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**AJAE APPENDIX: CONTRACT ENFORCEMENT, SOCIAL EFFICIENCY, AND  
DISTRIBUTION: SOME EXPERIMENTAL EVIDENCE**

**Steven Wu and Brian Roe**

The Ohio State University  
AED Economics  
Agricultural Administration Building  
2120 Fyffe Road  
Columbus, OH 43210-1067

Contact:  
[wu.412@osu.edu](mailto:wu.412@osu.edu)  
(614)247-7494

Fax: (614)292-4749

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## **Experimental Instructions for Buyers (C)**

In this experiment everyone begins with \$5. During the experiment, you can earn more money, with the exact amount depending on you and your pair members' decision. During the experiment your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\text{\$1} = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups with 5 buyers and 7 sellers. **You will remain a buyer throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and seller will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (from 1 to 7 for sellers and 1 to 5 for buyers) that will stay the same over all rounds of this game. The numbers can be used to negotiate trades within a given round *and* the numbers will allow you to track other participants between rounds.

## The Experimental Procedures in Detail

There are 5 buyers and 7 sellers. **You are a buyer for the whole experiment.** During the experiment, all your decisions will be entered on your computer screen. The following describes in detail how you will make decisions within each period of the experiment. Each period is divided into a **trading phase** followed by an **income determination phase**.

### 1. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. In order to do so **each buyer can submit as many offers as he/she wishes**. In each trading phase, you will see a screen that features the following:

- The trading period is indicated at the top of the screen. The remaining time in the trading phase is also indicated at the top right corner. The **trading phase will last 90 seconds**. When the time is up, the trading phase is over and no further offers can be submitted or accepted.
- Once the trading screen is displayed, the trading phase starts. As a buyer, you now have the opportunity to submit offers to sellers. Offers must include the following, which is to be entered into the right hand side of the screen:

- a) Specify whether the offer is to be public or private.

**Public offers** will be communicated to all participants, both sellers and buyers. In turn, you will see all public offers by other buyers. **A public offer can be accepted by any seller. Simply click on the “public” field to submit a public offer.**

A **Private offer** is submitted to one seller only. Only the seller will be informed of the offer and only the seller can accept the offer. **Click the “private” field to submit a private offer.** After that, you must specify which seller you want to submit the offer to by entering the seller’s ID number. Note that every seller maintains the same ID number throughout all 15 periods of the experiment.

- b) Specify what **price** you want to offer. Enter your price in the “Your price” field. The price can range from 0 to 100 (whole numbers only).
- c) Specify what **quality** you desire. Enter this in the “Desired quality field”. Quality can range from 0 to 10, where higher numbers are better. (whole numbers only)

After specifying the type of offer, the price, and the quality, click “OK” to submit it.

- On the left side of your screen, you will see the header “public offers,” which displays all public offers made by buyers, including your own offer.
- In the middle of the screen, you can see all private offers that you have submitted in the current trading phase.
- **Each buyer can submit as many private and public offers as he wishes in each period.** Each offer that you submit can be accepted at any time during the trading phase.
- **In any given period, each buyer can conclude at most one trade.** Once one of your offers has been accepted, you will be notified which seller accepted which of your offers.

This information will be displayed on the bottom right corner of your screen. At this point, all your other offers will be removed from the market and cancelled.

- **In any given period, each seller can conclude at most one trade.** You will be continuously informed about which sellers have not yet accepted an offer. On the bottom right of the screen, you will see 7 fields, each field for one of the 7 sellers. Once a seller has accepted an offer, an “x” will appear in the field next to the seller’s identification number. You cannot submit private offers to a seller who has already concluded a trade.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
- No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

## 2. Income Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will supply the quality level specified in the offers they agreed to accept. In other words, **the product quality you asked for in your offer is binding for your seller** – i.e. the computer will ensure that your desired quality is implemented.
- Similarly, all **buyers** who have concluded a trade will pay the price specified in the offer. In other words, **the price you agreed to is binding** and will be enforced by the computer.
- Points for you and your seller will be based on the price and quality specified in the offer.

## How Are Points (Income) Calculated?

### Your Points

- If you do not conclude a trade during the trading phase, you will receive 0 points for that period.
- If one of your offers is accepted, your points depend on the price you offered and on the product quality. Your points for that period are determined as follows:

$\text{Your Points} = 10 * \text{Product Quality} - \text{Price}$
-------------------------------------------------------------------

- As you can see, the higher the product quality, the more points you earn. At the same time, the lower the price you paid, the more points you earn.
- Higher quality at lower prices means more points for you.

### How do Sellers Earn Points?

- If a seller has not concluded a trade during the trading phase, he/she gains 10 points for that period.
- If the seller has accepted an offer, his/her income equals the price he/she receives minus the production costs he/she incurs. The income of a seller is determined as follows:

$\text{Points} = \text{Price} - \text{Production Costs}$
----------------------------------------------------------

- As you can see, the higher the price, the more points a seller earns. At the same time, the higher the quality, the higher the production costs, which reduces points.

- How are production costs calculated? The higher the quality the seller supplies, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from your points balance.

You will be informed about your points and the points of your seller in each period on an “**income screen**.” The following information is displayed on this screen:

- the seller you traded with (ID number)
- the price you offered
- the quality supplied
- the points earned (lost) by your seller in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. After the income screen has been displayed, the period is over. This will help you keep track of your performance across periods as well as the performance of those with whom you interact. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All sellers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.

## **Control Questionnaire for Subjects Prior to the Start of the Experiment**

Please solve the following exercises completely. If you have questions, ask one of the experimenters. After all participants have answered the questions correctly, the experiment begins.

1. Suppose that you are the buyer and you did not make an offer during the trading phase. How many points do you earn for this period?
2. Suppose that you are the buyer and you offered a price of 40 and indicated a desired quality of 9. A seller accepts your offer. How many points did you earn for this period?
3. Suppose that you are a buyer and you offered a price of 10 and indicated a desired quality of 2. A seller accepts your offer. How many points did you earn for this period?
4. If a seller did not accept an offer during the trading phase, how many points does this seller earn for that period?
5. Suppose that you are buyer no. 3 in round 2. Does this mean that you will still be buyer no. 3 in round 3?
6. Suppose that you are a seller and you accepted an offer with a price of 30 and a desired quality of 9. How many points did you earn for this period?
7. Suppose that you are a seller and you accepted an offer with a price of 40 and a desired quality of 2. How many points did you earn for this period?
8. Suppose that you are seller no. 5 in round 5. Does this mean you were seller no. 5 in rounds 1-4 and will continue to be seller no. 5 in rounds 6-10?

If you have finished the exercises, we recommend that you look at the exercises and the solutions provided again. After this, you should think about the decisions you'll want to make to maximize your points.

## **Experimental Instructions for Sellers (C)**

In this experiment everyone begins with \$5. During the experiment, you can earn more money, with the exact amount depending on you and your pair members' decision. During the experiment your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\$1 = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups with 5 buyers and 7 sellers. **You will remain a seller throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and sell will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (e.g. from 1 to 7 for sellers and 1 to 5 for buyers) that will stay the same over all rounds of this game. The numbers can be used to negotiate trades within a given round *and* the numbers will allow you to track other participants between rounds.



## The Experimental Procedures in Detail

There are 5 buyers and 7 sellers. **You are a seller for the whole experiment.** During the experiment, all your decisions will be entered on your computer screen. The following describes in detail how you will make decisions within each period of the experiment. Each period is divided into a **trading phase** followed by a **income determination phase**.

### 3. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. To do this, the buyers can submit offers to sellers. As a seller, you can, in each period, accept one of the offers. During the trading phase, you will see a screen with the following elements:

- The top left corner indicates the trading period that you are in. In the top right corner, you see the remaining time in the current trading phase, displayed in seconds. **The trading phase in each period lasts 90 seconds.** When the time is up, the trading phase is over and no further offers can be submitted by the buyer or accepted by the seller in the period.
- Once the trading screen is displayed, the trading phase starts. As a seller, you now accept offers submitted by the buyers. There are two types of offers that you can accept:
  - a. **Private offers to you.** Each buyer can submit a private offer only to you, if he/she chooses. If a buyer submits a private offer to you, **you alone will be informed about the offer and you alone can accept it.** If you receive private offers, they will appear on the left side of your screen, below the header “Private Offers to you.” For each private offer, you will be informed of the ID number of the buyer, the price offered, and the product quality desired. If you want to accept the offer, click the row in which the offer is displayed to highlight the offer. Then click the “accept” button at the bottom of the screen. Note that once you click the “accept” button, you cannot alter your choice anymore. Note that every buyer maintains the same ID number throughout all 15 periods of the experiment.
  - b. **Public Offers.** Each buyer can also submit public offers. When a buyer submits a public offer, all sellers are informed about these offers and **any seller can accept them.** All public offers are displayed on the right side of the screen, below the header “public offers.” For each offer, the buyer’s ID number, the price offered, and the desired quality are displayed. All other buyers and all sellers see this information. If you want to accept a public offer, click the row that it is in to highlight it. Then click the “accept” button at the bottom right corner. Once you click the accept button, you cannot alter your choice anymore.
- Once you accept an offer, the offer will be displayed on the bottom of the screen.
- **Each seller can conclude at most one trade in each period.** Thus, once you accept an offer, you cannot accept any other offers.
- **All buyers have to observe the following rules when submitting offers:**

- a) The price can range from 0 to 100 (whole numbers only).
- d) The **desired quality** can range from 0 to 10, where higher numbers are better. (whole numbers only).

- **Each buyer can, in each period, submit as many private and public offers as he/she wishes.** Each offer submitted by a buyer can be accepted at any time during the trading phase.
- **Each buyer can conclude at most one trade per period.** Once an offer has been accepted, the buyer will be informed about which seller accepted the offer. Because buyer can conclude only one trade per period, his/her other offers will automatically be canceled and no additional offers can be submitted.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
- No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

#### 4. Income Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will supply the quality desired by their respective buyers. All buyers who have concluded a trade will pay the price in the agreement. **The product quality desired by your buyer is binding for you as a seller and will be enforced by the computer. You will also receive the price you agreed to with your buyer and this will be enforced by the computer.** The computer will then determine your income (points) using the price and quality specified in the offer.

## How Are Points (Income) Calculated?

### Your Points

- If you did **not** conclude a trade during the trading phase, you gain 10 points for that period.
- If you accepted an offer, your income (points) equals the price you receive minus the production cost that you incur. Your income is calculated as follows:

<b>Points = Price – Production Costs</b>
------------------------------------------

- As you can see, the higher the price, the more points you earn. At the same time, the higher the quality that you supply, the higher the production costs, which reduces your points.
- How are production costs calculated? The higher the quality that you supply, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

- In summary, higher price at lower quality means more points.

#### How do Buyers Earn Points?

- If a buyer does not conclude a trade during the trading phase, he/she will receive 0 points for that period.
- If a buyer's offer is accepted, his/her points depend on the price he/she offered and on the product quality. His/her points for that period are determined as follows:

$\text{Points} = 10 * \text{Product Quality} - \text{Price}$
--------------------------------------------------------------

- As you can see, the higher the product quality, the more points a buyer earns. At the same time, the higher the price paid, the fewer the points the buyer earns.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from their point balances.

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

You will be informed about your points and the points of your buyer in each period on an “**income screen**.” The following information is displayed on this screen:

- the buyer that you traded with (ID number)
- the price that was offered to you
- your buyer's desired quality
- the points earned (lost) by your buyer in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. This will help you keep track of your performance across periods as well as the performance of those with whom you interact. After the income screen has been displayed, the period is over. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All buyers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.

## **Experimental Instructions for Buyers (RC1)**

In this experiment everyone begins with \$5. During the experiment you can earn more money, with the exact amount depending on you and your pair member's decisions. During the experiment, your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\text{\$1} = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups consisting of 5 buyers and 7 sellers. **You will remain a buyer throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and sell will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (from 1 to 7, e.g., buyer #3, seller #5, etc). Buyers and sellers keep the same identification number for all rounds of this game.

## The Experimental Procedures in Detail

Each period is divided into a **trading phase** followed by a **quality determination phase**.

### 5. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. In order to do so **each buyer can submit as many offers as he/she wishes**. In each trading phase, you will see a screen with the following features:

- The trading period is indicated at the top of the screen. The remaining time in the trading phase is also indicated at the top right corner. The **trading phase will last 90 seconds**. When the time is up, the trading phase is over and no further offers can be submitted or accepted.
- Once the above screen is displayed, the trading phase starts. As a buyer, you now have the opportunity to submit offers to sellers. Offers must include the following, which is to be entered into the right hand side of the screen:
  - e) Specify whether the offer is to be public or private.

**Public offers** will be communicated to all participants, both sellers and buyers. In turn, you will see all public offers by other buyers. **A public offer can be accepted by any seller. Simply click on the “public” field to submit a public offer.**

A **Private offer** is submitted to one seller only. Only the seller will be informed of the offer and only the seller can accept the offer. **Click the “private” field to submit a private offer.** After that, you must specify which seller you want to submit the offer to by entering the seller’s ID number. Remember, every seller maintains the same ID number throughout all periods of the experiment.

- f) Specify what **price** you want to offer. Enter your price in the “Your price” field. The price can range from 0 to 100 (whole numbers only).
- g) Specify what **quality** you desire. Enter this in the “Desired quality field”. Quality can range from 0 to 10, where higher numbers are better (whole numbers only).

After specifying the type of offer, the price, and the quality, click “OK” to submit it.

- On the left side of your screen, you will see the header “public offers,” which displays all public offers made by buyers, including your own offer.
- In the middle of the screen, you can see all private offers that you have submitted in the current trading phase.
- **Each buyer can submit as many private and public offers as he wishes in each period.** Each offer that you submit can be accepted at any time during the trading phase.
- **In any given period, each buyer can conclude at most one trade.** Once one of your offers has been accepted, you will be notified which seller accepted which of your offers. This information will be displayed on the bottom right corner of your screen. At this point, all your other offers will be removed from the market and cancelled
- **In any given period, each seller can conclude at most one trade.** You will be continuously informed about which sellers have not yet accepted an offer. On the bottom right of the screen, you will see 7 fields, each field for one of the 7 sellers. Once a seller

- has accepted an offer, an “x” will appear in the field next to the seller’s identification number. You cannot submit private offers to a seller who has already concluded a trade.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
  - No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

#### 6. Quality Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will determine the level of quality that they will supply to their buyers. **The product quality you asked for in your offer is not binding for your seller** – i.e. your seller can choose any quality he/she wants to from 1 to 10.
- While your seller is determining quality, you are asked to specify which quality you *expect* him/her to supply. In addition, we ask you to state how certain you are that the seller will actually deliver the quality you expect.

## How Are Points (Income) Calculated?

### Your Points

- If you do not conclude a trade during the trading phase, you will receive 0 points for that period.
- If one of your offers is accepted, your points depend on the price you offered and on the product quality. Your points for that period are determined as follows:

$\text{Your Points} = 10 * \text{Product Quality} - \text{Price}$
-------------------------------------------------------------------

- As you can see, the higher the product quality, the more points you earn. At the same time, the lower the price you paid, the more points you earn.
- Higher quality at lower prices means more points for you.

### How do Sellers Earn Points?

- If a seller has not concluded a trade during the trading phase, he/she gains 5 points for that period.
- If the seller has accepted an offer, his/her income equals the price he/she receives minus the production costs he/she incurs. The income of a seller is determined as follows:

$\text{Points} = \text{Price} - \text{Production Costs}$
----------------------------------------------------------

- As you can see, the higher the price, the more points a seller earns. At the same time, the higher the quality, the higher the production costs, which reduces points.

- How are production costs calculated? The higher the quality the seller supplies, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from your points balance.

You will be informed about your points and the points of your seller in each period on an “**income screen**.” The following information is displayed on this screen:

- the seller you traded with (ID number)
- the price you offered
- your desired quality
- the product quality you actually received from your seller.
- the points earned (lost) by your seller in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. This will help you keep track of your performance across periods. After the income screen has been displayed, the period is over. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All sellers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.

## **Control Questionnaire for Subjects Prior to the Start of the Experiment**

Please solve the following exercises completely. If you have questions, ask one of the experimenters. After all participants have answered the questions correctly, the experiment begins.

9. Suppose that you are a buyer and you did not make an offer during the trading phase. How many points do you earn for this period?
10. Suppose that you are a buyer and you offered a price of 30 and indicated a desired quality of 9. A seller accepts your offer and actually chooses a quality of 8. How many points did you earn for this period?
11. Suppose that you are a buyer and you offered a price of 10 and indicated a desired quality of 2. A seller accepts your offer and actually chooses a quality of 5. How many points did you earn for this period?
12. If a seller did not accept an offer during the trading phase, how many points does this seller earn for that period?
13. Suppose that you are buyer no. 3 in round 2. Does this mean that you will still be buyer no. 3 in round 3?
14. Suppose that you are a seller and you accepted an offer with a price of 30 and a desired quality of 9. You supplied an actual quality of 8. How many points did you earn for this period?
15. Suppose that you are a seller and you accepted an offer with a price of 40 and a desired quality of 2. You supplied an actual quality of 5. How many points did you earn for this period?
16. Suppose that you are seller no. 5 in round 5. Does this mean you were seller no. 5 in rounds 1-4 and will continue to be seller no. 5 in rounds 6-10?

If you have finished the exercises, we recommend that you look at the exercises and the solutions provided again. After this, you should think about the decisions you'll want to make to maximize your points.



## **Experimental Instructions for Sellers (RC1)**

In this experiment everyone begins with \$5. During the experiment you can earn more money, with the exact amount depending on you and your pair member's decisions. During the experiment, your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\text{\$1} = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups consisting of 5 buyers and 7 sellers. **You will remain a seller throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and sell will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (from 1 to 7, e.g., buyer #3, seller #5, etc). Buyers and sellers keep the same identification number for all rounds of this game.

## The Experimental Procedures in Detail

Each period is divided into a **trading phase** followed by a **quality determination phase**.

### 7. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. To do this, the buyers can submit offers to sellers. As a seller, you can, in each period, accept one of the offers. During the trading phase, you will see a screen that has the following elements:

- The top left corner indicates the trading period that you are in. In the top right corner, you see the remaining time in the current trading phase, displayed in seconds. **The trading phase in each period lasts 90 seconds.** When the time is up, the trading phase is over and no further offers can be submitted by the buyer or accepted by the seller in the period.
- Once the above screen is displayed, the trading phase starts. As a seller, you now accept offers submitted by the buyers. There are two types of offers that you can accept:
  - - a. **Private offers to you.** Each buyer can submit a private offer only to you, if he/she chooses. If a buyer submits a private offer to you, **you alone will be informed about the offer and you alone can accept it.** If you receive private offers, they will appear on the left side of your screen, below the header “Private Offers to you.” For each private offer, you will be informed of the ID number of the buyer, the price offered, and the product quality desired. If you want to accept the offer, click the row in which the offer is displayed to highlight the offer. Then click the “accept” button at the bottom of the screen. Note that once you click the “accept” button, you cannot alter your choice anymore. Remember, every buyer maintains the same ID number throughout all periods of the experiment.
    - b. **Public Offers.** Each buyer can also submit public offers. When a buyer submits a public offer, all sellers are informed about these offers and **any seller can accept them.** All public offers are displayed on the right side of the screen, below the header “public offers.” For each offer, the buyer’s ID number, the price offered, and the desired quality are displayed. All other buyers and all sellers see this information. If you want to accept a public offer, click the row that it is in to highlight it. Then click the “accept” button at the bottom right corner. Once you click the accept button, you cannot alter your choice anymore.
- Once you accept an offer, the offer will be displayed on the bottom of the screen.
- **Each seller can conclude at most one trade in each period.** Thus, once you accept an offer, you cannot accept any other offers.
- **All buyers have to observe the following rules when submitting offers:**
  - a) The price can range from 0 to 100 (whole numbers only).
  - h) The **desired quality** can range from 0 to 10, where higher numbers are better (whole numbers only).

- **Each buyer can, in each period, submit as many private and public offers as he/she wishes.** Each offer submitted by a buyer can be accepted at any time during the trading phase.
- **Each buyer can conclude at most one trade per period.** Once an offer has been accepted, the buyer will be informed about which seller accepted the offer. Because buyer can conclude only one trade per period, his/her other offers will automatically be canceled and no additional offers can be submitted.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
- No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

#### 8. Quality Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will determine the level of quality that they will supply to their buyers. **The product quality desired by your buyer is not binding for you as a seller.** That is, you can choose to supply the quality desired by your buyer or you can choose either a higher or lower quality. The only constraint on you is that the quality ranges from 1 to 10 and is a whole number.
- Note that to choose quality, you must enter the value for quality in the field “Choose the actual quality” and then click “OK.” Once you click “OK” your decision is final and cannot be altered.
- As a reminder, the quality you choose must range from 1 to 10.

## How Are Points (Income) Calculated?

### Your Points

- If you did **not** conclude a trade during the trading phase, you gain 5 points for that period.
- If you accepted an offer, your income (points) equals the price you receive minus the production cost that you incur. Your income is calculated as follows:

<b>Points = Price – Production Costs</b>
------------------------------------------

- As you can see, the higher the price, the more points you earn. At the same time, the higher the quality that you supply, the higher the production costs, which reduces your points.
- How are production costs calculated? The higher the quality that you supply, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

- In summary, higher price and lower quality means more points.

### How do Buyers Earn Points?

- If a buyer does not conclude a trade during the trading phase, he/she will receive 0 points for that period.
- If a buyer's offer is accepted, his/her points depend on the price he/she offered and on the product quality. His/her points for that period are determined as follows:

$\text{Points} = 10 * \text{Product Quality} - \text{Price}$
--------------------------------------------------------------

- As you can see, the higher the product quality, the more points a buyer earns. At the same time, the higher the price paid, the fewer the points the buyer earns.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from their point balances.

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

You will be informed about your points and the points of your buyer in each period on an “**income screen**.” The following information is displayed on this screen:

- the buyer that you traded with (ID number)
- the price that was offered to you
- your buyer's desired quality
- the product quality that you actually chose.
- the points earned (lost) by your buyer in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. This will help you keep track of your performance across periods. After the income screen has been displayed, the period is over. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All buyers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.

## **Experimental Instructions for Buyers (RC2)**

In this experiment everyone begins with \$5. During the experiment you can earn more money, with the exact amount depending on you and your pair member's decisions. During the experiment, your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\text{\$1} = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups consisting of 5 buyers and 7 sellers. **You will remain a buyer throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and sell will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (from 1 to 7, e.g., buyer #3, seller #5, etc). Buyers and sellers keep the same identification number for all rounds of this game.

## The Experimental Procedures in Detail

Each period is divided into a **trading phase** followed by a **quality determination phase** and a **price determination phase**.

### 9. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. In order to do so **each buyer can submit as many offers as he/she wishes**. In each trading phase, you will see a screen with the following features:

- The trading period is indicated at the top of the screen. The remaining time in the trading phase is also indicated at the top right corner. The **trading phase will last 90 seconds**. When the time is up, the trading phase is over and no further offers can be submitted or accepted.
- Once the above screen is displayed, the trading phase starts. As a buyer, you now have the opportunity to submit offers to sellers. Offers must include the following, which is to be entered into the right hand side of the screen:
  - i) Specify whether the offer is to be public or private.

**Public offers** will be communicated to all participants, both sellers and buyers. In turn, you will see all public offers by other buyers. **A public offer can be accepted by any seller. Simply click on the “public” field to submit a public offer.**

A **Private offer** is submitted to one seller only. Only the seller will be informed of the offer and only the seller can accept the offer. **Click the “private” field to submit a private offer.** After that, you must specify which seller you want to submit the offer to by entering the seller’s ID number. Remember, every seller maintains the same ID number throughout all periods of the experiment.

- j) Specify what **price** you want to offer. Enter your price in the “Your price” field. The price can range from 0 to 100 (whole numbers only).
- k) Specify what **quality** you desire. Enter this in the “Desired quality field”. Quality can range from 0 to 10, where higher numbers are better (whole numbers only).

After specifying the type of offer, the price, and the quality, click “OK” to submit it.

- On the left side of your screen, you will see the header “public offers,” which displays all public offers made by buyers, including your own offer.
- In the middle of the screen, you can see all private offers that you have submitted in the current trading phase.
- **Each buyer can submit as many private and public offers as he wishes in each period.** Each offer that you submit can be accepted at any time during the trading phase.
- **In any given period, each buyer can conclude at most one trade.** Once one of your offers has been accepted, you will be notified which seller accepted which of your offers. This information will be displayed on the bottom right corner of your screen. At this point, all your other offers will be removed from the market and cancelled
- **In any given period, each seller can conclude at most one trade.** You will be continuously informed about which sellers have not yet accepted an offer. On the bottom

- right of the screen, you will see 7 fields, each field for one of the 7 sellers. Once a seller has accepted an offer, an “x” will appear in the field next to the seller’s identification number. You cannot submit private offers to a seller who has already concluded a trade.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
  - No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

#### 10. Quality Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will determine the level of quality that they will supply to their buyers. **The product quality you asked for in your offer is not binding for your seller** – i.e. your seller can choose any quality he/she wants to from 1 to 10.
- While your seller is determining quality, you are asked to specify which quality you *expect* him/her to supply. In addition, we ask you to state how certain you are that the seller will actually deliver the quality you expect.

#### 11. Price Determination Phase

- Following the quality determination phase, each **buyer** who has concluded a trade will determine the actual price that will be paid to his/her seller. **The price you promised in your offer is not binding** – i.e., at this point you can choose any price you want from 0 to 100.
- While you finalize your price, your seller is asked to specify which price he/she *expects* that you will pay. In addition, the seller is asked to state how certain he/she is that the expected price will be paid.

## How Are Points (Income) Calculated?

### Your Points

- If you do not conclude a trade during the trading phase, you will receive 0 points for that period.
- If one of your offers is accepted, your points depend on the price you choose to pay during the price determination phase and on the actual product quality delivered. Your points for that period are determined as follows:

$\text{Your Points} = 10 * \text{Product Quality} - \text{Price}$
-------------------------------------------------------------------

- As you can see, the higher the product quality, the more points you earn. At the same time, the lower the price you paid, the more points you earn.
- Higher quality at lower prices means more points for you.

### How do Sellers Earn Points?

- If a seller has not concluded a trade during the trading phase, he/she gains 5 points for that period.

- If the seller has accepted an offer, his/her income equals the price he/she receives minus the production costs he/she incurs. The income of a seller is determined as follows:

<b>Points = Price – Production Costs</b>
------------------------------------------

- As you can see, the higher the price, the more points a seller earns. At the same time, the higher the quality, the higher the production costs, which reduces points.
- How are production costs calculated? The higher the quality the seller supplies, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from your points balance.

You will be informed about your points and the points of your seller in each period on an “**income screen**.” The following information is displayed on this screen:

- the seller you traded with (ID number)
- the price you offered
- your desired quality
- the product quality you actually received from your seller.
- the points earned (lost) by your seller in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. This will help you keep track of your performance across periods. After the income screen has been displayed, the period is over. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All sellers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.



## **Experimental Instructions for Sellers (RC2)**

In this experiment everyone begins with \$5. During the experiment you can earn more money, with the exact amount depending on you and your pair member's decisions. During the experiment, your income is calculated in points. At the end of the experiment, points are converted into dollars at the rate of:

$$\text{\$1} = 70 \text{ points}$$

Your initial balance of \$5 equals 350 points.

**Without exception, all written information you received from us is for your private use only. You are not allowed to pass over any information to other participants in the experiment. Talking during the experiment is not permitted. Violations of these rules would force us to stop the experiment. If you have any questions, please ask us.**

### **General Information**

The experiment is divided into periods. In each period, you have to make decisions, which you will enter on a computer screen. There are 15 identical periods in all and **the experiments ends at the end of period 15.**

Participants are divided into two groups consisting of 5 buyers and 7 sellers. **You will remain a seller throughout the experiment.** This session will involve trading between buyers and sellers. The price agreed upon between the buyer and sell will determine how much money each party makes during the period.

Trades will take place on the computer screen. Buyers and sellers will each be identified by a number (from 1 to 7, e.g., buyer #3, seller #5, etc). Buyers and sellers keep the same identification number for all rounds of this game.

## The Experimental Procedures in Detail

Each period is divided into a **trading phase** followed by a **quality determination phase** and then by a **price determination phase**.

### 12. The Trading Phase

Each period starts with a trading phase. During the trading phase, each buyer can conclude a trade with one seller. To do this, the buyers can submit offers to sellers. As a seller, you can, in each period, accept one of the offers. During the trading phase, you will see a screen that has the following elements:

- The top left corner indicates the trading period that you are in. In the top right corner, you see the remaining time in the current trading phase, displayed in seconds. **The trading phase in each period lasts 90 seconds.** When the time is up, the trading phase is over and no further offers can be submitted by the buyer or accepted by the seller in the period.
- Once the above screen is displayed, the trading phase starts. As a seller, you now accept offers submitted by the buyers. There are two types of offers that you can accept:
  - a. **Private offers to you.** Each buyer can submit a private offer only to you, if he/she chooses. If a buyer submits a private offer to you, **you alone will be informed about the offer and you alone can accept it.** If you receive private offers, they will appear on the left side of your screen, below the header “Private Offers to you.” For each private offer, you will be informed of the ID number of the buyer, the price offered, and the product quality desired. If you want to accept the offer, click the row in which the offer is displayed to highlight the offer. Then click the “accept” button at the bottom of the screen. Note that once you click the “accept” button, you cannot alter your choice anymore. Remember, every buyer maintains the same ID number throughout all periods of the experiment.
  - b. **Public Offers.** Each buyer can also submit public offers. When a buyer submits a public offer, all sellers are informed about these offers and **any seller can accept them.** All public offers are displayed on the right side of the screen, below the header “public offers.” For each offer, the buyer’s ID number, the price offered, and the desired quality are displayed. All other buyers and all sellers see this information. If you want to accept a public offer, click the row that it is in to highlight it. Then click the “accept” button at the bottom right corner. Once you click the accept button, you cannot alter your choice anymore.
- Once you accept an offer, the offer will be displayed on the bottom of the screen.
- **Each seller can conclude at most one trade in each period.** Thus, once you accept an offer, you cannot accept any other offers.
- **All buyers have to observe the following rules when submitting offers:**
  - a) The price can range from 0 to 100 (whole numbers only).

- 1) The **desired quality** can range from 0 to 10, where higher numbers are better (whole numbers only).
- **Each buyer can, in each period, submit as many private and public offers as he/she wishes.** Each offer submitted by a buyer can be accepted at any time during the trading phase.
- **Each buyer can conclude at most one trade per period.** Once an offer has been accepted, the buyer will be informed about which seller accepted the offer. Because buyer can conclude only one trade per period, his/her other offers will automatically be canceled and no additional offers can be submitted.
- Once all 5 buyers have concluded a trade or after time has elapsed, the trading phase is over.
- No buyer is obliged to submit offers, and no seller is obliged to accept an offer.

### 13. Quality Determination Phase

- Following the trading phase, all **sellers** who have concluded a trade will determine the level of quality that they will supply to their buyers. **The product quality desired by your buyer is not binding for you as a seller.** That is, you can choose to supply the quality desired by your buyer or you can choose either a higher or lower quality. The only constraint on you is that the quality ranges from 1 to 10 and is a whole number.
- Note that to choose quality, you must enter the value for quality in the field “Choose the actual quality” and then click “OK.” Once you click “OK” your decision is final and cannot be altered.
- As a reminder, the quality you choose must range from 1 to 10.

### 14. Price Determination Phase

- Following the quality determination phase, each **buyer** who has concluded a trade will determine the actual price that will be paid to his/her seller. **The price promised in the buyer’s offer is not binding** – i.e., at this point (after quality has been determined) the buyer can choose any price from 0 to 100.
- While the buyer finalizes price, each seller is asked to specify which price he/she *expects* that will be paid. In addition, each seller is asked to state how certain he/she is that the expected price will be paid.

## How Are Points (Income) Calculated?

### Your Points

- If you did **not** conclude a trade during the trading phase, you gain 5 points for that period.
- If you accepted an offer, your income (points) equals the price you receive during the price determination phase minus the production cost that you incur. Your income is calculated as:

$\text{Points} = \text{Price} - \text{Production Costs}$
----------------------------------------------------------

- As you can see, the higher the price, the more points you earn. At the same time, the higher the quality that you supply, the higher the production costs, which reduces your points.
- How are production costs calculated? The higher the quality that you supply, the higher the costs. All sellers have the following cost table:

<i>Quality</i>	1	2	3	4	5	6	7	8	9	10
<i>Cost</i>	0	1	2	4	6	8	10	12	15	18

- In summary, higher price and lower quality means more points.

#### How do Buyers Earn Points?

- If a buyer does not conclude a trade during the trading phase, he/she will receive 0 points for that period.
- If a buyer's offer is accepted, his/her points depend on the price he/she offered and on the product quality. His/her points for that period are determined as follows:

$\text{Points} = 10 * \text{Product Quality} - \text{Price}$
--------------------------------------------------------------

- As you can see, the higher the product quality, the more points a buyer earns. At the same time, the higher the price paid, the fewer the points the buyer earns.

Please note that buyers and sellers can incur losses in each period (lose rather than gain points). These losses are subtracted from their point balances.

Points for all buyers and sellers are determined in the same way. **Each buyer can therefore calculate the income of his/her seller and each seller can calculate the income of his/her buyer.** Further, each buyer and seller is informed about the ID number of his/her trading partner in each period.

You will be informed about your points and the points of your buyer in each period on an “**income screen**.” The following information is displayed on this screen:

- the buyer that you traded with (ID number)
- the price that was offered to you
- your buyer's desired quality
- the product quality that you actually chose.
- the points earned (lost) by your buyer in this period.
- the points that you earned (lost) in this period.

Please enter all the information on the screen in the documentation sheet supplied to you. This will help you keep track of your performance across periods. After the income screen has been displayed, the period is over. Another period begins, starting with a trading phase. Once you have finished studying the income screen, please click “continue”. All buyers also see an income screen displaying the same information.

Before we begin the experiment, we ask all participants to complete a questionnaire which will test your familiarity with the procedures. The experiment will not begin until all participants are completely familiar with all procedures.

In addition, we will conduct **2 trial periods of the trading phase** so that you can get accustomed to the computer. During the trial periods, no money can be earned.

## **Control Questionnaire Completed by Subjects Prior to Trading**

Please solve the following exercises completely. If you have questions, ask one of the experimenters. After all participants have answered the questions correctly, the experiment begins.

17. Suppose that you are a buyer and you did not make an offer during the trading phase. How many points do you earn for this period?
18. Suppose that you are a buyer and you offered a price of 30 and indicated a desired quality of 9. A seller accepts your offer and actually chooses a quality of 8. How many points did you earn for this period?
19. Suppose that you are a buyer and you offered a price of 10 and indicated a desired quality of 2. A seller accepts your offer and actually chooses a quality of 5. How many points did you earn for this period?
20. If a seller did not accept an offer during the trading phase, how many points does this seller earn for that period?
21. Suppose that you are buyer no. 3 in round 2. Does this mean that you will still be buyer no. 3 in round 3?
22. Suppose that you are a seller and you accepted an offer with a price of 30 and a desired quality of 9. You supplied an actual quality of 8. How many points did you earn for this period?
23. Suppose that you are a seller and you accepted an offer with a price of 40 and a desired quality of 2. You supplied an actual quality of 5. How many points did you earn for this period?
24. Suppose that you are seller no. 5 in round 5. Does this mean you were seller no. 5 in rounds 1-4 and will continue to be seller no. 5 in rounds 6-10?

If you have finished the exercises, we recommend that you look at the exercises and the solutions provided again. After this, you should think about the decisions you'll want to make to maximize your points.

Examples of Trading Screen Observed by Experimental Subjects

Period

3 out of 15

Remaining time (sec): 63

Public offers			Your private offers		
Buyer	Price	Desired quality	Price	Desired quality	to Seller

You are a BUYER

Your ID-number: 2

Here you make your offers

☐ public

☐ private

If private, to which seller?

Your price:

Desired quality:

OK

1

2

3

4

5

6

7

Your Seller	Your Price	Your desired quality

Period					
1 out of 15					
Public offers			Your private offers		
Buyer	Price	Desired quality	Price	Desired quality	to Seller
1	59	8			
2	40	6			
3	56	4			