Appendix A: Instructions

AUCTION-2 (UF)

This is an experiment in economic decision-making. The experiment consists of several rounds. At the end of each round your payoff for that round will be calculated. At the end of the experiment, your payoff from each round will be added up and this sum will determine your payoff for the experiment. Your payoff will be made with funds provided through grants by various institutions. Please feel free to earn as much of this money as possible. Everything contained in these instructions and everything you hear in this session is an accurate representation of this experiment. Be sure to ask any questions that you may have during this instruction period, and ask for assistance, if needed, at any time. All subjects receive the same instructions.

There are four parts in today's experiment:

1. These instructions
2. The trading game consisting of a random number of auctions
3. A questionnaire
4. The (private) payment of earnings

THE TRADING GAME OVERVIEW

In this experiment you will be required to bid for units of a good which we will call widgets. There will be 26 widgets available to all players. The resale value of each widget at the end of the auction is 20Fr. You will be submitting a schedule of bids. This schedule indicates the number of widgets you are willing to buy at a given price level. The possible price levels will be 17Fr, 18Fr, 19Fr, and 20Fr. Once all schedules have been submitted, the computer will assign widgets to players submitting the highest bids until the available supply of 26 widgets is exhausted. All the players will pay the same price (clearing price) for each widget he/she is allocated. At the end of each auction your cash balance will increase by 20 francs for each widget you hold, so you will earn profits on each widget you purchase at a clearing price less than 20 francs. There will be multiple auctions. The exact number will be randomly chosen. At the end of the experiment your balance in francs will be converted to cash (1 franc = $0.10), and you will be paid that amount in cash. Only you and the assistant that pays you will learn your earnings from today's session.

DETAILS

There will be 26 widgets available for sale. Your resale value for each widget is 20 francs. (This means that after the auction your balance will increase by 20

francs for each widget that you hold, less what you paid for each widget). Prior to each auction, you will be required to submit via computer a schedule of bids. This schedule indicates the number of widgets you are willing to buy (including zero) at each possible price level. The possible price levels will be 17Fr, 18Fr, 19Fr, and 20Fr and the sum of all of your bids may not exceed the number of units indicated at your computer terminal. This number may be different for different participants. Once each participant has submitted his/her schedule of bids, the computer will calculate the highest price at which all 26 widgets can be sold and will allocate widgets to players that submit bids that are equal to or higher than this price. The price paid for each widget will be equal to the clearing price. **The market-clearing price will be the highest price at which the total demand for widgets summed across all bidders is equal to 26.**

There will be several rounds of bidding. Only you will know your actual bids, allocations, and payoffs in each round, however all the participants will know the eventual clearing price of each round. You have the option to change your bids from one auction to another. The computer will end the experiment after some random number of rounds of bidding. Only the computer knows this number of rounds.

THE CALCULATION OF YOUR PAYOFFS

Your payoffs from each auction will be equal to the difference between your resale value for each widget (20Fr) and the clearing price times the number of widgets you are allocated. At the end of each round your payoffs will be calculated. At the end of each experiment, the payoffs of each round will be added up. The sum of your round by round payoffs will determine your payoff from the experiment.

After the experiment has ended, your cumulative dollar payoff will be determined using the following formula: $ Payoffs = Balance in Francs $*$ 0.10.
Each participant will learn only his/her own final cash payment.

COMMUNICATION RULES

Before and after each round you may discuss strategies with the other players for about 1 minute. However you are required to remain seated behind your computer screen at all times. You are explicitly **not allowed to**:

(1) Make physical threats of any kind or verbally abuse other players
(2) Agree to share profits after the experiment
(3) Look at the computer screen of any other player
(4) Ask other participants how much they have earned when the experiment has ended.

The following examples are for illustrative purposes only. They are not intended to be suggested as "best" strategies and simply demonstrate the implications of a possible set of actions.

EXAMPLE 1. Consider a game with 5 bidders: A, B, C, D and E. Suppose they submit the following schedules:

Price	Bidders					Demand	Cumulative demand	Supply
	A	B	C	D	E			
20	11	0	5	0	0	16	16	26
19	5	0	3	2	0	10	26	26
18	5	0	8	6	18	37	63	26
17	5	26	10	18	8	67	130	26

The demand at each price is the sum of the demands of bidders A, B, C, D, and E. For example the demand at price 20 is equal to 11 + 0 + 5 + 0 + 0 = 16. The cumulative demand is equal to the total demand at that price and all higher prices. For example the cumulative demand at the price of 19 is 16 (Demand at 20) + 10 (Demand at 19) = 26. The market-clearing price is the highest price at which the cumulative demand equals the supply. In this case, the cumulative demand equals the supply at price equal 19. The allocation and profit of the players is as follows:

Price	A	B	C	D	E
Allocation	16	0	8	2	0
Profit	$16 * (20 - 19) = \mathbf{16}$	**0**	$8 * (20 - 19) = \mathbf{8}$	$2 * (20 - 19) = \mathbf{2}$	**0**

Since the value of a widget for each player is 20, each player makes a profit for each unit that he/she bought at a price below 20. Since in this example the clearing price is 19, each participant makes a profit of 1Fr times the number of units he/she is allocated.

Note: At the end of each round, you will learn the total demand at each price and your own payoff, but you will not learn the bids or payoffs of any other participant.

EXAMPLE 2. The following example illustrates a case where cumulative demand does not exactly equal supply at any price, and shows how the widgets are allocated if this occurs.

	Bidders					Demand	Cumulative demand	Supply
Price	A	B	C	D	E			
20	11	0	5	0	0	16	16	26
19	5	0	3	2	0	18	34	26
18	5	0	8	6	18	29	63	26
17	5	26	10	18	8	67	130	26

In this case, the market-clearing price is 19. Each player will be allocated his/her demand at price 20 and *some* of his/her demand at price = 19. Each player's allocation at 19 will depend on how large his/her bid was at that price: the larger the bid the larger the allocation as follows. Player A bids for 5 units at a price of 19. Since these 5 units represent 5/18 or 27.7% of demand at price=19, this player receives 27.7% of the number of widgets necessary to make cumulative demand at price = 19 equal 26 (the supply of widgets). Since 10 widgets will be allocated from bids at price = 19, player A receives 2.8 of these widgets (27.7% of 10 rounded to the tenth). Player A will also receive his/her entire bid of 10 at price = 20.

The allocation and profit of the players is as follows:

Price	A	B	C	D	E
Allocation	13.8	0	6.7	1.1	4.4
Profit	$13.8 * (20 - 19) = \mathbf{13.8}$	0	$6.7 * (20 - 19) = \mathbf{6.7}$	$1.1 * (20 - 19) = \mathbf{1.1}$	$4.4 * (20 - 19) = \mathbf{4.4}$

GRAPHICAL INTERFACE

The following figures are for illustrative purposes only. They are not intended to be suggested as "best" strategies and simply demonstrate the computer interface.

Figure A1 shows the first screen you will see when the game starts. The computer screen is divided into three main areas: The "Bid Frame" (large area on the left-upper corner), the "History Graph" (thin rectangular area on the right-upper corner) and the "History Table" (wide rectangular area on the bottom of the screen).
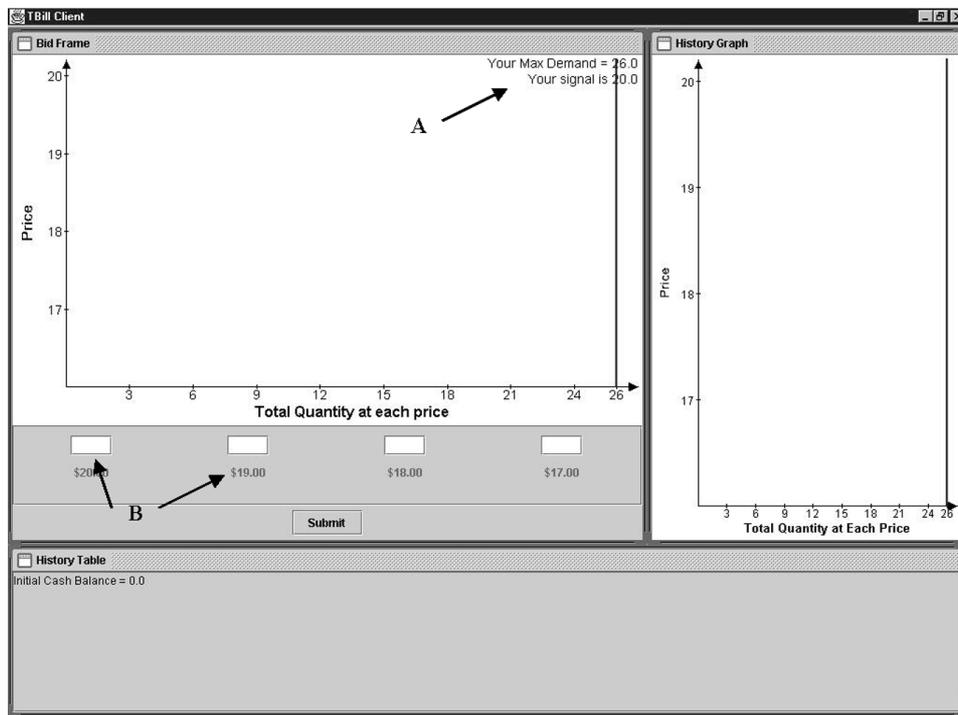
Figure A1.

The Bid Frame is the interface that allows you to input your bids at each price. Point "A" reminds you that your resale value for each widget will be 20Fr. The white fields marked with "B" are where you will input your bids at the different prices. Notice that there is one field for each of the four allowed prices (that is 20Fr, 19Fr, 18Fr and 17Fr). You must submit your bid at each respective price by typing a non-negative integer between 0 and 26. By default the computer positions your cursor in the 20Fr field. You can move to the next field (19Fr) by pressing Tab on your keyboard or by clicking the field with the left button of your mouse.

Figure A2 shows you how the process just described works. You will notice that as you input your demand schedule in the mentioned fields, the computer will draw a demand curve (demand graph). It will look like the downward sloping ladder graph marked with the letter "C" in Figure A2.
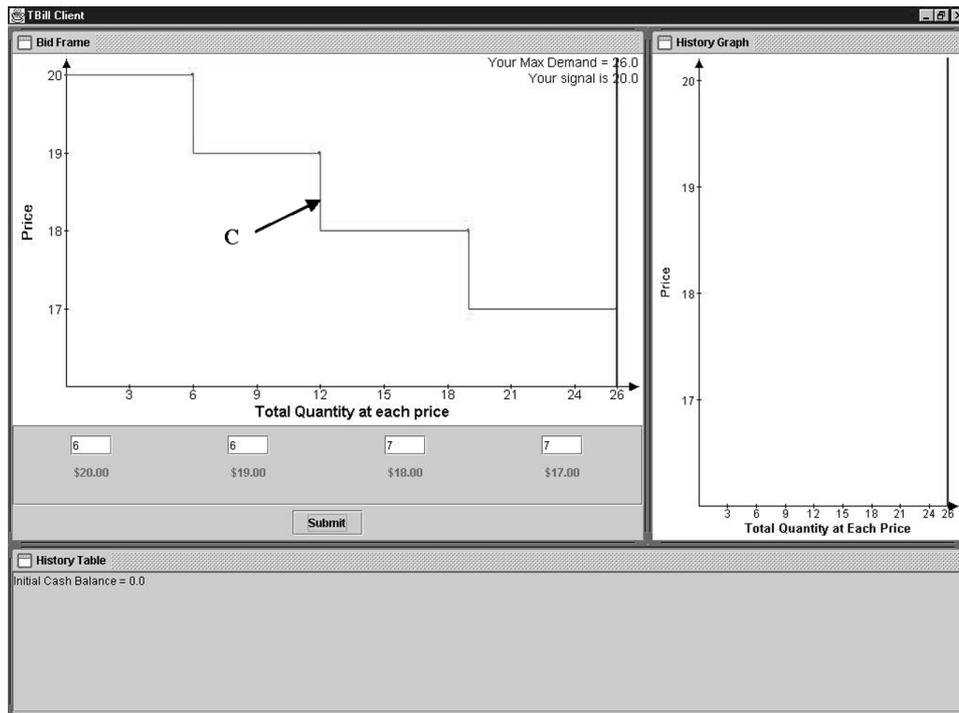
Figure A2.

Note that this subject has a maximum demand of 26. Recall that different subjects may have different maximum demands. You are allowed to bid for less than this amount but not more. Once you are done inputting your bids, you submit them by clicking the "Submit" button on the screen with your mouse, or by "tabbing" into it with your keyboard and pressing the "Enter" key.

Once all subjects have submitted their bids, the results for the auction will be displayed. The results for the round just played will always be displayed in the same area as the "Bid Frame" (the large area on the right-upper corner of the screen). Notice however that the label of the Frame has changed to "Auction Results". Figure A3 shows the hypothetical results of the first round in our example. The "Auction Results" Window will show your original demand curve, the market clearing price with a dotted blue line, and will highlight with green the portion of your demand curve which was filled (in the case of our example 13 widgets).
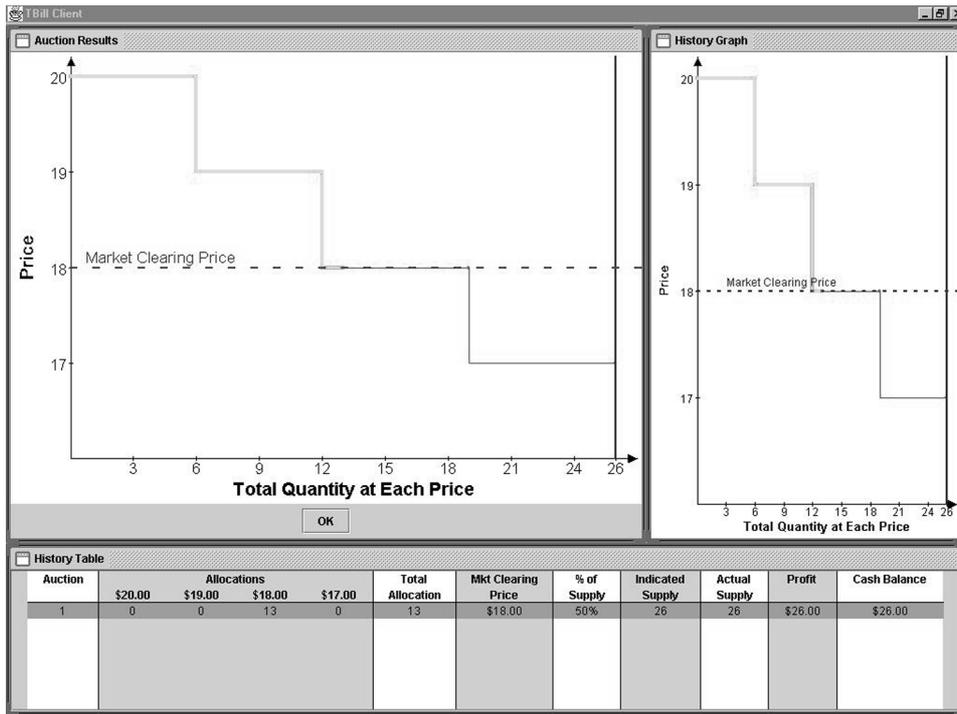
Figure A3.

The "History Table" gives you a numerical summary of the round's results. It tells you the number of widgets you were allocated, the market-clearing price, the percentage of the overall supply of 26 widgets you received, your profits, and your cash balance.
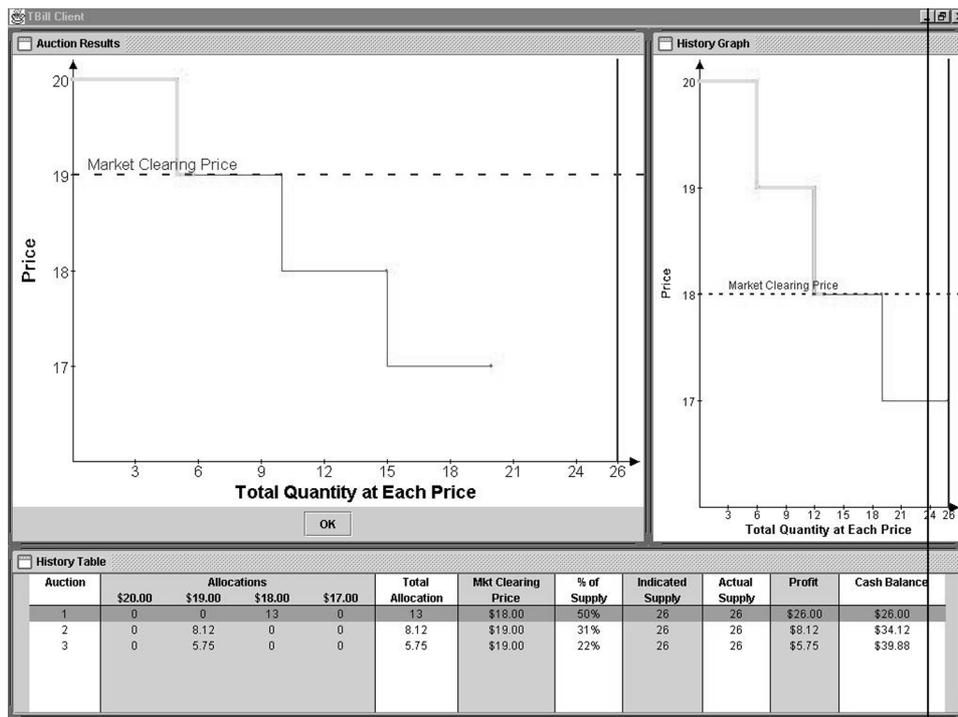
Figure A4.

Figure A4 shows how the "History Graph" displays results from previous rounds. In this illustration, even though the game has already been played three rounds, the graph (upper right-hand corner) is showing the results of the first one. Please notice how the "Auction Results" Graph and the "History Graph" differ: the "Auction Results" Graph shows the results of the last round played (in this case round 3) and the "History Graph" is showing those of the first round.

At any point in the game you can recall the "History Graph" from past rounds by double clicking the desired round in the "History Table". Notice in Figure A4 that although the "History Table" depicts the results of all the rounds played, the first round is highlighted. This means that the "History Graph" shown corresponds to that highlighted round. By default, after each round, the "History Table" will highlight the last round played, but you can change this at any point of the game by highlighting the desired round. When a game lasts for more rounds than the "History Table" can show in its limited area, a scroll bar will appear to the right of the table. This allows you to view the results from any period.

The computer will randomly determine the last auction. When this occurs a screen will be displayed that reports your initial cash balance (zero) and your profits at the end of the game. If you wish you may write down your profits, but you need not do so; the experimenter has this record and will pay you your exact earnings in

private. Finally, press "Enter" with the keyboard (or click "Ok" using the mouse) and your screen will go blank. If you don't do this, the screen will automatically go blank after 60 seconds. Either way, do not get up from your seat until instructed to do so.

QUIZ

1. Suppose you bid for 1 widget at a price of 20Fr, 10 widgets at a price of 19Fr, 2 widgets at a price of 18Fr, and 13 widgets at a price of 17Fr. Suppose you receive you receive all the widgets you bid for at a price greater than or equal to 18Fr, and none of the widgets you bid for at a price of 17Fr. What is your profit in Francs for the period?

2. Assume the following set of bids.

Price	Bidders					Demand	Cumulative demand	Supply
	A	B	C	D	E			
20	1	0	5	8	1	15	15	26
19	2	0	5	0	1	8	23	26
18	10	0	5	3	12	30	53	26
17	13	26	11	15	12	77	130	26

a. What is the market-clearing price?

b. What is the profit of player B?

c. What is the profit of player D?