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DISCUSSION PAPER SERIES

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# ABSTRACT

## Do Contract Remedies Affect Efficient Renegotiation? An Experiment

Rational parties enter into a contract if the agreement is mutually beneficial. However, after the contract is formed, changes to the costs and/or benefits of performance may render the original contract undesirable. In this paper, we carry out an incentivized experiment to study the effect of alternative remedies on the parties' ability to renegotiate their contractual obligations. After entering into a contract, experimental subjects observe symmetrical changes to the original costs and/or benefits, which create a misalignment of their performance vs. breach incentives. Renegotiation of the original contract would allow parties to realign their interests and to capture some additional surplus. Our experimental design compares the effects of damage and specific performance remedies on the parties' ability to renegotiate. Our results confirm Coase' (1960) irrelevance of remedies proposition, providing novel insights for the choice of contract remedies in the face of possible market shocks.

**JEL Classification:** K12, K41, C90, D86, D91

**Keywords:** efficient breach, contract remedies, specific performance, damages

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## 1. Introduction

Whether one legal remedy is more efficient than another in fostering an efficient contract breach is ultimately an empirical issue. This paper investigates the micro-determinants of renegotiation under alternative legal remedies for breaches of contracts. Specifically, we aim to determine whether the choice of legal remedy—specific performance or damages—affects contracting parties' willingness and ability to renegotiate in the wake of an exogenous market shock to prevent an inefficient breach or an inefficient performance of a contract.

We consider two symmetrical contractual scenarios involving a sale contract. In the first scenario, the contract is subject to a damages remedy. The promisor (seller) has the right to breach, and the promisee (buyer) would need to negotiate to prevent the breach and receive the good or service that was promised. In the second scenario, the contract is subject to specific performance. The promisee (buyer) has a right to enforce performance and the promisor (seller) would need to negotiate to avoid performance and permissively breach. In each scenario, the contracting parties face financially symmetrical changes to the costs and/or benefits of the original contract after that contract has been formed. This creates a misalignment of their incentives for performance vs breach. Under each scenario, parties could benefit from the renegotiation of their agreement. With these scenarios in mind, our incentivized experiment assesses whether legal remedies affect contracting parties' willingness and ability to renegotiate to avoid an inefficient breach or an inefficient performance in the face of an exogenous market shock.

Our experiment aims to identify the determinants of contract renegotiation in the face of breach opportunities against the theoretical backdrop of Coase's (1960) irrelevance of remedies proposition. We structure our analysis as follows. In Section 1.1, we introduce our research question, providing a brief survey of the legal instruments available to enforce contractual promises. In Section 1.2, we identify how our contribution relates to the existing literature. In Section 2, we present our experiment, which is structured in two parts. In Part 1, we utilize a modified "Contract-Breach Game" à la Bigoni et al. (2017) to elicit micro-level behaviour and to enable causal identification of the effects of contract remedies—these effects would otherwise be difficult to observe or estimate with survey/observational data at the market level. The experiment tests how different breach remedies affect parties' (1) willingness to renegotiate a contract, (2) ability to bring renegotiation to a successful completion, and (3) approach to splitting the renegotiation surplus. In Part 2 of the experiment, we utilize a Dictator

Game to elicit other-regarding preferences. In Section 3, we discuss our results. Our results provide strong support for Coase's (1960) irrelevance proposition, showing that the choice of remedy has no effect on contracting parties' reactions to market shocks and their willingness and ability to carry out optimal renegotiation. We further conduct an heterogenity analysis to verify the relevance of other-regarding preferences in breach renegotiations. In Section 4, we conclude by discussing the implications of our results for the design of legal frameworks that support optimal contract execution and renegotiation.

### 1.1 Research Question

When parties enter into a contract they expect their conterparts to do as they promised. Yet, contractual promises are not always fulfilled. What should be the legal remedy for a breach of the agreement? One point is clear in all contemporary legal systems: the disappointed promisee (breachee) should not take the law into her own hands and force the breaching promisor (breachor) to fulfill his promise. The breachee must instead seek relief by bringing her claims in court. Apart from this common foundation, modern legal systems vary in the types of solutions that they offer when a contractual promise is breached.

Broadly speaking, the promissee's rights can be protected by either a "strong" remedy (where the promisee can force the breaching promisor to fulfill the contractual obligation) or by a "weak" remedy (where the promisor can unilaterally avoid performance by paying damages to his promisee). In the legal terminology, strong remedies are called "specific performance" remedies, whereas weak remedies fall under the general category of "damages." Law and econonomics scholars (Posner, 1977, Cooter and Ulen, 1997, Edlin, 1998) describe the main characteristics of these two categories of remedies as follows:

1. Specific Performance: In the event of a breach, the breachee can force the breachor to fulfill the contractual obligation and carry out the performance as stated in the contract, *unless* both parties reach an agreement to resolve the contract with the payment of a mutually agreed upon sum. Under Specific Performance, the promisor can avoid the performance of the original contract *only with* the consent of the promisee and renegotiation of the original contract. By using Calabresi and Melamed's (1972) terminology, this form of relief corresponds to a "property rule."
2. Damages: A promisor is entitled to breach the contract without the consent of his promisee. In the event of a breach, the breachor must pay an amount of damages to his

breachee. Damages may be agreed upon by the parties at the time of the contract (liquidated damages) or liquidated by the court to compensate the promisee for the foregone performance benefit (compensatory damages). Under a damages remedy, a promisee who wants to obtain the promised contractual performance, rather than damages, would have to renegotiate the contract to reverse the promisor's decision to breach. Using Calabresi and Melamed's (1972) terminology, this "weak" remedy corresponds to a "liability rule."

Contemporary legal systems diverge greatly in their use of contract remedies. In the interest of simplicity, we will provide a stylized mapping of the three main legal approaches, classifying them as (i) strong-remedy systems; (ii) mixed-remedy systems; and (iii) weak-remedy systems.

(i) *Strong-Remedy Systems.* At one end of the spectrum, German law (and other German-based legal systems) adopts strong remedies across nearly the entire range of contractual obligations. Under German law, the legal dogma asserts that a contract grants the promisee a right to obtain performance, not a right to obtain damages in lieu of performance. Section 241 of the German Civil Code (BGB) makes this point clear by stating that a contract gives the creditor a "right to demand performance from the debtor." With a few exceptions, German courts apply this provision, granting specific performance relief for the enforcement of contractual obligations (Treitel, 1988; Zweigert & Kotz, 1998, p. 472-3).

(ii) *Mixed-Remedy Systems.* French law (and other French-based legal systems) follows a mixed approach that entails a dual application of strong and weak remedies. The guiding principle "*nemo ad facere compelle potest*" ("nobody can be forced to do [something]") serves as the aspirational criterion in the application of contract remedies. Article 1184, par. 2 of the French Civil Code allows the breachee to obtain specific relief, "when the original performance is still possible" (hence excluding its use in case of impossibility), but Article 1142 restricts the adoption of specific performance remedies when their use would infringe upon the individual freedom or autonomy of the promisor (Zweigert & Kotz, 1998, p. 475-9). In applying these principles, French-based civil law jurisdictions have come to distinguish between "obligations to give" (e.g., delivery of an existing good or transfer of title to land) and "obligations to do" (e.g., production of a not-yet-existing good or performance of

a service), granting specific performance for the enforcement of obligations to give, and damages for the obligations to do (Treitel, 1988).[1]

(iii) *Weak-Remedy Systems.* The Anglo-American common law system stands at the other end of the spectrum, utilizing damages as the default remedy for breach of contractual obligations, with some equitable exceptions (Farnsworth, 1970; Hillman, 2019).[2] It should be noted, at this point, that U.S. courts quantify damages (the money compensation to be paid in case of breach) in a variety of ways. The most common measure is that of *expectation damages*—an amount of money equivalent to the value that the injured promisee was expecting to receive from the contract. Another measure of damages for breach of contract is *reliance damages*—an amount of money that restores the injured promisee's level of well-being before entering the contract. This measure is generally lower than expectation damages because the injured promisee does not recover the value she was expecting to gain from the contract—instead, reliance damages merely seek to make the promisee "whole."[3] A third measure of damages for breach of contract is *liquidated damages*—the amount of damages that the parties agreed upon at the time of the contract.[4]

Given the variety of breach remedies employed by modern legal systems, one might question whether a specific legal remedy governing a contract genuinely influences the conduct of contracting parties. Our experimental study wishes to investigate this question. We look at the effects of damages vs. specific performance on how situations arising after contract formation are resolved. Specifically, we investigate whether, in the wake of a market shock, a legal system's remedy for unkept promises affects the contracting parties' willingness and ability to renegotiate a contract to allow a breach to occur (when a specific performance remedy is used) or to obtain an efficient performance (when a damages remedy is used). Understanding

[1] The 1980 Vienna Convention on Contracts for the International Sale of Goods, the 2016 Unidroit Principles for International Commercial Contracts, and the 2020 Principles of European Contract Law adopt solutions reflecting the dual French approach (Zweigert & Kotz, 1998, p. 484-5; Lando and Beale, 2000). In 1970, a legislative reform also brought Israeli law closer to its European counterparts. Prior to 1970, Israel followed the common law rule, utilizing damages as the standard remedy for breach of contract (specific performance was an equitable remedy used exceptionally for the sale of real property and unique goods). In 1970, the enactment of the Contracts (Remedies for Breach of Contract) Law changed Israeli law to adopt the civil law rule, granting specific performance relief for breach of contracts, subject to certain exceptions (Anidjar et al., 2020).

[2] Legal historians have traced the peculiar trajectories involved in the evolution of contract remedies. In the early common law, contract enforcement relied almost exclusively on specific performance but later progressed to an almost exclusive reliance on damages (Durfee, 1935 and Dawson, 1959). Civil law systems evolved in the opposite direction—from an almost exclusive reliance on money damages under classical Roman law to the inclusion of specific performance remedies in modern codifications (Dawson, 1959, Zweigert & Kotz, 1998).

[3] This measure of damages generally includes restitution of the price (if any price had been paid already), plus any additional contract-specific expenditures that the promisee made in reliance of the contractual promise.

[4] For a good—and pleasantly readable—introduction to U.S. contract law, see Hillman (2019). Chapter 5 provides a comprehensive treatment of damages remedies.

how parties react to alternative legal remedies presents a critical factor for consideration in contract design.

The theoretical backdrop of our experiment is Coase's (1960) theorem—having served as a starting point for several important contributions to the law and economics of remedies, the Coase theorem provides the natural foundation for our rational choice hypothesis. When applied to breach of contract situations, the Coase theorem basically states that, in the absence of transaction costs, the choice of legal remedies is irrelevant to overall welfare. If an exogenous shock changes the parties' respective costs and benefits under the original agreement, parties will bargain and reach an efficient agreement—with a resulting breach or performance of the contract—regardless of the legal remedy being used. In our incentivized experiment, we will test Coase's irrelevance proposition.

Our interest in testing the irrelevance proposition stems from observations that behavioral factors such as inequity aversion (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Charness and Rabin, 2002) and endowment effects (Kahneman et al., 1991) run against Coase's irrelevance proposition (see section 5.1.3 in Medema, 2020, for an extended discussion). The endowment effect diminishes with weaker remedies, such as damages, since buyers are aware that the promisor can avoid performance by paying compensation. As a result, buyers become less attached to the good under a damage remedy due to the increased uncertainty of obtaining actual performance. In turn, this uncertainty can trigger loss aversion, a concept from prospect theory, which posits that losses loom larger than gains, leading actors to value goods more when considering their loss compared to their acquisition.

According to these behavioral intuitions, even when transaction costs do not pose an impediment to parties' renegotiation, legal remedies may affect the contracting parties' willingness and ability to renegotiate a contract in the face of exogenous shocks. These questions have thus far been left open by the extant empirical and experimental literature. Our experiment investigates whether the choice of alternative legal remedies affects contracting parties' renegotiation and division of the renegotiation surplus.

## 1.2 Literature Review

Breach remedies play a crucial role in contract law, especially in situations where writing complete contracts is not feasible due, for example, to information asymmetry and uncertainty about possible changes in the contractual circumstances (Rogerson 1992). Among other purposes, legal remedies to breach of contract serve to protect parties that make contract-

specific investments, to mitigate hold-up problems, and to foster efficient renegotiation of contractual terms (see, Williamson, 1985; Rogerson, 1992; Nöldeke and Schmidt, 1995; Coase 2006).

On the choice of remedies for breach of contract, legal scholars have taken quite diverse positions. As recently pointed out by Parisi et al. (2024), both the consequentialist (economic) and the deontological (moralist) viewpoints consider the failure to perform on a promise excusable in at least some subset of cases, but their perspectives do not always converge on when contract breaches should be permitted with the payment of damages and when specific performance remedies should instead be made available to the non-breaching promisee (Birmingham, 1969; Barton, 1972; Warkol, 1998). At one end of the spectrum, the standard economic analysis contends that if the promisor gains more than the promisee loses from a breach, then allowing non-performance with payment of damages (i.e., giving parties a right to breach) is socially desirable—allowing a breach would increase joint welfare compared to performance (Posner, 1999 and 2009; Shavell, 2006 and 2009). At the other end of the spectrum, deontological philosophers of contract law consider the moral duty to keep one's promises to constitute a foundational principle of contracts, which should not be brushed aside based on cost-benefit analyses (Sidhu, 2006; Mather, 1999; Fried, 1981; Shiffrin, 2009). Some law and economics scholars have similarly argued in favor of specific performance remedies observing, among other concerns, that judicial liquidation of damages may be socially costly (Kronman, 1978; Schwartz, 1979; Depoorter and Tontrup, 2012).[5] As shown by Baron and Wilkinson-Ryan (2009) and Bigoni et al. (2017), the layperson's views about the excusableness of non-performance are surprisingly nuanced, embracing the consequentialist (economic) reasoning in some cases and the deontological (moralist) view in other cases.[6]

In an earlier experimental study, Depoorter and Tontrup (2012) took a first step toward investigating the effect of specific performance remedies, comparing promisees' breach decisions in the presence of a specific performance remedy and in the absence of any default

[5] Scholars in contract law and economics argued that a damages remedy is an efficient default remedy for contract breach, since it induces breach only if the cost of performance for the promisor outweighs the value of performance for the promisee (Birmingham, 1969; Barton, 1972). Some other scholars argued in favour of specific performance as the most efficient default remedy, since it embraces the moral obligation that promises should be kept (Depoorter and Tontrup, 2012), and because damages may impose unnecessary costs (Kronman, 1978; Schwartz, 1979). However, no evidence has been presented to see how the views of ordinary contracting parties aligns with these opposing claims.

[6] The survey-based studies and economic experiments conducted by Baron and Wilkinson-Ryan (2009) and Bigoni et al. (2017) have shown that ordinary people have greater tolerance for contract breaches when the promisor seeks to avoid unanticipated losses (i.e., loss-avoiding breaches) but are less willing to excuse performance when the promisor breaches to pursue a profit (i.e., gain-seeking breaches).

breach remedy. Their findings show that participants were more willing to obstruct an efficient breach under specific performance. Depoorter and Tontrup's experimental setting did not allow parties to renegotiate and only considered breach opportunities driven by more lucrative outside offers. Bigoni et al. (2017) extended the inquiry, allowing parties to renegotiate, to study whether the promisor's motive for the breach—avoidance of a loss vs pursuit of more lucrative offers—affects the parties' willingness and ability to renegote. In that experiment, parties always carried out renegotiation under a default specific performance remedy.

Our experiment differs from these earlier contributions because we allow the default contract remedy to vary in order to analyze whether individuals' incentives to breach or to renegotiate differ when the default legal remedy varies. The experiment attempts to replicate situations where changes in the original conditions (at the time of contract formation) lead parties to reconsider their original contractual commitment. Such changes to conditions include changes in the original costs and the rise of new opportunities, which may alter the opportunity cost of the parties' original contractual engagement. We refer to these latter factors as the "outside options" faced by the contracting parties. Our analysis delivers novel findings regarding parties' renegotiation behavior in the shadow of alternative legal remedies. The results will provide valuable information to transactional lawyers in designing optimal contracts and to lawmakers and judges entrusted with making policy choices over which breach remedies to apply in the face of exogenous market shocks.

## 2. Experimental Design.

The experiment comprises of two parts. In Part 1, we consider a modified version of the "Contract-Breach Game" introduced by Bigoni et al. (2017), where a market shock *may* occur after the contracting parties agreed to sign a binding contract. After learning about the occurrence of a shock, parties can renegotiate the contractual terms. The key, novel aspect of our design is to allow the comparison of renegotiation outcomes under two *breach remedies*: a damages remedy (*Damages* treatment) and a specific performance remedy (*Specific Performance* treatment). This modified "Contract-Breach Game" à la Bigoni et al. (2017) allows us to study how frequently an efficient agreement *to breach* is reached under specific performance, and how frequently an efficient agreement *to perform* the contract is reached under damages. Furthermore, this game allows us to analyze whether the compensation paid by the promisor to the promisee differs between alternative breach remedies, and between

alternative reasons to breach. In Part 2, all participants take part in a Dictator Game, to control for their inequality aversion.

**Table 1:** Overview of the stage game

| **Stage** | **Specific Performance** | **Damages** |
|---|---|---|
| **Stage 0**<br>**Initial parameters** | Cost of production for seller: $C = 40$<br>Value from transaction for buyer: $V = 60$<br>Contract price: $P = 50$ | |
| **Stage 1**<br>**Shock** | $C' = 60$<br>$V' = 60$<br>Outside option for S: $O_S = 80$ | $C' = 60$<br>$V' = 80$ |
| **Stage 2**<br>**Enter renegotiation** | ***B* can enforce performance** and the contract is performed or move to stage 4.<br><br>**Performance is inefficient.** | ***S* can breach** and the contract is **not** performed or move to stage 4.<br><br>**Breach is inefficient.** |
| **In case of no renegotiation** | The contract is performed:<br>$\pi_S^d = 50-60 = -10$<br>$\pi_B^d = 60 - 50 = 10$<br>$\pi_{total}^d = 0$ | Damages (D = 60) are paid:<br>$\pi_s^d = 50-60 = -10$<br>$\pi_B^d = 60 - 50 = 10$<br>$\pi_{total}^d = 0$ |
| **Stage 3**<br>**Renegotiation phase** | S and B renegotiate to allow a breach (buyer is compensated with a transfer $t$)<br>$\pi_S^r = 80 - 60 - t \in [-10, 10]$<br>$\pi_B^r = t \in [10, 30]$<br>$\pi_{total}^r = 20$<br><br>$10 \leq t \leq 30$ | S and B renegotiate to fulfil the contract at a new price $P' > P$<br>$\pi_S^r = P' - 60 \in [-10, 10]$<br>$\pi_B^r = 80 - P' \in [10, 30]$<br>$\pi_{total}^r = 20$<br><br>$50 \leq P' \leq 70$ |

**Contract-Breach Game.** In Part 1, participants are randomly assigned the role of buyer (*B*) or seller (*S*) and are matched in pairs. Production costs (*C*) are initially set to 40 and the value of the good (*V*) for the buyer is set to 60, yielding a total surplus ($\pi_{Total}$) of 20. Unlike in Bigoni et al. (2017), the parties need to agree to perform a contract in which the price, *P*, is initially exogenously set to 50. After the contract is signed, a shock may occur and modify the initial parameters (i.e., production costs and the parties' outside options can change). When shocks occur, forcing specific performance (in the Specific Performance treatment) or allowing the breach of the contract (in the Damages treatment) would yield an aggregate loss. In both cases a contract renegotiation would be efficient. In the following, we describe all the stages of the game in detail (see Table 1 for an overview).

Once randomly matched in pairs, buyers and sellers go through the following steps.

**Stage 0**: The buyer and the seller are informed about the production costs and the benefits from the transaction.

**Stage 1**: An exogenous shock may happen with probability 60% and lead to an increase in production costs, $C' = 60$, in both treatments. At the same time, in the Specific Performance treatment, the seller has an opportunity to sell the good to a different buyer for a price of 80, while in the Damages treatment, the value of the good for the buyer increases to 80.

**Stage 2**: The parties must decide whether to renegotiate the contract. Given the increased production costs, the seller has an interest in breaching the contract. Renegotiation starts if both parties decide to enter the renegotiation stage.

- With a Specific Performance remedy, the buyer can force the performance of the contract, and the seller cannot unilaterally choose to breach. If the seller chooses to perform his existing obligation, this period is over. By performing, the seller suffers a loss, while the earnings of the buyer remain unchanged compared to stage 0. The total surplus is equal to zero. Alternatively, the seller can seek cancellation of the contract by offering compensation *t* to the buyer.
- With a Damages remedy, the seller can unilaterally choose to breach, paying damages ($D = V$). If the contract is breached, this period is over. By breaching and paying damages, the seller suffers a loss, while earnings for the buyer remain unchanged compared to stage 0. The total surplus is equal to zero. Alternatively, the parties can renegotiate the contract and agree to perform for a new price *P'*.

**Stage 3:** If the parties decide to renegotiate, they have 60 seconds to reach an agreement on the compensation *t* payable to the buyer (Specific Performance treatment) or the new price *P'* (Damages treatment). Specifically, under each of the two remedies, renegotiation takes place as follows.

- Under Specific Performance, the seller can offer any positive integer *t* between 10 and 30 to compensate the buyer for the cancellation of the contract. The buyer can either accept the offer or demand a higher amount *t* (always between 10 and 30), and the seller can accept or reject his demand. Offers and demands can be adjusted at any time, during the 60-second renegotiation stage. If an offer or demand is agreed upon, the original contract

is resolved, and the parties' payoffs are determined according to the agreed terms. If no agreement is reached by the end of the renegotiation stage, the original contract is enforced through specific performance.

- Under Damages, the buyer can offer any price *P'* between 50 and 70 to convince the seller to carry out the performance instead of breaching the contract. The seller can either accept the offer or propose a higher (between 50 and 70) price. Offers and proposals can be revised at any time, during the 60-second renegotiation stage. If an offer or proposal is accepted, the contract is resolved, and the parties' payoffs are determined according to the agreed terms. If no agreement is reached by the end of the renegotiation stage, the contract is breached, and the seller will pay damages, compensating the buyer for the expected value of the performance, $D = V$.

In our experiment, the game was repeated for 25 periods and roles were fixed throughout the experiment. At the beginning of each period, buyers and sellers were paired randomly, within matching groups of 6 participants (3 buyers and 3 sellers). Their identities remained anonymous throughout the experiment to avoid any reputational effect, while preserving the one-shot nature of the Contract-Breach Game. At the end of each round, the parties were informed about the outcome of the renegotiation phase, their own earnings, and the earnings of their counterpart. Subjects could always see their cumulative earnings (including their initial endowment) on the screen. Shocks occurred with 60% probability and the random draw was performed at the matching-group level. We predetermined the sequence of shocks over the 25 periods for six sessions, and each predetermined sequence was used once for the Damages treatment and once for the specific performance treatment. This generated a balanced sequence of shocks across the two treatments.

After the Contract-Breach Game, subjects were asked to play a dictator game in which they had to split 20 tokens between themselves and another, anonymous player, to control for their inequality aversion, and then to answer survey questions on individual characteristics (gender, education level, field of study, etc.). The instructions for both treatments and the Dictator Game are provided in the Appendix together with the final questionnaire.

***Procedures.*** A total of 288 subjects, equally divided across treatments, participated in the experiment. Subjects were recruited via ORSEE (Greiner, 2015), and all 12 sessions were run in English at the BLESS lab. The experiment was programmed and conducted using the z-Tree software (Fischbacher, 2007). Each session lasted about 90 minutes, and the average payment

was 12.9 euros. The study was approved by the ethical committee of the University of Bologna (Protocol N. 0156345) and was pre-registered (AEARCTR-0013798).

***Outcomes of interest and testable hypotheses.*** In our set-up, parties have perfect information on each other's payoff functions, there are no transaction costs, and contract remedies are enforced instantly and without cost. Within this framework, the Coase theorem predicts that the parties will always reach a surplus-maximizing agreement, regardless of the remedies in place. Since the payoffs parties obtain when bargaining fails are also identical across treatments, we expect the difference between remedies to have no impact on how the surplus is distributed between them. However, different models offer varying predictions on how the parties will resolve the bargaining problem. According to the Nash bargaining solution (Nash, 1950) the parties should agree on an outcome that yields zero surplus to the seller (i.e. $\pi_S^r = 0$ and $\pi_B^r = 20$),[7] since this is the solution that maximizes the product of their excess utilities, given by:

$$(\pi_S^r - \pi_S^d)(\pi_B^r - \pi_B^d)$$

An alternative theoretical benchmark is provided by the egalitarian bargaining solution proposed by Kalai (1977), according to which $\pi_S^r = \pi_B^r = 10$. Yet, aspects such as the endowment effect and loss aversion might affect the bargaining outcome and lead to differences across treatments.

In light of these considerations, we focus on three main outcomes of interest, and three main null hypotheses.

- **Renegotiation entry:** Percentage of contracting parties that enter the renegotiation phase after a shock—these are cases where renegotiating the contract would always be efficient.
  *HP1: Different remedies do not affect the parties' ability to enter an efficient contract renegotiation.*
- **Renegotiation success:** Percentage of contracting parties that successfully reach an agreement, conditional on entering the renegotiation stage.

[7] The same prediction is also supported by an alternative solution, proposed by Kalai and Smorodinsky (1975), according to which the parties should agree on a solution that equalizes the parties' relative gains with respect to the disagreement outcome.

*HP2: Different remedies do not affect the probability that an agreement is reached, conditional on entering renegotiation.*

- **Surplus to seller:** Percentage of the renegotiation surplus captured by the seller. The variable is defined only for those contracting parties who managed to successfully renegotiate the contract after a shock.
  *HP3: For all the contracting parties who renegotiated the contract, the division of the aggregate surplus is not affected by the choice of remedy.*

## 3. Empirical approach

We test each of our three main hypotheses by means of a two-prong approach. The first approach is more conservative and is based on non-parametric two-tailed Wilcoxon Mann-Whitney tests, which test the difference of the distribution of the outcomes of interest between treatments. The unit of observation in this case is the average outcome per matching group, across all rounds, yielding 48 total observations. This allows us to detect an effect of 0.85 of a s.d. with $\alpha = 0.05$ and $(1 - \beta) = 0.8$. Based on the data collected by Bigoni et al. (2017), this corresponds to a difference of 3 percentage points in the percentage of contracting parties who enter renegotiation when an exogenous shock takes place (*HP1*), a difference of 5 percentage points in the rate of success of renegotiation (*HP2*), and a difference of 0.9 units (out of 20) in the surplus allocated to the Seller in the renegotiation stage, when renegotiation is successful.[8]

The second approach relies on the panel structure of our dataset and allows us to control for learning dynamics across periods. For each of the three outcomes mentioned in Section 2, we ran a linear regression based on the following equations:

$$Y_{i,t} = \beta_0 + \beta_1 D_i + \beta_2 t + \eta_i + \epsilon_{i,t} \quad (1)$$

$$Y_{i,t} = \beta_0 + \beta_1 D_i + \beta_2 t + \beta_3 D_i t + \eta_i + \epsilon_{i,t} \quad (2)$$

where $Y_{i,t}$ is the outcome of interest, in matching group $i$ and period $t$, $D_i$ is a dummy variable taking value 1 if matching group is assigned to the *Damages* treatment and 0 if it is assigned to the *Specific Performance* treatment, and $\eta_i$ is the matching-group specific error component. Since we only focus on the periods in which a shock takes place, with this specification we will have an unbalanced panel of 48 individuals and approximately 15 periods. Based on the simulations obtained via the Stata pc_simulate package (Burlig et al., 2020), we detected a

[8] The power calculation was performed using G*Power3 (Faul et al., 2007; 2009).

variation of 4 percentage points in the share of contracting parties who enter renegotiation when an exogenous shock takes place (*HP1*), a difference of 6 percentage points in the rate of success of renegotiation (*HP2*), and a difference of 0.9 units (out of 20) in the surplus allocated to the Seller in the renegotiation stage, when renegotiation is successful, with $\alpha = 0.05$ and $(1 - \beta) = 0.8$.

**Heterogeneity.** Other-regarding preferences have been shown to play an important role in barganing. For instance, in the context of the Contract-Breach Game, Bigoni et al. (2017) showed that inequality-averse subjects accept low offers more often in cases of loss-avoiding breaches than gain-seeking breaches. In light of this evidence, we conducted an heterogenity analysis leveraging data from the Dictator Game played in Part 2 of the experiment.

We classify subjects into 'inequality-tolerant' and 'inequality-averse' based on a median split of the allocation choice in the Dictator Game. For each matching group, we construct the dummy variable *Altruistic Buyers* $(B_i)$, taking value 1 if the majority of the buyers in the group are inequality-averse. Similarly, for each matching group, we will construct the dummy variable *Altruistic Group* $(G_i)$ taking value 1 if the majority of the buyers and sellers in the group are inequality-averse. We ran a linear regression based on the following equation:

$$Y_{i,t} = \beta_0 + \beta_1 D_i + \beta_2 B_i + \beta_3 D_i B_i + \beta_4 t + \eta_i + \epsilon_{i,t} \quad (3)$$

where $Y_{i,t}$ is each of the three outcomes of interest described in Section 2, in matching group $i$ and period $t$, $D_i$ is a dummy variable taking value 1 if the matching group is assigned to the *Damages* treatment and 0 if it is assigned to the *Specific Performance* treatment, and $\eta_i$ is the matching-group specific error component. We repeated the same analysis in equation (3) for $G_i$.

We also looked at the periods in which there was no initial shock to check if other-regarding preferences might have played a role. In these periods, one should expect no renegotiation, but an inequality-averse buyer could be prompted to use renegotiation to reduce the unbalance between buyers' and sellers' earnings from the bargaining phase. A buyer's willingness to renegotiate in periods without shocks could create an opportunity to offer the seller a more favorable price.

## 4. Results

We have a total of 1200 observations at the matching group level, 680 (56.7%) of which involved a shock.[9] In the periods without shocks, only 16.0% of the contracting parties entered the renegotiation stage and only 27.7% of them successfully reached an agreement (i.e., in the absence of a shock, only 4.4% of the agreements were modified). When entering renegotiation without a shock, the parties confirm their willingness to enter the contract, and simply renegotiate on the selling price. As one might expect, when there are no changes to the initial conditions the total surplus is divided almost equally among the parties. The surplus to the seller in the Specific Performance treatment was 57.5% and in the Damages treatment was 45.8% which is very close to the equal split they would have obtained from the original agreement, without renegotiation.

In the remainder of the paper, we focus only on the periods in which a shock had occurred and test for treatment differences in our three main variables of interest: renegotiation entry, renegotiation success, and surplus to seller (see Table 2).[10]

### 4.1 Renegotiation results for periods with a shock

**Table 2:** Descriptive statistics

| | Renegotiation Entry | Renegotiation Success | Surplus to Sellers |
|---|---|---|---|
| Damages | 0.931 | 0.864 | 0.155 |
| *(s.d.)* | *(0.080)* | *(0.062)* | *(0.089)* |
| Specific Performance | 0.949 | 0.839 | 0.178 |
| *(s.d.)* | *(0.048)* | *(0.069)* | *(0.077)* |
| Damages vs. Specific Performance (p-val.) | 0.796 | 0.180 | 0.257 |

**Notes:** All p-values are calculated using a two-sided Mann–Whitney U test.

Overall, 94% of the contracting parties entered the renegotiation stage when a shock to the original conditions occurred (specifically, 93.1% renegotiated under a Damages remedy and 94.9% under a Specific Performance remedy).[11] We fail to find any statistically significant difference in the renegotiation entry across treatments (Mann–Whitney U test, 24 obs. each treatment, $p = 0.796$, two-sided). Models 1 and 2 in Table 3 provide evidence from

[9] The sequence and the number of shocks over the 25 periods varied across sessions and matching-groups; the minimum (maximum) number of shocks observed by a matching group was 6 (19).
[10] All the analyses presented in this section were pre-registered.
[11] Both parties in the pair need to agree to enter the renegotiation. If we look at individual-level data, out of 4080 decisions only 117 did not agree to enter the renegotiation stage.

regressions exploiting the panel nature of the data where the dependent variable is Renegotiation Entry (%). We fail to find any significant treatment difference but, as one might expect, there is some learning, with matching-groups becoming more likely to enter the renegotiation as the game progresses (see also Figure 1, panel (a)). Yet, there is no difference in this learning process across treatments. This finding is not surprising considering that parties are not forced in any way to reach an agreement that they do not consider satisfactory.

We now focus on the contracting parties who enter the renegotiation stage after a shock and consider the share of contracting parties who manage to successfully reach an agreement. Overall, 85% (86% and 84% in Damages and in Specific Performance, respectively) of renegotiating parties reached an agreement. This is quite remarkable given the short amount of time available to renegotiate and shows that our subjects were especially aware of the efficiency gains obtainable through renegotiation. We fail to find any statistically significant difference in the renegotiation enter across treatments (Mann–Whitney U test, 24 observations in each treatment, $p = 0.180$, two-sided). Models 3 and 4 in Table 3 reports results from panel regressions and confirm that the rate of successful renegotiation does not depend on the treatment. Interestingly, we do not find any strong sign of learning over time as the coefficient of the variable period is zero (as confirmed also by Figure 1, panel (b)).

**Table 3:** Regression Analysis

| | Renegotiation Entry (1) | Renegotiation Entry (2) | Renegotiation Success (3) | Renegotiation Success (4) | Surplus to Sellers (5) | Surplus to Sellers (6) |
|---|---|---|---|---|---|---|
| Damages *(d)* | -0.014 | -0.013 | 0.023 | 0.002 | -0.024 | 0.003 |
| | (0.019) | (0.026) | (0.020) | (0.037) | (0.024) | (0.029) |
| Period | 0.005*** | 0.005*** | 0.001 | -0.000 | -0.005*** | -0.004*** |
| | (0.001) | (0.001) | (0.001) | (0.002) | (0.001) | (0.001) |
| Damages *(d)* x Period | | -0.000 | | 0.002 | | -0.002* |
| | | (0.001) | | (0.002) | | (0.001) |
| Intercept | 0.879*** | 0.879*** | 0.830*** | 0.842*** | 0.244*** | 0.231*** |
| | (0.016) | (0.018) | (0.021) | (0.026) | (0.019) | (0.020) |
| R-squared | 0.069 | 0.069 | 0.003 | 0.004 | 0.069 | 0.072 |
| N. obs. | 680 | 680 | 680 | 680 | 670 | 670 |

**Notes:** GLS panel-data regression with random effect. The symbol *** indicates significance at the 1%. Dummy variables are denoted with *(d)*.

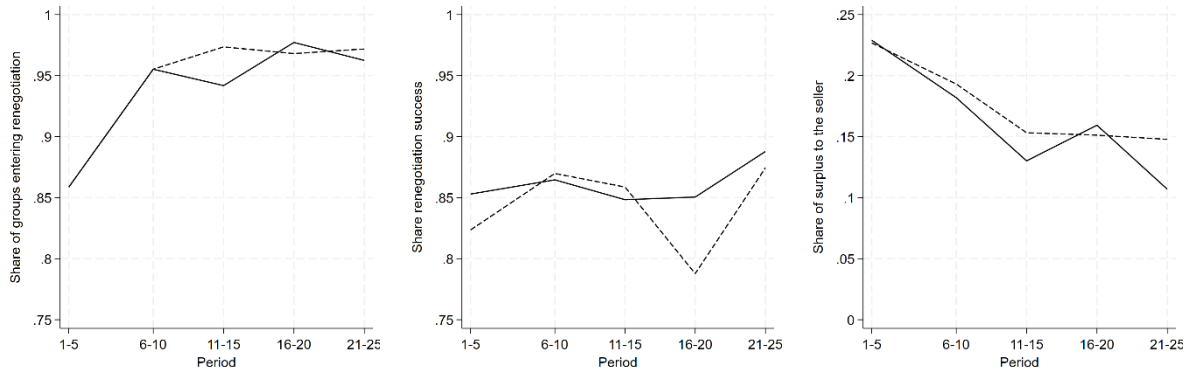
So far, we have established that in both treatments the vast majority of our experimental participants choose to renegotiate and are able to reach an agreement after a shock. We now study how the surplus is divided between buyers and sellers. In particular, we consider the share of the surplus earned by sellers who possess less bargaining power relative to buyers, as

these sellers suffer a loss when disagreement occurs. As a result of the renegotiation sellers earn only a small share of the available surplus: 15% in the Damages treatment and 18% in the Specific Performance treatment, revealing no statistically different effect of remedies on the division of the surplus (Mann–Whitney U test, 24 obs. each treatment, $p = 0.257$, two-sided). Models 5 and 6 in Table 3 report results from panel regressions and establish no clear difference across treatments when the learning process is non-negligible. Yet, it is quite puzzling to notice that the effect of the learning process slightly diverges between the two treatments (*Damages (d) x Period*) with sellers' earnings declining more steeply over time in Damages rather than in Specific Performance (see also Figure 1, panel (c)).

Our findings so far seem to support Coase's (1960) theorem, according to which, in the absence of transaction costs, the choice of legal remedies is irrelevant to overall welfare. If an exogenous shock changes the parties' respective costs and benefits under the original agreement, parties will bargain and reach an efficient agreement, regardless of the legal remedy being used. Indeed, our experimental findings fully confirm the null hypothesis that that choice of legal remedies would not affect the parties' rational renegotiation of the contract. All data converge to the predicted equilibria in a quite remarkable way. Of course, our evidence comes from a highly controlled environment where parties are able to enforce remedies costlessly (in both treatments specific performance and damages can be enforced costlessly), buyers have not made reliance investments, and the parties cannot edge against the risk of a shock.

**Figure 1:** Behavior over time

a) Renegotiation entry b) Renegotiation success c) Surplus to sellers




**Notes:** Solid lines denote the Damages treatment; dashed lines denote Specific Performance.

In the remainder of the analysis, we conduct a more in-depth examination of the influence of altruism on the observed results.

### 4.2 Results for the heterogeneity analysis

To better understand the renegotiation dynamics, we used answers to the Dictator Game played in Part 2 of the experiment. Out of 20 tokens, participants kept for themselves on average 14.5 tokens (median: 13 tokens), with roughly one third of the participants keeping everything for themselves and one third sharing equally. The average number of tokens kept was similar across both roles (i.e., buyers vs. sellers) and treatments (Damages vs. Specific Performance). Following our pre-analysis plan, we classified buyers and sellers as "inequality-averse" the if they kept for themselves a smaller or equal number of tokens relative to the median in the population. We then defined two dummy variables:

- *Altruistic Buyers* taking value 1 if the majority of the buyers in the matching group are inequality-averse
- *Altruistic Groups* taking value 1 if the majority of the buyers and sellers in the matching group are inequality-averse

Overall, 46% of the matching groups are classified as *Altruistic Buyers*, and 31% as *Altruistic Groups.*[12] We first focus on buyers, as they possess relatively stronger bargaining power and thus are more likely to shape the bargaining process. Table 4 reports descriptive statistics for our three outcome variables of interest, for two categories of matching groups. The first category includes groups with at most one inequality-averse buyer (i.e. *Selfish-Buyer* groups), the second category comprises groups with two or three inequality-averse buyers (i.e. *Altruistic-Buyer* groups). The composition of the group only marginally affects the likelihood of entering the renegotiation, which is extremely high for both types of groups, though the likelihood is slightly but significantly lower for *Altruistic-Buyer* groups under Specific Performance. Similarly, buyers' altruism does not seem to affect the probability of successful renegotiation. Interestingly, some differences arise with respect to the division of surplus. Under both remedies, Altruistic-Buyer groups tend to leave a larger share of the surplus to sellers (see last two columns of Table 4). However, the difference is small in magnitude and statistically significant only under Damages. This adds to previous evidence on the role of individual preferences on bargaining outcomes. If we compare the two treatments, we see that when buyers are selfish, they end up reaching better deals for themselves (i.e., they leave a

[12] 50% of matching groups in Damages and 41.7% of matching groups in Specific Performance are classified as *Altruistic Buyers*. 37.5% of matching groups in Damages and 25% of matching groups in Specific Performance are classified as *Altruistic Groups.* For both *Altruistic Buyers* and *Altruistic Groups*, there is no significant difference across treatments (Mann–Whitney U test, p-value > 0.2, two-sided).

smaller share of the surplus to the sellers) under Damages. Selfish buyers have more leverage in their renegotiation under a Damages remedy.[13]

**Table 4:** Descriptive statistics on the role of altruistic buyers

| | Renegotiation Entry **Selfish** | Renegotiation Entry **Altruistic** | Renegotiation Success **Selfish** | Renegotiation Success **Altruistic** | Surplus Sellers **Selfish** | Surplus to Sellers **Altruistic** |
|---|---|---|---|---|---|---|
| Damages | 0.952 | 0.910 | 0.849 | 0.878 | **0.120** | **0.190** |
| *(s.d.)* | *(0.048)* | *(0.100)* | *(0.068)* | *(0.056)* | *(0.068)* | *(0.096)* |
| Specific Performance | **0.969** | **0.920** | 0.827 | 0.855 | 0.168 | 0.193 |
| *(s.d.)* | *(0.026)* | *(0.058)* | *(0.060)* | *(0.081)* | *(0.070)* | *(0.087)* |
| Damages vs. Specific Performance (p-val.) | 0.603 | 0.716 | 0.328 | 0.644 | 0.054 | 0.895 |

**Notes:** *Selfish* refers to matching-groups where at most one buyer is classified as inequality-averse, while *Altruistic* refers to matching-groups where two or three buyers are classified as inequality-averse. All p-values are calculated using a two-sided Mann–Whitney U test. Numbers in bold indicate that the difference between Selfish and Altruistic groups, within the treatment, is statistically significant at the 5% level, according to a two-sided Mann–Whitney U test.

## 5. Concluding Remarks

Parties enter into contracts to pursue mutually beneficial objectives. Remedies for breach of contract are necessary to ensure that parties can make credible commitments and rely on the agreements they have made. However, when market shocks occur, alternative breach remedies may be conducive to different outcomes. Specific performance may compel the fulfillment of a contract that has become inefficient (inefficient performance), while damage remedies might permit the breach of a contract that remains efficient (inefficient breach). According to Coase's (1960) theorem, if an exogenous shock changes the parties' respective costs and benefits under the original agreement, parties would bargain and renegotiate the existing contract to reach an efficient agreement. In the absence of transaction costs, situations of inefficient performance or inefficient breach would not occur, regardless of the applicable legal remedy.

In our incentivized experiment, we tested Coase's irrelevance proposition to verify if, in the shadow of distinct legal remedies, parties rationally renegotiate contracts that are no longer jointly desirable. Behavioral factors including inequality aversion and the endowment

[13] These results are confirmed by panel regressions presented in Table A.1 in Appendix. Results are qualitatively the same, if we consider *Altruistic* and *Selfish Groups* rather than *Altruistic* and *Selfish Buyer*. Results are available upon request to the authors.

effect made us question if the type of legal remedy—specific performance versus damages—had any impact on the contracting parties' willingness and ability to renegotiate inefficient agreements and on the outcomes of such renegotiations. Parties seem to have a have a firm understanding of contractual efficiency and optimally renegotiate inefficient arrangements in the wake of market shocks. In line with Harrison and McKee (1985) we also find that prosocial concerns seem to play at best a moderate role in shaping the outcome of the bargaining process, which in our experiment approximates the Nash bargaining solution. Our experimental investigation into the effects of contract remedies on renegotiation dynamics strongly supports Coase's hypothesis. However, it is important to note that we created a highly controlled environment, offsetting some elements present in the real world. While previous studies have documented a sizable endowment effect in abstract contexts, such as lotteries (Isoni et al., 2011), one could suspect that the use of actual goods in the contractual context might make treatment differences more salient, potentially leading to different results. Additionally, contracting parties might respond differently to breaches based on the type of contractual obligation. For instance, failing to transfer an existing good might be viewed differently than failing to supply a service or produce a new good. If future experiments confirm these differences, the results will provide empirical support for legal systems that use mixed remedies. Another factor that might affect the generalizability of our results is that prices were exogenously set by the experimenter. While this should not influence the outcomes with fully rational agents, distortions could arise, particularly with participants who have different levels of experience with the task, as might happen in real-world situations.

These insights can prove valuable for the design of legal frameworks that support optimal contracts when we exit the ideal world of costless renegotiation and transaction costs are positive. Future theoretical work should build on these findings for a better understanding of the comparative advantage of alternative remedies when contract renegotiation is costly. Having cleared the concerns regarding the possible behavioral effects of remedies, the design of contract remedies can focus on the economic efficiency and fairness in contractual engagements. The probability and magnitude of exogenous shocks to costs and benefits of performance are likely to differ across the spectrum of contractual relationships. When transaction costs can prevent efficient renegotiation, the choice of remedies may indeed be critical to minimize the expected social loss from inefficient performance or inefficient breach of contractual obligations.

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**Statement**

We hereby confirm that all research has been conducted in compliance with the IRB protocols of the institution receiving the grant. The project has received IRB approval on May 29, 2024, from the Ethics Committee of the University of Bologna (prot. N. 0156345).

Appendix A: Additional Tables

**Table A.1:** Panel regressions on heterogenous treatment effects.

| | **Renegotiation entry (1)** | **Renegotiation success (2)** | **Surplus to sellers (3)** |
|---|---|---|---|
| Damages (d) | -0.014 | 0.025 | -0.049 |
| | (0.025) | (0.027) | (0.032) |
| Altruistic buyer | -0.048* | 0.032 | 0.020 |
| | (0.026) | (0.028) | (0.034) |
| Damages x Altruistic buyer | 0.007 | -0.006 | 0.047 |
| | (0.037) | (0.039) | (0.047) |
| Period | 0.005*** | 0.001 | -0.005*** |
| | (0.001) | (0.001) | (0.001) |
| Intercept | 0.899*** | 0.817*** | 0.236*** |
| | (0.019) | (0.024) | (0.023) |
| R-squared | 0.089 | 0.007 | 0.098 |
| N. obs. | 680 | 680 | 670 |
| Post estimation test | | | |
| Altruistic buyer + Damages x Altruistic buyer=0 | 0.121 | 0.349 | 0.043 |

Note: The post estimation test reports the p-value for the test: Altruistic buyer + Damages x Altruistic buyer = 0.

Appendix B Instructions

Appendix B.1 Instructions for Damages Treatment

# Instructions

Welcome. The purpose of this study is to investigate how people make decisions. From now until the end of the study,any communication with other participants is not allowed. If you have a question, please raise your hand and one of uswill come to your desk to answer it.

In this experiment, you will be able to earn money depending on your choices and the choices of the other participants. Upon completion of the study, the amount you earned will be paid to you via PayPal. Payments are confidential; no other participant will be told the amount you earned. All earnings are expressed in tokens, which will be converted toEuros at the end of the study at the rate of 1 Euro = 30 tokens.

This study is composed of two parts. We will now read instructions for Part 1. Instructions for Part 2 will be distributedat the end of Part 1.

## Part 1

**Roles and task.** At the beginning of this part of the study, the computer will randomly assign you a "role": half of youwill be Sellers, the other half will be Buyers. Your role will remain fixed throughout the study.

Each Seller will be matched with one Buyer, and the two parties will be involved in a transaction.

- The Seller produces a good, and the expected production cost for each good is equal to 40 tokens.
- The Buyer expects to receive a benefit of 60 tokens from the purchase of the good.

The transaction is articulated in five phases.

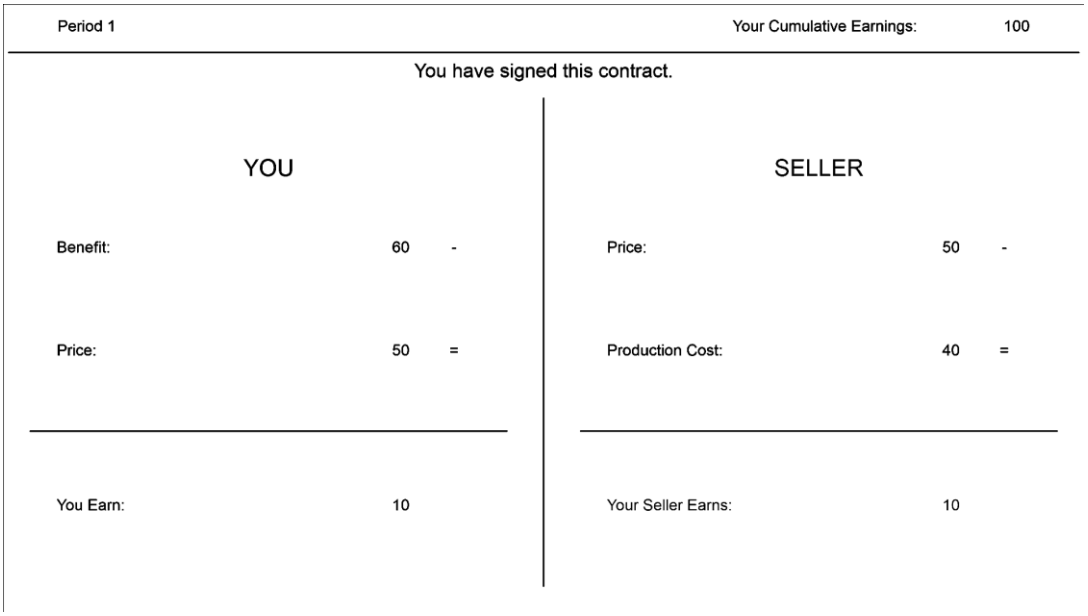
**Phase 1: Contract.** The good is sold by the Seller to the Buyer, at a price of 50 tokens.

The two figures above show the screen for the Buyer (upper panel) and the Seller (lower panel). On the left side of theBuyer's screen, you can see that the benefit to the Buyer is 60 and the price is 50 and, so the Buyer's earnings from the contract will be 10 tokens (benefit minus price).

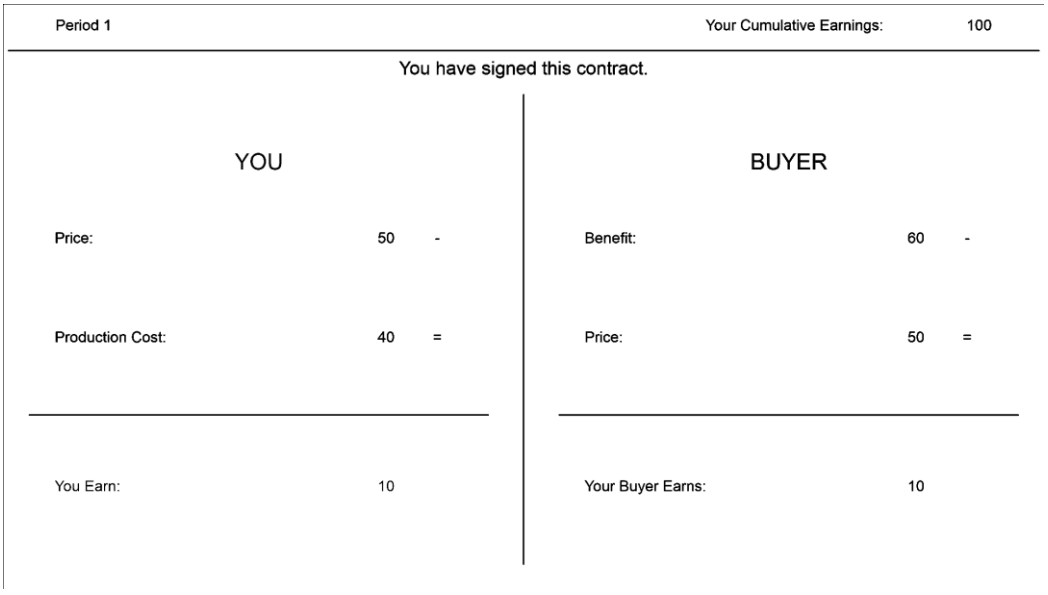
Likewise, on the left side of the Seller's screen, you can see that the price is 50 and the production cost is 40, so the Seller's earnings from the contract will be 10 tokens (price minus production cost).

In this phase of the experiment, there are no decisions to make, and the contract is binding for both parties.

Buyer




Seller

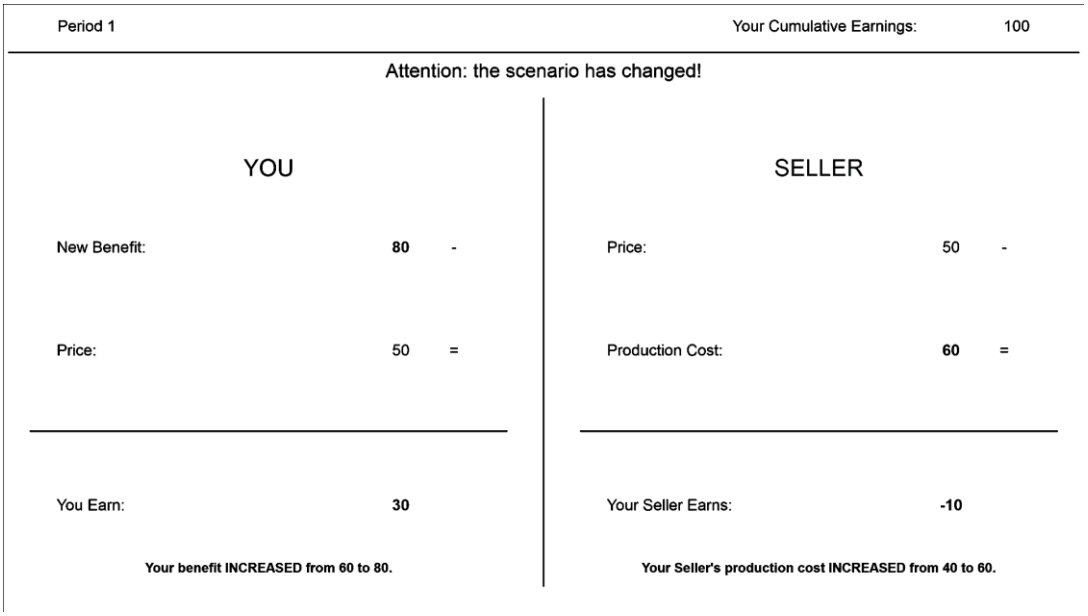


**Phase 2: The scenario may change.** With probability 60% the conditions presented in phase 1 change.

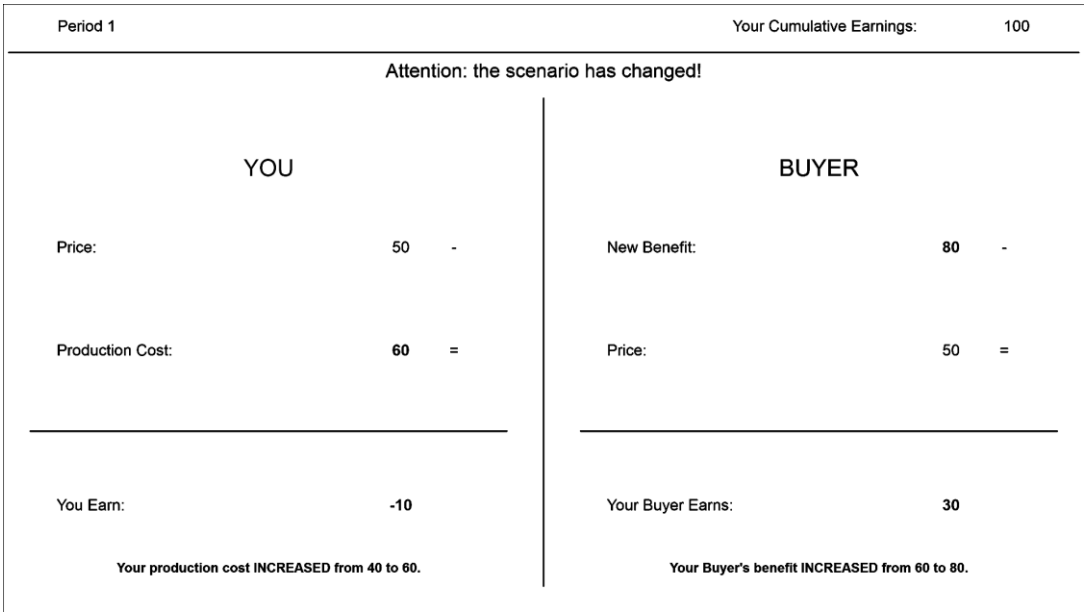
**A.** The production costs of the Sellers unexpectedly increase from 40 tokens to 60 tokens. In this case, if the con-tract is performed as promised, the Seller loses 10 tokens (price minus production costs).

**B.** The Buyer's benefit increases: that is, buying the good now yields a benefit of 80 tokens.

Buyer




Seller




**Phase 3: Contract breach and renegotiation.** If the scenario has changed, the Seller can unilaterally breach the contract, even without the consent of the Buyer.

In this case the Seller will compensate the Buyer with 10 tokens (which is exactly the earnings a Buyer

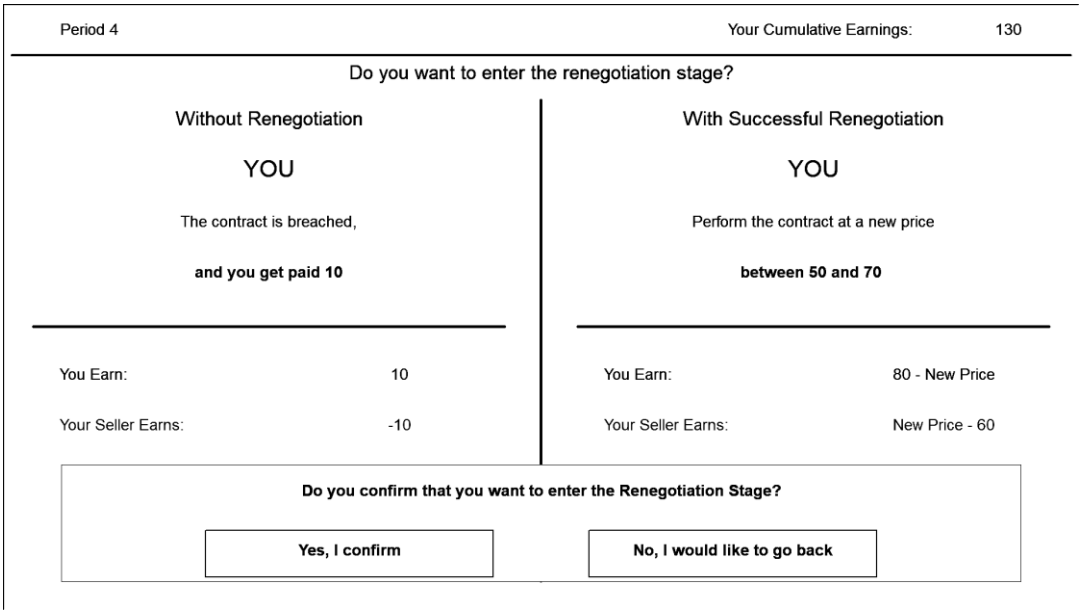
would have made by purchasing the good and keeping the good). Importantly, in this case the Buyer does not receive the good, and does not derive any benefit from it.

Alternatively, the Buyer and the Seller can renegotiate the contract, and agree on a new price.

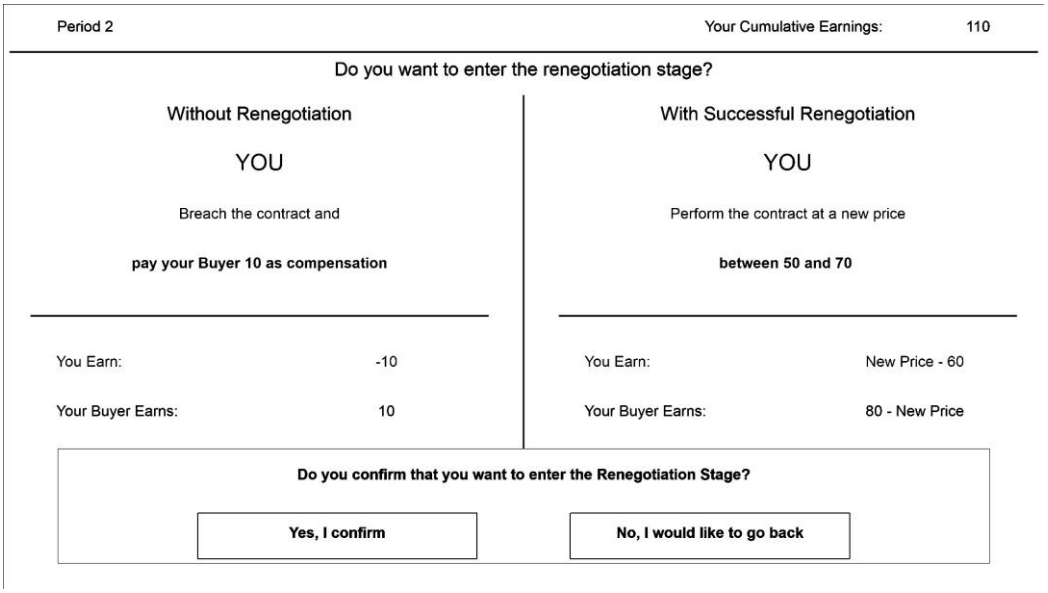
If the scenario has not changed, the Buyer and the Seller can perform the original contract and trade at a price of 50.Alternatively, they can renegotiate the contract, and agree on a new price.

The Buyer and the Seller simultaneously choose whether they want to renegotiate. Renegotiation is possible only if both choose to renegotiate.

Buyer

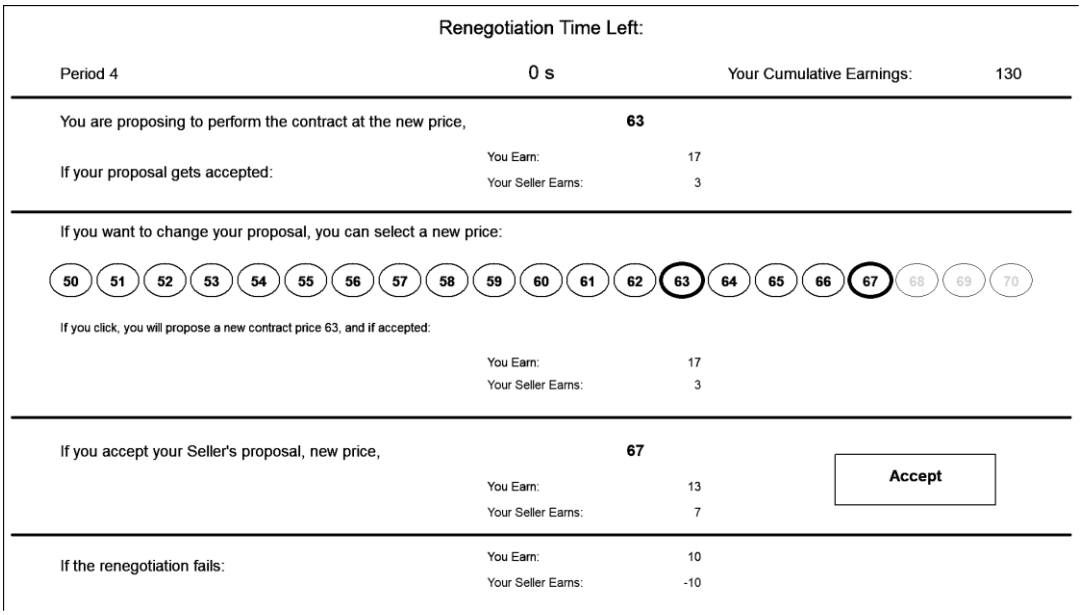



Seller

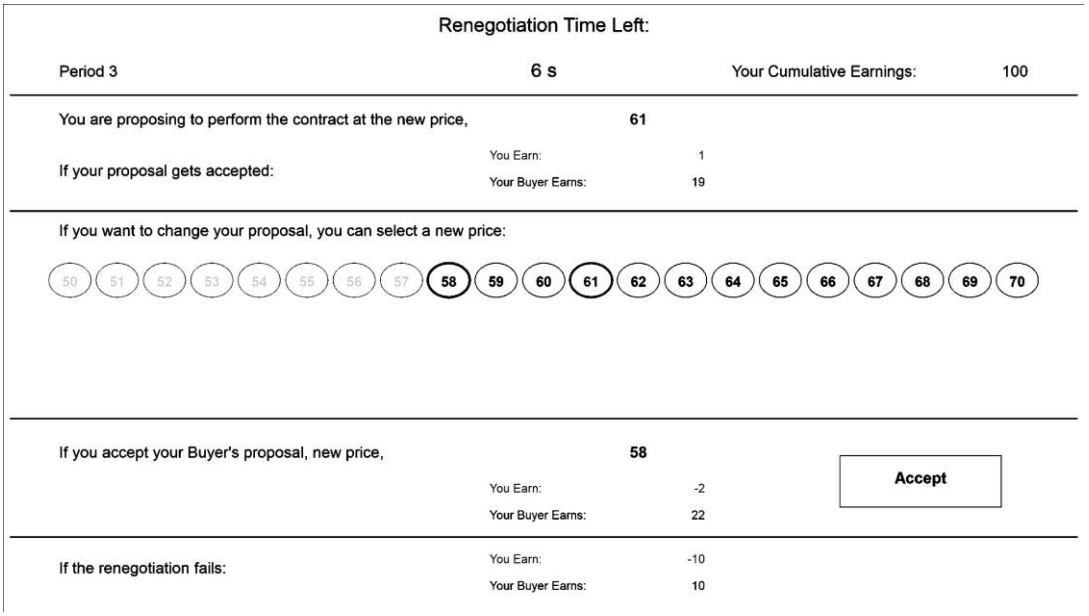


**Phase 4: Renegotiation.** If they choose to renegotiate, the Buyer and the Seller have 60 seconds to modify theoriginal contract.

Buyer




Seller




The Buyer and the Seller can propose a new price, initially included between 50 and 70. To propose a price, they can click on one of the numbers displayed in the middle of the screen. The can change their proposed price at any time, during the Renegotiation stage.

As soon as the Buyer proposes a price, this price is displayed in the lower part of the Seller's screen, who now has the possibility of accepting it, by clicking on the "Accept" button. Alternatively, the Seller can make a counteroffer by selecting a different price. The Seller will not be able to propose a price lower than the price proposed by the Buyer.

Similarly, as soon as the Seller proposes a price, this price is displayed in the lower part of the Buyer's screen,

who now has the possibility of accepting it, by clicking on the "Accept" button. Alternatively, the Buyer can make a counterofferby selecting a different price. The Buyer will not be able to propose a price higher than the price proposed by the Seller.

If a price is accepted within the 60-second time limit, renegotiation succeeds and a new contract is performed at the new price.

If the Buyer and the Seller do not reach an agreement on the new price within the 60-second time limit, or they do notenter renegotiation, the outcome depends on whether there was a change in scenario.

- If there was no change in scenario, the original contract is performed.
- If there was a change in scenario, the original contract is breached, and the Seller will compensate the Buyerwith 10 tokens.

**Phase 5: Outcome.** Your screen displays a summary of what happened in Phases 2-4. The screen displays which variation in the initial conditions occurred in Phase 2, whether a renegotiation phase took place, and what was its outcome. On the lower part of the screen you can read your earnings, and the earnings of your counterpart.

**Periods, groups, and private account.** The task will be repeated for 25 periods. In each period the computer will form groups of two—one Seller and one Buyer—at random. You can see the number of the current period in the upper-left corner of the screen. In Phase 2 of each period, a shock might occur, with a 60% probability. The sequenceof the events is predetermined by the computer and cannot be influenced in any way by your previous actions.

At the beginning of the first period, an endowment of 150 tokens will be to your cumulative earnings. Per-period earnings will add up to your cumulative earnings too. In case you were to suffer a loss in a period, the tokens will be subtracted from your private account. Your cumulative earnings are always visible in the upper-right part of the screen.

**To sum up.**

- At the beginning of the experiment, you will be randomly assigned to the role of Seller or Buyer: the roles will remain fixed throughout the experiment.
- There will be 25 periods, and at the beginning of each period the computer will randomly match one Seller and one Buyer.
- In each period:
- The contract is signed;
- There can be a change in the initial conditions for the Seller and the Buyer: production costs increase for the Seller and the Buyer's benefit increases at the same time. The occurrence of this event is predetermined by the computer and does not depend in any way from your previous choices. You cannot know in advance the future sequence of events;
- The Seller can breach the original contract if the costs increase by paying damages;
- The Buyer and the Seller can renegotiate and agree on a new price;
- Renegotiation lasts 60 seconds.

The following table summarizes the outcomes in the 4 possible situations that can emerge in a period.

| **Change in scenario** | **Renegotiation** | **Contract** | **Seller's cost** | **Buyer's benefit** | **Price** | **Seller's earnings** | **Buyer's earnings** |
|---|---|---|---|---|---|---|---|
| No | No | performed | 40 | 60 | 50 | 10 | 10 |
| No | Yes | performed | 40 | 60 | $P'$ in 40-60 | $P'$-40 | 60-$P'$ |
| Yes | No | breached | 60 | 80 | — | -10 | 10 |
| Yes | Yes | performed | 60 | 80 | $P''$ in 50-70 | $P''$-60 | 80-$P''$ |

Earnings accumulate from period to period and are added to (or subtracted from) your private account.

We now ask you to answer a few questions, to verify that the instructions given so far are clear for everybody. The answers you give to these questions will not affect your earnings in any way.

Appendix B.2 Instructions for Specific Performance Treatment

# Instructions

Welcome. The purpose of this study is to investigate how people make decisions. From now until the end of the study,any communication with other participants is not allowed. If you have a question, please raise your hand and one of uswill come to your desk to answer it.

In this experiment, you will be able to earn money depending on your choices and the choices of the other participants. Upon completion of the study, the amount you earned will be paid to you via PayPal. Payments are confidential; no other participant will be told the amount you earned. All earnings are expressed in tokens, which will be converted toEuros at the end of the study at the rate of 1 Euro = 30 tokens.

This study is composed of two parts. We will now read instructions for Part 1. Instructions for Part 2 will be distributedat the end of Part 1.

## Part 1

**Roles and task.** At the beginning of this part of the study, the computer will randomly assign you a "role": half of youwill be Sellers, the other half will be Buyers. Your role will remain fixed throughout the study.

Each Seller will be matched with one Buyer, and the two parties will be involved in a transaction.

- The Seller produces a good, and the expected production cost for each good is equal to 40 tokens.
- The Buyer expects to receive a benefit of 60 tokens from the purchase of the good.

The transaction is articulated in five phases.

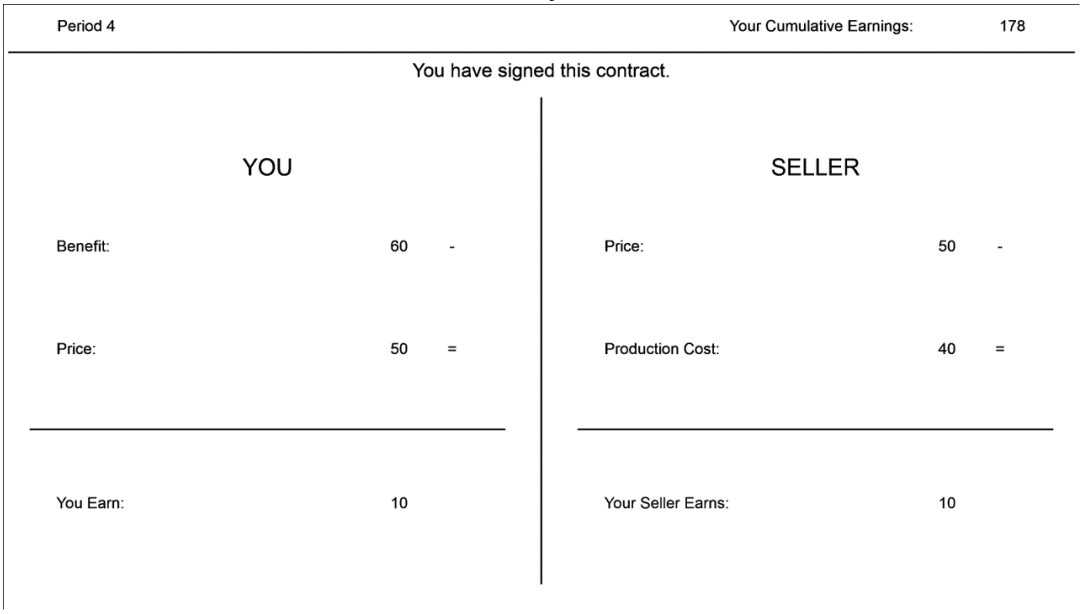
**Phase 1: Contract.** The good is sold by the Seller to the Buyer, at a price of 50 tokens.

The two figures above show the screen for the Buyer (upper panel) and the Seller (lower panel). On the left side of theBuyer's screen, you can see that the benefit to the Buyer is 60 and the price is 50 and, so the Buyer's earnings from the contract will be 10 tokens (benefit minus price).

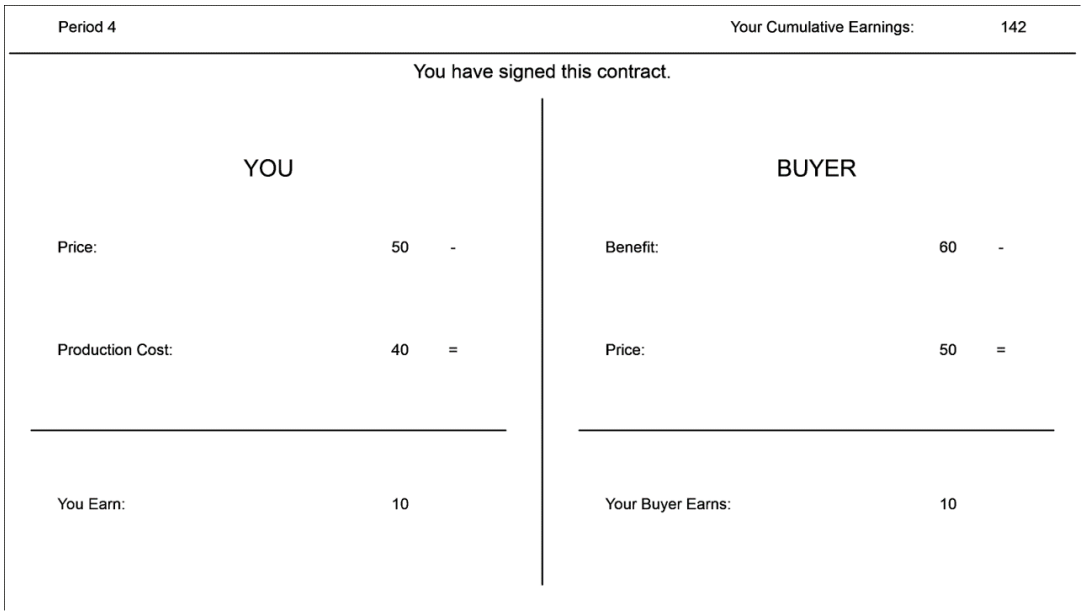
Likewise, on the left side of the Seller's screen, you can see that the price is 50 and the production cost is 40, so the Seller's earnings from the contract will be 10 tokens (price minus production cost).

In this phase of the experiment, there are no decisions to make, and the contract is binding for both parties.

Buyer




Seller

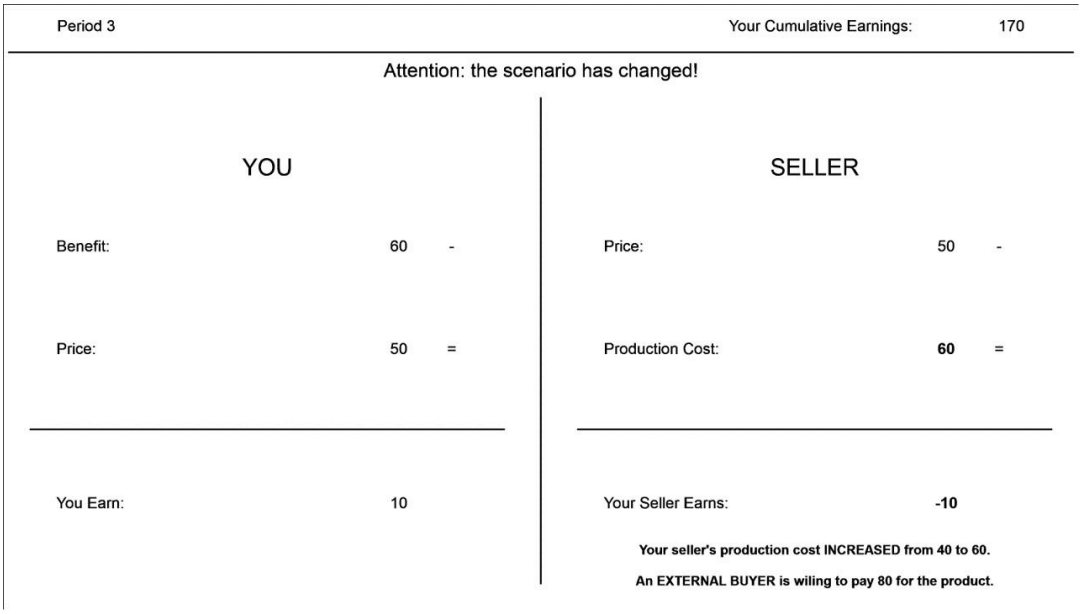


**Phase 2: The scenario may change.** With probability 60% the conditions presented in phase 1 change.

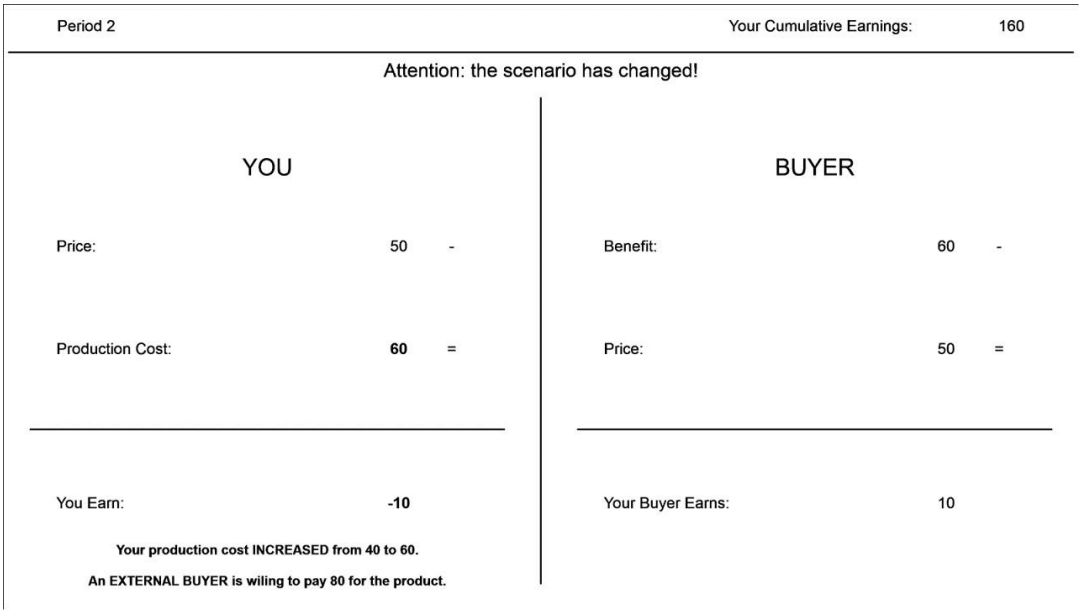
**A.** The production costs of the Sellers unexpectedly increase from 40 tokens to 60 tokens. In this case, if the con-tract is performed as promised, the Seller loses 10 tokens (price minus production costs).

**B.** The Seller gets an offer from another buyer; that is, if the current contract is canceled, the seller can sell theproduct to an external buyer for a price of 80.

Buyer




Seller

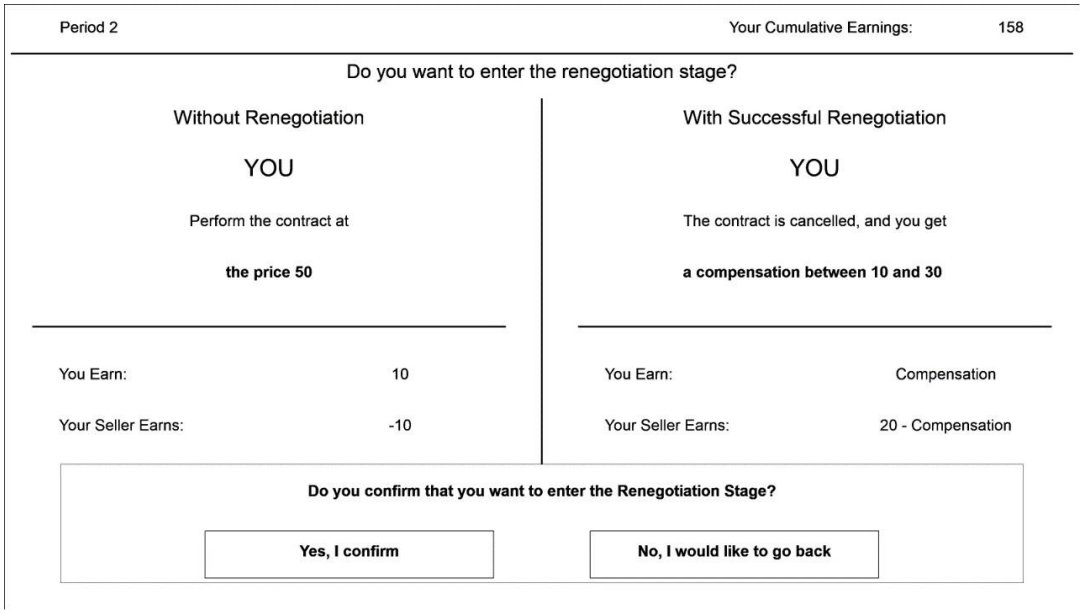


**Phase 3: Contract breach and renegotiation.** If the scenario has changed, the Seller cannot cancel the contract, without the consent of the Buyer.

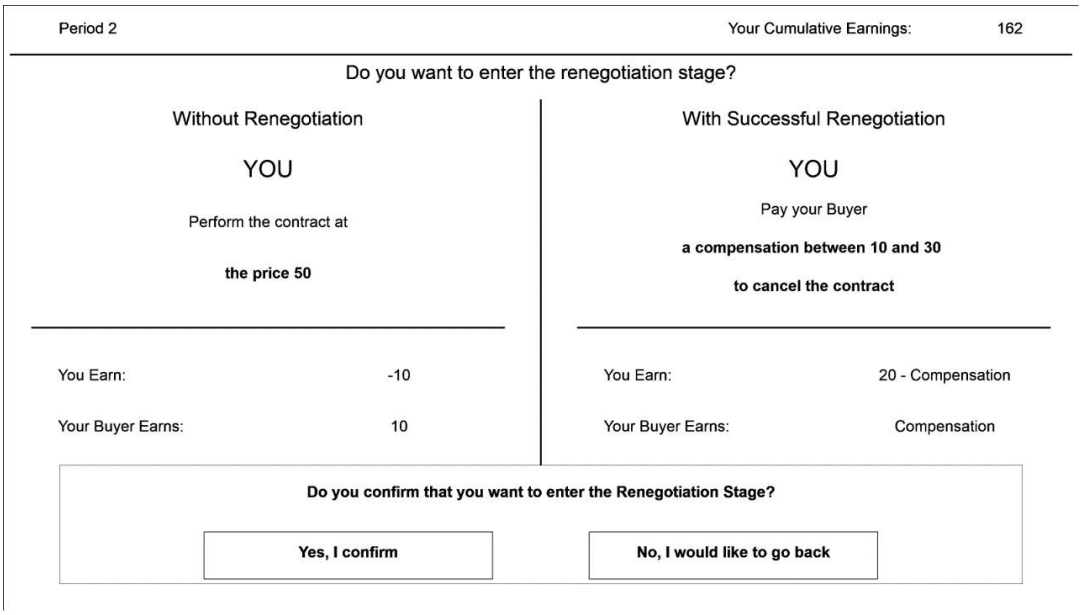
If the current is performed, the Seller will get a price of 50 and bear a production cost of 60, and the Buyer will pay a price of 50 and get a benefit of 60 from the product. Importantly, in this case the Seller cannot sell the product to the external buyer, and does not derive any benefit from this offer.

Alternatively, the Buyer and the Seller can renegotiate, and agree on a compensation from the Seller to the Buyer, tocancel the contract. In this case the Seller can sell the product to the external buyer, and get a price of 80.

Buyer



Seller

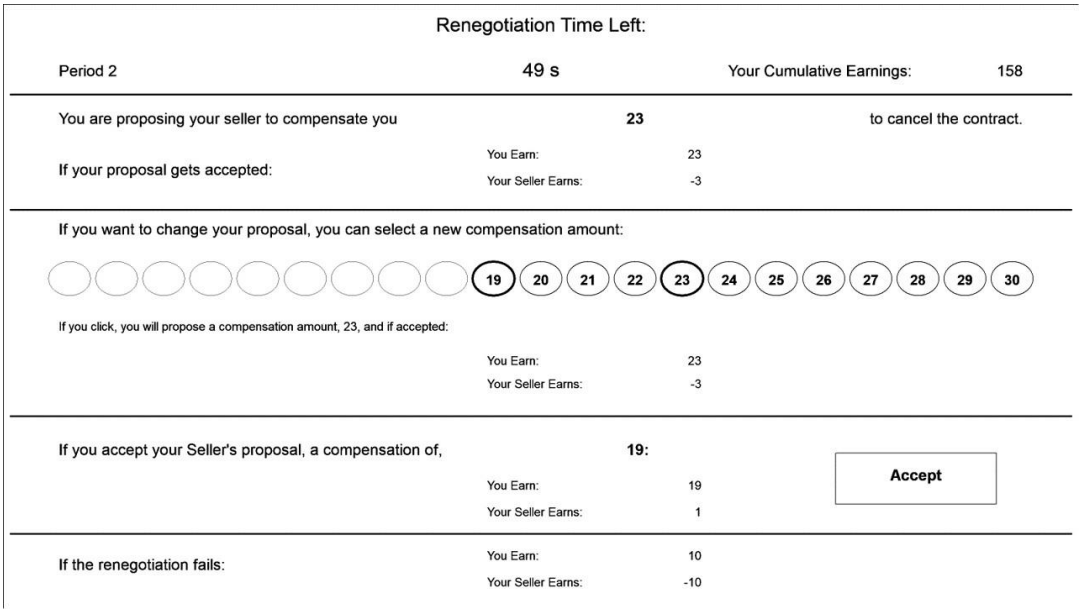



If the scenario has not changed, the Buyer and the Seller can perform the original contract and trade at a price of 50.Alternatively, they can renegotiate the contract, and agree on a new price.

The Buyer and the Seller simultaneously choose whether they want to renegotiate. Renegotiation is possible only ifboth choose to renegotiate.

**Phase 4: Renegotiation.** If they choose to renegotiate, the Buyer and the Seller have 60 seconds to agree on a compensation to cancel the original contract.

Buyer



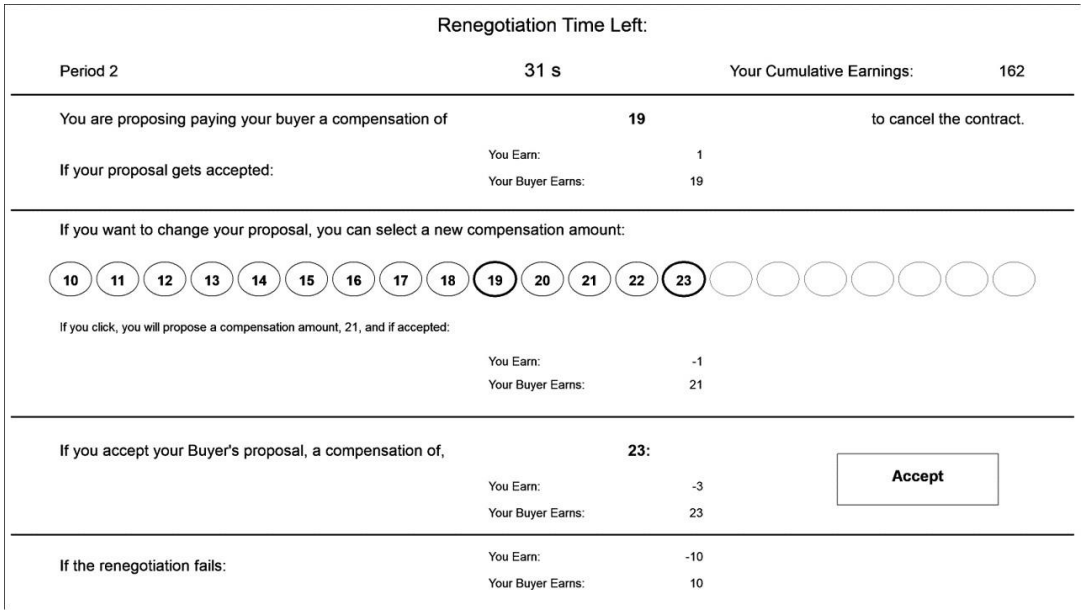
## Seller

The Buyer and the Seller can propose a compensation, initially included between 10 and 30. To propose a compen- sation, they can click on one of the numbers displayed in the middle of the screen. They can change their proposed compensation at any time, during the Renegotiation stage.

As soon as the Buyer proposes a compensation, this is displayed in the lower part of the Seller's screen, who now has the possibility of accepting it, by clicking on the "Accept" button. Alternatively, the Seller can make a counterofferby selecting a different compensation. The Seller will not be able to propose a compensation higher than the one proposed by the Buyer.

Similarly, as soon as the Seller proposes a compensation, this is displayed in the lower part of the Buyer's screen, who now has the possibility of accepting it, by clicking on the "Accept" button. Alternatively, the Buyer can make a counteroffer by selecting a different compensation. The Buyer will not be able to propose a compensation lower thanthe one proposed by the Seller.

If a compensation is accepted within the 60-second time limit, renegotiation succeeds, the contract is canceled and theSeller transfers the agreed-upon compensation to the Buyer, and sells the good to the external buyer for a price of 80.




If the Buyer and the Seller do not reach an agreement on the compensation within the 60-second time limit, or they donot enter renegotiation, the original contract is performed and the outcome depends on whether there was a change inscenario.

- If there was no change in scenario, the Seller bears the original cost of 40.
- If there was a change in scenario, the Seller bears the increased cost of 60.

**Phase 5: Outcome.** Your screen displays a summary of what happened in Phases 2-4. The screen displays which variation in the initial conditions occurred in Phase 2, whether a renegotiation phase took place, and what was its outcome. On the lower part of the screen you can read your earnings, and the earnings of your

counterpart.

**Periods, groups, and private account.** The task will be repeated for 25 periods. In each period the computer will form groups of two—one Seller and one Buyer—at random. You can see the number of the current period in the upper-left corner of the screen. In Phase 2 of each period, a shock might occur, with a 60% probability. The sequenceof the events is predetermined by the computer and cannot be influenced in any way by your previous actions.

At the beginning of the first period, an endowment of 150 tokens will be to your cumulative earnings. Per-period earnings will add up to your cumulative earnings too. In case you were to suffer a loss in a period, the tokens will be subtracted from your private account. Your cumulative earnings are always visible in the upper-right part of the screen.

**To sum up.**

1. At the beginning of the experiment, you will be randomly assigned to the role of Seller or Buyer: the roles willremain fixed throughout the experiment.
2. There will be 25 periods, and at the beginning of each period the computer will randomly match one Seller andone Buyer.
3. In each period:
    - The contract is signed;

      There can be a change in the initial conditions for the Seller: production costs increase and there is an external buyer willing to buy the product from the Seller at a higher price. The occurrence of this event is predetermined by the computer and does not depend in any way from your previous choices. You cannotknow in advance the future sequence of events;
    - The Seller cannot cancel the original contract, unless the Buyer agrees;
    - The Buyer and the Seller can renegotiate and agree on a ;
    - Renegotiation lasts 60 seconds.

The following table summarizes the outcomes in the 4 possible situations that can emerge in a period.

| Change in scenario | Renegotiation | Contract | Seller's cost | Buyer's benefit | Price ($P/P'$) or Compensation ($c$) | Seller's earnings | Buyer's earnings |
|---|---|---|---|---|---|---|---|
| No | No | performed | 40 | 60 | $P$=50 | 10 | 10 |
| No | Yes | performed | 40 | 60 | $P'$ in 40-60 | $P'$-40 | 60-$P'$ |
| Yes | No | performed | 60 | 60 | $P$=50 | -10 | 10 |
| Yes | Yes | canceled | 60 | 60 | $c$ in 10-30 | 20-$c$ | $c$ |

Earnings accumulate from period to period and are added to (or subtracted from) your private account.

We now ask you to answer a few questions, to verify that the instructions given so far are clear for everybody. The answers you give to these questions will not affect your earnings in any way.

Appendix B.3 Instructions for Dictator Game

# Instructions

## Part 2

**Decision task.** In this part you must decide how to allocate some tokens between you and another participant, whom we will refer to as ”your match”.

In the following Figure you can see the decision screen: each cell represents a possible allocation.

Please look at the first cell in the upper-left corner: in this distribution you get 0 tokens and your match gets 20. In the next allocation, you get 1 and your match gets 19. In the last allocation, in the bottom-rightcorner, you get 20 and your match gets 0.

To select the favorite allocation, you have to press on the desired cell and confirm your choice.


**Groups and earnings.** The computer will randomly form pairs. In each pair, the choice of one of the two participants will be randomly selected, and implemented. Hence, the implemented choice could be yours,or it could be the choice of the other person in your pair, that is, your match.

At the end of the study, you will know whether the selected choice is yours or your match’s, and you will know your earnings from Part 2. These will then be added to your cumulative earnings in Part 1, and converted into Euros to determine your final payment.

# Questionnaires

**A. Were the instructions clear to you?**

1) Not at all clear
2) Not very clear
3) Somewhat clear
4) Very clear

**B. Gender**

1) Female
2) Male

**C. What is your age?**

**D. Were you born in Italy**

1) Yes
2) No

**E. Birthplace (if born in Italy)**

1) Trentino AA, Veneto, Friuli VG
2) Piemonte, Valle d'Aosta, Lombardia, Liguria
3) Toscana, Umbria, Marche, Lazio
4) Abruzzo, Molise, Puglia, Basilicata, Calabria, Campania
5) Sicilia, Sardegna

**F. Birthplace (if not born in Italy)**

1) Europe
2) Asia
3) North America
4) Center or South America
5) Africa
6) Oceania

**G. In general, would you say that most people can be trusted or that you need to be very careful in dealing with people?**

1) Most people can be trusted
2) Need to be very careful
3) Do not know

**H. Do you think that most people would try to take advantage of you if they got a chance, or**

**would they try to be fair? Please show your response on this card, where 1 means that "people would try to take advantage of you", and 10 means that "people would try to be fair":** 1 [= People would try to take advantage of you], 2, 3, 4, 5, 6, 7, 8, 9, 10 [= People would try to be fair]

I. **Please tell us, on a scale from 1 to 10 where 1 is never justified and 10 means always justified, whether you think it can always be justified, never be justified, or something in between: Claiming government benefits to which you are not entitled.**

- 1 [=Never justified], 2, 3, 4, 5, 6, 7, 8, 9, 10 [=Always justified]

J. **Please tell us, on a scale from 1 to 10 where 1 is never justified and 10 means always justified, whether you think it can always be justified, never be justified, or something in between: Cheating on taxes if you have a chance.**

- 1 [=Never justified], 2, 3, 4, 5, 6, 7, 8, 9, 10 [=Always justified]

K. **Are you generally ready to take on risks or you tend to avoid them? Please use this scale where 1 means "risk averse", while 10 means "ready to take risks".** 1 [= Risk averse], 2, 3, 4, 5, 6, 7, 8, 9, 10 [= Ready to take risks]

L. **Have you ever participated to experiments before?**

1) No, never
2) 1-2 times
3) 3 times or more

M. **Have you ever attended game theory courses?**

1) Yes
2) No

N. **Have you ever attended law courses?**

1) Yes
2) No