

ISSN 1936-5349 (print)
ISSN 1936-5357 (online)

HARVARD

JOHN M. OLIN CENTER FOR LAW, ECONOMICS, AND BUSINESS

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AND MARKET FORECLOSURE:
FURTHER EXPERIMENTAL RESULTS

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Discussion Paper No. 718

07/2012

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Exclusive Dealing and Market Foreclosure: Further Experimental Results

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Abstract

This paper reports further experimental results on exclusive dealing contracts. We extend Landeo and Spier's (2009) work by studying Naked Exclusion in a strategic environment that involves a four-player, two-stage game. In addition to the roles of seller and buyers, our experimental environment includes the role of a potential entrant (a fourth passive player). Our findings are as follows. First, payoff endogeneity increases the likelihood of exclusion. Second, communication between the potential entrant and the buyers increases buyers' coordination on their preferred equilibrium (equilibrium with entry) and hence, reduces the likelihood of exclusion. Entrant-buyers communication also induces more generous offers.

Journal of Institutional and Theoretical Economics, 168, 2012, pp. 150-170.

^{*}University of Alberta Economics Department and Yale Law School, and Harvard Law School. Claudia Landeo acknowledges financial support from Northwestern University School of Law and the University of Alberta, and the hospitality of the Harvard Law School and Northwestern University School of Law. Kathryn Spier acknowledges financial support from the Harvard Law School. We wish to thank Christoph Engel, Janice Nadler, and Ansgar Wohlschlegel for helpful discussions and comments. We are grateful for comments from conference participants at the 2011 Max Planck Institute-University of Bonn Seminar on Testing Contracts, and the 2011 Annual Meeting of the American Law and Economics Association. We thank Tim Yuan for programming the software used in this study. The usual qualifier applies.

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1 Introduction

Over the last three decades, exclusive dealing contracts have captured the attention of academic researchers and public policy makers alike. Starting in the 1970's, ROBERT BORK [1978], RICHARD POSNER [1976] and other legal scholars associated with the Chicago School argued that incumbent producers could not profitably use exclusive dealing contracts to exclude more efficient rivals from the market. According to the Chicago School, exclusive dealing contracts and related business practices served legitimate business goals, including the prevention of free riding and the protection of relationship-specific investments.¹ More recently, however, researchers have used the tools of non-cooperative game theory to illustrate how and when exclusive contracts can serve purely anticompetitive objectives (RASMUSEN, RAMSEYER, AND WILEY [1991]; SEGAL AND WHINSTON [2000]).

The theoretical literature on exclusive dealing and market foreclosure is interesting and subtle. RASMUSEN, RAMSEYER AND WILEY [1991] and SEGAL AND WHINSTON [2000] showed how an incumbent monopolist can use exclusive dealing contracts to deter more efficient competitors from entering the market when there are economies of scale in production.² When sufficiently many buyers have signed exclusive deals, the entrant cannot achieve minimum efficient scale and entry is thereby rendered unprofitable. Thus, when a buyer signs an exclusive deal, he imposes a negative externality on the other buyers. When the incumbent seller must make the same offer to all buyers (so he cannot discriminate in his contract offers), both “exclusion equilibria” and “entry equilibria” can arise (SEGAL AND WHINSTON [2000]). If the market is foreclosed, it is the result of a coordination failure

¹The Chicago School scholars argued that the amount of money that the incumbent would need to pay to induce the reluctant buyers to accept exclusive deals – namely their increased consumer surplus from entry – would swamp the incumbent's future gain from exclusion (the monopoly rents). See POSNER's [1976] critique of *United States v. United Shoe Machinery Corporation* [1922].

²Exclusive contracts are modeled as transfers from the incumbent to a buyer in exchange for the buyer's promise not to buy from any other seller. See also FUMAGALLI AND MOTTA [2006] and SIMPSON AND WICKELGREN [2007].

among the buyers. Whether and when market foreclosure will occur is therefore an empirical question.

Despite the active theoretical literature, there has been very little empirical work on this topic. This reflects the scarcity of relevant real-world data since, in practice, contracts are drafted and negotiated in private business settings and are not easily observed by researchers. LANDEO AND SPIER [2009] present the first examination of exclusive dealing in a laboratory setting. Their work also contributes to the experimental economics literature by providing the first experimental study of coordination games with complete information and payoffs endogenously determined by the previous move of a strategic player.³ Their experimental environment involves a three-player, two-stage game. Human subjects played the roles of a seller (the incumbent monopolist) and two buyers.⁴ Their findings suggest that without adequate communication channels and in the absence of discrimination, subjects often fail to coordinate on their preferred equilibrium and entry is consequently deterred. Better communication between the buyers leads to more generous offers from the seller and a greater likelihood of entry. Interestingly, LANDEO AND SPIER [2009] show that the buyers are more likely to accept exclusive contracts, reducing the likelihood of entry, when the incumbent seller is played by another human subject (so the offers are “endogenous”). This finding suggests the presence of social preferences (i.e., the buyers’ fairness and reciprocity considerations) and points out the importance of the seller’s intentionality.

This paper reports further experimental results on exclusive dealing contracts and market foreclosure. We extend LANDEO AND SPIER’s [2009] work by studying Naked Exclusion in a strategic environment that involves a four-player, two-stage game. In addition to the roles of seller and buyers, our experimental environment includes the role of a potential entrant (a fourth passive player).⁵ The potential entrant is a captive player because he is at the collective mercy of the incumbent monopolist (the contract designer) and the two buyers. The explicit presence of a potential entrant might induce the buyers and the strategic seller to consider this fourth party, and hence it might affect the exclusionary power of exclusive dealing contracts. Specifically, we assess the robustness of LANDEO AND SPIER’s [2009] findings regarding the effects of payoff endogeneity to the explicit presence of an entrant, and explore the effects of communication between the potential entrant and the buyers on the incumbent seller’s offers and the likelihood of exclusion. Note that although this paper is motivated by contractual agreements between firms, firms are run by individuals and contracts are negotiated by human agents. Therefore, there is reason to believe that regards-for-others considerations might also be present in these settings (DUFWENBERG ET AL. [forthcoming]).

Our experimental design encompasses two buyer-payoff treatments, endogenous payoffs and exogenous payoffs. For the endogenous-payoff treatment, a human

³A more recent experimental paper is SMITH [2011].

⁴In their exogenous-payoff treatment, subjects play the role of a buyer only.

⁵We will use the terms *potential entrant* and *entrant* interchangeably.

subject (representing the incumbent seller) chooses the contract offers. For the exogenous-payoff treatment, we take the very same offers observed in the endogenous payoff treatment and administer them to a separate set of subjects in an exogenous fashion (through the computer). We also consider two communication treatments, no-communication and one-way unstructured entrant-buyers communication (where the potential entrant sends unstructured messages to both buyers, after the buyers receive the proposal from the seller but before the buyers make their decisions). A combination of a subset of these treatments generates three experimental conditions.⁶ The subjects, a pool of undergraduate and graduate students from Harvard University, were paid according to their performance.

Our main findings are as follows. First, endogeneity increases the likelihood of exclusion. That is, the buyers are more likely to accept exclusive deals when these deals are endogenously designed by another subject in the laboratory rather than exogenously generated. Second, one-way unstructured communication between the potential entrant and the buyers increases buyers' coordination on their preferred equilibrium (equilibrium with entry) and hence, reduces the likelihood of exclusion. Communication between the entrant and the buyers also significantly affects the offers chosen by the sellers, inducing more generous offers. Our findings underscore the importance of combining experimental and behavioral observation with theoretical modeling.⁷

The rest of the paper is organized as follows. Section 2 outlines the theoretical model and predictions. Section 3 discusses the qualitative hypotheses. Section 4 presents the experimental design. Section 5 examines the results from the experimental sessions. Section 6 outlines an extension of the analysis of the effects of the explicit presence of a potential entrant.⁸ Section 7 concludes the paper and discusses avenues for future research.

2 Theoretical Framework

Consider the strategic environment presented in RASMUSEN, RAMSEYER, AND WILEY [1991] and SEGAL AND WHINSTON [2000] (hereafter RRW-SW). In the first stage, the incumbent monopolist simultaneously offers exclusive contracts to the buyers. The exclusive contracts are modeled as transfer payments, x , from the incumbent seller to each of the buyers in exchange for a buyer's exclusivity. After observing both offers, the buyers simultaneously decide whether to accept or reject their respective offers (we will refer to this as the "acceptance subgame"). In the

⁶Note that the endogenous-payoffs environment, in which the buyers might be forced to consider not only the potential entrant but also the seller, is the most empirically-relevant setting. In order to achieve efficiency in the collection of data, we explored the effects of communication under endogeneity only. See the Experimental Design section for details.

⁷Although this paper is motivated by exclusive dealing and market foreclosure, our findings and insights might apply to other contexts as well. See LANDEO AND SPIER [2009] for details.

⁸We will use the terms *explicit presence* and *presence* interchangeably.

second stage, the potential entrant decides whether to enter the market. Due to the presence of scale economies, entry will occur only if sufficiently many buyers rejected the incumbent seller's offers in the first stage. Prices are determined in the third stage. If entry occurred in stage two, the incumbent seller and the entrant compete in price for any buyers who rejected the incumbent's offers in stage one. Absent entry, the incumbent seller sets monopoly prices and extracts monopoly rents.

Our experimental implementation of the general RRW-SW framework follows LANDEO AND SPIER [2009]. We consider only two buyers. The incumbent seller can deter entry and maintain monopoly power over both buyers when even a single buyer accepts an exclusive deal in stage one. Therefore entry occurs only when both buyers refuse the incumbent seller's offers. We focus our attention on the first stage of the RRW-SW framework, assuming that the continuation payoffs of the four players reflect subgame-perfect behavior in stages two and three.⁹ That is, we experimentally study the incumbent seller's offers to the buyers, and the acceptance subgame implied by these offers.

We use the following numerical example.¹⁰ If both buyers reject the seller's offers in stage one, then the entrant enters and captures the market from the incumbent seller in stages 2 and 3. The incumbent seller's payoff is 0, each buyer's consumer surplus 1000, and the entrant's payoff is 1000. If one or both buyers accept the offer x , then the entrant stays out. The incumbent seller's continuation payoff from selling to a single buyer is 975, each buyer's continuation payoff is 0, and the entrant's continuation payoff is 0. Hence, the seller's stage one payoff in case of acceptance of the offers by one or both buyers is equal to 1950 minus the offer(s) accepted, x , and each buyer's payoff is x . Note that entry is socially efficient in this example. The social surplus when entry occurs, 3000, exceeds the social surplus when the market is foreclosed, 1950. To reduce subjects' computational costs, we restrict the incumbent seller's offers to $x \in \{100, 650, 800\}$. Note that the entrant's payoff is set in a way that allows for similar payoff structures in case of rejection and acceptance by both buyers of offers equal to 650 (the mode offers observed in Landeo and Spier, 2009, under no-discrimination). Specifically, the players' payoffs in case of rejection by both buyers are equal to $(0, 1000, 1000, 1000)$, for the seller, buyers and entrant, respectively. In case of acceptance by both buyers and offers equal to 650, the payoffs are equal to $(650, 650, 650, 0)$, for the seller, buyers and potential entrant, respectively.

The buyers' acceptance subgame, presented in Table 1, corresponds to a symmetric coordination game with two pure-strategy Nash equilibria, an exclusion equilibrium (with acceptance by both buyers) and an equilibrium with entry (with rejection

⁹Including all three stages would require buyers to use backward induction to compute their payoffs in the acceptance subgame, and might introduce noise into the experimental results (JOHNSON ET AL. [2002]). A potential shortcoming of our design might come from the vulnerability of players' decisions to game specification due to the violation of truncation consistency (BINMORE ET AL. [2002]).

¹⁰We follow LANDEO AND SPIER [2009] except for the addition of the entrant's payoff.

Table 1
Buyers' Payoffs Matrix for the Acceptance Subgame

	Accept	Reject
Accept	(x, x)	$(x, 0)$
Reject	$(0, x)$	$(1000, 1000)$

by both buyers). The payoff structure resembles a stag hunt game (i.e., a game of assurance), in which strategic uncertainty is present. In fact, in this strategic setting, the buyers experience conflict between their common motive to coordinate on (reject, reject) and earn 1000 each, and their private motive to avoid the risk of getting nothing if the other person accepts. Then, although the equilibrium with entry is Pareto dominant, we might expect the exclusion equilibrium to be chosen in the lab. Finally, note that the equilibrium with entry is risk dominated (HARSANYI AND SELTEN [1988]) by the exclusion equilibrium for transfers $x > 500$. Hence, for offers $x \in \{650, 800\}$, the exclusion equilibria are risk-dominant.

The following proposition characterizes the set of subgame-perfect Nash equilibria.

PROPOSITION:¹¹ *There are multiple subgame perfect Nash equilibria, some of which lead to exclusion and others which lead to entry.¹² In the exclusion equilibria, the incumbent offers $x \in \{100, 650, 800\}$ and both buyers accept. In the equilibria with entry, the incumbent offers $x \in \{100, 650, 800\}$ and both buyers reject.*

3 Qualitative Hypotheses

The qualitative hypotheses are as follows.

HYPOTHESIS 1: *Under offers greater than or equal to (650, 650), endogeneity (where offers are made by human subjects) will increase the likelihood of exclusion; otherwise, endogeneity will reduce the likelihood of exclusion.¹³*

Building on previous findings from experimental economics and social psychology regarding fairness (LOEWEINSTEIN ET AL. [1989], reciprocity (SOBEL [2005]) and the role of intentionality on triggering social preferences (BLOUNT [1995]), LANDEO AND SPIER [2009] explore the effect of payoff endogeneity (contracts designed by other human subjects) on exclusion. In their experimental environment, the role of seller is played by a human partner only under the endogenous-payoffs conditions.

¹¹This proposition corresponds to LANDEO AND SPIER's [2009] Proposition 1. For a more general version of this proposition and a formal proof, see SW's [2000] Proposition 1.

¹²There are also mixed-strategy equilibria in the acceptance subgame. We restrict attention here to pure-strategy equilibria.

¹³This hypothesis corresponds to LANDEO AND SPIER's [2009] Hypothesis 3.

The seller gets a payoff equal to zero in case of rejection by both buyers. Under the exogenous-payoffs conditions, on the other hand, the offers are made by the computer. Buyers know the nature of the seller. LANDEO AND SPIER [2009] find that endogeneity increases the likelihood of exclusion. In fact, the buyers are more likely to accept exclusive deals when these deals are endogenously designed by another subject in the laboratory rather than exogenously generated. These findings suggest the presence of buyers’ fairness and reciprocity considerations.

Our experimental setting is similar to LANDEO AND SPIER [2009] except for the explicit presence of a potential entrant (a fourth passive player). Note that the entrant gets a payoff greater than zero only in case of rejection by both buyers. Then, the explicit presence of an entrant might act as a *focal point* device, i.e., “a signal that coordinates [buyers’ mutual] expectations” (SCHELLING [1960, p. 54]).¹⁴ Hence, it might induce buyers to choose their preferred equilibrium (the entry equilibrium). Note also that the degree of interaction between the entrant and the buyers (which might affect the focal-point effect) is the same in both the endogenous and exogenous environments. Then, we might expect that the focal-point effect of the presence of the entrant will influence buyers’ decision-making in similar way in both environments.

We do not claim that the focal-point effect of the presence of a potential entrant necessarily reflects buyers’ regards for the entrant’s well-being. In fact, in environments in which the buyers and the entrant do not interact (no-communication environments), buyers’ regards for the entrant’s well-being might be weakly elicited only.¹⁵ In the no-communication environments, a division of the pie that involves equal payoffs for the two buyers and the seller, i.e., a pair of offers equal $(650, 650)$, might then reflect the normative expectations about fairness (i.e., buyers might not exhibit regards for the potential entrant’s payoff). Offers equal to or greater than $(650, 650)$ might be perceived by the buyers as “kind” offers. Given that buyers’ considerations about fairness will be stronger in case of a human seller, we might infer that the elicitation of reciprocity considerations will also be stronger under payoffs endogeneity. As a consequence, we might expect that the likelihood of rejection of these offers will be lower for the endogenous payoff conditions.¹⁶ Following the same line of analysis, for offers equal to $(100, 100)$, we expect a higher likelihood of rejection under endogeneity.

Hence, for offers greater than or equal to $(650, 650)$, we might expect a higher likelihood of exclusion under the endogenous-payoffs environment (compared to the exogenous-payoff environment), i.e., an alignment with LANDEO AND SPIER’s [2009]

¹⁴Schelling argues that “[coordination problems] provide some focal point for a concerted choice, some clue to coordination, some rationale for the convergence of the participants’ mutual expectations” (SCHELLING [1960, p. 90]). He also states that “[a] prime characteristic of ... focal points is some kind of prominence or conspicuousness” (SCHELLING [1960, p. 57]).

¹⁵See Section 6 for details.

¹⁶This analysis assumes that endogeneity does not affect the focal-point effect of the explicit presence of an entrant. Note, however, that endogeneity might affect the likelihood of exclusion in a similar way if endogeneity also weakens the focal-point effect of the presence of an entrant.

findings.

HYPOTHESIS 2: *One-way unstructured entrant-buyers communication will reduce the likelihood of exclusion and increase the seller's offers.*

BOHNET AND FREY [1999] study the effects of social proximity on the elicitation of social preferences in dictator environments. Their findings suggest that the elicitation of regards for the recipient varies inversely with social distance between the proposer and the recipient. They argue that “[w]hen social distance decreases, the ‘other’ is no longer some unknown individual ... but becomes an ‘identifiable victim’ (THOMAS C. SCHELLING [1968])” (BOHNET AND FREY [1999, p. 335]).¹⁷ ANDREONI AND RAO [forthcoming] study the effects of communication on eliciting empathy and altruism in dictator games. They find that one-way communication between the recipient and the offeror increases the offeror’s proposal. We might expect that one-way unstructured communication between the entrant and the buyers will increase social proximity and hence elicit buyers’ regard for the entrant’s well-being. Then, communication between the entrant and the buyers might enhance the focal-point effect of the presence of an entrant. As a consequence, communication might increase buyers’ coordination on their preferred equilibrium (the equilibrium with entry) and hence, reduce the likelihood of exclusion. Communication between the entrant and the buyers might also enhance buyers’ coordination on their preferred equilibrium (equilibrium with entry) by just making the presence of the potential entrant more salient, i.e., a *pure*-salience effect.

BLUME AND ORTMANN [2007] argue that the effect of buyer-buyer communication might be reduced by the presence of safer alternatives. We hypothesize that the effect of entrant-buyers communication might be affected by safer alternatives in a similar way. As a result, entrant-buyers communication might have a weaker effect on reducing the likelihood of exclusion in case of offers higher than (500, 500), for which the Pareto efficient outcome is also the risk-dominated one. The seller then has an additional incentive (not present in the no-communication environment) to make higher offers. Hence, we might expect higher offer levels under entrant-buyers communication as a way to attenuate the negative effect of entrant-buyers communication on exclusion.

4 Experimental Design

We specify the experimental setting in a way that satisfies the assumptions of the theory. To ensure control and replicability, a free-context environment is constructed.¹⁸

¹⁷Note that our experimental environment is characterized by anonymity. However, communication might still reduce social distance by allowing buyers to learn more about the potential entrants. SCHELLING [1968], as cited in BOHNET AND FREY [1999, p. 339], states that “the more we know, the more we care.” See also HOFFMAN ET AL. [1996] and CHARNESS ET AL. [2007].

¹⁸If our findings in this simple environment do not conform to the theory, there is little hope that this theory can explain subjects’ behavior in more complex settings (see DAVIS AND HOLT

Human subjects paid according to their performance are used in this study. A concern with our study, a concern that is common to all experimental research, is its external validity. Although our experiment cannot predict the effects of exclusive contracts in richer environments, the experiment provides evidence regarding whether payoff endogeneity and one-way entrant-buyers communication in an environment such as the one we have structured here will have the predicted effects.¹⁹

The experimental design consists of two buyers' payoff treatments and two communication treatments. The buyers' payoff treatments are exogenous payoffs (EX) and endogenous payoffs (EN). The communication treatments are no-communication (NC) and one-way entrant-buyers unstructured communication (C_E). A combination of a subset of these treatments generates three experimental conditions, (EN/NC), (EX/NC) and (EN/ C_E). Note that the endogenous-payoffs environment, in which the buyers might be forced to consider not only the potential entrant but also the seller, is the most empirically-relevant setting. Note also that we might expect that the focal point effect of the presence of an entrant and the effect of communication on strengthening this focal point effect will be stronger under exogeneity. In order to achieve an efficient collection of data, we decided to assess the effects of communication under the most empirically-relevant (and least favorable) scenario only, i.e., under endogeneity.

4.1 The Games

Procedural regularity is accomplished by developing a software program that permits subjects to play the game by using networked personal computers.²⁰ The experiment is a four-player, two-stage game. Subjects play the role of seller (the incumbent monopolist), buyer 1, buyer 2, or potential entrant. We apply neutral labels to the subjects' roles (Player A, for the seller, Players B1 and B2 for the two buyers, and Player C for the potential entrant) because we consider that the use of more realistic labels (i.e., seller, buyer, entrant) are not necessary to improve subjects' understanding due to the simple experimental environment, and that these labels might generate noise in the subjects' responses due to the degree of identification with the role described by the label. Note that the roles of buyer 1 and buyer 2 are similar. We use a laboratory currency called the "token" (650 tokens = 1 US dollar).

The benchmark game corresponds to the environment presented in SEGAL AND WHINSTON [2000] for the case of no-discrimination (i.e., endogenous payoffs/no communication condition). In the first stage, the seller makes simultaneous exclusionary offers to both potential buyers. The offers consist of transfers of money from the seller to the buyers in exchange of agreeing to buy only from that seller. In the

[1993]). Hence, our experiment might provide useful feedback to theorists.

¹⁹There is a trade-off between control and external validity. Experimental methods are complementary techniques to field data analysis.

²⁰Software screens and written instructions are available upon request.

second stage, after observing both offers, each buyer decides whether to accept or reject the exclusive contract.

Variations of this benchmark game satisfy the other experimental conditions: (i) in the exogenous payoffs treatment, the computer makes the offers in the first stage. Subjects are informed that the offers are made by the computer. Each exogenous session is matched with a previously run endogenous session and the offers made by the computer are programmed to follow the pattern of offers made by the human seller in the corresponding endogenous session.²¹ Note also that both the exogenous and endogenous conditions involve two stages; and, (ii) in the communication treatment, unstructured messages from the entrant to the buyers (through computer terminals) are allowed. The entrant has the option to send simultaneous unstructured messages to both buyers. Each buyer observes both messages. Communication occurs immediately after the information about the offers is provided to the buyers, and before each buyer reports her *decision* of acceptance or rejection of the offer. The seller is not informed about the content of the messages.

4.2 The Experimental Sessions

We ran three 70-minute to 90-minute sessions of 12 to 16 subjects (48 subjects in total, 48 observations per condition) at experimental laboratories of Harvard University. The subject pool was recruited from undergraduate and graduate programs at Harvard University, mostly by posting advertisements on public boards and on electronic bulletin boards. The pool of subjects encompasses graduate and undergraduate students from a variety of fields of study.²²

At the beginning of each session, written instructions were provided to the subjects.²³ The instructions about the game and the software used were verbally presented by the experimenter to create common knowledge. Subjects were informed about the random process of allocating roles and about the randomness and anonymity of the process of forming groups. Game structure, possible choices, and payoffs were common information among subjects. Subjects were informed only about the game version they were assigned to play. Subjects were also instructed that they would receive the dollar equivalent of the tokens they hold at the end of the experiment, and they were informed about the token/dollar equivalence. Finally,

²¹To make the endogenous and exogenous conditions comparable, for each exogenous payoff session, the formation of groups (pair of buyers in this case) replicated the randomization process of forming groups followed by the corresponding endogenous session. To ensure that the sequence of offers received by each individual buyer in the exogenous and endogenous conditions followed the same pattern, each buyer in the exogenous payoff conditions was matched with a buyer in the corresponding endogenous condition and followed the same pattern of offers (and matching process with other buyers).

²²The session for the exogenous payoffs (no human seller) condition was shorter. The number of observations corresponds to the total number of groups per condition. Each condition involves 4 groups per round, and 12 rounds in total. (See description of the actual rounds below.)

²³See the Appendix for a sample of the instructions for the EN/NC condition.

subjects were required to fill out a short questionnaire to ensure their ability to read the information tables. The rest of the session was entirely played using computer terminals and the software designed for this experiment.

The experimental sessions encompassed four practice rounds. In case of the endogenous payoffs conditions, each player experienced the roles of seller buyer, and entrant at least once; in case of the exogenous payoff condition, each player experienced the roles of the buyer and entrant at least once. Note that the outcomes from the four practice rounds were not considered in the computation of players' payoffs. Hence, during these practice rounds subjects had an incentive to experiment with the different options and hence, learn about the consequence of their choices. After the last practice round, every participant was randomly assigned a role, and played twelve actual rounds. At the beginning of each round, new four-subject groups were randomly and anonymously formed.²⁴ At the end of each round, subjects received information only about their group results and payoffs. Communication between players was done through a computer terminal, and therefore, players were completely anonymous to one another. Hence, this experimental environment did not permit the formation of reputations. Given the randomization process used to form groups, and the diversity of payoff matrices that subjects confronted (due to the heterogeneity of offers), the twelve actual rounds do not represent stationary repetitions of the game. Consequently, we can treat each round as a one-shot experience.

The average payoff was \$34, for a time commitment of approximately 80 minutes. (The participation fee was \$10 per hour.) At the end of each experimental session, subjects received their monetary payoffs in cash.

5 Results

5.1 Data Summary

Table 2 provides the descriptive statistics for the sum of seller's offers, exclusion rate, seller's payoff, and sum of buyers' payoffs. Following LANDEO AND SPIER [2009], we define the sum of seller's offers as the sum of offers made by the seller to both buyers, and the exclusion rate as the percentage of total groups with one or both buyers accepting the seller's offer. The data suggest that endogeneity increased exclusion, and communication negatively affected exclusion.

Table 3 describes the offers made by the sellers and the buyers' responses per pair of offers (frequencies and exclusion rates per pair of offers). For example, in the EN/NC condition, the sellers chose to offer (650, 650) in 40 out of 48 observations. Thus, these offers were the mode offers under no-communication (83% of total offers). When these offers were endogenous, in 95% of these observations, one or both buyers accepted. When these offers were part of the exogenous condition, then only

²⁴The computer was programmed to form groups taking into account the maximization of the number of different groups in a twelve-period session.

Table 2
Descriptive Statistics

Condition	Mean Sum of Seller's Offers ⁽¹⁾	Exclusion Rate	Mean Seller's Payoff ⁽²⁾	Mean Sum of Buyers' Payoffs
EN/NC [48]	1350.00 (112.99)	.96	822.92 (391.66)	1129.17 (396.24)
EX/NC [48]	1350.00 (112.99)	.35	434.38 (600.28)	1547.92 (624.16)
EN/C _E [48]	1393.75 (343.58)	.83	563.54 (438.29)	1394.79 (449.50)

Note: ⁽¹⁾The offers made by the computer in the exogenous payoffs session replicate the pattern of seller's offers in the corresponding endogenous payoffs session. ⁽²⁾For the exogenous payoffs condition, the Mean Seller's Payoff corresponds to the mean computer's payoff; standard deviations are in parentheses; sample sizes (number of groups) are in brackets.

33% of the offers were accepted.

Under communication, on the other hand, offers equal to (800, 800) were the mode offers (54% of total offers). These offers were accepted by one or both buyers 96% of the time. Although offers equal to (100, 100) can be supported as a SPNE, allowing the seller to exclude the buyer at low cost, our findings indicate that these offers were rarely made by the sellers (6% of total offers for the EN/C_E environment) and were always rejected by the buyers. Thus, the buyers' responses are aligned with the risk dominance predictions (HARSANYI AND SELTEN [1988]). These findings are also suggestive of strategic behavior by the seller (i.e., the seller's anticipation that the buyers are more likely to reject offers following communication by the entrant).

5.2 Analysis

Our regression analysis involves standard errors that are robust to general forms of heteroskedasticity and hence, they account for the possible dependence of observations within session.²⁵

Exclusion Rates

Table 4 presents the effect of each treatment on exclusion. We take pairs of conditions and estimate probit models.²⁶ Each probit model includes a treatment dummy

²⁵Note that each person plays in 12 rounds and interacts with other players during the session.

²⁶We assess (i) the effect of payoff endogeneity in no-communication environments, and (ii) the effect of communication, in endogeneity environments.

Table 3

Frequency of Seller's Offers and Exclusion Rate per Pair of Offers

Condition	(100, 100)	(650, 650)	(800, 800)	Total
EN/NC	0	40 [.95]	8 [1.00]	48
EX/NC	0	40 [.33]	8 [.50]	48
EN/C _E	3 [.00]	19 [.79]	26 [.96]	48

Note: Exclusion rates are in brackets.

Table 4

Effects of Treatments on the Probability of Exclusion
(Tests of Differences across Conditions)

Endogeneity		Communication	
Conditions	Marginal Effect	Conditions	Marginal Effect
EX/NC v. EN/NC	.6042*** (.0002)	EN/NC v. EN/C _E	-.1163*** (.0037)
Observations	96	Observations	96

Note: The columns report the change in the probability of exclusion due to endogeneity and communication (probit analysis using sessions as clusters; marginal effects reported); robust standard errors are in parentheses; *** denotes significance at the 1% level; observations correspond to number of groups.

variable and round as its regressors. The treatment dummy variable is constructed as follows. For example, for the case of the probit model that assesses the effect of communication under endogenous offers, the dummy variable will take a value equal to 1 if the observation pertains to the condition EN/C_E, and a value equal to 0 if the observation pertains to the condition EN/NC.²⁷ Marginal effects of treatments are reported here.²⁸ The standard errors computed are robust to general form of heteroskedasticity and hence, they account for the possible dependence within session.²⁹

The effects of endogeneity on the probability of exclusion are reported in the second column of Table 4. Endogeneity significantly increases the likelihood of exclusion. This result can be explained as follows. Under endogeneity, fairness and

²⁷The data for conditions EN/C_E and EN/NC are pooled to estimate this probit model.

²⁸Given that probit magnitudes are difficult to interpret, we report the marginal effects.

²⁹The variable round was statistically significant only for the probit models involving EN/NC v. EN/C_E. The marginal effect is equal to .0150 (p -value = .002).

reciprocity considerations are strongly elicited. Hence, buyers will be more willing to accept seller’s offers greater than or equal to (650, 650), which represent 100% of the total offers, for the no-communication environment. As a result, higher exclusion rates are observed under endogeneity (96 v. 35%, for the EN/NC and EX/NC conditions, respectively). These results provide support to Hypothesis 1.

RESULT 1: *Endogeneity significantly increases the exclusion rate.*

The effects of entrant-buyers communication on the probability of exclusion are reported in the fourth column of Table 4. Communication significantly decreases the likelihood of exclusion (83% v. 96%, for the EN/ C_E and EN/NC conditions, respectively), which supports Hypothesis 2.³⁰ These results resemble LANDEO AND SPIER’s [2009] findings on the effects of buyer-buyer communication on buyers’ coordination on their preferred equilibrium. Importantly, in our setting, coordination is achieved without relying on explicit communication between buyers about their intended choices. These findings might suggest that the presence of an entrant acts as a focal-point mechanism, which is enhanced by one-way communication between the entrant and the buyers.

Note that communication might enhance the focal-point effect of the presence of a potential entrant through a *pure-salience* effect and/or through the elicitation of buyers’ regards for the entrant’s well-being. Most messages sent by the entrants underline the fact that (Reject, Reject) provide the highest payoffs for both buyers. For instance, an entrant sent the following messages to both buyers: “Please reject this proposal. Neither of you should settle for less than 1000 tokens. This offer is way too low.” Only few messages explicitly attempt to elicit social preferences toward the entrant (but some of them also involve some salience considerations). For instance, an entrant sent the following messages to both buyers: “Have some pity on this poor Player C? :(The offer’s not that great.” Given that the interpretation of the messages (and hence, the effect of the messages on buyers’ choices) is *subjective* in nature, we cannot rule out the possibility that these messages elicit buyers’ regards for the entrant.³¹

RESULT 2: *One-way unstructured communication between the entrant and the buyers significantly reduces the exclusion rate.*

Seller’s Offers

Table 5 reports the results of the analysis of the effect of communication on the mode sum of seller’s offers, i.e., probit estimation. Robust standard errors and

³⁰Regarding results 1 and 2, probit estimations and data corresponding to the last six rounds of play are available upon request. Note that the qualitative results still hold when only the last six rounds of play are considered.

³¹See Table A1 for a sample of entrants’ messages.

Table 5
Effect of Communication on the Likelihood of (650, 650) Offers
(Tests of Differences across Conditions)

Conditions	Marginal Effect
EN/NC v.	-.4980***
EN/C _E	(.0383)
Observations	96

Note: Probit analysis using sessions as clusters; marginal effects are reported; robust standard errors are in parentheses; *** denotes significance at the 1% level; observations correspond to number of groups.

marginal effects are reported.³² Note that pair of offers equal to (650, 650) are the mode seller’s offers under no-communication only. Our results indicate that communication significantly reduces the likelihood offers equal to (650, 650). In fact, when communication is allowed, sellers move from offering (650, 650) in the majority of the cases (83%) to offering (650, 650) in 40% of the cases and (800, 800) in 54% of the cases.³³ This seller’s behavior might be explained by the seller’s anticipation of higher buyers’ coordination (on rejection of the offers) under communication between the entrant and the buyers.³⁴

RESULT 3: *One-way unstructured communication between the entrant and the buyers significantly affects the choice of offers by sellers. It reduces the likelihood of (650, 650) offers.*

6 Effect of the Explicit Presence of a Potential Entrant: An Extension

We start the exploration of the effects of the explicit presence of a potential entrant by comparing Naked Exclusion in experimental environments with and without the explicit presence of a potential entrant.

6.1 Qualitative Hypothesis

The qualitative hypothesis regarding the effect of the presence of a potential entrant is as follows.

³²Regression analysis includes round as an additional regressor. The effect of round is statistically significant. The marginal effect is equal to .0643 (p -value = .029).

³³In the no-communication environment, offers equal to (800, 800) are rarely offered (17%).

³⁴Probit estimation and data corresponding to the last eight rounds of play are available upon request. Note that the qualitative results still hold.

HYPOTHESIS 3: *The explicit presence of a potential entrant will increase buyers' coordination on their preferred equilibrium (equilibrium with entry) and hence, reduce the likelihood of exclusion.*

Schelling argues that most coordination situations provide some focal point for the convergence of expectations. “Finding ... a key ... that is mutually recognized as the key becomes *the* key ... A prime characteristic of ... these ... focal points is some kind of prominence or conspicuousness” (SCHELLING [1960, p. 57], emphasis added.). We claim that the explicit presence of a potential entrant (and the fact that her payoff is greater than zero only in case of rejection by both buyers) might provide a *coordination key*.³⁵ Hence, we might expect that the presence of a potential entrant might act as a “focal-point mechanism,” facilitating buyers’ coordination on their preferred equilibrium (equilibrium with entry).

McAdams and Nadler state that “salience might work unreflectively, merely because it causes a certain strategy to be ‘on the mind’ of each subject, or reflectively, because it also causes each subject to expect his or her counterpart to play the salient strategy” (MCADAMS AND NADLER [2005, p. 117]). Following MEHTA ET AL. [1994], they conclude that “when subjects have an incentive to coordinate, they reason about what others will find salient” (MCADAMS AND NADLER [2005, p. 117]). In our strategic environment, strategic uncertainty related to rejection will be reduced only if a buyer believes the other buyer will also reject. Then, the focal point mechanism might require reflection.

We do not imply that this focal-point effect necessarily reflects buyers’ regards for the entrant’s well-being. Reflection might not necessarily elicit social preferences. Findings from previous experimental economics studies suggest that the elicitation of social preferences requires social proximity (BOHNET AND FREY [1999]; HOFFMAN ET AL. [1996]; CHARNES ET AL. [2007]), and that social proximity might be strengthened by communication (ANDREONI AND RAO [forthcoming], and more generally interaction between the relevant parties. Finally note that, although a fourth-player environment might induce buyers to consider the effects of their decisions not only on the seller’s payoff but also on the potential entrant’s payoff, ultimatum games with a passive third player suggests that the recipients might not care about the passive player’s well-being (GÜTH ET AL. [1998]). Hence, the presence of an entrant might simply reflect a *pure-salience* effect: it might make the (reject, reject) outcome more prominent for each buyer and hence, induce buyers to coordinate their expectations (i.e., induce the buyer to believe that the other buyer will also find this outcome more prominent, and hence, will choose it).³⁶

³⁵Mehta et al. add, “[Schelling’s] central idea [about salience] seems to be this: when someone is playing a ... coordination game, she will look for a *rule of selection* which, if followed by both players, would tend to produce successful coordination. A rule of selection (and by extension, the label or strategy that it identifies) is salient to the extent that it ‘suggests itself’ or seems obvious or natural to people *who are looking for ways of solving coordination problems*” (MEHTA ET AL. [1994, p. 661]).

³⁶Whether the focal-point effect of the explicit presence of a potential entrant operates through

Table 6
Descriptive Statistics (LANDEO AND SPIER [2009])

Condition	Mean Sum of Seller's Offers ⁽¹⁾	Exclusion Rate	Mean Seller's Payoff ⁽²⁾	Mean Sum of Buyers' Payoffs
EX/ND/NC [120]	1261.67 (227.22)	.81	729.17 (464.84)	1230.42 (480.17)
EN/ND/NC [120]	1261.67 (227.22)	.92	680.42 (311.76)	1273.75 (321.10)

Note: ⁽¹⁾The offers made by the computer in the exogenous payoffs session replicate the pattern of seller's offers in the corresponding endogenous payoffs session.

⁽²⁾The Mean Seller's Payoff corresponds to the mean computer's payoff; standard deviations are in parentheses; sample sizes (number of groups) are in brackets.

6.2 Results

We compare our results for the case of the EX/NC condition with Landeo and Spier's (2009) EX/ND/NC condition, and our findings for the case of EN/NC with LANDEO AND SPIER's [2009] EN/ND/NC case.³⁷ In our settings, the sellers are restricted to make equal offers to both buyers. Then, these environments involve non-discriminatory offers. The only difference between our conditions and LANDEO AND SPIER's [2009] conditions is that LANDEO AND SPIER's [2009] environments do not involve the explicit presence of a potential entrant.

Table 6 summarizes the information for the EX/ND/NC and EN/ND/NC (LANDEO AND SPIER [2009]) conditions. Under exogeneity, the exclusion rate experienced under LANDEO AND SPIER's [2009] EX/ND/NC environment (81%, Table 6) is higher than the exclusion rate in the presence of a potential entrant (35% in the EX/NC environment, Table 2). Under endogeneity, however, the exclusion rate observed under LANDEO AND SPIER's [2009] EN/ND/NC setting is (marginally) lower than the exclusion rate in the presence of an entrant (EN/NC) (92% and 96%, Tables 7 and 2, respectively).

Table 7 provides a more detailed description of the offers made by the sellers and the buyers' responses per pair of offer (frequency and exclusion rates per pair of offers) in the EX/ND/NC and EN/ND/NC (LANDEO AND SPIER [2009]) conditions. Under endogeneity (and exogeneity),³⁸ the mode seller's offers are equal to (650, 650), for our conditions and LANDEO AND SPIER's [2009] conditions (83% and 93%, respectively). Under exogeneity, 84% of those offers were accepted by at

a *pure*-salience effect and/or through the elicitation of buyers' regards for the entrant's well-being is ultimately an empirical question, which is beyond the scope of this study.

³⁷ND stands for *no discrimination*.

³⁸Remember that the offers made by the human sellers in case of endogeneity were used to construct the offers in the exogenous-payoffs environments.

Table 7

Frequency of Seller's Offers and Exclusion Rate per Pair of Offers (LANDEO AND SPIER [2009])

Condition	(100, 100)	(650, 650)	(800, 800)	Total
EX/ND/NC	5 [.00]	112 [.84]	3 [1.00]	120
EN/ND/NC	5 [.00]	112 [.96]	3 [1.00]	120

Note: Exclusion rates are in brackets.

least one buyer in the EX/ND/NC (LANDEO AND SPIER [2009]). However, only 33% of those offers were accepted by at least one buyer in the EX/NC case (current study).³⁹ However, under endogeneity, our findings and LANDEO AND SPIER's [2009] results are similar: the majority of these offers were accepted by at least one buyer (95% and 96%, for the case of EN/NC and EN/ND/NC, respectively). These results suggest that endogeneity weakens the focal-point effect of the explicit presence of an entrant.

Table 8 summarizes the exclusion and no exclusion rates under exogeneity for our current study and LANDEO AND SPIER's [2009] study. These results indicate that, when the explicit presence of a potential entrant is allowed in exogenous-payoffs environments, coordination failure is reduced. In LANDEO AND SPIER [2009], in 48% of the pairs both buyers accepted the offers, and in 33% of pairs, one buyer accepted the offer (i.e., (A, R) or (R, A) occurred). This corresponds to an exclusion rate of 81%. In our study (for the exogenous/no-communication condition), only in 2% of the pairs both buyers accepted the offers, and in 33% of pairs, at least one buyer accepted the offer. This corresponds to an exclusion rate of 35%. COOPER ET AL. [1992] argue, following HARSANYI AND SELTEN [1988], that the play of strategy (A, A) is a consequence of strategic uncertainty over the play of an opponent. The presence of a potential entrant then seems to provide a basis for the strong beliefs needed to overcome coordination failures. In fact, the coordination problem is alleviated by incorporating a potential entrant: in LANDEO AND SPIER [2009], 19% of pairs of buyers rejected the offers. Note that, in our study, 65% of pairs rejected those offers, when exogenous payoffs are present.

We next conduct probit analyses of the effects of the explicit presence of a potential entrant on the probability of exclusion in exogenous-payoffs and endogenous-payoffs environments. The probit models include a treatment dummy variable and round as its regressors,⁴⁰ and robust standard errors that account for the possible

³⁹Even in case of offers (800, 800), the acceptance by at least one buyer was only 50% under EX/NC (compared to 100% in case of EX/ND/NC).

⁴⁰Under exogeneity, the treatment dummy variable takes a value equal to 1 if the observation pertains to the EX/NC condition (and a value equal to 0 in case of EX/ND/NC). Similarly, under

Table 8
Frequency of Action Pair

	Exclusion (A, A), (A, R), (R, A)	No Exclusion (R, R)
EX/NC (current study)	.35	.65
EX/ND/NC (LANDEO AND SPIER [2009])	.81	.19

Note: Observations for our current study and LANDEO AND SPIER’s [2009] study correspond to pooled data for rounds 1 to 12.

dependence of observations within a session. The results suggest that the presence of a potential entrant significantly affects the likelihood of exclusion in exogenous-payoffs environments.⁴¹ In fact, the presence of a potential entrant reduce exclusion (i.e., increases buyers’ coordination on their preferred equilibrium) by 46 percentage points (a significant effect, p -value $< .001$). Thus, when exogeneity is present, there is a clear support to Hypothesis 3. When offers are endogenous, we observe that the explicit presence of a potential entrant (marginally) increases the likelihood of exclusion: 96% versus 92% for the EN/NC and EN/ND/NC conditions, respectively (a weakly significant effect, p -value = .048).⁴² These findings might suggest that social preferences toward the seller (elicited by seller’s intentionality) more than offset the focal point effect of the presence of an entrant.

RESULT 4: *When exogeneity is allowed, the explicit presence of a potential entrant significantly decreases the likelihood of exclusion.*

7 Summary and Conclusions

RASMUSEN, RAMSEYER, AND WILEY [1991] and SEGAL AND WHINSTON [2000] construct theoretical frameworks where economies of scale in production allow an incumbent to foreclose the market by bribing only a subset of buyers. A collective action problem arises where the buyers are jointly better off refusing exclusive deals but may be individually tempted to accept them (due to strategic uncertainty). LANDEO AND SPIER [2009] provide the first experimental evidence on Naked Exclusion. We contribute to this literature by studying the effects of endogeneity and entrant-buyers communication in a strategic environment that allows for a fourth passive player, the potential entrant.

Our analysis is focused on the qualitative theoretical predictions derived from subgame perfection, and the robustness of these predictions to offer endogeneity and

endogeneity, the treatment dummy variable takes a value equal to 1 if the observation pertains to the EN/NC condition (and a value equal to 0 in case of EN/ND/NC).

⁴¹The variable round is not statistically significant. The qualitative results also hold if we consider the last 6 rounds of play only.

⁴²The variable round is not statistically significant.

entrant-buyers communication. Our findings suggest first that endogeneity increases the likelihood of exclusion. The buyers are more likely to accept exclusive deals when these deals are endogenously designed by another subject in the laboratory rather than exogenously generated. These results indicate that LANDEO AND SPIER’s [2009] findings regarding the effect of endogeneity are robust to the explicit presence of a potential entrant. Second, one-way unstructured communication between the entrant and the buyers increases buyers’ coordination on their preferred equilibrium (equilibrium with entry) and hence, reduces the likelihood of exclusion. Communication also significantly affects the offers chosen by sellers, inducing more generous offers. Finally, we provide evidence that the explicit presence of an entrant acts as a focal-point mechanism in exogenous-payoffs environments, facilitating buyers’ coordination on their preferred equilibrium (equilibrium with entry).

Possible extensions can be related to isolate the two main channels through which focal-point mechanisms might operate: the *pure*-salience effect and the elicitation of social preferences.⁴³ These, and other extensions, may be fruitful topics for future research.

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⁴³Landeo and Spier are currently studying focal point mechanisms in strategic environments involving team production with complementarities.

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Table A1: Sample of Entrants' Messages

Messages

Reject this proposal! We will all get 1000 tokens instead of just 650 for you each. There's no competition between us - we'll all benefit the most this way!

The offer seems a bit low to me.

This is an incredibly low offer. Why settle for it when you can take 1000 each by rejecting this offer?

GUARANTEED 1000 tokens! REJECT any offer. No offer can be better than 1000 tokens. So reject. It's the best thing for both players B.

This is an okay offer but you can both do a lot better by rejecting it.

Admittedly 800 seems fair. But if BOTH of you reject then BOTH of you get 1000. 1000 is a lot better than 800. Trust each other (and me) and reject the offer.

Reject! That way we'll each get 1 000 tokens instead of just 650 (not even the max offer!). Since we're not in competition with each other we'll all benefit the most this way!

Reject for peace and prosperity! Go Sox.

The name of the game here is TRUST! Please have faith in your fellow B. When both of you reject this offer both of you will do the best possible in this round. :)

Woe is me in such a position as this! The offer's really not that great anyway.

Let's reject this offer and earn the max profit from the round!
Player C is not the bad guy!

Have some pity on this poor Player C? :(The offer's not that great.

PLEASE GIVE THIS MATERIAL TO THE
EXPERIMENTER AT THE END OF THE SESSION

INSTRUCTIONS

This is an experiment in the economics of decision-making. Harvard University and Northwestern University have provided the funds for this research.

In this experiment you will be asked to play an economic decision-making computer game and to make decisions in several rounds. The experiment currency is the “token.” The instructions are simple. If you follow them closely and make appropriate decisions, you may make an appreciable amount of money. At the end of the experiment you will be paid your total game earnings in CASH along with your participation fee. If you have any questions at any time, please raise your hand and the experimenter will come to your desk.

SESSION AND PLAYERS

The session is made up of 16 rounds. The first 4 rounds are practice rounds and will not be counted in the determination of your final earnings.

- 1) Before the beginning of each practice round, the computer will randomly form groups of four people: one **Player A**, two **Players B (B1 and B2)**, and one **Player C**. The roles will be randomly assigned. During the practice rounds, each person will play the roles of **Player A**, **Player B (B1 or B2)**, and **Player C** at least once.

- 2) After the fourth practice round, twelve actual rounds of the game will be played. Every participant will be randomly assigned a role. The roles of **Player A** and **Player C** will remain the same during the twelve rounds. At the beginning of each round, new groups of four people, one **Player A**, two **Players B (B1 and B2)**, and one **Player C** will be randomly formed.

You will not know the identity of the other three players who belong to your group in any given round.

THE ROUND

Each round has two stages.

STAGE 1

- 1) Player A **simultaneously makes proposals to Players B1 and B2**. The two proposals **must be equal**. The possible proposals are **100, 650, or 800** tokens. If the proposal is accepted, there will a transfer from Player A to the Player(s) B who accepted the proposal. Note that, if one or both offers are accepted, the round payoff for Player A will be equal to 1,950 tokens minus the amount of offers accepted, and the round payoff for Player C will be equal to 0 tokens. If both proposals are rejected, the round payoff for EACH Player B will be equal to 1,000 tokens, Player A's round payoff will be equal to 0 tokens, and round payoff for Player C will be equal to 1,000 tokens. Before deciding his/her proposals, Player A should note that the possible outcomes are as follows.

If **BOTH PLAYERS B ACCEPT** the offers:

Player A's payoff = 1950 tokens – Offer to Player B1 – Offer to Player B2

Player B1's payoff = Offer to Player B1

Player B2's payoff = Offer to Player B2

Player C's payoff = 0 tokens

If **BOTH PLAYERS B REJECT** the offers:

Player A's payoff = 0 tokens

Player B1's payoff = 1000 tokens

Player B2's payoff = 1000 tokens

Player C's payoff = 1000 tokens

If **ONLY PLAYER B1 ACCEPTS** the offer:

Player A's payoff = 1950 tokens – Offer to Player B1

Player B1's payoff = Offer to Player B1

Player B2's payoff = 0 tokens

Player C's payoff = 0 tokens

If **ONLY PLAYER B2 ACCEPTS** the offer:

Player A's payoff = 1950 tokens – Offer to Player B2

Player B1's payoff = 0 tokens

Player B2's payoff = Offer to Player B2

Player C's payoff = 0 tokens

- 2) Both proposals are **immediately** revealed to players **B1, B2,** and **C.**

STAGE 2

- 1) After receiving the proposal, each Player **B** **decides whether to accept or reject** Player **A**'s proposal. If the proposal(s) is (are) accepted, there will be a transfer from Player **A** to the Player(s) **B** who accepted the proposal. Note that, if one or both offers are accepted, the round payoff for Player **A** will be equal to 1,950 tokens minus the amount of offers accepted, and the payoff for Player **C** will be equal to 0 tokens. If both proposals are rejected, the round payoff for EACH Player **B** will be equal to 1,000 tokens, Player **A**'s round payoff will be equal to 0 tokens, and Player **C**'s round payoff will be equal to 1,000 tokens.

When making their decisions, Players **B1** and **B2** should take into account that their round payoff will depend on their decision and on the decision of the other Player **B**. Each Player **B** should also check the final payoffs of the round associated with his/her decision and the decision of the other player B.

- 2) The **round ends.**

ROUND PAYOFF

The Payoff Table shows the possible round payoffs for players **A**, **B1**, **B2**, and **C**.

Payoff Table

Role	PAYOFFS IF B1 AND B2 ACCEPT	PAYOFFS IF B1 AND B2 REJECT	PAYOFFS IF B1 ACCEPTS AND B2 REJECTS	PAYOFFS IF B1 REJECTS AND B2 ACCEPTS
A	1950 – (OFFER B1 + OFFER B2)	0	1950 – OFFER B1	1950 – OFFER B2
B1	OFFER B1	1000	OFFER B1	0
B2	OFFER B2	1000	0	OFFER B2
C	0	1000	0	0

Four exercises related to the Payoff Table are presented below. Please fill the blanks.

Exercise 1. Column 1 of Payoff Table (B1 AND B2 ACCEPT)

Suppose Player **A** offers **X** tokens to **B1** and **X** tokens to **B2**, and both **B1** and **B2**, **accept** the offers. Then, **A**'s round payoff is equal to _____ tokens, **B1**'s round payoffs is equal to _____ tokens, **B2**'s round payoff is equal to _____ tokens, and **C**'s round payoff is equal to _____ tokens.

Exercise 2. Column 2 of Payoff Table (B1 AND B2 REJECT)

Suppose Player **A** offers **X** tokens to **B1** and **X** tokens to **B2**, and both, **B1** and **B2** **reject** the offers. Then, **A**'s round payoff is equal to _____ tokens, **B1**'s round payoffs is equal to _____ tokens, **B2**'s round payoff is equal to _____ tokens, and **C**'s round payoff is equal to _____ tokens.

Exercise 3. Column 3 of Payoff Table (B1 ACCEPTS AND B2 REJECTS)

Suppose Player **A** offers **X** tokens to **B1** and **X** tokens to **B2**, and **B1** **accepts** the offer and **B2** **rejects** the offer. Then, **A**'s round payoff is equal to _____ tokens, **B1**'s round payoffs is equal to _____ tokens, **B2**'s round payoff is equal to _____ tokens, and **C**'s round payoff is equal to _____ tokens.

Exercise 4. Column 4 of Table (B1 REJECTS AND B2 ACCEPTS)

Suppose Player **A** offers **X** tokens to **B1** and **X** tokens to **B2**, and **B1** **rejects** the offer and **B2** **accepts** the offer. Then, **A**'s round payoff is equal to _____ tokens, **B1**'s round payoffs is equal to _____ tokens, **B2**'s round payoff is equal to _____ tokens, and **C**'s round payoff is equal to _____ tokens.

SESSION PAYOFF

The game earnings in tokens will be equal to the sum of payoffs for the 12 actual rounds. The game earnings in dollars will be equal to (Game Earnings in tokens)/650 (650 tokens = 1 dollar). Hence, the total earnings in dollars will be equal to the participation fee plus the game earning in dollars.

GAME SOFTWARE

The game will be played using a computer terminal. You will need to enter your decisions by using the mouse. In some instances, you will need to wait until the other players make their decisions before moving to the next screen. Please **be patient**. There will be two boxes, displayed in the upper right-hand side of your screen, that indicate the “Round Number” and “Your Role.”

Press the NEXT >> button to move to the next screen. Please **do not press the NEXT button more than once, do not try to go back** to the previous screen, and **do not close the browser**: the software will stop working and you will lose all the accumulated tokens.

Next, the **4 PRACTICE ROUNDS** will begin. After that, 12 actual rounds of the game will be played. **You can consult these instructions at any time during the session.**

**THANKS FOR YOUR
PARTICIPATION IN THIS
STUDY!!**

**PLEASE GIVE THIS MATERIAL TO THE
EXPERIMENTER AT THE END OF THE SESSION**