



Trading partner choice and bargaining culture in negotiations[☆]



Owen R. Phillips^{a,*}, Amy M. Nagler^{b,1}, Dale J. Menkhaus^{b,2},
Shanshan Huang^{c,3}, Christopher T. Bastian^{b,4}

^a Department of Economics and Finance, University of Wyoming, Laramie, WY 82071-3985, USA

^b Department of Agricultural and Applied Economics, University of Wyoming, Laramie, WY 82071-3354, USA

^c Nanjing University of Finance and Economics, Nanjing, Jiangsu 210046, China

ARTICLE INFO

Article history:

Received 4 February 2013

Received in revised form 1 May 2014

Accepted 6 May 2014

Available online 22 May 2014

JEL classification:

C78

C91

D80

Keywords:

Negotiations

Matching

Laboratory experiments

ABSTRACT

In negotiated transactions the act of choosing trading partners and “who chooses” creates a bargaining culture that influences trading behavior. Results are presented from experimental markets in which paired buyers and sellers negotiate the repeated sale of units. Relative to a market environment in which traders are randomly matched, choosing a trading partner increases the number of units exchanged and lowers negotiated prices. Collective seller earnings suffer. Who does the choosing, that is, whether buyers select sellers or sellers select buyers, further impacts prices and therefore relative earnings. Those choosing tend to be disadvantaged.

© 2014 Elsevier B.V. All rights reserved.

1. Introduction

In many negotiated transactions, there is the practice of buyers announcing that they seek potential sellers. This puts sellers in the position of choosing buyers. Likewise, in some markets there is the practice of sellers announcing they are available to buyers for negotiated sales; in this setting buyers choose sellers. In labor negotiations, for example, it is a matter of practice for employers to choose with whom to bargain, but in some markets employees announce their availability and choose potential employers. In the sale of housing it is usually the seller who seeks a buyer, and the buyer decides with

[☆] USDA Economic Research Service (ERS) Cooperative Agreement N45106 supported this research. Additional support came from the Paul Lowham Research Fund and School of Energy Resources, University of Wyoming. The views expressed in this paper are those of the authors and not necessarily those of the University of Wyoming, ERS, or the USDA. Substantial help from two anonymous referees and Dirk Engelmann is gratefully acknowledged.

* Corresponding author. Tel.: +1 307 766 2195; fax: +1 307 766 5090.

E-mail address: owenphil@uwyo.edu (O.R. Phillips).

¹ Tel.: +1 307 766 5634.

² Tel.: +1 307 766 1994.

³ Tel.: +86 1380 903 2743.

⁴ Tel.: +1 307 766 4377.

whom to commence negotiations. In agricultural land rental markets those seeking to lease land often choose the lessor of the land. In the sale of commodities, we observe consistent practices in some markets of buyers approaching, or choosing, the sellers of grains (malt barley, for example); and in other markets, sellers approach or choose buyers (as in the sale of cattle). We view auto dealers as sellers ready to negotiate with buyers, and buyers choose whom to approach. We believe most negotiated transactions are initiated by either a buyer seeking and choosing a willing seller or a seller seeking and choosing a willing buyer.¹

When same or similar items are traded over a period of time, traders acquire information about the bargaining style of counterparts. Reputations and expectations are formed, and based on bargaining style, sellers may prefer certain buyers, and buyers may prefer certain sellers. When compared to random matching of agents, choosing with whom to bargain has a potential to impact bargaining outcomes because agents are purposefully brought together. In a laboratory market setting this paper investigates how choosing a bargaining partner affects prices, quantities traded, relative earnings, and total earnings. While random matching tends to move traders toward the predicted equilibrium price in the market, we find that choosing a bargaining partner creates equilibriums with relatively lower prices and larger quantities sold.

Paired traders, privately negotiating a transaction, lack information regarding the experiences of other traders in the market discovering price. Pairs receive restricted signals from their respective trading partners such as initial bids or offers, counteroffers, and the time it takes to reach agreement. Observation of such signals impacts expectations and responses. In this paper a “bargaining style” is characterized through greedy (generous) initial offers/bids and patience (impatience) exhibited in making counteroffers. Together, these two traits decide initial bids and offers, speed of trades, and the eventual price negotiated for each trade. Our contention is that partner choice facilitates the creation and evolution of individual bargaining styles that form a bargaining culture.

We posit that a bargaining culture is bounded by the rules of the trading institution, and once trading rules are in place, a bargaining culture further defines the norms of accepted behavior. Different cultures may (and do) develop within trading institutions, but we argue that a negotiation trading institution coupled with partner choice creates a unique bargaining culture. In laboratory bargaining experiments we find that the act of choosing a partner as well as “who chooses” creates a bargaining culture that is different than when traders are randomly matched. Randomly matched traders tend to make opening bids and offers that bracket the predicted equilibrium price (80 tokens in our experimental design) as the midpoint, and negotiated prices tend to go to this midpoint.

When there is choice of trading partners, the average opening bid from buyers and the average opening offer from sellers shifts downward, which leads to lower negotiated prices overall; and even though all opening bids posted by buyers decline, they are relatively higher when buyers choose sellers and relatively lower when sellers choose buyers. Also, while the act of choosing a trading partner lowers all opening offers, sellers do not seem otherwise affected by whether sellers or buyers choose. Thus choosing affects initial bids and offers of buyers and sellers differently.

Trading pairs also trade more quickly and more units are traded when one partner chooses the other. Impatience to complete the transaction and move on to the next trade is consistent with more generous initial bids and offers. Impatience is reflected in the way traders make counteroffers after their initial openings. An impatient trader will counter more frequently and give up more with each counter. Generosity and impatience move a market toward lower trade prices and more units traded; collective buyer earnings are augmented. In contrast, sellers do much better in a randomly matched bargaining environment.

We believe when agents can choose with whom they bargain, a culture emerges in which they seek counterparts with a desirable bargaining style – these are people who will make generous initial bids or offers and move relatively quickly (impatience) on reaching agreement. Desirable trading partners are willing to give up surplus on a single transaction in order to negotiate on more units overall. However, relatively greedy and slow traders can capture more surplus on a single unit. Because of these opposing incentives buyers and sellers experience a natural tension over the pace of trading. A person who trades slowly forfeits potential surplus on future trades in a repeated setting within a defined trading window. When haggling over the price of an item a trader must evaluate the opportunity cost of foregoing future transactions, but for any discount factor traders seek a match with someone who puts a greater value on future transactions ([Muthoo, 1999, Chapter 10](#)).

Below we give more attention to the choosing paradigm in order to explain what is important to traders when they select counterparts with alternative bargaining styles. Four simple styles are suggested, through traders being generous versus greedy and impatient versus patient. From these traits an agent can create and communicate a bargaining style. It is suggested that choice of a trading partner facilitates bargaining styles and overall bargaining culture such that bargaining outcomes are different in a choose environment than in an environment in which traders are randomly matched.

¹ No example will perfectly match our laboratory design of a buyer choosing or seller choosing. In practice we recognize that the act of choosing (or matching) may be clouded by how the pool of buyers and sellers is created. In labor markets, for example, a pool of sellers may choose a buyer, from which the buyer then chooses with whom to negotiate. In this case there are multiple levels of choosing.

2. Behavioral considerations²

We discuss bargaining styles for which traders may both gain and distinguish themselves in a choose environment. Traders create a reputation through two related and reinforcing points of distinction: (1) their opening bids/offers which signal *generosity* and (2) how quickly they make offers and counteroffers to reach agreement, which Muthoo (1999, Chapter 10) calls *impatience*.

Impatience and generosity create trading characteristics that support each other. An impatient trader will tend to make a generous initial bid/offer in order to move the deal along. Similarly a generous trader effectively exhibits impatience because they are inclined to make initial bids/offers and counter bids/offers that are acceptable to their counterpart; trading moves faster as a consequence. Thinking of a trader as relatively generous or impatient may not be as important as recognizing that levels of generosity and impatience combine to define an individual's bargaining style.³ In repeated trading, information that allows individuals to learn and identify bargaining styles of potential trading partners also allows them to better assess the risk of having undesirable outcomes with trading partners. When there are limited opportunities to match, trading partners are motivated to create an expectation of a desirable bargaining style that maximizes overall profits and reduces the risk of foregoing future trades.

Fig. 1 is a stylized representation of how relative generosity and impatience impact negotiations. In each portion of the figure the horizontal line between offers and bids represents a 50/50 split of the available surplus. In the generosity schematic on the top portion of Fig. 1 the vertical lines for the four potential matches span the difference between the initial seller offer and buyer bid. Distance from a 50/50 split depends on whether traders are in each case relatively greedy or generous. We model a greedy trader as a person with an opening price that is relatively distant from a 50/50 split. A generous person will open closer to a 50/50 split. Four possible pairings are described in the figure. For seller/buyer pairings there are the following matches: generous/generous, greedy/greedy, generous/greedy, and greedy/generous.

Generous/generous pairings will enter negotiations with the shortest range between opening bids and offers. Greedy/greedy matches open with the widest expected range between bids and offers. The midpoint of the relative ranges, a focal point for many agreements, suggest a bargaining advantage and more attractive outcomes for greedy partners who are matched with generous trading partners. Thus traders will seek counterparts who are relatively generous. Relatively greedy traders are a poor match; they forfeit gains from future trades by creating a wide bargaining range that has to be breached with counteroffers.

In the impatience schematic on the bottom of Fig. 1 we depict patience with a dotted arrow path and impatience with a solid arrow path. The length of the arrow represents the relative amount of concessions toward agreement. An impatient trader moves away from their opening trade price faster than someone who is patient. Once again, the horizontal line is a 50/50 split of total surplus. For the sake of illustration the opening bid and offer are centered on an even split of surplus. Traders who are both patient will go to the midpoint of their opening prices, but trade slower, posting fewer transactions. Traders who are both impatient will also go to their midpoint but make more transactions.

All traders prefer to be matched with relatively impatient traders, who care more about moving on to the next transaction. A patient trader can sit on a bid or offer while the impatient person makes counteroffers that move the trade price closer to what the patient trader wants to pay or be paid. A price advantage tends toward a relatively patient agent as depicted in Fig. 1. Even though an impatient trader might not begin with a generous initial bid or offer, quick movement toward a counterpart's position is desirable to the counterpart. A desirable counterpart is someone who is relatively impatient about reaching agreement. Trading pairs that are generous and impatient should make more trades than pairs that are greedy or patient. Advantage may be achieved if a trader is matched with a relatively impatient and generous counterpart.⁴

Another factor that affects behavior in a choice environment is the very act of choosing a counterpart. We believe that a buyer choosing a seller or a seller choosing a buyer creates different expectations on the parts of buyers and sellers. When a trader seeks out a counterpart, this signals a trader's relative willingness to negotiate. Hence when buyers choose sellers the perception is that a buyer has the greater willingness to give up surplus in order to make a transaction. When sellers choose buyers, it is the seller who signals greater willingness. The signals may have different frames, and therefore different impacts, depending on whether it is the buyer or seller choosing.

² This discussion is loosely based on Muthoo (1999 Chapter 10), Lewicki et al. (2009), and Ghosh (1996).

³ Bargaining styles may be classified as individuals who are greedy/patient, greedy/impatient, generous/patient, and generous/impatient. Bargainers have an incentive to buy low and sell high. A greedy buyer (seller) will bid (offer) relatively low (high). These four combinations are expounded for a buyer: A greedy/patient buyer will have a bargaining style that makes a low initial bid, makes few counterproposals, and does not move quickly toward the midpoint of the initial offer and bid. A greedy/impatient buyer has a bargaining style that makes a low initial bid, reacts quickly with numerous counterproposals, but does not quickly move toward the midpoint. A generous/patient buyer makes a relatively high initial bid, does not react quickly with counterproposals but moves in relatively large increments toward the midpoint. A generous/impatient buyer makes a relatively high initial bid and moves quickly toward the midpoint.

⁴ However, these observations must be tempered in the case of repeated bargaining rounds, where traders learn about downward sloping demand and increasing marginal costs as, for example, described in Fig. 2. Under these basic market conditions it will be preferable to be matched with a patient trader in later rounds – as a patient trader would likely have more units still available for trading associated with greater available surplus than marginal units closer to the intersection of supply and demand.

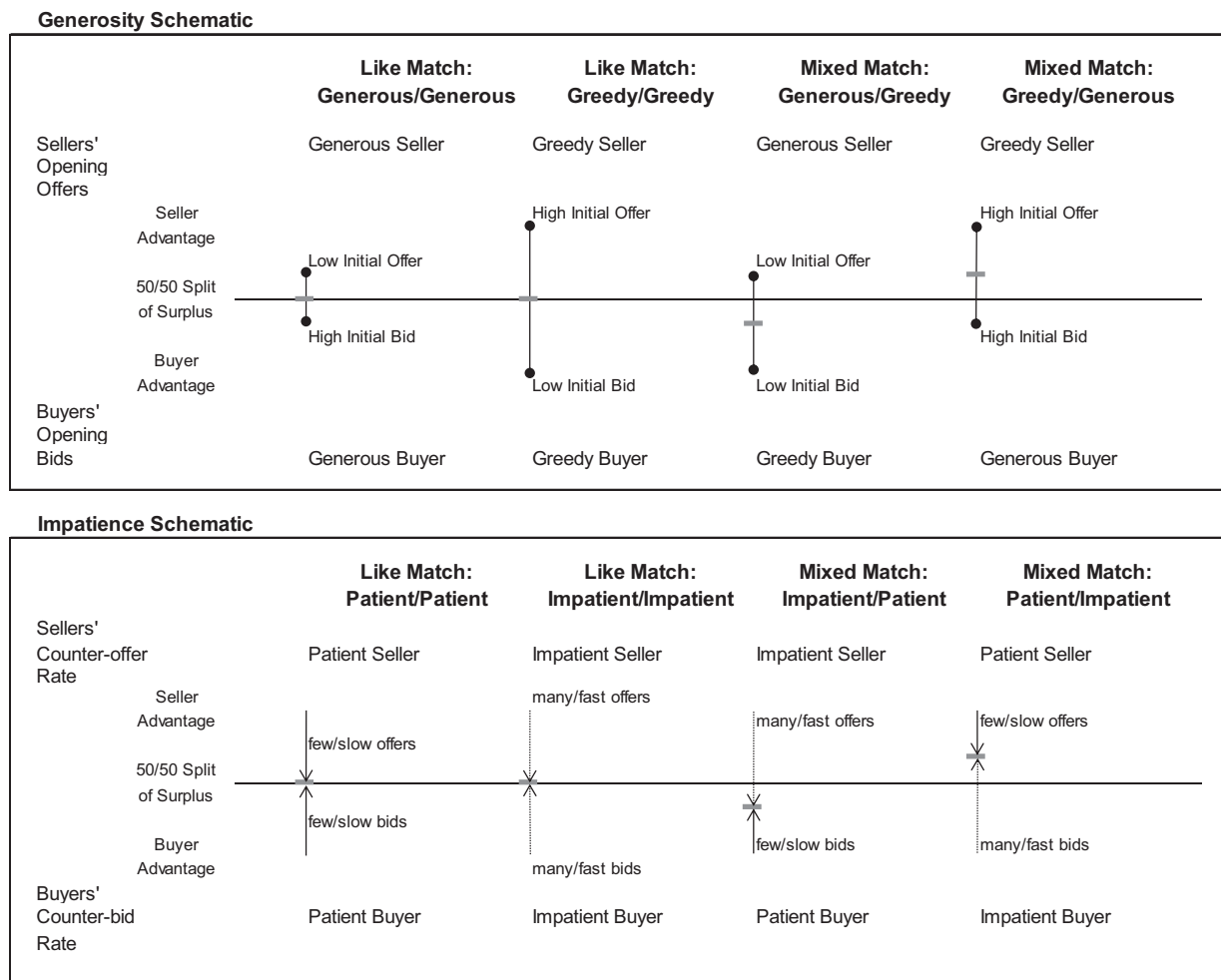


Fig. 1. Generosity and impatience schematics: stylized representation of relative bargaining styles and negotiation advantage.

To put this argument on a more practical level, imagine that a person has a car for sale. If the seller approaches a buyer and asks “Do you want to buy my car?” this question begins the process of choosing a buyer with whom to negotiate and signals a desire to sell. It gives the buyer an advantage. If, on the other hand, the buyer approaches the seller and asks “Do you want to sell your car?” the buyer is both choosing the seller and signaling a willingness to make the purchase; it gives the seller an advantage.

We therefore make the case that choice will affect both those who are chosen and those who choose. Partner choice will affect the bargaining style of potential partners who are chosen. Those chosen will learn over time if their bargaining style is desirable based on relative generosity and impatience. Choosers will go for the most desirable trading partner. This provides a signal to an individual that if they are not chosen quickly, they have an undesirable bargaining style. These traders must alter their style to increase the probability of being chosen by a desirable chooser. The market moves away from a well-defined equilibrium at the intersection of supply and demand, and toward one less precise with lower prices and a greater quantity traded.

Being chosen as a trading partner provides some advantage within any pairing. A chosen seller is positioned to negotiate higher prices; a chosen buyer is positioned to negotiate lower prices. Overall, we propose that partner choice fosters a bargaining style to ultimately alter the bargaining culture and resulting outcomes in negotiated transactions as compared to randomly matched traders. We contend this bargaining culture – which results in more units traded at lower prices – gives advantage to the buyer and to those who are chosen. Buyers who are chosen have a clear advantage; sellers who choose have a clear disadvantage.

There is related and supporting research that gives an inherent advantage to buyers in bargaining environments because buyers frame a transaction differently than sellers. Neale et al. (1987) suggest the seller role is conceptualized as one that initiates action (the exchange of goods, services, or both) to gain in a transaction. The buyer responds to the seller's initiative and may focus on what is given up (a loss) in exchange. Thus, the very roles of buyer or seller create a gain/loss frame that

Table 1

Unit buyer redemption values and seller costs (tokens).

Unit	Redemption value	Cost
1	130	30
2	120	40
3	110	50
4	100	60
5	90	70
6	80	80
7	70	90
8	60	100

is different for these traders. Buyers negatively frame a transaction and focus on potential losses, while sellers positively frame a transaction and focus on potential gains. This suggests a buyer advantage in bargaining because they value marginal gains more than sellers.⁵

3. Experimental procedures and design

Our experimental design addresses the impacts of trading partner choice on bargaining outcomes in repeated negotiations. Specifically, we developed a simplified forward delivery, negotiation trading institution with treatments defining how buyers and sellers are matched to negotiate trades. Experimental procedures follow standard practices and relate to previous research (Menkhaus et al., 2007; Phillips and Menkhaus, 2010). A sample set of instructions is provided as an online supplement.

3.1. Market design

Experiments were conducted in an experimental economics laboratory at the University of Wyoming with linked personal computers and in-house software for bargaining. Participants were university students, recruited on campus mainly from business and economics classes. Trades were negotiated between buyer–seller pairs by typing in bids and offers. Each experimental session followed a standard procedure. At the beginning of each session, eight participants were randomly designated as four buyers and four sellers. The session began with a presentation of instructions followed by one or more practice sessions. Practice sessions used different seller costs and buyer values than those in the actual experiment. Paid bargaining rounds did not begin until all participants were comfortable with the mechanics of trading. Following instructions and practice sessions, 20 or more trading periods (each period consisting of three one-minute bargaining rounds) were conducted during each experimental session. Participants did not know when an experiment would end in order to maintain saliency to the end of a session.⁶

In a trading period each buyer was given a table of unit redemption values for eight units and each seller was given a table of unit costs for eight units. Redemption and cost tables were the same for all subjects, but participants did not know this, that is, information was private to each participant. Table 1 shows redemption values that started at 130 tokens for the first unit and decreased by 10 tokens per unit to 60 tokens for the eighth unit; costs began at 30 tokens increasing by 10 tokens per unit to 100 tokens. Individual and aggregate unit cost and unit redemption value schedules create step functions for aggregate supply (costs) and demand (redemption values) as illustrated in Fig. 2. For these unit values and unit costs, with four buyers and four sellers, the predicted competitive equilibrium price is 80 tokens, number of trades is a quantity tunnel of 20–24 units, potential buyer and seller earnings are 150 tokens each per period, and total possible earnings in the market are 1200 tokens (300 tokens/pair \times 4 pairs).

Each trading period consisted of three one-minute bargaining rounds, where traders worked from their redemption value or cost schedule provided at the start of the trading period. The four buyers and four sellers were paired either randomly or through a choice process before negotiating prices. Pairing procedures were defined in three treatments as described below. During a bargaining round trading pairs were free to enter offers and counteroffers between themselves, similar to the rules of a double auction. A buyer could raise a bid without waiting for a response from the seller and a seller could lower an offer without waiting for a response from the buyer. Units were traded sequentially, starting with the first unit in Table 1. As trades were made, buyers earned the difference between the redemption value for the unit traded and the negotiated price; sellers earned the difference between the negotiated price and their unit cost.

Two methods may be used in delivery of goods traded: advance production or forward contracting. In advance production sellers enter a market with inventory in stock, incurring sunk costs before sales; in a forward market transaction, price and

⁵ There is a group of studies that show buyers consistently outperform sellers in private negotiation market exchange (Bazerman et al., 1985; Neale and Bazerman, 1985; Huber and Neale, 1986; McAlister et al., 1986; Neale and Northcraft, 1986; Neale et al., 1987). Collectively they suggest that the role labels of “buyer” and “seller” induce negative and positive frames, respectively.

⁶ Subjects were informed that after period 20 a random number generator in the program chose a whole number between 1 and 100 with equal probability. If the number drawn was 20 or less, the experiment ended. Otherwise it continued.

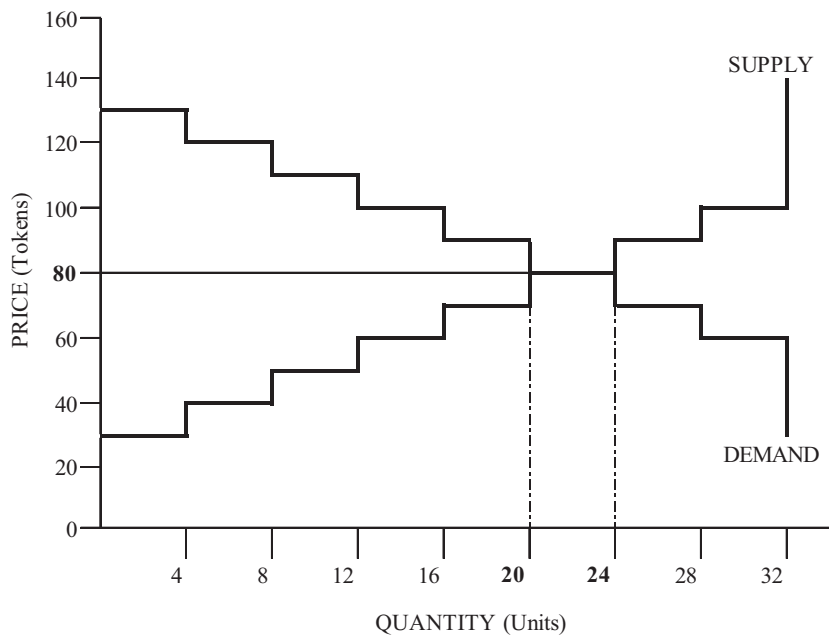


Fig. 2. Induced aggregate market demand and induced market supply for four buyers and four sellers.

quantity are agreed upon before production (Menkhaus et al., 2000). Forward delivery is a standard “simplest” market design in experimental markets (Phillips et al., 2001). Moreover, advance production puts sellers at a bargaining disadvantage in private negotiation because of the inventory cost (Menkhaus et al., 2003). Given our research objective to study the impact of trading partner choice, the *forward contract or delivery* design is used in these experiments.

Buyers were bound to make progressively higher bids and sellers to make progressively lower offers. Agents were not able to make unprofitable trades. Traders were privately informed of the redemption value or cost of their current unit and future units available for trade, their earnings on each transaction, and during trading each player was provided the full progression of their trading partner’s bids or offers in real time. In the upper right corner of a trader’s screen a clock ticked down from the one minute mark at the beginning of a bargaining round. For each trading pair, a bargaining round ended when either one partner had no more units to profitably trade or time ran out. At the end of each bargaining round and after each three-round trading period a participant’s earnings were privately displayed.

All participants were paid a \$10 show-up fee. In addition to this amount, participants were paid based on their earnings in the experimental market. Earnings were denoted in a monetarily-convertible currency referred to as tokens. One token equaled one cent. Market earnings accumulated during the sequence of trading periods. Token earnings were paid out privately, in cash, at the end of the experiment session. Market earnings were between \$25 and \$30, paid in addition to the show-up fee, for a session that lasted about one and one-half hours.

Along with earnings, trade prices, and number of units sold, the agent ID, timing, and amount of each offer and counteroffer associated with each negotiation and trade were recorded for the experimenter. Reported aggregate period bargaining outcomes include the number of trades per period, average period prices, relative earnings (reported as the difference between average period seller and buyer earnings), and total period earnings (a measure of total surplus or market efficiency). Measures reported from individual trade data include the first posted negotiation price (initial bid or offer) in round one of each trading period along with the calculated range and midpoint of average opening bids and offers and average number of bids and offers posted per completed trade.

3.2. Treatments

Three treatments define the procedures by which buyers and sellers were matched. These treatments, as well an aggregate choice treatment, are summarized in Table 2. In the first treatment, buyers and sellers were assigned a bargaining partner randomly (RM). Before each bargaining round, pairs were randomly matched and no identification was provided indicating which players were paired.⁷ In two choose treatments, only one side of the market was given the opportunity to select from a

⁷ A referee has correctly pointed out that if buyer and seller number identifications were provided in the RM treatment there would be opportunity to form reputations, and this could impact bargaining outcomes. It is possible that choosing a buyer or seller hastens behavior that would also exist if there were simply trader identification with random matching.

list of players. Either buyers chose sellers or sellers chose buyers. In the buyer choose treatment, a seller had no recourse but to do business with the buyer who chose them for a one-minute bargaining round. Similarly, in the seller choose treatment, a buyer had no recourse but to do business with the seller who chose them for a one-minute bargaining round.

The four sellers were labeled S1, S2, S3, and S4 and the four buyers were labeled B1, B2, B3, and B4 for the duration of the experiment. In the Buyer Choose (BC) treatment each of the four players assigned to be buyers in the market was given the S1 through S4 list of sellers from which they could choose a trading partner. Buyers clicked on the seller number of their choice. Buyers selected sellers on a first-come basis and the selection process continued until all sellers were matched; the last unmatched seller was automatically assigned to the last unmatched buyer. Likewise, in the Seller Choose (SC) treatment this procedure gave sellers the option to select from the B1 through B4 list of buyers. Trading partner numbers were displayed on both trading and recap computer screens. Selections were typically completed in seconds.

In order to compare random pairing with an overall “Choice Environment” (CE) an aggregate treatment was created combining data from both the BC and SC treatments. Six sessions of the random match baseline comparator were conducted; three sessions each of the two choice treatments were conducted, so the aggregate CE treatment formed a data set from these six sessions.

4. Data and analysis

Data are presented graphically and estimates of trends are made using a convergence model. The graphical analyses provide general descriptions and comparisons of selected bargaining outcomes from alternative experiment treatments. Two separate convergence models were estimated from which tests of statistical differences were conducted. In one, bargaining outcomes from the baseline random match treatment (RM) were compared to those from the overall choice environment (CE). In the other, results from a baseline buyer choose (BC) treatment were compared to bargaining outcomes from the seller choose (SC) treatment. The following general convergence model, based on those developed by [Ashenfelter et al. \(1992\)](#) and [Noussair et al. \(1995\)](#), was estimated to describe asymptotes and allow for statistical comparisons across treatments:

$$Z_{it} = B_0 \left[\frac{(t-1)}{t} \right] + B_1 \left(\frac{1}{t} \right) + \alpha D_{it} \left[\frac{(t-1)}{t} \right] + \beta D_{it} \left(\frac{1}{t} \right) + u_{it} \quad (1)$$

where Z_{it} is the variable (bargaining outcome) of interest, such as average period sale price, number of units traded, earnings, initial bids, or initial offers across replications for each of t trading periods (1, . . . , 20) in cross section (treatment) i ; B_0 is the predicted asymptote and B_1 is the starting level of the dependent variable for the base treatment (RM or BC); α and β are, respectively, adjustments to the asymptote and starting level relative to the base; D_{it} is a dummy variable separating the two treatments in each of the two convergence models – zero for the base treatment and one for the other (CE or SC); and u_{it} is an error term. The Parks method ([Parks, 1967](#)) was used to estimate the model as it accounts for unique statistical properties resulting from the panel data sets. Analyses were conducted in SAS using the PANEL Procedure ([SAS, 1999](#)).

In order to conduct statistical tests for differences between converged levels, data were checked for normal distribution of residuals using a Shapiro–Wilk test (H_0 : Normal Distribution, $\alpha = 0.05$) and statistical tests from the convergence model are reported for outcomes meeting this assumption. Normality requirements were met for all bargaining outcome data from all treatments. Parameter estimates and t -tests for differences between treatments are therefore reported for all bargaining outcomes.⁸

5. Results and evidence

Our discussion begins with comparing the random matching (RM) bargaining outcomes with bargaining in the combined choice environment (CE). Individual buyer and seller choose treatments BC and SC are then compared. [Table 3](#) and [Figs. 3 and 4](#) compare bargaining outcomes for each of the treatment pairs. To establish differences between treatments in generosity and impatience, [Table 4](#), and [Figs. 5 and 6](#), present opening bids and offers from individual trade data. From these data we test for differences in initial bids and initial offers between the RM and CE and then the BC and SC treatments. Providing more insight on the level of impatience, [Table 5](#) summarizes the number of individual offers and counteroffers per trade.

⁸ Satisfaction of normality requirements for all data used did not warrant the use of nonparametric tests.

Table 2
Summary of experimental treatments.

Treatment	Abbr.	Description	Sessions
Random matching	RM	Buyer/seller pairs were matched randomly before each bargaining round	6
Buyer choose	BC	Buyers were able to select sellers	3
Seller choose	SC	Sellers were able to select buyers	3
Choice environment	CE	Aggregate treatment, combining all choose (BC, SC) data	6

Table 3

Convergence estimates (average outcomes over 20 periods) for bargaining outcomes and significance tests for comparisons between treatments.

Treatment	Bargaining outcome			
	Trades	Price	Relative earnings (SE–BE)	Total earnings
<i>Random match versus choice environment</i>				
Random match (RM) (B_{RM})	17.2 ^a (16.6)	80.0 ^a (79.4)	0.9 ^a (–4.6)	1083.2 ^a (1062.5)
Choice environment (CE) ($B_{RM} + \alpha_{CE}$)	18.9 ^b (18.6)	76.3 ^b (75.2)	–30.1 ^b (–37.0)	1145.3 ^b (1131.1)
<i>Buyer choose versus seller choose</i>				
Buyer choose (BC) (B_{BC})	19.1 ^a (18.7)	78.0 ^a (76.4)	–15.3 ^a (–27.2)	1147.6 ^a (1127.6)
Seller choose (SC) ($B_{BC} + \alpha_{SC}$)	18.7 ^a (18.5)	74.5 ^b (74.1)	–44.7 ^b (–46.8)	1141.7 ^a (1134.7)

Shapiro–Wilk test statistics confirm normally distributed residuals for all bargaining outcomes (p -values > 0.05). ^{a,b} Different letters in a column indicate significant difference between treatment pair convergence levels at a 95% confidence level. For example, all pairwise comparisons between RM and CE are significantly different at the 0.05 level because superscript letters are different. In the BC and SC comparisons trades and total earnings are not significantly different.

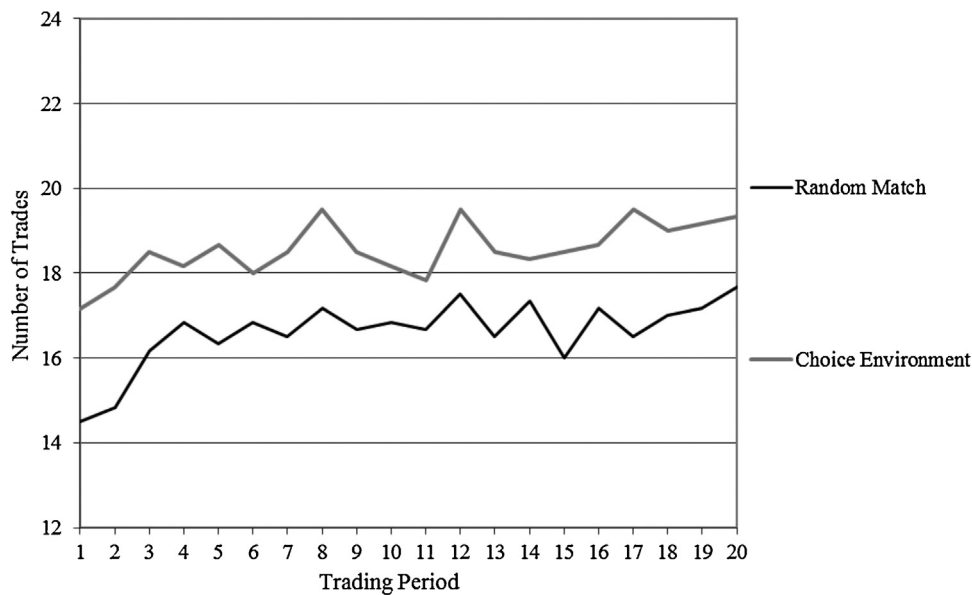
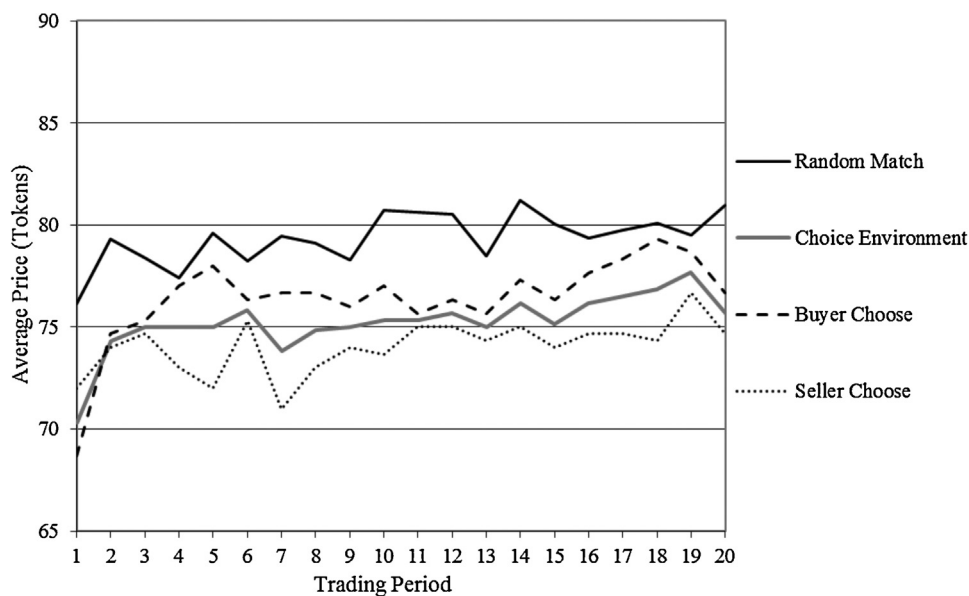
**Fig. 3.** Number of trades per period: random match and aggregate choice environment treatments.**Fig. 4.** Average price per period: random match, aggregate choice environment, and individual buyer choose and seller choose treatments.

Table 4

Convergence estimates for opening buyers' bids and sellers' offers in bargaining round one and significance tests for comparisons between treatments, calculated range and midpoint, and convergence estimates for period prices (rounds 1–3).

Treatment	Opening negotiation				Bargaining outcome
	Initial bid (IB) posted by buyer	Initial offer (IO) posted by seller	Range ⁱ (IO – IB)	Midpoint ⁱ (IO + IB)/2	
<i>Random match versus choice environment</i>					
Random match (RM) (Base, B_{RM})	55.6 ^a	109.0 ^a	53.4	82.3	80.0 ^a
Choice environment (CE) ($B_{RM} + \alpha_{CE}$)	56.8 ^a	98.5 ^b	41.7	77.7	76.3 ^b
<i>Buyer choose versus seller choose</i>					
Buyer choose (BC) (Base, B_{BC})	63.4 ^a	98.4 ^a	35.0	80.9	78.0 ^a
Seller choose (SC) ($B_{BC} + \alpha_{SC}$)	51.2 ^b	97.3 ^a	46.1	74.3	74.5 ^b

Shapiro–Wilk test statistics confirm normally distributed residuals for all bargaining outcomes (p -values > 0.05). ^{a,b} Different letters in a column indicate significant difference between treatment pair convergence levels at a 95% confidence level. ⁱ The range and midpoint for each treatment are calculated from the IB and IO estimated convergence levels reported in first two columns. Interest here focuses on within-treatment behavior, rather than on behavior across treatments; thus, statistical differences are not tested between treatments for range and midpoint estimates.

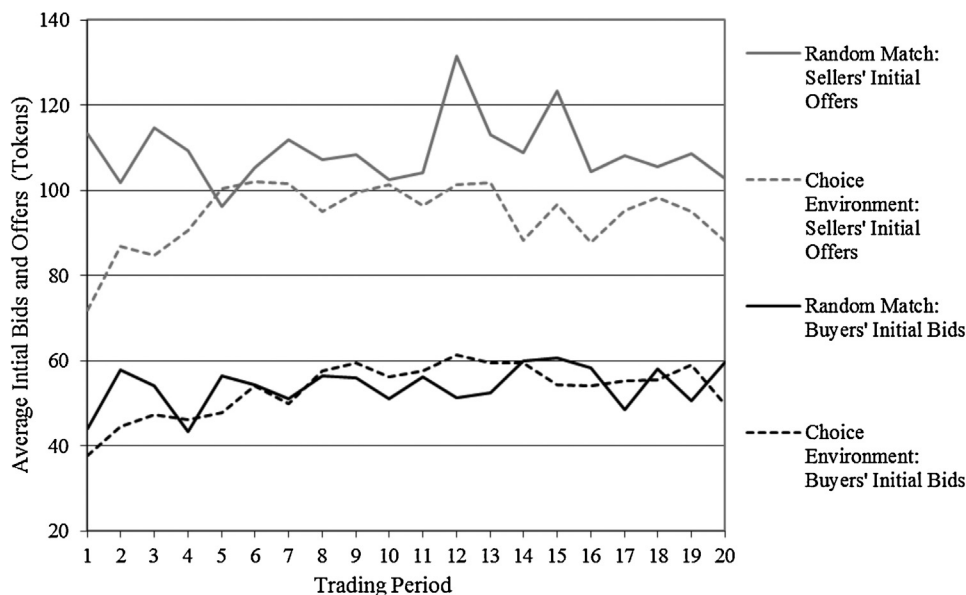


Fig. 5. Random match and aggregate choice environment treatments: initial sellers' offers and buyers' bids per period.

5.1. The choice environment matters

In the choose environments the choice of bargaining counterpart does not resemble random selection. If selection in BC and SC were random the four buyers would match with each of the four sellers in 25% of the bargaining rounds. However, by way of illustration, in round 1 for all BC sessions, B1 chose S2 41% of the time, B2 chose S4 52% of the time, and B4 chose S1 61% of the time. In round 2, B2 chose S4 67% of the time, B3 chose S2 59% of the time. In round 3, B3 chose S2 49% of the time and B4 chose S4 62% of the time. Similarly by way of example, for round 1 in all SC sessions, S1 chose B2 55% of the time, S3 chose B1 41% of the time. In round 2, S1 chose B1 68% of the time, and S2 and S4 both chose B4 34% of the time. In round 3, S2 matched with B2 52% of the time and S4 paired with B4 54% of the time.

Table 5

Average number of buyers' bids and sellers' offers and total negotiations per trade (standard deviation, n observations).

Treatment	Buyers' bids per trade	Sellers' offers per trade	Negotiations (bids and offers) per trade
Random match*	4.1 ^a (3.0, 4309)	4.3 ^a (3.1, 4469)	8.4 ^a (5.7, 8778)
Buyer choose	4.3 ^a (3.3, 4853)	4.6 ^b (4.0, 5130)	8.9 ^b (6.9, 9983)
Seller choose	4.3 ^a (3.2, 4779)	4.6 ^b (3.7, 5089)	8.9 ^b (6.5, 9868)

^{a,b} Different letters in a column indicate significant difference between averages at a 90% confidence level. Differences were tested using a standard Student's t -test. *Sessions 1 through 3 did not save complete individual trade information. Averages are calculated using sessions 4 through 6.

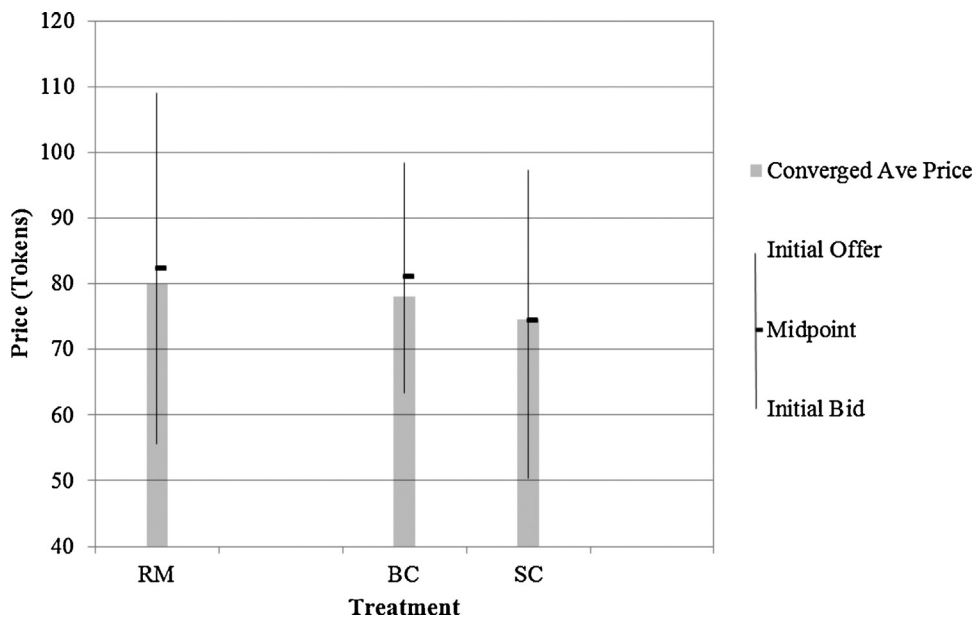


Fig. 6. Range and midpoint of opening buyers' bids and sellers' offers (round 1) and converged period trade prices (rounds 1–3) by treatment.

A comparison of bargaining outcomes with randomly paired trading partners and the aggregate CE data provide evidence that choice impacts trading. Choosing a bargaining partner increases trading levels and lowers prices in the market. Further, while buyer and seller earnings are nearly equal with random matching, in the choose sessions lower prices benefit buyers who earn more as they purchase larger numbers of units.

Fig. 3 shows random matching generates about 17 trades per period; the estimated convergence level reported in Table 3 is 17.2. Trade levels below the predicted market equilibrium of 20–24 units are consistent with our previous work that reports lower trading levels in negotiation trading institution when compared to other trading institutions such as ascending auctions (Menkhaus et al., 2003). However, more matching opportunities in negotiations (that is, with five as opposed to three bargaining rounds per period) will move average quantities closer to the market intersection of supply and demand (Menkhaus et al., 2007).

With choice, the number of trades conducted in each period increases to nearly 19 (Fig. 3). The estimated convergence level (Table 3) is 18.9, significantly higher than the trading level with random matching. Overall there is about a 10% increase in the number of transactions when there is choosing, compared to random matching. Clearly there is less patience with trading individual units, and this is a valued attribute when subjects can identify and choose a trading partner.

With RM, negotiated prices converge to the predicted equilibrium of 80 tokens. The convergence model provides an estimated parameter of 80.0 tokens (Table 3). Fig. 4 shows this convergence is from below; by period 10, prices are stable at about 80 tokens. Prices in CE are markedly different. They converge to about 4 tokens below the random level, about a 5% decrease to an estimated level of 76.3 tokens (Table 3). Fig. 4 contrasts the difference in prices between a choice environment and random matching; prices begin at about 70 tokens and rise, but never reach the average in random matching.

Convergence estimates for relative earnings reported in Table 3 show that with RM buyer and seller earnings are essentially equal for the demand and supply conditions described in Fig. 2. However, in the CE treatment buyers are relatively better off. They were able to earn an estimated 30.1 tokens per trading period more than sellers (Table 3). This translates to buyers earning about 24% more than sellers.

Traders exchange more units under the CE treatments so total earnings, or total surplus in the market, should be greater than when subjects are randomly matched. Total surplus with RM converges to an estimated 1083.2 tokens per period. In the CE this estimate is significantly higher, converging to an estimate of 1145.3 (Table 3), closer to the predicted equilibrium or maximum surplus of 1200 tokens. There is about a 6% increase in surplus for the combined choice environments reflecting the effect of more units traded.

Altogether, the data on trading levels (Fig. 3) and prices (Fig. 4) along with convergence estimates for prices, trades, and earnings measures (Table 3) provide confirmation of a distinct difference between a market with random pairing and a market where agents are able to choose with whom they will initiate negotiations. Random pairings move the market toward an equilibrium price predicted by the intersection of supply and demand. When agents choose with whom they will bargain prices are significantly lower and quantities traded significantly greater. These results support our argument that choosing a counterpart in repeated private negotiation facilitates or promotes a bargaining style and overall bargaining culture of relatively generous bids and offers or impatient negotiations.

5.2. Who chooses matters

Comparing choice treatments BC and SC, we find no significant differences between convergence estimates of 19.1 trades per period in the BC treatment and 18.7 in the SC treatment (Table 3). Hence, in terms of trading levels, it does not matter which side of the market is choosing. Likewise for *total* earnings it does not matter which side of the market is choosing; no significant differences are found between the BC and SC treatments (Table 3).

In spite of similar higher trading levels in BC and SC treatments, whether buyers choose sellers or sellers choose buyers, does influence prices and *relative* earnings. Prices negotiated in the BC and SC treatments are significantly different. Fig. 4 shows that when buyers choose sellers, prices remain consistently above those when sellers choose buyers as trading partners. Estimated convergence levels in Table 3 are significantly different at 78.0 and 74.5 tokens in the respective BC and SC treatments. In absolute terms, average estimated seller earnings were significantly lower in the SC (120.4 tokens) treatment as compared to the BC (135.7 tokens) treatment.

From Table 3 we note that when buyers choose – contrary to their desire to “buy low” – the estimated convergence levels for prices are relatively high, and when sellers choose prices trend toward low levels – at odds with a seller’s desire to “sell high.” This suggests that those choosing have a relative disadvantage. Choosing signals a “hat-in-hand” willingness to negotiate. This notion is explored in a further analysis of initial bids and offers as well as in the timing of negotiations and trades below.

5.3. Opening bids and offers are different

The initial bid or offer is a signal of generosity. If generosity is a valued attribute in “choose” environments, there should be relatively more generous initial bids and offers than when traders are randomly matched. Table 4 as well as Figs. 5 and 6 report average initial bids and offers (the initial price negotiation posted for each bargaining pair in round one of each period).⁹ In Table 4 and Fig. 6 the calculated range and midpoint of initial bids and offers is provided along with the observed bargaining outcome for average period prices in all three bargaining rounds for each treatment.

Table 4 and Fig. 5 compare initial bids and offers for the RM and aggregate CE treatments. With random matching, buyers post opening prices in round one of each trading period that converge to an estimated 55.6 tokens; sellers’ posted opening offers converge to 109.0 (Table 4). This equates to a range of about 53 tokens within which bids and offers converge. The midpoint of about 82 is just above the final convergence price estimate of 80 tokens for all trades conducted in all three bargaining rounds each period. Sellers give up an average of 29 tokens and buyers about 24 tokens from their opening bids and offers, the midpoint of first bids and offers posted with random matching is in line with the final average trade price.

In a choice environment sellers are more accommodating in their initial price postings. Compared to the RM baseline, in CE, initial buyer bids remained the same (convergence estimates are 55.6 and 56.8 tokens, respectively, with no significant difference between the RM and CE treatments) while sellers post more generous opening offers – dropping their opening offers nearly 11 tokens to 98.5 (Table 4). This tendency is illustrated in Fig. 5, which shows opening buyers’ bids and opening sellers’ offers over the 20 trading periods for the RM and combined CE treatments. Initial bids in CE remain close to RM levels, while initial offers are more generous, dropping below the random comparator in all but one period. Sellers *overall* tend to be generous in their initial offers when there is a choice.

Buyers are relatively more generous in BC compared to RM. Initial bids to sellers *whom buyers have chosen* increase about 8 tokens from the RM base, from an estimated 55.6 (RM) to 63.4 (BC) in Table 4. This behavior confirms that those choosing perceive themselves to have less bargaining power. In contrast, initial bids from buyers who are *chosen* in the SC treatment are more demanding than BC buyers; they make initial bids about 4 tokens lower than buyers in the RM base (Table 4 reports SC estimated initial bids are 51.2 and significantly different than BC initial bids). Chosen traders post initial prices that indicate they perceive themselves to have a bargaining advantage relative to the choosers.

We can see from a comparison of the calculated midpoints and period price outcomes in Table 4 that in all treatments the midpoint between initial bids and offers in round one is generally a good predictor of the overall converged price estimate for all trades completed in all three bargaining rounds of each period. This connection is clear in Fig. 6 which is a graphical representation of the range and midpoints of first prices posted and estimated convergence prices by treatment. Initial bids and offers essentially establish the eventual price of the transaction.

Sellers in the CE treatments decrease initial offers more than buyers increase initial bids. In other words, sellers make more of an adjustment than buyers in a choice environment. This observation suggests that sellers take a different perspective than buyers on the trading environment; within the context that traders tend to go to the midpoint of initial offers and bids, sellers as a group are more generous than buyers in their bargaining behavior.

Our results suggest this role recognition may be altered in a choice environment and resulting bargaining cultures. When present, the impact of “seller” and “buyer” role recognition is consistent with earlier work. However, role-recognition does not always exist when bargains are struck. Further, the degree to which the roles impact trading behavior depends on the

⁹ We do not use later round bids and offers because buyers and sellers trading at different paces will be at different redemption and cost values.

choice environment, whether buyers or sellers are choosing. A seller choosing creates the greater disadvantage, as Table 4 shows by lower average market prices in SC than BC.

5.4. Further evidence on impatience – counteroffer speed

Table 5 reports the average number of price negotiations posted by trading pairs to arrive at a trade. Average bids and offers posted are reported for buyers and sellers as well as a total number of negotiations (bids and offers) for the RM, BC, and SC treatments. All negotiations from all bargaining rounds in periods one through twenty are included. The standard deviation in number of posted prices per trade and number of observations are reported in parentheses. Statistical differences between the three treatment averages are included.

As expected, more bids and offers are posted overall when there is choosing. This suggests on average that traders adapt their bargaining styles to be more impatient compared to the random match treatment. The total number of posted prices with random matching was 8.4 bids and offers per trade negotiated by trading pairs and significantly higher at 8.9 for each of the choose treatments (Table 5). This increase in prices posted is significant for sellers' offers as well, which increased from an average of 4.3 offers posted per completed trade for randomly paired traders to 4.6 in each BC and SC (Table 5). Relatively more prices posted during trade negotiations are observed in the two choose treatments than with random matching fits with an increased willingness to trade when trading partners are chosen.

6. Conclusion

Comparing random matching and an aggregate choice environment in Table 3 illustrates two very different bargaining outcomes resulting from different bargaining cultures. When buyers and sellers are randomly paired for each new bargaining round by the experimenter, prices converge to the predicted price equilibrium and relative buyer and seller earnings are symmetrical. Generally the results support the notion that choosing a partner alters bargaining styles and ultimately bargaining outcomes for privately negotiated transactions in a limited match trading environment. Choosers become more generous in their opening bids (buyers) or offers (sellers). Traders generally become more impatient when negotiating trades in the choose environment as compared to the random match environment. The seller may face lower earnings in the choose environment. When choice in trading partners is introduced trading levels increase and prices drop significantly favoring buyers in our experiments that profit from lower prices.

When sellers lower their initial offers they are giving up potential earnings, so it is very important that increased trades mitigate losses from lower prices. It is not so important for buyers because as trade prices fall they earn more on each purchase. Trading faster at lower prices clearly disadvantages sellers relative to buyers. Sellers are placed in a prisoner's dilemma that cannot be escaped by any individual seller, because trading fewer units at higher prices, would leave a seller with a disadvantage in being matched. Trading more than other sellers at lower prices may help a seller relative to other sellers, and losses could be mitigated this way, but our laboratory environment does not allow sufficient elasticity in demand or costs to increase seller earnings. It would take flatter demand and cost schedules than we describe and illustrate in Table 1 and Fig. 2. We note that traders are unaware of these basic market conditions.

Our results indicate choosing a trading partner for a negotiated transaction creates a bargaining culture that impacts expectations associated with bargaining style. This may be beneficial for market participants to recognize. Those who choose tend to be more generous and impatient in their initial bids or offers when trying to negotiate a trade. For those being chosen, this signals a potential bargaining opportunity. Those who choose a trading partner may mitigate some of this disadvantage by being more patient. However, this strategy may result in less trading and reduced market efficiency overall.

These results suggest that buyers and sellers must continually assess the benefits and costs of participating in a negotiations market institution. Success is influenced by the practice of choosing a bargaining partner and individual bargaining styles that evolve from choosing. In repeated bargaining the practice of choosing a trading partner is common. Market institutions are not neutral toward relative trader gains. The relative disadvantage to sellers in repeated bargaining with choice may motivate sellers to seek alternative market institutions. An alternative trading institution, such as an ascending auction, is a reasonable consideration. We observe a transition from private negotiation to auction mechanisms and vice versa. It is an evolution that blends different institutions to create unique trading environments, collectively referred as "negotiauctions" (Subramanian, 2010). Closer parity between buyer and seller earnings may create stable blends of market institutions.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.jebo.2014.05.005>.

References

- Ashenfelter, O., Janet, J., Farber, H.S., Spiegel, M., 1992. An experimental comparison of dispute rates in alternative arbitration systems. *Econometrica* 60, 1407–1433.
- Bazerman, M.H., Magliozzi, T., Neale, M.A., 1985. Integrative bargaining in a competitive market. *Organ. Behav. Hum. Decis. Process.* 35, 294–313.
- Ghosh, D., 1996. Nonstrategic delay in bargaining: an experimental investigation. *Organ. Behav. Hum. Decis. Process.* 67, 12–25.

- Huber, V.L., Neale, M.A., 1986. Effects of cognitive heuristics and goals on negotiator performance and subsequent goal setting. *Organ. Behav. Hum. Decis. Process.* 38, 342–365.
- Lewicki, R.J., Barry, B., Saunders, D.M., 2009. *Negotiation*, 6th ed. McGraw-Hill/Irwin Press, New York.
- McAlister, L., Bazerman, M.H., Fader, P., 1986. Power and goal setting in channel negotiation. *J. Market. Res.* 23, 228–237.
- Menkhaus, D.J., Bastian, C.T., Phillips, O.R., O'Neill, P.D., 2000. Supply and demand risks in laboratory forward and spot markets: implications for agriculture. *J. Agric. Appl. Econ.* 32, 159–173.
- Menkhaus, D.J., Phillips, O.R., Bastian, C.T., 2003. Impacts of alternative trading institutions and methods of delivery on laboratory market outcomes. *Am. J. Agric. Econ.* 85, 1323–1329.
- Menkhaus, D.J., Phillips, O.R., Bastian, C.T., Gittings, L.B., 2007. The matching problem (and inventories) in private negotiation. *Am. J. Agric. Econ.* 89, 1073–1084.
- Muthoo, A., 1999. *Bargaining Theory with Applications*. Cambridge University Press, Cambridge, UK.
- Neale, M.A., Bazerman, M.H., 1985. When will externally set aspiration levels improve negotiator performance? A look at integrative behavior in a competitive market. *J. Occup. Behav.* 6, 19–32.
- Neale, M.A., Northcraft, G.B., 1986. Experts amateurs, and refrigerators: comparing expert and amateur negotiators in a novel task. *Organ. Behav. Hum. Decis. Process.* 38, 305–317.
- Neale, M.A., Huber, V.L., Northcraft, G.B., 1987. The framing of negotiations: contextual versus task frames. *Organ. Behav. Hum. Decis. Process.* 39, 228–241.
- Noussair, C.N., Plott, C.R., Riezman, R.G., 1995. An experimental investigation of the patterns of international trade. *Am. Econ. Rev.* 85, 462–491.
- Parks, R.W., 1967. Efficient estimation of a system of regression equations when disturbances are both serially and contemporaneously correlated. *J. Am. Stat. Assoc.* 62, 500–509.
- Phillips, O.R., Menkhaus, D.J., 2010. The culture of private negotiations: price drift in bilateral bargaining. *J. Econ. Behav. Organ.* 76, 705–715.
- Phillips, O.R., Menkhaus, D.J., Krogmeier, J.L., 2001. Laboratory behavior in spot and forward auction markets. *Exp. Econ.* 4, 243–256.
- SAS, 1999. *SAS/ETS User's Guide Version 8*. SAS Institute Inc., Cary, NC.
- Subramanian, G., 2010. *Negotiauctions*. W.W. Norton, New York.