Mean Markets or Kind Commerce?*

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Abstract: Does market interaction influence morality? We study a particular angle of this classic question theoretically and experimentally. The novelty of our approach is to posit that people are motivated by reciprocity; an urge many argued affects humans. We scrutinize how this shapes interaction in treatments mimicking societies (autarky, barter, and market societies) that differ only as regards whether and how people trade. While many have argued that market interactions make people more selfish, our reciprocity-based theory suggests that market interaction on the contrary induces more pro-sociality. The experimental results are broadly (but not completely) consistent with the theoretical predictions. The results may also shed light on the development of morality and prosocial behavior over time, in particular with respect to episodes in history where the nature of commerce was transformed.

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1. Introduction

Economists typically expect people's market behavior to be guided largely by self-interest. As famously expressed by Adam Smith in *The Wealth of Nations* (1776):

> *It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own self-interest. We address ourselves not to their humanity but to their self-love, and never talk to them of our own necessities, but of their advantages*.

Since that time, there is no doubt that markets have been instrumental in contributing spectacular improvements in material living conditions. Yet, our well-being does not only depend on market outcomes; factors like equality of opportunities, trust in institutions, and the level of crime play an important role as well. For example, most of us prefer to live in a society where people are kind to each other, and neither violent nor trying to take advantage of others. Indeed, Smith himself, not the least in his *Theory of Moral Sentiments* (1759), emphasized the importance of morality and social norms for understanding behavior and well-being.[1] A natural question is whether markets and trade make us more or less selfish, and more or less prosocial, toward those we traded with and others.

The answer is not obvious. While, as noted in the next section, many have argued that market interaction makes people more selfish and/or more immoral, there are also arguments that markets induces more prosocial behavior. We add to this discussion by theoretically articulating, and experimentally exploring, a novel perspective: We consider the implications of people being motivated by *reciprocity*, i.e., they desire to be kind to those they deem to be kind and unkind to those they deem to be unkind. We explore its role in commerce and subsequent post-trading behavior. Formally, we build on the reciprocity model developed by Dufwenberg & Kirchsteiger (2004) (D&K). We then test our theory for empirical relevance, by designing and running an appropriate lab experiment.

In our theory, we introduce three different institutions: AUTARKY, where no interaction between agents takes place; BARTER, where agents face a bilateral exchange setting; and MARKET, where agents face a multilateral market setting. We derive several clear insights with interesting

[1] Adam Smith had more generally a broad perspective on human behavior and motivations and discussed most psychological, and also some sociological, mechanisms that are now analyzed within behavioral economics – see e.g., Ashraf et al. (2005) – which is in sharp contrast to the narrow-minded and purely selfish *homo economicus* caricature that is at times attributed to him.

implications: First, trade triggers positive reciprocity. Trading partners will view each other as kind rather than unkind.[2] Second, trade therefore generates prosocial spillover effects in the aftermarket, as regards interaction with prior trading partners. Third, the prosocial spillover does not extend to people with whom one has not traded. We convert these insights into testable hypotheses as regards how different trading institutions generate different predictions for the prosocial spillover effects.

In order to test our theory, we conducted a highly stylized but carefully controlled experiment. We introduce three treatments, intended to capture the essence of the three societies described in our theory. Our design allows us to hold payoffs (or income) fixed between different treatments, and thus disregard any income effect that might be associated with the efficiency-enhancing effects of markets. The experiment has two stages. In the first stage (Stage 1), the participants were randomly allocated to three treatments, reflecting economic transactions in AUTARKY, BARTER, and MARKET economies, respectively. In the second stage (Stage 2), which was identical across treatments, each subject could distribute money between themselves and others in two versions of a dictator game (*d*-game-1 and *d*-game-2). We measure how the trade experiences in the first stage of the experiment affect how individuals distribute money to the other participants in the second stage. The experimental results are broadly (but not completely) consistent with the theoretical predictions.

The remainder of the paper is organized as follows: Section 2 briefly reviews related literature and Section 3 presents the game forms we use to represent our three stylized societies, where D&K's theory is then applied to generate testable predictions. Section 4 outlines the experimental design, while Section 5 presents the results and Section 6 provides some concluding remarks.

2. Related Literature

Over the centuries, many – including philosophers, politicians and religious authorities – have argued that market interaction tends to make people more selfish and/or more immoral, and that this will have spillover effects outside of markets. For example, St. Augustine considered lust for money and

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[2] The approach harmonizes well with Adam Smith's perspective, *op. cit.* One may argue that most butchers, brewers and bakers we interact with actually tend to be rather friendly, and that they provide good meat, beer, and bread that improve our quality of life. This, in turn, may imply that we, spontaneously, want to reciprocate and be kind back also outside the market. In the present paper, we will therefore in a highly stylized experiment analyze such potential reciprocal behavior induced by the perceived kindness associated with the gains from trade.

possessions to be one out of three deadly sins (see Deane, 1963, pp. 44-56). Others on the contrary argued that markets enhance morality and induce prosocial behavior. For example, Albert Hirschman (1977), in his *The Passions and the Interests, Political Arguments for Capitalism before Its Triumph*, shows that many thinkers contemporary with Adam Smith, such as Montesquieu, Hume, Turgot and Condorcet largely argued in favor of market capitalism because of its supposed civilizing effects; effects that would reduce conflict and violence when passions were largely replaced by the interests.

Consistent with this, Steven Pinker (2011) has, in a much discussed and partly controversial contribution, argued that the amount of human violence has in most periods of humanity decreased over time. He explains how this decrease has been particularly dramatic during certain time periods, notably during the transmission from hunter-gatherer to the agricultural society roughly 10,000 years ago, and during the transition from an agricultural to an industrial society; in Europe, this second transition took place around the time when Adam Smith wrote *The Wealth of Nations*. In terms of trade, the first transition largely also implied a transition from an AUTARKY to a BARTER society, whereas the latter implied a further transition to a MARKET society. There is also cross-culture experimental evidence indicating that market interaction actually tends to make people more prosocial; see in particular Henrich et al. (2001, 2004, 2005), who compared 15 small-scale societies with quite different institutions, as well as the follow-up studies by Henrich et al. (2006, 2010) and Ensminger & Henrich (2014). Moreover, McCloskey recently puts forward related arguments largely through cultural development associated with the industrial revolution and the birth of the modern market economy in her trilogy *Bourgeois Virtues*, *Bourgeois Dignity*, and *Bourgeois Equality* (McCloskey 2006, 2010, 2016).

We suggest that the human tendency to reciprocate, i.e., the desire to be kind to those deemed kind and unkind toward those deemed unkind, can organize this data. This should be compelling insofar that scientists from many fields, as well as many other authors, forcefully argued that reciprocity constitutes a basic form of human motivation; see Mauss (1954), Goranson & Berkowitz (1966), Trivers (1971), and Akerlof (1982) for early influential work in, respectively, anthropology, social psychology, biology, and economics, and Fehr & Gächter (2000) and Sobel (2005) for some critical surveys by economists.[3]

[3] As regards older history, morality based on the idea of reciprocal justice, e.g., an eye for an eye, is very old as reflected, for instance, in the Hebrew Bible and the Quran. Fehr & Gächter (p. 159) quote from The Edda from the 13th century that "A man ought to be a friend to his friend and repay gift with gift. People should meet smiles with

Yet, even if we accepted the description of the historical episodes, and the comparison of different societies, causation via changing market conditions and incentives to reciprocate does not follow from correlation. There are many potential mechanisms behind the historical patterns. For example, one could argue that increased pro-sociality and decreased violence, over time are largely resulting from income effects. Falk & Szech (2013) pioneered the use of lab experiments for shedding light on the market-and-morals debate. They show that a smaller share of participants are willing to forsake money for preventing the death of a mouse when they are bargaining over the life of the mouse in double auction markets than when they are deciding individually. Their interpretation is that the market interactions undermine moral values. However, follow up studies have called the robustness, and even the interpretation, of their finding in to question, and also provided alternative designs; see e.g. Bartling et al. (2015, 2020) and Kirchler et al. (2016). For example, Kirchler et al. (2016), show that immoral behavior in the setting of Falk & Szech (2013) is robust to various nudges, but can be reduced with monetary punishment, whereas Bartling et al. (2020) replicate the main treatment effect of Falk & Szech and included additional treatments, leading them to conclude that repeated play rather than market interaction seems to cause the erosion of moral values.

Modern theory on reciprocity – including Rabin (1993), D&K, and Falk & Fischbacher (2006) – uses tools of so-called psychological game theory (see Geanakoplos, Pearce & Stacchetti 1989 for a pioneering contribution and Battigalli & Dufwenberg 2020 for an overview). As far as we know, the present study is novel in theoretically exploring implications of reciprocity on prosocial behavior in different trading regimes, as well as in providing corresponding experimental tests.

3. Theory

We envisage three different societies that reflect different degrees of commercial activity:

AUTARKY: a hunter-gatherer society where each individual is economically independent.

BARTER: a society where pairs of individuals meet and engage in bilateral exchange.

MARKET: a monetary economy, where elaborate trading cycles occur.

smiles and lies with treachery.” For more modern examples (though with an emphasis on negative reciprocity) from literature, film, business, as well as lab experiments, see Dufwenberg, Smith & Van Essen (2013, Section III).

To arrive at simple special cases of these societies that are amenable to experimental testing, we assume hereafter that each of the three forms of society corresponds to a game form with four interacting players. They are labeled A, B, C, and D. Within each society, the framing of the game involves locks and keys, presented as potential carriers of value. The players (or participants) are informed that locks have values only when they are paired with the corresponding key, and vice versa, which follows intuition. In AUTARKY, no trade takes place; in BARTER, bilateral exchange agreements are expected; and in MARKET each player is assumed to sell and buy keys in the induced market. When all decisions are made, the expectation is that each player will have the same endowment within as well as between societies. The details of the setup are as follows:

Game forms:

AUTARKY: Each player is endowed with two numbered "locks" and two numbered "keys." Let L1, L2, … be "lock #1," "lock #2," etc, with K1, K2, … defined analogously. A is given L1, L3, K1, K3; B is given L2, L4, K2, K4; C is given L5, L7, K5, K7; and D is given L6, L8, K6, K8. The players are told that each matching pair – (L*n*, K*n'*) such that $n = n'$ – is worth 50 tokens and that unmatched locks or keys are worth nothing. Players make no choices and, thus, there are no trade or exchange possibilities. Since each of them already holds two matching pairs, each receives 100 tokens.

BARTER: Each player is endowed with two locks and two keys. A is given L1, L3, K1, K4; B is given L2, L4, K2, K3; C is given L5, L8, K5, K7; D is given L6, L7, K6, K8. The players are told that each matching pair is worth 55 tokens and that unmatched locks or keys are worth nothing. The players are also told that in an attempt to get a second matching pair (they already have one each) they may say *Yes*-or-*No* to a bilateral trade agreement with the player holding the key with the number that matches their own unmatched lock. In exchange for that key they would give to that player the key with the number that matches that player's unmatched lock. Saying *Yes* costs a player 10 tokens, regardless what the other players do. A trade occurs if and only if both players involved in a trade say *Yes* to it. If all players say *Yes*, so that A trades with B and C trades with D, then each player will in total obtain 100 (= 55+55-10) tokens.

MARKET: Each player is given two locks and two keys, as follows: One is given L1, L5, K2, K3, another L2, L6, K4, K7, a third L3, L7, K1, K8, and the fourth L4, L8, K5, K6. Each player knows about the four lock-key packages and the own locks and keys, but not the distribution for the other players.[4] Players are told that each matching pair is worth 55 tokens and that unmatched locks or keys are worth nothing. Players are told that there is an opportunity to sell their keys and to buy keys that match their locks. Each such transaction would involve a price of 15 tokens, paid from buyer to seller. However, the number of transaction that actually will occur is decided as follows: Each player must make a single *Yes*-or-*No* choice regarding whether he/she is willing to sell (each of) the keys he/she is endowed with as well as to buy (each of) the keys that would match the locks he/she holds. Choosing *Yes* in this fashion costs 10 tokens regardless of what other players do. If a player says *Yes*, the numbers of sales and purchases he/she subsequently will be involved in depends on what the other players choose. If all players say *Yes*, so that all feasible trades occur, then each player will in total obtain 100 (=55+55-15-15+15+15-10) tokens. Note that with this outcome, participants trade in a cycle mimicking the nature of a market economy. If all players say *Yes*, so that all feasible trades occur, then each player will in total obtain 100 (=55+55-15-15+15+15-10) tokens. If it is not the case that all players say *Yes*, then some of their payoffs will be lower, with details depending on just who chooses *No* (some calculations are presented below).

Reciprocity, maximal trade, and players' kindnesses:

Suppose the players are motivated by reciprocity; they desire to be kind to those deemed to be kind and unkind toward those deemed to be unkind, specifically, as in D&K's theory. We focus our analysis on the kindness of players in what we shall call a "maximal-trade outcome", meaning the strategy profile where all players choose *Yes* in BARTER and MARKET, and the automatically generated outcome (without trade!) in AUTARKY. Using D&K's theory, the maximal-trade outcome is an equilibrium in any of the three game forms described in Section 2.1.[5]

[4] For example, if player B has L2, L6, K4, K7 he/she knows that, but he/she does not know whether player C has L1, L5, K2, K3 or L3, L7, K1, K8 or L4, L8, K5, K6.

[5] This is trivially true in AUTARKY where the players make no active choices. In BARTER and MARKET there are additional (but Pareto dominated) equilibria without trade that we do not focus on. The introduction of markets and increased use of market interaction will of course not eliminate the mechanisms underlying negative reciprocity, but it might, through shared gains from trade, tilt the relation such that positive reciprocity becomes relatively more important compared to negative reciprocity. Thus, increased market interactions, and the corresponding gains from trade, may make the positive reciprocity related to interests relatively more important compared to negative reciprocity associate with (largely negative) passions, and one may further speculate that this in addition also spurs cultural evolution, e.g., toward social norms that become more positive toward financial transactions and more negative toward revenge as a means to protect honor.

In D&K's (as in Rabin's) theory, kindnesses can range from negative to positive, and while the former case breeds hostility the latter breeds generosity. It turns out that in our game forms, and in a maximal-trade outcome, negative reciprocity is never an issue. Therefore, all our analysis to follow will concern how positive (or at least non-negative) kindness breeds generosity.

We have parameterized our game forms such that each player's material payoff will be 100 in a maximal-trade outcome. However, a player's "kindness" to others, a notion which is central in reciprocity theory, differs between the game forms. We will not describe all the details about D&K's theory here, but merely explain how to calculate players' kindnesses in our games. Namely, *i*'s kindness to *j* in a maximal-trade outcome – labeled κ_{ij} – equals half of the difference between what *j* gets with maximal-trade (=100) and what *j* would get if *i* did whatever is feasible to block trade. We calculate κ_{ij} for each of our three game forms:

AUTARKY: $\kappa_{ij} = 0$ for all i,j = A,B,C,D ($i \neq j$)

Explanation: In AUTARKY, maximal-trade involves no trade. There is nothing to block. Trivially, since *i* has no choice, there is no difference between what *j* gets with maximal-trade (=100) and what *j* would get if *i* did whatever is feasible to block trade (=100). We get $\kappa_{ij} = ½\times(100\text{-}100) = 0$.

BARTER: $\kappa_{BA} = \kappa_{AB} = \kappa_{DC} = \kappa_{CD} = 27.5$; $\kappa_{ij} = 0$ for all other cases ($i \neq j$)

Explanation: Note that A&B (and C&D) influence each other's payoff as if A (or C) chose a row while B (or D) chose a column in the following game form:

Table 1: Material payoffs in BARTER

	Yes	*No*
Yes	100, 100	45, 55
No	55, 45	55, 55

The maximal-trade outcome corresponds to the strategy profile (*Yes, Yes*); B gets 100 when A chooses *Yes*, and would otherwise have gotten 45 tokens, etc. We get $\kappa_{AB} = \kappa_{BA} = \kappa_{CD} = \kappa_{DC} = ½ \times (100\text{-}45) =$

27.5.[6] The cases where $\kappa_{ij} = 0$ reflect situations where the players cannot influence the payoff of a non-trading partner, and the calculations resemble the AUTARKY case.

MARKET: $\kappa_{ij} = 18.33$ for all i,j = A,B,C,D ($i \neq j$)

Explanation: The κ_{ij}'s depend on the endowments. For example, suppose they are as follows:

A: {L1, L5, K2, K3} B: {L2, L6, K4, K7}

C: {L3, L7, K1, K8} D: {L4, L8, K5, K6}

It is helpful to draw a flow-chart of trades (using arrows above) in the all-choose-*Yes* equilibrium. Then note that *if each player knew each trading partner's ID* we would get:

$$\kappa_{AB} = \kappa_{DA} = \kappa_{BC} = \kappa_{CD} = 20$$
$$\kappa_{AD} = \kappa_{BA} = \kappa_{CB} = \kappa_{DC} = 7.5$$
$$\kappa_{AC} = \kappa_{CA} = \kappa_{BD} = \kappa_{DB} = 27.5$$

To verify the calculations, consider first κ_{AB}. That number reflects how A could have unilaterally changed B's payoff from 100 tokens (corresponding to B's material payoff when all-choose-*Yes*) to that resulting when A unilaterally deviates to choose *No*. Choice *No* would deny B access to K2, hence reduce B's revenue by 55-15 = 40 tokens (B fails to make a pair worth 55 tokens, but does not have to pay 15 tokens for K2). Hence A's total material payoff would equal 100-40=60 tokens. Accordingly, in the all-choose-*Yes* equilibrium, we get $\kappa_{AB} = ½\times(100\text{-}60) = 20$. κ_{DA}, κ_{BC}, and κ_{CD} are calculated analogously. The next four kindnesses ($\kappa_{AD} = \kappa_{BA} = \kappa_{CB} = \kappa_{DC} = 7.5$) concern a player who can deny another player a sale including a payment of 15; hence reduce that player's income to 100-15 = 85 tokens. Kindness in these cases equals ½×(100-85) = 7.5 tokens. The final four kindnesses

[6] Readers familiar with D&K's paper may take note that the strategies *Yes* and *No* are "efficient" in the sense of D&K (see their pp. 275-6), which is critical for rendering the choice *Yes* kind. The feature that guarantees this property is the trading cost (10 tokens) incorporated in the game form.

($\kappa_{AC} = \kappa_{CA} = \kappa_{BD} = \kappa_{DB} = 27.5$) concern players interacting via both a sale and a purchase; we get to "sum up" the two calculations just described: kindness equals 20+7.5 = 27.5 tokens.

However, in MARKET, the players are not given information about co-players' identity, hence cannot perform the just stated calculations and associate them with particular others. The reasonable way to calculate the kindness with respect to any other player, in an all-choose-*Yes* equilibrium, is to take expected values. Hence, perceived kindness is in equilibrium equal to the average kindness, so we get $\kappa_{ij} = (20+7.5+27.5)/3 = 18.33(\ldots)$.

Predictions for stage 2:

Imagine that individuals interact in a society – be it AUTARKY, BARTER, or MARKET – and then, unexpectedly, run into someone toward whom, at some cost, they can be generous. Will they give anything, and how much? We propose that the kindness generated in the preceding societal activity may now, so-to-say, "spill over." Namely, in the spirit of kindness-based reciprocity, if *i* runs into *j*, then the higher were κ_{ji} in the preceding societal activity, the more *i* will give to *j*.

Specifically, envisage that the unexpected opportunity to be generous appears as a version of the dictator game. For testing purposes, we shall consider two varieties:

> *d-game-1*: One individual – A, B, C, or D – per group is selected to be the dictator. This person receives 90 tokens and is asked to divide this amount between him- or herself and the other group members. The Dictator has to give the same amount to each of the others. Finally, whatever is given to another will be doubled (by the experimenter).[7]
>
> *d-game-2*: Works like d-game-1, except that the dictators can give individual amounts to the other group members.[8]

Next, refer to Table 2 which summarizes the players' kindnesses, in each society, with maximal trade:

[7] For example, if C gives 17 tokens to each of the others then A, B, and D gets 34 while C keeps 39 (= 90-3×17).

[8] For example, if C is the dictator and gives 17, 20, and 0 tokens to, respectively of A, B, and D then the outcome will be that A gets 34, B gets 40, D gets 0, and C keeps 53 (= 90-17-20).

Table 2: Players' kindnesses in each society with maximal trade

	AUTARKY	BARTER	MARKET
κ_{ABA}	0	27.5	18.33
κ_{ACA}	0	0	18.33
κ_{ADA}	0	0	18.33
κ_{BAB}	0	27.5	18.33
κ_{BCB}	0	0	18.33
κ_{BDB}	0	0	18.33
κ_{CAC}	0	0	18.33
κ_{CBC}	0	0	18.33
κ_{CDC}	0	27.5	18.33
κ_{DAD}	0	0	18.33
κ_{DBD}	0	0	18.33
κ_{DCD}	0	27.5	18.33

For *d*-game-1 it matters how kind *i*'s co-players are to *i on average*. The answer is obvious for AUTARKY and MARKET. Noting that (0+0+27.5)/3 = 9.166 we arrive at Table 3:

Table 3: Players' average kindnesses, in each society, with maximal trade

	AUTARKY	BARTER	MARKET
Others' average kindness	0	9.166	18.33

To generate predictions, for i = A, B, C, or D, let $x_i(s)$ be *i*'s choice in *d*-game-1 in society *s*, where s = 1 for AUTARKY, s = 2 for BARTER, or s = 3 for MARKET. Similarly, for i,j = A, B, C, or D, with $i \neq j$, let $y_{ij}(s)$ be *i*'s choice in *d*-game-2 in society *s*. Hence

$$x_i(s) \in [0,30]$$

$$y_{ij}(s) \in [0,90] \text{ and } \Sigma_{j \neq i}\, y_{ij}(s) \leq 90$$

D&K's original theory gives prediction for game forms where all players are aware of all features. This is different from our setting where no players, at the time that they interact in an initial society (i.e., AUTARKY, BARTER, or MARKET), are aware of the dictator game to come. Nevertheless, we generate predictions based on the spirit of players reciprocating kindness by appeal to the intuitive principle that the kinder j has been to i the more inclined i will subsequently be to give to j. More precisely, and with reference to Tables 2 and 3, we hypothesize as follows.

H1.1: $x_i(1) < x_i(2)$ for i = A, B, C, D

H1.2: $x_i(1) < x_i(3)$ for i = A, B, C, D

H1.3: $x_i(2) < x_i(3)$ for i = A, B, C, D

In words, average contributions in MARKET will be higher than average contributions in BARTER, which will be higher than average contributions in AUTARKY. The prediction is based on inequalities $0 < 9.166 < 18.33$ in Table 3.

Let $\%[x_i(t) > 0]$ be the percentage of strictly positive $x_i(t)$ choices. We will also test:

H2.1: $\%[x_i(1) > 0] < \%[x_i(2) > 0]$ for i = A, B, C, D

H2.2: $\%[x_i(1) > 0] < \%[x_i(3) > 0]$ for i = A, B, C, D

H2.3: $\%[x_i(2) > 0] < \%[x_i(3) > 0]$ for i = A, B, C, D

The motivation is in part analogous to that for H1.1-3. However, we now focus on the frequency with which participants give positive amounts rather than on how much they give. The justification relates to the intuitive idea that participants may be heterogeneous as regards whether or not and how much reciprocity matters to them. This may lead to a difference between the effect of reciprocity on how many participants give at all compared to the effect of reciprocity on the magnitude of contributions conditional on individuals' willingness to give a positive amount.

H1.1-3 and H2.1-3 concern *d*-game-1. We can generate analogous hypotheses for *d*-game-2, by focusing on the average individual amount given to the other group members in that game. Let $z_i(t) = (\Sigma_{j \neq i}\, y_{ij}(t))/3$ for t=1,2,3. We get:

H3.1: $z_i(1) < z_i(2)$ for i = A, B, C, D

H3.2: $z_i(1) < z_i(3)$ for i = A, B, C, D

H3.3: $z_i(2) < z_i(3)$ for i = A, B, C, D

H4.1: $\%[z_i(1) > 0] < \%[z_i(2) > 0]$ for i = A, B, C, D

H4.2: $\%[z_i(1) > 0] < \%[z_i(3) > 0]$ for i = A, B, C, D

H4.3: $\%[z_i(2) > 0] < \%[z_i(3) > 0]$ for i = A, B, C, D

Furthermore, in BARTER, since 0 < 27.5 in the BARTER column of Table 2, analogous reasoning motivates the following hypotheses concerning how participants will discriminate between their trading partner[9] and the others. Again, we distinguish between the amount participants give (H5) and the frequency with which participants give positive amounts (H6):

H5: $y_{ij}(2) > y_{ik}(2)$ for i,j,k = A,B,C,D ($i \neq j \neq k$) if j is i's trading partner while k is not.

H6: $\%[y_{ij}(2) > 0] > \%[y_{ik}(2) > 0]$ for i,j,k = A,B,C,D ($i \neq j \neq k$) if j is i's trading partner while k is not.

4. The Experiment

The experimental sessions were run in the EconLab at the University of Innsbruck, during the summer and autumn of 2019. We recruited 522 student participants across all faculties. We randomly and anonymously allocated participants to groups of four – i.e., each individual was assigned an ID-letter: A, B, C or D. The experiment proceeded with two parts. The first part corresponded to a participation in one of three societies (i.e., AUTARKY, BARTER or MARKET), in a between-subject treatment design. The framing was as described in Section 2. Thus, each player in each treatment, reflecting the different societies, was told about the locks and keys as carriers of value and that locks have values only when they are paired with the corresponding key, and vice versa. The experiment was designed such that the expectation was that each player would have the same endowment within as well as

[9] i and j are trading partners if ij = AB-or-BA-or-CD-or-DC and not trading partners if ik = AC-or-BC-or-CA-or-DA.

between societies when all trade was done. In this way, there were no between-treatment income effects.

The second part involved the two dictator games corresponding to the ones described in Section 2. We used a variation of the strategy method such that we elicited *all* participants' behavior should they become the dictator in *both* versions of the dictator game (*d*-game-1 and *d*-game-2). Participants were informed about the nature of each of the two dictator games, and how the total amount of 90 tokens could be distributed among the group members based on the decision taken in one of the games. At first, participants were neither told which of the two games would be played nor who would be selected to be the dictator. The decision makers indicated their choices for each of the cases. Then, we told the decision makers which version of the dictator game was the relevant one, which subject had been randomly selected as the dictator, and what decision was finally implemented; at the end, payments were made accordingly. No information was given about other participants' decisions, in either of the two versions.

The benefit of this design was that we generated 2×4 = 8 times as many observations as we would have obtained if we selected one version and one designated dictator per society a priori. The reason why we implemented only the decision of one individual in each group and why we had no revelation of non-randomly selected individuals' decisions, was to maintain the spirit, as far as possible, of a dictator game, where the co-players (receivers) of the dictator are inactive. The reason why we allocated 90 tokens (rather than, for instance, 100 tokens) is that 90 is divisible by 3, so it is easy to give it all away in equal amounts while sticking to integers. Recall also that the amounts given by the dictator were doubled and that the dictator kept the remainder of what he did not send to the other group members.

In each session, all three treatments were run simultaneously. We programmed the experiment using z-Tree [3.6.7]. Moreover, we implemented a show-up fee of 4 Euro, protecting participants from making negative payoffs overall, regardless of their choices. We set the exchange rate of tokens to Euro at 15:1. The average duration of the experiment was 10.53 minutes (1.47 minutes) and the average payout (including show-up fee) was 12.89 Euro (SD 1.84 Euro).

5. Results

5.1 Stage 1 and Descriptive Overview of Results in Stage 2

A prerequisite for the experimental examination of the predictions based on reciprocity theory established in Section 2 is a design in Stage 1 of the experiment that ensures that almost all groups in BARTER and MARKET arrive at the "all-choose-*Yes*" equilibrium. This means that the groups are comprised exclusively of participants who have agreed to the exchange/trade agreement. Therefore, before we present the treatment results, we check whether the design applied in Stage 1 of the experiment meets this requirement.

Of the 346 participants in the BARTER and MARKET treatment, only six participants (1.73%) did not agree to the exchange/trade agreement, which means that the design has worked in the intended direction. Consequently, for BARTER and MARKET we only include the groups that have arrived at the "all-choose-*Yes*" equilibrium to test the predictions developed in Section 2. In doing so we also ensure that there are no differences in participants' income prior to Stage 2, which rules out confounding income effects in the dictator game. Therefore, we arrive at a total of 516 participants (340 in the BARTER/MARKET treatments and 176 in the AUTARKY treatment) for the econometric tests of the hypotheses. We follow Benjamin et al. (2018) and apply a 5%- and a 0.5%-significance level in all statistical tests in the paper.

First, we present Table 4, which shows descriptive statistics on contributions for all three treatments. Recall that in *d*-game-1 [*d*-game-2] the contributions to others are [not] forced to be equal; Table 1 reports data concerning the contributions to each of the other three group members.

Table 4: Descriptive statistics for all three treatments regarding contributions to individual other group members. In Treatment AUTARKY, no interaction between agents takes place. In Treatment BARTER, agents face a bilateral exchange setting and in Treatment MARKET, agents face a multilateral market setting. d-game-1 represents the average equal contribution to each of the other three group members in the dictator game. *d*-game-2 represents the average individual contributions to each of the other three group members in the dictator game.

Treatment	*d-game*	*Mean*	*Median*	*Sd.*	*Min*	*Max*	*N*
AUTARKY	1	12.18	10	10.13	0	30	176
AUTARKY	2	11.41	10	10.39	0	30	176
BARTER	1	12.15	10	10.41	0	30	168
BARTER	2	11.47	10	10.48	0	30	168
MARKET	1	14.78	15	11.25	0	30	172
MARKET	2	14.24	15	11.71	0	30	172

5.2 Hypotheses Tests – The Dictator Games

Result 1: *Average contributions by dictators in the market setting (MARKET) are significantly higher than average contributions by dictators in AUTARKY and BARTER in d-game-1 and d-game-2. Nevertheless, we find no difference between contributions in dictator decisions in AUTARKY and BARTER under both versions of the dictator game.*

Support: We test the hypotheses derived from reciprocity theory in Section 2 and start with hypotheses H1 to H4. In Section 2 we established the predictions that the average contributions in *d*-game-1 and the aggregated average contributions in *d*-game-2 will be highest in the dictator game in Treatment MARKET, followed by Treatment BARTER, and finally Treatment AUTARKY (H1 and H3). Figure 1 visually compares the average contributions under both versions of the dictator game between the three treatments. The visual impression suggests that there is no difference between the average contributions in AUTARKY and BARTER, but that average contributions in Treatment MARKET appear to be higher than in both other treatments.

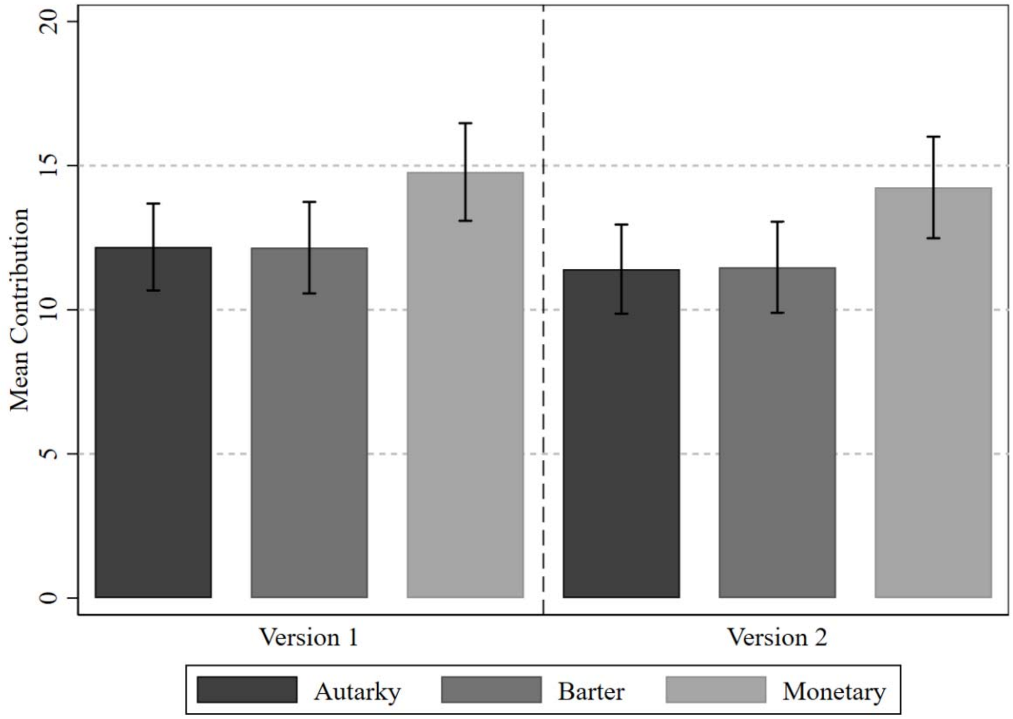

Figure 1: Mean contributions across treatments (AUTARKY, $N = 176$; BARTER, $N = 168$; MARKET $N = 172$) for *d*-game-1 (identical amount to all group members) and *d*-game-2 (different amounts possible. The whiskers indicate the 95% confidence intervals.

Next, we first statistically test for treatment differences in *d*-game-1; compare hypotheses H1.1 – H1.3. We apply non-parametric, pairwise Mann-Whitney-U tests and report the results in Table 5 (we refer to one-sided *p*-values). Specifically, we do not find statistically significantly higher dictator contributions in BARTER than in AUTARKY. Nevertheless, participants who engaged in market interactions in Stage 1 of the experiment in MARKET contribute statistically significantly higher amounts to the other group members compared to participants in AUTARKY and BARTER, respectively. Based on these results, we can only support parts of hypothesis H1. In contrast to the predictions, compared to AUTARKY, we only find higher contributions in MARKET but not in BARTER. Furthermore, to examine H2, we test for pairwise differences regarding the share of positive contributions between treatments in *d*-game-1; compare hypotheses H2.1 – H2.3 in Table 5.

Table 5: Non-parametric test-statistics for treatment differences in the contributions in *d*-game-1 (equal contributions to all group members). In AUTARKY, no interaction between agents takes place. In BARTER, agents face a bilateral exchange setting and in MARKET, agents face a multilateral market setting. To test our unidirectional hypotheses, we refer to one-sided *p*-values from normal approximation in the Mann-Whitney-U tests. For Fisher's exact test, we report one-sided *p*-values.

Number	*Hypothesis*		*Stat*	*N*
H1.1 AUTARKY VS BARTER	$x_i(1) < x_i(2)$ for i = A, B, C, D	Mann-Whitney	$z = 0.092$	344
H1.2 AUTARKY VS MARKET	$x_i(1) < x_i(3)$ for i = A, B, C, D	Mann-Whitney	$z = -2.117$*	348
H1.3 BARTER VS MARKET	$x_i(2) < x_i(3)$ for i = A, B, C, D	Mann-Whitney	$z = -2.062$*	340
H2.1 AUTARKY VS BARTER	$\%[x_i(1) > 0] < \%[x_i(2) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.437	344
H2.2 AUTARKY VS MARKET	$\%[x_i(1) > 0] < \%[x_i(3) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.294	348
H2.3 BARTER VS MARKET	$\%[x_i(2) > 0] < \%[x_i(3) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.403	340

* $p < 0.05$, ** $p < 0.005$

Specifically, we expect the share of positive contributions in the dictator game to be highest in MARKET, followed by BARTER, and finally AUTARKY. Therefore, we apply pairwise Fisher's exact tests and report the one-sided *p*-values in the second half of Table 5.

We do not find supporting evidence for hypothesis H2, as we do not find any statistically significant difference in the share of positive contributions between any of the three treatments.

Next, we proceed by econometrically examining hypotheses H3 and H4, which deal with the results in *d*-game-2, where participants could send deviating amounts to all three other group members. Specifically, in Section 2 we established the same predictions for *d*-game-2 as for *d*-game-1. Therefore, we replicate the analyses reported in Table 5 for average contributions in d-game-2 and show the results in Table 6 (we refer to one-sided *p*-values). We find qualitatively similar patterns for contributions in *d*-game-2 compared to the results on contributions in *d*-game-1. In particular, we show that average individual contributions by dictators in MARKET are higher compared to the corresponding average individual contributions by dictators in BARTER and AUTARKY, but there is no difference in average individual contributions between AUTARKY and BARTER (see hypotheses H3.1 – H3.3). Consequently, we can only partially support hypothesis H3. For hypothesis H4, we test for pairwise differences in the share of positive contributions between the treatments in *d*-game-2. Again, we apply Fisher's exact tests and report the results in the second half of Table 6 (see hypotheses H4.1 – H4.3). Similar to the results for *d*-game-1 and the associated hypotheses H2.1 – H2.3, we do not find a statistically significantly higher share of positive contributions in MARKET than in BARTER than in AUTARKY. This suggests a tendency that reciprocity concerns seem to have an influence on the magnitude of contributions conditional on the willingness to give a positive amount but not on the willingness to give any amount itself.

Table 6: Non-parametric test-statistics for treatment differences in contributions in *d*-game-2 (different amounts possible). In AUTARKY, no interaction between agents takes place. In BARTER, agents face a bilateral exchange setting and in MARKET, agents face a multilateral market setting. To test our unidirectional hypotheses, we refer to one-sided *p*-values from normal approximation in the Mann-Whitney-U tests. For Fisher's exact test we report one-sided *p*-values.

Number	*Hypothesis*		*Stat*	*N*
H3.1 AUTARKY vs BARTER	$z_i(1) < z_i(2)$ for i = A, B, C, D	Mann-Whitney	z = -0.083	344
H3.2 AUTARKY vs MARKET	$z_i(1) < z_i(3)$ for i = A, B, C, D	Mann-Whitney	z = -2.026*	348
H3.3 BARTER vs MARKET	$z_i(2) < z_i(3)$ for i = A, B, C, D	Mann-Whitney	z = -1.957*	340
H4.1 AUTARKY vs BARTER	$\%[z_i(1) > 0] < \%[z_i(2) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.451	344
H4.2 AUTARKY vs MARKET	$\%[z_i(1) > 0] < \%[z_i(3) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.548	348
H4.3 BARTER vs MARKET	$\%[z_i(2) > 0] < \%[z_i(3) > 0]$ for i = A, B, C, D	Fisher's exact	1-sided Fisher's exact = 0.450	340

* $p < 0.05$, ** $p < 0.005$

In the last step, we go more into detail in the BARTER treatment and test for a causal effect of reciprocity in Stage 1 on pro-sociality in our dictator games.

> Result 2: *Average individual contributions and the share of positive individual contributions to former exchange partners are statistically significantly higher compared to average individual contributions and the share of positive individual contributions to the other group members (non-exchange partners) in* BARTER.

Support: To address hypotheses H5 and H6, we test whether contributions and the share of positive contributions to former exchange partners are higher than contributions and the share of positive contributions to non-exchange partners in BARTER. Here, we exclusively focus on contributions in *d*-game-2, where individual contributions to each group member were possible. Figure 2 depicts average contributions to group members who were exchange partners in Stage 1 of the experiment and those who were not. The visual impression suggests that participants are more generous toward former trading partners than to other participants in their group.

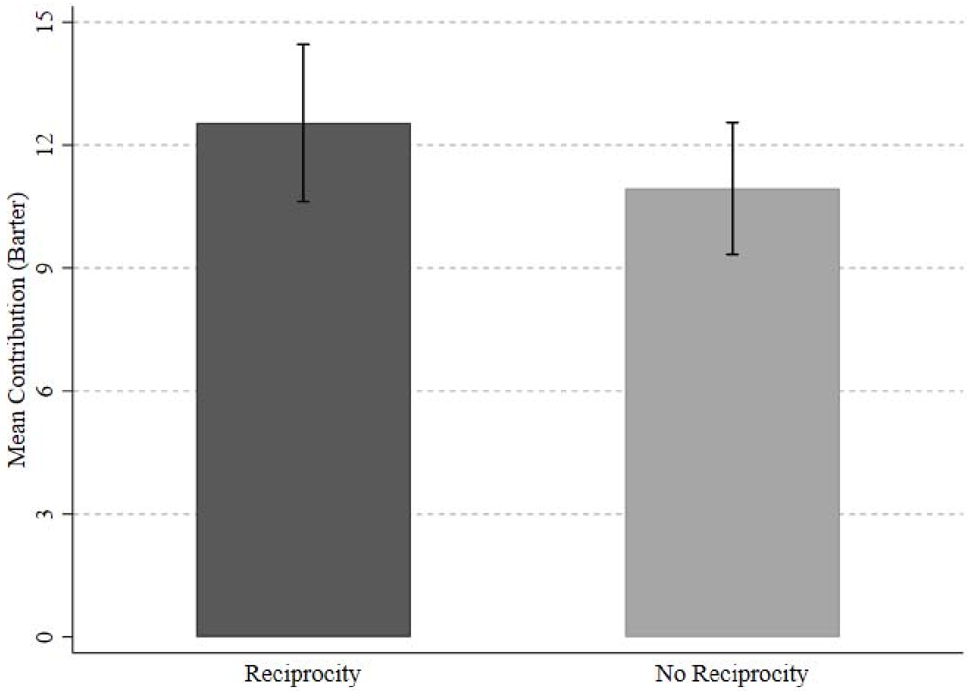

Figure 2: Mean contributions to trading partners and non-trading partners in the BARTER treatment ($N = 168$). The whiskers denote the 95% confidence intervals. In Treatment BARTER, agents face a bilateral exchange setting.

We apply Wilcoxon signed-rank tests to statistically test for differences and show the results in Table 7 (we refer to one-sided *p* values). We infer that contributions to former exchange partners are statistically significantly higher than contributions to former non-exchange partners (see hypothesis H5 in Table 7). This means that participants share more with group members with whom they engaged in a barter in Stage 1 of the experiment than with group members with whom they did not. This result supports hypothesis H5 and suggests that participants in our experiment gain utility by reciprocating intended kind behavior (gains through trade) of matched participants in stage 1 by contributing more to these participants in the dictator games.

Table 7: Non-parametric test-statistics for differences contributions to trading partners and non-trading partners in the BARTER treatment in *d*-game-2. In Treatment BARTER, agents face a bilateral exchange setting. To test our unidirectional hypotheses, we refer to one-sided *p*-values.

Number	*Hypothesis*		*Stat*	*N*
H5	$y_{ij}(2) > y_{ik}(2)$ for i,j,k = A,B,C,D ($i \neq j \neq k$) if j is i's trading partner while k is not.	Wilcoxon	$z = 3.381^{**}$	168
H6a	$\%[y_{ij}(2) > 0] > \%[yik_1(2) > 0]$ for i,j,k_1 = A, B, C, D (i ≠ j ≠ k_1) if j is i's trading partner while k_1 is not.	McNemar	*chi2* = 7.000*	168
H6b	$\%[y_{ij}(2) > 0] > \%[yik_2(2) > 0]$ for i,j,k_2 = A, B, C, D (i ≠ j ≠ k_2) if j is i's trading partner while k_2 is not.	McNemar	*chi2* = 6.000*	168

* $p < 0.05$, ** $p < 0.005$

Moreover, we test whether the share of positive contributions to former exchange partners is higher compared to the share of positive contributions to former non-exchange partners, as outlined in hypothesis H6. We apply McNemar tests, and report the results in Table 7 (we refer to one-sided *p*-values). To test H6 with a McNemar test, we split the hypothesis into two parts (H6a and H6b).[10] $y_{ij}(2)$ indicates average contributions to former exchange partners in BARTER, while $yik_1(2)$ represents average transfers to the first non-exchange partner and $yik_2(2)$ to the second non-exchange partner in BARTER.[11] Overall, we find that positive contributions by dictators are statistically significantly more frequent in dictator decisions, where participants were matched with group members who were exchange partners in Stage 1 than in transfer decisions where they were matched with group members who were not. This is in line with hypothesis H5 and further supports the notion that reciprocity concerns do matter for participants. It further suggests that reciprocity not only affects the magnitude

[10] This is because the binary dummies (0 and 1) indicating whether a positive amount or zero was given cannot be meaningfully averaged over the decisions regarding both non-exchange partners, but must be tested separately.

[11] Consequently, *i* and *j* are trading partners if *ij* = *AB*-or-*BA*-or-CD-or-*DC*, *i* and k_1 are no exchange partners if ik_1 = *AC*-or-*BC*-or-CA-or-*DA (*defined as first non-exchange partner*)* and *i* and k_2 are non-exchange partners if ik_2 = *AD*-or-*BD*-or-CB or-*DB* (defined as second non-exchange partner).

of giving but also the willingness to give any positive amount.

6. Conclusion

In this paper, we contributed to the old question whether and how market interactions influence moral behavior. We approached this issue both theoretically and experimentally. We introduced three market institutions: AUTARKY, where no interaction between participants took place; BARTER, where participants faced a bilateral exchange setting; and MARKET, where decision makers faced a multilateral market setting. In our theoretical contributions, we built on the D&K reciprocity theory in order to obtain theoretical predictions of market interaction on subsequent prosociality.

We first showed that if people are motivated by reciprocity, then whether or not people are prosocial depends on the structure of preceding trade and on whether we consider a trading partner or someone else. Under AUTARKY, people will not be inclined to be kind to others. In a modern economy, i.e., in MARKET, if all individuals trade with each other (via chains of exchange mediated by monetary payments), people will not be inclined to be kind to others in general. In the intermediate case, BARTER, where there is 1-on-1 exchange between some individuals but not others, people will be inclined to be kind to their trading partners but not to others. Our theoretical insights harmonize well with some prominent thoughts about key transitions that occurred through economic history mentioned earlier, such as those provided by Pinker (2011) and McCloskey (2006, 2010, 2016), and they are also consistent with cross-cultural experimental findings of Henrich et al. (2001, 2004, 2005). Yet, none of these studies could of course identify causal links and there are several potential mechanisms behind the observed patterns, e.g., related to the rapid income increase resulting from the development of market economies.

Therefore, we have also conducted a lab experiment where the income is held fixed in order to provide simple tests of the derived theoretical hypotheses. We find, in line with the theoretical predictions, higher pro-sociality following market interactions compared to the barter interactions and the autarky setting. In particular, we showed that dictator contributions in the market setting (MARKET) were significantly higher compared to contributions by dictators in AUTARKY and BARTER in *d*-game-1 (where contributions had to be the same to each other player) and by dictators in AUTARKY in *d*-game-2 (where varying contributions were possible). In contrast to our predictions, we do not find any differences in pro-social behavior between participants in AUTARKY and BARTER.

However, we nevertheless find that people give significantly more to exchange partners than to non-exchange partners in BARTER, also in line with the theoretical predictions.

All in all, our theory seems to stand up pretty well to our empirical tests. These support some but not others of the positions adopted by the philosophers and other thinkers we cited in Section 2, and are also consistent with some historical evidence regarding the reduction of violence over time. Our paper offers a novel way to understand those positions and patterns. The crux is that market interaction may plausibly make people more pro-socially *because* of their inclination to reciprocate. Historical episodes that involve the use of markets then promote prosocial choice outside those markets.

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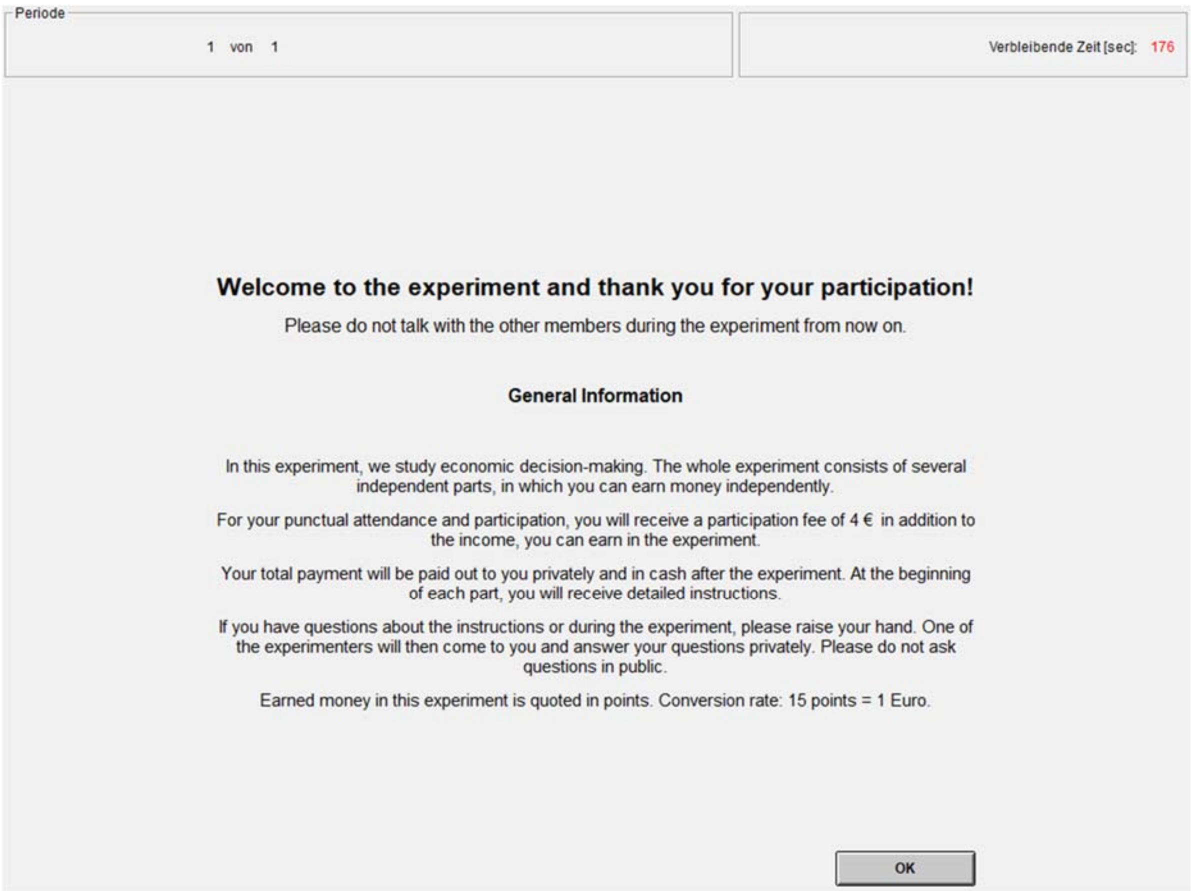
Appendix

Experimental Instructions

1. General Instructions


Periode

1 von 1

Verbleibende Zeit [sec]: 176

Welcome to the experiment and thank you for your participation!

Please do not talk with the other members during the experiment from now on.

General Information

In this experiment, we study economic decision-making. The whole experiment consists of several independent parts, in which you can earn money independently.

For your punctual attendance and participation, you will receive a participation fee of 4 € in addition to the income, you can earn in the experiment.

Your total payment will be paid out to you privately and in cash after the experiment. At the beginning of each part, you will receive detailed instructions.

If you have questions about the instructions or during the experiment, please raise your hand. One of the experimenters will then come to you and answer your questions privately. Please do not ask questions in public.

Earned money in this experiment is quoted in points. Conversion rate: 15 points = 1 Euro.

OK

2. Part 1: Treatment AUTARKY

Periode

1 von 1

Verbleibende Zeit [sec]: 159

Part 1

You are allocated to a group of four members, each of whom is assigned an ID (A, B, D, or D

Your ID: A

Each member in your group receives two keys and two locks as follows:

You: Key #1, **Lock #1**, **Key #3**, **Lock #3**.

Member B **Key #2**, **Lock #2**, **Key #4**, **Lock #4**.

Member C **Key #5**, **Lock #5**, **Key #7**, **Lock #7**.

Member D **Key #6**, **Lock #6**, **Key #8**, **Lock #8**.

Each matching Key-Lock pair has a value of 50 points (unmatched pairs have a value of 0 points).

OK

Periode

1 von 1

Verbleibende Zeit [sec]: 169

Report

Each matching Key-Lock pair has a value of 50 points (unmatched pairs have a value of 0 points).

Your amount of matching key-lock pairs is 2, this yields 100 points.
Member B's amount of matching key-lock pairs is 2 , this yields 100 points.
Member C's amount of matching key-lock pairs is 2, this yields 100 points.
Member D's amount of matching key-lock pairs is 2, this yields 100 points.

Your total score amounts to 100.00 points.
Member B's total score amounts to 100.00 points..
Member C's total score amounts to 100.00 points.
Member D's total score amounts to 100.00 points.

OK

3. Part 1: Treatment BARTER

Periode

1 von 1

Verbleibende Zeit [sec]: 135

Part 1

Barter

You are allocated to a group of four members, each of whom is assigned an ID (A, B, D, or D).

Your ID: A

Each member in your group receives two keys and two locks as follows:

You: **Key #1**, **Lock #1**, **Key #4**, **Lock #3**
Member B: **Key #2**, **Lock #2**, **Key #3**, **Lock #4**
Member C: **Key #5**, **Lock #5**, **Key #7**, **Lock #8**
Member D: **Key #6**, **Lock #6**, **Key #8**, **Lock #7**

Each matching Key-Lock pair has a value of 55 points (unmatched pairs have a value of 0 points).

You and member B can decide simultaneously on whether to agree to a bilateral exchange agreement, where both of you obtain another matching Key-Lock pair by exchanging Key #3 and Key #4.

To agree to the exchange agreement costs 10 points. The barter between you and member B takes place if and only if BOTH of you agree to the exchange agreement. While you will always have to bear the cost for agreeing (10 points), irrespective of whether a barter takes place or not, keep in mind that you will obtain 2x55 = 110 points if you have two matching Key-Lock pairs.

Therefore, the total score of both you and member B will be 100 (2x55 - 10 = 100) if both of you agree.

Do you want to agree to the exchange agreement, where you receive Key #3 for your Key #4? ○ Yes ○ No

OK

Periode

1 von 1

Verbleibende Zeit [sec]: 156

Barter-report

Note that keys are exchanged if and only if you and member B agree to an exchange agreement. Each matching Key-Lock pair has a value of 55 points (unmatched pairs have a value of 0 points). To agree to the exchange agreement costs 10 points.

The barter did not take place, since member B did not agree to the exchange agreement. You, on the other hand, did agree.

Your amount of matching key-lock pairs is 1, this yields 55 points.

Member B's amount of matching key-lock pairs is 1 , this yields 55 points.

Member C's amount of matching key-lock pairs is 2, this yields 110 points.

Member D's amount of matching key-lock pairs is 2, this yields 110 points.

Your total score amounts to 45.00 points.

Member B's total score amounts to 55.00 points.

Member C's total score amounts to 100.00 points.

Member D's total score amounts to 100.00 points.

OK

4. Part 1: Treatment MARKET

Periode

1 von 1

Verbleibende Zeit [sec]: 167

Part 1
Trade

You are allocated to a group of four members, each of whom is assigned an ID (A, B, D, or D).

Your ID: A

Each member in your group receives two keys and two locks as follows:

You: **Key #2**, **Lock #1**, **Key #3**, **Lock #5**
Member B: **Key #4**, **Lock #2**, **Key #7**, **Lock #6**
Member C: **Key #1**, **Lock #3**, **Key #8**, **Lock #7**
Member D: **Key #5**, **Lock #4**, **Key #6**, **Lock #8**

Each matching Key-Lock pair has a value of 55 points (unmatched pairs have a value of 0 points).
You and the other group members can decide simultaneously on whether to agree to the following trade agreement: Each member offers his/her keys for sale and makes purchasing offers for the necessary keys to obtain two matching Key-Lock pairs (in your case: Key #1 and #5). Each key has the price of 15, which the buyer pays the seller.
To agree to the trade agreement costs 10 points. A trade for each key only takes place if and only if there is both a buyer AND a seller for this key. While you will always have to bear the cost for agreeing (10 points), irrespective of whether trades takes place or not, keep in mind that you will receive 2x55 = 110 points if you have two matching Key-Lock pairs.
The total score also depends on whether you and the other group members agree to the trade agreement. Three examples: If no member of your group agrees, then the total score of you and the other members will amount to 0 points. If you do not agree while the other members do agree, your total score will still amount to 0 points while the total score of the other members will vary (45, 60 and 85). If you and the other members do agree, the total score of each member in your group will amount to 100 (2x55 -10 = 100). In this case, the prices for the keys cancel, since each member buys two keys and sells two keys.

Do you want to agree to the trade agreement? ○ Yes ○ No

OK

Periode

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Trade-report

Note that a key changes owner if and only if there is a buyer and a seller for this key. Each matching Key-Lock pair has a value of 55 points (unmatched pairs have a value of 0 points).
Selling a key yields 15 points .
Buying a key costs 15 points.
To agree to the trade agreement costs 10 points.

You did agree to the trade agreement but did not sell your **Key #2** , since no other member wanted to buy this key.

You did agree to the trade agreement and did sell your **Key #3** to another member.

You did agree to the trade agreement and did buy **Key #1** from another member.

You did agree to the trade agreement and did buy **Key #5** from another member.

Your amount of matching key-lock pairs is 2, this yields 110 points.

Another members' amount of matching key-lock pairs is 0, this yields 0 points.

Another members' amount of matching key-lock pairs is 1, this yields 55 points.

Another members' amount of matching key-lock pairs is 1, this yields 55 points.

Your total score amounts to 85.00 points.

Another members' total score amounts to 0.00 points.

Another members' total score amounts to 60.00 points.

Another members' total score amounts to 45.00 points.

OK

5. Part 2: Dictator Decision

Periode

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Part 2

You now receive an additional 90 points and can decide on how much of that amount to keep for yourself and how much to give to each other member in your group. The experimenter will double any amount you give to another group member.

At the end of Part 2, **ONE** member of your group and **ONE** of the two alternatives described below will be randomly selected and the amounts resulting from this decision will be paid to you and your group members.

You will only observe the realized allocation decision and not all the decisions by the others at the end.

The earnings from this part will be added to whatever you earned in part 1 of the experiment.

Alternative 1

Here you must indicate which identical amount you would like to give to each member of your group (between 0 and 30 points).

Alternative 2

Here you must indicate which amount you would like to give to each member of your group, whereby the size of the amounts can vary between members (between 0 and 90 points).

OK

Periode

1 von 1

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Alternative 1

How much do you want to give to **each** of the members in your group (same amount for all three other group members, between 0 and 30 points)?

X =

In case you and alternative 1 are selected randomly, you will receive the amount you did not give to the other three group members.
In this case, this would be 90 - 3*X. Reminder: The experimenter will double any amount you give to another group member.

Alternative 2

How much do you want to give to **member B** (between 0 and 90 points)?

Amount I give to B =

How much do you want to give to **member C** (between 0 and 90 points)?

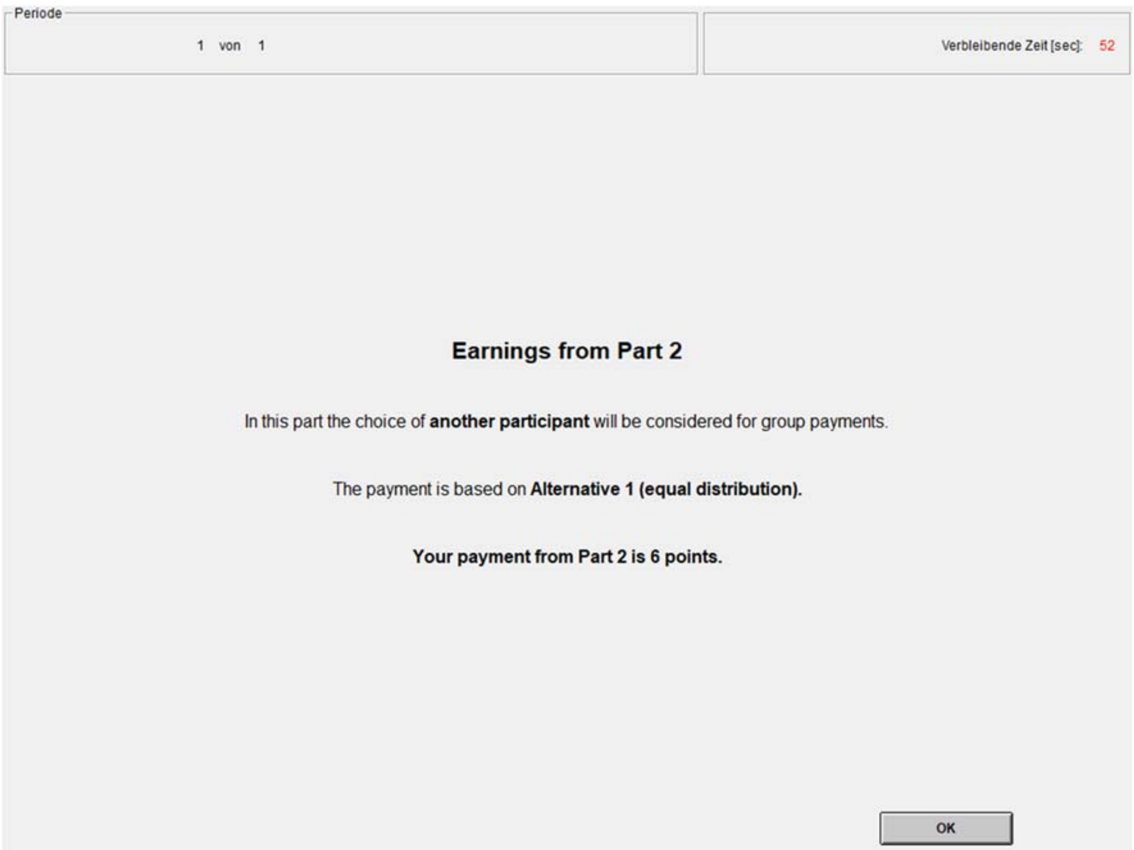
Amount I give to C =

How much do you want to give to **member D** (between 0 and 90 points)?

Amount I give to D =

In case you and alternative 2 are selected, you will receive the amount you did not give to the other three group members.
In this case, this would be 90 minus the amount you wanted to give to the other three members of your group. Reminder: The experimenter will double any amount you give to another group member.

OK


Periode
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Earnings from Part 2
In this part the choice of another participant will be considered for group payments.
The payment is based on Alternative 1 (equal distribution).
Your payment from Part 2 is 6 points.
OK