# The Role of Outside Option for Sellers and Exogenous Break Down Rate on Trading: An Experimental Analysis[1]

**Mürüvvet Büyükboyacı**
Middle East Technical University, Turkey
muruvvet@metu.edu.tr

**Abstract:**

This paper analyzes how trading and prices change in a double auction environment with outside option for sellers which is given with a probability if trade does not occur in the market, through an experiment. We assume that before the double auction occurs, outside option is announced. By knowing both announced outside option and offers and bids in the double auction (market), a seller chooses between selling his/her good in the market now and receiving outside option in the next round if the game continues to next round with some probability. We use two continuation probabilities in treatments, high or low. First, we find that the probability of choosing the outside option is significantly affected by the continuation probability, sellers' risk aversion, gender, and cost. Second, we find no effect of time preferences on choosing the outside option. Third, we do not find any effect of continuation probabilities on the market price.

**Keywords:** Double auction, outside option, time preferences, risk preferences, continuation probability

**JEL Codes:** D02, D40

[1] I thank Serdar Yürek for excellent research assistance.

# 1. Introduction

There are two motivating examples for this study: 1) the role of unemployment insurance on the employment rate and equilibrium wage, 2) the role of government purchase of an agricultural good from a price that is announced earlier, on the sale to the government (or in the market) and market price. The first one is largely studied in the literature both theoretically and empirically (see Tatsiramos and van Ours, 2012 for a survey). Most of these studies work on incentives influencing the behavior of employed workers and unemployment insurance recipients and offer some designs to improve the system. The empirical literature working on this question is using the specific countries' data. Experimental studies, how such an outside option for employees (or late payment of outside option) affect employers' offers, employees' bids and the employment rate in a competitive market is missing in that literature. In this example, an unemployed person can choose to be involved in the labor-market interaction immediately or to wait for the unemployment insurance to be paid. Depending on how impatient an employee is (or how late unemployment insurance is paid), s/he may opt for unemployment insurance or search/work for another job in the market immediately.

Second, government involvement in agriculture can be seen in many places and it can be in many different ways. The government can provide subsidies, act as a price regulating party, can be a dominant buyer of the good in the market etc. with the aim of supporting farmers and ensuring the sustainability of the agriculture sector. For instance, in Turkey the state-owned enterprise, Caykur is a dominant buyer in the tea market with 53.1% (Caykur 2016) share. Each year, before the harvest season, Caykur announces a purchasing price for fresh tea. However, it does not make payments on receipt (Caykur 2017). Such late payments can affect farmers' decisions on where to sell their goods due to their impatience. Depending on how impatient producers are, the amount of supply in the private market, hence the price in there can change.

This paper tries to model and test experimentally the situations described above. In particular, we consider the following environment in our experiment: 1) Sellers have an outside option which is realized with some probability if the trade does not occur in a double auction market in the first period.[2] 2) The outside option is larger than the competitive equilibrium price without the outside option.[3] 3) The outside option is known to both parties.

In order to understand what affects people's decision on selling their goods in the market or choosing the outside option, and the market price in such an environment, we run an experiment. We

[2] This probability is a treatment variable: it can be high or low and represents the impatience level of an agent.
[3] The unemployment insurance, which differs from country to country, is generally based on last months' earnings (this may be higher or lower than the equilibrium wage rate for the job seeker). For Caykur's case, since the producers prefer to sell their goods to Caykur even it pays late, we assume that the outside option is higher than the equilibrium price of the good in the market.

expect that subjects' decisions will be affected from producers' costs (the higher cost a producer has, the more likely s/he will wait for the outside option)[4] 2) Producers' risk and time preferences.[5]

Our experiment consisted of three stages. The first stage had 20 periods. In each period of the first stage, there was a market where subjects were assigned to the roles of buyers and sellers, while the experimenter took the role of dominant buyer. At the beginning of each period, the experimenter announced a price. By knowing the announced price, buyers and sellers decided to trade the good until the end of the period, in a double-auction environment. Then, with probability "p", the goods which were not traded in the market were purchased by the experimenter at the pre-announced price in the second period. By this way, we mimic the discounting effect of waiting for the payment as it is done in infinitely repeated game experiments. This is called as "standard random termination method" proposed by Roth and Murnighan (1978).[6] In order to find out the effect of such a delay on the producers with different patience levels, we set p=0.8 for one treatment (for patient producers) and p=0.6 for the other (for impatient producers).

In the second stage, we elicit risk preference of the subjects with the method proposed by Holt and Laury (2002). Subjects were asked to choose one lottery ticket from each of ten pairs one of which was riskier than the other. In each ticket, there were two possible outcomes with high and low payments. In the riskier lottery ticket, the difference between payments was higher than the other lottery ticket. While, the amounts of payments proposed by the tickets were constant over the pairs, the likelihood of high payments was increasing in the later pairs. Therefore, less risk-averse subjects were expected to choose the option with higher risk starting from earlier pairs.

In the last stage of the experiment, we elicited subjects' time preferences by multiple price list (Andersen, 2006). According to this method, subjects were asked to choose one alternative from each of six pairs where one of the alternatives made payment now and the other made payment next week. In particular, in each row subjects chose between 400 tokens in the future versus an amount, from 350 tokens to 100 tokens with a decrement of 50, today. We expect more patient subjects to choose "now" options only for high values, i.e., only in the first rows; less patient subjects to choose "now" options for both high and low options.

Given the setting of our experiment, we expect to see higher market price and lower number of trades in the market with higher continuation probability (p = 0.8). Furthermore, in addition to the continuation probability, we expect to see significant effects of producers' cost, time and risk preferences on their decision to be in the market. We expect: 1) As the level of producers' risk-aversion

[4] For labor market example, one can think an employee with a higher cost of effort will be more likely to wait for the outside option.
[5] In the current paper, we did not consider liquidity constraints of farmers as Mani et al. (2013) or Geng et al. (2017) did.
[6] See Frechette and Yuksel (2016) for the comparison of this method with other methods proposed in the literature. For instance, instead of random termination, subjects can play the game certain period of time, but their period payoffs from the future can be discounted. Guth et al (2007) used the latter one for a finite period in their experiment, i.e., in a 2-period game, instead of random termination for the next period, if trade occurred in the second period, they gave the discounted profit of period 2 to the subject. However, in terms of expected utility there should not be any difference.

increases, the probability of choosing the outside option is expected to decrease. 2) As a producer's cost increases, the probability of choosing the outside option is expected to increase. 3) The more patient a seller is, the more likely s/he will choose the outside option. Unlike our expectations for the market price, we find no significant difference in the market prices of high-continuation and low-continuation probability treatments[7]. We also do not find any effect of sellers' patience on choosing the outside option. Nevertheless, as in our prediction, we find that the more risk averse a seller is, the less likely s/he chooses the outside option. A seller with higher cost is more likely to choose outside option. Additionally, we find being male positively and significantly affects choosing the outside option.

Our study contributes to two different parts of the literature. First of all, we evaluate the effect of an agricultural policy on the producer's decision as well as on the market, via a lab experiment. Although investigation of agricultural policies by laboratory experiments are not very common, there is a growing interest on the topic in the literature (Hoobs and Mooney 2016; Colen et al 2016). Loy et al (2014) try to evaluate an agricultural policy which has the aim of decreasing milk quota prices in Germany by using experimental tools. Mock et al. (2016) experimentally test the effects of the actions taken by the U.S. Bureau of Land Management to increase availability of native seeds by smoothing its demand and using forward contracts for its purchases. Similar to these studies, we also experimentally evaluate the possible effects of a policy implemented in the fresh tea market of Turkey.

Second, we contribute to the literature that is related with time preferences in the market environment. Güth and Ritzberger (1995) construct a theoretical model and show that in the market of durable goods which is repeated more than once, a monopoly can increase its profit, if the monopoly is more patient than buyers. Similarly, Güth et al (2004) construct a model of two-period durable-goods market with privately known impatience, cost and valuation. They test the result of their model via a laboratory experiment. The results of their experiments show that, as their model predicted, the monopoly sets higher prices when the monopoly is more patient than the buyer and, the buyer rejects more of the monopoly's offers, when the buyer is more patient than monopoly. Our study also relates time discounting of producers with the market outcome. Unlike earlier studies, we do find that no significant difference in prices of markets with high and low continuation probability. This can be due to the environment and set-up of our study.[8]

## 2. Experiment

### 2.1 Experimental Design and Procedures

There were three stages in the experiment. [9] In the first stage, we made subjects play a market game for 20 periods. Each period of the first stage consisted of two rounds where the payoffs from the second round are

[7] We found a significant difference in prices at 10 % significance level only when we look at last 3 periods.
[8] We used a competitive environment.
[9] See the supplementary material for instructions of the experiment.

discounted.[10] In other words, in the first round of each period, sellers and buyers traded among themselves if they wanted (each seller knew only his/her own cost and each buyer knew only his/her own valuation for the product. Without the outside option, we expect that if the agreed price is above the cost of a seller, it is expected from the seller to sell his/her good; if the agreed price is lower than the valuation of a buyer it is expected from the buyer to buy the good.) In that round, buyers were able to bid for the good and sellers were able to make offers for the good. The program that we used for the experiment prevented offers or bids that brought sellers or buyers loss.[11] If the subjects traded in the first period, buyers' payoffs were valuation-agreed price, and sellers' payoffs were agreed price-cost.[12]

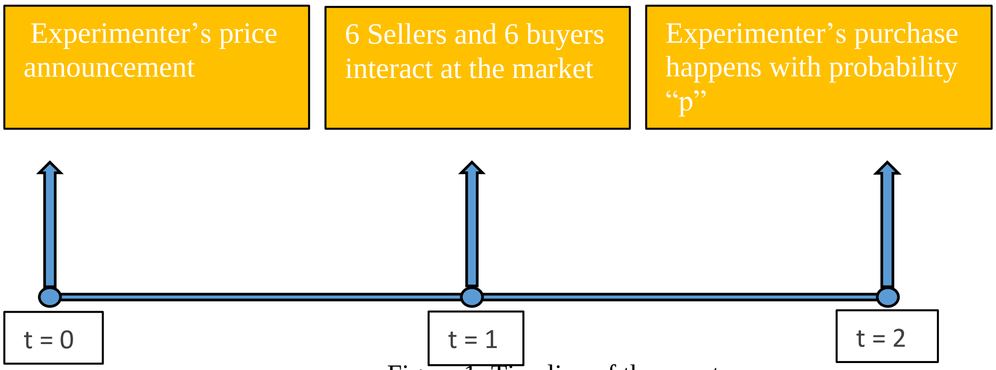

Figure 1: Timeline of the events

In a period, the second round was realized with probability p. If the second round was realized, the sellers who could not trade in the first round sold their goods to the experimenter over a preannounced price level. If the second round was not realized, the experiment continued with the next period and sellers' payoffs with a good were 0 for that period. If we assume that the amount announced by the experimenter to buy sellers' goods in the second round, is x, and the second round occurs with p probability, then the value of outside option offered by the experimenter for the seller in the first round is p*(x-cost).

Twelve subjects participated to each session. Among those, six of them were buyers and six of them were sellers. The first stage of the experiment ended in 20 periods. The sellers and buyers changed their roles after the 10th period. In particular, the subjects in the buyer (seller) role passed to the seller (buyer) role after the first 10 periods.[13] Each subject played 20-period market experiment in the first stage. Each period ended in 90 seconds. We changed the continuation probabilities across the sessions. We ran 4 sessions (48 subjects) when the continuation probability (p) was 0.6 and 4 sessions (48 subjects) when the continuation probability was 0.8. Subjects in the role of seller saw the screen in the first stage in Figure 2.[14]

[10] The payoffs from the second round is discounted by realizing the second round, with probability p.
[11] In particular offers below the cost for the sellers, and bids above the valuation for the buyers were not allowed.
[12] We assumed that both sellers and buyers are risk neutral. So, according to the risk neutrality assumption, the utility function of sellers and buyers will be U(x) =x. So, a person's utility from two rounds will be $\sum_{i=0}^{1} \delta^t u_i^t(x)$, where $\delta \in [0,1)$; if a person trades at the market then s/he will obtain a payoff from the market in the 1st round. She may choose not to trade at the market in the 1st period and sell its good to government in the 2nd round but this time his/her payoff will be discounted.
[13] The aim of this role change is to decrease disadvantageous situation for the buyers.
[14] Subjects in the buyer role saw a similar screen.

During the experiment, the valuation of the buyers and the cost of the sellers did not change. Subjects' earnings from this stage is determined by the sum of their earnings from a randomly drawn period in the first 10-period, and a randomly drawn period from the second 10-period.

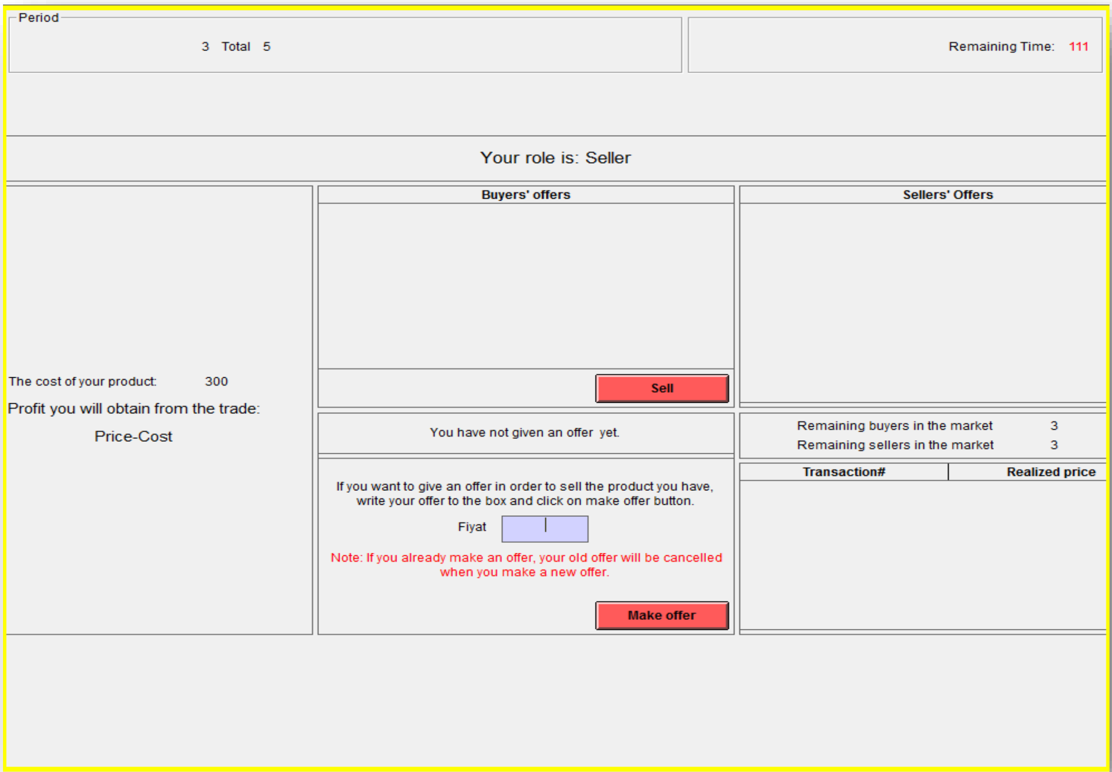


Figure 2: Screenshot of the first stage

In the second stage of the experiment, we elicited the risk attitude of each subject by using the Holt and Laury (2002) method. Subjects were offered ten pairs of lotteries (situations) and asked to pick one from each. In each situation, high and low payoffs offered in a lottery did not change but the probability of winning the high payoff increased by 1/10 as the number of situations increased one by one. In Situation 1, the less-risky lottery (Option A) had a higher expected payoff than the riskier one (Option B). Hence, only very strong risk lovers were expected to pick Option B in this situation. Moving further down the situations, the expected payoff difference between the lotteries in Option A and in Option B decreased and eventually turned to negative in Situation 5. In Situation 10, subjects choose between a sure payoff of 200 tokens (Option A) and a sure payoff of 385 tokens (Option B). Since Option B offered a higher payoff in this last situation, by then all subjects should have switched from Option A to Option B. In this choice task, a consistent subject should switch from Option A to Option B just once. However, earlier experiments using Holt and Laury's (2002) method showed that some subjects may go back and forth between Option A and Option B. To prevent such behavior in our experiment, we asked subjects the situation number at which they wanted to switch from Option A to Option B. With these monetary payoffs, it is optimal for a risk-neutral subject to switch from Option A to Option B in Situation 5. Similarly, it is optimal for a risk-averse (risk-loving) subject to switch from Option A to Option B after (before) Situation 5. The payment for the second stage was determined according to the subject's lottery choice in a randomly chosen situation among these ten situations and was revealed at the end of the experiment.

In the last stage of the experiment, we used a multiple price list to measure the subjects' time preferences (Andersen et al, 2006). According to this method, we offered subjects to choose between two alternatives in 6 different rows. In each row, they are asked whether they want 400 tokens next week or 400-t (t took value from 50 to 350 with increments of 50 in each row) tokens today. In particular, the first (sixth) row asked subejcts to choose between 350 (100) tokens today and 400 tokens next week. In order to understand subjects' time preferences we checked where the subjects switched from choosing now to next week. Subjects' payments in this stage were determined according to their decision in a randomly drawn row. Subjects' payments were made at the end of the experiment.

The experiment was run at METU BAEL Experimental Laboratory in May of 2017. The participants were undergraduate students, who were registered to METU BAEL database for the experiments. The subjects participated to 8 sessions, each of which ended in an hour. Each subject participated in only one session. All sessions were computerized using z-tree (Fischbacher, 2007). In total, 96 subjects participated in the experiment. For payoffs, we used tokens, each token being equivalent to 0.02 Turkish Liras (TL). Each subject received 5 TL for participation, and also their winnings from each stage, as described above. On average, a subject earned 22 TL, including the 5 TL participation fee.[15]

#### 2.2 Institutional Background and Hypotheses

The costs of sellers were 500, 550, 600, 650, 700 and 720. The valuations of the buyers were 900, 850, 800, 750, 720, and 700. Each seller had one good and each buyer could buy just one good. According to these costs and valuations we found the market equilibrium price to be between 700 and 720, equilibrium quantity is 5. (Demand and supply graphs for the market are shown in Figure 3.). The experimenter's preannounced-fixed price is 1000, which is shown by the blue line on the graph.

[15] By the time hourly minimum wage was 5.75 TL.

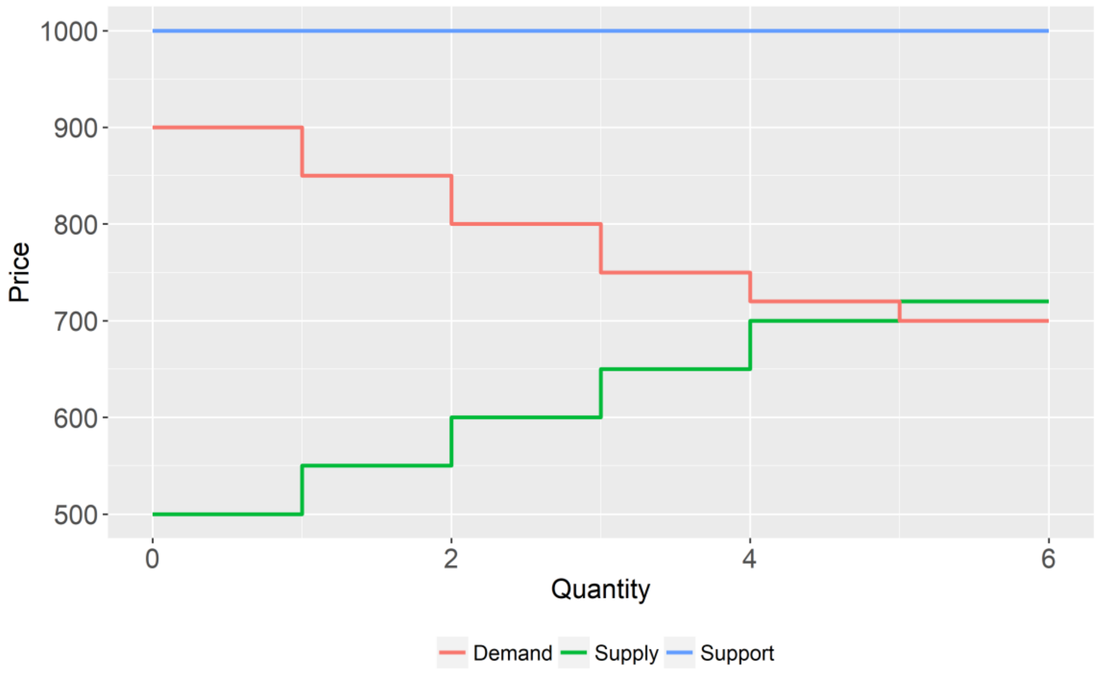


Figure 3: Market without an outside option for the sellers.

Now, we analyze each seller's optimal choice between selling his/her good in the market or to the experimenter under the risk neutrality assumption when p = 0.8.

If sellers are given information about what the experimenter will be paying in the next round, the seller with the highest cost among six sellers will be the one who wants to wait for the experimenter's purchase the most (the seller with cost 720). Since this seller cannot trade his/her good at the market, s/he won't get any payoff from the market, whereas if s/he waits for the experimenter's purchase his/her expected payoff will be 0.8*(1000-720) =224. Hence, it is optimal for the seller with the highest cost to sell his/her good to the experimenter. The equilibrium price in this case will be the same as before because this seller would not be part of any trade if s/he were to stay at the market.

Inductively, now we continue with the seller who has the second highest cost (the seller with cost 700). The highest payoff this seller can obtain by trading in the market 720-700=20.[16] On the other hand, the payoff s/he would obtain by waiting for the experimenter's purchase is 0.8*(1000 - 700) = 240. So, it is also optimal for this seller to wait for the experimenter's purchase instead of selling his/her good at the market.

If the sellers other than the ones with the highest two costs, trade at the market, the equilibrium price will be between 720 and 750.[17] [18] In this case, the seller with the third highest cost (the seller with cost 650) in the

[16] The upper bound for the equilibrium price is 720.
[17] New equilibrium is calculated according to 4 sellers with costs, 500, 550, 600, 650 and 6 buyers. Since both costs and valuations are private information and subjects do not know how many sellers are active in the private market, we assume that the realized market is still competitive with unequal number of buyers and sellers. We know that when the numbers of buyers and sellers are not equal whole surplus goes to the short side (Yan et al 2016).
[18] In this case, buyer with the third lowest valuation bids at least as the valuation of buyer with second lowest valuation. Therefore, lower bound for the price becomes 720.

market can obtain 750-650=100 if s/he chooses to trade at the market but if s/he waits for the experimenter's purchase, his/her expected payoff will be 0.8*(1000- 650)=280. Hence, it is optimal for this seller to wait for the experimenter's purchase as well.

Now, there are three sellers active in the market and the rest chose to wait for the experimenter. With the current sellers, new market equilibrium price will be between 750 and 800. In this case, the seller with the fourth highest cost (the seller with cost 600) can obtain 800-600=200 from the market. However, if s/he chooses to wait for the experimenter's purchase his/her expected payoff will be 0.8*(1000-600) = 320. Hence, it is optimal for this seller to wait for the experimenter's purchase as well.

If it is assumed that there are two sellers (the ones with the lowest two costs) in the market, new market equilibrium price will be between 800 and 850. The seller with the fifth highest cost (the seller with cost 550) can obtain 850-550=300 from the market at most whereas if s/he waits for the experimenter's purchase his/her expected payoff will be 0.8*(1000-550) = 360. Hence, it is optimal for this seller to wait for the experimenter's purchase as well.

If there is only one active seller in the market, bid of the buyer with highest valuation will be at least equal to valuation of the buyer with second highest valuation. This implies equilibrium market price will be between 850 and 900. If the seller sells his/her good to the buyer with the highest valuation his/her expected payoff from the trade will be at most 900-500=400. If s/he chooses to wait for experimenter's purchase in the second round, his/her expected payoff is 0.8*(1000-500) = 400. Then s/he will be indifferent between making a trade at the market and waiting for the experimenter's purchase.[19]

**Hypothesis 1:** When continuation probability is 0.8, equilibrium price will be 900, and equilibrium quantity exchanged will be 1.

We want to compare the equilibrium price reached in this environment with a lower continuation probability while keeping other parameters (buyers' valuations, sellers' costs, the experimenter's preannounced price level) the same. With a similar inductive reasoning we followed above when p=0.6, and under the risk neutrality assumption we find equilibrium market price to be between 820 and 850 and equilibrium quantity to be 2.

**Hypothesis 2:** When continuation probability is 0.6, equilibrium price will be between 820 and 850 and equilibrium quantity to be 2.

If we incorporate the sellers' risk aversion to the model, we predict in both treatments, the higher risk aversion a seller has, the less likely s/he will wait for the experimenter's purchase, the more likely s/he will trade in the market, and the realized equilibrium price will be lower due to higher market supply.

**Hypothesis 3:** The equilibrium market price reached in the market, when the continuation probability is 0.8, will be higher than the equilibrium market price reached in the market when the continuation probability is

[19] In order to encourage trade in the market, we gave 10 tokens extra to the ones who trade at the market (Smith, 1976). So actually, we expect only the seller with the lowest cost to trade at the market.

0.6. In both case, the equilibrium price will be higher than the equilibrium price in the market without the experimenter's purchase (710 on average, Figure 3).

## 3. Results

In this section, we first focus on the market behavior when the continuation probability is 0.8 and 0.6. Then, we analyzed what affect the sellers' decisions for selling their goods to the experimenter.

### 3.1. Market Behavior

According to Hypothesis 1, we expect the equilibrium market price to converge 900 tokens when p=0.8. As can be seen in the right of Figure 4, price converged to a level which is much lower than 900 when p=0.8. Then we look at how price converged in the market with a lower continuation probability, p=0.6. According to Hypothesis 2, we expect the equilibrium market price to be between 820 and 850 when p=0.6. However, as can be seen from the left of Figure 3, we observe a lower price than predicted in Hypothesis 2. A possible explanation for these results may be subjects' risk aversion. Our model is based on risk-neutral subjects. The more risk-averse subjects are, the more likely they will trade in the market instead of selling their goods to the experimenter which may decrease the converged price.

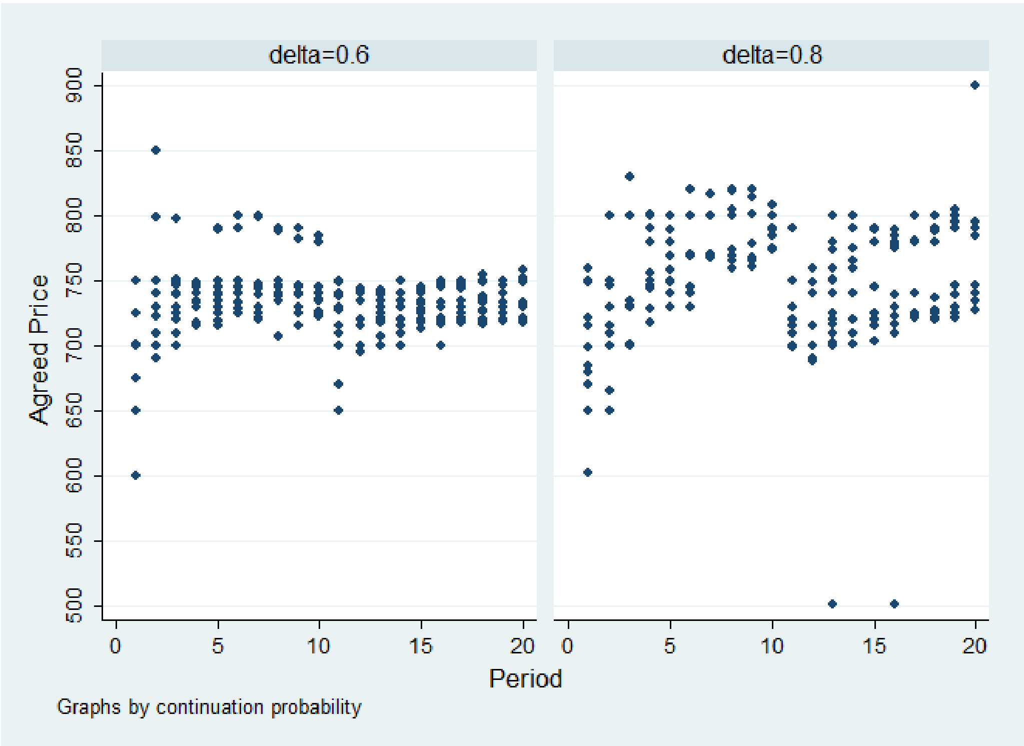


Figure 4: Agreed prices with high and low continuation probability

Table 1 show the mean agreed prices and standard deviations for high and low continuation probabilities. Since subjects can learn through the experiment, we calculated means of agreed prices for the last three periods in high and low continuation probabilities. We found that although there is a significant difference in the prices when we look at last three periods (p-value= 0.0833) at 10% significance level, there is no significant difference in the mean prices of all periods (p-value= 0.1489).[20] Again Table 1 and Figure 2 shows that agreed prices are more volatile in the high continuation probability treatment.

| Continuation probabilities | 18th-19th-20th periods | All periods |
|---|---|---|
| P=0.6 | 732.39<br>(12.26) | 732.98<br>(24.76) |
| P=0.8 | 763.36<br>(39.65) | 750.02<br>(46.44) |

Table 1: Mean prices with high and low continuation probabilities
(Standard deviation is in the parenthesis)

We expect market price to be between 700 and 720 when there is no outside option. We compare the mean of observed prices with high and low continuation probability with 710 (mean of price interval predicted without outside option) by using one-sample t-test. We found that mean of observed prices are significantly higher than 710 at 10% significance level when continuation probability is low (p-value=0.06). Further, we found that mean of observed prices are significantly higher than 710 at 5% significance level when continuation probability is high (p-value=0.02). Having an outside option did not increase the market's price as predicted for the sellers but it increased compared to not outside option case.

In Table 2, we report the period profits of sellers and buyers with high and low continuation probabilities. There is no significant difference in sellers' and buyers' period profits between high and low continuation probabilities (p-value=0.1489 and p-value=0.7728, respectively).[21] However, for both continuation probabilities, sellers' period profits are significantly higher than buyers' (p-value=0.021 and p-value=0.021, respectively).[22]

| Continuation probabilities | Buyers | Seller |
|---|---|---|
| P=0.6 | 99.10<br>(57.37) | 138.85<br>(79.83) |

[20] For all comparisons we used Wilcoxon-rank sum test.
[21] Wilcoxon rank-sum test for sellers and buyers is applied.
[22] The valuations and costs do not generate symmetric welfare theoretically, for buyers and seller in a market without outside option. In such market, while producers' welfare is 550 in the equilibrium, buyers' welfare is 470. Hence, we cannot be sure that the difference in buyers' and sellers' welfare observed in the experiment stem from the outside option or not.

| | | |
|---|---|---|
| P=0.8 | 97.31<br>(58.14) | 156.43<br>(86.69) |

Table 2: Period profits for buyers and sellers with high and low continuation probabilities (Standard deviation is in the parenthesis)

### 3.2 Determinants of the sellers' decision

In order to identify determinants of the sellers' decision about trading in the market or choosing outside option, we used a probit model. Our dependent variable takes the value 1, in a given period if the seller chooses the outside option and it takes 0 otherwise. On the purpose of testing our expectations about the determinants of the sellers' decision, we include the independent variables: sellers' cost, their risk preferences elicited in Stage 2, time preferences elicited in Stage 3, their gender (takes the value 1 if the seller is male, 0 otherwise), the period at which decision is made, and continuation probability (takes the value 1 if the continuation probability is high and 0 otherwise).

In accordance with our expectation, the results in the Table 3 show that high continuation probability positively affects the probability of choosing the outside option. Again consistent with our expectations, as the seller becomes more risk averse, the probability of seller choosing the outside option decreases. In the literature, it is found that females are more risk averse. In line with this finding and our result on risk-averse sellers' outside option choice, we found that being male increases the probability of choosing outside option. This may be due to higher risk aversion of females according to males (Byrnes, Miller and Schafer, 1999; Arch, 1993). As it is discussed above, the outside option provides greater profit chance for the sellers with higher cost, relative to the profit available for them at the market. Hence, the sellers with higher cost are more likely to choose the outside option. The results of our regression support this argument. Nevertheless, this effect is very small. Another possible determinant of the sellers' decision is the number of periods that the decision is made, because participants' behavior may change when they get experienced in the market. However, our results show no significant relation between the number of periods and the probability of sellers' choice for outside option. Likewise, we were expecting that being patient for sellers to increase probability of choosing outside option. However, we found no significant effect of being patient on sellers' choice.

| Dependent variable | Probability of a seller to choose outside option |
|---|---|
| Risk Preference | -0.07*** (0.03) |
| Time Preference | 0.04 (0.04) |
| Period | -0.005 (0.008) |
| Cost | 0.004*** (0.001) |
| Gender | 0.42**(0.19) |

| | |
|---|---|
| Continuation Probability | 0.39*** (0.13) |
| Constant | -2.43*** (0.68) |
| Pseduo-$R^2$ | 0.09 |
| # Observations | 960 |
| # Clusters | 8 |
| ** Significant at 5% level. | |
| *** Significant at 1% level. | |

Table 3: Probit estimation of the seller's decision

(Robust Standard errors are clustered at session level)

## 4. Discussion

In this study, we evaluated how outside options given to sellers which are realized with changing probabilities (high or low) affected trade and price in a double auction environment through an experiment. First, we found that sellers' decision for involvement into trade is affected from the probability with which outside option is realized. Additionally, sellers' gender, cost, and risk preference also affected sellers' outside option choice. Nevertheless, when we look at the effect of continuation probability on agreed prices in trades, we do not observe any difference in the treatments with high or low continuation probabilities. The agreed prices in trades seem to be significantly higher than the price that should be reached theoretically without an outside option. Hence, either with high or low continuation probability, outside option to sellers seems to increase their welfare (price-cost).[23]

**References**

Andersen, S., Harrison, G. W., Lau, M. I., & Rutström, E. E. ,2006. Elicitation using multiple price list formats. Experimental Economics, 9(4), 383-405.

Arch, E. 1993. "Risk-Taking: A Motivational Basis for Sex Differences," *Psychological Reports* 73: 3, pp. 6-11.

[23] When we look at the buyers' and sellers' welfares involved in trades in two treatments, we observe no significant difference between treatments with high or low continuation probability.

Byrnes, J.; Miller, D. C., Schafer, W. D. 1999. “Gender differences in risk taking: a meta-analysis,” *Psychological Bulletin* 125, pp. 367-383.

Colen, L., S. Gomez y Paloma, U. Latacz-Lohmann, M. Lefebvre, R. Préget, and S.Thoyer. 2016. Economic experiments as a tool for agricultural policy evaluation: insights from the European CAP. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, *64*(4): 667-694.

Caykur 2016. Fresh tea sector report http://www.caykur.gov.tr/CMS/Design/Sources/Dosya/Yayinlar/142.pdf (accessed June 6, 2018).

Caykur. 2017. Fresh tea actions report http://www.caykur.gov.tr/CMS/Design/Sources/Dosya/Yayinlar/241.pdf (accessed June 6, 2018).

Fischbacher, U. 2007. z-Tree: Zurich toolbox for ready-made economic experiments. *Experimental Economics*, *10*(2): 171-178.

Frechette, G.R. and S. Yuksel. 2017. Infinitely repeated games in the laboratory: four perspectives on discounting and random termination, *Experimental Economics*, 20: 279-308.

Geng, X., W. Janssens, and B. Kramer. 2017 Liquid Milk: Cash Constraints and Day-to-Day Intertemporal Choice in Financial Diaries. IFPRI Discussion Paper 1602. Available at SSRN: https://ssrn.com/abstract=2926060

Güth, W., P. Ockenfels and K. Ritzberger. 1995. On durable goods monopolies an experimental study of intrapersonal price competition and price discrimination over time. *Journal of Economic Psychology*, *16*(2): 247-274.

Güth, W., S.Kröger and H. T. Normann. 2004. Durable-Goods Monopoly with Privately Known Impatience: A Theoretical and Experimental Study. *Economic Inquiry*, *42*(3): 413-424.

Hobbs, J. E. and S. Mooney. 2016. Applications of Behavioral and Experimental Economics to Decision Making in the Agricultural, Food, and Resource Sectors: An Introduction. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, *64*(4): 593-597.

Holt, C. A. and S. K. Laury. 2002. Risk aversion and incentive effects. *American Economic Review*, *92*(5): 1644-1655.

Loy, J. P., T. Glauben, T. Requate and C. R. Weiss. 2014. A Sealed-bid Double Auction Experiment on German Milk Quota Exchanges. *Journal of Agricultural Economics*, *65*(2): 420-445.

Mani, A., S. Mullainathan, E. Shafir, and J. Y. Zhao. 2013. Poverty impedes cognitive function. *Science*, 341(6149), 976–80.

Mock, B., K. Hansen, R. Coupal, and D. Menkhaus. 2016. Policy experiments for the US Intermountain West native seed industry. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, *64*(4): 695-716.

Roth, A. E., and J. K. Murnighan. (1978). Equilibrium behavior and repeated play of the prisoner's dilemma. *Journal of Mathematical Psychology*, 17, 189–198.

Smith, V. L. 1976. Experimental economics: Induced value theory. *The American Economic Review*, *66*(2): 274-279.

Tatsiramos, K., van Ours J.C. (2014). Labor Market Effects of Unemployment Insurance Design. Journal of Economic Surveys, 28(2), 195-399.

Yan, H., D. Friedman, and D. Munro. 2016. An experiment on a core controversy. *Games and Economic Behavior*, *96*: 132-144.