Delegating Responsibility to the Market: How Competition Shapes Fairness Perceptions*

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Abstract

While competition is a central pillar of economics, little is yet known about its psychological implications. In this study we show that competition importantly shapes fairness perceptions. If a trading party delegates the determination of the terms of trade to a competitive mechanism, unfavorable terms trigger significantly less counterproductive behavior from the interaction partner than if the trading party implements the same terms directly. This effect is robust to an increase in the intensity of competition, a stronger involvement of the deciding trading party in the competitive process, and a change in the access characteristics of competition. Our results suggest that competition alters the attribution of blame.

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1 Introduction

Major cornerstones of economics (e.g., price theory) build on the competitive forces of the market. In his famous work on the wealth of nations Adam Smith wrote: ”In general, if any branch of trade, or any division of labor, be advantageous to the public, the freer and more general the competition, it will always be the more so” (Smith, 1863, p. 145). Current economic thought continues to associate competition with positive connotations such as market clearing prices and an efficient allocation of resources, free access to trade, and the maximization of social welfare.

However, the favorable view of competition in standard economics is also challenged frequently. An important element of this criticism is the observation that even though competition may be an efficient allocation procedure, competitive allocations often violate normative standards of fairness. The fairness issue is not only widely discussed and criticized in public debate (see e.g., Sandel, 2012), but has also been given attention in economic research. Kahneman, Knetsch & Thaler (1986), for example, provide survey evidence showing that many people consider conditions on competitive markets to be an unfair determinant of outcomes (at least in certain situations).[1] In contrast to these results, other authors argue that competition is a fair procedure and innately linked to fairness judgments, because it ”provides a relatively objective measure of what B[uyer] and S[eller] bring to the relationship” (Hart & Moore, 2008, p. 12).

From an economics point of view, it is important to emphasize that the fairness implications of competition matter not only for normative reasons. There is ample evidence that perceptions of fairness have important behavioral consequences in many economic and social situations (see, e.g., Fehr & Fischbacher, 2002; Fehr & Schmidt, 2003; Fehr, Goette & Zehnder, 2009). In particular, the willingness to take retaliatory counterproductive actions if others create unfair outcomes is well documented (see, e.g., Fehr & Fischbacher, 2003). The prevalence of this kind of counterproductive behavior is a mixed blessing. Although the punishment of unfair behavior may, in the long run, help to support social norms and cooperation in some contexts, it can also create substantial deadweight losses (see Gaechter et al., 2008 for an interesting study on the up- and downsides of altruistic punishment). Thus, the question of whether and under what conditions competition leads to perceived unfairness is also of importance for efficiency reasons.

So far, economic research has revealed little about how competition shapes fairness per-

[1] A famous example from this work is the following: “A hardware store has been selling snow shovels for \$15. The morning after a large snowstorm, the store raises the price to \$20.” Among the 94 interviewed people only 17 thought that this price increase is acceptable, while the other 77 participants perceived it as unfair.

ceptions and the corresponding behavioral reactions. The aim of this paper is to make a first step in filling this gap. To this purpose we set up a controlled laboratory experiment that allows us to investigate in a very systematic way how competition shapes the manner in which trading parties react to the realization of unfavorable terms of trade. We find that the same unfavorable terms trigger fewer counterproductive reactions if the term-setting party has chosen a competitive auction instead of dictating the terms directly. More precisely, we find that using a competitive mechanism to determine the terms of trade leads to a shift of blame. Under competition the blame for unfavorable terms seems to be assigned to the competitors rather than the trading partner. However, because the increase in counterproductive behavior against competitors is smaller than the reduction in counterproductive behavior against the trading partner, the choice of competition reduces the total inefficiencies caused by conflict. Our results suggest that trading parties can successfully delegate the responsibility for unfavorable outcomes to the market.

The setup of our experiment reflects the situation of a powerful trading party who can select one of several possible interaction partners. The deciding trading party can choose between two different procedures to determine the terms of trade: she can either choose to set the terms directly herself, or she can let the terms be determined in a competitive auction between two potential trading partners. The market power of the deciding party implies that she can appropriate most of the surplus, and the outcomes thus tend to be unfavorable for the party on the other side of the transaction. We measure fairness perceptions by giving the interaction partners a costly counterproductive option that allows them to retaliate against the deciding party and/or their competitor. Specifically, once the terms of trade have been determined, both the selected trading partner, and the one who walks away empty-handed, can choose to hurt the deciding party and/or their competitor by destroying part of theirs payoffs.[2]

In addition to our main treatment we also present the result of three additional treatments which we implemented to examine the boundaries of the blame reducing effect of competition. Each of these robustness treatments modifies our baseline setup in a way that makes it less likely that unfavorable outcomes created by competition are perceived as acceptable. In the first robustness treatment we involve the deciding party more intensely in the competitive process. Instead of being able to delegate the determination of the terms

[2]The counterproductive actions in our experiment correspond to what Hart and Moore (2008) call performance shading. In reality shading can occur in various forms. For example, imagine that the deciding trading party is a buyer who faces multiple sellers. One obvious way in which the selected seller can hurt the buyer is by lowering the quality of the product or service delivered to the buyer (lowering the quality may be costly if their is a risk of detection or if the seller himself prefers delivering a high quality product). Another common and often powerful form of shading is malicious gossip. This form of shading can be used by both selected and rejected parties and may be targeted at both trading partners and competitors.

to an automatized clock auction, the deciding party itself actively enters the offers in the auction. This implies that the deciding party has a direct impact on the outcome of the competitive process, which may increase the attributed blame. In the second robustness condition we eliminate the feature that only competition grants equal access to trade from our design. This removes an important justification for the choice of competition and may therefore increase the perceived unfairness if competition is chosen and leads to unfavorable terms. In the third robustness treatment, finally, we increase the competitive pressure in the auction by adding a third potential trading partner. The increased competitive pressure increases the likelihood that unfavorable terms result and may therefore render the choice of competition less acceptable. Somewhat surprisingly, our results show the none of the three robustness conditions significantly alters our results. The effect that competitively determined terms of trade trigger fewer counterproductive actions persists in all treatments. The use of competition seems to be an effective and robust way to reduce the blame associated with unfavorable terms and to avoid counterproductive reactions.

In section 3 we present our experimental design. Section 4 presents the results. In final section 5 we summarize the findings and discuss the implications of our study.

2 Related Literature

To be written ...

3 Experimental Design and Procedure

Our experiment reflects the strategic situation of a powerful, term-setting party that faces multiple potential trading partners in a very stylized and simple manner. We use a multi-receiver dictator game with costly punishment. To be able to study the effects of competition in the determination of the terms of trade, we allow our dictators to choose between two mechanisms to determine how much money they transfer to one of the possible receivers. In the direct mechanism, the dictator chooses directly how much he transfer to an exogenously pre-selected receiver. In the competitive mechanism the transfer level is determined in a competitive auction among all potential receivers. We measure receivers' fairness perceptions and their attribution of blame through their attribution of costly punishment points to the other players in the game (i.e., the dictator and the other receivers). The main focus of our analysis is on the effects of the different procedures of transfer determination on punishment decisions.

3.1 The Baseline Treatment

We implement the following three player game: The dictator (Player A) receives an endowment of 90 points, the two receivers (Players B and C) have an endowment of 10 points each. The dictator (A) has the possibility to make a transfer $x \in [0, 40]$ to one of two receivers (B or C). The transfer can be determined directly (in which case the transfer always goes to B) or in a competitive auction between the receivers (both B and C have potentially access to trade). After the transfer has been determined, one of the two receivers receives an additional endowment of 5 points which he can use to allocate punishment points to the dictator and/or the other receiver (whether it is B or C who can punish is randomly determined and does not depend on which receiver has received the transfer).

In the following we provide a step-by-step account of the game, and describe each player's decisions in much more detail:

Step 1: *Dictator's mechanism choice*
Player A first decides to either set the transfer level herself (direct mechanism) or to let the transfer level be determined in a competitive auction between Players B and C (competitive mechanism).

When setting the transfer herself, Player A can simply decide how many points she wants to transfer. The minimal transfer is zero, the maximal transfer is fourty points. If A sets the transfer herself, it always goes to B and C receives nothing.

If A chooses competition, the transfer either goes to B or to C depending on which player wins in the competitive process. Competition is implemented in the form of a clock auction. The transfer offer starts at 0 points, and automatically increases by one point each second. As in the direct mechanism, the maximum transfer in the competitive mechanism is 40 points. Once the clock auction arrives at a transfer of 40 points (after 40 seconds), the transfer does not increase anymore. The auction stops as soon as one of the two receivers has accepted a transfer offer.

Step 2: *Receivers' punishment decisions*
After the transfer level and the receiving player have been determined, one of the receivers (B or C) has the possibility to assign punishment points to the dictator and/or the other receiver. To this end the randomly selected punisher received an additional endowment of 5 points. Punishing another player is costly for the punishing receiver: In order to destroy one point of another player, B or C has to give up 0.1 points of his own payoff. In total, a maximum of 50 points can be deducted from the other two players. Punishments can reduce a player's profit down to zero, but we do not allow for negative profits.

To maximize the number of observations, punishment decisions were elicited using a variant of the strategy method: After having learned about the transfer size and which player gets the transfer, but before knowing which receiver has been selected as the punisher both receivers indicate their punishment decisions. After B and C have made their punishment decisions, it is randomly determined which player's decision is implemented. This procedure is common knowledge in the experiment, i.e., the receivers are aware of the fact that their decision is implemented with a probability of 50%.[3]

Step 3: *Payoffs*

The payoffs resulting from the game are easiest explained in two steps. Let us first calculate an intermediary payoff that is reached after the transfer determination but before the punishment stage. We denote these intermediary payoffs by π^T. Table 1 displays the intermediary payoffs for Players A, B and C as a function of the transfer x.

Table 1: Intermediary payoffs

	direct	competition	
		B wins	*C wins*
π_A^T	$90 - x_B$	$90 - x_B$	$90 - x_C$
π_B^T	$10 + x_B$	$10 + x_B$	10
π_C^T	10	10	$10 + x_C$

Note: The subscript of transfer x indicates which of the two receivers gets the transfer.

After the punishment points p have been assigned to the corresponding players, final payoffs π are then calculated as shown in table 2.

Table 2: Final payoffs

	B punishes	*C punishes*
π_A	$\pi_A^T - p_B^A$	$\pi_A^T - p_C^A$
π_B	$\pi_B^T + 5 - 0.1(p_B^A + p_B^C)$	$\pi_B^T - p_C^B$
π_C	$\pi_C^T - p_B^C$	$\pi_C^T + 5 - 0.1(p_C^A + p_C^B)$

Note: For punishment points p, subscripts denote the player at the origin of the punishment, whereas superscripts denote the player at which punishment is targeted.

[3]Alternatively, we could have given the punishment rights to both receivers simultaneously. However, this would have created the potential for strategic counter-punishments among the receivers. While such punishment patterns might have been interesting, they would have implied that the punishment decision could no longer have been used as a clean indicator for the attribution of blame.

In words, the payoffs can be summarized as follows: A's payoff is equal to her endowment minus the transfer and minus the points that are deducted for punishment by the selected player B or C. The payoffs of B and C are composed of their endowment plus the transfer, if the player is determined to be the transfer receiver. In addition, if B's or C's decision is selected to be implemented for punishment, he receives another endowment of five points, from which the points he spends on punishment are being deducted. Finally, if the player's decision is not selected for punishment, the points that the selected other player B or C deducts from him are subtracted from the final payoff.

3.2 Treatment Variations

Our principal hypothesis is that the dictator is assigned fewer punishment points if the same low transfer has been determined in the competitive auction rather than directly chosen by the dictator. In order to test the robustness and the limits of this hypothesized effect, we conducted three further experimental treatments. Each of these treatments differed from the baseline treatment in only one dimension so that we can cleanly identify the impact of each separate dimension. In this section we provide a brief description of the changes that we implemented in each of the additional treatments.

3.2.1 Involvement Treatment

The clock-auction that determines the transfer size in the competitive mechanism in the baseline treatment is a very anonymous process in which the transfer is determined entirely by the actions of the two receivers without any involvement of the dictator. In reality, however, there are often situations in which all potential trading parties are directly participating in the bidding process. We therefore want to test whether a stronger involvement of the dictator in the competitive process weakens the punishment-reducing effect of competition. To do so, we conducted the involvement treatment in which Player A plays an explicit part in the competitive auction.

If Player A chooses the competitive mechanism in this treatment, he has to define a sequence of ten increasing transfer offers. The full sequence of offers is shown to the two competing receivers before the start of the competitive auction. In the actual auction, the transfer offers made by the dictator are then presented to the two competitors one after the other. Each proposal is displayed to the receivers for 1.5 seconds before the next higher proposal is shown and can be accepted. As in the baseline treatment, the player (B or C) who first accepts a proposal, receives the transfer. If none of A's ten offers is accepted, the highest offer of A becomes the starting point of an ensuing clock auction that is implemented in exactly the same way as in the baseline treatment, i.e. the transfer is increased by one point each second up to the maximum transfer of 40. (If the dictator's highest proposal is already 40, the clock auction does not increase the transfer anymore.)

Given that the responders get to see the entire pattern of proposals before the auction starts, the involvement treatment is a strong robustness test of the hypothesized punishment-reducing effect of competition, because responders should be able to make meaningful inferences about the proposer's intentions based on the pattern of the transfer proposals. For a selfish dictator it is thus much more difficult to hide her intentions behind the competitive process in this treatment.

3.2.2 Symmetric Access Treatment

In the symmetric access treatment our aim was to isolate the importance of the access component of competition. As described above, in the baseline treatment the transfer always goes to Player B if Player A decides to determine the transfer level directly. Thus, the only chance for C to get access to the transfer is if the dictator chooses to implement the competitive mechanism. Choosing competition thus allows the dictator to create ex-ante fairness between the two other players as it gives C a potential access to the transfer. This may be seen as providing Player A with a legitimate reason to use the competitive mechanism.

In order to understand the extent to which this access component is a driver of the punishment-reducing effect of competition, we ran the symmetric access treatment where Player C also gets a chance of receiving the transfer when the proposer chooses to set the transfer level directly herself. Specifically, in this treatment it is randomly determined whether Player B or C receives a directly determined transfer. Each player has a 50% chance of receiving the transfer. The symmetric access treatment thus varies only the way in which the direct mechanism is implemented. The competitive mechanism still takes the exact same form as in the baseline treatment.

3.2.3 Intense Competition Treatment

Another potentially important dimension for the punishment-reducing effect is the intensity of competition. The more intense the competition, the more likely it is that competition leads to an unfavorable outcome for the trading parties on the long side of the market. This may imply that the choice of competition is perceived as more unfair, if the intensity is higher. As a consequence, the punishment-reducing effect may be weakened or even reversed if the intensity is increased.

To test this notion, we ran the intense competition treatment in which we increase competition by adding another potential receiver, Player D. This makes a four-player game out of the game described above. The implementation of the direct mechanism is not altered by this, and is exactly the same as in the baseline.

The fourth player D in the intense competition treatment is a clone of C in the baseline treatment. This means that D never gets the transfer if A decides to set it directly, and that D competes for the transfer in a clock auction with B and C if A chooses to delegate to competition. For the implementation of the punishment decisions, the presence of the third potential punisher means that the probability that a given receiver's punishment decision is implemented is reduced to 1/3.

3.3 Data Collection and Procedural Details

The experimental sessions were conducted at the Frankfurt laboratory for experimental economics (FLEX) at Goethe-University in Frankfurt, Germany. Participants were recruited from the subject pool for economics experiments at Goethe-University using ORSEE (Greiner, 2003). The experiments were programmed and conducted with z-Tree (Fischbacher, 2007).

We ran seven sessions for each of the four treatments. This yields a total of 28 sessions and 619 participants. We aimed at 24 participants per sessions. However, sometimes no-shows implied that session had to be conducted with 20 (intense competition) or 21 (other treatments) participants. In one session of the involvement treatment an exceptionally high rate of no-shows resulted in a session with 15 participants only. All sessions were conducted during June, July, and November 2012.

Treatments were randomly assigned to sessions, and participants were randomly assigned to roles at the beginning of each session. In each session, participants played 12 rounds of the game with randomly matched partners. Interactions were anonymous, i.e., it was not possible to know the identity of the other players with which one interacted.

Participants received detailed written instructions at the beginning of the experiment, and had to correctly answer a number of control questions before the session was started. A summary of the instructions was read aloud to participants. After having played the game participants answered a final questionnaire containing open-form questions about their choices in the experiment, a number of psychometric scales, as well as socio-demographic questions.

Sessions lasted for 75 to 90 minutes including the reading of the instructions, the control questions, the twelve rounds of the game, the final questionnaire, and the payment of participants. Participants received a show-up fee of 10 EUR. To determine the payments from the game, one of the twelve periods was randomly selected for pay-out with an exchange rate of five points per Euro. The average earnings were 16.44 EUR (24.44 EUR on average for participants in the role of A, and 12.79 EUR on average for participants in a role other than A). Participants received their payments in private.

4 Results

The principal research question we aim to answer is whether the selection of competition as a process to determine outcomes allows to reduce counterproductive behavior in response to unfavorable outcomes. In the experiment, counterproductive behavior is operationalized via a costly punishment option available to one of the receivers. We interpret this dependent variable as a measure of the behavioral reaction to the perceived fairness of both the outcome and the process of outcome determination.

4.1 Main Results

As our first main result we show that our data support the hypothesis that the choice of competition as the mechanism to determine outcomes reduces the punishment that receivers impose on the dictator in reaction to a low transfer.

> **RESULT 1:** The same transfer triggers less punishment of the dictator, if the dictator has chosen to let the transfer be determined in a competitive auction rather than setting the transfer level herself.

Figure 1 shows that in the baseline treatment competition clearly reduces punishment of the dictator. The solid lines in the graph capture the number of points that are on average deducted from the dictator by the two receivers as a function of the transfer size. Not surprisingly, the figure shows that transfer size matters: The punishment of the dictator decreases with increasing transfers. The most relevant finding for our research interest is, however, that the process of outcome determination clearly matters as well: In the competitive mechanism the punishment of the dictator is lower than in the direct mechanism for any given transfer size. For a given transfer level, the dictator is thus punished less when the transfer is determined competitively as compared to when the transfer is directly set by the dictator herself.

[Figure 1 about here.]

In our experiment receivers cannot only punish the dictator, but they can also target the other receiver. We have seen that competition reduces the punishment of the dictator, but what happens to punishment of the other receiver? Does some of the blame for a low outcome shift to him? Our second result suggests that this is indeed the case.

> **RESULT 2:** For a given transfer, the punishment targeted at the other receiver is higher, if the dictator chose to let the transfer be determined competitively rather than setting the transfer herself.

The two dashed lines in Figure 1 represent the punishment targeted at the other receiver. In contrast to the punishment targeted at the dictator (represented by the two solid lines in the figure), the graph shows that when competition is chosen by the dictator, the other receiver is punished more than in the direct mechanism. Competitition thus decreases the punishment of the dictator, but increases the punishment of the other receiver. It seems that the blame for a low transfer is shifted from the dictator to the competitor when competition is chosen.

Given the opposite effects of competition on punishment of the dictator and the other receiver, it is important to also look at the effect of competition on total punishment. The selection of competition is only efficiency enhancing if the reduction of the punishment of the dictator is less than fully compensated by the increase of the punishment of the other receiver. Our third result confirms that competition reduces total punishment and therefore boosts efficiency.

> **RESULT 3:** The choice of a competitive mechanism to determine the transfer level decreases the overall punishment level.

A simple comparison of the effect sizes in Figure 1 makes it obvious that the increase in the punishment of the other receiver in the competitive mechanism does not fully offset the decrease in the punishment of the dictator. Total punishment, i.e. the sum of the punishment points assigned to all three players within a group, is thus lower in the competitive mechanism than in the direct mechanism. The coefficient for competition in the regressions reported in columns 5 and 6 of Table 3 shows that this effect is significant ($p < .05$) in the baseline treatment. Table 3 also displays the regression results for the effects of competition on punishment of the dictator (columns 1 and 2) and of the other receiver (columns 3 and 4). The decrease of dictator punishment and the increase in punishment of the other receiver in the baseline treatment are both statistically significant.

[Table 3 about here.]

4.2 Robustness across Receiver Types

In the baseline treatment, and in fact in all treatments except symmetric access, the roles of the two receiver types are not completely identical. The difference between the roles is that the B types are sure to receive the transfer when the dictator chooses the direct mechanism, whereas the C types' only chance to receive a transfer is when the dictator uses competition. This difference is potentially relevant for the punishment decisions, as it gives the B types a motive to punish the dictator when she chooses to delegate to competition, and the C types a motive to punish her when she chooses the direct mechanism. Panel A of Figure 2 shows, however, that the punishment-reducing effect of a competitively determined transfer is almost identical for the two receiver types in the baseline treatment. Both show a clear decrease in the punishment of A when the transfer is determined competitively. The other three panels in Figure 2 indicate that this is true not only in the baseline but also in the other experimental treatments.

[Figure 2 about here.]

Also the increase in punishment of the other receiver does not depend on the player type. Figure 3 shows that across all treatments all types of players increase the punishment of the other receiver when competition has been chosen by the dictator to set the transfer.

[Figure 3 about here.]

4.3 Robustness across Treatment Variations

The results of the baseline treatment discussed so far show that competition reduces punishment in comparison to the direct mechanism. In this section we investigate to what extent this effect is altered by the modifications of our setup implemented in our three additional treatments.

4.3.1 Involvement

In our first robustness check we examine the effect of a more explicit involvement of the dictator in the competitive process. In the involvement treatment we changed the nature of the competitive mechanism by involving the dictator much more directly and letting her define the terms of the auction. Specifically, the dictator has to define a set of 10 increasing transfer offers that is fully disclosed to the receivers before the auction starts. The transfer offers set by the dictator are then presented one after another to the competing receivers during the auction. The top-left panel in Figure 4 indicates that the effect we identify in the baseline is robust to this stronger involvement of the dictator. As in the baseline, also in this treatment there is less punishment for the dictator when she chooses competition, and more punishment of the other receiver.[4]

[Figure 4 about here.]

4.3.2 Symmetric Access

The next robustness check we consider is the symmetric access treatment. In this treatment, in the direct mechanism each receiver has an equal chance to obtain the transfer. We therefore eliminate a potentially important fairness advantage of competition if agents care about equal ex-ante chances of receiving the transfer. The top-right panel in Figure 4 shows the punishment patterns in the symmetric access treatment. We can see that for transfers of up to 15 points, which make up the vast majority of cases, the dictator is still punished less also in this treatment. It is only for the relatively rare transfers that are greater than 15 points that the two solid lines cross. The effect of competition on dictator punishment thus goes in the same direction as in the baseline treatment for the clear majority of observed cases. As in the baseline, we can also observe in this treatment that competition leads to an increase in punishment of the other receiver. Thus overall, the pattern is very similar to the baseline. The elimination of the access advantage of competition does apparently not alter the effects in an important way.

4.3.3 Intense Competition

Finally, the bottom-left panel in Figure 4 illustrates the results of the intense competition treatment. In this treatment we intensified receiver competition by adding a third receiver whose role is identical to C's. The shift to the left in the distribution of transfer sizes (displayed at the bottom of the graph in panel C) indicates that competition for transfers is indeed more fierce in this treatment. Concerning punishment we can see that also in this treatment, for any possible transfer, the dictator is better off by choosing competition than by setting the transfer level herself, as she is punished less when choosing competition.

[4] We do not find effects of dictators' offer patterns on punishment. Dictators' offer patterns can most straightforwardly be characterized by the first offer (the starting point), the last offer (the end point), and the mean offer. When regressing punishment of the dictator on these independent variables and controlling for transfer size and period, the results are the following: first offer = .076 (p = .692), mean offer= $-.193$ (p = .559), last offer = .062 (p = .707), p-values based on standard errors clustered on the level of the individual participant (as clustering on the session level would yield only seven clusters).

We can again observe an increase of punishment of the other receivers when competition is chosen.

4.3.4 Regression Analysis of Treatment Variations

The regression results reported in columns 1 and 2 of Table 3 confirm that there are no significant differences regarding the effect of competition on the punishment of the dictator between the three treatment variations and the baseline. The coefficients for the dummy variables capturing the three treatment variations and the interaction of these variables with a dummy for competition are all non-significant. The only exception is the marginally significant coefficient of the dummy for the intense competition treatment. This means that compared to the baseline there was less dictator punishment in this treatment in the direct mechanism at transfers of zero.

Columns 3 and 4 of Table 3 display the results of regressions for punishment of the other receiver(s). The only significant difference to the baseline can be observed in the involvement treatment. The significant coefficient of the interaction effect of the dummy for the involvement treatment and the dummy for competition indicates that in the involvement treatment the increase in punishment of the other receiver when competition is chosen is larger than in the baseline. This is somewhat surprising, as it could have been expected that the involvement of the dictator in the competitive process would lead the dictator to be held more responsible for the competitive outcomes, and thus more punishment being assigned to her when she chooses the competitive mechanism than in the baseline. We have seen that this is not the case. Instead it seems that the stronger involvement of the dictator actually further increases the blame and the punishment that is placed on the other receiver. For the other treatment variations there are no significant differences to the baseline.

Both effects, the reduction of punishment of the dictator and the increase of punishment of the other receiver when competition is chosen, are thus robust to the treatment variations. What does this mean overall, i.e. what is the effect of competition on total punishment? The bottom-right panel in Figure 4 shows that total punishment is lower in all treatments when competition is chosen than when the transfer is set directly by the dictator. The difference between the two mechanisms is largest in the baseline treatment. The treatment variations we conducted do therefore at least directionally somewhat weaken the punishment-reducing effect of competition. However, as the regression results reported in columns 5 and 6 of Table 3 show, these differences are not significant. The finding that competition decreases punishment compared to the direct mechanism is thus very robust to our treatment variations.

4.4 Individual Heterogeneity

Our results show that the use of competition affects punishment choices. However, the individual heterogeneity in regard to receivers' punishment decisions is large. Across all treatments of the experiment, 25.2% (N=425) of participants in the roles of B, C or D never use the punishment possibility and never deduct any points from any of the other participants during the entire twelve periods of the experiment.[5] Given that punishment is costly, these are the participants that may be seen as acting strictly according to a standard self-interest hypothesis maximizing their monetary gains. Differentiating by the target of the punishment, we find that 28.9% of receivers never assign any punishment to the dictator,[6] and 40.9% never punish the other receiver(s).[7]

The regressions reported in Table 4 give an impression of the importance of unobserved individual differences in preferences for punishment decisions. The model reported in the second column includes individual participant fixed effects to explain the observed variance in the punishment of the dictator, whereas the model reported in the first column does not. The difference in explained variance between the two models (captured by the R^2 values) is striking. Unobserved individual differences between participants in the role of receivers explain the largest part of the variance in dictator punishment.

Thanks to the design of our experiment, the apparent importance of unobserved individual differences does not pose a problem for identifying the effects we are interested in. Interactions in the laboratory were anonymous, meaning that the dictator could not observe with whom she is interacting. She could thus not condition her mechanism choice on any possible characteristics of the receivers, and any unobserved individual differences between receivers should even out on average, as the assignment of individual receivers to the mechanism is in fact a random process. Our design therefore allows for a clean identification of

[5] By treatments the results are the following: In the baseline 35.1% of the receivers (N=108) never use any punishment, compared to 21.4% (N=98) in the involvement treatment, 21.3% (N=108) in the symmetric access treatment, and 36.9% (N=111) in the intense competition treatment. In this regard, the baseline and the intense competition treatment differ significantly from the involvement ($p < .05$) and the symmetric access treatment ($p < .10$, p-values obtained via OLS regression with clustered standard errors). There are no other significant differences.

[6] By treatment the results are the following: In the baseline 31.5% of receivers never punish the dictator compared to 18.4% in the involvement, 18.5% in the symmetric access and 31.5% in the intense competition treatment. In this regard, the involvement and the symmetric access treatment differ significantly from the baseline ($p < .10$) and from the intense competition treatment ($p < .05$, p-values obtained via OLS regressions with clustered standard errors). There are no other significant differences.

[7] By treatment the results are the following: 50.0% of receivers never punish the other receiver(s) in the baseline, 38.8% in the involvement, 33.3% in the symmetric access, and 41.4% in the intense competition treatment. In this regard, the baseline differs significantly from the symmetric access treatment ($p < .01$), and the involvement treatment ($p < .10$, p-values obtained via OLS regressions with clustered standard errors). There are no other significant differences.

the effect of competition on punishment, despite the presence of individual heterogeneity.[8] It is thus only logical that the effect remains the same when accounting for such unobserved individual differences (compare models 1 and 2 in Table 4).

[Table 4 about here.]

Pinpointing the sources (or at least identifying possible correlates) of the observed individual heterogeneity in punishment is not the key focus of our study, but it is potentially interesting and may help to better understand the effect. When analyzing the data on demographics and personality measures gathered in the post-experimental questionnaire, we find that the only individual difference variable that is predictive of punishment decisions in our data is gender. Women tend to use less punishment than men, and, what is more interesting, the reduction of dictator punishment by the use of competition is significantly more pronounced for men than for women (see the positive sign of the coefficient for the interaction between a dummy for women and a competition dummy in column 3 of Table 4). Model 4 shows that the effect also holds when controlling for a number of personality dimensions that are potentially correlated with gender.[9]

The individual heterogeneity in punishment decisions and the gender difference in the punishment-reducing effect of competition are also illustrated in Figure 5. The figure shows the average punishment assigned to the dictator by each receiver in the experiment conditional on whether the transfer is determined by the competitive mechanism (x-axis) or the direct mechanism (y-axis). The gray lines indicate equal punishment in both mechanisms, corresponding to no effect of the mechanism of transfer determination on punishment choices for a given individual. The large majority of observations lies above the gray line, indicating that the punishment-reducing effect of competition holds for most receivers. We can also see that the effect is more pronounced for men than for women as the orange circles representing a female receiver tend to lie closer to the gray line than the green x's for male receivers.

[Figure 5 about here.]

[8] The same is true for identifying treatment differences, given that assignment to treatments was randomized by the experimenters.

[9] None of the personality measures included in model 4 in Table 4 shows a significant interaction with the competition dummy when entering these interaction terms into the same regression. Moreover, the interaction between competition and gender remains significant also when controlling for these additional interaction terms.

4.5 Dictators' Choices and Profits

Since competition leads to lower punishment of the dictator for any given transfer size, choosing competition to determine the transfer is beneficial for dictators. Yet, at least at the beginning, the dictators are somewhat reluctant to make use of the competitive mechanism: Only 35.2% (N=54) of dictators in the Baseline treatment do so in the first period of the game. However, dictators learn quickly that choosing competition can increase their profits, and the share of dictators choosing to delegate the transfer determination to competition increases to 48.3% when looking at all periods of the baseline treatment. Figure 6 shows that the temporal development of mechanism choices is very similar in all treatments. What the figure doesn't show is the considerable individual heterogeneity among dictators in regard to mechanism choices: Across all treatments, 28.4% (N=194) of dictators never use the competitive mechanism,[10] whereas 13.4% use it in all twelve periods.[11]

[Figure 6 about here.]

Figure 7 displays Player A's profits as well as total profits - the sum of the profits of all players in a group (i.e., social welfare) - across the treatments differentiated by delegation decisions. Despite the transfers in the competitive mechanism being on average higher than in the direct mechanism,[12] in all treatments of the experiment the dictator makes a larger profit when choosing competition than when setting the transfer herself. Because of the higher average transfers in the competitive mechanism, the differences are not large, but they are statistically significant.[13]

For total profits, i.e. social welfare, the differences are more pronounced. Because com-

[10]By treatments the results are the foollowing: In the baseline 25.9% of the dictators (N=54) never use the competitive mechanism, compared to 26.5% in the involvement treatment (N=49), 29.6% in the symmetric access treatment (N=54), and 32.4% (N=37) in the intense competition treatment. The differences are not statistically significant ($p > .10$).

[11]By treatments, the results are the following: In the baseline 16.7% of the dictators always use the competitive mechanism, compared to 16.3% in the involvement treatment, 11.1% in the symmetric access treatment, and 8.1% in the intense competition treatment. The differences are not statistically significant ($p > .10$).

[12]Across all treatments, the mean transfer when set directly is 4.50 points (N=2848) compared to 9.36 points (N=2252) when the transfer is determined by competition. See also the transfers distributions in the different treatments displayed at the bottom of the graphs in Figures 1 and 4.

[13]When considering all treatments together, the difference in dictators' profits between the two mechanisms is significant at $p < .01$. When looking at each treatment individually, the difference is still marginally significant at $p < .10$ for all treatments except the baseline. When controlling for transfer size (as in the regressions reported in Table 3), the difference is significant at $p < .01$ in each individual treatment (and also overall, considering all treatments together). The reported p-values stem from OLS-regressions regressing player A's profit on a dummy capturing the delegation decision. Standard errors were clustered on experimental sessions.

petition reduces overall punishment, welfare is maximized when Player A chooses to use competition to determine the transfer. Also this difference is statistically significant.[14]

[Figure 7 about here.]

5 Summary and Conclusions

Our results indicate that delegating the determination of the terms of trade to a competitive mechanism is an effective way to reduce counterproductive reactions to unfavorable outcomes. The dictator in our game can decrease the receivers' counterproductive reactions significantly by delegating the transfer determination to competition instead of setting the transfer level herself. The dictator can thus avoid punishment and make larger profits by using the competitive mechanism instead of simply exerting her power and setting the transfer directly.

Using competition seems to shift (at least partly) the blame for the unequal outcome from the dictator to the competing receiver(s). Although the dictator is still the main beneficiary of a low transfer, and despite the fact that the dictator could have avoided a low transfer by making a generous decision in the direct mechanism, the dictator seems to be able to shun the blame and to effectively shift it to the other receiver by selecting competition.

Competition thus has opposing effects on the punishment of the dictator and the punishment of the other receiver. Because it reduces the punishment of the dictator more than it increases the punishment of the other receiver, it has a beneficial impact on the efficiency of the exchange overall. Thus, according to our results, competition is not only an efficient allocation mechanism in the standard economic sense, it also seems to have, at least in our set-up, beneficial effects on fairness perceptions which help reduce costly and efficiency-damaging counterproductive behavior.

Taken together, our findings support the view that competition importantly shapes people's fairness perceptions. The same unfavorable outcome seems to appear as less unfair if it has been determined in a competitive process than if it has been determined non-competitively. This interpretation squares well with Hart & Moore's (2008) assumption that the objectivity of market forces turns a competitive outcome into something which is perceived as acceptable or even fair. This finding also contributes to the emerging litera-

[14] When considering all treatments together, the difference between the direct and the competitive mechanism is significant at $p < .01$. The difference is also significant in each individual treatment ($p < .05$ in all treatments). Again, the reported p-values come from OLS-regressions regressing total profits on a dummy for the delegation decision, with standard errors clustered on experimental sessions.

ture in behavioral economics on the effects of different procedures on fairness perceptions (see, e.g., Bolton et al., 2005; Sebald, 2010; Chassang & Zehnder, 2011), a topic that is also very prominent in the psychology literature (see, e.g., Thibaut & Walker, 1975; Brockner & Wiesenfeld, 1996)

Why should competition be a fair process of outcome determination? In the manner it was implemented in our experiment, competition does have certain characteristics of a fair process: Its rules are clearly defined, and the auction process is transparent. Moreover, it guarantees a level-playing field by granting equal access possibilities to the transfer for both receivers. However, the fact that we do not find a significant weakening of the effect of competition in the symmetric access treatment clearly shows that this access component of competition can not serve as the full explanation. The effect of competition on fairness perceptions seems to go beyond this.

Competition may also be a way to diffuse responsibility. The direct implication of the other receiver in the outcome determination in the auction may make him become a more salient target for punishment than the dictator who is the actual beneficiary of a low transfer. Similar to the already demonstrated effects of delegation (Bartling & Fischbacher, 2012) and intermediation (Coffman, 2011), competition therefore seems to make it harder to attribute the blame for an unfair outcome to the final beneficiary. Yet, it is remarkable, and not necessarily in line with this interpretation, that the effect does not seem to be altered by involving the beneficiary more directly in the competitive process, as in our involvement treatment.

In general, the effects of competition prove to be surprisingly robust to our treatment variations. These variations include, as mentioned, a closer involvement of the trading partner in the competitive process, an elimination of the access advantage of competition, and an increase of the degree of competition. None of these manipulations succeed in significantly reducing the effects of competition.

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6 Figures and Tables

Figure 1: Punishment patterns in the baseline treatment

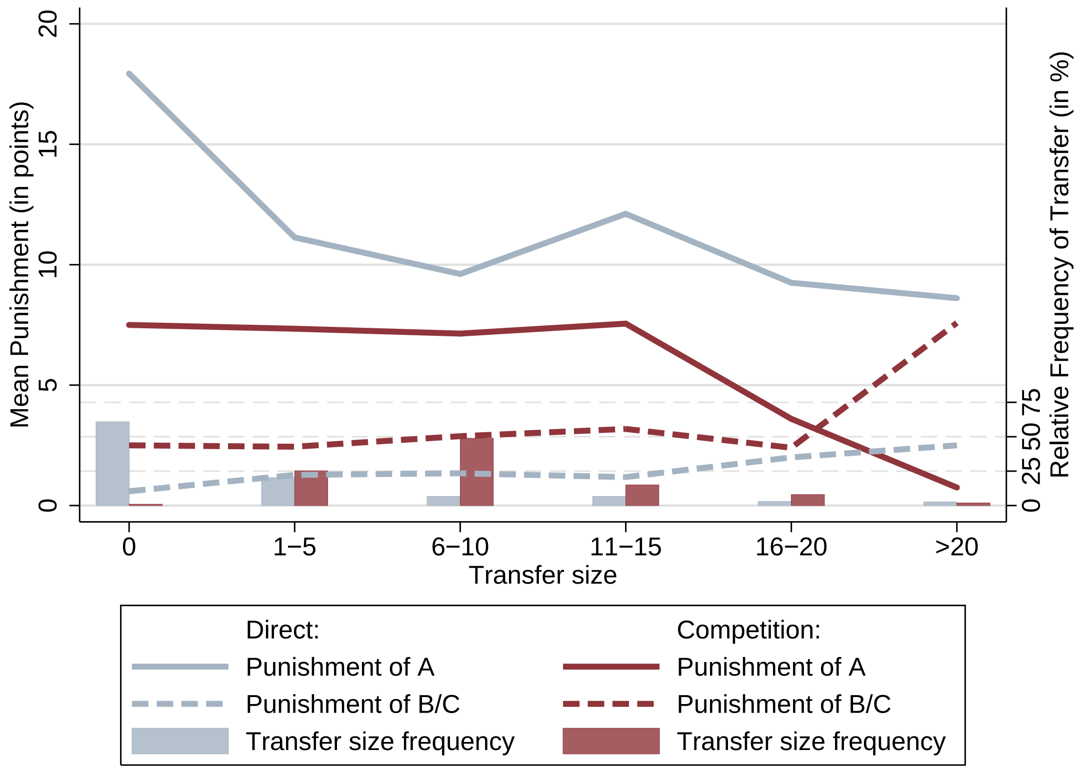
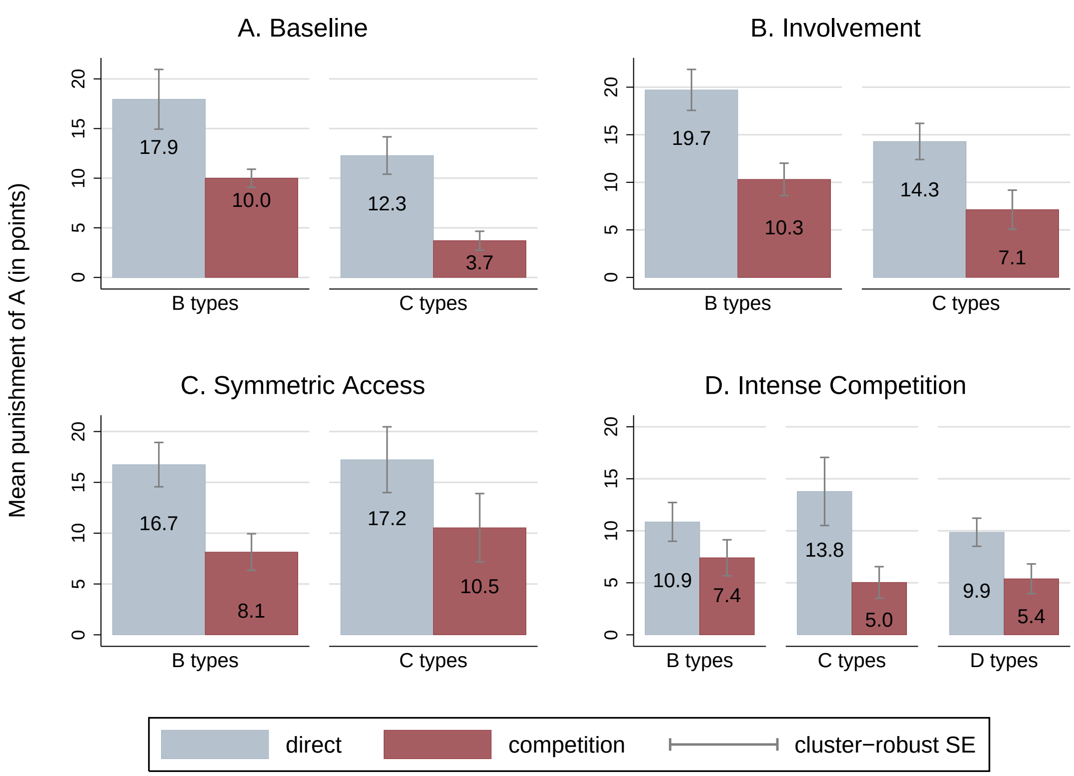
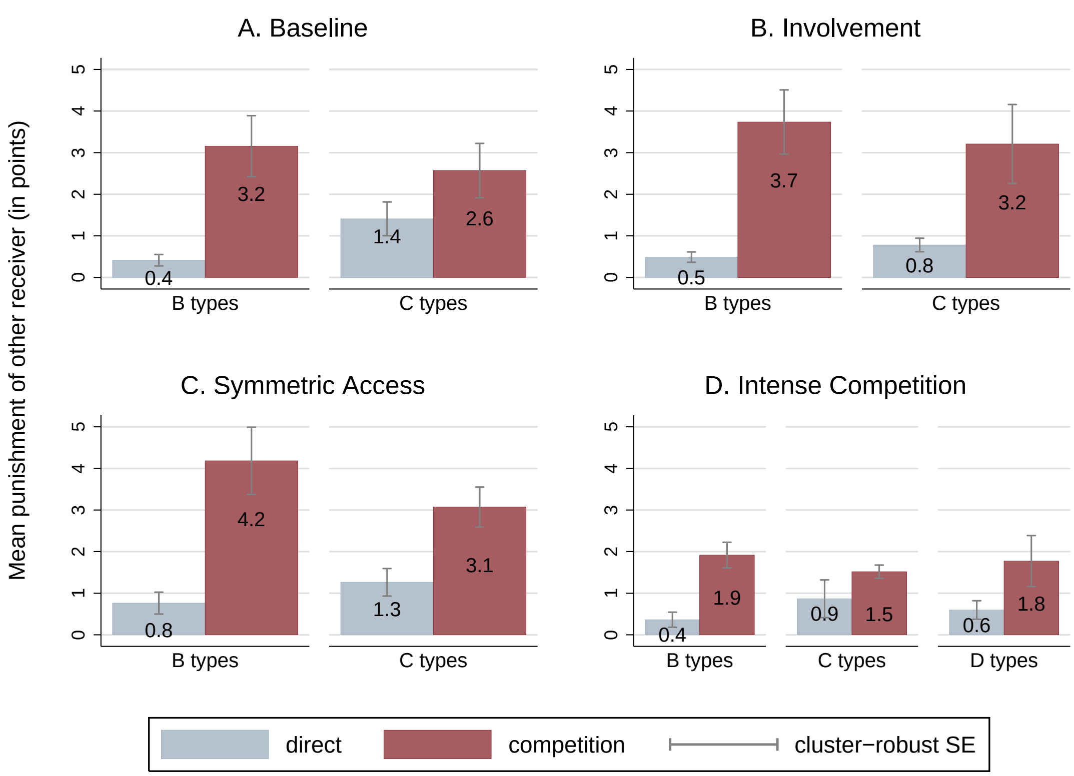


Figure 2: Punishment of the dictator by receiver type



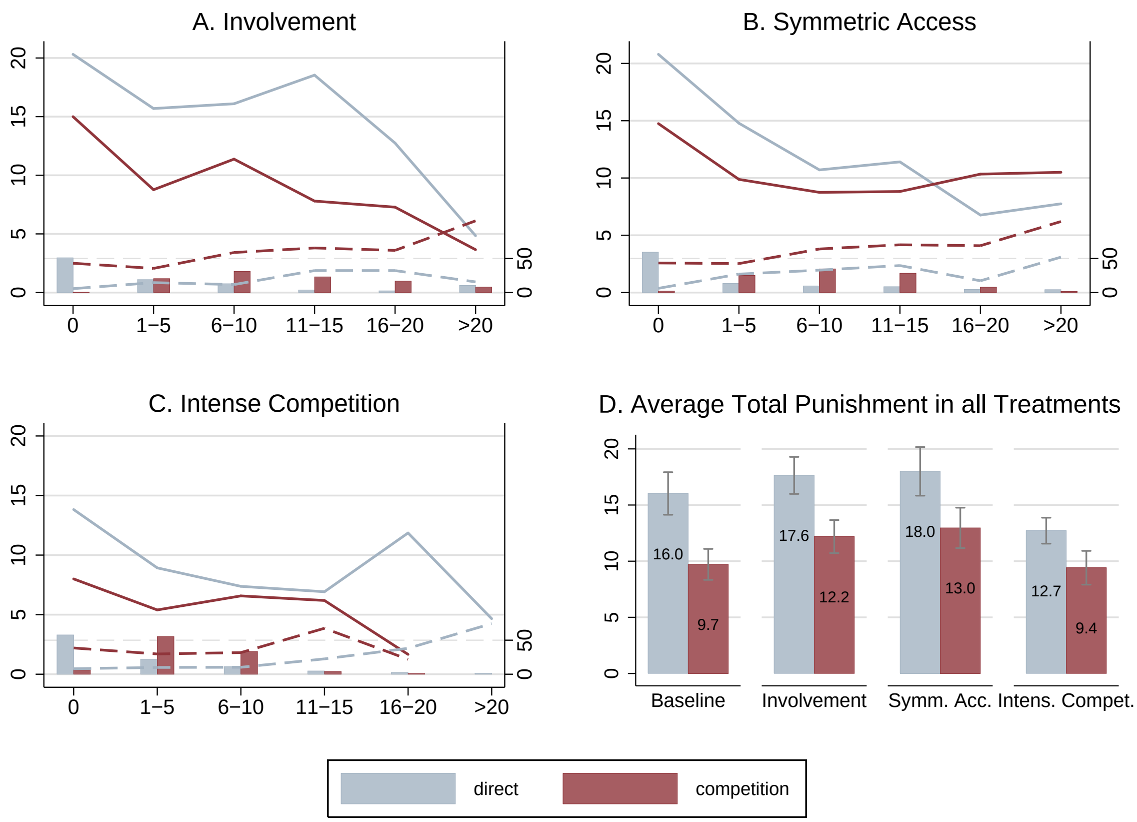
Note:
Error bars represent plus/minus one standard error of the mean, clustered on experimental sessions.

Figure 3: Punishment of the other receiver by receiver type



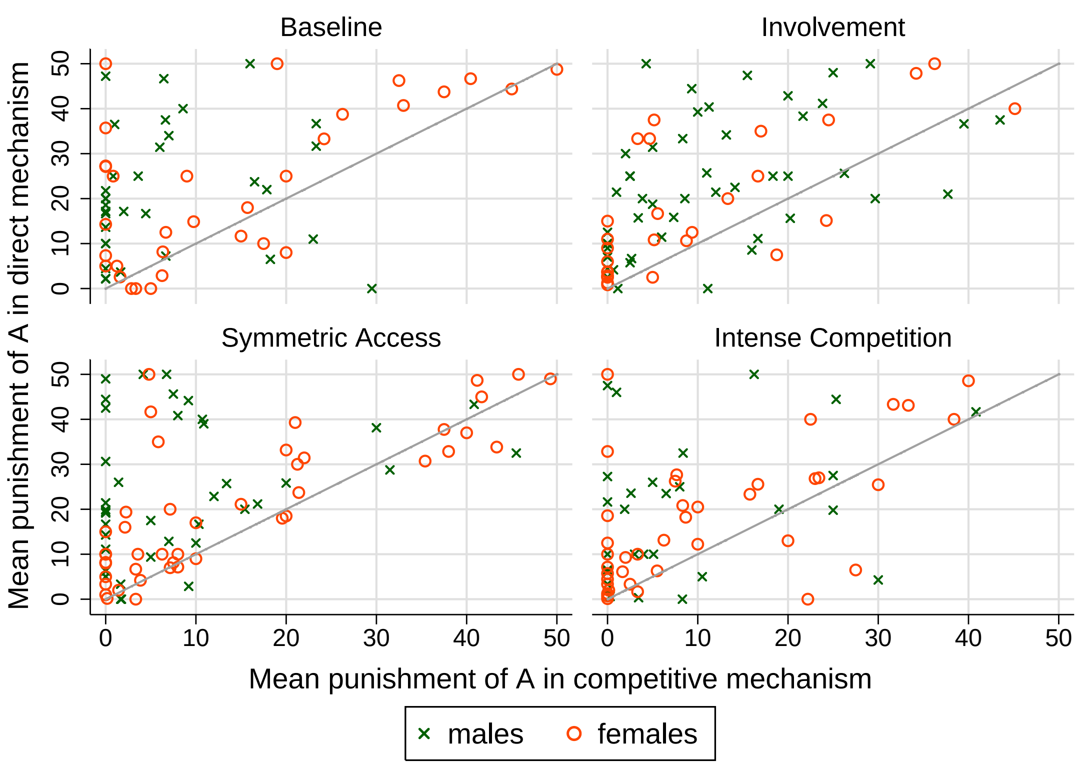
Note:
Error bars represent plus/minus one standard error of the mean, clustered on experimental sessions.

Figure 4: Punishment patterns in the treatment variations



Notes:
Panels A, B, C: Like in Figure 1, the solid lines correspond to the average punishment of the dictator and the dashed lines to the average punishment of the other receiver(s). Punishment is shown on the left y-axis. The bars at the bottom of the graphs show the distribution of the frequency of the different transfer sizes in the two mechanisms. The relative frequency of a transfer (in %) is displayed on the right y-axis.
Panel D: The y-axis corresponds to average total punishment per receiver, i.e. the number of points that a receiver deducts on average from both the dictator and the other receiver(s). Error bars (in grey) represent plus/minus one standard error of the mean, clustered on experimental sessions.

Figure 5: Individual heterogeneity in receivers' punishment decisions



Notes:
Each marker corresponds to one receiver.
Receivers who did not punish at all were excluded from the graphs.

Figure 6: Dictators' mechanism choices over time

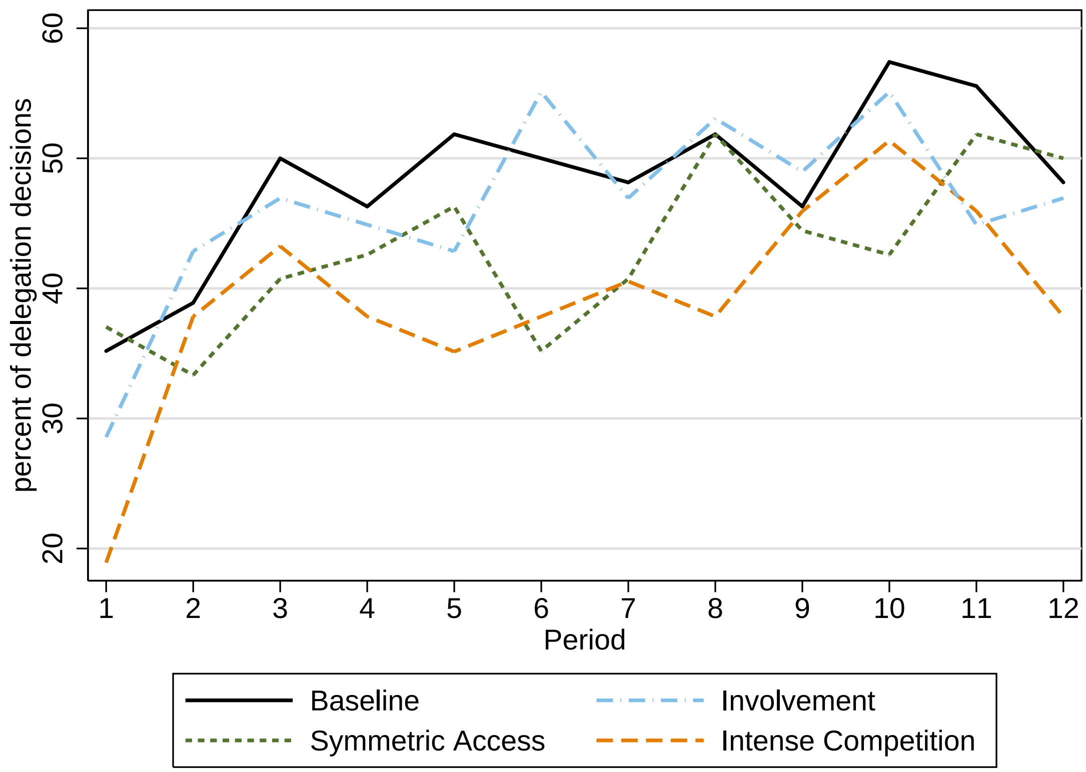
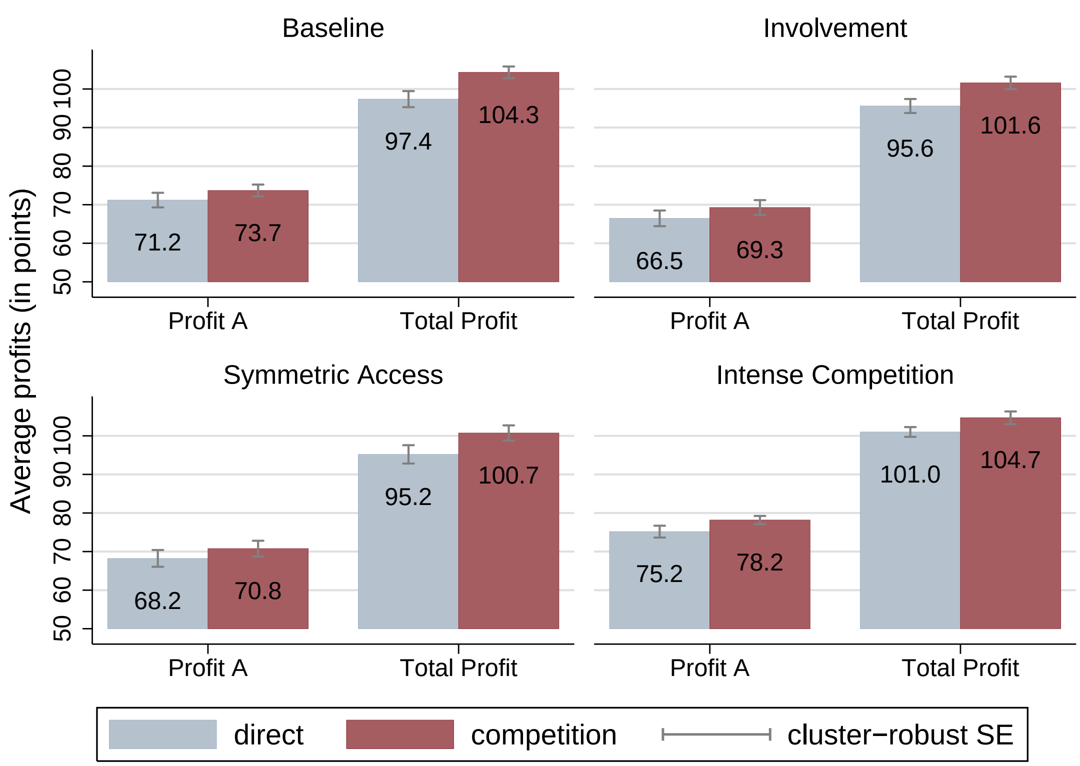


Figure 7: Profits by mechanism choice



Notes:
Intense Competition treatment: To make the treatments more easily comparable in the graph, the endowment of 10 points of the additional third receiver in the Intense Competition treatment has been deducted from total profits for this treatment.
Error bars represent plus/minus one standard error of the mean, clustered on experimental sessions.

Table 3: Regression results for effects on punishment

	Punishment of A		Punishment of B/C/(D)		Total punishment	
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	Tobit	OLS	Tobit	OLS	Tobit
Competition	−5.504***	−17.709***	1.219**	2.653*	−4.338**	−15.478**
	(1.838)	(6.733)	(0.559)	(1.452)	(2.000)	(7.804)
Transfer	−0.393***	−1.405***	0.076***	0.166***	−0.307***	−1.247***
	(0.045)	(0.183)	(0.012)	(0.025)	(0.048)	(0.206)
Period	−0.336***	−1.277***	−0.021	−0.176**	−0.363***	−1.362***
	(0.118)	(0.355)	(0.017)	(0.074)	(0.112)	(0.364)
Competition X Period	−0.044	−0.680	0.045	0.175*	0.001	−0.086
	(0.156)	(0.540)	(0.038)	(0.101)	(0.159)	(0.618)
Involvement	3.014	8.144	−0.493**	−2.398**	2.495	7.976
	(2.385)	(7.628)	(0.235)	(1.184)	(2.416)	(8.560)
Competition X Involvement	−0.147	2.294	0.909	3.142**	0.764	6.322
	(1.710)	(5.926)	(0.636)	(1.443)	(1.747)	(6.833)
Symmetric Access	2.309	6.527	0.017	−0.300	2.316	7.226
	(2.655)	(8.433)	(0.288)	(1.367)	(2.662)	(9.371)
Competition X Symmetric Access	0.368	5.136	0.713	1.771	1.087	8.037
	(1.977)	(7.002)	(0.650)	(1.601)	(2.078)	(8.218)
Three Receivers	−3.755*	−10.898	−0.276	0.292	−3.418	−10.144
	(2.049)	(6.854)	(0.278)	(1.427)	(2.088)	(7.687)
Competition X 3 Receivers	1.483	4.229	−0.581	0.561	2.060	11.629
	(1.835)	(8.132)	(0.611)	(1.715)	(1.860)	(8.057)
Constant	18.658***	8.350	0.764***	−4.343***	19.420***	8.749
	(1.732)	(5.606)	(0.218)	(1.230)	(1.702)	(6.047)
R^2 / Pseudo R^2	0.075	0.019	0.154	0.050	0.040	0.009
Number of observations	5100	5100	2328	2328	5100	5100
Number of clusters	28	28	28	28	28	28

$^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$

Notes:

Robust standard errors, clustered on the session level, are in parentheses.

Dependent variables are the number of punishment points assigned to the dictator (models 1 & 2), the other receiver (3 & 4), or in total (5 & 6).

Tobit regressions were censored at 0 and 50 corresponding to minimum and maximum possible punisment.

In model 2 there are 3165 left-censored and 623 right-censored observations; in model 4 there are 1502 left-censored and 0 right-censored observations; and in model 6 there are 2919 left-censored and 877 right-censored observations.

Table 4: Individual heterogeneity in receivers' punishment of the dictator

	(1)	(2)	(3)	(4)
Competition	-8.714^{***}	-9.931^{***}	-11.613^{***}	-11.613^{***}
	(1.396)	(1.042)	(1.647)	(1.544)
Transfer	-0.417^{***}	-0.543^{***}	-0.425^{***}	-0.411^{***}
	(0.055)	(0.045)	(0.053)	(0.049)
Period	-0.340^{***}	-0.365^{***}	-0.340^{***}	-0.347^{***}
	(0.118)	(0.102)	(0.116)	(0.117)
Competition X Period	-0.036	0.003	-0.036	-0.020
	(0.154)	(0.095)	(0.153)	(0.152)
Gender (1=Female)			-3.942^{**}	-3.928^{**}
			(1.455)	(1.498)
Female X Competition			5.647^{***}	5.783^{***}
			(1.427)	(1.392)
Agreeableness				-1.737
				(1.157)
Extraversion				-0.124
				(0.672)
Intellect				-1.894^{*}
				(0.949)
Neuroticism				0.923
				(0.910)
Conscientiousness				0.837
				(0.812)
Constant	18.988^{***}	19.890^{***}	21.062^{***}	30.037^{***}
	(1.390)	(0.716)	(1.455)	(7.384)
Individual fixed effects	No	Yes	No	No
R^2	0.061	0.578	0.068	0.081
Number of observations	5100	5100	5100	5100
Number of clusters	28	28	28	28

$^{*}p < .10$, $^{**}p < .05$, $^{***}p < .01$

Notes:

OLS-regressions. The dependent variable in all models is the number of punishment points assigned to the dictator (Player A).

Robust standard errors, clustered on the session level, are in parentheses.

The increase in R^2 from model (1) to model (3) is signficant at $p = .002$. The increase from model (3) to model (4) is significant at $p = .042$.

The Big Five traits included as controls in model (4) were measured in the post-experimental questionnaire using a German translation (Streib & Wiedmaier, 2001) of the mini-IPIP scale (Donnellan et al., 2006). Each trait was measured by four items on five-point Likert scales. Cronbach's α indicates the following measurement reliabilities: Agreeableness $\alpha = .650$, Extraversion $\alpha = .734$, Intellect $\alpha = .636$, Conscientiousness $\alpha = .756$, and Neuroticism $\alpha = .689$ (α-values are calculated based on responses from 425 individuals in the roles of receivers in the experiment).