



# Skills in the marketplace: Market efficiency, social orientation, and ability in a field-based experiment



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## ABSTRACT

Neoclassical economic theory predicts that markets will clear, leaving little or no marginal gains from trade. Laboratory experiments have largely confirmed this prediction, though the results of recent field experiments have been mixed, especially in developing countries. I create a multiround trading market in Uganda to explore the efficiency of trading and test whether traders' personal traits are associated with market efficiency and individual bargaining success. To test the effects of individual traits, I utilize data on measures of the traders' human and physical capital, risk and time preferences, and social orientation, specifically pro- and antisocial behavior and aggression. I find that the buyers' and sellers' relative levels of social orientation and human capital are associated with levels of market efficiency within rounds. Measures of social orientation, however, are less associated with individual success. I also find that rents obtained in the experiment are strongly associated with the wealth levels of participants two years later, but this association is limited to those who were randomly assigned to be buyers in the experiment. I present evidence that this association is driven by greater buyer bargaining ability.

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## 1. Introduction

The prediction that markets in equilibrium will clear, leaving behind little or no marginal gains from trade, is a central tenet of neoclassical economic theory. Research on financial and trading markets in developed countries has largely confirmed this prediction (Fama, 1970), along with a number of laboratory experiments (Smith, 1962). More recently, in a field experiment with memorabilia traders, List (2004) found efficiency rates as high as 97% in some rounds of trading.

Evidence on market efficiency in developing countries is more mixed. Financial markets are often incomplete, but those that exist perform relatively well (Magnusson and Wydick, 2002). Among small-scale traders, the results are less promising. Bulte et al. (2013) find efficiency rates below 90% among inexperienced trading communities in Sierra Leone. Through a novel experimental design, they show that varying interaction mechanisms can increase this rate by a small amount, though there are still significant inefficiencies. Their results suggest that expanding market growth will help push out inefficiencies; however, there is still good reason to be worried about the reasons for low efficiency<sup>1</sup>.

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<sup>1</sup> Interestingly, Code and Sunder (1993) show that computer-programed zero-intelligence traders can achieve equilibrium in market trading. This makes the question of why there are low efficiency rates in developing countries an even bigger concern.

While existing laboratory and field experiments have focused on the overall efficiency of markets, they have paid little attention to who is participating in the market. In any market, some individuals will likely obtain greater rents than others due to greater bargaining ability, which is likely based on a range of personal abilities and characteristics. If these characteristics affect not only individual success but also overall market efficiency, then the “wrong” mix of personal characteristics among participants in a market could lead to inefficient outcomes. The role of market participants' individual characteristics on market performance could thus be of interest to researchers and policymakers working to better understand market efficiencies in both developed and developing countries.

In order to explore what contributes to low-efficiency outcomes and how this may be associated with market participants' individual characteristics, I describe here the results of an experiment in Uganda that merges individual outcome data from a bargaining experiment with detailed individual preferences, social orientation, and skills-based information. I create a private auction, multi-round trading market where individuals are randomly selected as buyers and sellers and given random values for an imaginary good. The design is intended to reflect the market conditions that people in Uganda and other developing countries regularly face. I use the results to explore the efficiency of trading, whether participants' individual traits could predict market efficiency and/or individual bargaining success, and how individuals' relative success in the experiment correlated with their future wealth levels.

In early rounds of trading, I find low efficiency rates similar to those found by [Bulte et al. \(2013\)](#), discussed above. By the final rounds, however, efficiency rates are higher and close to neoclassical theoretical predictions. I also find that a number of individual characteristics are correlated with success, both of the overall market and of individual participants in the experiment. Greater average age, wealth, and human capital of participants are positively associated with market efficiency, whereas indices of participants' patience, pro- and antisocial behavior, and aggression are negatively associated with market efficiency. Greater age, human capital, wealth, patience, and aggression are associated with individual success in the market, though inconsistently. The significance of individual success in the experimental market to wealth outcomes after the experiment varies by whether a person was selected to be a buyer or a seller.

Specifically, I look at how the rents obtained by participants correlate with their future wealth outcomes, collected two years after the experiment was run. I find that the total rent an individual obtains is positively associated with individual wealth two years after the experiment, but only for those who were assigned to play as buyers. I do not find an association with intermediate business outcomes for either buyers or sellers. While I am not able to test for all potential mechanisms directly, the evidence suggests that the correlation is based on buying ability particularly rather than overall entrepreneurial ability<sup>2</sup>.

Overall, the results of the experiment described here suggest that market buyers and sellers in a developing country are not obtaining full rents, though this inefficiency occurs at a rate similar to that found in developed economies. Measures of individual social orientation and abilities are important for aggregate market performance, but the social orientation measures are not important for individual performance. This suggests that participants' individual characteristics play a complementary role within markets.

This paper contributes to the literatures looking at market efficiency and the role of individual ability and social orientation on individual and market outcomes. The results suggest that future work on market and social efficiency will need to include consideration of participants' individual social orientation. In the next section, I discuss current research on the role of individual social characteristics and abilities in economic outcomes.

## 2. Evidence of the role of individual characteristics

This study is part of a growing research field looking at how individual characteristics and skills correlate with economic outcomes. A major limitation of this literature is that, while individual characteristics have been found to correlate with economic outcomes, much of the work is a theoretical and does not present a strong case for which characteristics should matter. The current paper is limited in this way as well. Thus, much of the results in the literature show a correlation between characteristics and outcomes, but these correlations are not necessarily consistent across studies. Clearly, individual characteristics matter in some way, but it is still unclear how fully conceptualize the role they play.

For instance, [DellaVigna \(2009\)](#) summarizes research on how individuals deviate from standard economic models, including the role of social preferences, limited attention, and persuasion in market outcomes. [Heckman et al. \(2006\)](#) present evidence that cognitive and noncognitive skills predict a number of economic outcomes, including employment, wages, and occupational choice. [Leibbrandt \(2012\)](#) finds a strong correlation between prosocial outcomes in a laboratory experiment and outcomes from a trading market in Brazil. [Iyer and Schoar \(2010\)](#) conduct a market experiment by sending buyers to negotiate with sellers and look at final price agreements. They then test whether the outcomes of the negotiations correlate with whether a buyer is from a different community than a seller helps. They find this does matter. In an experiment using a double-auction design in Kenya, [Haushofer and Zurlinden \(2013\)](#) find that bids conform to neoclassical theory. They also find a correlation between cognitive skills and experimental outcomes. The results of these papers are similar to what I find

<sup>2</sup> It is still possible that the games are picking up seller/business expertise. However, given that the results for those assigned to be sellers are not correlated with future outcomes, it is likely that this is not the case.

in the current experiment, though only age and human capital are consistently associated with outcomes, while wealth, patience, and aggression, are associated in some specifications and for some players, but not for everyone.

The current experiment is conducted on a sample of individuals who were part of a broader experiment that looks at how to develop entrepreneurship among un- and underemployed youth. There is also a growing literature exploring the correlation between individual characteristics and business outcomes. Djankov et al. (2007) look at the determinants of being an entrepreneur in Brazil and find that family characteristics are the best predictor of being self-employed. Acharya et al. (2007) explore the psychology of entrepreneurial success by correlating different characteristics with economic returns. They find that self-efficacy, achievement motivation, age, and prior borrowing experience are all associated with success. Bloom and Van Reenen (2007) collect data on management practices (and ability) and find a large heterogeneity of business quality, due in large part to a large number of businesses being poorly managed. More competition decreases bad management; businesses passed down in the family are generally the worst managed. Djankov et al. (2007) test whether attitude toward risk, I.Q., self-confidence, family background, and social networks are predictive of business outcomes and find that family characteristics have an influence on whether someone becomes an entrepreneur, though business outcomes are best predicted by intelligence and family education.

To study the effects of individual ability and experience in market settings, Kagel and Richard (2001) look at the prevalence of the winner's curse in those with a lot of experience in markets and those with little experience, while List (2004) looks at the differential returns and equilibrium when pairing experienced buyers and sellers with inexperienced buyers and sellers. There is also research looking at the differences in competitive behavior across genders in market settings (Gneezy et al., 2003; Ham and Kagel, 2006). Researchers have also studied the relationship between risk aversion and discounting with cognitive ability (Benjamin et al., 2013). Finally, Garvin and Kagel (1994) and Casari et al. (2007) look at correlations between the winner's curse, gender, and ability, as measured by SAT scores.

In the current study I utilize the results of the business development experiment two years after the experiment described here was conducted. Contrary to much of this literature, I do not find an association between individual characteristics and business outcomes. Only the results of the experiment correlate with business returns.

The results of the experiment presented in this paper also contributes to research connecting behavior in the lab with real life and future outcomes<sup>3</sup>. Two papers that find similar connections are Karlan (2005), who finds that results from trust games are associated with repayment rates for microfinance customers after a year, and Berge et al. (2015), who find a strong association between laboratory measures of individual competitiveness and actual investment, employment, profit, and sales of businesses.

### 3. Experimental design

This experiment was designed to mimic normal market interactions with which most participants would be familiar, but with a well-defined structure. This allows me to test whether and how quickly the prices and quantities obtained fit with neoclassical economic theory. While market prices and quantity are close to optimal in the experiment, there is significant variation within the market for individual outcomes.

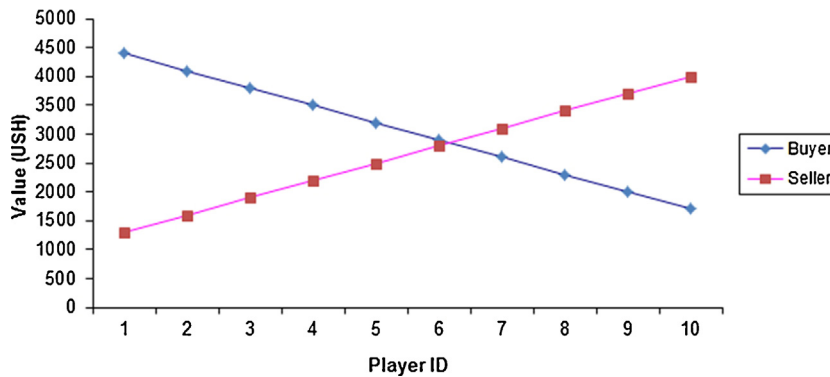
The experiment was conducted in the Langi region of northern Uganda, so all of the participants come from the same ethnic group. Participants were invited from a pool of individuals taking part in a randomized evaluation of a cash grant project, described in Blattman et al. (2014), that was meant to increase business ownership and self-employment. Each session of the experiment described in this paper required 20 participants to be present, but that number did not always show up out of the invited pool. When there were too few invited participants, people were selected from the local community. In total, 78.5% of the sample population is from the larger cash grant project evaluation sample.

In each of the sessions, people were from the same general area, though none were immediately related to each other. One limitation of this setup is that I am not able to capture how well the participants knew each other. However, I am able to control for whether individuals were part of the same group funded by the cash grant program discussed in Blattman et al. (2014). Whether or not a participant was from that group did not affect individual selection into either the buyer or seller roles. Controlling for participation in the cash grant project did not substantially change any of the results or interpretations.

Individuals were randomly assigned as either sellers or buyers (10 players in each group per session) and given cards with either their costs or values, respectively. Buyers and sellers kept these roles for the remainder of the experiment. I predetermined the reservation values, which were generated randomly to minimize learning between players. The values for buyers started at 1700 USH (\$0.85) and proceeded by amounts of 300 USH (\$0.15) until they reached the maximum value of 4400 USH (\$2.20). For sellers, the lowest cost started at 1300 USH and increased by 300 USH until they reached 4000 USH. The most efficient outcome is presented in Fig. 1, where equilibrium price is between 2800 USH and 2900 USH and equilibrium quantity traded is 6. The maximum amount of rent per round is 9600 USH among all players<sup>4</sup>.

<sup>3</sup> For excellent discussions about the generalizability of laboratory games to real-life outcomes, see Levitt and List (2007) and essays by Camerer (2015), Harrison et al. (2015), Kagel (2015), Fréchet (2015), Kessler and Vesterlund (2015), Reiley (2015), and Al-Ubaydli and List (2015) in the *Handbook of Experimental Economic Methodology*.

<sup>4</sup> The normal daily wage in northern Uganda at the time was about 6000 USH (\$3.00), though most people are not able to make this wage consistently. Average consumption per person per day is below \$1.25.



**Fig. 1.** The neoclassical theoretical outcome prediction from the experiment. Individuals were randomly assigned as either a buyer or seller and given values that varied according to the figure. The equilibrium price is between 2800 and 2900 US\$, while the equilibrium quantity is 6.

Participants played the experiment as a private market. Individuals were allowed to freely roam around a large room and negotiate prices with opposite types. Participants were told that the experiment was meant to mimic the marketplaces found in large and small towns across Uganda. Buyers were to approach sellers and offer prices, with all information kept private by the research team to facilitate optimal bargaining. A time limit was imposed of 5 min per round, which was generally enough time for buyers and sellers to negotiate with a number of people.

When a price was reached, participants approached an enumerator and quietly informed them of the price. The price was then recorded along with the value and costs of the two players. Each participant played a total of 10 rounds, and all information was kept private by the research team. For security reasons, players were informed that the research team would return a few days later to pay individuals the amount of their profit or surplus value from all of the experiments. This promise was credible because the team had been interviewing the participants a number of times during the previous two years and had developed a relationship with them.

The experiment was run in early 2010. A local research team including a manager and two assistants collected the data. All three spoke the local language, Luo, which was the main language of the experiments. The researcher and the manager trained the team and issued clear instructions on how to explain the experiments to participants, when and how to answer questions, and how to record information. The full protocols are included in the Online Appendix.

A total of 10 sessions were run with 20 participants in each session, with 10 rounds per session. The total sample would ideally have been 200 participants with 2000 person rounds. However, as some invited participants did not show up, the total sample that includes detailed individual characteristics is 143 people and 1430 person rounds. Due to missing values, the analysis detailed below includes between 128 and 143 participants. The missing values are from the larger evaluation: 86% of the sample was tracked at the final data collection, with 14% missing.

Since some of the invited participants did not attend, it is possible the sample studied here represents a select group. To test for selection in attendance, I explore the correlation between attending and the main outcomes and controls available for the invited sample in the Online Appendix, Section A.4. There is not a significant relationship between attendance and any variable. A test of performance between the invited local community and evaluation samples, also presented in the Online Appendix, suggests there is no difference in performance between these groups either. While the sample of participants who played these games are not representative of the full sample of people in Uganda due to the nature of the evaluation sample being used here<sup>5</sup>, those that attended this experiment have similar characteristics to the invited sample.

#### 4. The role of skills and social orientation in market outcomes

As discussed in the introduction, the majority of the literature looking at how individual characteristics affect economic outcomes focuses on entrepreneurs and the self-employed. However, there has not been much focus on the role of social orientation for other outcomes, including market interactions. In this section I discuss how social orientation and skills may affect individual outcomes in bargaining situations.

In a market, the price agreed upon by a buyer and seller will lie between the cost to the seller and the value to the buyer, i.e.,  $cost \leq price \leq value$ . The rent to the seller is thus equal to  $p - c = r_S$  and the rent to the buyer is equal to  $v - p = r_B$ .  $r_S$  and  $r_B$  may not necessarily be equal to each other, depending on the outcome of the bargaining process. An individual's rent will thus be a function of different characteristics. For individual  $i$  during round  $j$ , obtained rents may be determined by a characteristic function composed of different individual traits. In the case described here, this would be  $r_{ij} = f_{ij}(k, h, t, r, s_p,$

<sup>5</sup> Blattman et al. (2014) discuss selection into the sample. Individuals were younger and better off than the average Ugandan, but still poor by local and international standards.

$s_A$ ,  $a$ ), where  $k$  is individual  $i$ 's physical capital,  $h$  is human capital,  $t$  is time preferences,  $r$  is risk preferences,  $s_P$  is proclivity toward community involvement (prosociality),  $s_A$  is proclivity to be antisocial, and  $a$  is aggressiveness.

The total rent obtained by all participants within the round is thus  $R_j = \sum_{i=1}^{20} r_{ij}$ . If individual characteristics are additive in the way they affect rents obtained in a round, then  $R_j = \sum_{i=1}^{20} f_{ij}(\cdot)$ . In this case, total rents are predicted by the total sum of each of the characteristic functions.

It is possible, though, that total trading round outcomes could be more than the sum of the individual characteristics. If there is a complementarity of traits within the market, the total obtained rent will instead be a function of the total individual traits. In this case,  $R_j = F_j(K, H, T, R, S_P, S_A, A)$ , where capitalization of individual characteristics refers to an aggregation of the total population.  $F_j(\cdot)$  and  $\sum_{i=1}^{20} f_{ij}(\cdot)$  could thus behave very differently. In this experiment, I test for this complementarity of traits.

I know of no existing theory to directly relate how individual traits might affect individual and market outcomes. However, it is possible to conjecture what the role of these characteristics might be at the individual and aggregate levels. Looking at the literature discussed above, [Acharya et al. \(2007\)](#) find a positive association between age and entrepreneurial success. Speculating on this association, age may reflect experience, though it is possible to imagine that individuals who are older may also have more difficulty interacting in the market.

Physical capital, the total wealth of an individual, may proxy for past success in dealing with the market, or family wealth. In either case, it may be positively associated with individual outcomes in this experiment as it can partially reflect greater experience with bargaining and thus greater rents in this experiment. Alternatively, if successful people are more likely to act generously, this could lead to decreased returns for those with more wealth. At the aggregate level, a higher level of experience of the participants may suggest greater general efficiency.

Human capital may reflect general ability and is thus likely to positively correlate with outcomes at both the individual and aggregate levels if ability is important for outcomes. For instance, [Haushofer and Zurlinden \(2013\)](#) found a positive association between human capital and bargaining outcomes.

Time preference reflects an individual's patience, and may be positively associated with individual and aggregate outcomes if patient individuals are more willing to search out a better price. However, too much patience could be associated with lower outcomes if people spend too much time searching for higher values. Likewise, risk preferences could be positive or negative for individual outcomes depending on whether taking chances improves outcomes.

Prosociality (i.e., community involvement) reflects both individual likeability and positive attitudes towards others. [Leibbrandt \(2012\)](#) has found a positive association between prosocial attitudes and trading success in Brazil. If likeability is used to an individual's advantage, it will be positively associated with outcomes. On the other hand, if positive attitudes dominate, prosociality will be negatively associated with trading outcomes as community-involved individuals will bargain less effectively for themselves and will instead bargain with greater concern for other people's outcomes. Likewise, at the aggregate level a strongly community-involved group could perform more efficiently if this is used for advantage, or worse if concerns of fairness dominated.

Both antisocial behavior and aggressiveness are expected to be negatively associated with outcomes if other participants view these behaviors as negative and therefore do not interact or interact less with these individuals. If, instead, aggressive individuals are not discriminated against, this behavior could lead to higher individual and aggregate outcomes if it helped drive other participants to accept lower returns.

While the literature mentioned above helps in considering possible ways individual characteristics might function during personal interactions, the discussion here remains generally speculative due to the small amount of existing evidence on this subject. This is especially true concerning the roles of antisocial and aggressive behavior, which, as far as I am aware, have not yet been explored in the literature.

## 5. Market efficiency

The summary statistics for the experiment are presented in [Table 1](#). The average price across the rounds is 2700 USH, which is close to the predicted equilibrium values of 2800–2900 USH. Across all of the rounds, the prices average between 90% and 98% of the predicted level, with very little change round to round. Individual price levels within each session, though, were quite varied.

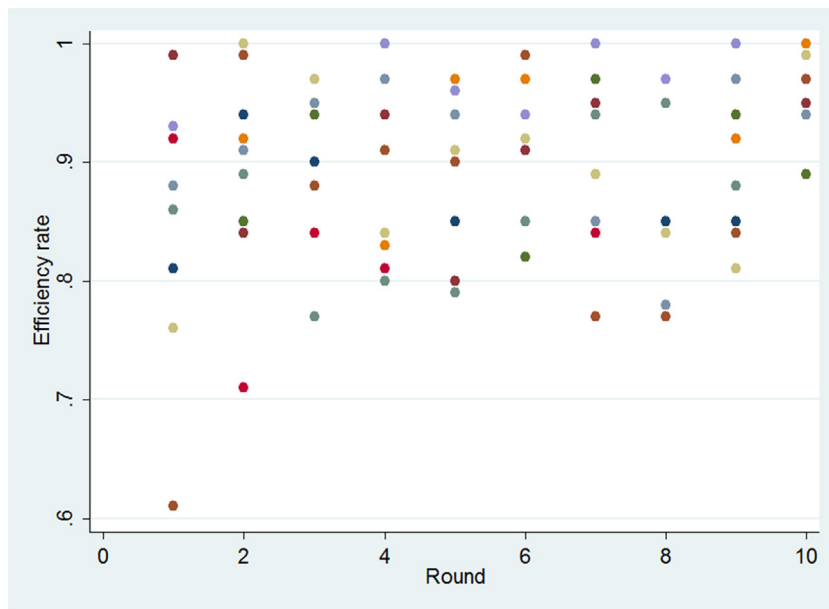
Individual average rents are likewise consistent around 700 USH. Twenty-two trades (less than 2% of all trades) were made with negative rents. This is likely due to some people in early stages misunderstanding the rules. In the later stages, there are no negative trades. There is a high level of heterogeneity in rent returns, with some people performing exceptionally well. As predicted, there is a large difference in returns between buyers and sellers. Buyers averaged 293 USH more rents each round than sellers, about 40% of the average rent. This suggests buyers had a large market power compared to sellers, perhaps due to the instructions to buyers to search for sellers. Anecdotally, sellers were observed to not search much for a buyer, but instead bargained with buyers who approached them.

Efficiency rates are calculated as the percentage of total possible rents available that were obtained by the entire group in each round. In the early rounds, the rates are well below 90%, which is consistent with the results of [Bulte et al. \(2013\)](#) in Sierra Leone. Efficiency rates by round are shown in [Fig. 2](#). I plot efficiency rates for each round played in each session. In the first rounds, there is a large variation in efficiency rates. As people play more rounds, these rates improve across the

**Table 1**  
Summary statistics of the experiments by round.

	Round										All
	1	2	3	4	5	6	7	8	9	10	
Average price	2729	2631	2565	2634	2708	2764	2717	2782	2773	2725	2703
Max price	4000	4100	4000	3800	3900	4000	4100	4150	4100	4100	
Min price	1500	1600	1500	1500	1400	1900	1600	1600	1800	1400	
SD price	571	608	539	534	577	507	542	544	556	432	
Average rent	694	705	728	693	671	714	703	647	686	746	699
Min rent	-2000	-900	-800	-1100	-1500	-600	-2000	100	50	50	
Max rent	2900	2200	2800	1900	2200	2200	2400	1800	2100	2700	
SD rent	661	506	562	532	579	506	540	449	467	515	
Actual group rent	7980	8320	8450	8380	8190	8780	8510	8410	8440	8880	8434
% of max rent	83%	87%	88%	87%	85%	91%	89%	88%	88%	93%	88%

Notes: This table presents the summary statistics for each round, averaged across all of the sessions. While the average prices and rents are close to the theoretical predictions, within each round there is significant variation in the individual prices and rents. Note that rent can be negative if someone traded above (buyers) or below (sellers) their reservation price. As described in the text, this happened in less than 2% of trades. Note that total rent possible is 9600 per round.



**Fig. 2.** Efficiency rates for each round in each session, for a total of 100 rounds. Round 1 shows the efficiency rate for each of the 10 sessions. Some efficiency rates overlap and so cannot be seen. Efficiency is defined as the total rents obtained per round divided by the total theoretical rents obtainable.

sessions. By the last round, efficiency has increased to 93% on average. In 11 of the 100 total rounds played, efficiency was at 99% or greater. The average efficiency rate includes a small number of very poor performing sessions. Dropping the single worst performing session in the last period increases efficiency to 96%.

Maximizing efficiency comes from an optimal matching of buyers and sellers. By design, market equilibrium in the experiment means four buyers and four sellers would not trade. This happened in only 69 of the 100 total rounds played. Even in the last round, there are fewer than predicted no-trades in three of the sessions.

**6. Measures of individual characteristics**

The research team collected data on individual characteristics as part of a larger evaluation of a cash transfer evaluation. The definitions, source, and date of collection of each variable are presented in Table 2. Baseline refers to the baseline data collection, i.e., before the intervention, for the experiment described in Blattman et al. (2014). The variables were collected at the baseline in 2008, or during the first follow-up survey in 2010, which coincided with the experiment described here. The data includes a wide range of economic, social, and psychological indicators, described in more detail below.

Table 3 presents the summary statistics for individual characteristics used in the analysis presented here. Note that the sample size is 143, which is the number of individuals invited to the experiments who actually showed up. Individuals are relatively young (25 years of age on average), with 29% being female. Compared to other young people in northern Uganda,

**Table 2**  
Variable description.

Variable	Description	Date collected
Age	Age of individual	Baseline (2008)
Sex	Sex of individual	Baseline (2008)
Human Capital	Index of years of education, literacy in native language or English, whether ever received vocational training, number recall and numeracy test	Baseline (2008)
Wealth	Index of assets, current cash savings and cash earned in the last month from all economic activities	Baseline (2008), first endline (2010), second endline (2012)
Risk aversion	Index of localized questions on daily risk questions and non-incentivized risk question	First endline (2010)
Patience	Index of localized questions on non-incentivized choices between acting now and waiting	First endline (2010)
Pro-social	How many groups the individual participated in with other community members, such as religious and sports groups. It also tries to measure the quality of interactions with community members, i.e. whether community members were helpful to them, and vice versa	First endline (2010)
Anti-social	Problems interacting in the community. For example, individuals were asked “Do you keep to yourself when you are worried?” and rated this as often, sometimes, rarely, and never	First endline (2010)
Aggression	Index of self-reported actual fights and arguments with family, neighbors and police	First endline (2010)

Notes: This table presents the variables used in the analysis and the timing of when they were collected. Baseline and endline refers to the data collections of the larger experiment this experiment was a part of. The experiments described here were conducted during the first endline, in 2010. The baseline values were thus collected two years before this experiment.

**Table 3**  
Individual summary statistics.

	N	Mean	Std. Dev.	Min	Max
Total rents in '000 USH	143	4.042	1.723	0.5	8.9
Age	143	25.413	5.879	16	56
Female	143	0.287	0.452	0	1
Human capital index	143	0	1	-3.284	2.719
Wealth index	143	0	1	-1.244	4.409
Risk aversion index	143	0	1	-2.898	1.992
Patience index	143	0	1	-2.264	2.760
Pro-social index	143	0	1	-2.210	1.716
Anti-social index	143	0	1	-3.107	2.309
Aggression index	143	0	1	-1.314	3.128

Notes: The sample size is based on the number of invited participants that showed up to the sessions. In total, 143 invited participants participated in the experiments.

the participants are slightly better off in terms of literacy and assets. They are still very poor by most measures and fall below the government of Uganda's poverty threshold. All indices are constructed by normalizing each component piece to a mean of 0 and standard deviation of 1, summing the components, and then normalizing the sum. The variables and their components are as follows.

### 6.1. Human capital

The human capital index is composed of measures of individual intelligence and education. It includes years of education and whether the person felt she could read and/or write in her native language or English. It also includes whether the person ever received vocational training, which is a common supplemental education after finishing public schooling. The research team also administered a number recall test to individuals to test how well they could remember a string of numbers read by an enumerator, as well as a numeracy test, which asked simple math questions.

### 6.2. Wealth

The wealth index includes a principle component analysis index of assets, which is constructed from a list of over 50 common household assets. Each participant was asked about assets one-by-one to ensure there was no issue with recall of ownership. The index also includes current cash savings, which are not common in this context. Finally, it includes cash earned in the last month from all economic activities. Again, to avoid recall errors, the enumerator provided a list of 25

common activities with the respondent noting whether they engaged in that activity in the last four weeks and how much income they received from it.

### 6.3. Risk

The risk index is constructed from a set of localized questions to test daily risk preferences. A common type of question was as follows:

Suppose you have a severe pain in your leg. You have the choice between two options.

Option A: You can get some medicine that will reduce the pain but will not cure you.

Option B: You can get surgery that will cure you; however, there is a small risk of death.

Which option would you choose?

Participants then chose which option they preferred. These questions were constructed to mimic real-life risk situations that these individuals might face.

Participants were also asked the following at the end of the questionnaire:

You have a choice between the following two options.

Option A: You can receive 2000 USH for sure.

Option B: We play *Labyeka*. If you win, you get 3000 USH. If you lose, you get 1000 USH.

Which option do you choose?

*Labyeka* is a well-known local game of chance with a 50% chance of winning. After they made their decision, individuals then played the game and were paid based upon their choices and the outcomes.

### 6.4. Patience

Patience was also determined through a questionnaire using a set of localized questions. An example question to test patience is as follows:

Suppose you are sick. The illness is not life-long, but it will last for a few months. You have the choice between two options.

Option A: You can get some medicine today, which will make you feel somewhat better.

Option B: You can wait a week until a better medicine is available that will make you feel entirely good again. You can only choose one medicine.

Which option do you choose?

It was decided not to include incentivized questions that include a time lag as there was no credible way to pay participants after the questionnaire was completed.

### 6.5. Pro- and antisocial behaviors

The community involvement and antisocial variables are constructed from a set of localized questions designed to test positive and negative interactions with other people and the community. They are not mirror images of each other, but instead reflect different types of interactions. The prosocial, or community involvement, questions addressed how many groups the individual participated in with other community members, such as religious and sports groups. These questions were also designed to try to measure the quality of an individual's interactions with other community members, such as whether community members are helpful to them and vice versa. Antisocial questions focused on problems interacting in the community. For example, individuals were asked, "Do you keep to yourself when you are worried?" and rated their response as often, sometimes, rarely, or never.

### 6.6. Aggression

The aggression index is a construct of self-reported actual fights and arguments with family, neighbors, and police. The communities involved in this study are not prone to high levels of fighting or aggression; nonetheless, some issues were self-reported. While it is possible that this variable is the most prone to being misreported by respondents, the individuals were generally open to discussing such incidents.



**Table 4**  
Balance test.

	Age	Female	Human capital Index	Wealth index	Risk aversion index	Patience Index	Pro-social index	Anti-social index	Aggression index
Buyer dummy	-0.753 [0.918]	0.011 [0.077]	0.113 [0.154]	-0.079 [0.137]	0.128 [0.120]	0.051 [0.132]	0.063 [0.175]	-0.174 [0.165]	0.219 [0.161]
<i>N</i>	1430	1430	1430	1430	1420	1410	1430	1430	1430
<i>R</i> <sup>2</sup>	0.182	0.099	0.252	0.374	0.543	0.459	0.031	0.148	0.164

Notes: Dependent variable is listed in the first row. Robust standard errors, bootstrap clustered at the session level, are in brackets. Statistical significance is reported as: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . The sample size is based on the number of invited participants that showed up to the sessions, 143, who each played 10 rounds, totaling 1430 data points. The values for risk aversion are missing for one participant, and the patience index is missing for two.

**Table 5**  
Correlates of who trades.

	Pooled	Buyer	Seller
Bad price	-0.667*** [0.021]	-0.636*** [0.030]	-0.694*** [0.030]
Age	-0.001 [0.002]	0.002 [0.003]	-0.003 [0.003]
Female	-0.018 [0.027]	-0.022 [0.046]	-0.014 [0.036]
Human capital index	0.016 [0.013]	0.024 [0.019]	0.012 [0.019]
Wealth index	0.014 [0.014]	0.017 [0.023]	0.002 [0.025]
Risk aversion index	-0.016 [0.017]	-0.014 [0.035]	-0.029 [0.020]
Patience index	-0.002 [0.017]	-0.011 [0.023]	0.002 [0.026]
Pro-social index	-0.010 [0.012]	0.001 [0.020]	-0.020 [0.018]
Anti-social index	-0.042 [0.049]	-0.098 [0.065]	0.039 [0.072]
Aggression index	-0.051 [0.048]	-0.081 [0.068]	0.004 [0.073]
<i>N</i>	1410	670	740
<i>R</i> <sup>2</sup>	0.481	0.469	0.532

Notes: Whether traded is the dependent variable. Robust standard errors, bootstrap clustered at the session level, are in brackets. Statistical significance is reported as: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . The sample for the first column is described in Table 4. Columns 2 and 3 are after dividing the sample into only buyers or sellers, respectively. The sample size is not the same for columns 2 and 3 due to the presence of other people in the community randomly selected as buyers and sellers.

## 7. Individual market outcomes

As described earlier, individuals were selected to be either buyers or sellers and assigned specific ID numbers, which, unbeknownst to them, corresponded to what value (buyers) or cost (sellers) they would be given throughout the experiment. These values (costs) were randomly staggered and assigned so that each person received each value (cost) once throughout the 10 rounds. As the ID numbers were distributed randomly, it is unlikely there is selection among the timing of the received values (costs). Table 4 presents a test of balance across a range of individual indicators. None of the individual characteristics are statistically significantly related to whether a person was selected as a buyer or seller (the omitted category). This suggests randomization worked and there was little or no selection into the individual roles.

### 7.1. Who trades?

To test who engages in trade, I estimate the following OLS model on those that trade and those that do not:

$$T_{ir} = \alpha V_{ir} + \beta S_{ir} + \delta R_{ir} + \gamma X_i + \varepsilon_i \quad (1)$$

where  $i$  is the individual,  $r$  is the round,  $T$  is a dummy for whether the individual traded,  $V$  is a dummy for whether the value (cost) they received is too low (high) and so will not be traded in the theoretical equilibrium<sup>6</sup>,  $S$  is a matrix of dummies for the

<sup>6</sup> In addition to using a dummy variable for the price, I have also explored using the complete set of reservation values. Doing so does not change the main results, but interpretation becomes harder and so this analysis is not included here.

**Table 6**  
Correlates of individual rents from the experiment.

	Pooled OLS	Pooled Heckman	Buyer Heckman	Seller Heckman
Bad price	−357.431*** [38.047]	−2.094*** [0.074]	−1.998** [0.096]	−2.192*** [0.111]
Buyer dummy	321.312*** [37.395]	322.161*** [35.060]		
Age	−7.172* [3.854]	−7.142** [3.630]	−16.504*** [5.524]	−3.805 [3.222]
Female	−31.363 [46.883]	−32.695 [44.142]	2.065 [61.597]	−12.434 [40.850]
Human capital index	42.237 [23.304]	41.341* [22.030]	−27.862 [41.687]	75.102*** [17.173]
Wealth index	2.981 [20.366]	2.132 [18.993]	47.580* [28.002]	−21.696 [22.446]
Risk aversion index	31.553 [29.728]	30.344 [27.927]	55.473 [38.104]	−27.832 [31.018]
Patience index	40.902 [26.021]	39.486 [24.307]	74.012** [31.600]	2.375 [23.441]
Pro-social index	12.613 [20.548]	12.225 [19.070]	15.729 [31.139]	11.971 [18.466]
Anti-social index	12.337 [65.145]	11.531 [61.066]	−70.210 [98.354]	96.980 [59.444]
Aggression index	10.983 [68.206]	10.370 [63.897]	−62.109 [99.935]	107.985* [62.718]
<i>N</i>	824	1400	663	737
<i>R</i> <sup>2</sup>	0.263			

Notes: Rent per individual per round is the dependent variable. Robust standard errors, bootstrap clustered at the session level, are in brackets.

Statistical significance is reported as: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . The full sample is described in Table 4. Column 1 only includes trades, which means those that did not trade in a round are excluded from the sample.

session an individual played in,  $R$  is the matrix of dummies for the round played<sup>7</sup>,  $X$  is the full set of individual characteristics, and  $\varepsilon$  is the error term. The standard errors are robust and bootstrap clustered at the session level as individual outcomes may be associated with the other participants of the experiment.

The results of this analysis are presented in Table 5. The only significant predictor of who trades is whether the individual received a price to the right of the equilibrium. As neoclassical equilibrium analysis would suggest, the effect of receiving a bad price is large, negative, and very significant.

## 7.2. Market trader characteristics

To test what characteristics predict the level of rents achieved for individuals, I estimate the following model:

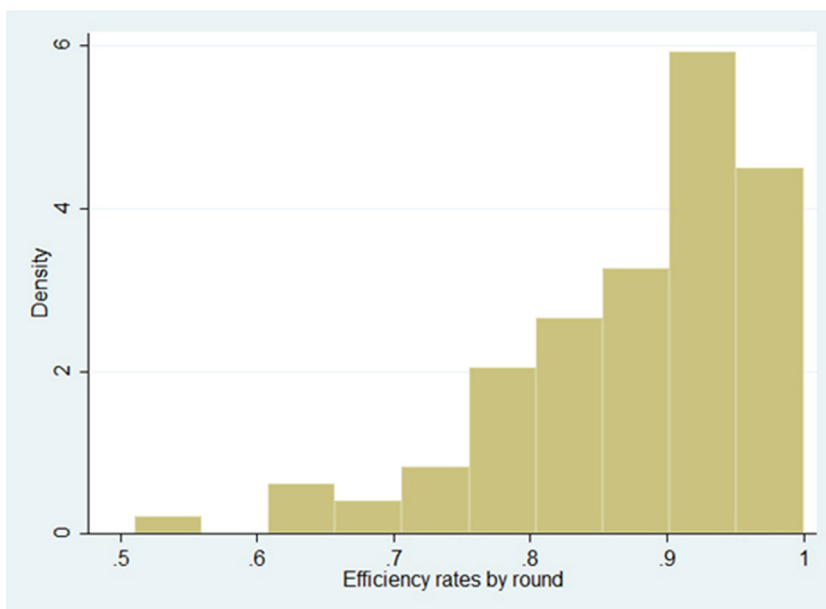
$$Y_{ir} = \alpha V_{ir} + \beta S_{ir} + \delta R_{ir} + \gamma X_i + \varepsilon_i \quad (2)$$

where, again,  $i$  is the individual,  $r$  is the round,  $V$  is a dummy for whether the value (cost) they received is too low (high) and so will not be traded in the theoretical equilibrium,  $S$  is a matrix of dummies for the session an individual played in,  $R$  is the matrix of dummies for the round played,  $X$  is the full set of individual characteristics, and  $\varepsilon$  is the error term.  $Y$  is the amount of rent person  $i$  receives in round  $r$ . Standard errors are again robust and bootstrap clustered at the session level. As the prices were given randomly, and it is only prices that consistently predicts who trades, I also use outside of equilibrium price to identify a two-step Heckman selection model for whether someone traded, as in List (2004) and Bulte et al. (2013)<sup>8</sup>. The results are very similar to the OLS model.

Results for the full sample are presented in Table 6, columns 1 and 2. The difference in rents between buyers and sellers is large and very significant. This is likely due to three reasons. First, the instructions were meant to mimic a market found in developing countries, with buyers seeking out sellers, which could lead to larger market power for the buyers. Second, the design put a 400 USH higher average value for buyers over sellers, which buyers appear to have taken advantage of. Finally,

<sup>7</sup> Note that individuals played in a single session, and within this session they played for 10 rounds. The session dummy controls for session level effects, while controlling for the round takes into account potential learning effects by individuals.

<sup>8</sup> The Heckman model helps to address the problem of missing transaction data as everyone does not trade in each round. This missing data may cause biased and inconsistent estimates. The Heckman model directly addresses the issue of selection of who trades and when by treating missing trade data as an omitted variable problem. As the prices are randomly predetermined and assigned to participants, an out of equilibrium price in any given round is exogenous to individual ability and can serve as an unbiased selection criteria for whether the individual traded. Specifically, the Heckman model is a two stage process, where selection on whether an individual trades is estimated using a Probit model. This selection is then incorporated in the second stage as an explanatory variable. Note that the reservation value is predictive of both participation in trading and potential profits, and so the exclusion restriction may not hold. OLS results are thus the preferred specification.



**Fig. 3.** Density of efficiency rates by round. Efficiency is defined as the total rents obtained per round divided by the total theoretical rents obtainable.

as will be presented later, the experiment correlates with future wealth two years later, not business outcomes, and only for buyers. It is thus possible that individuals simply relate better to being a buyer than a seller.

Columns 3 and 4 present the results of the Heckman selection model, with buyers and sellers separated. Age is very significant and negative for buyers but not sellers. Being one year older decreases rents by 17 USH, less than 3% of the average rents per round<sup>9</sup>. Human capital is significant and positively associated with outcomes for sellers, but not buyers. A one standard deviation increase in human capital increases rents by approximately 12% per round. Wealth and patience are also significant for buyers, but not for sellers. The aggression index is positively associated and large for sellers only, suggesting a one standard deviation in aggression increases rents by 15% per round, but is negatively associated for buyers, though not significant. Wealth, risk aversion, and patience are not significant for any specification<sup>10</sup>.

These results suggest that measures of age, which may proxy for experience, and human capital are important for individual bargaining success. There is also some evidence that negative social traits decrease returns for individual buyers. None of the measures though are associated with seller outcomes.

## 8. When are markets efficient?

As discussed in Section 4, efficiency rates varied per round and by sessions. Fig. 3 presents the incidence of efficiency rates. The majority are above 90% efficiency, though there is some important variation. In this section, I look at what aggregate average individual characteristics correlate with the realized efficiency rates. To do so, I estimate the following model:

$$E_r = \gamma \bar{X}_{ir} + \mu r + \varepsilon_r \quad (3)$$

where  $r$  is the round,  $s$  is the session,  $E$  is the efficiency rate in round  $r$ ,  $\bar{X}$  is the full set of individual characteristics, averaged per session, and  $\varepsilon$  is the error term. All standard errors are bootstrap clustered at the session level. Note that the sample size here is 100, from 10 sessions with 10 rounds per session.

The average value of individual characteristics by round is used as an aggregate measure of individuals within the experiment. The use of the average values is motivated by the discussion in Section 3, where the question of complementarities of individual traits is discussed. This specification therefore allows for a test of the difference between individual traits and outcomes, versus group outcomes. I present the results of estimating Eq. (3) using OLS in Table 7. Column 1 presents the results for the entire sample. Columns 2 to 4 explore different truncations of the data, including trimming either 5% of the top or bottom performing rounds, or trimming both.

The results are very striking in the level of significance of aggregate individual characteristics for efficiency rates by round. Most of the measures are significant and do not change much between the different truncations. Mean age is positively

<sup>9</sup> Rents were 699 USH on average per round, as shown in Table 1.

<sup>10</sup> The results of including a lag in the specification for previous round rent, i.e.  $Y_{ir} = \alpha Y_{ir-1} + \beta X_i + \varepsilon_i$  is presented in the Online Appendix. The lag is not significant and does not change the results. The result of including the individual components of the indices is also included in the Online Appendix and likewise does not change the general results.

**Table 7**  
Correlates of round efficiency.

	Full sample	Truncated top 5 (%)	Truncated bottom 5 (%)	Truncated top and bottom 5 (%)
Mean age	0.043*** [0.015]	0.042*** [0.016]	0.027** [0.013]	0.027** [0.012]
Percent female	0.816** [0.375]	0.787** [0.392]	0.509 [0.318]	0.502 [0.304]
Mean human capital index	0.003 [0.095]	-0.031 [0.100]	0.063 [0.082]	0.085 [0.076]
Mean wealth index	0.103** [0.043]	0.096** [0.044]	0.055 [0.035]	0.060 <sup>†</sup> [0.035]
Mean risk aversion index	-0.083 [0.097]	-0.065 [0.099]	-0.072 [0.080]	-0.079 [0.078]
Mean patience index	-0.262** [0.112]	-0.252** [0.114]	-0.166 <sup>†</sup> [0.090]	-0.167 <sup>†</sup> [0.089]
Mean pro-social index	-1.365*** [0.445]	-1.298*** [0.466]	-0.907** [0.373]	-0.911** [0.356]
Mean anti-social index	-1.820*** [0.542]	-1.717*** [0.572]	-1.282*** [0.456]	-1.296*** [0.431]
Mean aggression index	-2.131*** [0.642]	-2.016*** [0.674]	-1.458*** [0.539]	-1.473*** [0.512]
Round	0.006 <sup>†</sup> [0.003]	0.006 <sup>†</sup> [0.003]	0.004 [0.003]	0.004 [0.003]
N	100	95	90	95
R <sup>2</sup>	0.153	0.121	0.153	0.203

Notes: Dependent variable is actual rents obtained per round divided by the theoretical rents possible. Robust standard errors, bootstrap clustered at the session level, are in brackets.

Statistical significance is reported as: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . The data is averaged at the level of the round by session. The dependent variable is the total achieved rents in each round by session, divided by the total possible rents. The sample size is 100 as there were 10 rounds in each of the 10 sessions.

associated with efficiency. An increase in the average age of participants by one year increases efficiency by three to four percentage points. Percentage of participants who are female and the wealth index are also positively associated with efficiency rates. Patience, prosocial, antisocial and aggression are all negatively associated with round efficiency. These last three indices are especially large. On average the aggression index is  $-0.029$  per round with a standard deviation of 0.40. Decreasing aggression by a 0.1 standard deviation is associated with an increase in efficiency by eight percentage points. Finally, the coefficient for the round dummy is positive and significant. Efficiency rates increased by 0.6% per round for the full sample, suggesting there was learning over time.

The results suggest that the characteristics of market participants are very important for the overall efficiency of the market. Older, wealthier groups with more women are associated with more efficient rounds, while patience, prosocial, antisocial and aggressive behaviors are associated with much lower efficiency.

## 9. Long-term correlations

Finally, I explore the association between the bargaining experiment and future outcomes for individuals. I test whether the rents obtained during the experiment run here are associated with real-life outcomes two years later. To do this I estimate the following model:

$$W_i = \alpha Y_i + \beta X_i + \varepsilon_i \quad (4)$$

where  $i$  is the individual,  $W$  is a wealth index collected two years after the bargaining experiment was run,  $Y$  is the amount of total rent person  $i$  received in all rounds,  $X$  is the full set of individual characteristics and  $\varepsilon$  is the error term. Standard errors are again robust and bootstrap clustered at the session level.

The results are presented in Table 8 and are again presented as both pooled and separated by buyers and sellers. The results for total rents from the experiment show a very significant and positive association with the wealth index. An increase of 1000 USH in rents from the bargaining experiment is associated with a 0.76 to 0.95 standard deviation increase in wealth. As I found in previous estimations presented above, the results are only significant for buyers<sup>11</sup>. Finally, age and human capital are the only control variables associated with future wealth, though again only for buyers. None of the variables are associated with outcomes for sellers.

There may be a number of reasons why the results of this experiment correlate with future wealth outcomes. I explore here two possible explanations, both based on the assumption that the results from the experiment reflect a general set of skills in this context that are important for individuals over long periods of time.

<sup>11</sup> The results are similar in size and significance when looking at consumption (not shown) rather than wealth.

**Table 8**  
Correlates of wealth 2 years after bargaining experiment.

	Pooled	Pooled	Buyers	Buyers	Sellers	Sellers
Total rents in '000 USH	0.778** [0.329]	0.572* [0.336]	0.756* [0.404]	0.950** [0.395]	0.512 [0.611]	0.474 [0.712]
Buyer dummy	-0.296 [0.195]	-0.209 [0.192]				
Age		0.029 [0.015]		0.035* [0.020]		0.022 [0.023]
Female		0.130 [0.186]		0.128 [0.229]		0.265 [0.295]
Human capital index		0.304*** [0.095]		0.574*** [0.128]		0.151 [0.145]
Wealth index		0.005 [0.097]		-0.067 [0.127]		-0.091 [0.166]
Risk aversion index		-0.070 [0.112]		-0.156 [0.145]		0.117 [0.189]
Patience index		0.034 [0.112]		-0.141 [0.134]		0.108 [0.190]
Pro-social index		-0.022 [0.088]		-0.024 [0.116]		0.041 [0.136]
Anti-social index		-0.152 [0.276]		-0.096 [0.357]		-0.498 [0.434]
Aggression index		-0.243 [0.286]		-0.114 [0.373]		-0.574 [0.454]
N	128	128	63	63	65	65
R <sup>2</sup>	0.178	0.295	0.426	0.639	0.141	0.254

Notes: Dependent variable is an index of total wealth. Robust standard errors, bootstrap clustered at the session level, are in brackets. Statistical significance is reported as: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.10$ . The sample is described in Table 3. It is reduced from the total of 143 due to missing data at the final follow-up data collection.

The first explanation is that rents reflect an ability of individuals to conduct business. This may be especially true given the larger experiment this bargaining experiment is a part of was focused on developing entrepreneurship. To test for this, I explore intermediate outcomes for business success, presented in Appendix Table A.3. The independent variables include whether the person works in a skilled trade, whether they keep books for their business, whether they pay taxes, the amount of business assets on hand, and revenues and profits in the last month. Rents from the games do not correlate with any of these measures. This is true for the full sample, as well as splitting the sample into buyers and sellers (not shown).

The second explanation is that rents may reflect individual traits that are useful in real-life markets, and so individuals that perform well here may in general pay less and get more from their market interactions than those that perform poorly. Unfortunately, I do not have data on individual real-life market interactions, and so I cannot test this directly. However, I believe this presents an explanation as to why the results found in Table 8 show that only buyer rents correlate with future outcomes, and not sellers. That is, the experiment mirrored normal market interactions where buyers sought out sellers. Individuals performed well as buyers, not as sellers, in the game, which reflects real-life behaviors.

## 10. Discussion

This study uses a classic experiment from economics in a novel way to explore if and how individual characteristics correlate with market and individual outcomes. The experiment was designed to closely mimic local market interactions, but in a controlled setting. By randomizing prices and values, I am able to identify who does and who does not trade, allowing for an unbiased use of the Heckman selection model to explore what individual characteristics predict individual outcomes. I am also able to then identify what group characteristics predict general market efficiency.

Overall, the results suggest that market buyers and sellers in a developing country are not obtaining the full rents possible, though not an amount much different than found in developed economies. Measures of social orientation and other characteristics are found to be important for aggregate market performance, though social orientation appears to be much less important for individual outcomes. This surprising outcome is likely due to the complementarity of individual characteristics, meaning that together people can affect outcomes in a way greater than the simple summation of their individual characteristics.

Average age, percentage of women and average wealth are positively associated with aggregate outcomes. Patience is negatively associated with outcomes, suggesting that a group of people that take too long to make bargains is inefficient. Community involvement is likewise negatively associated, suggesting that other regarding preferences led to concerns of fairness to dominate over efficient outcomes. Unsurprisingly, both antisocial behavior and aggressiveness are negatively associated with outcomes.

It is somewhat surprising that aggregate characteristics are associated with market efficiency outcomes, but individual characteristics do not correlate with individual outcomes. As noted in Section 3, there is no reason to believe a priori that

these characteristics would behave the same at individual and aggregate levels. It appears that a high concentration of certain characteristics can affect market outcomes.

Finally, the results of the experiment correlate strongly with future wealth. Bargaining ability appears to be important for individual economic outcomes in this context. These results suggest that such experiments can offer a clue as to future outcomes for individuals. While data limitations make it difficult to say directly why these results correlate with future outcomes, it is likely this is due to individual market prowess as buyers, not sellers of goods.

The role of individual traits in economic outcomes is being explored by economists with increasing interest. This work suggests that models of markets that do not include individual social orientation are missing an important factor for market performance. However, while traits may be important, there is no well specified model of how or why they would be. Future work on market interactions would benefit from taking into account the traits of the participants, but with caution and motivated by theory.

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## Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.jebo.2015.10.008>.

## References

- Acharya, V., Rajan, A., Schoar, A., 2007. What determines entrepreneurial success? A psychometric study of rural entrepreneurs in India. Working paper.
- Al-Ubaydli, Omar, List, John A., 2015. On the generalizability of experimental results in economics. In: Fréchet, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Benjamin, D., Brown, S., Shapiro, J., 2013. Who is “behavioral”? Cognitive ability and anomalous preferences. *J. Eur. Econ. Assoc.* 11 (6), 1231–1255.
- Berge, Lars Ivar Oppedal, Bjorvatn, Kjetil, Pires, Armando Jose Garcia, Tungodden, Bertil, 2015. Competitive in the lab, successful in the field? *J. Econ. Behav. Organiz.* 118 (October), 303–317.
- Blattman, Christopher, Fiala, Nathan, Martinez, Sebastian, 2014. Generating skilled self-employment in developing countries: experimental evidence from Uganda. *Q. J. Econ.* 129 (2), 697–752.
- Bloom, Nick, Van Reenen, John, 2007. Measuring and explaining management practices across firms and nations. *Q. J. Econ.* 122 (4), 1351–1408.
- Bulte, Erwin, Kontoleon, Andreas, List, John, Turley, Ty, Voors, Maarten, 2013. When economics meets hierarchy: a field experiment on the workings of the invisible hand. In: Working Paper.
- Camerer, Colin, 2015. The promise and success of lab–field generalizability in experimental economics: a critical reply to Levitt and List. In: Guillaume R., Schotter, Fréchet, Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Casari, Marco, Ham, John C., Kagel, John H., 2007. Selection bias, demographic effects, and ability effects in common value auction experiments. *Am. Econ. Rev.* 97 (Sept (4)), 1278–1304.
- DellaVigna, Stefano, 2009. Psychology and economics: evidence from the field. *J. Econ. Lit.* 47 (2), 315–372.
- Djankov, Simeon, Qian, Yingyi, Roland, Gerard, Zhuravskaya, Ekaterina, 2007. What makes a successful entrepreneur? Evidence from Brazil. In: Working Papers w0104. Center for Economic and Financial Research (CEFIR).
- Fama, Eugene, 1970. Efficient capital markets: a review of theory and empirical work. *J. Finance* 25 (2), 383–417.
- Fréchet, Guillaume, 2015. Laboratory experiments: professionals versus students. In: Fréchet, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Garvin, Susan, Kagel, John H., 1994. Learning in common value auctions: some initial observations. *J. Econ. Behav. Org.* 25 (December (3)), 351–372.
- Gneezy, Uri, Niederle, Muriel, Rustichini, Aldo, 2003. Performance in competitive environments: gender differences. *Q. J. Econ.* 118 (3), 1049–1074.
- Gode, Dhananjay, Sunder, Shyam, 1993. Allocative efficiency of markets with zero-intelligence traders: market as a partial substitute for individual rationality. *J. Polit. Econ.* 101 (1), 119–137.
- Ham, John C., Kagel, John H., 2006. Gender effects in private value auctions. *Econ. Lett.* 92 (Sept (3)), 375–382.
- Harrison, Glenn, Lau, Morten, Rutström, E. Elisabet, 2015. Theory, experimental design, and econometrics are complementary (and so are lab and field experiments). In: Fréchet, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Haushofer, Johannes, Zurlinden, Noémie, 2013. Market Convergence and Equilibrium in a Kenyan Informal Settlement Working Paper.
- Heckman, James, Stixrud, Jora, Urzua, Sergio, 2006. The effects of cognitive and non-cognitive abilities on labor market outcomes and social behavior. *J. Lab. Econ.* 24 (July (3)), 411–482.
- Iyer, Rajkamal, Schoar, Antoinette, 2010. Are there cultural determinants of entrepreneurship? *Int. Diff. Entrepreneurship*, 209–240 (NBER) <http://press.uchicago.edu/ucp/books/book/chicago/1/bo8648214.html>.
- Kagel, John, 2015. Laboratory experiments: the lab in relationship to field experiments, field data, and economic theory. In: Fréchet, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Kagel, John, Richard, Jean-Francois, 2001. Super-experienced bidders in first-price common-value auctions: rules of thumb, nash equilibrium bidding, and the winner’s curse. *Rev. Econ. Stat.* 83 (August (3)), 408–419.
- Karlan, Dean, 2005. Using experimental economics to measure social capital and predict financial decisions. *Am. Econ. Rev.* 95 (December (5)), 1688–1699.
- Kessler, Judd, Vesterlund, Lise, 2015. The external validity of laboratory experiments: the misleading emphasis on quantitative effects. In: Fréchet, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.

- Leibbrandt, Andreas, 2012. Are social preferences related to market performance? *Exp. Econ.* 15 (December (4)), 589–603.
- Levitt, Steven, List, John, 2007. What do laboratory experiments measuring social preferences reveal about the real world? *J. Econ. Perspect.* 21 (2), 153–174.
- List, John, 2004. Testing neoclassical competitive theory in multilateral decentralized markets. *J. Pol. Econ.* 112 (October (5)), 1131–1156.
- Magnusson, Magnus, Wydick, Bruce, 2002. How efficient are Africa's emerging stock markets? *J. Dev. Stud.* 38 (4), 141–156 (16).
- Reiley, David, 2015. *The lab and the field: empirical and experimental economics*. In: Fréchette, Guillaume R., Schotter, Andrew (Eds.), *Handbook of Experimental Economic Methodology*. Oxford University Press, New York, NY.
- Smith, Vernon, 1962. An experimental study of competitive market behavior. *J. Pol. Econ.* 70, 111–137.