A Field Experiment on Bargaining

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Abstract

We present field experimental evidence of gender discrimination in a competitive environment. We exploit the existence of a large and widely used competitive market where prices are settled by face-to-face bargaining to test for the existence of differential treatment. To do this, we trained confederate buyers to implement a simple bargaining strategy that consisted of repeating a maximum acceptable price until the offer is accepted or rejected. This protocol forces sellers to reveal their strategies and their willingness to compromise with different buyers. While we find that initial price dynamics are consistent with attempts to screen by the seller, negotiations are more likely to continue with women than men. Also, women obtain better prices and are rejected less frequently. These results are puzzling because sellers are likely to face similar buyers whether they reject a man or a woman. The data reveal no evidence that these differences are due to selection issues or sellers obtaining more enjoyment out of providing services to one gender over the other.

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1. Introduction

Experimental evidence and economic intuition suggest that in the presence of competition behavior will likely be consistent with selfish preferences. As discussed by Fehr and Schmidt (1999), competition decreases the capacity of any particular individual to affect the distribution of outcomes, thereby making it difficult for fairness to be a consideration. Similarly, in competitive markets we expect that the marginal consumer or producer will determine the market price, making it difficult for discriminatory outcomes to emerge (Heckman, 1998). We investigate whether competition produces equal treatment by implementing a field experiment in a large, competitive and decentralized market where prices are set negotiation - a taxi market. These type of markets are important because they allow us to observe the process of price formation and the effect of frictions on equilibrium outcomes (Osborne and Rubinstein, 1990).

This market is appealing for conducting experiments for several reasons. First, prices are set by face-to-face negotiations. Second, the market is highly competitive, and deregulation has made it a market with virtually no barriers to entry. Third, the market has been established for at least 15 years, and no major changes in the supply of transportation services is on the horizon. Fourth, the market is widely used by most segments of the population, so it is less likely to be subject to selection bias. This means that the way prices are established in this market are less a reflection of a learning process and more an expression of an ongoing equilibrium. Fifth, the stakes involved in the negotiations are large, and they are an important component of the consumption basket of an average household. That is, our results not only tell us something about markets, but also about the conditions that different segments of the population face in general.

Our experimental design is based on the ultimatum game (Guth et al., 1982). The basic characteristic of the ultimatum game that we exploit here is the capacity of proposers to make take-it-or-leave-it offers. In the face of take-it-or-leave-it offers, responders have to decide between accepting the current offer or taking the expected payoff after rejection. If the continuation payoffs of responders are independent of the identity of who makes the offer, responders will not, on average, treat different proposers making the same offer differently. Samuelson (1992) shows that, in the presence of asymmetric information, sellers with incomplete information about buyers' valuations of a homogeneous good might find it profitable to screen low-valuation buyers and avoid trading with them. However, if buyers have the opportunity to counter-offer the proposals of sellers and sellers future payoffs are uncorrelated with the identity of previous traders, then no discriminatory treatment is possible even if screening

takes place.[1] The intuition is that if the continuation payoffs of sellers, after getting rejected, are independent of the identity of the buyers, then buyers can mimic the strategy of other buyers whose offers are accepted in equilibrium.[2] In other words, if a seller is willing to take money from a yellow buyer rather than waiting for the next random customer, he should also find it acceptable to take the same amount of money from a green buyer rather than waiting for the next random customer.[3]

We find that women are rejected less frequently than men (54.7% for women 68.1% for men). This is remarkable since all of our confederates are asking for the same prices for the same routes in the same manner. Also, opening offers are 2.5% higher for men than for women and that difference widens to 4.3% by the last round of negotiation.

Our design overcomes some identification problems common in strategic interactions by restricting the actions available to one of the bargainers - the buyers in this market. In general, outcomes of the bargaining process do not reveal the preferences of bargainers. The decisions of proposers in ultimatum games, for instance, can be the result of preferences for fairness or fear of rejection. As shown by List (2004), the presence of differential treatment and outcomes of unstructured bargaining cannot be taken as evidence of preference-based discrimination. This is so because both sides will adjust their bargaining strategies according to their prior beliefs of each others' gains from trade. In our experiment, sellers are confronted with either selling at a given price or not selling to that potential buyer at all. Failures to reach an agreement might reflect differences in expectations of potential gains from trade. Sellers will become more pessimistic after a rejection of an offer made to a buyer thought to be more impatient than a patient one. In equilibrium, one would expect to see these differences reflected in the dynamics of negotiations. That is, prices will start higher and decay more rapidly for an impatient buyer. Our study does not find differences in price dynamics and suggests price differences and rejection rates by gender are not due to differences in expectations.

The remainder of this paper is organized as follows. Section 2 provides some theoretical background. Section 3 gives some background on the market under study, Section 4 describes our experiment. Section 5 present and discusses the results. Section 6 concludes.

2. Bargaining in Markets

[1]Our experimental design owes much to the work of Eckel and Grossman (2001) and Solnick (2001). These authors note that by manipulating the information on the identity of responders and proposers it was possible to identify differential social preferences in the lab.

[2]We are clearly not arguing that discrimination might occur due to statistical reasons. We are arguing that if buyers can counter-offer, sellers will have a hard time discriminating against some of them. If buyers are not allowed to make counter-offers, it is possible to write a model with discrimination due to statistical reasons.

[3]This requires that the support of the distribution of valuations of all players is the same.

This section adapts Samuelson's (1992) model of bargaining with matching in markets. This model is important for our research for two reasons. First, it shows that sellers might refuse to trade even when positive gains from trade are available. That is, in equilibrium, sellers might *screen* buyers. Rejections are a common feature of the market we analyze. Second, the model shows that discrimination based on personal characteristics should not be expected even if these characteristics are correlated with the valuation of the good to be traded. The model predicts that rejection rates for similar offers must be constant across genders.

Consider a two-sided market composed of an infinite number of buyers and sellers. Buyers can be male or female and their valuation of the good either high or low. Gender is an observable characteristic, but valuations are private information. Assume that the proportion of men is q_m. A male buyer values the good at $\overline{b}$ with probability p_m and at $\underline{b}$ with probability $1-p_m$, with $p_m \in (0,1)$. A female buyer values the good at $\overline{b}$ with probability p_f and at $\underline{b}$ with probability $1-p_f$, with $p_f \in (0,1)$. We assume that $\overline{b} > \underline{b} > 0$. The valuation of the good for the seller is zero.

In each period, a buyer is matched with a seller with probability r_b and a seller is matched with a buyer with probability r_s.[4] If a seller and buyer are matched, the seller proposes a price from a set of three possible offers $(\overline{p}, \underline{p}, \underline{b})$ such that $\overline{b} > \overline{p} > \underline{p} > \underline{b}$. A buyer is then asked to counter offer by offering a price from the same set of possible prices. The seller then either accepts or reject the counter-offer. If the seller accepts the offer, both player abandon the market and are replaced by exact replicas. If the seller rejects, the bargaining stage stops and both players remain in the market to be matched in the next period. Both sellers and buyers discount time with the same discount factor, R. We assume that $R(\overline{b}-\underline{b}) > b - \underline{p}$.

Proposition: There are two possible types of (stationary) equilibria. In one equilibrium, all buyers counter-offer $\underline{b}$ and sellers accept this price. In a second equilibrium, high-valuation buyers counter-offer $\overline{p}$ or $\underline{p}$ (depending on the equilibrium) and buyers accept. Low-valuation buyers counter-offer a price lower than high valuation buyers that sellers reject. In any equilibrium, the price paid by male and female buyers is the same.[5]

It is clear that an equilibrium where all buyers offer $\underline{b}$ is possible. In this equilibrium, the continuation payoffs of a seller is strictly below $\underline{b}$ and therefore it is optimal to accept the offer. It is therefore optimal for the buyer to offer $\underline{b}$. This equilibrium is efficient.

[4]The probabilities represent the ratio of matches to the number of buyers and sellers respectively.

[5]The results of the model hold if the seller cannot make an opening offer. This illustrate that the results are robust to the inclusion of extra rounds of negotiations. The key element of the model is that the buyer can respond to the sellers demands. In the original model by Samuelson (1992) only sellers can make offers, and in that context it is possible to construct an equilibrium with discrimination.

The second type of equilibrium allows for sellers to screen low valuation buyers. Suppose that in equilibrium sellers propose price $\underline{p}$ and reject any counter-offer below it and accept any counter-offer above it. High-valuation buyers counter-offer $\underline{p}$ to any proposal and low-valuation buyers counter-offer $\underline{b}$ to any offer. For a seller to reject an offer of $\underline{b}$ it must be the case that $\underline{b} \leq Rv$, where v is the seller's expected earning at the beginning of a round of play. By construction, $v = q_s\left[q_m(p_m\underline{p} + (1-p_m)Rv) + (1-q_m)(p_f\underline{p} + (1-p_f)Rv)\right] + (1-q_s)Rv$ or $v = \frac{\left(q_m p_m + (1-q_m)p_f\right)q_s}{1+\left(q_m p_m + (1-q_m)p_f\right)q_s R - R}\underline{p}$. Since v is increasing in $q_m p_m + (1-q_m)p_f$, it follows that if there is a high enough portion of high-valuation buyers then sellers will find it profitable to reject an offer of $\underline{b}$. High-valuation buyers will find it profitable to pay $\underline{p}$ since their gains from trade will be $\overline{b} - \underline{p}$ which are the maximum gains in equilibrium. In this equilibrium, sellers screen out low-valuation buyers. These buyers never trade in equilibrium despite the existence of positive gains from trade ($\underline{b}$) because sellers can extract larger gains from high-valuation buyers.[6]

An important feature of this model is that no discrimination based on gender is possible in equilibrium. It follows from the structure of the game that, in any equilibrium (efficient or not), if a seller finds it profitable to take price p from a male buyer it should also find it profitable to take price p from a female buyer. While sellers can discriminate against low-valuation buyers, they cannot discriminate against a particular gender.[7]

3. The Lima Taxi Market

The taxi market in Lima is extremely competitive. Unlike many U.S. cities that limit the number of taxis on the streets, the taxi market in Lima is mostly unregulated. While there are taxis on the streets that have gone through licensing by the government, roughly 85% of the taxis are unauthorized (JICA, 2005). In the early 1990's, legislation was passed that allows any person willing to provide public transportation the right to do so. So, the streets are full of taxis. According to the Metropolitan Transportation Commission, there are about 200,000 taxis in the city of Lima. This is far more than a city of the size of Lima could possibly support–in 2007, the President of the Peruvian association of drivers (Fechop) estimated the number of taxis should be about 25,000.

There are two types of taxi drivers: those that own their car and those that rent. Approximately half of the authorized drivers own their car. For those that rent, drivers pay a fixed rental fee, between S/.30 and S/.60 ($10-$20) per day, and pay their own gas and then keep the money from the fares. The types of cars used for taxis are quite diverse. It is common

[6]There are other *screening* equilibria, this particular one is used for expositional reasons only.

[7]In this model, if one gender does not posses high-valuation buyers, they could be completely shut out of the market in equilibrium. However, it is not possible to observe sellers charging different prices to different groups if sales occur with positive probability in both groups.

to see Korean TICOs and Japanese sedans and station wagons that had their steering wheel switched from left to right. The average daily net earning of a taxi driver is between S/.30 and S/.50, and the average number of rides per day is 20. Given the number of taxis in the market and assuming that a taxi user takes at least 2 taxis a day, this means that between 1.5 and 2 million people use taxis as a means of daily transportation. According to the 2007 Peruvian census, metropolitan Lima has about 1.8 million households. This means that on average one household member takes a taxi every day.

While the majority of taxi drivers are male, taxi passengers are representative of the population of Lima as a whole. Both men and women take taxis. People take them on their way to work. Students take them on their way to college. And, parents take them to drop kids off to school and to do shopping. In the morning hours, most taxi rides are for the purpose of going to work or school (JICA, 2005). The wide use of taxis is a reflection of the fact that many people do not own a car in Peru. According to the 1993 census only 1 in 6 households had some kind of automobile, and many of these households use these cars as a way to earn income, rather than as household transportation.

According to the IMF, the average per capita monthly income in Peru is about S/.950. A person that spends S/.5 in taxis daily will consume about 16% of their monthly income in taxis alone. This suggests that people have an incentive to bargain for the best possible price. This also holds for the taxi driver. Each successful negotiation represents between 5-7% of their daily income. The Peruvian Institute of Statistics finds that an average household in Lima spends about 8.8 percent of their monthly budget in transportation services.

In our study area, the availability of taxis is high, and the routes we study are very competitive. For the experiment, taxi negotiations are conducted in the morning hours (from 8am to noon) when the market is at its most active. Only 26% of taxis during that period are empty (JICA, 2005).

4. Experimental Design

Three men and three women are our confederate taxi passengers. The men and women were chosen so that we have three "couples," where each couple are similar in appearance and height. The main difference is that one is a man and one is a woman. All are between 21 and 24 years of age. All couples were trained in the same way and by the same experimenters.

The couples dressed similarly to eliminate any clothing attire that might signal personal characteristics. In particular, all participants wore jeans and a plain, long-sleeve, dark t-shirt for the entire period of the study. Women did not wear make-up, and men did not wear facial hair.

Each confederate passenger carried a small MP3 player that was used to record the negotiation. They also carried a small notebook to write down additional information. Confederates kept the recorder on at all times. This was done to reconstruct data in case of faulty note taking and to monitor that the confederates followed the protocol. We verified the recordings, and all confederates followed the protocol.

To avoid confounding effects due to variation in the hour of the day and routes used. All confederates took the same routes every day. The routes consisted of three locations that formed a triangle. Confederates were instructed to take taxis from one location to another, around the circle, during the hours of 8am to 12pm. Half of the confederates went one direction and half went the other around the circle. At roughly 10am, each confederate switched direction and took taxis the other direction. This gives us negotiations from each confederate on each route in each direction.

Confederates were instructed to stop a taxi at random, approach the passenger window, and ask: "How much would it cost to go to X?". After the taxi driver quoted a price, the confederate was instructed to simply say:textquotedblleft Y", and nothing else, after each offer price from the taxi driver. Y is a price set by the experimenters. Confederate passengers were instructed to repeat price Y until either the taxi driver accepted the price or left in disagreement. If the first price quoted by the taxi driver was Y, then there was no need to negotiate. Confederates were trained to respond in the most neutral way possible, avoiding any facial expression or intonation. The recordings verify that they followed the instructions. If the price was rejected, confederates were instructed to step away from the street, take out their cell phone (as if they just received a call), and wait for the street to clear of any taxis that might have seen that the confederate's last negotiation ended unsuccessfully. This guarantees that each negotiation is "fresh" and without confounding information.

Our protocol is very natural in the bargaining environment of taxis in Peru. It is expected that a potential passenger will approach the passenger-side window and ask for a price. It is also expected that some negotiation will ensue.

The counter-offer prices were chosen to be close to the minimum acceptable price for a taxi driver for a particular route. We obtained these prices by consulting with several taxi drivers and taxi companies. The prices were low enough so as to generate rejections and test for difference across males and females.

Given the possibility that some confederate passengers might face higher levels of rejection, confederates were instructed to take a taxi (at a possibly higher price) to the next location if after 10 minutes he or she has not managed to get a taxi at the set maximum price. This allowed us to not have some confederate passengers stuck in the same location for too long. It also permitted us to obtain observations for all confederate passengers on all routes and all hours.

It is important to note that our protocol called for confederate passengers to actually take the taxi to the negotiated location. This was done to increase realism and to avoid suspicion from the taxi drivers that something unusual was happening.

We used four different circle routes across a total of six days. Two routes were used only once, and two routes were used twice (on two different days). This was done to minimize the possibility that the study itself might affect the behavior of taxi drivers. In addition, the study allowed us to detect daily variations in the demand for taxi that might be associated with increased competition.

Each route consisted of three points, A, B and C. Confederates moved from point A to B, from B to C and C to A or viceversa. The distance between points vary greatly. The two shortest routes were 1.3 miles and 1.6 miles long and the two longest routes were 3.9 miles and 4.1 miles long. The average length of the route was about two miles long. We chose several routes and distance to ensure robust results and that they are not a reflection of a particular population of taxi drivers that may favor certain routes. Varying the distance of routes also increase the *room* for bargaining.

5. Results

5.1. Basic Results

This section discusses the main results of our experiment. Table 1 presents basic information on the distribution of initial offers made by drivers according to maximum acceptable prices. We observe price dispersion. Most initial prices (75 percent) are at least 2 soles above the maximum acceptable price and only in a few cases do initial prices coincide with the maximum acceptable price (3 percent). Almost 40 percent of initial offers were 3 soles or more above the maximum acceptable price. This shows that our design was able to generate enough disagreement between buyers and sellers as to observe bargaining.

The existence of price dispersion is consistent with buyers and sellers having imperfect information about each others valuation of the good. The theory section shows that in a market with matching this can support equilibria where gains from trade are not realized even if they are common knowledge. Buyers or sellers might reject transactions that secure positive gains if even larger gains are expected in a new matching. Table 1 shows that over 60 percent of all negotiations ended in disagreement (the final offer was higher than the maximum acceptable price). This pattern was observed across all markets and experimental conditions.

Table 1. Distribution of Initial Offers

Opening Offer	*Maximum Acceptable Price* 3	4	5	6	All
3	7	0	0	0	7
4	17	7	0	0	24
5	44	73	7	0	124
6	18	131	28	5	182
7	19	74	39	52	184
8	4	35	93	66	198
9	1	4	14	13	32
10	0	3	17	11	31
12	0	0	1	1	2
13	0	0	0	1	1
15	0	0	0	1	1
Rejections	62 *(56%)*	208 *(64%)*	147 *(74%)*	70 *(47%)*	487 *(62%)*
Total	110	327	199	150	786

It is common that in the presence of asymmetric information buyers and sellers will attempt to learn each others' valuation through haggling. For instance, sellers facing impatient buyers will find it optimal to start with high prices that are gradually reduced until they are accepted. The rate at which prices decline will be a reflection of the impatience of buyers. Impatient buyers will prefer to buy a high price today than to wait for a low price in the future. Because patient buyers can wait more, sellers will find it more difficult to price discriminate with them.

Table 2 presents the distribution of the duration of negotiations. Consistent with models of bargaining with asymmetric information, we find that 70 percent of negotiations lasted more than one round. The mode of the distribution is 2 rounds of negotiation. Recall that about 60 percent of these negotiations ended up in disagreement. This is evidence of the heterogeneity of sellers' outside options. Table 2 also shows that the duration of negotiation is different for male confederate passengers and female confederate passengers. Negotiations with women are likely to last longer, and this difference is statistically significant.

Table 2. Rounds of Negotiations *(percent)*

	Women	Men	Total
Round 1	102 *(28)*	133 *(31)*	235 *(30)*
Round 2	128 *(36)*	194 *(46)*	322 *(41)*
Round 3	85 *(24)*	85 *(20)*	170 *(22)*
Round 4	36 *(10)*	11 *(3)*	47 *(6)*
More Rounds	8 *(3)*	2 *(0)*	10 *(1)*
Total	360 *(100)*	425 *(100)*	785 *(100)*

Test of difference in distribution

$\chi^2(6) = 30.52$, $p - value = 0.000$

Figure 1 shows the (unconditional) average price offered per round of negotiation. It shows that there is large variance in prices across rounds but that prices tend to decline nonlinearly. This is consistent with equilibrium behavior in a model with asymmetric information (see Fudenberg and Tirole, 1991).

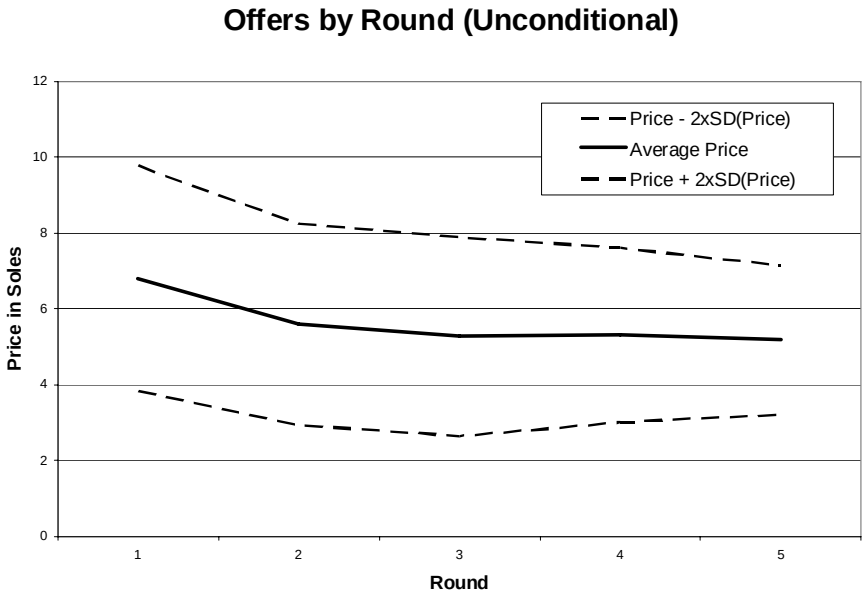

Figure 1. Price Dynamics

Not all negotiations lasted the same number of rounds, so Figure 1, on its own, does not provide a clear view of sellers' strategies. For instance, negotiations lasting more than two rounds might have started at significantly different prices than negotiations lasting only 2 periods. More importantly, routes in our study are not necessarily comparable. Supply and demand conditions vary by route, hour of the day and day of the week.

Table 3 presents fixed-effect estimates of the final price offered by a seller by duration of negotiation. The regressions control for the route, direction of traffic, day of the week (if the same route was used in different days) and hour of the day. For negotiations lasting more than one round, the regression also controls for the seller's initial offer. We find again that the relationship between the final price offered and the initial price is nonlinear. Negotiations lasting three rounds are expected to reach a price that is half the initial price but negotiation lasting two rounds reach a price that is three-quarters the initial price. Table 3 also shows that final prices offered are not significantly related to the gender of the confederate passenger.

Table 3. Price Dynamics - Final Price

	Duration of Negotiations			
Variable	1 Round	2 Rounds	3 Rounds	4 Rounds
Male	0.033	0.105	0.030	-0.122
	(0.863)	(0.137)	(0.747)	(0.644)
Monday	0.249	0.071	0.120	-0.508
	(0.462)	(0.524)	(0.358)	(0.104)
Tuesday	0.566**	0.099	0.176	-0.278
	(0.021)	(0.413)	(0.299)	(0.504)
8am	0.158	0.345	-0.107	-0.170
	(0.726)	(0.164)	(0.666)	(0.731)
9am	-0.321	0.219	0.017	-0.068
	(0.481)	(0.354)	(0.947)	(0.861)
10am	0.005	0.134	-0.033	-0.393
	(0.991)	(0.571)	(0.893)	(0.299)
11am	-0.241	0.212	0.163	-0.565
	(0.582)	(0.366)	(0.496)	(0.127)
Opening Offer		0.835***	0.509***	0.450***
		(0.000)	(0.000)	(0.007)
Constant	7.076***	-0.323	1.545***	2.444**
	(0.000)	(0.348)	(0.001)	(0.042)
Observations	235	322	170	47
R^2	0.041	0.639	0.409	0.406

p-value in parentheses

5.2. Gender Differences

The theory section suggests that if buyers are able to make counter-offers to sellers we should not expect differential treatment even if screening is present. The capacity of buyers to imitate each other makes this arbitrage by sellers impossible. Differences in prices would therefore

reflect the fact that continuation payoffs after failed negotiations with men and women are different or that non-selfish preferences exist. This section discusses gender differences in bargaining outcomes and possible reasons behind them.

Let the difference between an initial offer and the maximum acceptable price be a measure of the potential surplus to be divided by buyers and sellers. Figure 2 presents the distribution and probability of rejection for each observed potential surplus for men and women. The first observation is that men tend to experience larger surpluses over which to bargain. This is consistent with men receiving higher initial prices than women. For instance, 37 percent of surpluses faced by women are above 2 while 47 percent of surpluses faced by men are above 2.

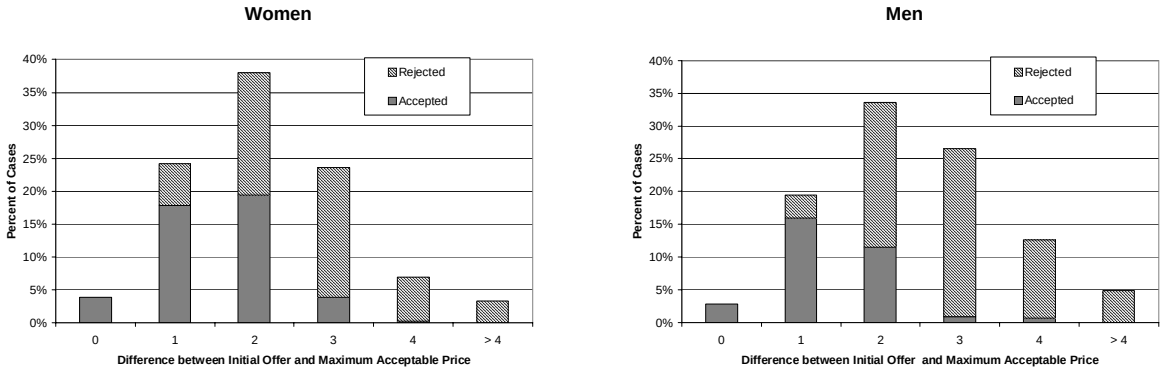

Figure 2. Rejection as a function of the Difference between Initial Offer and Maximum Acceptable Price

Table 4 presents regression analysis of several negotiation outcomes and tests for gender differences. While we discuss the results of linear regression analysis for simplicity reasons, all results hold when using other methods (e.g., conditional logit and count models). As in Table 3, all the regressions include fixed-effects for routes and direction of traffic and controls for day of the week and hour of the day. Table 4 shows that men receive offers that are about 15 cents higher than women. This difference in prices is 29 cents when considering final prices. Table 4 shows that differences in final prices remain even controlling for initial offers.

Men are 8 percent more likely to be rejected than women and they are more likely to face shorter negotiations than women. This result is remarkable because sellers are likely to face similar market conditions after rejecting a man or a woman. Table 4 shows that differences in rejection rates persist even after controlling for initial offers. That is, sellers prefer a lower offer when this comes from a woman than a men.

Table 4. Regression Analysis

Variables	Opening Offer	Last Offer	Last Offer	Rejection Rate	Number of Rounds
Male	0.148**	0.286***	0.154**	0.082***	-0.257***
	(0.049)	(0.002)	(0.015)	(0.007)	(0.000)
Monday	0.106	0.343**	0.248**	0.153***	-0.407***
	(0.368)	(0.017)	(0.012)	(0.001)	(0.000)
Tuesday	0.310***	0.553***	0.275***	0.072	-0.221**
	(0.009)	(0.000)	(0.006)	(0.134)	(0.039)
8am	0.038	0.226	0.192	-0.028	-0.382**
	(0.853)	(0.366)	(0.260)	(0.737)	(0.039)
9am	-0.407**	-0.400*	-0.036	-0.095	-0.085
	(0.040)	(0.099)	(0.830)	(0.234)	(0.639)
10am	-0.338*	-0.390	-0.088	-0.029	-0.109
	(0.090)	(0.110)	(0.599)	(0.717)	(0.548)
11am	-0.227	-0.283	-0.080	0.006	-0.067
	(0.242)	(0.233)	(0.623)	(0.941)	(0.703)
Opening Offer			0.895***	0.183***	-0.014
			(0.000)	(0.000)	(0.675)
Constant	6.875***	5.732***	-0.422	-0.687***	2.592***
	(0.000)	(0.000)	(0.109)	(0.000)	(0.000)
Route×Direction	Yes	Yes	Yes	Yes	Yes
Observations	786	786	786	786	785
R^2	0.039	0.072	0.568	0.215	0.061

p-value in parentheses

Field experiments normally trade-off realism for experimenter control. Our study is no exception. Differences in bargaining outcomes might be due to subtle difference in market conditions faced by men and women. These changes in market conditions might affect their bargaining position. For instance, men might have an advantage if they attract a more varied and larger fleet of cars. This might happen because taxi drivers believe that men are more likely to take a car in bad condition than a woman. At the same time, since taxi drivers are predominately male, they might find it more enjoyable to drive in the company of a woman than a man. In this case, difference in prices would simply reflect differences in gains from trade and not discrimination.

Table 5 reproduces the analysis of Table 4 but expands the set of controls.[8] To control for market conditions, we add a dummy variable indicating whether negotiations were done while a competitor taxi was waiting in case the negotiation ended unsuccessfully. To further control for potential difference in market conditions between men and women, we also add a dummy variable indicating if the car was above average quality and below average quality. Finally, since younger drivers might be more affected by the presence of women, we also control for the age of the driver.

Table 5 shows that all the results remain unchanged. Men receive slightly higher opening offers, higher closing offers, are rejected more frequently and face shorter negotiations.

[8]Missing data is due to underreporting.

Table 5. Regression Analysis

Variables	Opening Offer	Last Offer	Last Offer	Rejection Rate	Number of Rounds
Male	0.147*	0.279***	0.147**	0.074**	-0.272***
	(0.062)	(0.004)	(0.026)	(0.021)	(0.000)
Competitor taxi	0.027	0.006	-0.018	0.025	-0.024
	(0.760)	(0.957)	(0.802)	(0.474)	(0.762)
Low Quality Taxi	-0.152	-0.273**	-0.136	-0.097**	0.008
	(0.207)	(0.065)	(0.177)	(0.047)	(0.941)
High Quality Taxi	-0.220*	-0.234	-0.037	-0.053	0.190*
	(0.059)	(0.100)	(0.703)	(0.263)	(0.071)
Driver's Age	0.001	0.000	-0.001	0.000	-0.000
	(0.799)	(0.974)	(0.821)	(0.898)	(0.976)
Monday	0.102	0.316**	0.224**	0.131***	-0.350***
	(0.399)	(0.033)	(0.026)	(0.007)	(0.001)
Tuesday	0.321***	0.570***	0.281***	0.078	-0.234**
	(0.008)	(0.000)	(0.005)	(0.111)	(0.032)
8am	0.109	0.314	0.217	-0.018	-0.412***
	(0.604)	(0.221)	(0.215)	(0.827)	(0.030)
9am	-0.345*	-0.304	0.006	-0.085	-0.129
	(0.091)	(0.224)	(0.972)	(0.304)	(0.485)
10am	-0.267	-0.320	-0.079	-0.015	-0.145
	(0.193)	(0.204)	(0.644)	(0.857)	(0.435)
11am	-0.142	-0.170	-0.042	0.018	-0.132
	(0.477)	(0.487)	(0.799)	(0.822)	(0.463)
Opening Offer			0.900***	0.180***	-0.007
			(0.000)	(0.000)	(0.831)
Constant	6.799***	5.699***	-0.417	-0.702***	2.602***
	(0.000)	(0.000)	(0.185)	(0.000)	(0.000)
Route×Direction	Yes	Yes	Yes	Yes	Yes
Observations	717	717	717	717	717
R^2	0.047	0.081	0.575	0.214	0.064

p-value in parentheses

The results of Tables 4 and 5 suggest that difference in prices and rejection rates cannot be explained by differences in market conditions. Table 6 tests if confederate passengers had

perceptible differences in their experiences.[9] The analysis confirms that men and women did not face significantly different populations of cars or drivers. One might expect that male drivers would deliberately extend the duration of travel if they enjoy the company of women relatively to that of men.[10] The data shows no difference in the time taken with male and female passengers.

Table 6. Regression Analysis

Variable	Car Quality (1 to 3)	Driver's Age	Travel Time
Male	0.021	-0.778	0.036
	(0.581)	(0.249)	(0.948)
Monday	-0.037	-1.736*	-1.518*
	(0.528)	(0.098)	(0.077)
Tuesday	0.055	-1.958*	2.657***
	(0.345)	(0.058)	(0.009)
8am	-0.142	-1.539	1.858
	(0.164)	(0.400)	(0.238)
9am	-0.045	-1.787	2.141
	(0.649)	(0.317)	(0.154)
10am	-0.064	-1.859	1.238
	(0.523)	(0.302)	(0.407)
11am	-0.049	0.256	1.216
	(0.613)	(0.884)	(0.410)
Constant	2.077***	41.317***	10.272***
	(0.000)	(0.000)	(0.000)
Route×Direction	Yes	Yes	Yes
Observations	751	758	313
R^2	0.008	0.019	0.043

p-values in parenthese

Why do men receive worst outcomes in this market? Table 7 gives us a clue on the difference in strategies used by sellers with men and women. The table presents the duration of successful and unsuccessful negotiations for men and women. We see that men are likely to face shorter

[9]Ordinal regressions with clustered errors per route and direction of traffic produce similar results.

[10]Drivers choose the route they take to get the passenger to the requested destination.

negotiations in both situations: men's offers are rejected or accepted faster than those of women.

Table 7. Duration of Negotiations by Outcome *(percent)*

	Accepted Offers		Rejected Offers		
	Women	Men	Women	Men	Total
Round 1	11 *(7)*	12 *(9)*	91 *(46)*	121 *(42)*	235 *(30)*
Round 2	68 *(42)*	70 *(51)*	60 *(30)*	124 *(43)*	322 *(41)*
Round 3	49 *(30)*	46 *(34)*	36 *(18)*	39 *(13)*	170 *(22)*
Round 4	26 *(16)*	8 *(6)*	10 *(5)*	3 *(1)*	47 *(6)*
More than 4	8 *(5)*	0 *(0)*	0 *(0)*	2 *(1)*	10 *(1)*
Total	162 *(100)*	136 *(100)*	197 *(100)*	289 *(100)*	784 *(100)*

6. Conclusions

We investigate bargaining outcomes in a large, competitive and decentralized market where prices are set through face-to-face negotiations. While it is known that these markets can theoretically produce behavior that is different from the competitive market paradigm, even when frictions are small (Rubinstein and Wolinsky, 1985), less is known about what prices emerge empirically. In this paper, we test whether this market discriminates based on gender and whether these differences are consistent with the presence of search costs or asymmetric information.

To do this, we conduct a field experiment where confederate buyers implemented a simple take-it-or-leave-it strategy. This allows us to observe sellers' strategies and their willingness to compromise with different people. We find that market outcomes are consistent with attempts by market participants to screen the reservation value of potential partners. Many transactions do not occur even when gains from trade are possible.

We find that women are rejected less frequently than men (54.7% for women 68.1% for men). Also, opening offers are 2.5% higher for men than for women and that difference widens to 4.3% by the last round of negotiation. Analysis of the data reveals that these differences in outcomes are not likely due to selection bias or utility differences in providing the good to women rather than men. The analysis also reveals that attempts to screen do not differ across male and female passengers, suggesting that reasons other than information asymmetry explain the outcomes.

References

Eckel, C. and P. Grossman, "Chivalry and Solidarity in Ultimatum Games," *Economic Inquiry*, 39(2), 171-188, 2001.

Fehr, E. and K. Schmidt, "A Theory of Fairness, Competition, and Cooperation," *Quarterly Journal of Economics*, 114(3), 817-868, 1999.

Fudenberg, D. and J. Tirole, *Game Theory*, MIT Press, 1991.

Heckman, J., "Detecting Discrimination," *Journal of Economic Perspectives*, 12, 101-116, 1998.

List, J., "The Nature and Extent of Discrimination in the Marketplace: Evidence from the Field," *Quarterly Journal of Economics*, 119(1), 49-89, 2004.

Osborne, M. and A. Rubinstein, *Bargaining and Markets*, Academic Press, 1990.

Rubinstein, A. and A. Wolinsky, "Equilibrium in a Market with Sequential Bargaining," *Econometrica*, 53(5), 1133-1150, 1985.

Samuelson, L., "Disagreement in Markets with Matching and Bargaining," *Review of Economic Studies*, 59(1), 177-185, 1992.

Solnick, S., "Gender Differences in the Ultimatum Game," *Economic Inquiry*, 39(2), 189-200, 2001.