

Randomized Double Auctions
Gains from Trade, Trader Roles, and Price Discovery

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Online Supplementary Materials S1: Experimental Instructions

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S1: SUPPLEMENTARY MATERIAL: EXPERIMENTAL INSTRUCTIONS

Introduction

This is an experiment in the economics of market decision making. Based on your decisions in this experiment, you can earn a significant amount of money that will be paid to you IN CASH at the end of the experiment. During the experiment all units of account will be in experimental dollars. At the end of the experiment the amount of experimental dollars that you earn will be converted into dollars at the conversion rate of X dollars per experimental dollar. Your earnings plus a lump sum amount of 5 dollars will be paid to you in private.

From this point onwards you are NOT allowed to communicate with any other participant except according to the rules specified below. If you have any questions, raise your hand and we will answer your questions in private. From this point onwards, you will be referred to by your participant number. Your participant number is given in the upper right corner of your computer screen.

Ready

Market Trading

Period

1

Your id :

1

Current Earning:

Cumulative earning from last period

225

Time left 118

Values

1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3

Number of unit bought 0

Number of unit sold 0

Current number of units on hand: 3

In this experiment we are going to conduct a computerized market in which you will be trading a fictitious good. Trading will occur in a sequence of market days, or trading periods. At the beginning of each trading period, you and the other traders will receive a number of units of the fictitious good. The number of units you receive will be shown in the top center of the screen labeled as "Initial number of units." On this example screen, you have been initially allocated three units.

You and other traders are free to buy or sell units in the market.

In the top left corner of your trading screen you will find a box called "Values" which shows the value of each unit. PLEASE FIND "VALUES" BOX ON THE SCREEN NOW.

The units that you currently hold and may sell will be marked with "HOLD." To make money by selling, you will have to sell a good for a price that exceeds its value.

You can also buy extra units. To make money from buying, you must buy at a price that is less than the unit's value. The box shows the value of additional units - the more you hold, the lower the value of each additional unit. Note that the number of units allocated at the beginning of a period may differ across traders, and across periods.

For example, this screen indicates that you currently hold three units. The first unit has a value of 85; the second unit has a value of 75; and the third unit has a value of 65. These values are what you give up if you decide to sell. If you were to buy additional units, the next (4th) unit would be worth 45 and the fifth would be worth 35. Any units above the fifth have no value.

Your Earnings in a period will equal the sum of earnings you make from buying and selling. You can ONLY make money from buying and selling, not from simply holding the units that you have been allocated, as we explain on the next screen.

Next

Market Trading

Period 1 Your id : 1 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Values of the next unit sold:	Value of the next unit bought:
65	45

Instructions for Buying

During each period you are free to buy units of the good from the market. As described above, for each unit you buy and hold, you will receive the next unit's value as listed in the "Values" table. For example, if you currently hold three units, as in the case shown above, then the value of the next unit (the 4th) is 45. This value is also displayed in the top center box as "Value of the next unit bought" PLEASE FIND "VALUE OF THE NEXT UNIT BOUGHT" ON THE SCREEN NOW.

Your earnings from each purchase equal the difference between the value of the unit bought and the price you pay for it:

Your Earnings from a Purchase = Value of the Unit Bought - Purchase Price

For example, on this screen the value of the next unit you buy is 45. If you buy the unit for 30 experimental dollars then your earnings from the purchase will be

Earnings = 45 - 30 = 15

A Buying Calculator, located in the bottom-right corner of the screen, will help you evaluate the earnings from buying the next unit. TRY ENTERING A PRICE OF 30 INTO THE BUYING CALCULATOR NOW TO SEE HOW IT WORKS. .

Next

Values	Purchsing Price	Profit from buying :
45	<input type="text" value="1"/>	0
<input type="button" value="Calculate"/>		

Market Trading

Time left 119

Period 1 Your id : 1
Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
Number of unit bought 0
Number of unit sold 0
Current number of units on hand: 3

Values of the next unit sold:	Value of the next unit bought:
65	45

Buyer Decision

<p>Buy at this Price</p> <p>Lowest Offer</p> <p>No offer yet</p>	
<p>Open Bids to Buy</p>	<p><input type="text"/> Submit Bid to Buy</p> <p>Make a bid to buy</p> <p>Your current bid: <input type="text"/> No bid yet</p> <p>Withdraw Bid</p>

To buy, enter the price you are willing to pay--your Bid to Buy--into the Buyer Decision box, located on the right side of the trading screen: .

PLEASE ENTER A BID OF 30 IN THE BUYER DECISION BOX TO PRACTICE SUBMITTING A BID TO BUY. Don't worry - this practice will not affect your earnings.

Next

Buying Calculator

Values	Purchsing Price:	Earning from buying :
45	<input type="text"/>	0
<p>Calculate</p>		

Market Trading

Time left 117

Period 1 Your id : 1
Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
Number of unit bought 0
Number of unit sold 0
Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Buyer Decision

Buy at this Price	
Lowest Offer	
No offer yet	
Open Bids to Buy	
\$30.00	<input type="text"/> Submit Bid to Buy
	Make a bid to buy
Your current bid:	No bid yet
	Withdraw Bid

NOW PRACTICE SUBMITTING YOUR OWN BID TO BUY.

Next

Buying Calculator

Values:	Purchasing Price:	Earning from buying :
45	<input type="text"/>	0
	Calculate	

Market Trading

Time left 117

Period 1 Your id : 1
Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
Number of unit bought 0
Number of unit sold 0
Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Earning from the most recent transaction purchasing
Value: 65
Buyer Decision

Buy at this Price

Lowest Offer

\$35.00

Open Bids to Buy

Submit Bid to Buy

Make a bid to **buy**

Your current bid: No bid yet

Withdraw Bid

You can also buy by accepting the lowest price being offered by sellers. The lowest offer price is shown in the top left corner of the buyer's decision box. To buy, simply click the red "Buy at this Price" button above the "Lowest Offer" price.

For example, the "Lowest Offer" displayed on this screen is 35. To buy at this price simply click "Buy at this Price."

Next

Buying Calculator

Values:	Purchasing Price	Earning from buying
45	<input type="text"/>	0

Calculate

Market Trading

Period 1 Your id : 1 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	HOLD
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 4

Value of the next unit sold:	Value of the next unit bought:
45	35

Earning from the most recent transaction purchasing
Value: 45
- Price:30
Earning :15

<div style="border: 1px solid black; padding: 2px; display: inline-block; color: white; background-color: red;">Buy at this Price</div> Lowest Offer No offer yet	
Open Bids to Buy \$30.00	<input style="width: 50px; height: 20px;" type="text"/> <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-left: 10px;">Submit Bid to Buy</div>
	<p>Make a bid to buy</p> Your current bid: <input style="width: 50px; height: 20px;" type="text"/> No bid yet <div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">Withdraw Bid</div>

Your earnings from the most recent purchase will be displayed in the upper right corner of your trading screen, as in the following example:

After you buy a unit, the word "HOLD" will appear next to the unit you bought in the Values table.

You may buy multiple units in the same period. The earnings from each purchase will be added to your total earnings during the period.

Next

Buying Calculator

Values:	Purchasing Price	Earning from buying
35	<input style="width: 50px; height: 20px;" type="text"/>	:
		0
<div style="border: 1px solid black; padding: 2px; display: inline-block; margin-top: 5px;">Calculate</div>		

Value of the next unit sold:	Value of the next unit bought:
N/A	50

Test1: For understanding

Question: Suppose your Value of the next unit bought is 50.

a. If you buy a unit for a price of 60, your profit/loss will be

Check Answer

b. If, instead, you buy this unit for the price of 37, your profit/loss will be

Check Answer

c. If the Lowest Offer to sell in the market is 53, will you make a profit by buying at this price?

Yes, I will make a profit No, I will make a loss

Next

Buying Calculator

Values	Purchasing price:	Earning from buying
50	<input type="text"/>	5
<input type="button" value="Calculate"/>		

Market Trading

Period Your id : Current Earning: Cumulative earning from last period
 1 1

Values

1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Instructions for Selling

During each period you can also sell units that you hold. For each unit you sell, you will receive the price you sold it for, but you will give up the value of your last held unit.

For example, on this screen you hold three units. If you sell, you will always start by selling your last, i.e., the 3rd unit. By selling this unit you give up the 3rd unit's value of 65, as shown in the Values table.

This value of the next unit sold is also shown in the center of the screen and labeled as "Value of the next unit sold:"

Your earnings from the sale will equal the difference between the price you receive for the unit and its value:

Your Earnings from the Sale = Sale Price - Values

Suppose that you sell a unit with a value of 65, for a price of 80. Then your earnings from this sale are:

Earnings is $80 - 65 = 15$

A Selling Calculator, located in the bottom-left corner of the screen, will help you evaluate your earnings from selling the next unit:

TRY ENTERING A PRICE INTO THE SELLING CALCULATOR NOW TO SEE HOW IT WORKS

Selling Calculator

Selling price	Values:	Earning from sale:
<input type="text" value=""/>	65	0
<input type="button" value="Calculate"/>		

Market Trading

Period 1 Your id : 1 Current Earning: Cumulative earning from last period

Values

1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Seller decision

Sell at this Price

Highest Bid

No bid yet

Open Offers to Sell

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

To sell, submit your offer price in the Seller Decision box and click "Submit Offer to Sell".

PLEASE ENTER AN OFFERS of 80 IN THE SELLER DECISION BOX NOW

Selling Calculator

Selling price	Values:	Earning from sale:
<input type="text"/>	65	0
Calculate		

Next

Market Trading

Period 1 Your id : 1
 Current Earning: Cumulative earning from last period

Values

1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	HOLD
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Seller decision

Sell at this Price

Highest Bid

No bid yet

Open Offers to Sell
 \$80.00

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

NOW PRACTICE SUBMIT THE OFFERS

Selling Calculator

Selling price	Values:	Earning from sale:
<input type="text" value="1"/>	65	0
Calculate		

Next

Market Trading

Period 1 Your id : 1
 Current Earning: Cumulative earning from last period

Earning from the most recent Selling

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
65	45

Seller decision

Sell at this Price

Highest Bid

\$80.00

Open Offers to Sell

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

Alternatively, you may sell a unit by accepting the Highest Bid currently available in the market. For example, on this screen the highest bid to buy is 80. To sell at this price, you would click the red "Sell at this Price" button located in the top right of the Seller Decision box.

Your earnings from the most recent purchase will be displayed in the upper right corner of your trading screen

Selling Calculator

Selling Price:	Values:	Earning from sale:
<input style="width: 30px; height: 20px;" type="text"/>	65	0
Calculate		

Next

Market Trading

Period 1

1 unit

Current
Earning
(Trading):Cumulative
earning (last
period)

1

Values

1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	65	
4th unit:	45	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 1
 Current number of units on hand: 2

Earning from the most recent Selling

sold80

 Value: 65

 Profit: 15

Cost of the next unit sold:	Value of the next unit bought:
75	65

Seller decision

Sell at this Price

Highest Bid

\$80.00

Open Offers to Sell

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

Selling Calculator

Selling Price:	Values:	Earning from sale:
<input type="text"/>	75	0

Calculate

Next

Your earnings from the most recent sale will be displayed in the upper right corner of your trading screen. For example, in this screen you just sold a unit for 80 that had a value of 65, thereby earning $80 - 65 = 15$ experimental dollars.

After you sell a unit, the word "HOLD" will disappear from the unit you sold in the Values table.

You may sell multiple units in the same period, but you can only sell units you hold. The earnings from each sale will be added to your total earnings in the period.

Value of the next unit sold:	Value of the next unit bought:
80	N/A

Test2: For understanding

Question: Suppose your value of the next unit sold is 80.

a.If you sell this unit for a price of 40, your profit/loss will be

Check Answer

b.If, instead, you sell this unit for the price of 96, then your profit/loss will be

Check Answer

c. If the Highest Bid to Buy in the market is 47, will you make a profit by selling at this price?

Yes, I will make a profit

No, I will make a loss

Selling Calculator

Selling Price	Values:	Earning from sale:
<input type="text"/>	80	-15
<input type="button" value="Calculate"/>		

Next

Market Trading

Period 1 Your id : 1
 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	70	HOLD
4th unit:	56	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold: 70
 Value of the next unit bought: 56

Price of unit sold:

Seller decision

Sell at this Price

Highest Bid

\$40.00

Open Offers to Sell

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

Buyer decision

Buy at this Price

Lowest Offer

\$45.00

Open Bids to Buy

Submit Bid to Buy

Make a bid to **buy**

Your current bid: No bid yet

Withdraw Bid

Selling Calculator

Selling Price	Values:	Earning from sale:
	70	-5

Calculate

You are free to buy and sell as many units as you want in a period, but you can only sell the units that you currently hold. The earnings from each transaction will be added to your total earning in the period.

In order to help you make decisions, the trading screen will display the current highest bid, the current lowest curent offer, and prices of all units sold in the market.

Next

Buying Calculator

Values:	Purchasing Price	Profit from buying :
56		11

Calculate

Market Trading

Time left 117

Period 1 Your id : 1
 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	70	HOLD
4th unit:	56	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
70	56

Seller decision

Sell at this Price

Highest Bid

\$40.00

Open Offers to Sell

Submit Offer to Sell

Make an offer to **sell**

Your current offer: No offer yet

Withdraw Offer

Buyer decision

Buy at this Price

Lowest Offer

\$45.00

Open Bids to Buy

Price of unit sold:

Submit Bid to Buy

Make a bid to **buy**

Your current bid: No bid yet

Withdraw Bid

Selling Calculator

Selling Price	Values:	Earning from sale:
<input style="width: 50px;" type="text"/>	70	0

Calculate

Buying Calculator

Values:	Purchasing Price	Earning from buying:
56	<input style="width: 50px;" type="text"/>	0

Calculate

Your earnings from your latest transaction, and you cumulative period earnings, will be also displayed in the top portion of your decision screen.

Trading in each period will close after two minutes.

Next

Period 1

Initial number of unit in this period	3
Number of unit bought	1
Number of unit sold	1
Current number of units on hand:	3

Sum of Values of the units you hold:	225
+ Selling Prices You Received for units sold:	80
- Purchase Prices You Paid for units bought:	30
- Sum of Value held at beginning of period	225

Your Period Earnings:	50
Cumulative earning:	50

At the end of every period, the period results screen will display the summary of your earnings, and the number of units you bought and sold. This procedure will repeat for a number of periods.

Next

Market Trading

Period 1 Your id : 1 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	70	HOLD
4th unit:	56	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
70	56

Test 3 for understanding -- use the calculators if needed
 Suppose your Value of the next unit bought is 56 and the value of the next unit sold is 70.

If you buy, what is the HIGHEST PRICE YOU COULD BID and not make a loss from this purchase?

If you sell, what is the LOWEST PRICE YOU COULD OFFER and not make a loss from this sale?

Selling Calculator

Selling Price	Values:	Earning from sale:
<input type="text"/>	70	0
<input type="button" value="Calculate"/>		

Buying Calculator

Values:	Purchasing Price	Earning from buying :
56	<input type="text"/>	0
<input type="button" value="Calculate"/>		

Market Trading

Period 1 Your id : 1 Current Earning: Cumulative earning from last period

Values		
1st unit:	85	HOLD
2nd unit:	75	HOLD
3rd unit:	70	HOLD
4th unit:	56	
5th unit:	35	
6th unit:	0	
7th unit:	0	
8th unit:	0	

Initial number of unit in this period 3
 Number of unit bought 0
 Number of unit sold 0
 Current number of units on hand: 3

Value of the next unit sold:	Value of the next unit bought:
70	56

Sell at this Price
Highest Bid
\$45.00

Buy at this Price
Lowest Offer
\$51.00

Test 4 for understanding -- use the calculators if needed
 Suppose your Value of the next unit bought is 56 and the Value of the next unit sold is 70. Suppose the current Highest Bid to buy in the market is 45, and the Lowest Offer to sell in the market is 51.

If you buy at the Lowest Offer price, then your profit/loss from this purchase will be
Check answer

If you sell at the Highest Bid price, then your profit/loss from this purchase will be
Check answer

Can you make a profit from buying current Lowest Offer and/or selling at the current Highest Bid?

Next
Selling only
Buying only
Both Buying and Selling

Selling Calculator

Selling Price	Values:	Earning from sale:
<input style="width: 30px;" type="text"/>	70	0
Calculate		

Buying Calculator

Values:	Purchasing Price	Earning from buying :
56	<input style="width: 30px;" type="text"/>	0
Calculate		

ARE THERE ANY QUESTIONS?

Next