

**Auctions of Homogenous Goods with Increasing Returns: Experimental
Comparison of Alternative “Dutch” Auctions**

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Appendix

The base text is for the Ascending mechanism in the Exposure treatment. The parts that are different in the Super Free Riding are in *italics*, and the parts that are different in the Free Riding are underlined. The parts that are both *underlined and italicized* are in both, Free Riding and Super Free Riding environments. The parts that are different in the Descending treatments are **bold**.

Instructions

Introduction

This is an experiment in market decision-making. If you follow the instructions carefully and make good decisions, you can earn a considerable amount of CASH.

The experiment consists of a sequence of 20 auctions. At the end of the session you will receive ten dollars (\$10) PLUS your total earnings from the 20 auctions. Additionally, in certain sessions in this study, participants in some of the roles will receive an additional five dollar (\$5) payment. The sessions and the roles for the additional payment have already been determined, and will be announced at the end of the session. The decisions you make in the auctions today will have no effect on whether or not you receive this additional payment.

It is important that you do not talk or in any way try to communicate with other people during the experiment. If you disobey the rules, we will have to ask you to leave.

How your earnings are determined

In each auction you and two other participants will compete to purchase 2 units of a fictitious asset. If you purchase 1 or 2 units of the asset, your earnings are equal to the difference between your resale value for that number of units and the price you paid for the asset. Your resale value for 1 and 2 units will be displayed on your screen at the beginning of each auction.

$$\text{YOUR EARNINGS} = \text{RESALE VALUE} - (\text{UNIT PURCHASE PRICE} \times \text{NUMBER OF UNITS}).$$

For example, if you buy 2 units, pay 50 per unit, and your resale value for 2 units is 120, your earnings are

$$\text{EARNINGS FROM THE ASSET} = 120 - (50 \times 2) = 20 \text{ tokens.}$$

You will lose money if you pay more than your resale value. This can happen if you purchase one unit at a price higher than your resale value for one unit or if you purchase two units at a price higher than their total resale value.

At the end of each auction, all bidders will see the auction's outcome on their screens, including the final selling prices for the units. If you won one or two units, you will be informed of your

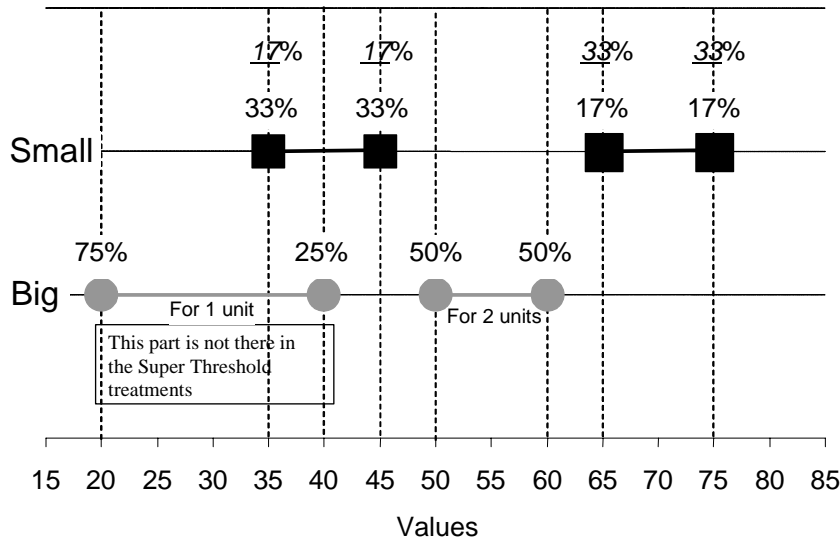
earnings. If you did not win any units, you will be told that you did not trade, and your earnings for that auction are 0.

Your earnings from all previous auctions, along with your values, the winning prices, and the amounts you paid, will be displayed on your screen after each auction.

Resale Values

- In every auction there is one 'BIG bidder' who is willing to buy two units at a high price, if he can get both units, and two 'small bidders' who each want only one unit, and may be prepared to pay either a high or a low price for it.
- The 'BIG bidder' will have a 25% chance of having a value of 40 for one unit and a 75% chance of having a value of 20 for one unit. *The 'BIG bidder will have a value of 0 for one unit.*
- The 'BIG bidder' will also have a 50/50 chance of having a value of 100 or 120 for two units. (**Note:** $100/2 = 50$, and $120/2 = 60$).
- There is a 33% chance that both 'small' bidders will have low values, and in this case each small bidder will have an equal chance of having a value of 35 or 45.
- There is a 67% chance that one of the 'small' bidders will have a high value and the other will have a low value. In this case the bidder with the low value will have an equal chance of having a value of 35 or 45, and the bidder with the high value will have an equal chance of having a value of 65 or 75. *There is a 67% chance that both 'small' bidders will have a high values. In this case they will have an equal chance of having a value of 65 or 75.*
- Both 'small' bidders will never have high values. *'Small' bidders will always either both have high values or both have low values.*
- You will have the same role, 'BIG' or 'small' bidder, in all auctions.

Information about resale values is summarized in the figure below.



BIG Bidders

- Value for 1 unit: 25% - 40, 75% - 20 0
- Value for 2 units: equal chance of 100 or 120

1. Small Bidders

- Probability both have low values: 33%
- Probability 1 has low and 1 has high value: 67% 0%
- Probability both have high values: 0% 67%
- Low values: equal chance of 35 or 45
- High values: equal chance of 65 or 75

Conduct of the Auctions

(Pictures of the bidding screens are at the end of these instructions.)

In this auction you bid on units by doing nothing, and you indicate when you wish to STOP bidding by clicking a button. The unit price of the asset will start at 10 tokens and will increase every second by 0.5 tokens. If you are a 'small bidder' your profit if you win one unit at the current market price will be displayed on your screen. If you are a 'BIG bidder' your profits if you win one or two units will be displayed on your screen. Note that as the price goes up, your profits at the current price go down. If the profit becomes negative, the words will turn red.

The unit price of the asset will start at 85 tokens and will decrease every second by 0.5 tokens. If you are a 'small bidder' your profit if you win one unit at the current market price will be displayed on your screen. If you are a 'BIG bidder' your profits if you win one or two units will be displayed on your screen. Note that as the price goes down, your profit at the current price goes up. When the profit is negative the words are red, but when the price becomes low enough and the profit becomes positive, the words will turn black.

The desired quantity for Big bidders will start at 2 units, and they can change it by clicking the 'I want One' and 'I want Two' buttons. Small bidders can only win one unit.

When the price becomes higher than what you are willing to pay, click the 'I am Out' button. If you are a 'small' bidder clicking this button guarantees that you will not win any units. If you are a 'BIG bidder' clicking this button guarantees that you will not win 2 units, but you may win one unit.

The total number of units demanded will be displayed on your screen. The auction ends when the total number of units demanded by all three bidders falls to 2 or below.

'BIG' bidders will see two buttons: 'I Want Two' and 'I Want One'. 'Small' bidders will see one button: 'I Want One'. When you are ready to buy units at the current price, click the button corresponding to the number of units you want. If one unit is sold, *the price of the remaining unit goes back up to 85 tokens and will again, the auction will pause for 3 seconds, and then the price of the remaining unit will continue to* decrease every second by 0.5 tokens. After you buy one unit you cannot buy any more units. The auction ends as soon as both units are sold. The units will be allocated to bidders willing to pay the highest prices. If two bidders place bids at exactly the same price, the units will be allocated to the

bidder who wanted more units, and if both bidders demanded the same number of units, the winner will be determined randomly.

Example 1 Suppose that your resale value for 1 unit is 20 0 and for 2 units it is 120, and you let the price reach 59.5 tokens per unit, and you then click the 'I am Out' button when the price is at 60. Suppose that at this point there is only one other eligible participant, who still wants one unit at 60, so the auction ends. So the auction ends with one unit going to the other bidder for 60, and one unit going to you for which you pay 59.5 (the highest price at which you were willing to trade). Your earnings are $20 \text{ 0} - 59.5 = -39.5$ -59.5 tokens. You lose money because you were allocated only one unit.

Suppose that your resale value for 1 unit is 20 and for 2 units it is 120, and you let the price reach 59.5 tokens per unit, and you then click the 'I am Out' button when the price is at 60. At this point there are two small bidders still eligible, because if both small bidders do not have low values they must both have high values. So the auction ends with each small bidder winning one unit at 60 and you not winning any units.

Suppose that your resale value for 1 unit is 40 0 and for 2 units it is 120, and you click the 'I Want Two' button when the price gets down to 50 tokens per unit. You get two units, and your earnings are $120 - 50 \times 2 = 20$ tokens.

Example 2 Suppose that your resale value for 1 unit is 20 0 and for 2 units it is 100, and you let the price reach 19.5 tokens per unit, at which point you click the 'I am Out' button when the price is at 20. Suppose that at this point the auction ends, and the two other bidders each win 1 unit at 20. Your earnings are 0 tokens because you did not win any units.

Suppose that your resale value for 1 unit is 20 and for 2 units it is 100, and you let the price reach 45.5 tokens per unit, at which point the auction ends. This means that both 'small' bidders had low values, so they were both out at 45. In this case you win both units and pay 45.5 per unit and your earnings are: $100 - (45.5 \times 2) = 9$.

Suppose that your resale value for 1 unit is 20 0 and for 2 units it is 120, and as the price gets down to 40 another bidder buys one unit. At this point there is only one unit available, and the price goes back up to 85. Suppose that when the price gets down to 50 you click 'I Want Two' button. You will get an error message informing you that there is only one unit available. Suppose that as the price gets down to 40 another bidder purchases one unit. In this case you earn 0 because you did not buy any units.

Example 3 Suppose that your resale value for 1 unit is 20 0 and for 2 units it is 100, and the auction ends when the price reaches 35 without you clicking the 'I am Out' button. In this case you are allocated two units, you pay 35 tokens per unit, and your earnings are $100 - (35 \times 2) = 30$ tokens.

Suppose that your resale value for 1 unit is 20 and for 2 units it is 100, and the auction ends when the price reaches 65.5 without you clicking the 'I am Out' button. In this case you are

allocated two units, you pay 65.5 tokens per unit, and your earnings are $100 - (65.5 \times 2) = -31$ tokens. You lose money because you paid more for two units than your value for two units.

Suppose that your resale value for 1 unit is 20 and for 2 units it is 100, and you click the 'I want Two' button when the price gets down to 70. In this case your earnings are $100 - (70 \times 2) = -40$ tokens. You lose money because you paid more than your resale value.

Example 4 Suppose that your resale value for 1 unit is 75 and for 2 units it is also 75 (you have no additional value for the second unit), and you let the price get up to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $75 - 60 = 15$ tokens.

Suppose that your resale value for 1 unit is 75 and for 2 units it is also 75 (you have no additional value for the second unit), and you let the price get up to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $75 - 60 = 15$ tokens.

Suppose that your resale value for 1 unit is 75 and for 2 units it is also 75 (you have no additional value for the second unit), and you click the 'I want One' button as the price gets down to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $75 - 60 = 15$ tokens. The price for the remaining unit will continue to go down. Suppose the other 'small' bidder in this auction has a value of 75 also (same as you). Suppose that when the price gets down to 0.5 the other 'small' bidder clicks the 'I want One' button and wins the remaining unit. This bidder's earnings are $75 - 0.5 = 74.5$.

Example 5 Suppose that your resale value for 1 unit is 45 and for 2 units it is also 45 (you have no additional value for the second unit), and you let the price get up to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $45 - 60 = -15$ tokens. You lose money because you paid more than your resale value.

Suppose that your resale value for 1 unit is 45 and for 2 units it is also 45 (you have no additional value for the second unit), and you let the price get up to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $45 - 60 = -15$ tokens. You lose money because you paid more than your resale value.

Suppose that your resale value for 1 unit is 45 and for 2 units it is also 45 (you have no additional value for the second unit), and you click the 'I want One' button as the price gets down to 60, at which point the auction ends. In this case you are allocated one unit, you pay 60 tokens for this unit, and your earnings are $45 - 60 = -15$ tokens. You lose money because you paid more than your resale value.

Matching

You will not be matched with the same two participants for two consecutive auctions. You will not be told which of the other participants in the room you are matched with, and they will not be told that you matched with them. What happens in one auction has no effect on what happens in any other auction.

Ending the experiment

At the end of the experiment, your earnings from all 20 auctions will be totaled and converted to dollars at the rate of five (5) cents for each token. At this point it will be announced whether or not participants in this session and in your role receive the additional \$5 payments. You will be paid this total amount plus an additional \$10 show-up fee, in private and in cash. The total payment will be displayed on your computer screen at the end of the session.

Now, please complete the quiz below. If you have any questions raise your hand and I will come to where you are sitting and answer them. When everyone has completed the quiz I will go over the answers and we will begin the decision making part of the experiment.

Bidding Screens for the Ascending Mechanism

Period: 1 of 2		Remaining time [sec]: 226	
Total Resale Value for 1 unit: 20 Total Resale Value for 2 units: 100		You are the BIG bidder	
		Current Price per Unit: 43.0	
		Number of units available: 2	
		Number of bidders still in is: 3	
		Number of units demanded: 4	
Your current quantity is: 2		Auction in Progress	
Profit information at your highest acceptable price		Click a button when the market price becomes too high for you.	
If you win one unit: -23.0			
If you win two units: 14.0			
Click a button to change the quantity you wish to purchase.			
<input type="button" value="I want one (1)"/>		<input type="button" value="I want two (2)"/>	
		<input type="button" value="I am out"/>	

The screen for the Super Free Riding environment reads “Total Resale Value for 1 unit: 0”.

Period		1 of 2		Remaining time [sec]: 245	
Total Resale Value for 1 unit: 35 Total Resale Value for 2 units: 35		You are Small bidder number 2 Current Price per Unit: 34.0 Number of units available: 2 Number of bidders still in is: 3 Number of units demanded: 4			
Your current quantity is: 1 Your profit at the current price is: 1.0		Auction in Progress Click a button when the market price becomes too high for you.			
		<input type="button" value="I am out"/>			

Bidding Screens for the Descending Mechanism

Period		1 of 2		Remaining time [sec]: 243	
Total Resale Value for 1 unit: 40 Total Resale Value for 2 units: 120		You are BIG bidder Current Price per Unit: 57.0 Number of units available: 2 Number of bidders still in is: 3			
Your profit at the current price if you get one unit: -17.0 Your profit at the current price if you get two units: 6.0		Auction in Progress Click a button to purchase at the current market price.			
		<input type="button" value="I want One"/> <input type="button" value="I want Two"/>			

The screen for the Super Free Riding environment reads “Total Resale Value for 1 unit: 0”.

Total Resale Value for 1 unit: 65
Total Resale Value for 2 units: 65

You are Small bidder number 1

Current Price per Unit: **63.0**

Number of units available: 2

Number of bidders still in is: 3

Your profit at the current price is: 2.0

Auction in Progress

Click a button to purchase at the current market price.

I want One