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Unbundling Efficient Breach: An Experiment

ABSTRACT: Current law and economics scholarship analyzes efficient breach cases monolithically. The standard analysis holds that breach is efficient when performance of a contract generates a negative total surplus for the parties. However, by simplistically grouping efficient breach cases as of a single kind, the prior literature overlooks that gain-seeking breaches might be different from loss-avoiding breaches. To capture these different motives, we designed a novel game called Contract-Breach Game where we exogenously varied the reasons for the breach — pursuing a gain or avoiding a loss — under a specific performance remedy. Results from an incentivized laboratory experiment indicate that the motives behind the breach induce sizable differences in behavior; subjects are less willing to renegotiate when facing gain-seeking than loss-avoiding breaches, and the compensation premium obtained by the promisee is higher. Our analysis suggests that inequality aversion is an important driver of our results; indeed, inequality-averse subjects accept low offers more often in cases of loss-avoiding breaches than gain-seeking breaches. These results give us insight into the preferences and expectations of ordinary people in a case of a breach.

KEYWORDS: *contract damages, efficient breach, motives for breach, Contract-Breach game*
JEL CODES: K12, D86, C9

> …"*the essential purpose of a contract between commercial men is actual performance and they do not bargain merely for a promise, or for a promise plus the right to win a lawsuit* ".
>
> *UCC, Section 2-609, Comment 1*

1. Introduction

On the question of efficient breach, there exists a subtle tension between the economic and the moral viewpoints. Both perspectives consider the failure to keep a promise excusable in at least some subset of cases when the net social benefit of breach is

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sufficiently large (Warkol 1998, p. 321). Yet they do not always agree on the boundary conditions when such breaches may be permitted. Assuming Kaldor-Hicks wealth maximization, the standard economic analysis contends that if the promisor gains more than the promisee loses from a breach, then a damages rule (allowing nonperformance with compensation) will be efficient. Moreover, to the extent that expectation damages are perfectly compensatory, and the promisee is thereby fully compensated, such a breach would be Pareto efficient, leaving neither party in a worse position than if the promisor had in fact performed. In contrast, deontological philosophers of contract law take the moral duty to keep one's promises as a foundational principle of contracts, which cannot be brushed aside by cost-benefit analyses (Sidhu, 2006; Mather, 1999; Fried, 1981; Shiffrin, 2009, 2012).

Judicial and lay intuitions seem ambivalent with respect to the notion of efficient breach (Warkol, 1998; Baron and Wilkinson-Ryan, 2009; Zamir and Medina, 2010). In general, the intuitions of laymen seem to track consequentialist (economic) reasoning in cases of loss-avoiding breach, while being deontological (moralist) in cases of gain-seeking breach. Consider, for instance, two firms renting a restaurant for their annual event. In the first case, the restaurant's owners try to cancel the reservation due to the sudden demise of the chef and asks the firm to breach the contract, offering some compensation, as replacing the chef in haste would be too costly. In the second case, instead, the restaurant's owners want to breach the contract because they received a better offer from another group, willing to rent the space on the same date. We believe that one might well be more inclined to forego performance and ask for a lower compensation in the first (loss-avoiding breach) rather than in the second example (gain-seeking breach). This thought experiment suggests that the distinction between loss-avoiding and gain-seeking breach may be analytically important.

In line with our intuition, survey-based studies conducted in recent years (Baron and Wilkinson-Ryan, 2009) suggest that lay intuitions about the excusableness of nonperformance are surprisingly nuanced. Survey participants were tolerant of breach in cases where the promisor sought to pay damages in lieu of performance to mitigate unanticipated costs ("loss-avoiding breach"). Yet they were unwilling to excuse performance when the promisor breached to pursue a better deal ("gain-seeking breach").

Existing empirical evidence on these issues relies exclusively on anecdotic evidence from court cases, and from non-incentivized surveys. Unfortunately, data about actually

occurring breaches are scarce. Moreover, comparing real-world loss-avoiding and gain-seeking breaches is difficult, as many important variables – interested parties, amount of surplus generated by the contract, available information, etc. – may vary from one case to the other, hence making it difficult to draw any inference. Economics reasons, such as allocative efficiency, productive efficiency, restrained incentives, information-forcing effects, and competitive effects could also drive any observed difference (see Parisi and Porat, 2016). In this paper, we adopt a novel approach to the problem, and test whether the motives behind a breach are behaviorally relevant by means of a controlled laboratory experiment. We utilize an incentivized economic experiment granting tight control over the relevant parameters and allowing to exogenously manipulate the variables of interest. We indeed understand incentivized experiments as a new and important source of evidence, that could complement real-world and survey data.

We introduce a novel Contract-Breach Game, where buyers and sellers sign a binding contract and, afterwards, a shock might occur. We exogenously vary the shock to simulate loss-avoiding and gain-seeking breaches. As specific performance remedies apply to the contract, the promisee can force the promisor to perform the act(s) stated in the contract, unless both parties agree on the compensation and cancel the contract. This study is the first to investigate these issues in a non-hypothetical, strategic environment, where subjects make decisions with real pecuniary consequences, both for themselves and for other participants of the experiment. Our results confirm that, broadly speaking, lay intuition finds empirical support: the promisees require a higher compensation to consent to gain-seeking than to loss-avoiding breaches. Interesting enough, we can provide a behavioral explanation for the observed difference. Our results are in line with behavioral arguments suggesting that people dislike highly unequal distributions of wealth (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). More specifically, inequality-averse subjects in our experiment are more willing to accept a low offer in cases of loss-avoiding breaches than gain-seeking breaches. These findings are consistent with the results of a recent experiment by Mittlaender Leme de Souza (2016), who investigates how the perception of the moral value of a breach depends on the breach's consequences, and shows that breaches aimed at avoiding unanticipated unequal outcomes are generally considered as moral.

The paper is structured as follows. In Section 2, we review the moral and economic arguments for efficient breach in the prior literature. In Section 3, we present the Contract-Breach Game and describe the experimental design. In Section 4, we present the results of

our experiment, which show that people's reactions differ with respect to gain-seeking and loss-avoiding breaches, while remaining undistinguishable across seller-breaches and buyer-breaches – consistent with our intuition. In Section 5, we conclude with a summary of our results and possible policy implications. We also explain the limits of our conclusions given the design and nature of our experiment.

2. Efficient Breach: Moral vs. Economic Arguments

A representative of the moral perspective on efficient breach is Sheana Shiffrin (2007). Shiffrin argues that contracts create two distinct obligations: one legal and one moral. Both obligations are grounded in the "promise principle." In her view, the problem is that, by allowing parties to deviate from their legal promise via efficient breach, the law implicitly *encourages* the violation of their moral promise.[5] Shiffrin brings to fore the tension between the legal and moral norms, questioning the coherence of contract law as being at the same time grounded upon and indifferent to promise-keeping.

Several law and economics scholars have responded to the moral arguments against efficient breach, attempting to make the economic argument more palatable for non-economists. Shavell (2006) observed that, while efficient breach *can* be immoral when the awarded damages are less than expectation damages, moral considerations should be tempered by the understanding that contracts are necessarily *incomplete* promises and that generally parties *would have* agreed to an expectation damages remedy if they had bothered to select a remedy *ex ante*. Similar arguments arise in the work of other scholars who suggest that the cost-benefit analysis underlying the notion of efficient breach reflects the implicit will of the contracting parties (Shavell, 2009; Markovits and Schwartz, 2011 and 2012).

Moral theorists have not found these defenses of efficient breach convincing. The argument that in a hypothetical complete contract the parties would have included a right to breach in their agreement leaves a fundamental question unanswered. If a right to breach truly reflects the contracting parties' preferences and natural expectations (such as to amount to the implied will of the majority of them), how do we explain the promisees'

[5] Shiffrin (2007, p. 708).

distaste for efficient breach even when full compensation is granted?[6] Furthermore, Macaulay (2000) points out that, although crude practices of efficient breach could be observed in one-shot contractual interactions, when parties are involved in a relational contract they are less likely to make use of efficient breach. This view is similarly embraced by the Official Comments to the Uniform Commercial Code: "This section rests on the recognition of the fact that the essential purpose of a contract between commercial men is actual performance and they do not bargain merely for a promise, or for a promise plus the right to win a lawsuit." (UCC, Section 2-609, Comment 1). Hence, the question arises again: if efficient breach reflects the parties' preferences and natural expectations in one-shot relationships, why is it the case that repeat-players do not take advantage of their right to breach in their relational contracts?

A possible answer to these objections comes from a general complaint about efficient breach: expectation damages rarely make the promisee whole in practice. This complaint is echoed by several authors and is by most scholars accepted as an uncontroversial fact in contract practice (Fried, 2007; Goetz and Scott, 1980; Muris, 1983; Shavell, 2009). But if imperfect compensation is what drives the wedge between the economic and non-economic attitudes toward efficient breach, we should expect the promisee's disappointment for the breach to be a function of under-compensation; or at least, the observed distaste for efficient breach should be invariant with respect to the circumstances that led to the breach. Yet a survey research by Baron and Wilkinson-Ryan (2009) seems to suggest that circumstances matter. In particular, as Wilkinson-Ryan & Hoffman suggest (2010), since the breach of the contract is conceived by the promisee as an exploitation and betrayal, he would suffer a psychological harm and react accordingly.

These problems and objections challenge the very core of the incomplete-contract and implied-consent arguments used by law and economics scholars in defense of efficient breach. In this paper we wish to consider these challenges seriously, stepping away from the economic vs. non-economic discursive dichotomy, in the search for behavioral evidence that could help develop a more nuanced theory of efficient breach and possibly reconcile the different views.

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[6] Macaulay (2000) observes that the presence of other factors is clearly reflected in the promisees' distaste for breach, even when full compensation is granted.

3. Experimental Design and Predictions

To test whether the desirability of the option to breach varies – from a layman's perspective – depending on the circumstances, we designed a Contract-Breach Game in which the contract gives the promisee the option to force performance – i.e., specific performance.[7] Under specific performance, a breach is allowed only if the parties reach an agreement to resolve the contract with the payment of compensation by the promisor to the promisee. The Contract-Breach Game allows us to study how frequently this efficient agreement to breach is reached and whether the compensation paid by the promisor to the promisee is higher in some circumstances rather than others. We chose specific performance as our background remedy, because only if the occurrence of the breach is conditional on the consent of both parties, as is the case with specific performance, it is possible to measure the promisee's reaction to loss avoiding and to gain seeking breaches.

In our novel game, buyers and sellers are forced to enter into an exogenously given contract yielding equal profits to both parties. After the contract is formed, an exogenous shock may increase the production cost for the seller or decrease the expected value of the good for the buyer (loss-avoiding breach), or it may provide either the buyer or the seller a more profitable outside option (gain-seeking breach). To test if there is a difference if the party asking for a breach is the seller or the buyer, we implemented two treatments. In the *Sellers* treatment, the shock only impacts the seller, either increasing the production costs or introducing the availability of a new opportunity to sell the good. In the *Buyers* treatment, the shock only impacts the buyer, either decreasing the buyer's valuation of the good, or introducing the opportunity to acquire the good elsewhere.

The experimental methodology allows us to have tight control over all the parameters of the game. In naturally occurring contracts, it would be difficult to have a precise estimate of many of the relevant parameters, such as the value of the good for the

[7] This breach remedy is common in European legal systems, where remedies are limited to compensatory damages in fewer cases than in common law jurisdictions. (Fransworth, § 12.4, p. 765-70). Unlike European systems, common law jurisdictions allow unilateral breaches quite liberally, protecting promisees only with the award of compensatory damages.

buyer, the cost for the seller, or the available alternative contracting opportunities. Moreover, the initial price could already incorporate a premium for unrealized but foreseeable future circumstances (e.g., possible increase in production costs). The Contract-Breach game allows us to hold all these variables constant and to manipulate only one element at a time.

In the following, we describe the Contract-Breach Game in greater detail.

3.1 Contract-Breach Game

Participants are randomly assigned the role of buyer or seller, and matched in pairs. An exogenously given contract stipulates that the seller transfers a good to the buyer for a price of 90 experimental currency units (ECUs). The ex-ante production cost for the seller is set to 80 ECUs, while the ex-ante value of the good for the buyer is set to 100 ECUs. Hence, the contract produces a surplus of 20 ECUs to be divided equally between the two parties. After the contract is signed, however, an exogenous shock *may* occur and change the production cost or the expected value of the good, or provides a better contract opportunity with a third party.[8] As we anticipated, the contract is subject to a *specific performance remedy*, i.e., either party can force the other to fulfill the contract obligation.

We implemented two treatments: *Sellers* and *Buyers* (Table 1). In the *Sellers* treatment, the shock only impacts the seller, either increasing the production costs (from 80 to 110 ECUs) or introducing the availability of a new opportunity to sell the good (at 110 instead of 90 ECUs). In the former case, the seller may breach the contract to *avoid a loss* of 20 ECUs (Table 1, Case 1), while in the latter he may breach to *pursue a gain* of 20 ECUs (Case 2). In the *Buyers* treatment, the shock only impacts the buyer, either decreasing the buyer's valuation of the good from 100 to 70 ECUs, or introducing the opportunity to acquire the good elsewhere (at 70 rather than 90 ECUs). In the former case, the buyer may breach to avoid a loss (Table 1, Case 3), while in the latter he may breach to pursue a gain (Case 4). Each participant was exposed to only one treatment.

To better understand the notation and the situation under analysis, consider for

[8] More details on the likelihood of the shock are provided below.

example Case 1 in Table 1, where the production costs of a seller increase from 80 to 110 ECUs. If the contract is fulfilled, the seller loses 20 ECUS (recall the selling price is equal to 90 ECUs); hence the total surplus is negative (-10 ECUs).[9] Given the specific performance remedy, a promisor can breach the contract only if the promisee agrees, accepting some form of monetary compensation, *K,* in lieu of performance. If the buyer accepts a compensation *K,* the total surplus is 0 ECUs. [0] In both treatments, resolution of the contract after any type of shock is efficient, as it increases the total surplus by 10 ECUs.

[9] In this example the seller loses 20 ECUs and the buyer earns 10 ECUs; the total surplus under performance is hence negative (-10 ECUs).

[0] In this case, the seller loses *K* ECUs and the buyer earns *K* ECUs; the total surplus under breach is hence zero.

	Sellers treatment	Buyers treatment
Loss-avoiding breach	**Case 1:** seller breaches to avoid loss (↑ costs=110) **Contract fulfilled** $\pi_s^c = -20;\ \pi_b^c = 10;\ S^c = -10$ **Efficient breach** $\pi_s^{br} = -K;\ \pi_b^{br} = K;\ S^{br} = 0$	**Case 3:** buyer breaches to avoid loss (↓ value=70) **Contract fulfilled** $\pi_b^c = -20;\ \pi_s^c = 10;\ S^c = -10$ **Efficient breach** $\pi_b^{br} = -K;\ \pi_s^{br} = K;\ S^{br} = 0$
Gain- seeking breach	**Case 2:** seller breaches to pursue a gain (↑ price=110) **Contract fulfilled** $\pi_s^c = 10;\ \pi_b^c = 10;\ S^c = 20$ **Efficient breach** π_s^{br} 30 $K; \pi_b^{br}$ $K; S^{br}$ 30	**Case 4:** buyer breaches to pursue a gain (↓ price=70) **Contract fulfilled** $\pi_b^c = 10;\ \pi_s^c = 10;\ S^c = 20$ **Efficient breach** π_b^{br} 30 $K; \pi_s^{br}$ $K; S^{br}$ 30
Inefficient breach	**Case 5:** no variations for the seller **Contract fulfilled** $\pi_s^c = 10;\ \pi_b^c = 10;\ S^c = 20$ **Inefficient breach** π_s^{br} $K;\ \pi_b^{br}$ $K; S^{br}$ 0	**Case 6:** no variations for the buyer **Contract fulfilled** $\pi_b^c = 10;\ \pi_s^c = 10;\ S^c = 20$ **Inefficient breach** π_b^{br} $K; \pi_s^{br}$ $K; S^{br}$ 0

Notes: π_i^j denotes the earnings of party *i*=(s=seller; b=buyer) under the circumstances *j*=(c=execution of contract; br=breach) and K is the accepted compensation to breach the contract. 76 subjects participated in the Sellers treatment and 82 in the Buyers treatment. Each subject, regardless of the treatment, played the contract-breach game for 18 periods, with random matching, and experienced 6 negative shocks (loss-avoiding breach), 6 positive shocks (gain-seeking breach), and 6 situations in which the initial conditions did not change (inefficient breach).

Table 1: *Four Cases of Efficient Breach*

Structure of the stage game. Buyers and sellers are randomly matched in pairs, and go through the following steps:

Stage 0: the buyer and the seller are informed about the contract terms.

Stage 1: an exogenous shock may happen and the value of the good for the buyer can decrease (loss-avoiding breach) or a new seller can be introduced, offering a lower price

In the following, we will describe the game for the *Buyers* treatment. In the *Sellers* treatment, roles were reversed in stages 2-5. In both treatments, stages 0, 1, and 6 lasted 10 seconds each.

(gain-seeking breach). If none of the two conditions is realized, the terms of the contract remain the same as in Stage 0.

Stage 2: the buyer chooses whether to fulfill his existing obligation or to renegotiate the contract. [2] If the contract is fulfilled the period is over.

Stages 3-5: there are at most three renegotiation rounds. In the first one, the buyer can offer any positive integer $0 \leq K \leq 20$, to compensate the seller for the breach of the contract. The seller can either accept the offer or enter the second renegotiation round and make a counteroffer (between 0 and 20). If the seller makes a counteroffer, the buyer can either accept it or make a last counteroffer to the seller. If an offer or counteroffer is accepted, the contract is resolved and the parties' payoffs are determined according to the agreed terms. If by the end of the third renegotiation round no agreement is reached, the original contract is enforced through specific performance. [3]

Stage 6: the parties are informed about the outcome of the renegotiation phase, their own earnings, and the earnings of their counterpart. Subjects can always see their cumulative earnings (including their initial endowment) on the screen. [4]

Table 2 presents the payoffs of the two parties in case an offer (K) is accepted by the promisee as compensation for the breach. It reveals that any compensation K between 10 and 20 generates a Pareto-improvement with respect to the outcome that would emerge with the performance of the contract.

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[2] This option is available even when no shock occurs.

[3] In each round, subjects have 10 seconds to accept an offer, and 30 seconds to make an offer. If a subject does not accept or reject the offer within 10 seconds, the offer is automatically rejected, while in case no offer is made before the 30 seconds elapse, a counteroffer equal to the most profitable option for the offering party is automatically made (20 in Stage 4, and 0 in Stage 5).

[4] Subjects are paid for their choices in all 18 periods.

	Role	No Breach	Accepted compensation K								
			0	**1**	**2**	[...]	**10**	[...]	**15**	[...]	**20**
Gain-seeking	Promisor - **Recipient**	10	30	29	28	[...]	20	[...]	15	[...]	10
	Promisee - **Dictator**	10	0	1	2	[...]	10	[...]	15	[...]	20
Loss-avoiding	Promisor - **Recipient**	-20	0	-1	-2	[...]	-10	[...]	-15	[...]	-20
	Promisee - **Dictator**	10	0	1	2	[...]	10	[...]	15	[...]	20

Table 2: *Efficient Breach and Accepted Compensation.*

Sequence of events, repetitions, and matching groups. Subjects play 18 periods of the stage game, in a fixed role: either as a buyer or as a seller. At the beginning of each period, new pairs of buyer and sellers are randomly formed, and identities remain undisclosed. This eliminates any reputational concerns and preserves the one-shot nature of the contract-breach game.

The sequence of the events is predetermined and constant across treatments, but unknown to subjects. Each event – no-shock, positive shock, and negative shock – occurs *exactly six times*. This implies that in our setup the same person takes decisions in both gain-seeking and loss-avoiding scenarios, as well as in scenarios in which breach is inefficient (i.e., no exogenous shocks occur). Participants are truthfully informed that the sequence of the events across periods is given and cannot be influenced by previous transactions. However, they are not aware of the frequency with which each event would happen (see Instructions in Appendix).

Our setup resembles situations in which the parties anticipate a breach as a possible scenario. While we acknowledge that on some occasions, the breach is a surprise for the promisee, sufficiently sophisticated parties (such as business transactors) should anticipate at the time of contracting, that the promisor might have an interest to breach in the future, and that a renegotiation might follow.

In each session, participants are divided into two matching groups. Pairs of buyers and sellers are always formed within each matching group, so the two matching groups in each session are independent of each other because there is no possibility of contagion

between them. [5] Participants in the first matching group face the "loss-avoiding" case in the first period, the "gain-seeking" case in the second period, and the no-event case in the third period. For participants in the second matching group the order of the events in the first two periods is reversed. From period 4 onwards, the sequence of the events is randomly drawn (with no repositioning) for each of the two matching groups, and is constant across all sessions. This set-up allows for a clear comparison across subjects of the effects of gain-seeking and loss-avoiding breaches on the outcome of the renegotiation.

We decided to let participant interact for many periods for two main reasons. First, there is widespread experimental evidence that subjects might need time to familiarize with a novel task in the lab and repeated interaction can facilitate learning and convergence to equilibrium. Second, being able to vary the reason behind the breach within the same treatment allows for a tighter control over subjects' behavior, because we can observe how the same participants react in response to such an exogenous variation, holding individual characteristics constant. This makes it possible to establish a clean causal link between the motives of the breach, and the reaction they trigger. Also, remember that in our experiment subjects are randomly re-matched at the beginning of every round so to exclude any form of reputational effects and preserve the one-shot nature of the strategic situation.

Dictator game and inequality aversion. At the end of the 18 periods of play, subjects are randomly matched in pairs and asked to play two dictator games (DG1 and DG2), intended to capture individual dispositions toward inequality in a set-up that closely matches the one they previously played. In DG1, subjects have to decide how to split 30 ECUs between themselves and a randomly chosen counterpart; they can give to the counterpart any number of ECUs between 10 and 30. In DG2, subjects must choose how many ECUs (between 0 and 20) to transfer from the counterpart's account to their own. All subjects played both games in the role of the dictator. Roles of dictator and recipient were

[5] We have 4 sessions for each treatment, for a total of 16 matching groups equally divided across Sellers and Buyers treatment. Each matching group included between 8 and 12 participants, evenly divided between buyers and sellers. In our analyses, we will consider each matching group as an independent observation.

assigned at random after all subjects made their choices. Only one of the two dictator games was selected at random for payment to rule out hedging between decisions.

As illustrated in Table 2, the payoffs of the dictator in DG1 correspond to those of the promisee in the "gain-seeking" case of our Contract-Breach Game, while those of the recipient correspond to the payoffs of the promisor. A similar mapping exists between the payoffs in DG2 and those of the two parties in the "loss-avoiding" case of the main game. However, in the Contract-Breach Game the level of compensation depends on the interplay of promisor and promisee, while in the dictator games any type of strategic interaction is stripped away and the outcome is completely in the hands of the dictator. By observing behavior in a set-up where bargaining does not play any role, we can single out inequality aversion as a potential driver of behavior also in the main game. To this aim, it is important that payoffs are as comparable as possible between the different parts of the experiment.

Procedures. The experiment involved 158 subjects; 76 in the Sellers treatment and 82 in the Buyers treatment. We conducted 8 sessions – equally divided across treatments – at the Bologna Laboratory for Experiments in Social Sciences (BLESS) in April 2013. The number of participants in each session ranged from 16 to 22. Two matching groups were used in each session, for a total of 8 independent observations per treatment. No subjects participated in more than one session. The stage game was repeated for 18 periods, hence giving us a total of 684 pairs in the Sellers treatment and 738 pairs in the Buyers treatment. Participants were mostly college students recruited through ORSEE (Greiner, 2015). The experiment was programmed and conducted using the z-Tree software (Fischbacher, 2007). Upon arrival, participants were randomly assigned to private cubicles to avoid eye contact; a paper copy of the instructions was distributed before each part, and instructions were read out loud to ensure common knowledge. [6] Before proceeding to the main part of the experiment, all subjects had to correctly answer a series of computerized control questions. No form of communication between the participants was allowed in the experiment. The average session lasted approximately 1.5 hours. All earnings in the experiment were expressed in ECUs and converted at the end of the session at the rate of €1 for every 20 ECUs. There was no show-up fee, but subjects received an initial endowment of 150 ECUs

[6] Instructions are reported in Appendix B.

(€7.5) at the beginning of the first period of the contract breach game, to accommodate for potential losses, and avoid any issue of limited liability. Subjects were paid privately in cash at the end of the session; the average earning was €14.50.

3.2 Theoretical Predictions and Procedures

In the Contract-Breach Game, rational parties should agree to forego performance of the contract whenever either type of event occurs, and the promisee should accept any compensation higher than 10; hence, the promisor should offer exactly 11 under both types of events. In both DG1 and DG2, dictators should simply maximize their earnings and get 20 ECUs.

These standard theoretical predictions focus on objective payoffs and treat all cases of efficient breach alike (Posner, 2009). However, there are economic and behavioral arguments suggesting that people may actually treat loss-avoiding breaches differently from gain-seeking ones. There are at least two relevant strands of the literature that provide independent rationales for these behavioral differences. First, there are the economic arguments on the effects of a right to breach, such as restrained incentives, productive and allocative efficiency that can vary across our four cases. In particular, Parisi and Porat (2016) posit that loss-avoiding breaches are more desirable than gain-seeking ones, regardless of whether buyers or sellers are the promisors. Second, insights from behavioral and experimental economics suggest that people tend to be averse toward highly unequal distributions of wealth (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000). Related evidence from Baron and Wilkinson-Ryan (2009) also points in the same direction.

In the dictator game, inequality-averse subjects should be willing to sacrifice part of their payoff – hence keep less than 20 – in order to reduce the distance between their earnings and those of the recipient. In addition, they should keep less in DG1 than in DG2, as in DG1 the distance between dictator's and recipient's payoffs is minimized when the former keeps 0, while in DG2 this happens when the dictator keeps 15. For the same reason, in the Contract-Breach Game inequality aversion may induce promisees to accept lower offers when the breach is loss-avoiding rather than gain-seeking.

We thus formulate three hypotheses that will guide our exposition of the results:

Hypothesis 1: Promisees will enter the renegotiation phase more often in cases of loss-avoiding rather than gain-seeking breaches, irrespective of the role of the breaching party.

Hypothesis 2: The two parties will reach an agreement more often in cases of loss-avoiding than in cases of gain-seeking breaches, irrespective of the role of the breaching party.

Hypothesis 3: When an agreement is reached to allow efficient breach, the promisee will obtain a larger share of the surplus as compensation for a gain-seeking breach than for a loss-avoiding one. There should be no differences based on the role of the breaching party.

4. Experimental Results

We provide an overview of the results in Table 3, which presents the average per-transaction profits and surplus by type of breach. The data reveal that the realized (total) surplus was significantly lower than the theoretical benchmark in all cases, suggesting that subjects were not always able or willing to reach an agreement to avoid the inefficient performance of the contract, notwithstanding the efficiency gains from doing so. In addition, promisees' earnings tended to be larger than predicted, while lower than predicted earnings were obtained by promisors. This indicates that even when a breach was allowed, subjects split the surplus in a way that was generally more favorable to the promisee than predicted by theory.

Event	**Profit**		**Total**
	Promisee	**Promisor**	**surplus**
Inefficient breach	**9.89**	**9.77**	**19.66**
	[9.80, 9.99]	[9.56, 9.98]	[19.40, 19.93]
	10.00	*10.00*	*20.00*
Loss-avoiding	**11.45**	**-14.11**	**-2.66**
	[11.15, 11.75]	[-14.67, -13.57]	[-3.05, -2.28]
	11.00	*-11.00*	*0.00*
Gain-seeking	**12.18**	**14.63**	**26.80**
	[11.75, 12.60]	[14.05, 15.21]	[26.18, 27.43]
	11.00	*19.00*	*30.00*

Notes: The table reports in bold the average profits per period, while in squared brackets it presents the 95% confidence intervals and in italics the theoretical benchmarks. We have 474 observations for each event and role.

Table 3: *Observed Profits and Theoretical Benchmarks*

We shall proceed into an analysis of the results, first considering the frequency with which subjects entered the renegotiation stage and the number of efficient breach

agreements that were reached (Results 1 and 2). We shall then look at the division of the surplus between the parties (Results 3 and 4).

Do promisors always enter the renegotiation stage? Is there a difference depending on the reason for the breach?

Result 1: Promisors entered the renegotiation phase more often when facing a loss-avoiding than a gain-seeking breach.

Figure 1 reports the frequency of (forced) specific performance without renegotiation ("no-renegotiation rate"), divided by type of breach. [7] In the case of loss-avoiding breach, nearly all promisors accepted the possibility to renegotiate the contract. For gain-seeking breaches a different picture emerges, as the breaching party decides not to pursue the renegotiation more than 6% of the time. The difference between loss-avoiding and gain-seeking breaches is significant at the 1% level in the first occurrence (Chi-squared test, $N = N_2 = 79$), and at the 5% level when pooling data from all occurrences (Wilcoxon matched pairs test, $N = N_2 = 16$, all treatments pooled). [8] Results are confirmed by a series of probit regressions with individual-level random effects including controls for subjects' individual characteristics and experience (Table A-1 in Appendix). In line with Hypothesis 1, this result suggests that the reason for the breach has an impact on the willingness of promisors to ask for a renegotiation despite the fact that (i) the breach is always efficient, (ii) the surplus generated by the breach is constant across conditions, and (iii) there is no cost associated with the renegotiation.

[7] In Figure 1 we consider efficient breach cases only. No-renegotiation is 86.4% if there is no shock and the frequency of inefficient breaches is 1.7%. This confirms that the experimental subjects correctly understood the incentive structure of the situation they faced.

[8] We adopt a conservative approach to account for the lack of independence of observations across rounds and pairs. If not otherwise specified, the unit of observation is the average at the matching group level (N=16). Comparisons between renegotiation rates for gain-seeking and loss-avoiding breaches are based on Wilcoxon matched pairs test; comparisons between renegotiation rates in the Buyer and Seller treatments are based on Wilcoxon-Mann Whitney tests. Tests for the first occurrence are based on Chi-squared tests and treat each pair as an independent unit of observation.

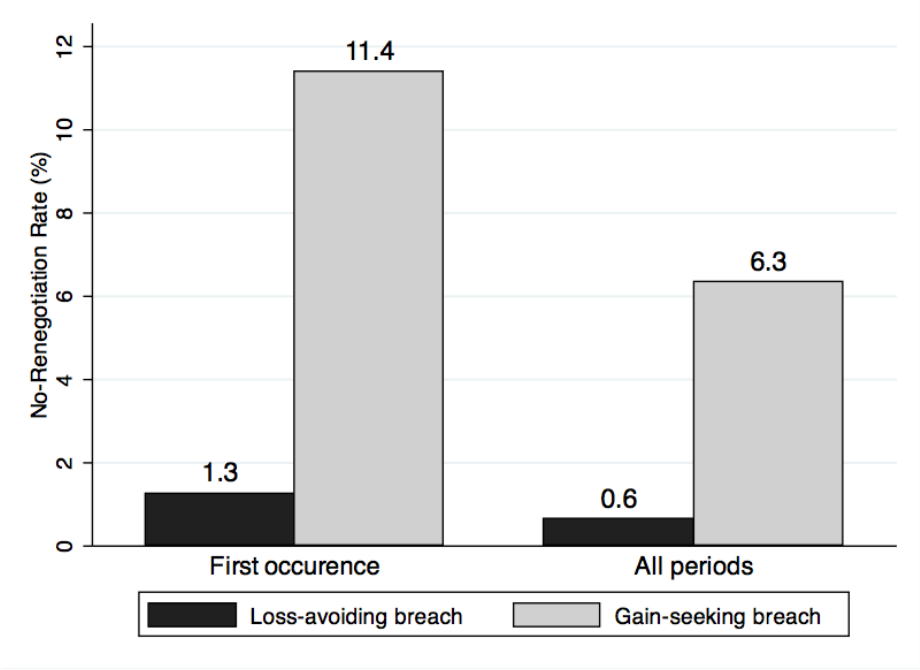

Figure 1: *Cases of Forced Specific Performance without Renegotiation*

As shown in Figure 1, the percentage of cases in which promisors choose not to attempt renegotiation is higher in the first occurrence, as compared to all occurrences, suggesting that subjects learn over time that the breach can be desirable. Notice however that the difference is significant only in the *Buyers* treatment (significant at the 1% level in the first occurrence, N $=N_2=41$, and at the 5% level in all occurrences, N $=N_2=8$), while in the *Sellers* treatment the entrance rates are not significantly different depending on the reason for the breach.

How often do parties that were willing to renegotiate reach an efficient agreement? Do results differ depending on the reason for the breach and/or on the identity of the breaching party?

Result 2: For parties that pursued renegotiation, the rates of successful renegotiation do not depend on the reason for the breach or the identity of the breaching party.

We report that subjects that were willing to engage in renegotiation reached an efficient breach agreement in 73.1% of the cases (Table A-2 in Appendix). In total, efficient breach was permitted in 70.7% of the instances; 41.5% of the parties that successfully renegotiated the contract reached agreement only in the final round of renegotiation. Only

22.1% reached an agreement accepting the first offer made by the promisor. When a loss-avoiding (gain-seeking) breach occurred, 73.9% (72.3%) of renegotiations were successfully concluded. As revealed by a Wilcoxon-Mann Whitney test, no significant differences emerge depending on the reason for the breach (p-value>0.1); the same is true if we consider each treatment separately or the initial occurrence only (p-value>0.1, Pearson Chi-squared, N=73). [9]

Further, the data indicate that, with experience, reaching an agreement on an efficient breach becomes easier. In the first occurrence of a shock, conditional on renegotiation, parties reached an agreement only 58.5% of the time; this percentage jumps to 81.0% in the final occurrence of a shock, and the difference is highly significant, according to a Wilcoxon signed-rank test (p-value<0.01, N=32).[20] We also find that the success rate of the renegotiation is not significantly influenced by the identity of the breaching party. Results are similar if we consider only the first occurrence.

These results suggest that once parties accept the idea of engaging in renegotiation, they are able to carry out renegotiation successfully at the same rate, regardless of the reasons of the underlying breach. However, the reasons for the breach affect the way the surplus is split between the parties, as discussed below.

How do the parties split the surplus of an efficient breach? Does the compensation obtained by the promisee vary depending on the reason for the breach and/or the identity of the breaching party?

As we noted above, in all circumstances where breach is efficient, the promisee should receive compensation of 11, which means that he should earn 10% more by breaching the contract than when no breach takes place. Let us define the "compensation premium" as the percentage difference between the compensation obtained by the promisee, and the payoff he would get through actual performance: *CP=(K-10)/10.*

---

[9] The rates of success of the renegotiation phase are 72.1% (loss-avoiding breaches) vs. 69.9% (gain-seeking breaches) in the *Sellers* treatment, and 75.6% vs. 74.6% in the *Buyers* treatment.

[20] A similar pattern is observed for both types of breaches: the rate of successful renegotiation goes from 60.7% to 79.3% for gain-seeking breaches (p-value<0.05, N=16) and from 56.4% to 82.7% for loss-avoiding breaches (p-value<0.01, N=16).

Figure 2: *Compensation Premium*

Figure 2 reports the average compensation premium obtained by the promisee when the efficient breach took place. Overall, the promisee received a compensation premium of 26.1%, which is markedly higher than what the standard theory predicts. Indeed, the median accepted offer was 13 ECUs (i.e., *CP*=30%).

Result 3(a): The compensation premium obtained by the promisee is higher for gain-seeking breaches than loss-avoiding breaches.

In line with our Hypothesis 3, we observe significant differences in the division of the surplus generated by the breach (which is always equal to 10 ECUs), depending upon the reason for the breach. Actual compensations were 12.0 ECUs in loss-avoiding and 13.2 ECUs in gain-seeking breaches. This generated an average compensation premium of 20.2% for loss-avoiding breaches, and 32.0% for gain-seeking breaches (Figure 2), and the difference is significant at the 1% level (N=16).[2] Results are confirmed by linear

[2] Comparisons between offers and compensations between loss-avoiding and gain-seeking breaches are based on Wilcoxon-Mann Whitney tests for Period 1, and on Wilcoxon matched pairs tests when considering all periods.

regression models with individual-level random effects and including controls for subjects' individual characteristics and for possible time trends (Table A-3 in Appendix, Model 1-2). A significant disparity in compensation premiums emerged both when the breaching party was the buyer, and when it was the seller (p-value<0.05, N=8; Table A-3, Model 3 and 4). Interestingly, the difference in premiums between the two reasons for the breach emerged only as the game progressed. Despite the compensation premium being larger for gain-seeking (17.4%) than loss-avoiding breaches (7.6%), in the first occurrence of the shock, the difference is not significant at any conventional level.

Result 3(b): The compensation premium obtained by the promisee for the efficient breach is not affected by the role of the promisor.

The identity of the breaching party does not seem to have a significant impact on the average compensation premium obtained by the promisee, which is on average 27.9% in the *Seller* treatment, and 24.3% in the *Buyer* treatment (p-value>0.1, $N = N_2 = 16$). This result is consistent with the expectations expressed in the second part of Hypothesis 3. However, a caveat is required here: the framing of our experiment is only minimally characterized in terms of the differences between the roles of buyers and sellers, and the efficiency concerns that might emerge in real-life situations (Parisi and Porat, 2016) were not likely to emerge in the laboratory.[22]

Can individual attitudes toward inequality explain observed differences in compensation premiums?

Result 4: Inequality-averse subjects accept low offers more often in cases of loss-avoiding breaches than gain-seeking breaches.

Data from renegotiation suggest that higher compensation premiums are required in cases of gain-seeking breach than in cases of loss-avoiding breach. Despite efficiency gains from the breach and the range of the compensation premium being identical across

[22] Roles were indeed assigned randomly and, for instance, there was no difference between buyers and sellers with respect to the reversibility of the investments or the effect on competitiveness.

the types of breaches, one should note that the degree of inequality—i.e., the distance between promisor's and promisee's earnings—associated with each compensation level K varies depending on the nature of the breach. Whereas inequality monotonically increases as the premium increases in cases of loss-avoiding breach, inequality is minimized with a 50% compensation premium (i.e., an accepted offer of 15 ECUs) in cases of gain-seeking breach (see Table 2). A subject that dislikes inequality may be willing to accept a small (perhaps even negative) premium in the loss-avoiding case to reduce the distance between the earnings of the two parties. However, the same subject might ask for a high premium in the gain-seeking case, as this would help reduce inequality. We therefore conjecture that inequality-averse subjects may accept low offers for loss-avoiding breaches, but that they will tend to be less inclined to do so for gain-seeking breaches.

To shed light on the link between inequality and compensation premiums, let us classify promisees into two categories based on DGs' choices: inequality-tolerant and inequality-averse. To this end, we first define the inequality index, *I*, as the sum of the payoff differences between the two parties in DG1 and DG2. Let us call x_i the amount of money given to the recipient, and y_i the amount of money kept by the dictator, in game *i*. The inequality index I is: $I = |x_1 - y_1| + |x_2 - y_2|$. The average inequality index for promisees was 35 and the median value was 46.[23] We hence classify subjects that have an index below the median as being inequality-averse, and those with an index equal or above the median as being inequality-tolerant.

Let us now consider low offers—i.e., offers less than or equal to 10—and test whether inequality-tolerant and inequality-averse subjects respond differently. Overall, 10.7% of the promisees accepted low offers; meaning, they accepted no or negative premiums to allow for a breach. The fraction increases to 15.8% if we only consider inequality-averse subjects.

[23] In DG1 (DG2), 37.3% (44.3%) of the subjects did not act as self-interested profit-maximizers and nearly all deviations from self-interest aimed to reduce the distance between dictator's and recipient's earnings. Overall, 48.1% of the subjects acted selfishly in both DGs.

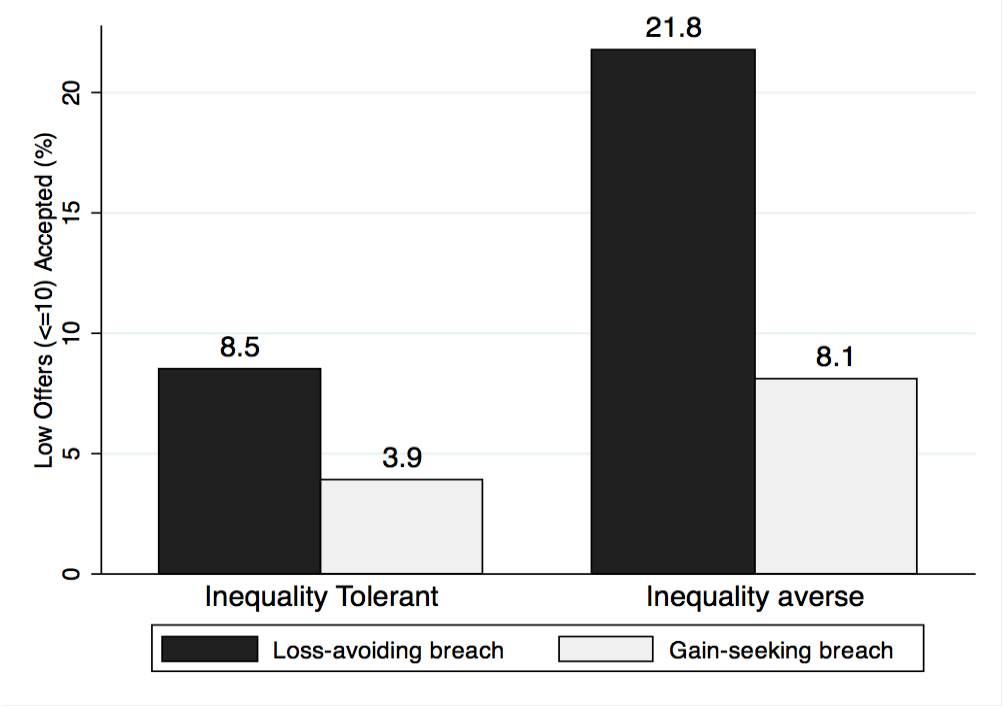

Figure 3: *Acceptance Rates of Low Offers*

Figure 3 reports the acceptance rate of low offers organized by the type of subject (i.e., inequality-averse or inequality-tolerant) and by the type of breach. In cases of gain-seeking breach, 8.1% of inequality-averse and 3.9% of inequality-tolerant subjects accepted low offers. In cases of loss-avoiding breach, the numbers more than doubled: 21.8% of inequality-averse subjects accepted a negative or zero compensation premium to release the promisor from the contract. Our data show that inequality-averse subjects accept less generous offers in cases of loss-avoiding breach – possibly to prevent promisors from incurring high losses.

Further support for Result 4 is provided by a probit regression (Table 4). The dependent variable has the value 1 if a low offer is accepted and 0 if it is refused.

Dep var: Accept(1)/Reject(0)	Coefficient	SE
Gain-seeking	-0.341	(0.215)
Inequality-Averse	0.374**	(0.188)
Gain-seeking x Inequality-averse	-0.252	(0.287)
Male	-0.246	(0.155)
Age	0.000	(0.017)
Experience	-0.237**	(0.110)
Low Understanding	0.489**	(0.200)
N.obs.	888	

Notes: Probit regression on acceptance of low offers (≤ 10), individual random effects. Symbol ** indicates significance at the 5% level. Cases in which no shocks occurred are not included in the regression. Gain-seeking: 1=gain-seeking breach, 0=loss-avoiding breach. Inequality-averse: 1=inequality-averse promisee, 0=inequality-tolerant promisee.

Table 4: *Inequality-Aversion and Low Offers*

Regression results suggest that the probability of acceptance of a low offer is smaller in cases of gain-seeking breaches than in cases of loss-avoiding breaches (i.e., the negative coefficient of the variable *Gain-seeking*), but the effect is significant only for inequality-averse subjects.[24] The positive and significant coefficient of the dummy variable *Inequality-Averse* confirms the intuition that inequality concerns correlate with a greater willingness to accept low offers. Results are robust to a series of controls for gender, age, experience, and understanding.[25]

[24] A t-test confirms that the sum of the coefficients for *Gain-seeking* and *Gain × Inequality-averse* is highly significant (p-value<0.01).

[25] *Male* is a dummy variable taking value 1 for males and 0 otherwise; *Age* is the age of the subject; *Experience* takes the value 1 if the subject is unexperienced, 2 if he participated in at most 2 experiments, and 3 if he participated in 3 or more experiments. To account for possible comprehension problems, we considered subjects that were particularly slow in answering the control questions, and those who made several mistakes. We attribute value 1 to the dummy variable *Low understanding* for all subjects who were in the last decile either according to their total answering time, or according to their total number of mistakes.

5. Discussion and Conclusions

In this paper, we tried to explain the disparity between economic analyses of efficient breach and the prevailing positions in the moral philosophy of contracts. We argued that a more nuanced economic understanding of the different kinds of efficient breach is desirable and that behavioral motives should be taken into account to understand lay people's intuitions under different breach circumstances. We developed a new experimental paradigm, dubbed Contract-Breach Game, to empirically test the desirability of different types of breaches under specific performance. The experimental toolbox allowed us to have a control over all the relevant variables in a way that would not be possible with real-world data. We exogenously manipulated the reasons for a breach – loss-avoiding vs gain-seeking – by introducing random shocks. Our test subjects had to bargain under different scenarios with real financial incentives: their breaching decision determined their final payments. Our experimental results highlight that loss-avoiding breaches are more desirable than gain-seeking breaches; this is especially true for subjects who display stronger egalitarian preferences.

We acknowledge that it is impossible to imitate real life situation in a laboratory, and our experiment is no exception. Indeed, in a laboratory environment, subjects do not behave exactly as they would have behaved in real life situations, but still there is much to learn from their behavior. Our experiment's results – based on the repeated experience of a one-shot game – are more indicative of repeat players, who get used to modifications and adjustments of contracts, as is the case in many business environments. The results of our experiment indicate that individuals exhibit different attitudes toward loss avoiding and gain seeking breaches, and those different attitudes must be indicative of the parties' expectations from a breach even in discrete breach cases between non-business parties.[26]

Our laboratory evidence shows that lay people's intuitions, and moral philosophers' arguments regarding efficient breach, are consistent with the economic rationale of efficient

[26] *See* Feldman & Teichman. 2010, for the argument that people's reaction to breach depends among other things on the type of the contract. The authors show, through experiments, that people are more averse to a breach of a negotiated contract as opposed to a standard form contract.

breach. Efficiency arguments examined by Parisi and Porat (2016) and moral values seem to go hand in hand: a finding that is in line with Binmore's (2005) view, that ethics is the outcome of an evolutionary process that tends to push the society toward the equilibrium which is collectively more profitable.

Our experimental findings and the observed reactions of our subjects reflect the parties' values and expectations and may be used to inform the choice of remedies in different cases of efficient breach. Specifically, we show that individuals are more tolerant to loss-avoiding breaches – we should thus allow loss-avoiding breaches more easily, and compensatory damages may be viewed as the most appropriate remedy in those cases. Conversely, individuals are less tolerant to gain-seeking breaches – we should thus discourage those breaches, and specific performance or disgorgement damages may become more desirable in those cases.

As a final observation, it should be noted that in the framework of our experiment, we assumed that the contract was enforced with a remedy of specific performance (a property rule, in Calabresi and Melamed's (1972) terminology), rather than a damage remedy (a liability rule, under the same terminology), as is the case with unique good contracts.[27] As previously explained, we chose specific performance as our background remedy, because it made the non-performance of the contract conditional on the consent of both parties, rather than on the promisor alone. This allowed us to measure the promisee's reaction to loss-avoiding and gain-seeking breaches. In regimes that adopt a damage remedy, rather than specific performance, the promisor, rather than the promisee, would have the last word as to whether performance takes place. In such cases, if the performance of the contract remains efficient after the shock, the promisee would need to entice the promisor to perform, offering an additional payment. The direction of the payment would hence change: promisor to promisee under specific performance; promisee to promisor under damages. Whether our findings could hold when the background remedy is damages is a question that warrants future investigation to measure the effect of a change in remedies on the parties' renegotiation.

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[27] In Continental Europe, specific performance is considered to be the primary remedy in contracts, while under Anglo-American common law expectation damages is the primary remedy. Under both legal regimes, however, the common remedy for unique good contracts is specific performance.

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Appendix A: Tables

	Dep. Var.: No renegotiation								
	Pooled				Sellers		Buyers		
	Model (1)		Model (2)		Model (3)		Model (4)		
Gain-seeking	1.276	***	1.537	***	1.022	**	1.995	***	
	(0.294)		(0.319)		(0.463)		(0.490)		
Occurrence			-0.664	***	-1.267	**	-0.413		
			(0.248)		(0.525)		(0.311)		
Occurrence x Gain			0.029	**	0.055	**	0.019		
			(0.012)		(0.026)		(0.015)		
Male			-1.273	***	-0.575		-1.736	**	
			(0.470)		(0.486)		(0.763)		
Age			0.045		0.053	**	0.067		
			(0.036)		(0.022)		(0.132)		
Experience			0.473		0.141		0.789		
			(0.353)		(0.400)		(0.535)		
Low Understanding			1.572	***	1.379	***	1.689	**	
			(0.486)		(0.507)		(0.725)		
N.obs.	948		948		456		492		

Notes: Probit regression on No Entrance (1=no entrance; 0=entrance) with individual random effects. Symbols $***$ and $**$ indicate significance at the 1% and 5%, respectively. Occurrence indicates the number of times a given event has occurred, and ranges from 1 to 6. Male is a dummy variable taking value 1 for males and 0 otherwise; Age is the age of the subject; Experience takes value 1 if the subject is inexperienced, 1 if he participated in at most 2 experiments, and 3 if he participated in 3 or more experiments. We attribute value 1 to the dummy variable Low understanding for all subjects who were in the last decile either according to their total answering time, or according to their total number of mistakes in the control questions.

Table A-1: *Treatment effect on no-entrance rate*

Event	Seller		Buyer	Total
Loss-avoiding breach	0.721	~	0.756	0.739
	~		~	~
Gain-seeking breach	0.669	~	0.746	0.723
Total	0.710	~	0.751	0.731

Table A-2: *Rates of Success, Conditional on Renegotiation*

	Dep. Var.: Compensation Premium			
	Pooled		Sellers	Buyers
	Model (1)	Model (2)	Model (3)	Model (4)
Gain-seeking	11.544 ***	10.576 ***	10.745 ***	12.58 ***
	(2.004)	(2.812)	(2.926)	(2.727)
Buyer		-1.327		
		(3.460)		
Buyer x Gain		2.018		
		(3.996)		
Male		7.459 **	7.994 **	5.433
		(2.905)	(3.753)	(4.249)
Age		-0.099	-0.237	-0.105
		(0.333)	(0.758)	(0.380)
Experience		3.85 *	0.07	6.309 **
		(2.177)	(3.154)	(2.891)
Low Understanding		-19.446 ***	-31.726 ***	-13.364 ***
		(3.734)	(5.906)	(4.650)
N.obs.	665	665	334	331
R-squared	0.043	0.155	0.166	0.166

Notes: Linear regression on compensation premium with individual random effects. Symbols $***$, $**$, and $*$ indicate significance at the 1%, 5% and 10% level, respectively. Test on joint significance of Buyer and Buyers x Gains in Model (2) p=0.874. Male is a dummy variable taking value 1 for males and 0 otherwise; Age is the age of the subject; Experience takes value 1 if the subject is inexperienced, 1 if he participated in at most 2 experiments, and 3 if he participated in 3 or more experiments. We attribute value 1 to the dummy variable Low understanding for all subjects who were in the last decile either according to their total answering time, or according to their total number of mistakes in the control questions.

Table A-3: *Treatment Effect on Compensation Premium*

Appendix B: Experimental Instructions

(not for publication)

Here we report the instructions for the "Seller" treatment. Instructions for the "Buyer" treatment are available from the authors upon request. The parts in *[italics]* were red by the experimenter, but not printed on the subjects' copy of the instructions.

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 us will 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 in cash. Payments are confidential; no other participant will be told the amount you earned. All earnings are expressed in tokens, which will be converted to Euros at the end of the study at the rate of 1 Euro = 20 tokens.

In this study there will be two parts: I am now about to read the instructions for the first part.

Instructions for Part 1

Roles and tasks: At the beginning of the study, each participant will be assigned one of two roles: Seller or Buyer. Half of you will be assigned the role of Seller, and half of you will be assigned the role of Buyer. Your roles will be generated by the computer and will remain fixed throughout the 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 80 tokens. The Buyer expects to receive a benefit of 100 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 90 tokens. On the left side of the screen, you can see that the price is 90 and the production cost is 80, so the Sellers earnings from the contract will be 10 tokens (price minus production cost).

Likewise, on the right side of the screen, you will see that the price is 90 and the benefit to the Buyer is 100, so the Buyers earnings from the contract will also be 10 tokens (benefit minus price).

In this phase of the experiment, there are no decisions to make, and the contract is binding for both parties. *[Please, press OK.]*

Phase 2: Variation in the initial conditions. In this phase of the experiment, there can be a change in the initial conditions presented in phase 1. There are three possible scenarios:

A. The production costs of the Sellers unexpectedly increase from 80 tokens to 110 tokens. In this case, if the contract is performed as promised, the Seller loses 20 tokens (price minus production costs), while the Buyer still earns 10 tokens. *[Please, press OK].*
B. The Seller finds a better selling opportunity; that is, he could sell the good to a different buyer at the higher price of 110 tokens. In this case, the Seller earns 10 tokens if he performs the contract as promised. If the Seller breaches the contract, he earns 30 tokens by selling the good to the new buyer (at a price of 110 tokens minus his production cost of 80 tokens); however, in this case the original Buyer would earn 0 tokens, as someone else will get to buy the good in his place.
C. Nothing changes with respect to Phase 1.

Both parties are informed if any variation in the initial conditions occurred. Please note that if the contract is performed as promised, the earnings for the Buyer remain the same (10 tokens) in all three situations. If the contract is not performed, the Buyer loses his benefit from the contract and obtains 0 tokens, plus whatever compensation is agreed upon in Phase 3. *[Please, press OK]*

Phase 3: Perform the contract or ask for a renegotiation. The Seller cannot breach the contract, without the consent of the Buyer. The Seller has two options: he can perform the contract as promised in Phase 1 or he can renegotiate the contract.

- If the contract is performed as promised the Buyer earns 10 tokens and the Seller earns either 10 tokens (under scenarios B and C) or - 20 tokens (under scenario A).

If the Seller decides to fulfill the contract, the transaction is completed (i.e., the Buyer and the Seller will not enter into Phase 4);

- If the Seller asks to renegotiate the contract he can make an offer to the Buyer as compensation for breaching the contract. In this case, the Buyer and the Seller enter into Phase 4 (renegotiation).

If the renegotiation leads to an agreement between the two parties, then the original contract is cancelled and is replaced by the new agreement. Under scenarios A and C, if the original contract is breached the good is not produced and the Seller does not bear any production cost (and does not get any payment for selling the good, since there is no good to sell). Under scenario B, if the original contract is breached the Seller can produce the good and sell it to the external buyer.

If the Seller and the Buyer do not reach an agreement, the original contract is performed as promised.

Phase 4: Renegotiation. Parties have 4 rounds of renegotiation available to modify the original contract. Parties will alternate in making offers and counter-offers. If no agreement is reached by the end of the 4th round, the original contract is implemented.

- In the first round of renegotiation, the Seller can make an offer to the Buyer as compensation for breaching the contract. The Seller has 30 seconds to make his decision: you can see the remaining time on the top of your screen. The minimum offer is 0 and the maximum offer is 20. *[Note: Please, look at the screen: can you see a red cursor? To make an offer you simply need to move the cursor]*
  - Example 1: suppose you are the Seller and your production costs have increased. Suppose you want to make an offer of 5 tokens to the Buyer to breach the contract. *[Please, move the cursor so to set an offer of 5.]*

    How much would you earn in this case?

    If the Buyer accepts the offer, the contract is not performed and you lose 5 tokens (i.e., the amount you offered as compensation to the Seller for breaching the contract). *[Note: your earnings are reported on the right side of the screen]*. On the bottom-left side of the screen you can see a graph reporting the offer for each renegotiation round; the graph will display all the offers and counter-offers. *[The purple cue in the graph moves as the offer changes.]* In this case, the Buyer earns 5 tokens.

If the Buyer refuses your offer, there will be 3 additional rounds of renegotiating. How much do you earn if you don't reach an agreement by the end of the last renegotiation round? Your earnings are equal to - 20 tokens (i.e., you will face a loss of 20). That is, because you received 90 tokens (i.e., the price in the original contract), but you faced a cost of 110 tokens (i.e., the production costs after the unexpected variation). The Buyers earnings will remain equal to 10 tokens, as in the original contract. *[You can find your earnings for this case in the right part of the screen.]*

If you do not press OK within the 30 seconds your offer is not transmitted to the Seller. In the left part of the screen you can see a graph with the renegotiation round and the corresponding offer: the graph will display all the offers and counter-offers. *[Can you see that the purple cursor moves as you change the offer? Please, press OK.]*

- Example 2: Suppose you are the Seller and you have found a better selling opportunity. Suppose you want to make an offer of 5 tokens to the Buyer to breach the contract and be able to sell the good to a new buyer for a higher profit. *[Please, move the cursor so to set an offer of 5 tokens.]*

  How much would you earn in this case?

  If the Buyer accepts the offer, you can breach the original contract and you can sell the good at the higher price. Your earnings in this case are equal to 25 tokens. Why 25 tokens? From the new contract you earn 30 tokens (110 tokens from the new higher selling price - 80 tokens of production costs). You have to pay 5 tokens to the Buyer to breach the original contracts; hence you earn 30 tokens (from the new contract) - 5 tokens (compensation paid to Buyer to breach the initial contract) *[Note: your earnings are reported on the right side of the screen].* In this case, the Buyer earns 5 tokens. If the Buyer rejects your offer, there will be 3 additional rounds of renegotiation.

  How much do you earn if you don't reach an agreement by the end of the last renegotiation round? Your earnings are equal to 90 tokens (price in the original contract) - 80 tokens (production costs) = 10 tokens. The Buyers earning are equal to 10 tokens, as in the original contract. *[Note: you can read the earnings for the case of renegotiation failure on the bottom-right side of the screen]. [Please, press OK.]*

Please recall that the Seller have 30 seconds to state his offer. If the Seller does not press OK within 30 seconds, the offer will be equal to 0 tokens.

- In the second round of renegotiation, the Buyer is informed about the Sellers offer and has to decide whether to accept or reject it. If he accepts the offer, the original contract is cancelled and renegotiation ends. If he rejects the offer, he has to state a counter-offer. The Buyer has 10 seconds to decides whether to accept or reject: if he takes no action within 10 seconds the offer is automatically rejected. If the Buyer rejects the offer, than he has 30 seconds to state a counter-offer. If the Buyer do not press OK within 30 seconds, the offer will be equal to 20 tokens.
- In the third round of renegotiation, the Seller is informed about the Buyers counter-offer and has to decide whether to accept or reject it. If he accepts the counter-offer, the original contract is cancelled and renegotiation ends. If he rejects the counter-offer, he has to state a new offer. The Seller has 10 seconds to decides whether to accept or reject: if he takes no action within 10 seconds the offer is automatically rejected. If the Seller rejects the offer, than he has 30 seconds to state a counter-offer. If the Seller does not press OK within 30 seconds, the offer will be equal to 0 tokens.
- In the fourth round of renegotiating, the Buyer is informed about the Sellers new offer and has to decide whether to accept it or to reject it. If the Buyer accepts the offer, the original contract is cancelled. If the new offer is rejected, the original contract is performed. Regardless of the choice made by the Buyer, this last round ends the renegotiation, and Phase 4 ends. The Buyer has 10 seconds to decides whether to accept or reject: if he takes no action within 10 seconds the offer is automatically rejected.

Phase 5: Earnings. The screen will display your earnings for the period, the cumulated earnings, and the earnings of your counterpart for the period.

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.

Periods, groups, and private account. The task will be repeated for 18 periods. In each period the computer will form groups of two – one Seller and one Buyer. You can see the number of the current period in the upper-left corner of the screen. In Phase 2 of each

period, one of the three scenarios (A, B, or C) occurs. The sequence of 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 deposited in your private account. Per-period earnings will cumulate in your account as well. In case you were to suffer a loss in a period, the tokens will be subtracted from your private account. In the upper-right part of the screen, you can see the balance of tokens in your private account.

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 18 periods, and at the beginning of each period the computer will 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: an increase in the production costs or a better outside selling opportunity. The occurrence of each 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 perform the original contract as promised or renegotiate the agreement with the Buyer;
- There will be at most 4 rounds of renegotiation. The Seller will make the first offer to breach the contract. If there is no agreement at the end of the fourth round, the original contract is performed.

Earnings accumulate from period to period and are added to (or subtracted from) your private account. *[Is everything clear?]* Before starting, please answer a few additional questions.

Instructions for Part 2

Decision task. In this part you must decide how to allocate some tokens. You have to take two decisions: one for scenario 1 and the other for scenario 2.

In Figure 1 you can see scenario 1: 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 the other gets 30. In the next allocation, you get 1 and the other gets 29. In the last allocation, in the bottom-right corner, you get 20 and the other gets 10. To select the favorite allocation, you have to press on the desired cell and confirm your choice.

FIGURE 1: SCENARIO 1

Let us now consider scenario 2 in Figure 2. As before, each cell represents a given allocation of tokens between you and another participant. Please look at the first cell in the upper-left corner: in this distribution you get 0 tokens and the other gets 0. In the next allocation, you get 1 and the other loses 1 token. In the last allocation, in the bottom-right corner, you get 20 and the other loses 20 tokens.

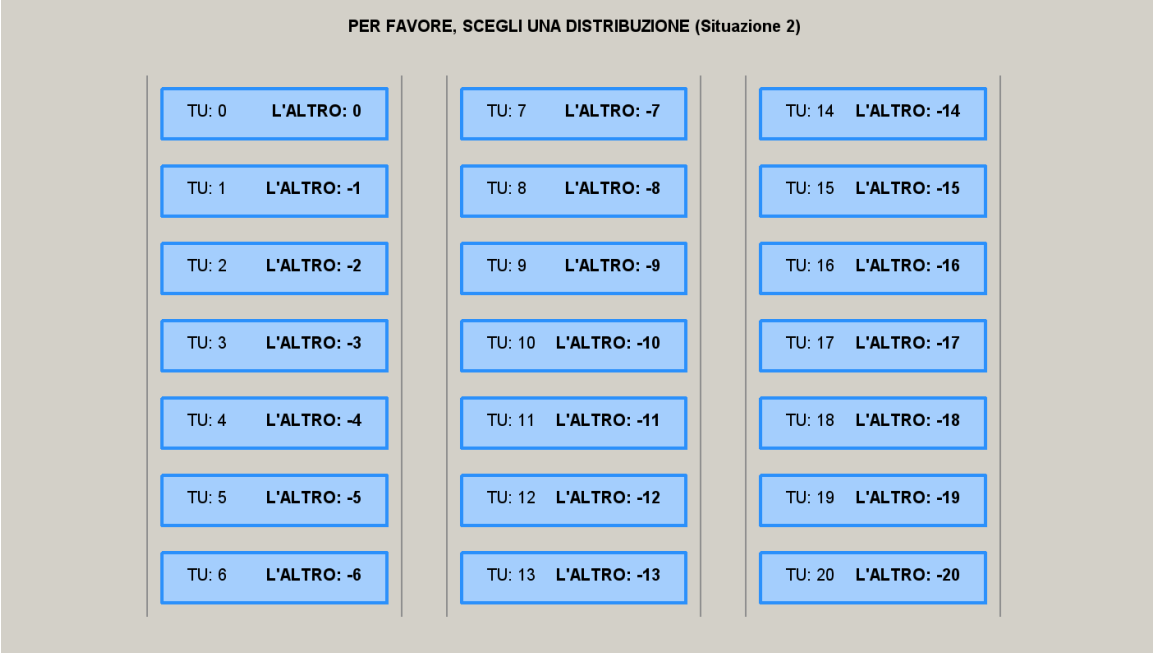

FIGURE 2: SCENARIO 2

Groups and earnings. Each one of you will take 2 decisions: one for each scenario. The computer will forms randomly groups of two and only one decision for each group will be carried over. The implemented choice could hence be your choice or the choice of the other person in your group. In addition, the relevant choice could be the one for scenario either 1 or 2. You will know whether your choice will be implemented only at the end of the studio; please pay attention to all your choices.

Appendix 3: Screenshots

(not for publication)

Here we present the screenshots of three possible scenarios presented to subjects in Part 1 of the experiment, under the "Seller" treatment.

FIGURE 3: SCENARIO A – INCREASE IN PRODUCTION COSTS

FIGURE 4: SCENARIO B – BETTER SELLING OPPORTUNITY

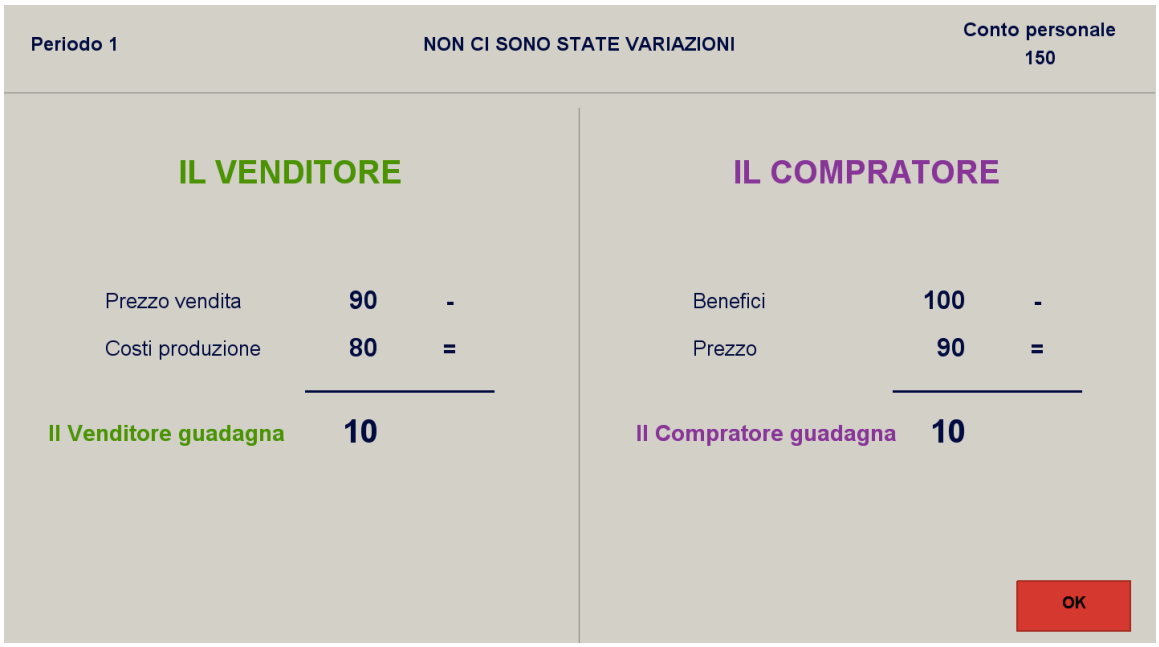

FIGURE 5: SCENARIO C – NOTHING CHANGES