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# DISCUSSION PAPERS

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# Market Interaction and the Focus on Consequences in Moral Decision Making

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May 2018

**Abstract**

There is a long ongoing debate on whether interaction in a market influences moral decisions of individuals. While some studies show that individuals tend to decide less morally when being exposed to a market environment, other studies argue that the experience of market interaction promotes moral behavior. We add to this discussion by distinguishing between two moral concepts: consequentialism and deontology. According to consequentialism, actions are evaluated only by their consequences. Contrary to that, deontology focuses solely on the morality of the action itself. We design an online experiment in order to investigate the effect of market interaction on moral decision making in a *subsequent* moral dilemma. Taking into account how markets make cost benefit considerations salient, we hypothesize that individuals are more likely to focus on consequences if they interacted in a market before.

JEL *classification*: D91, L1

*Keywords:* Consequentialism, deontological motivations, double auction, salience, decision theory.

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# 1 Introduction

The discussion about the effects of market interaction on moral behavior can be traced back to Hume and Smith[1]. For some time, the dominant opinion was that markets improve mutual understanding and cooperation (e.g. Montesquieu, 1749; Smith, 1761, 1776). However, other researchers started to promote the thesis that markets erode moral behavior (e.g. Veblen, 1899; Schumpeter, 1942; Hayek, 1948). They claim that market competition promotes the "winner-take-all" mentality, decreases concerns for others and lets people treat moral issues in terms of cost and benefits (Chen, 2011). In recent years, this debate resurfaced and economists contributed with numerous theoretical (e.g. Bowles, 1998; Shleifer, 2004) and experimental studies. Some of these experimental studies find that market interaction indeed decreases the concern for others (e.g. Falk and Szech, 2013; Bartling et al., 2014) while others find a moral enhancing effect of markets (e.g. Henrich et al., 2001; Francois et al., 2009).

Most of this work in economics does not distinguish between preferences over the consequences of an action and the moral costs of taking the action. However, some economists (e.g. Alger and Weibull, 2013; Falk and Tirole, 2016; Casal et al., 2016; Bartling and Özdemir, 2017; Chen and Schonger, 2017) started to consider concepts of morality which originate from philosophy and explicitly distinguish between these two aspects of an action.

There are two fundamentally different concepts in philosophy on how to evaluate the morality of an action: consequentialism and deontology. These concepts can take opposing views on whether an action is morally right or wrong. Immanuel Kant importantly shaped the theory of *deontology*, which suggests that the morality of an action must be evaluated by the action itself (Kant, 1870/1785, 1872/1788). That means, for example, one should kill under no circumstances since killing is not conform with moral norms. In contrast, according to *consequentialism* (to which utilitarianism belongs), the morality of an action is evaluated by its consequences. That is, killing is bad, but if by killing one person, the death of several other persons can be pre-

[1]For a collection of early statements on the effects of markets on culture see Hirschman (1977) and Hirschman (1982).

vented, killing is considered to be morally right. Evidence shows that many people consider both in their decisions, the consequences and the moral costs of an action (e.g. Ritov and Baron, 1999; Bartels, 2008; Chen and Schonger, 2017). Those individuals choose an action which contradicts moral norms if the effect on consequences is sufficiently beneficial. Such a consequentialist-deontological type might for example not kill one person in order to save two persons but is willing to kill one person to save three. In one situation he behaves according to deontological principles whereas in another he makes decisions according to consequentialism.

We do not intend to take a stance for either moral concept. However, it is important to distinguish between the different concepts, since pure consequentialist logic - which predominated the economic literature for a long time - sometimes fails to explain observed behavior. Furthermore, "theorists argue over deontological and consequentialist theories for criminal policy, contract law, property rights, procedural justice, constitutional interpretation and international law." (Chen 2011, p.4).

Whether decision makers apply either deontological or consequentialist principles is influenced by the context. Paxton et al. (2012) find that completing a Cognitive Reflection Test (CRT) prior to responding to moral dilemmas increases consequentialist responding, i.e. individuals who reflected more on the CRT made more consequentialist judgments. Also emotions can influence which of the two concepts is used in moral decision making. Negative emotions lead to more deontological decisions (Wheatley and Haidt, 2005), the unavailability of emotions comes along with more consequentialist moral judgments (Koenigs et al., 2007). Greene et al. (2001) show how a higher emotional involvement changes decision making. Capraro and Sippel (2017) find that women are more likely than men to apply the deontological concept when emotions are salient in the moral dilemma. The effect of cultural differences is reported by Gold et al. (2014) and Hauser et al. (2007). Such context dependence shows that studying the determinants of moral judgment is of high relevance.

While other studies concentrate on the question whether moral behavior can persist *in* markets, we investigate whether and how the experience of

interacting in a market influences moral decision making *outside* the market, i.e. in subsequent decisions.

We design an online experiment in which we let participants play either a market or a non-market game and subsequently confront them with a hypothetical moral dilemma in order to elicit their moral preferences. By letting participants play a market game, more specifically a double auction, we intend to shift the participants' mindset towards cost-benefit considerations. This is related to the method of priming from social psychology which argues that the use of a concept in one task increases the probability of using the same concept in a subsequent, unrelated task (Bargh and Chartrand, 2000). Economists have started to adapt this method to experimental economics (e.g. Benjamin et al., 2010; Chen, 2011; Cohn and Maréchal, 2016). Benjamin et al. (2010) show that priming can influence the salience of attributes, which in turn influences the primed individual's preferences. Their results are in line with the hypothesis that the salience of an attribute increases the weight that is given to this attribute. Instead of the traditional way of priming, which induces a mindset for example by letting participants think or read about a market, we let them have the experience of market interaction directly. In a market, individuals are confronted with cost-benefit considerations. We conjecture that such an experience makes consequences salient. We consider salience together with the moral preferences from Chen and Schonger (2017) to derive our hypothesis. Individuals who *only* care for the consequences or *only* care for the action itself should not be influenced by salience and therefore do not react to a change in the mindset. However, individuals with preferences for both attributes are influenced. Market priming, and thus salient consequences, shifts their moral decisions towards consequentialism.

Giving a higher weight to consequences would imply that certain values or norms (such as you should not lie or steal), that can only become manifest in an action but do not translate into consequences, would lose importance and vanish in decision-making processes. Focusing on consequences could therefore make decisions generally more efficient but less moral from a deontological perspective.

In a related study, Chen (2011) investigates the effect of labor competition on moral decision making. He finds that the effect of competition on moral decisions is affected by how participants relate to markets. In order to account for such a moderator effect of different attitudes towards markets, we use the Fair Market Ideology (FMI) scale of Jost et al. (2003).

The results of the experiment will significantly depend on whether we succeed in changing the mindset of individuals by the use of traditional behavioral games. In order to verify a shift towards a market mindset, we will apply a manipulation check to a sub-sample of our study participants. The manipulation check consists of a word completion task and is designed such that it should detect changes in mindsets regarding markets.

The remainder of the paper is structured as follows. In the next section, we give an overview over the recent literature about the effect of markets on morality and other determinants of moral judgment. In Section 3, we describe the design of the experiment. Section 4 introduces the preferences from Chen and Schonger (2017) and shows how salience affects them. In Section 5, we derive our hypotheses and Section 6 presents the pre-analysis plan. Section 7 discusses limitations and Section 8 concludes.

# 2 Literature

As mentioned in the Introduction, some experiments find that markets have a detrimental effect on moral behavior. Several of these experimental studies consider moral behavior defined as concerns for negative externalities of trade. Those studies analyze the prevalence of moral behavior when varying different influential aspects of a market: competition, diffusion of responsibility, social information and market framing. Plott (1983) find that experimental markets converge to the competitive equilibrium even if trade induces a negative externality of trading for all other market participants. Participants seem to just ignore the externality. Sutter et al. (2016) find that if trade has a negative externality on a third party, volume of trade is reduced but prices in the market depend rather on the relative number of buyers and sellers and not on the existence of a negative externality. Falk and Szech (2013) let participants of their experiment play a double auction

and vary the degree of competition by increasing the number of participants in a market. Participants bargain over the live of a mouse and it turns out that they are more willing to sacrifice the mouse if competition is high. Bartling et al. (2014) consider an experimental market where trade leads to a negative externality to a third party. They find that social concerns prevail in a market but decrease in the degree of competition. Bartling et al. (2017) use the same setting and vary the degree of diffusion of the negative externality. They find that such diffusion leaves the level of social concerns almost unaffected. Irlenbusch and Saxler (2015) run an experiment and try to disentangle three characteristics of markets: diffusion of responsibility, social information and market framing. In contrast to Bartling et al. (2017), they find that diffusion of responsibility makes participants rather accept the presence of negative externalities. The same effect is found if transactions are framed as markets. Social information in turn increases social concerns. Reeson and Tisdell (2010) report less contributions to a public good if the game is framed as a market. These studies have considered moral decision making *in* the market, whereas we consider moral decision making *after* market interaction. Such subsequent decision making has also been investigated by other researchers. Brandts and Riedl (2017) compare the effect of favorable and unfavorable experience in a market on the willingness to cooperate in a social dilemma game. They find that cooperation decreases if participants play the social dilemma game with participants from the same market but increases if participants were in a different market before. This suggests that the experience of competing with one another has a negative effect on cooperation. Cappelen et al. (2007) let participants play a dictator game in which they can contribute what they produced before in a production stage where participants can invest and get a return. Compared to the situation when participants were just endowed with some money, they find a significant reduction in the concerns for fairness in the dictator game. Hoffman et al. (1994) find the same effect when framing the pre-dictator-game-stage in terms of a market. Furthermore, giving a price to moral behavior can crowd out intrinsic motivation (e.g. Frey et al., 1996; Frey and Oberholzer-Gee, 1997; Gneezy and Rustichini, 2000; Mellström and Johannesson, 2008;

Bowles, 2008). Researchers also find that making people think of money makes them behave more individualistic (e.g. Vohs et al., 2006; Kube et al., 2012).

However, there are also studies that find markets lead to *more* moral behavior in the market. Pigors and Rockenbach (2016) run a lab experiment with consumers who buy a product from a firm that produces at a certain wage paid to its workers. They vary the opaqueness of the production process to the consumers and whether there is competition between firms. It turns out that social responsibility (i.e. caring for the wage of the production workers) only arises if there is supplier competition. Other studies find that markets also lead to more moral behavior in subsequent decisions. In an experimental study with 15 small-scale societies, Henrich et al. (2001) find that there are higher fairness and cooperation in communities with a higher market integration. Buser and Dreber (2014) also find that market priming increases the willingness to cooperate. Furthermore, market priming increases the weight participants give to efficiency and the trust in strangers (Al-Ubaydli et al., 2013).

Hence, there are contradicting results when considering moral decision making in the market *and* in subsequent decisions. One characteristic of the presented studies is that they typically use a concept of preferences over final payoffs in order to define moral behavior. This can be inequality aversion, preferences for efficiency or a Rawlsian motive for helping the least well-off. Together with self-interest, these preferences all belong to a consequentialist view of morality. Most of the literature thus only considers whether the market changes preferences within the consequentialist view, e.g. from other-regarding preferences to self-regarding preferences, without taking into account whether the moral costs of the action itself change. In contrast to that, we explicitly distinguish between the consequences and the moral costs of an action, i.e. between the concepts of consequentialism and deontology. Bartling and Özdemir (2017) and Casal et al. (2016) also distinguish between these concepts. Bartling and Özdemir (2017) investigate the possibility that if one refrains from a selfish action that induces a negative externality, another market actor could step in. From a consequentialist perspective, an

action that imposes negative externalities is not immoral if another person would impose the same externality otherwise. However, deontologists would argue that the action itself is immoral. Bartling and Özdemir (2017) find that participants are more likely to take the selfish action if no social norm exists. This suggests that social norms increase the importance of the moral costs of the action. Casal et al. (2016) consider a three-player ultimatum game and find that responders' concerns for negative externalities increase if they are better informed about the externality.

While Bartling and Özdemir (2017) consider moral decision making *in* markets, we contribute to the discussion by investigating whether the experience of interacting in a market influences moral decision making in *subsequent* problems that are unrelated to the market. Our study is thus closely related to Chen (2011), who considers the effect of labor competition on subsequent moral decision making.

In order to derive our hypotheses, we use the preferences of Chen and Schonger (2017), who model deontological preferences as lexicographic. Other economists also model deontological value choices (e.g. Alger and Weibull, 2013; Falk and Tirole, 2016). Stringham (2011) provides an overview of different ways of modeling morals, for example as internal constraints or as preferences (e.g. White, 2004; Rabin, 1995; Zamir and Medina, 2008). Furthermore, he discusses where internal constraints might come from.

As mentioned in the Introduction, several factors have been found to have an impact on moral decision making. Greene et al. (2009) find that spatial distance plays a role. Physical contact between the decision maker and the victim has been considered by Cushman et al. (2006). Sinnott-Armstrong (2008) study the temporal order of events. Costa et al. (2014) show that using a foreign language makes individuals rather respond according to consequentialist principles. The consequences are also relevant for decision making, which corresponds to the theory that some individuals consider both, the consequences and the action. An increasing number of lives that can be saved increases the probability of consequentalist decisions (Bartels, 2008). Furthermore, the relation/closeness to the victims matter (Kurzban et al., 2012). Swann Jr et al. (2010) find that the lives of ingroup

members are valued more than the lives of outgroup members. Competition in the labor market right before making a moral decision makes individuals rather decide deontological if they have negative emotions towards the market (Chen, 2011). We add to the discussion of the determinants of moral decision making by investigating the effect of market interaction.

# 3 Design

The study will be conducted on Amazon's Mechanical Turk (MTurk), a labor market intermediary (see e.g. Horton et al., 2011). We implement the experiment with the software o-Tree (Chen et al., 2016). In the first stage, participants are randomly assigned to either a market game (experimental treatment) or a non-market game (control treatment). In the second stage, we confront participants with a moral dilemma in order to elicit their moral preferences. Finally, participants fill in a questionnaire.

After the market/non-market game, we let a sub-sample of the participants do a word completion task, which serves as a manipulation check. Thereby, we verify whether the market game indeed succeeds in shifting participants' mindset towards cost-benefit considerations.

The study is designed to be between-participants in order to rule out potential confounding interaction effects between the various design elements. That means that each participant will only participate in one of the two treatments (either market or non-market). A sufficient number of observations and a proper randomization procedure guarantee causal interpretations.[2]

[2]A power analysis with power 0.9 shows that we need a minimum sample size of 445 participants per treatment to find an effect of 10%-points. We used a baseline share of consequentialist decisions of 37%. This share was found in a pretest on MTurk in which we presented the moral dilemma to 109 participants without previous manipulation.

## 3.1 Market game

"Markets are institutions where sellers and buyers interact and can trade items. Trade occurs whenever a seller and a buyer agree on a price." (Falk and Szech 2013, p.707) Following Falk and Szech (2013) and other researchers, we choose a double auction to represent a market. Double auctions incorporate several typical market aspects such as e.g. the privacy of the own valuation of the good, the interaction and competition among participants and the consideration of costs and benefits of a good. Asks, bids and occurring trades are public information. These auctions are well known for their rapid convergence towards the competitive equilibrium and their high efficiency (Ketcham et al., 1984).

We base the design of the double auction on a computerized version of Smith (1962). 18 participants are assigned to one auction (market) with 9 buyers and 9 sellers of a fictional good and 10 trading rounds. At the beginning of each round, each buyer privately learns his valuation $v$ of the good and each seller learns her production costs $c$. The valuations are randomly drawn from the set $\{30, 40, 50, \ldots, 110\}$ and the costs are randomly drawn from the set $\{10, 20, 30, \ldots, 90\}$. In the standard double auction, the valuation and costs are the same in each round. In contrast to that, we follow Cason and Friedman (1996) and Kagel (2004) and make a random draw in every round. This should make the market interaction more interesting and more similar among buyers and sellers. In each round, every value from the sets can appear only once among the buyers and sellers. The demand $D$ and supply $S$ at the beginning of each round are thus commonly known and depicted in Figure 1. In the competitive equilibrium, the equilibrium price $p^*$ is equal to 60 and there are 5 to 6 trades.

Sellers are told that they can sell one unit of the fictional good in each round. When the market opens, sellers can submit asks, i.e. the price at which they are willing to sell the product. The asks appear in a table labeled "Current bids and asks", which is visible to all market participants. Simultaneously, buyers are told that they can buy one unit of the fictional good in each round. Buyers can submit bids, i.e. the price at which they are willing to buy one unit of the good. The bids also appear in the table

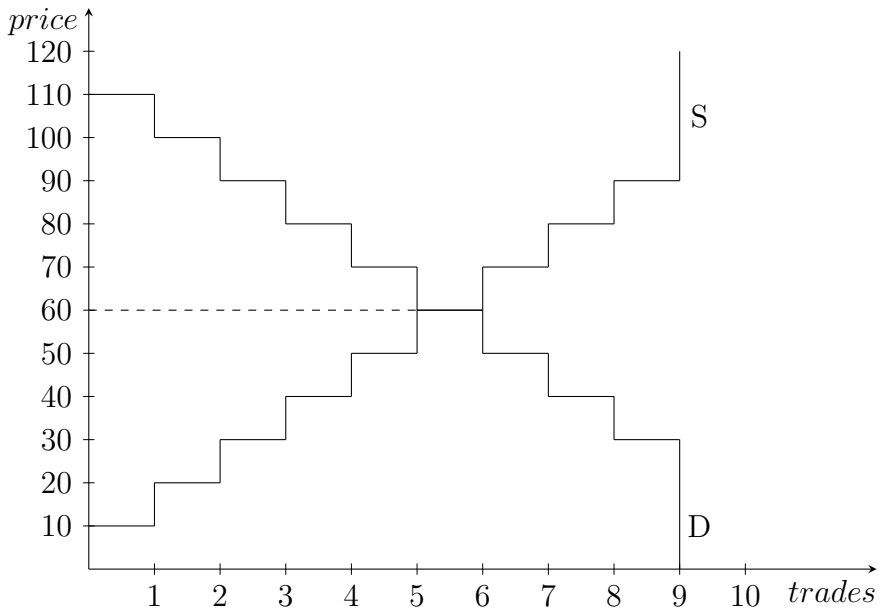


Figure 1: Demand and supply in double auction market.

"Current bids and asks". Figure 2 shows the double auction screen for a buyer. A trade occurs if a seller submits an ask that is lower than a current bid in the table or if a buyer submits a bid that is higher than a current ask. The trade is made at the price that was in the table first. Furthermore, a trade occurs if a seller/buyer directly accepts a bid/ask from the table. As long as they did not trade, buyers and sellers can change their bids/asks as many times as they wish until the market closes. If a trade occurs, a buyer's payoff is $\pi_B$ = valuation - price. A seller's payoff is $\pi_B$ = price - costs. If no trade occurs, payoffs are zero, i.e. the valuation and production costs only materialize in case of trade. After each trading round, participants receive feedback about their payoff and the trading prices in that round. Each participant takes part in 10 trading rounds. One round is randomly drawn at the end of the experiment to determine the amount that is added to the participant's participation fee.

It is challenging to predict the behavior of participants in a double auction theoretically. However, experimental evidence shows that there is a rapid convergence towards the competitive equilibrium in the standard version of the double auction with constant valuation and costs over all rounds and un-

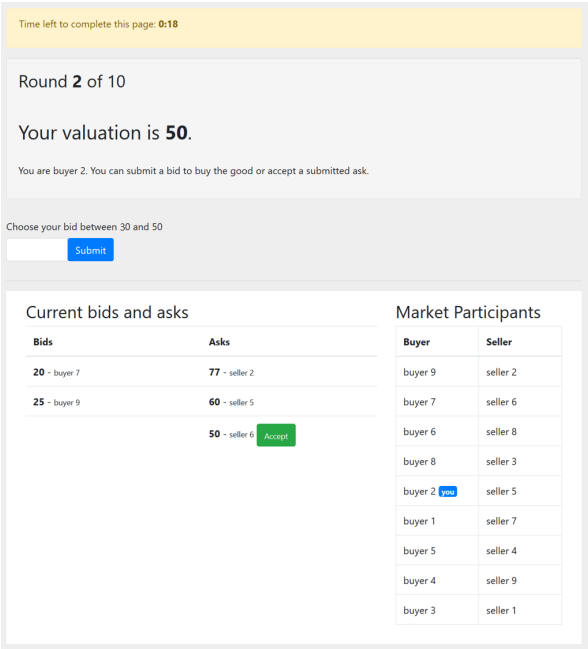


Figure 2: Double auction screen for a buyer

known distribution (e.g. Smith, 1962). Such rapid convergence has also been found given known distribution of $v$ and $c$ and random draws of valuations and costs in each round (Cason and Friedman, 1996; Kagel, 2004).

A soon as the competitive equilibrium has been reached, we can determine the ex-ante expected payoff per round in equilibrium. In the competitive equilibrium, buyers and sellers with high valuations / low costs for the good end up trading. The expected price is $p^* = 60$. Before learning her production costs, a seller expects to have costs above the equilibrium price with probability $\frac{3}{9}$. She will then expect not to trade and has zero payoff. With probability $\frac{6}{9}$, a seller will have costs lower or equal to the equilibrium price and can sell the good. A seller thus has the ex-ante expected payoff of $\frac{6}{9}E[p^* - c|c \leq 60] = 50/3$. A buyer has the ex-ante probability of $\frac{6}{9}$ that he has a valuation above or equal to the equilibrium price and buys at price $p^*$. With probability $\frac{3}{9}$, a buyer has a valuation lower than the equilibrium price and does not buy. The expected payoff of a buyer is thus $\frac{6}{9}E[v - p^*|v \geq 60] = 50/3$. The ex-ante expected variance of the payoff in

equilibrium amounts to $\frac{3}{9}(0-\frac{50}{3})^2+\frac{6}{9}E[(p^*-c-\frac{50}{3})^2|c\leq 60]=\frac{1000}{3}$ for a seller and $\frac{3}{9}(0-\frac{50}{3})^2+\frac{6}{9}E[(v-p^*-\frac{50}{3})^2|v\geq 60]=\frac{1000}{3}$ for a buyer.

In the competitive equilibrium, there are at most six trades per round. To give participants sufficient time to decide and trade, each market round lasts 60 seconds[3].

## 3.2 Non-market game

We designed a non-market game which serves as a baseline to the market. The interaction and competition between participants are two crucial aspects of a market setting, as well as the focus on costs and benefit. While these aspects should be ruled out in a non-market setting, we want to keep constant the risk (same expected income and same variance) and the group feeling. Furthermore, the cognitive depletion/load should be similar since it has been found that cognitive load can have an impact on moral judgment (Greene et al., 2008).

We thus let participants play 10 rounds of the following lottery game: Participants are assigned to groups of 9. In each round, participants are asked to guess a number out of the set $L\in\{20,30,40,\ldots,100\}$. Afterwards, a random device allocates every value of the set $L$ to one of the participants in the group. If the guess coincides with the allocated value, the participant receives a winning payoff of $\pi_W=50$. Otherwise, the losing payoff is

$$\pi_L = \begin{cases} 0 & \text{with prob. } 1/2 \\ 10 & \text{with prob. } 1/8 \\ 20 & \text{with prob. } 1/8 \\ 30 & \text{with prob. } 1/8 \\ 40 & \text{with prob. } 1/8. \end{cases} \tag{1}$$

The expected payoff in each round of the lottery is equal to $E[\pi]=\frac{1}{9}\cdot 50+\frac{8}{9}\cdot\frac{1}{8}(10+20+30+40)=\frac{50}{3}$, i.e. identical to the ex-ante expected payoff in equilibrium in the market game. The expected variance in each round is equal to $E[(\pi-\frac{50}{3})^2]=\frac{1000}{3}$. The expected payoff and the expected variance of the payoff are thus equivalent in the market and non-market

[3]Plott and Gray (1990) suggest 8 seconds per equilibrium trade as a rule of thumb for the round length in computerized double auctions.

game. Similar to the market game each participant receives feedback about the assigned number and the resulting payoff in that round. At the end of the experiment, one of the 10 rounds is randomly chosen to count for payment.

In this non-market game, participants do not compete or interact. Furthermore, they get a benefit without having to pay anything and they are not confronted with market terminology. However, the lottery incorporates the same risk and should also create a group feeling through the draw of the random number.

Since there is no direct interaction in the lottery, participants play the 10 rounds a lot faster than the 10 rounds of the double auction. In order to keep the depletion as constant as possible, we let participants of the lottery group play a real effort task before they enter the lottery. This real effort task is not incentivized since it has the mere purpose of making depletion similar in the two treatments.

Bartling et al. (2014) use an alternative non-market treatment in which they ask participants to choose a distribution of payoffs between three players. In Falk and Szech (2013)'s non-market condition, participants are asked to decide whether they would prefer to receive CHF 10 or to save the life of a mouse. Both studies try to create a non-market environment where decisions are comparable to the decisions in the market environment. However, it is difficult in our setting to let participants make the same distributional decisions since the double auction results in rather complicated interactions. Furthermore, we do not focus on the decisions *in* but on the decisions *after* the market/non-market interaction.

## 3.3 Manipulation check

Following e.g. Tulving et al. (1982), Bassili and Smith (1986) and Shu et al. (2012), we use a word completion task in order to test whether the market (non-market) game indeed results in a market (non-market) mindset. We constructed the word completion task using the guidelines of Koopman et al. (2013).

We present 14 word fragments in random order to the participants. Nine of these word fragments (MA _ L, CAS _, _ ONEY, _ AX, SUPP _ _, SAL _,

BR _ _ CH, _ _ DGET, and SH _ P) can be completed to words related to markets and trade (MALL, CASH, MONEY, TAX, SUPPLY, SALE, BRANCH, BUDGET, and SHOP) or neutral words (as e.g. MAIL, CASE, HONEY, FAX, SUPPER, SALT, BRUNCH, WIDGET, and SHIP). These words were chosen such that without any treatment intervention before, at least 17% of the participants fill in market-related words[4]. If the market interaction indeed manipulates the mindset, participants in the market treatment should be more likely to complete these word fragments with market-related words compared to participants in the non-market treatment. Another set of five word fragments (FR _ _ T, T _ _ LE, BE _ _, BREA _ _, and CAB _ _) with neutral meaning (e.g. FRUIT, TABLE, BEAR, BREACH, and CABLE) is part of the manipulation check to see whether participants in the market treatment and in the non-market treatment complete these word fragments similarly. This allows us to exclude that the market interaction also affects the completion of neutral words. Furthermore, it mitigates the problem that filling in market-related words could also have a priming effect, leading to a higher probability of filling in market-related words in subsequent word fragments.

We interpret a higher share of market-related words in the market treatment as a robustness check for the priming due to the experience of market interaction.

[4]We conducted a pretest on Amazon MTurk with 98 participants to verify this. Koopman et al. (2013) suggest that at least 25% of the participants should fill in market-related words. In our pretest, this was true for most of our market word fragments. Exceptions were MA _ L and SH _ P, where only 17% filled in MALL and SHOP.

## 3.4 Moral dilemma

After the treatment intervention (market or non-market game), we present a moral dilemma to the participants that was first used by Thomson (1985). This moral dilemma has been of interest to many researchers from philosophy (Foot, 1967; Thomson, 1985), neuroscience (Greene et al., 2001; Borg et al., 2006; Ciaramelli et al., 2007), psychology (Cushman et al., 2006; Hauser et al., 2007; Greene et al., 2009) and recently also from economics (e.g. Lanteri et al., 2010; Chen, 2011; Barak-Corren et al., 2018), in order to study moral decision making. The moral dilemma is as follows:

A boxcar breaks loose and is heading toward five workers on the tracks. They do not have enough time to get off the track. However, the participant has the opportunity to save these workers. The participant could use a lever to steer the boxcar to another track where only one worker is working. Many experiments find, that a vast majority of participants would do so. In contrast, most participants remain passive if, in order to save the workers, they have to push a fat man down a platform. These results are very robust (e.g. Petrinovich et al., 1993; Greene et al., 2001; Cushman et al., 2006) and researchers worked a lot on arguing why there are such strong differences between these situations. They argue that two factors are of special importance: physical involvement and the fact that in the push variant, the fat man is used as means to an end. The moral costs of the action are then especially high (Cushman et al., 2006).

In order to get a more balanced distribution of decisions to start with, we use a variant of the train dilemma in which there is a person on a platform above the tracks, standing on a trap door. The participant could open the trap door such that the person would fall down on the tracks, slow down the boxcar and thereby save the lives of three workers. Hence, there is no physical involvement but the person on the platform is used as means to an end. This variant has been used for example by Greene et al. (2009), Schwitzgebel and Cushman (2015) and Everett et al. (2016). They all find that in this moral problem, deontological and consequentialist answers and/or ratings are more balanced than in the lever or the push variant. The trapdoor variant allows eliciting whether people are willing to use others as means to an end with-

out the emotional salience that comes from the physical involvement. The dilemma can be illustrated as in Figure 3. Together with the figure, partici-

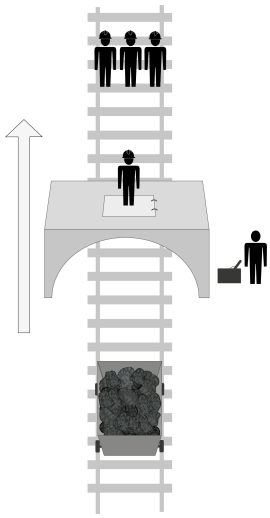

Figure 3: Moral Dilemma - Trapdoor

pants are presented the following instructions and have to decide whether to actively intervene or whether to stay passive (the instructions are taken with slight adaptations from Barak-Corren et al. (2018)):

You are working by the train tracks when you see a boxcar filled with coal break loose and speed down the tracks. The boxcar is heading toward three workers who do not have enough time to get off the track. Above the track is a platform with another worker. This worker is not threatened by the boxcar. However, he is standing over a trap door.

You have two options:

**Actively intervene:** You use a switch that opens the trap door and drops the one worker in front of the boxcar. Thereby, the worker's body gets caught in the wheels of the boxcar and slows it down. As a consequence, the one worker dies and the three workers stay unharmed.

**Stay passive:** You stay passive and let the boxcar head toward the three workers. As a consequence, the worker over the trap door stays unharmed and the three workers die.

*Sidenote:* In any case, you are sufficiently protected and stay unharmed. Assume that you will not face any legal consequences for either action.

Now you are asked to take one of the above options. In order to do so, imagine that you find yourself in the previously described situation. Please accept only the information given and try not to introduce additional assumptions that go beyond the problem as stated.

In contrast to many other studies, we ask participants what they would do rather than what they consider to be the morally right thing to do. Several researchers found differences in answers to these two questions (e.g. Kurzban et al., 2012; Tassy et al., 2013; Gold et al., 2013, 2015). We add the question about the morally right decision in the subsequent questionnaire. There is some criticism of the external validity of the hypothetical moral trolley problem. We will discuss this criticism in Section 7.

## 3.5 Questionnaire

As the last step, we elicit some socio-demographic data such as gender, age, education, religion, nationality, native language and income. We also ask them to rate their willingness to take risk and their trust in other people. Market and trading experience is elicited by questions about the frequency of trading at eBay or bargaining in markets. As a common procedure in priming studies, we ask whether participants were aware of the purpose of the study, especially of our intention of priming.

We add the questionnaire from Jost et al. (2003) to elicit the participants' attitude towards markets. This measure of fair market ideology was also used by Bartling et al. (2014). Participants have to rate their agreement with 15 statements about the market procedure and the fairness of 10 statements about market outcomes. This allows us to assess possible negative or positive

emotions towards markets. Furthermore, we ask participants whether they think they did well in the market/lottery game and we ask them to rate their mood during the experiment. These two questions should capture emotions towards the experience in the experiment. The complete questionnaire can be found in the Appendix.

### 3.6 Procedural details

We plan to conduct the experiment on Amazon Mechanical Turk with a total of 1200 participants. 500 participants will take part in the non-market treatment, 500 participants will take part in the market treatment. 200 additional participants will be presented with the manipulation check directly after the market / non-market game (100 participants per treatment). We use the software oTree (Chen et al., 2016) to program the experiment. We will conduct one treatment with 18 participants per session. We will invite the participants via MTurk. Sessions are expected to last 45 minutes on average. For the market treatment, we need 18 participants to start at the same time. In order to reduce the waiting time for the first arrivers and thus to reduce drop-outs, we will fill the empty spots with automated players ("bots") 10 minutes after the arrival of the first participant. After reading the instructions, participants will be asked to answer some control questions to make sure they understood the rules of the game. Only participants who complete all parts of the experiment receive payment. They will be payed via their MTurk account. Participants' expected earnings are $5 on average across sessions, with a participation fee of $3.

## 4 Theory

Chen and Schonger (2017) distinguish between three types of preferences: consequentalist, deontological and consequentialist-deontological preferences. We use their definition of the types.

**Definition 1** (Consequentialist preferences)**.** *A preference is consequentialist if there exists a utility representation $u$ such that $u = u(x)$.*

$x = x(d)$ represents the consequences of a decision $d$. Next to one's own payoff, it also includes e.g. reputation and others' payoffs.

In the moral dilemma described before, an individual with consequentialist preferences would prefer to actively intervene (A) and open the trap door over staying passive (P) if and only if

$$u_1(x_1(A)) \geq u_1(x_1(P)). \tag{2}$$

Assuming that the consequentialist prefers less over many deaths, he would always choose to actively intervene (A).

For a deontologist, preferences are lexicographic. The preferences over decisions depend on the decision $d$ itself. If an individual is indifferent between two decisions, consequences $x$ are considered.

**Definition 2** (Deontological preferences)**.** *A preference is called deontological if there exist $u$, $f$ such that $u = u(d)$, and $f = f(x)$, and for all $(x, d), (x', d')$: $(x, d) \succsim (x', d')$ if and only if $u(d) > u(d')$ or $[u(d) = u(d')$ and $f(x) \geq f(x')]$.*

There is evidence that actively deciding to kill someone rather than letting it happen, is considered as more immoral (Cushman et al., 2006; Moore et al., 2008). Hence, we consider actively intervening as more painful to a deontologist than staying passive:

$$u_2(A) = -M_2(A) < -M_2(P) = u_2(P). \tag{3}$$

where $M_2(d)$ are the moral costs of decision $d$ for a deontologist. A deontologist would thus always choose to stay passive (P) and does not care for the consequences.

There is a third type whose utility function incorporates both: consequences $x$ and the moral costs from decision $d$.

**Definition 3** (Consequentialist-deontological preferences)**.** *A preference is consequentialist-deontological if there exists a utility representation $u$ such that $u = u(x, d)$.*

We consider an additive utility function $u_3(x, d) = x_3(d) - M_3(d)$, where $x_3(d)$ are the consequences and $M_3(d)$ are the moral costs of decision $d$ for

the consequentialist-deontological type. Such a type would choose to become active, if and only if the difference in utility from consequences is higher than the difference of moral costs:

$$\begin{aligned} u_3(A) = x_3(A) - M_3(A) \geq x_3(P) - M_3(P) = u_3(P) \\ \Leftrightarrow x_3(A) - x_3(P) \geq M_3(A) - M_3(P). \end{aligned} \tag{4}$$

For the consequentialist-deontological type, we again need the assumption that he prefers less over many deaths. He would choose to become active if the improvement in consequences becomes more important than the cost of taking an immoral decision.

A psychological concept used by several economists (e.g. Kőszegi and Rabin, 2006; Bordalo et al., 2013) suggests that individuals focus on attributes which are more salient. We follow the model of salience-driven preferences of Bordalo et al. (2013) and assume that individuals indeed give a higher weight to the attribute that has a higher salience.

Changing the weights of consequences and moral costs has no influence on the decision of pure consequentialists and pure deontologists since they only consider one attribute in their decision. However, it has an influence on the decision of consequentialist-deontological types. If consequences are salient, the moral costs are discounted with $\delta \in (0, 1]$:

$$u_3(d) = x_3(d) - \delta M_3(d). \tag{5}$$

If the moral costs from the decisions are salient, consequences are discounted with $\delta \in (0, 1]$:

$$u_3(d) = \delta x_3(d) - M_3(d). \tag{6}$$

Given consequences are salient, consequentialist-deontological types are more willing to actively intervene:

$$\begin{aligned} u_3(A) = x_3(A) - \delta M_3(A) \geq x_3(P) - \delta M_3(P) = u_3(P) \\ \Leftrightarrow x_3(A) - x_3(P) \geq \delta[M_3(A) - M_3(P)]. \end{aligned} \tag{7}$$

This condition is more likely to be satisfied than condition (5) and hence we would expect more active interventions if consequences are salient.

There are different theories about what determines the salience of an attribute. Bordalo et al. (2013) argue that an attribute has a higher salience if it varies more within the choice set. We do not argue against the effect of variation on salience. However, since all participants consider the same moral dilemma, the variation within attributes remains constant between our treatments and should thus not play a role. Researchers from psychology and economics (Benjamin et al., 2010) argue that priming can affect the salience of attributes. Evidence is provided by Benjamin et al. (2010), who use a similar model in order to explain the influence of priming on the choice of individuals. In their model, an individual's utility has two parts: first, they get disutility from choosing another than their individually preferred action. Second, they get disutility from departing from the preferred action of their social category. Benjamin et al. (2010) argue that priming the social category increases the salience of the social category and thus the weight that individuals give to the disutility from deviating from their social category's optimal choice.

# 5 Hypotheses

Our main hypothesis is based on the predictions we get from the preferences of Chen and Schonger (2017) combined with a theory of salience. The hypothesis that the experience of interacting in a market increases the share of individuals who choose to become active corresponds to markets making consequences salient.

**Hypothesis 1.** *Participants who were exposed to the market environment are more likely to make consequentialist decisions in the moral dilemma than participants who were exposed to the non-market environment.*

As explained before, the theory of priming says that if a concept was used recently, it is more likely to be used in the next decision again. Bowles (1998), Chen (2011) and other economists support the view that markets let consumers focus on the cost-benefit concept and thus on consequences. Following Benjamin et al. (2010), this makes consequences salient in subsequent decisions.

We follow the argumentation of Chen (2011) when we derive the second hypothesis:

**Hypothesis 2.** *Market interaction leads to more consequentialist decisions if participants have a positive attitude towards markets.*

Chen (2011) argues that the affective state changes moral decision making. When a person has positive associations with something, he rather uses the concept of consequentialism (Valdesolo and DeSteno, 2006) while negative emotions trigger more deontological decisions (Wheatley and Haidt, 2005). We measure the attitude of a participant towards markets with the Fair Market Ideology scale in the questionnaire.

The performance in the treatment game could also have an influence on emotions. This implies the following prediction:

**Hypothesis 3.** *Better performance in the market/non-market game leads to more consequentialist decisions.*

Bowles (1998) suggests that the effect of market interaction can differ significantly depending on whether a participant performs well or poorly in the market. However, Brandts and Riedl (2017) find that positive experience in the market only has a positive effect on the contributions in a social dilemma if participants did not compete in the same market before.

# 6 Pre-analysis plan

In this section, we first describe the variables and then describe how we will analyze the data and test our hypotheses.

We will exclude the observations of participants who did not correctly answer the moral dilemma comprehension questions in the questionnaire. Furthermore, we will only consider participants who played at least eight rounds of the market/non-market game[5].

[5]If a participant closes the browser, a bot takes his place and the game continues. If the participant reopens the browser, he enters the game again.

## 6.1 Descriptive analysis

Table 1 lists the variables that will be elicited, including their descriptions.

| Variable | Description |
|---|---|
| active | Decision dummy: Decision in the moral dilemma: 0 - passive; 1 - active |
| market | Treatment dummy: 0 - non-market; 1 - market |
| perform | Average payoff in market/non-market game |
| mood | Self-reported mood during the experiment: from 1 - very bad to 5 - very good |
| fmi | Mean of FMI scale (25 items): from -5 to 5 |
| gender | Self-reported gender: 0 - male; 1 - female; 2 - other |
| age | Self-reported age |
| income | Self-reported income: 0 - No answer; 1 - Less than $10,000; 2 - $10,000 to $19,999; ... ; 14 - $100,000 to $149,999; 15 - $150,000 or more |
| education | Self-reported highest completed education: 1 - Less than High School; 2 - High School/GED; 3 - Some College (no degree); 4 - Bachelor's Degree; 5 - Master's Degree; 6 - Advanced Graduate work or Ph.D.; 7 - Other |
| trust | Self-reported trust attitude: from 0 - "You can't be too careful" to 10 - "Most people can be trusted" |

Table 1: List of variables.

| Variable | Description |
|---|---|
| risk | Self-reported risk attitude rank: from<br>0 - "not at all willing to take risks"<br>to 10 - "very willing to take risks" |
| nation | Self-reported nationality: 1 - US American; 0 - Other |
| english | Self-reported native language: 1 - English; 0 - Other |
| religious | Self-reported frequency of attendance of religious services:<br>1 - Never; 2 - Once a year; 3 - Once a month; 4 - Once a week;<br>5 - Multiple times a week |
| familiar | Self-reported familiarity with "moral trolley problem" dummy:<br>0 - No; 1 - Yes |

Table 1: List of variables (continued).

We define the variable $perform_i$ as the average payoff across all periods of participant $i$ in the market/non-market game. Furthermore, the variable $fmi_i$ is constructed by participant $i$'s average rating of the 25 items of the fairness market ideology scale. We will also have information about the number of bots in a market, the number of trades per round and the trading prices.

In order to test for successful randomization, we will compare the explanatory variables between the two treatments. More specifically, we will use Fisher's exact tests for gender and Mann-Whitney U test[6] to verify that income, education, and age do not differ significantly between the two treatments.

We will also compare drop-out rates in the treatments with a Mann-Whitney U test. If drop-out rates differ systematically, we have to conclude that there was different attrition in the two treatments.

[6]The parametric alternative of a t-test requires the variable to be interval scaled and to be normally distributed in the population. Throughout the analysis, we will use the t-test instead of the Mann-Whitney U test whenever we can verify that these two requirements are satisfied.

## 6.2 Market game

We are not primarily interested in the behavior of participants in the double auction directly. However, it is still important to look at the price and trading dynamics in order to test whether the markets converge to the competitive equilibrium. If they converge, we can be confident that payoffs in the market and the non-market treatment are distributed approximately equally.

We will use one-sample t-tests to compare the prices and the number of trades in the last trading periods with the equilibrium price of 60 and the equilibrium number of trades between 5 and 6. The coefficient of convergence $\alpha$ of a trading round is the ratio of the standard deviation of prices to the predicted equilibrium price (in percentage). $\alpha$ is thus a measure of exchange price variation relative to the predicted equilibrium exchange price. $\alpha$ is predicted to decline with trading periods. The efficiency of the market is defined as the sum of realized incomes divided by the maximal aggregate income. Efficiency should increase in the number of periods and approximately reach 100%. We will test the predictions of convergence using random effects regressions on a linear time trend with clustered standard errors on market level.

The convergence to the competitive equilibrium is of relevance since we designed the payoffs in the non-market game such that the payoff distributions are equal in expectation. We can also test directly whether the expected payoff of participants is indeed $\frac{50}{3}$ with a one-sample t-test. We expect it to be smaller since the competitive equilibrium is typically only approximated (at least in some periods).

## 6.3 Moral dilemma

In order to test our main hypothesis, we will compare the shares of active and passive decisions in the market and in the non-market treatment. If the randomization works properly, the difference in shares will be caused by the treatment intervention. We will test whether the difference in shares is statistically significant with a Fisher's exact test. We will interpret a significant difference as evidence for our hypothesis that market interaction lets participants rather make decisions according to consequentialism.

We will also compare the shares to the results from the pre-study on MTurk with 109 participants. Without any manipulation before the trap door moral dilemma, we found that 37% of the participants chose to actively intervene.

## 6.4 Regression analysis

We will run logit regressions in order to test our hypotheses more rigorously. We will cluster standard errors on the market/lottery level to account for possible correlation of the error term across participants from the same market or the same lottery. Furthermore, we will include session dummies to account for fixed effects due to dynamics particular to each market session (as for example the number of bots).

The dependent variable $active_i$ is a dummy variable that is 1 if participant $i$ chose to actively intervene in the moral dilemma and 0 if participant $i$ stayed passive. The probability that participant $i$ chooses to actively intervene given $X_i$ is

$$P(active_i = 1|X_i) = \frac{exp(X_i'\beta)}{1 + exp(X_i'\beta)}, \tag{8}$$

where $X_i$ is a vector with all explanatory variables and a constant. The marginal effect of explanatory variable $l$ is

$$\frac{\partial P(active_i = 1|X_i)}{\partial X_{il}} = \beta_l \frac{exp(X_i'\beta)}{1 + exp(X_i'\beta)}. \tag{9}$$

The marginal effect depends on the level of $X$. We will report marginal effects evaluated at means. When $X_{il}$ is a dummy variable, the marginal effect is defined as

$$P(active_i = 1|X_{il} = 1, X_i) - P(active_i = 1|X_{il} = 0, X_i). \tag{10}$$

We will run logit regressions, where we add additional explanatory variables step by step. In the first logit regression, $X_i$ will consist solely of the market dummy $market_i$. In a second step, we want to test the hypothesis that the attitude towards markets moderates the effect of market interaction. Controlling for such moderator variables is especially important if the effect

goes in opposite directions. We will add the fairness market ideology measure $fmi_i$ and an interaction variable $fmi_i\#market_i$. The interaction variable captures the effect of market attitude given a participant was assigned to the market treatment. Our hypothesis 2 suggests that $fmi_i\#market_i$ has a positive effect on the probability of actively intervening.

Since the argument that negative/positive emotions affect moral decision making also holds for participants in the non-market treatment, we will run a third logit regression and add the variables $mood_i$ and $perform_i$ and their interactions with $market_i$ to the explanatory variables. These variables capture the self-reported mood during the experiment and the performance of the participant in the market/non-market game. We will interpret positive coefficients for these variables as further evidence for our hypothesis 3.

Finally, we estimate the model including the control variables gender, age, religion, nationality, native language, income, employment, trust, risk aversion and market experience.

## 6.5 Manipulation check

The manipulation check serves as a robustness check for the priming of participants. Each participant could maximally fill in 9 market-related words out of 14 words in total. We will construct a market-priming-score which is computed simply by the number of completed market-related words (hence from 0 to 9). Afterwards, we will compare the average number of individual scores between treatments. In addition, we compare both mean scores with our baseline mean score from the pretest without manipulation stage.

In the baseline study with 98 participants and no priming, we found a mean score of 3.49. We will test for the significance of the differences with a Mann-Whitney U test. We expect that the mean score in the non-market treatment does not significantly differ from the baseline, whereas the mean score in the market treatment is significantly higher than both other mean scores.

# 7 Limitations

The attempt to prime participants through experimental games is a new method and is different from previous approaches[7]. We are aware of the fact that by explaining the double auction, several market-related words are pinned in the recognition memory and make it easier to be recognized in the manipulation check. We counter this effect by using only market-related words which were not used in the instructions or appeared in the instructions of both treatments.

Cohn and Maréchal (2016) raise some other worries when it comes to priming. First, several priming studies could not be replicated (Yong, 2012). Second, there is doubt on whether priming really works through the proposed mechanism. They suggest mitigating the latter by using a manipulation check, which we will implement with the word completion task. The problem of replication can be reduced by the provision of all material necessary for replication.

Another possible confounding factor is that cognitive depletion might have an influence on moral decisions (Greene et al., 2008). The transcription task and the lottery might not cause the same cognitive depletion as the double auction and this could result in different decisions. However, one could argue that cognitive depletion is also present in a real market and is thus illustrated realistically by the experimental double auction.

Several studies question the external validity of the moral trolley problem because of its hypothetical nature (FeldmanHall et al., 2012; Bauman et al., 2014; Gold et al., 2015). Bauman et al. (2014) revisit the external validity of moral trolley problems, observing that 1) participants are often amused, 2) trolley problems differ from moral problems which are encountered in reality and 3) that they elicit different psychological processes than real-world situations. Several researchers try to make the moral problems more realistic. Gold et al. (2013) and Gold et al. (2015) introduce trolley problems with economic incentives and real-life consequences. While harm in the traditional

[7] In one study e.g., participants had to arrange words to form a proper sentence. In one condition the available words were neutral, in the other related to markets and trade (see Al-Ubaydli et al. 2013).

moral trolley problem is typically deaths, they generalize the problem to economic harm. They find that the difference in moral judgments between the lever and the push scenario remains high. Navarrete et al. (2012) let participants play the lever scenario in a virtual reality environment and find that 90.5% of the participants turn the trolley. This result is in line with the 90% typically found in the classic hypothetical moral trolley dilemma.

With our setting, we cannot make inferences about the long-run effect of priming by market interactions. It would be interesting for further research to investigate long-lasting effects by letting participants take moral decisions repeatedly over time or by letting more time pass before presenting them with the moral decision.

We will use the online labor market MTurk. Benefits are that experiments are easy to implement and data can be generated at a low hourly pay of the participants. Drawbacks are that the researcher cannot control for the environment in which the participants are, whether they pay attention and that participants are mainly from the US. However, Berinsky et al. (2012) examine experimental data generated by Mechanical Turk users and find that results are comparable to data generated in a common laboratory. This is also reflected by numerous publications using Mechanical Turk data (e.g. Ambuehl et al., 2015; Chandler and Kapelner, 2013; Dreber et al., 2013).

Real-time interaction has not been tried often on MTurk yet. A recent paper by Arechar et al. (2018) discusses the methodological challenges. They find that in spite of all the problems, results from a public goods game are similar to the results in the laboratory. One problem of real-time interaction is the drop-out of participants. In our double auction, 18 participants have to be present at the same time in MTurk. We program bots which will take over in case some participants drop out. These bots will make bids/asks equal to their valuation/costs at a random point in time within a fixed (and commonly known) time-frame. The bots will be indicated as such, so that participants know whether they are playing with bots or real persons. However, our main question is not about the behavior in the double auction and we expect that the introduction of bots does not influence the experience of interacting in a market.

Instead of using a general subject pool, we could also test whether market professionals are more consequentialist than non-professionals. However, we would have to encounter the problem of self-selection. Furthermore, running an online experiment in a non-field setting gives us more control over the decision environment and the treatment intervention. Additionally, more and more people all over the world gain access to markets and engage in some form of market interactions. Understanding the influence of market interaction on moral decision making is therefore especially important for a general, representative subject pool.

# 8 Conclusion

In this paper, we presented an experimental design to test the hypothesis that market interaction leads to more consequentialist decisions in a subsequent moral dilemma. The design also allows detecting possible moderator effects of positive/negative emotions towards markets. Furthermore, the results of the experiment will give some insights on whether it is possible to prime participants, i.e. to change their mindsets, by letting them play an experimental game. This would have implications for experimental research in general.

If market interaction indeed increases the weight that individuals give to consequences, implications for general decision making depend on the preferences over consequences. If individuals only care for their own payoff, giving a higher weight to consequences makes them more likely to engage in individually profitable actions, even if these actions contradict moral norms as e.g. imposing negative externalities, lying or not cooperating. If individuals also care for the payoff of others, it might not necessarily be the case that more immoral actions are taken. On the one hand, there are less concerns for taking immoral actions. On the other hand, individuals might try to avoid actions that have inefficient consequences.

It is possible that the experience of market interaction also has an effect on other variables that are elicited in the questionnaire. For example, Al-Ubaydli et al. (2013) would suggest that trust in other people is increased by market interaction and Francois et al. (2009) show that higher market

competition leads to higher trust.

Future research should concentrate on the effect of market interaction on other moral dilemmas, e.g. whether participants are willing to lie in order to improve consequences. Specifically, we could give one person the opportunity to lie which increases his/her monetary payoff and the payoffs of all players of his/her group (Erat and Gneezy, 2012). We would expect that the salience of consequences increases the probability that a person is willing to lie. This extends our study with a consequential/deontological choice to an economically incentivized setting. Alternatively, the moral dilemma could be made more realistic and incentivized non-economically, e.g. by physical pain through electrical shocks. Instead of the hypothetical decisions on the lives of workers, participants could be confronted with the decision whether they let three other participants receive an electrical shock or whether they actively decide that an outsider is shocked instead.

# 9 Appendix

## 9.1 Instructions Double Auction

**Welcome and thank you for your participation!**

This is a study of decision-making. Please read the following instructions carefully.
The study consists of 3 parts:

- Part 1: An interactive game
- Part 2: A decision scenario
- Part 3: A short questionnaire

We will explain each part of the study before the respective part will start. You will receive a fixed participation reward of $3.00 at the end of part 3. In part 1, you can earn additional points which will be converted to real money.

One point equals $0.20.

The money you will earn in part 1 will be added to the fixed participation reward of $3.00. In parts 2 and 3, no additional money can be earned. You must finish all 3 parts of the study to receive payment. You will receive a personal code that allows you to receive your payment through MTurk at the end of the study.

**General rules**

In this part, you will be interacting in an online market consisting of 9 buyers and 9 sellers. These are real people interacting in real-time. You will be randomly assigned to the role of a buyer or the role of a seller. You will keep this role throughout the entire duration of the game. You will learn your role after reading the instructions.

There will be 10 trading rounds in which you can earn points by trading. One of these 10 rounds will be randomly chosen at the end of the study to

count for your payment. In each of the 10 trading rounds, the market opens for 60 seconds, during which trading between buyers and sellers is possible.

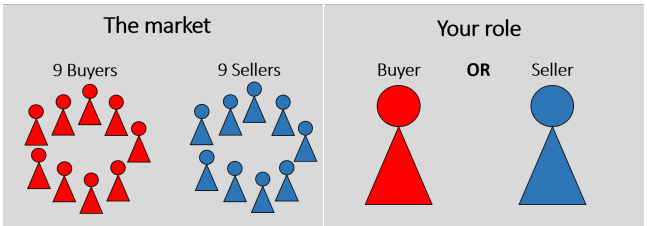


Figure 4: Market with buyers and sellers

### What can a buyer do?

In each trading round, each buyer can buy one unit of a fictional good. By buying and hence owning this good, buyers receive a benefit in terms of a valuation. At the beginning of each trading round, each buyer learns how much the good is worth to him, i.e. he learns his own valuation. These valuations are different for each buyer and measured in points. The valuations will be randomly assigned to the buyers in each round and can be 30, 40, 50, 60, 70, 80, 90, 100 or 110 points. Among the buyers, each number is assigned only once within a round, i.e. one buyer is assigned a valuation of 30 points, another buyer is assigned a valuation of 40 points, yet another buyer is assigned a valuation of 50 points and so on.

### What can a buyer earn?

A buyer can earn points by trading, i.e. by buying the good from a seller. If a trade occurs, a buyer gets the valuation (measured in points) minus the price (measured in points):

Buyer's earnings in points = valuation - price

If no trade occurs, a buyer earns 0 points.

### How does trading work for the buyer?

Trading is done on an online market platform. A buyer can trade in *two possible ways*:

1. He can accept an ask that has been submitted by a seller. The trade then occurs at the price of the ask.

2. Alternatively, he can submit a bid, i.e. the price at which he is willing to buy. If a seller accepts this bid or submits a lower ask, the trade occurs at the price of this bid.

The two possible ways of trading will be explained in more detail later on the screen.

The following screenshot shows what the online market platform looks like:

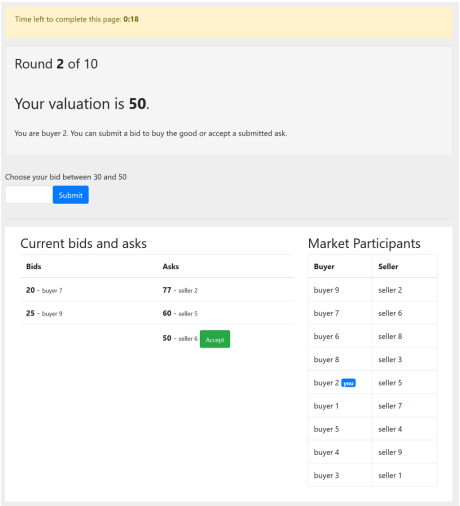


Figure 5: Double Auction Screen Buyer

In each trading round, buyers are numbered consecutively from 1 to 9. The numbers change each round such that no buyer can be identified. In the example, the buyer has number 2. The valuation of the buyer in this round is 50, as you learn from the message on the screen "Your valuation is 50." You see a list of all market participants at the right side of the screen. Bids and asks of the buyers and sellers are displayed in the table "Current bids and asks".

At the beginning of each round, there is a countdown of 10 seconds during which each buyer learns his valuation. Then the market opens for 60 seconds. While the market is open, each buyer can trade one unit of the good by accepting an ask of a seller or by submitting a bid (these are the two possible ways of trading shortly described before):

1. **Each buyer can accept an ask** from the table "Current bids and asks". He does so by clicking on the *accept* button that shows up next to the lowest ask in the table. The good then trades for the price of the ask.

2. **Alternatively, each buyer can submit a bid**, i.e. a price at which he is willing to buy the good. In order to do so, he can enter a value and click on *Submit*. The bid then appears in the table "Current bids and asks" and is visible to all sellers and buyers. Within a trading round, a buyer can revise his bid as many times as he likes and replace it by a new one. If a seller accepts the bid of the buyer, trade occurs at the price of the bid. To avoid a loss, a buyer can only submit bids that are equal to or lower than his valuation.

   If a buyer submits a bid and there are lower asks in the table, trade occurs at the price of the lowest ask. In principle, it is the same as if the buyer had directly accepted the lowest (and thus currently best) ask in the table.

When the market closes, each buyer receives feedback about his payoff and all trades from that round.

**What can a seller do?**

In each trading round, each seller can produce one unit of a fictional good that he can sell in the market. At the beginning of each trading round, each seller learns how much it costs for him to produce this good, i.e. he learns his own production costs. These production costs are measured in points. They will be randomly assigned to the sellers in each round and can be 10, 20, 30, 40, 50, 60, 70, 80 or 90 points. Among the sellers, each number is assigned

only once within a round, i.e. one seller is assigned production costs of 10 points, another seller is assigned production costs of 20 points, yet another seller is assigned production costs of 30 points and so on.

**What can a seller earn?**

A seller can earn points by trading, i.e. by selling the good to a buyer. If a trade occurs, a seller gets the price (measured in points) minus the production costs (measured in points):

Seller's earnings in points = price - production costs

If no trade occurs, the good is not produced, i.e. the seller does not pay the production costs. Thus, if no trade occurs, a seller earns 0 points.

**How does trading work for the seller?**

Trading is done on an online market platform. A seller can trade in *two possible ways*:

1. He can accept a bid that has been submitted by a buyer. The trade then occurs at the price of this bid.

2. Alternatively, he can submit an ask, i.e. the price at which he is willing to sell. If a buyer accepts this ask or submits a higher bid, the trade occurs at the price of this ask.

The two possible ways of trading will be explained in more detail later on the screen.

The following screenshot shows what the online market platform looks like.

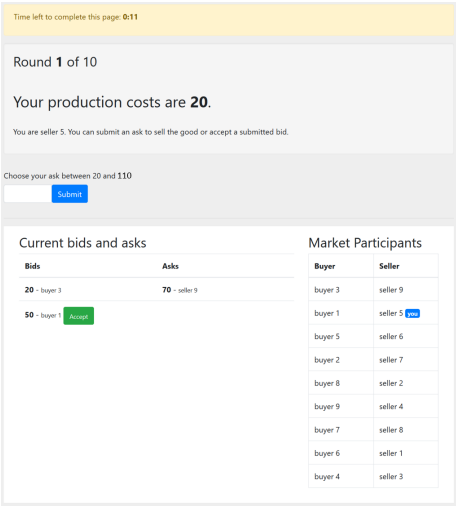


Figure 6: Double Auction Screen Seller

In each trading round, sellers are numbered consecutively from 1 to 9. The numbers change each round such that no seller can be identified. In the example, the seller has number 5. The production costs of the seller in this round are 20, as you can see from the message on the screen "Your production costs are 20." You see a list of all market participants at the right side of the screen. Bids and asks of the buyers and sellers are displayed in the table "Current bids and asks".

At the beginning of each round, there is a countdown of 10 seconds during which each seller learns his production costs. Then the market opens for 60 seconds. While the market is open, each seller can trade one unit of the good by accepting a bid of a buyer or by submitting an ask:

1. Each seller can accept a bid from the table "Current bids and asks". He does so by clicking on the *accept* button that shows up next to the highest bid in the table. The good trades at the price of the bid.

2. Alternatively, each seller can submit an ask, i.e. a price at which he is willing to sell the good. In order to do so, he can enter a value and click on *Submit*. The ask then appears in the table "Current bids and asks" and is visible to all sellers and buyers. Within a trading round,

a seller can revise his ask as many times as he likes and replace it by a new one. If a buyer accepts the ask of the seller, trade occurs at the price of the ask. To avoid a loss, a seller can only submit asks that are equal to or above his production costs.

If a seller submits an ask and there are higher bids in the table, trade occurs at the price of the highest bid. In principle, it is the same as if the seller had directly accepted the highest bid in the table.

When the market closes, each seller receives feedback about his payoff and all trades from that round.

**Control questions**

Please answer the following questions:

1. You are a buyer. Your valuation for the good is 50 points. You submit a bid of 40 points and a seller accepts this bid. What are your earnings (in points)?

2. You are a seller. Your production costs for the good are 20 points. You submit an ask of 25 points and a buyer accepts this ask. What are your earnings (in points)?

3. You are a buyer. Your valuation for the good is 40 points. Is it possible to submit a bid of 60 points? Yes/No

**What comes next**

- If you click on the next button, you will enter a waiting screen. Please be patient and wait until everyone finished reading the instructions and answering the questions. You will have to wait for 10 minutes at maximum.

- Afterwards, you will learn your role: Seller or buyer.

- There will be two test trading rounds to make you familiar with the screen and the rules. The earnings from the test rounds do not count for payment.

- After the two test rounds, there will be 10 trading rounds.
- Remember: **One** out of the 10 trading rounds will be randomly chosen at the end of part 3 to count for payment. The chosen round determines the money that will be added to your participation reward of $3.00. One point equals $0.20. You will learn which round was chosen and the money you earned after finishing part 3.
- Due to technical problems or other reasons it can happen that participants drop out of the study. To carry on with the game, automated players will take the open spots. Such a "bot" will always offer the good at a price equal to his production costs as a seller and bid a price equal to his valuation as a buyer. Bots will be indicated as such. (Therefore, all other players are real human players.)

## 9.2 Instructions Lottery

**Welcome and thank you for your participation!**

This is a study on decision-making. Please read the following instructions carefully.
The study consists of 3 parts:

- Part 1: A task + a game
- Part 2: A decision scenario
- Part 3: A short questionnaire

We will explain each part of the study before the respective part will start.

You will receive a fixed participation reward of $3.00 at the end of part 3. In part 1, you can additionally earn points which will be converted to real money.

One point equals $0.20.

The money you will earn in part 1 will be added to the fixed participation reward of $3.00. In parts 2 and 3, no additional money can be earned. You have to finish all 3 parts of the study to receive payment. You will receive your personal code that allows you to receive your payment through MTurk at the end of the study.

### General rules

This part consists of two sections. First, we will ask you to spend 10 minutes on a **transcription task**. Second, you will play a **lottery game** in which you can earn points. For the lottery, you will be randomly assigned to a group of 9 participants. The other participants are real people (MTurkers). Within this group, each participant plays 10 rounds of the lottery game, which we will explain to you later. One of these rounds will be randomly chosen at the end of the study to count for your payment.

### How does the transcription task work?

You will see some text passages and we ask you to transcribe (copy) these passages into an input field. Try to be exact and make sure to get all characters and spaces correctly. Note that copy-paste is not possible. Your earnings do not depend on your performance. However, we ask you to transcribe as many words as possible within the 10 minutes. After the transcription task, you are assigned to a group of 9 participants and the lottery will start.

### How does the lottery work?

At the beginning of each round, each participant has to choose a number that can be 20, 30, 40, 50, 60, 70, 80, 90 or 100 and enter this number in an input field on the screen.

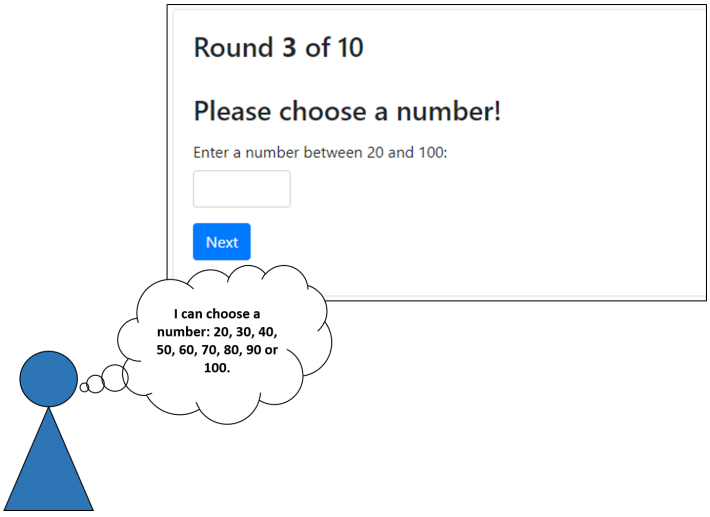


Figure 7: Lottery Screen

Then, the computer randomly assigns a number that can be 20, 30, 40, 50, 60, 70, 80, 90 or 100 to each participant. Among the 9 participants of a group, each number is assigned only once within a period, i.e. one participant is assigned number 20, another participant is assigned number 30, yet another participant is assigned number 40 and so on.

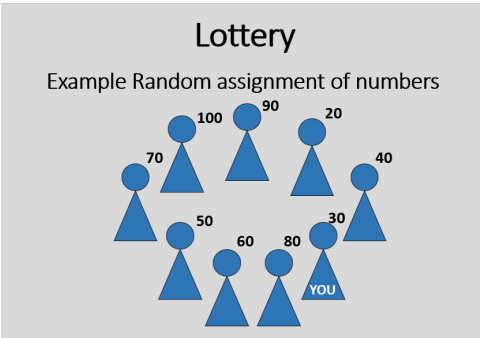


Figure 8: Lottery Group

### What can a participant earn?

Case 1: Number chosen = number assigned by computer

If the number a participant chooses coincides with the number that was ran-

domly assigned to him, this participant earns 50 points.

Case 2: Number chosen $\neq$ number assigned by computer

If the number a participant chooses does not coincide with the number that was randomly assigned to him, this participant earns:

- 0 points with probability 50%
- 10 points with probability 12.5%
- 20 points with probability 12.5%
- 30 points with probability 12.5% or
- 40 points with probability 12.5%.

Note: The earnings of one participant are independent of all other participants' earnings.

**Example 1**

If a participant chooses number 20 and is then assigned number 80, he receives:

- 0 points with probability 50%
- 10 points with probability 12.5%
- 20 points with probability 12.5%
- 30 points with probability 12.5% or
- 40 points with probability 12.5%.

**Example 2**

If a participant chooses number 70 and is then assigned number 70, he receives 50 points.

**Control questions**

Please answer the following questions to make sure you understood the rules of the game correctly.

1. You choose number 60. The computer randomly assigns number 40 to you. Your earnings are then 50 points. Yes/No

2. You choose number 20. The computer randomly assigns number 20 to you. What are your earnings (in points)?

3. If you are assigned number 80, can another participant be assigned number 80? Yes/No

**What comes next**

- If you click on the next button, you will directly continue with the transcription task.

- Once you finished the transcription task, you will proceed with the lottery: There will be two test rounds of the lottery to make you familiar with the screen and the rules. The earnings from the test rounds do not count for payment.

- After the test rounds, there will be 10 rounds of the lottery.

- Remember: **One** out of the 10 rounds will be randomly chosen at the end of part 3 to count for payment. The chosen round determines the money that will be added to your participation reward of $3.00. One point equals $0.20. You will learn which round was chosen and the money you earned after finishing part 3.

## 9.3 Questionnaire

1. Moral Dilemma Questions

   (a) Please, explain based on what you made your decision in the boxcar situation. *Text field*

   (b) Please remember the boxcar situation: How many persons would be killed if you stayed passive? *Text field, only numbers possible.*

   (c) Please remember the boxcar situation: How many persons would be killed if you actively intervened? *Text field, only numbers possible.*

   (d) I seriously thought about my decision. *7-point scale from strongly disagree to strongly agree*

   (e) I am satisfied with my decision. *7-point scale from strongly disagree to strongly agree*

   (f) Which of the actions is the morally right one? *Stay passive, actively intervene, neither, both (in random order)*

   (g) In your opinion, how did you perform in the game before? *Very poorly, poorly, fairly, well, very well*

   (h) How was your mood during the study? *5-point scale from very bad to very good*

2. Experiences in/with markets

   (a) Do you negotiate prices of products you want to buy? *Never, rarely, sometimes, often, always*

   (b) Do you use online shopping platforms like e.g. Ebay (as buyer or seller)? *Never, rarely, sometimes, often, always*

   (c) Do you trade in the stock exchange market? *Never, rarely, sometimes, often, always*

3. Fair Market Ideology (FMI) Scale

   Please evaluate the following statements on the 11-point scale ranging from -5 ("Completely disagree") to +5 ("Completely agree"):

   (a) The free market system is a fair system.

   (b) Common or "normal" business practices must be fair, or they would not survive.

   (c) In many markets, there is no such thing as a true "fair" market price.

   (d) Ethical businesses are not as profitable as unethical businesses.

   (e) The most fair economic system is a market system in which everyone is allowed to independently pursue their own economic interests.

   (f) Acting in response to market forces is not always a fair way to conduct business.

   (g) The free market system is an efficient system.

   (h) The free market system has nothing to do with fairness.

   (i) Acting in response to market forces is an ethical way to conduct business.

   (j) In free market systems, people tend to get the outcomes that they deserve.

   (k) The fairest outcomes result from transactions in which the buyers pay the "fair" market price.

   (l) Profitable businesses tend to be more morally responsible than unprofitable businesses.

   (m) Regulated trade is fair trade.

   (n) Economic markets do not fairly reward people.

   (o) Whatever price a buyer and seller agree to trade at is a fair price.

   Please evaluate the following statements on the 11-point scale ranging from -5 ("Completely unfair") to +5 ("Completely fair"):

(a) When a company raises the prices that it charges its customers for its goods, because management has obtained market research which suggests that its customers are willing to pay more, it is...

(b) When a professional athlete receives a raise because a raise has been received by another league player of comparable ability, but none the other team members receive comparable raises, it is...

(c) The fact that scarce goods tend to cost more in a free market system is...

(d) When a company downsizes in order to reduce its costs to be more competitive with rival companies, it is...

(e) When concessions at airports and concerts charge higher prices for beverages because they know that their customers have no alternatives, it is...

(f) The fact that wealthier people live in bigger homes and better neighborhoods than poorer people who cannot afford to pay the same prices is...

(g) When a company lays off higher-cost employees in the U.S. and replaces them with lower wage workers in a foreign country in order to make higher profits, it is...

(h) The fact that housing prices in Palo Alto, California are four to six times those for comparable houses in Chicago is...

(i) The fact that more educated employees tend to earn higher wages than less-educated employees is...

(j) The fact that some working families can afford to hire more household help than others is...

4. Risk Aversion

How do you see yourself: are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please tick a box on the scale, where the value 0 means: "not at all willing to take risks" and the value 10 means: "very willing to take risks".

5. Trust

   Generally speaking would you say that most people can be trusted or that you need to be very careful in dealing with people? Please tick a box on the scale, where the value 0 means: "You can't be too careful" and the value 10 means: "Most people can be trusted".

6. Sociodemographic variables

   (a) Please tell us with which gender you identify yourself. *Male, Female, Other (with text field)*

   (b) Please tell us your age. *Text field, only numbers*

   (c) What is your native language? *English, Other (with text field)*

   (d) What is your nationality? *US American, Other (with text field)*

   (e) Would you please give your best guess on your annual income of the previous year? Please indicate the answer that includes your entire household income before taxes. *12 Categories in steps of 10,000: Less than $10,000; $10,000 to $19,999;...; $100,000 to $149,999; $150,000 or more*

   (f) What is your highest level of education you completed? *Less than High School, High School/GED, Some College (no degree), Bachelor's Degree, Master's Degree, Advanced Graduate work or Ph.D., Other (with text field)*

   (g) What is current employment status? *Employed for wages, Self-employed, out of work and looking for work, out of work but not currently looking for work, a homemaker, a student, military, retired, unable to work, Other (with text field)*

   (h) What religion do you associate yourself with? *Christian, Jewish, Muslim, Hindu, Buddhist, Atheist, Other (please specify) Text field*

   (i) How often do you attend religious services? (Answers may be approximate.) *Never, Once a year, Once a month, Once a week, Multiple times a week*

(j) Are you familiar with any version of the so-called "Moral Trolley Problem" or "Trolley Problem"? *Yes, No*

(k) If you wish you can leave us a comment. *Text field*

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