile, Models 5 and 6 indicate that in ED higher amounts allocated to the recipient mean a higher likelihood of a change in strategy in the next round. Note that the size of the coefficients associated with the amount transferred (0.14 and 0.13) is smaller than in the CD treatment. In ED principals do switch due to higher amounts redistributed, but the effect is considerably smaller than in CD. The coefficient associated with *round* is never significant.

[21] In CD they can switch from one agent to another while in ED they can also switch from an agent to not delegating and from not delegating to one of the agents.
[22]Figures 3 and 4 in Appendix B represent the proportion of switching in decision maker under ED and CD over time. Switching decreases over time.
[23]We excluded the last round from the regressions to avoid the end game effect.
[24] The results hold if, instead of including subject fixed-effects, we cluster errors by subject. We estimated additional random effect models including other demographic variables of the principal and agents such as the gender of the decision maker and their age. This does not affect the results.

Table 5: Switching in round t based on round t-1

	CD		ED			
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Amount allocated to recipient in the previous round	0.23*** (0.00)	0.24*** (0.00)	0.11*** (0.00)	0.10*** (0.00)	0.14*** (0.00)	0.13*** (0.00)
Round		0.03 (0.54)		-0.03 (0.23)		-0.03 (0.19)
Observations	187 (17)	187 (17)	649 (59)	649 (59)	649 (59)	649 (59)
Log likelihood Prob>chi squared	-71.02 0.00	-70.84 0.00	-206.96 0.00	-206.24 0.02	-243.45 0.00	-242.58 0.00
-The number in parenthesis represents the total amount of principals observed rather than the amount of observations. *** p<0.01, ** p<0.05, * p<0.1.						

This result is in line with the previous literature (Hamman et al. 2010; Bartling and Fischbacher, 2012) where they argue that principals select those agents who share less with recipients. However, the coefficients associated with the amount shared are smaller for ED than for CD. Under CD principals are more prone to switch agents if the amount earned is small, this hints that competition between agents in CD is greater than under ED. It is not clear why this occurs. One potential explanation is that agents in CD understand that principals switch agents when they transfer more to recipients and thus start transferring lower amounts each round.

This is, however, not the case under ED. Under ED, principals also switch their strategy when they get lower amounts, but in a more moderate way. Consequently, agents may not realize the relationship between lower amounts and switching strategy in ED and do not use lower amounts allocated to recipients as a strategy to be selected by principals over time. This theory is supported when we analyze the data from agents' perspective. There is a clear relationship between higher profits for agents (more principals selecting the agent) and lower amounts reallocated to recipients in CD. We do not find this in ED

where amounts reallocated to recipients by agents are not connected to the agents' own profits. (See Table 2 in Appendix B for a detailed analysis of agent behavior). This gives us Result 4:

Result 4: *Under endogenous delegation, principals switch agents when they allocate higher amounts to recipients, however, the reaction is small and as a result agents do not reallocate lower amounts to recipients. Under compulsory delegation principals select agents who transfer less to recipients and the effect is greater than under endogenous delegation.*

5. Conclusions

It is important to point out that our baseline (dictator game) and compulsory delegation treatments' results are consistent with the existing literature. That is, principal's act as profit maximizers and select agents that maximize their payoffs. We have also replicated other treatments in Hamman et al. (2010) with similar qualitative results.

One of the outcomes of allowing for endogenous delegation is that under no-delegation the standard dictator game is obtained. We find that when individuals self-select into the role of the dictator they allocate significantly less to the receiver. Meanwhile, those that delegate the decision to an agent are more prosocial and on average delegate more. Interestingly, the distributional consequences of compulsory delegation and not delegating are to increase inequality while inequality is less under the standard dictator game and endogenous delegation (ED-D).

Lower allocations obtained under ED-N is along similar lines as the results obtained under the procedural manipulation of Hoffman et al. (1996) and Cherry et al. (2002). We do not obtain strong results as in Cherry et al (2002) where 95% of the outcome are in line with game theoretic predictions, however, one would not expect this given that the manipulation is subtle. The results regardless are un-expected with allocations significantly decreased. It seems that allowing for individuals to sort into delegators and non-delegators results in more and less pro-social. An analysis of the frequency of delegation and the amount transferred confirms a negative relationship between frequency of no-delegation and the amount transferred.

We also find that under ED-D, the outcomes are more pro-social. This is along the lines of previous studies (Dana et al. 2006; Dana et al. 2007; Andreoni and Bernheim, 2009; Grossman 2014) who find that subjects do not always want to face the outcome of

an unfair decision. Along this line Lazear et al. (2012) find that when subjects can avoid sharing environments, sharing decreases. We find that the less pro-social choose to allocate as a dictator while the more pro-social delegate. The result in Collins et al. (2018) is also among similar lines. That is, allocation decisions are lower when they are made by someone who bought or purchased the right to make the division compared to a subject who earned this privilege randomly. In our experiment there is random allocation of roles but in endogenous delegation the principal can keep the right to make the decision. Following previous literature, it may be the case that principals in endogenous delegation feel more entitled to share less than principals in the baseline. Similarly, another explanation could be the role of responsibility (Charness, 2000). The responsibility of the decision lies in the principal more under endogenous delegation as the principal can actively avoid unfair situations.

Finally, we ruled out any possible information effect that could explain these results implementing two different endogenous delegation treatments, one with information on principals' possible choices and another on which agents did not know that they were also competing with the principal (informationally closer to compulsory delegation). The results of these two treatments are identical suggesting that information asymmetries did not play a determining role.

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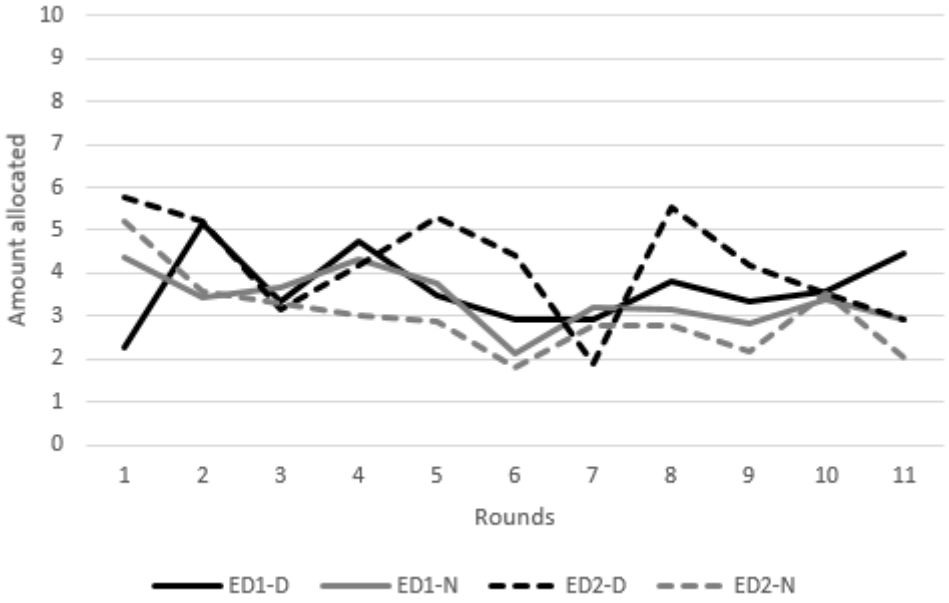
APPENDIX A

Figure 1A: Amounts allocated by the recipient by round when they delegate (ED-D) and not (ED-N) in ED-1 and ED-2 treatments



Overall we find that ED-1 and ED-2 give us similar results. The average shared amount with recipients in ED-1 is 3.47, not statistically significantly different from the average transferred amount in ED-2, 3.49 (, z= 0.383, p= 0.701 in a Mann-Whitney test).

In both treatments roughly half of the decisions were delegated, hinting that principals' behavior and did not change either. Moreover, as we can see in Figure 1, in both treatments selected agents reallocated higher amounts to recipients than principals, ED-1: 3.28 if they do not delegate, 3.70 when they delegate (z=-0.494, p=0.62); ED-2: 2.89 when they do not delegate, 4 when they delegate (z=4.84 ,p=0.00). We thus conclude that the information in the experiment does not matter in terms of agent's outcomes. Given this we pool the data from these two treatments. Henceforth this pooled data is referred to as ED.

APPENDIX B

Figure 1B: Number of times that each principal chooses not to delegate.

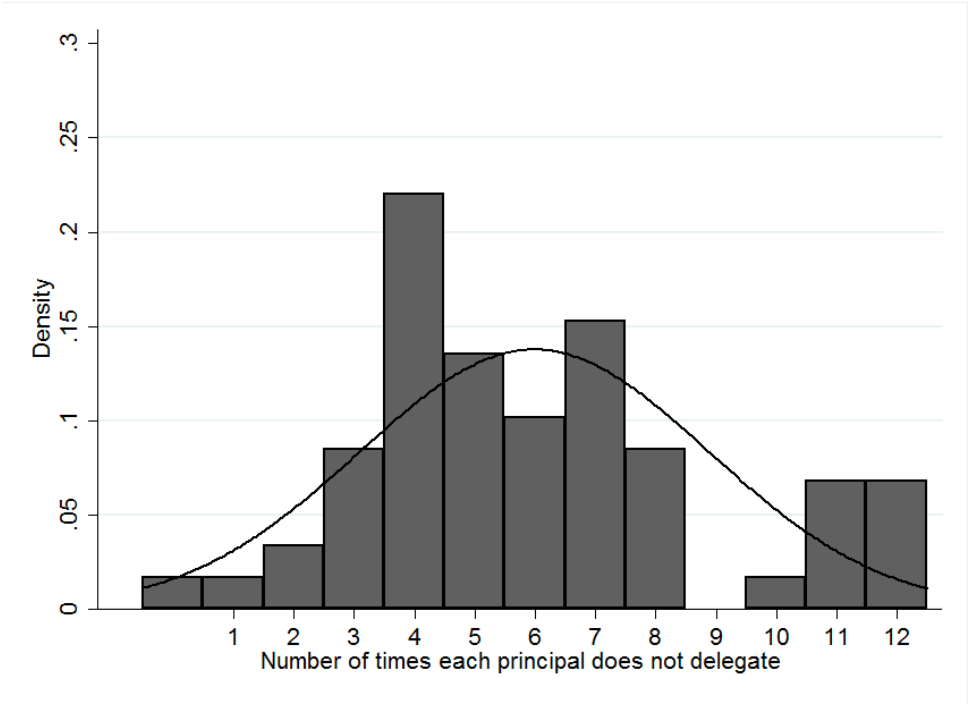


Figure 2B: Average amounts transferred to the recipient given number of times that the subject decided not to delegate.

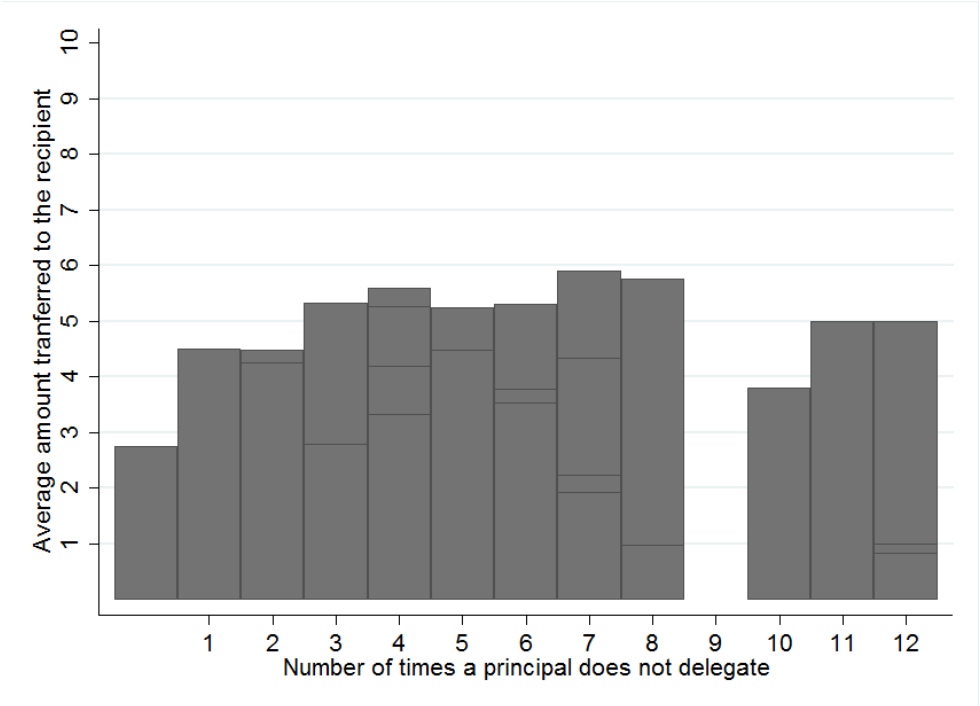


Figure 3B: Percentage switching from one decision maker to another by round in CD

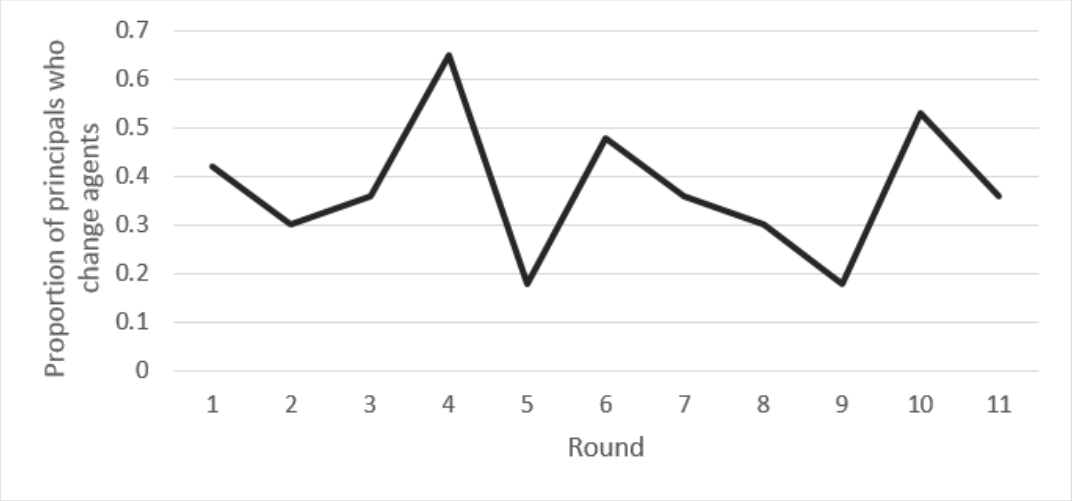


Figure 4B: Percentage switching from one decision maker to another by round in ED

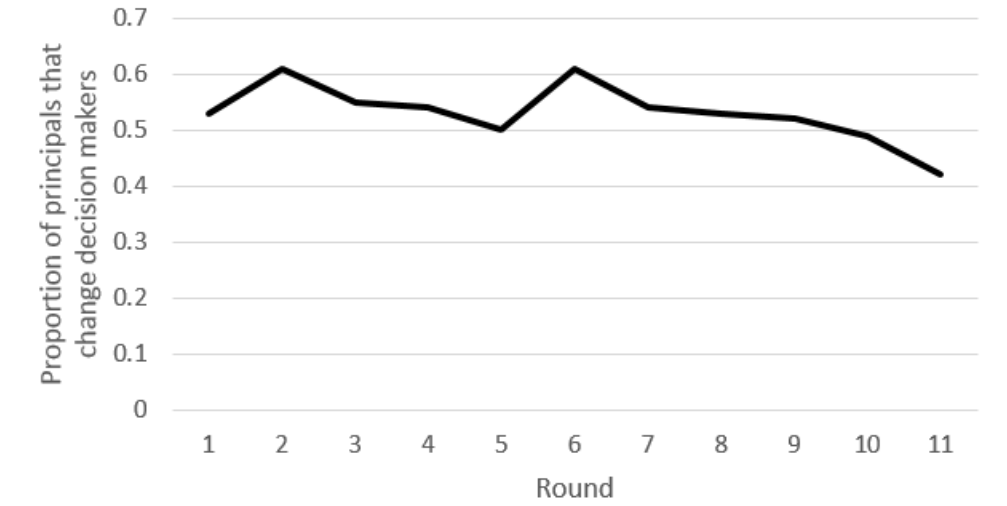


Table 1B: Seven item scale, form strongly disagree (-3) to strongly agree (+3) with a neutral option (0)

	BS		CD			ED		
Player	P	R	P	R	A	P	R	A
I feel personally involved in this experiment	1.85 (1.84)	-0.65 (2.25)	0.17 (2.18)	-0.82 (1.91)	1.1 (2.08)	1.31 (1.6)	-0.59 (2.17)	-0.06 (2.2)
The total profit obtained was relevant for me	1.55 (1.15)	0.75 (1.55)	1.71 (1.26)	0.06 (1.48)	0.5 (2.37)	1.22 (1.46)	0.85 (1.81)	0.03 (1.88)
I consider my behavior during the experiment acceptable	2.25 (1.11)	2.7 (0.57)	2.65 (2.64)	1.82 (1.24)	2.8 (0.42)	1.66 (1.52)	2.14 (1.43)	1.82 (1.51)
Players A with which I interacted had an acceptable behaviour	--------	0.25 (1.89)	--------	-0.24 (1.25)	0.7 (2.11)	--------	0.51 (1.88)	0.44 (1.76)
Players C with which I interacted had an acceptable behaviour	--------	--------	1.41 (1.62)	--------	--------	1.05 (1.43)	--------	--------
I am ready to take risks	1.4 (1.5)	1.75 (1.16)	1.94 (1.09)	1.76 (0.75)	2.3 (1.06)	1.36 (1.41)	1.86 (1.17)	1.74 (1.46)

Note: Standard deviation in parenthesis

Table 2 presents two regressions using the data from agents. The dependent variable will be the average allocation made by agents to principals in a round while the set of independent variables will include if the agent sees that he has been less chosen and therefore earned less profit (profit) and the round they are in. Generalized least squares regressions with cluster-robust standard errors are used as estimation method. In Model 1, the data analyzed is CD and in Model 2 ED.

There is a clear relationship between higher profits for agents and lower amounts reallocated to recipients in CD as the coefficient associated to agents profit is negative and significant. We do not find this in ED as the coefficient associated to profits is not significant.

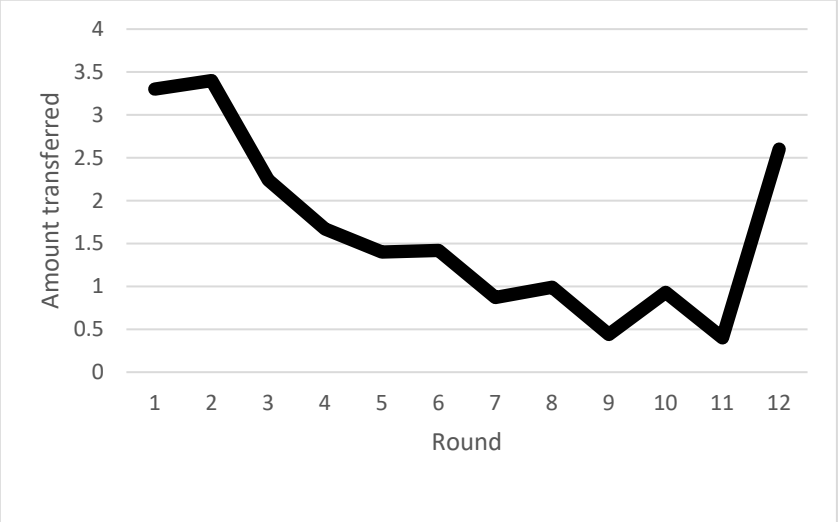
Table 2B: Amounts reallocated by agents depending on the profit obtained by them per round

	CD	ED
	Model 1	Model 2
Profit	-4.94***	0.26
	(1.61)	(3.42)
Round	-0.16*	-0.09
	(0.09)	(1.71)
Constant	3.86***	4.41***
	(0.66)	(11.62)
Observed agents	10	34

APPENDIX C: Compulsory and Endogenous delegation extra treatment

This graph presents the results of a 6 round CD and 6 rounds ED treatment. The treatment had 70 participants playing in 5 different sessions. We obtain the same results as in Hamman et al. (2010), where the outcome of ED after some rounds of CD converge to CD.

Figure 1C: Average amounts transferred to the recipient by round in CD-ED extra treatment



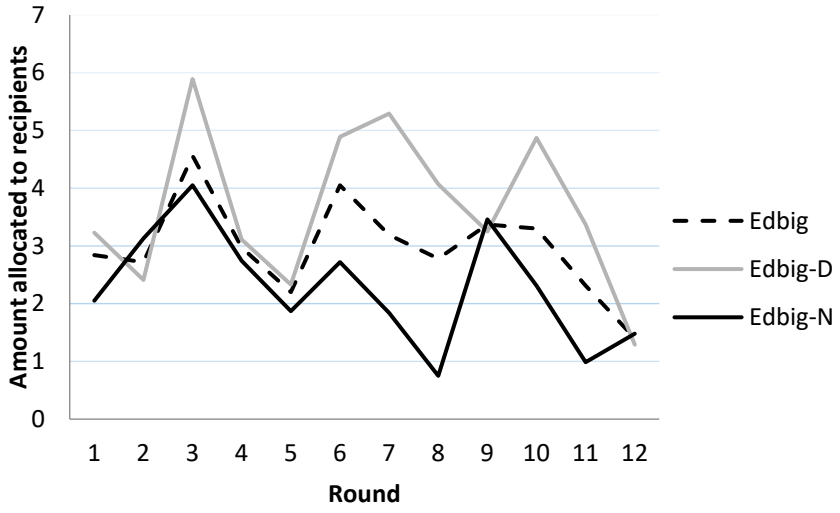
Notice that subjects played CD from round 1-6 and ED from round 7-12.

APPENDIX D: Endogenous delegation with bigger market size extra treatment.

The extra treatment (from now on ED-big) had 45 participants playing in 3 different sessions. Following Hamman et al. (2010) we had 7 principals, 3 agents and 7 recipients per session. The results obtained in ED-big are similar to those in ED. The only difference can be found in some deviations in the average amounts shared with recipients that are lower in ED-big (2.97) than in ED (3.47). This difference in quantities is probably due to the change in the number of participants. We observe the same tendency to transfer less in bigger groups when we compare our results in BS and CD (8 or 10 participants per session) with those of Hamman et al. (2010) (12 or 15 participants per session).[25]

The main results remain the same. First, the amount of decisions delegated are in both cases around 50% (52% in ED-big and 49% in ED) and second the average amounts shared by agents are significantly higher than the amounts shared by principals when there is no delegation (z= 5.56, p= 0.00 in a Mann-Whitney test). Figure 1 contains the average amounts transferred by principals and agents in the treatment and when agents and principals delegate.

Figure 1D: Amounts earned by the recipient by round and treatment



[25] In our treatments with small groups the average amount transferred by the principals on the BS treatment is 3.56. Meanwhile, in the CD treatment the average shared amount is 2.55. In Hamman et al. (2010): 2.18 in the Bs and 1.73 in the CD.

APPENDIX E: Instructions

- *Treatment 1: Dictator Game*

Thanks for participating in the experiment!

Please remember that from this moment on and till the end of the experiment no communication is permitted. If you have a question at any moment please raise your hand and we will answer your question in private.

All identities in this experiment are anonymous. No one in the experiment will get to know your identity during or after the experiment. Your identity will only be used to ensure that you are paid correctly. Please read the instructions with care. After reading them and before starting the game we will provide each participant with a graphical example of the experiment.

You will be paid at the end of the experiment. During the experiment we will use the term experimental money (EM) to refer to your earnings. At the end of the experiment we will transform this amount in the local currency using an exchange rate of 1. Notice that we will add 5 EM show up fee to your experimental earnings. Your earnings are your private information.

Experiment:

The experiment has twelve periods. The structure of the experiment is the following.

There are two types of players in this experiment: player A and player B.

At the start of the experiment you will be assigned a personal identification number by the computer. Whether you will be Player A or B is determined (randomly) by the computer.

In each period, each player A is randomly paired with a player B. Each pair, A-B, will be assigned 10 EM. We will now explain the structure of the game.

Each period:

At the start of each period, player A decides how to allocate 10 EM to player B and herself. The allocations can be made in increments of 1 cent of EM. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B plus the amount player A decides to keep will always add to 10 EM.

Once player A has taken their decision, each player will be informed about the amount they have been assigned.

At the end of each period all players, A and B, will see the information regarding current and previous periods, the identification numbers of their pairings and the amount assigned to them in each period.

Payment:

Besides the 5 EM show up fees, each particiant will be paid in the following manner.

At the end of the experiment one of the periods will be randomly chosen for each player A and B. Each player will be paid the amount they earned in that period. In addition, subjects will earn 2 EM for completing two short questionnaires

You will be called individually at the end of the experiment to be paid. You will inform the experimenter about you ID number and will be paid accordingly.

Any questions?

- *Treatment 2: Endogenous Delegation (ED-1)*

Thanks for participating in the experiment!

Please remember that from this moment on and till the end of the experiment no communication is permitted. If you have a question at any moment please raise your hand and we will answer your question in private.

All identities in this experiment are anonymous. No one in the experiment will get to know your identity during or after the experiment. Your identity will only be used to ensure that you are paid correctly. Please read the instructions with care. After reading them and before starting the game we will provide each participant with a graphical example of the experiment.

You will be paid at the end of the experiment. During the experiment we will use the term experimental money (EM) to refer to your earnings. At the end of the experiment we will transform this amount in your currency using an exchange rate of 1. Notice that we will add 5 EM show up fees to your experimental earnings. Your earnings are your private information.

Experiment:

The experiment has twelve periods. The structure of the experiment is the following.

There are three types of players in this experiment: player A, player B and player C.

At the start of the experiment you will be assigned a personal identification number by the computer. The computer will also inform you regarding the type of player you have been chosen to be.

In each period, each player A is randomly paired with a player B. There will also be two C players.

At the start of the period 10 EM will be assigned to each pairing (A-B). We will now explain the structure of the experiment.

Each period:

Player A's screen will show two boxes. Each box contains one of the two Players C and the option Myself.

Each player A has to select if the decision of dividing the experimental money is taken by one of the two C players or by player A (option Myself). To select an option,Player A simply needs to click on the associated box.

If A chooses player C, then player C decides how to divide the 10 EM between each pair of players A and B. The allocations can be made in increments of 1 cent. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B and player A always adds to 10 EM.

The allocation made by player C to a pair (A,B) is independent of the allocation made to another pair (if player C has been chosen by more than one player). If a player C has not been chosen by any player (A) then their screen will show a waiting message.

If Player A chooses the option Myself, the division of the money will be done by A.

Once all players have made their decisions, each player A and B will then be informed about the amount they have been assigned. In addition, all players will see a table containing all the information regarding previous periods.

Once all players A have made their decisions, player C is informed about the number of players A who have chosen him. Each decision maker (A or C) decides how to allocate 10 EM between players A and B. The allocations can be made in increments of 1 cent. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B and player A always add to 10 EM.

Payment:

Besides the 5 EM show up fees, each participant will be paid in the following manner.

At the end of the experiment one of the periods will be randomly chosen for each player A and B. Each player will be paid the amount they earned for that period. That is, this will be the amount that was allocated to them by player C in that period.

At the start of the experiment each player C is given an additional quantity of 5 EM However, player C loses 0.30 EM in each period and earns 0.15 EM for each player that selects him. Player C´s earnings are the total sum of the earnings in the entire experiment.

You will be individually called at the end of the experiment to be paid. You will inform the experimenter about you ID number and you will be paid accordingly.

Any questions?

Treatment 3: Endogenous Delegation without Information (ED-2)

Thanks for participating in the experiment!

Please remember that from this moment on and till the end of the experiment no communication is permitted. If you have a question at any moment please raise your hand and we will answer your question in private.

All identities in this experiment are anonymous. No one in the experiment will get to know your identity during or after the experiment. Your identity will only be used to ensure that you are paid correctly. Please read the instructions with care. After reading them and before starting the game we will provide each participant with a graphical example of the experiment.

You will be paid at the end of the experiment. During the experiment we will use the term experimental money (EM) to refer to your earnings. At the end of the experiment we will transform this amount in your currency using an exchange rate of 1. Notice that

we will add 5 EM show up fees to your experimental earnings. Your earnings are your private information.

Experiment:

The experiment has twelve periods. The structure of the experiment is the following.

There are three types of players in this experiment: player A, player B and player C.

At the start of the experiment you will be assigned a personal identification number by the computer. The computer will also inform you regarding the type of player you have been chosen to be.

In each period, each player A is randomly paired with a player B. There will also be two C players.

At the start of the period 10 EM will be assigned to each pairing (A-B). We will now explain the structure of the experiment.

Each period:

Each player A has to decide to delegate or not the decision of dividing the endowment on one of the two C players. To select an option, Player A simply needs to click on the associated box.

If A chooses a player C, then player C decides how to divide the 10 EM between each pair of players A and B. The allocations can be made in increments of 1 cent. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B and player A always adds to 10 EM.

The allocation made by player C to a pair (A, B) is independent of the allocation made to another pair (if player C has been chosen by more than one player). If a player C has not been chosen by any player (A) then their screen will show a waiting message.

Once all players have made their decisions, each player A and B will then be informed about the amount they have been assigned. In addition, all players will see a table containing all the information regarding previous periods.

Once all players A have made their decisions, player C is informed about the number of players A who have chosen him. Each decision maker (A or C) decides how to allocate 10 EM between players A and B. The allocations can be made in increments of 1 cent. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B and player A always add to 10 EM.

Payment:

Besides the 5 EM show up fees, each participant will be paid in the following manner.

At the end of the experiment one of the periods will be randomly chosen for each player A and B. Each player will be paid the amount they earned for that period. That is, this will be the amount that was allocated to them by player C in that period.

At the start of the experiment each player C is given an additional quantity of 5 EM However, player C loses 0.30 EM in each period and earns 0.15 EM for each player that selects him. Player C´s earnings are the total sum of the earnings in the entire experiment.

You will be individually called at the end of the experiment to be paid. You will inform the experimenter about you ID number and you will be paid accordingly.

Any questions?

- *Treatment 4: Compulsory delegation*

Thanks for participating in the experiment!

Please remember that from this moment on and till the end of the experiment no communication is permitted. If you have a question at any moment please raise your hand and we will answer your question in private.

All identities in this experiment are anonymous. No one in the experiment will get to know your identity during or after the experiment. Your identity will only be used to ensure that you are paid correctly. Please read the instructions with care. After reading them and before starting the game we will provide each participant with a graphical example of the experiment.

You will be paid at the end of the experiment. During the experiment we will use the term experimental money (EM) to refer to your earnings. At the end of the experiment we will transform this amount in the local currency using an exchange rate of 1. Notice that we will add 5 EM show up fee to your experimental earnings. Your earnings are your private information.

Experiment:

The experiment has twelve periods. The structure of the experiment is the following.

There are three types of players in this experiment: player A, player B and player C.

At the start of the experiment you will be assigned a personal identification number by the computer. The computer will also inform you regarding the type of player you have been chosen to be.

In each period, each player A is randomly paired with a player B. There will also be two independent C players.

At the start of the period 10 EM will be assigned to each pairing (A-B). We will now explain the structure of the game.

Each period:

Player A's screen will show two boxes. Each box contains the ID's of one of the two players C. Player A needs to choose from one of the two players C by clicking on the associated box. The chosen C will decide how to allocate the 10 EM between players A and B.

The selected player C decides how to divide the 10 EM between each pair of players A and B. The allocations can be made in increments of 1 cent. The amount of 10 EM will be fully allocated between players A and B. That is, the amount assigned to player B and player A always adds to 10 EM.

The allocation made by player C to a pair (A,B) is independent of the allocation made to another pair (if player C has been chosen by more than one player). If a player C has not been chosen by any player (A) then their screen will show a waiting message.

Once players C have made their decisions, each player A and B will be informed about the amount they have been assigned. In addition, all players will see a table containing all the information regarding previous periods.

Payment:

Besides the 5 EM show up fees, each participant will be paid in the following manner.

At the end of the experiment one of the periods will be randomly chosen for each player A and B. Each player will be paid the amount they earned for that period. That is, this will be the amount that was allocated to them by player C in that period.

At the start of the experiment each player C is given an additional quantity of 5 EM However, player C loses 0.30 EM in each period and earns 0.15 EM for each player

that selects him. Player C´s earnings are the total sum of the earnings in the entire experiment.

You will be individually called at the end of the experiment to be paid. You will inform the experimenter about you ID number and will be paid accordingly.

Any questions?