



Teacher guide to the pit market

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



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<https://beer-lab.org/>

How to use this guide

This guide helps you prepare, run, and debrief in class the **pit market** (bilateral haggling market) developed for the Behavioral and Experimental Economics Research Lab (BEER Lab) of the Department of Economics at Tecnológico de Monterrey. It is written for instructors of introductory and intermediate microeconomics, with or without prior experience in experimental economics.

The **quick implementation guide** is enough to launch a session. The operational chapters explain every screen. The conceptual chapters present the theoretical benchmarks and the evidence needed to interpret the results. Common rules are explained once; the extended variant only lists what changes relative to the baseline game.

Author

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For the instructor

This guide describes the English interface. A separate Spanish version exists. The screens in this guide were captured on a local instance of the game with simulated decisions; the numbers they show illustrate the interface and are *not* results from a class. Project only aggregate results: do not link codes to names, student IDs, seats, or individual decisions.

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Quick implementation guide

1.1 At a glance

Purpose	Show how prices form when there is no public price: each buyer–seller pair negotiates privately. Compare the outcome with the competitive supply-and-demand equilibrium and measure market efficiency.
Participants	The whole class forms a single market. Half are buyers and half are sellers; with an odd number there is one more buyer. At least 14 participants are recommended (see Chapter 5).
Market	Each buyer has a private value and each seller a private cost, on a ladder: values 240, 220, 200, ... and costs 0, 20, 40, ... ECU. Each person buys or sells at most one unit per period.
Decision	Propose a price to a specific person on the other side, answer with a different price, or accept the price offered. Negotiations are private and happen in real time.
Earnings	Buyer: value – price. Seller: price – cost. No trade: 0 ECU. The system blocks loss-making trades.
Duration	Each period lasts 240 seconds (adjustable). One period: 15–20 minutes including instructions; eight periods: 45–50 minutes, not counting the debrief.
Instructor (you)	teaching-admin.beer-lab.org → the game’s card → Open panel . It asks for a username and password (Section 2.1).
Students	The room link pitmarket.beer-lab.org/room/pit_market_en , its QR code (Section 2.5), or teaching.beer-lab.org .
Report	Equilibrium quantity and price, average efficiency, average price by period, early versus late periods, histogram of prices in the last period, and a table by period.

Attention

There are two different pages. **teaching-admin.beer-lab.org** is yours: from there you open the game’s panel and download this guide. **teaching.beer-lab.org** is your students’ page: from there one can only *play*, not create sessions.

1.2 Minimum sequence

Before class

1. Request panel access from lab.economia@servicios.tec.mx, stating the game, course, number of students, and date. You will receive the password for the username **admin**.
2. Open teaching-admin.beer-lab.org, find **Bilateral Haggling Market (Pit Market)**, and click **Open panel**. Enter the username and password.
3. Rehearse in **Demo**: open a configuration and play it with the participants' tabs to get to know the screens and the report (Section 2.3).
4. Choose the mode (one period or eight periods) or the extended variant with chat, and decide whether you will change the period length or the number of periods.

In class

5. Count the students present.
6. In the panel, open **Rooms** and the room **[EN] Bilateral Haggling Market** (or the extended one). Choose the configuration; if needed, adjust the period length or the number of periods under **Configure session**. Enter the *exact* number of students under **Number of participants** and click **Create**.
7. Share the room link or project its QR code. Each student clicks **Start**.
8. In the room, click **Monitor the session**: this opens the session page, with the **Monitor** (progress) and **Report** tabs. When the last period ends, open **Report**, click **Show results**, and lead the discussion.

After class

9. In the room, click **Close this room**. This frees it for the next group; the session's data are kept under **Sessions**.

1.3 Checklist

- ☐ Panel password received and tested at pitmarket.beer-lab.org/login.
- ☐ Rehearsal done in **Demo**.
- ☐ Computers, internet, browser, and projector ready.
- ☐ Mode, number of periods, and period length chosen to fit the class time.
- ☐ Number of session participants equal to the number of students present.
- ☐ Room link or QR code at hand (Section 2.5); tested from a phone.
- ☐ Students told that ECU are experimental units, that there is no cash payment, and that trading happens only on screen.
- ☐ Monitor and report open; equilibrium quantity and price worked out before revealing results.

Accessing the platform

2.1 Your access: teaching-admin and the game's panel

The instructors' page is teaching-admin.beer-lab.org. It does not appear in the beer-lab.org menu: type the address directly or bookmark it. It gathers all of the lab's classroom games; you can search by title, topic, or JEL code.

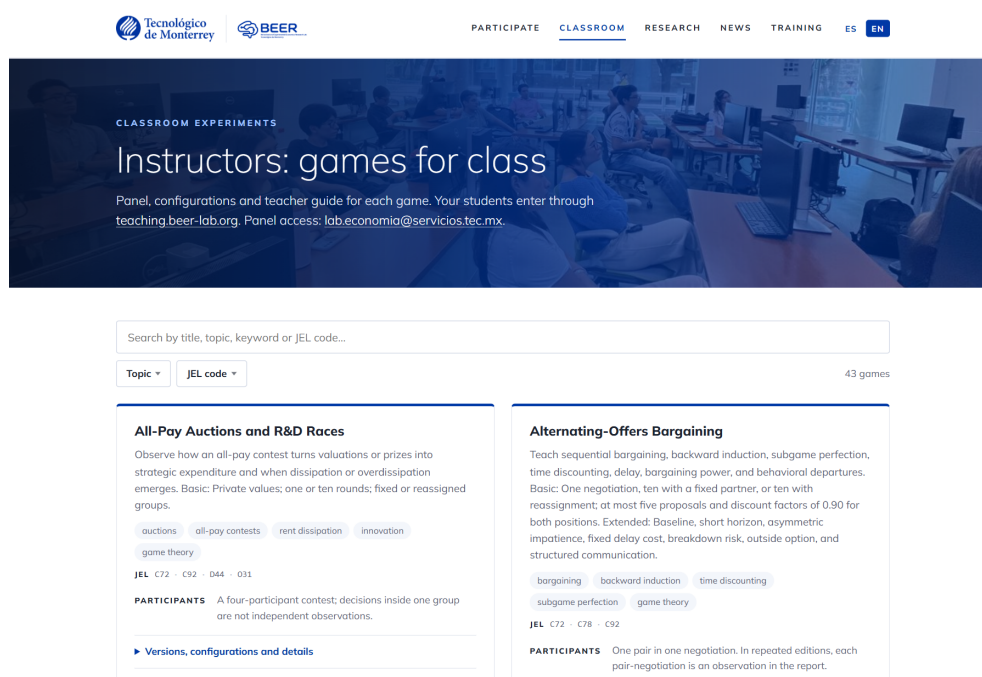


Figure 2.1: Instructors' page: teaching-admin.beer-lab.org.

Each game has a card with its description, participants, and duration, and two buttons: **Open panel**, which takes you to the game's panel, and **Teacher guide (PDF)**, which downloads this guide (the small **ES** link downloads the Spanish version).

Bilateral Haggling Market (Pit Market)

Same private-value market as the double auction but with no public price: each person haggles privately, one to one, with anyone on the other side and may keep several negotiations open (Holt, 1996). One period or eight periods, plus an extended version with chat.

competitive markets

bilateral bargaining

price discovery

efficiency

market institutions

JEL C78 · C92 · D41 · D47

PARTICIPANTS One market per session; about half buyers and half sellers. Works with any class size.

DURATION Approx. 15–20 min (one period) · 50–65 min (eight 4-minute periods), including instructions and comprehension check.

► Versions, configurations and details

Open panel

Teacher guide (PDF)

ES

Figure 2.2: The game’s card on the instructors’ page.

Expanding **Versions, configurations and details** shows the list of rooms. Each **open panel** in that list goes straight to the form for creating a session in that room (after logging in).

- **Español:** [open panel](#) — configurations: *[ES] Mercado de regateo — un periodo*, *[ES] Mercado de regateo — 8 periodos*
- **English:** [open panel](#) — configurations: *[EN] Pit market — one period*, *[EN] Pit market — 8 periods*
- **Español · extendido:** [open panel](#) — configurations: *[ES] Mercado de regateo extendido — con chat, 8 periodos*
- **English · extended:** [open panel](#) — configurations: *[EN] Pit market extended — with chat, 8 periods*

Figure 2.3: The game’s rooms on the expanded card; tick **Show extended version** to see the extended ones as well.

The game’s panel (<https://pitmarket.beer-lab.org>) is protected. **Open panel** shows the **Admin Login** screen: type **admin** under **Username** and the password the lab gave you under **Password**. If you do not have it, request it from lab.economia@servicios.tec.mx.

oTree Demo Sessions Rooms Data Server Check

Admin Login

Username:

Password:

Log in

Figure 2.4: Logging in to the game's panel.

2.2 The panel: minimum vocabulary

The panel is oTree's and it is in English. These are the only terms you need:

Demo	Practice sessions. It creates a session with dummy participants that you play yourself in several tabs. Use it to rehearse, never with students.
Rooms	Fixed addresses for class. Each game has four: basic and extended, in Spanish and in English. Your students always join through a room.
Create / Number of participants	Create the session in the room and declare how many people will play.
Configure session	Optional parameters of the configuration; here only the period length and the number of periods are worth adjusting (Section 2.4).
Monitor	Table with the period and the screen each participant is on. It does not show prices or trades.
Advance slowest participants	Monitor button that moves forward whoever has fallen behind (Section 2.4).
Report	The instructor report for projecting aggregate results.
Data	Download of the data as CSV.
Sessions	List of all your sessions, to return to an earlier one.
Close this room	Frees the room when you are done, for the next group.

In this panel, **Demo** lists only this game's six configurations and **Rooms** only its four rooms. If another game appears, do not start the session and notify the lab.

oTree Demo Sessions Rooms Data Server Check

Demo

[ES] Mercado de regateo — un periodo
[ES] Mercado de regateo — 8 periodos
[EN] Pit market — one period
[EN] Pit market — 8 periods
[ES] Mercado de regateo extendido — con chat, 8 periodos
[EN] Pit market extended — with chat, 8 periods

Juegos de mercados / Market games — BEER Lab
 Mercado de regateo bilateral (pit market) / Bilateral haggling market (pit market)

Figure 2.5: Demo: the game’s six configurations (four basic and two extended, in Spanish and English).

oTree Demo Sessions Rooms Data Server Check

Rooms

Current rooms:

[ES] Mercado de regateo bilateral
[EN] Bilateral Haggling Market
[ES] Mercado de regateo bilateral — extendido
[EN] Bilateral Haggling Market — extended

Figure 2.6: Rooms: the game’s four rooms.

2.3 Rehearsing before class

In **Demo**, click a configuration: this creates a practice session with eight participants (four buyers and four sellers) and shows the links page. Open each link **P1** to **P8** in a separate tab and play as if you were each student. As in class, trading starts only when all eight tabs have reached the waiting page, and each period lasts as long as the clock says. Then open **Report**. These sessions do not affect your classes.

oTree Demo Sessions Rooms Data Server Check

[EN] Pit market — 8 periods: session 'y7heizy3' (demo)

[New](#)
[Links](#)
[Monitor](#)
[Data](#)
[Payments](#)
[Report](#)
[Description](#)

Below are temporary links for testing and demonstration. To launch a real study, either create persistent links by setting up a [room](#), or create a session through the [sessions](#) page.

Choose one of the following options to play the session:

Combined views

Split-screen view
Not available ⓘ

Grid view
[Launch](#)

Session-wide testing link
Open the below link in up to **8** browser tabs.

<http://localhost:8024/join/dugehaja>

Single-use links
Open each link in its own browser tab.

P1	http://localhost:8024/InitializeParticipant/mjt1n8nr
P2	http://localhost:8024/InitializeParticipant/g4wqr3kn
P3	http://localhost:8024/InitializeParticipant/uxy05wfu
P4	http://localhost:8024/InitializeParticipant/chpz16rj
P5	http://localhost:8024/InitializeParticipant/ft01xzqn
P6	http://localhost:8024/InitializeParticipant/zd3roibj
P7	http://localhost:8024/InitializeParticipant/8fuiogqj
P8	http://localhost:8024/InitializeParticipant/e2yeriq2

Figure 2.7: Links of a practice session with eight participants. The screenshots in this guide were taken on a local copy, which is why the addresses say `localhost`; on the server they say `pitmarket.beer-lab.org`.

Attention

Do not rehearse with the room link open in several tabs of the same browser: oTree recognizes the browser and all the tabs would be the same person. To rehearse, use **Demo**.

2.4 Creating the session in class

In **Rooms**, open the room for the language and edition you will use. The form offers only that room's configurations. Choose the configuration, enter the number of students present under **Number of participants**, and click **Create**.

oTree Demo Sessions Rooms Data Server Check

Room: [EN] Bilateral Haggling Market

Create a new session

English room. Only the configurations of this game, language and edition are shown below.

Session Config

Number of participants

 Must be a multiple of 1

[Create](#)

[Configure session](#) ⚙️

App sequence

Figure 2.8: Form of the basic English room: only its two configurations appear.

Before clicking **Create**, **Configure session** expands the configuration's parameters. Only two are worth changing: **trade_seconds** (length of each trading period, 240 seconds by default) and **active_rounds** (number of periods, 1 to 8). Do not change **language**, **edition**, **treatment**, or **chat**: each room's configurations exist for that. The participant instructions show the period length and number of periods you set.

Once the session is created, the room shows that a session is taking place, with the links **Monitor the session** and **Close this room**.

oTree Demo Sessions Rooms Data Server Check

Room: [EN] Bilateral Haggling Market

Session **pzenkuar** is taking place in this room.

[Monitor the session](#) 🔗

[Close this room](#)

Start links

These URLs will stay constant for new sessions, even if the database is recreated.

Room-wide URL

Here is the room-wide URL anyone can use. Don't use this link when testing in multiple tabs on the same browser, because all tabs will be assigned to the same participant, using a cookie.

http://localhost:8024/room/pit_market_en

Hard-coded links

Generally, you should provide your participants with the room-wide URL above. But in special cases where you need to open (or re-open) a specific participant's link, by using the participant code, you can use the below links.

► Show/Hide

Figure 2.9: Room with a session in progress.

Attention

Declare the exact number, with no spare places. The lab's general guide suggests creating a few extra places; not in this game. Roles (buyer or seller), ranks, and values or costs are assigned to *all* participants declared when the session is created, and the report computes the equilibrium and the maximum surplus with them. If you declare more participants than actually join, the market never starts: the “Please wait” page before trading waits for the whole group. Moreover, an absent person may be a high-value buyer or a low-cost seller, and the market will not be able to reach the report's maximum surplus. If one student more than declared arrives, they will see a message in Spanish, even in the English rooms: “La sesión está llena” (the session is full). In that case, before starting, click **Close this room**, create another session with the correct number, and ask everyone to open the link or QR code again.

oTree Demo Sessions Rooms Data Server Check

[EN] Pit market — 8 periods: session 'yetuhnlc'

Edit Links Monitor Data Payments Report Description

ID	Code	Label	Progress	App	Round	PageName	Waiting	WaitsFor	Since	
P1	fd1edps		27/80	pit_market	3	Trade			1m	
P2	ozvm7j6o		27/80	pit_market	3	Trade			1m	
P3	e3d6e78o		27/80	pit_market	3	Trade			1m	
P4	c7pp8gfc		27/80	pit_market	3	Trade			1m	
P5	m56pk2b		27/80	pit_market	3	Trade			1m	
P6	65ok8xj		27/80	pit_market	3	Trade			1m	
P7	rwhe4rkj		27/80	pit_market	3	Trade			1m	
P8	43wkhiyw		27/80	pit_market	3	Trade			1m	
P9	vhnpkxu7		27/80	pit_market	3	Trade			1m	
P10	8fz9angw		27/80	pit_market	3	Trade			1m	
P11	x2l0qbul		27/80	pit_market	3	Trade			1m	
P12	...		27/80	pit_market	3	Trade			1m	

Figure 2.10: Monitor: each participant's period and page, without showing prices or trades.

Attention

Each trading period ends *only* when time runs out: there is no button to end it early, even if everyone has traded. If a student disconnects during trading, the period still ends for everyone else, but the group can stall on a waiting page (before trading or before the result), because each one waits for the whole market. First ask the student to reopen the room in the same browser: they resume where they were. If they cannot, use **Advance slowest participants** in the Monitor: it moves the participants who are furthest behind forward by one page (up to 20 per click). Anyone advanced out of the trading page without having traded gets no trade that period (earnings 0); trades already closed are kept. Do not click the button while the group is still trading: if everyone is on the trading page, everyone is equally “behind” and the click ends their period (up to 20 people per click).

2.5 How your students join

Students need no account and nothing to install; a phone or computer browser is enough. They have three routes, all leading to the same room:

1. **QR code.** Project the one for the room you will use (below, and full-size in Appendix A).

They scan it with their phone camera.

2. **Room link.** Share it in the class chat or on Canvas: https://pitmarket.beer-lab.org/room/pit_market_en.
3. **Catalogue.** On teaching.beer-lab.org they look for **Bilateral Haggling Market (Pit Market)** and click the button for their language (**English**, or **English · extended** if they tick **Show extended version**).



English, basic

pitmarket.beer-lab.org/room/pit_market_en



English, extended

pitmarket.beer-lab.org/room/pit_market_extended



Español, básica

pitmarket.beer-lab.org/room/pit_market_es



Español, extendida

pitmarket.beer-lab.org/room/pit_market_extendido

What participants will see

The student opens the room and clicks **Start**. If you have not yet created the session, the room shows a short waiting message in Spanish (“Por favor espere”, please wait) and lets them in automatically once you create it; so you can share the link or QR code from the start of class. No email or password is needed: each student receives an anonymous code.

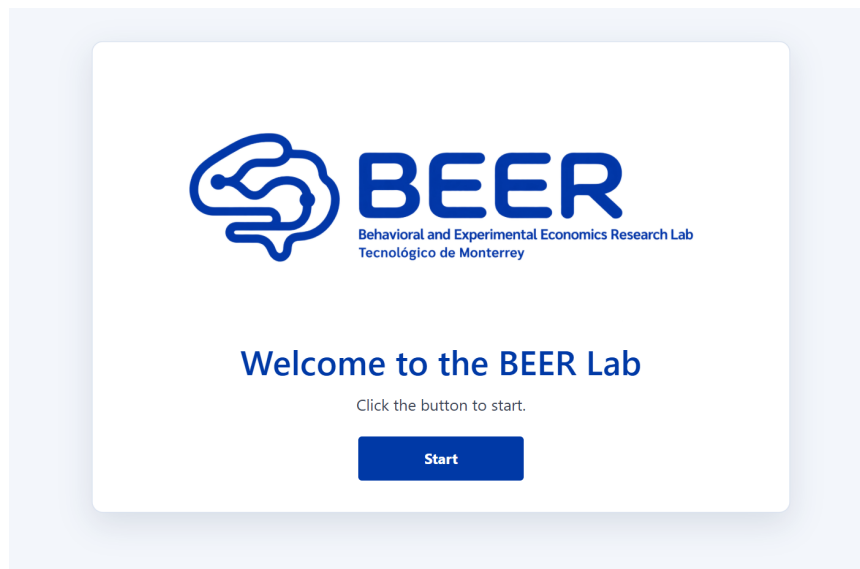


Figure 2.11: Room as the student sees it.

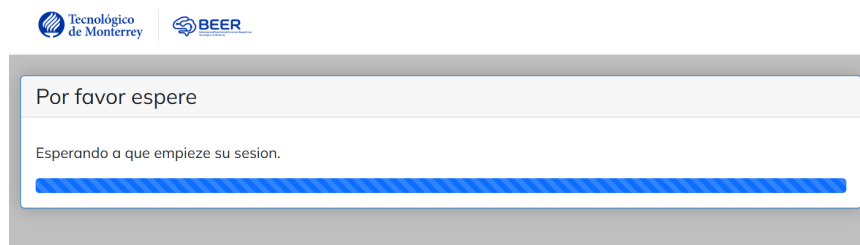


Figure 2.12: Student waiting page if the session does not exist yet; oTree shows it in Spanish, even in the English rooms.

Language is per room: a session created in the English room only receives those who join through the English room. If your group is mixed, choose one language for everyone; in this game the whole class forms a single market, so everyone must join through the same room.

Bilateral Haggling Market (Pit Market)

Same private-value market as the double auction but with no public price: each person haggles privately, one to one, with anyone on the other side and may keep several negotiations open (Holt, 1996). One period or eight periods, plus an extended version with chat.

competitive markets

bilateral bargaining

price discovery

efficiency

market institutions

JEL C78 · C92 · D41 · D47

Address: `pitmarket.beer-lab.org`

Español

English

Español · extendido

English · extended

☒ Show extended version

Figure 2.13: The game's card on teaching.beer-lab.org, the students' page.

The baseline game and its screens

3.1 Rules, incentives, and benchmarks

When the session is created, half of the participants (rounding up) become buyers and the other half sellers, in random order. Each side is ordered by rank. The buyer of rank i has value $v_i = \max(0, 240 - 20(i - 1))$ and the seller of rank j has cost $c_j = 20(j - 1)$:

$$\text{buyer earnings} = v_i - p, \quad \text{seller earnings} = p - c_j, \quad \text{no trade: } 0.$$

Each participant keeps the same role, rank, and value or cost in every period, as in the markets of [Smith \(1962\)](#). Each period, each person can close at most one trade. No one knows anyone else's value or cost.

Trading is *bilateral and private*. A participant picks a person on the other side and sends a price. That person can accept it or answer with a different price; either of the two can change their proposal at any time, up or down (there is no improvement rule). Only the side that did *not* set the standing price can accept it. Several negotiations with different people can run at once. When a trade closes, both parties leave the market until the next period and their other negotiations lapse. The system rejects any proposal or acceptance that would make its sender lose money; trading at zero earnings is allowed.

For the instructor

Before playing, ask for a prediction: if everyone looks for their best deal and no one sees anyone else's prices, at what price do you think trades will close? How many trades will there be? Write the answers down to compare them with the report.

3.2 Cover, instructions, and comprehension

The cover introduces the BEER Lab and the rules of conduct. The participant confirms having read them. The instructions depend on the assigned role: the buyer reads about their *value* and the seller about their *cost*. They describe only the action: they do not mention “pit market”, “competitive equilibrium”, or “efficiency”, nor do they suggest a price to negotiate.



Welcome to the BEER Lab

The **Behavioral and Experimental Economics Research Lab** of the Department of Economics at Tecnológico de Monterrey is a space for learning about economic decisions through controlled activities.

Today you will take part in a market as a buyer or a seller. Your earnings depend on your decisions.

During the session

- Do not talk or communicate with other people, except through the means shown on screen.
- Make your decisions individually.
- Follow the on-screen instructions. Do not refresh or close this page.
- If you need help, raise your hand.

I have read and understood the lab rules.

☐ Yes ☐ No

Start

Powered by [oTree](#)

Figure 3.1: Cover and lab rules.

Instructions

Period 1 of 8

In this activity you are a buyer. Each period you want to buy one unit of a product.

Each period you have your own **value** for your unit: the highest price it is worth paying. If you buy at a lower price you earn the difference; if you buy at a higher price you lose. No one else knows your value.

Your earnings = your value – the price you buy at. If you do not buy, your earnings are 0.

Example: if your value is 100 and you buy at a price of 65, your earnings are $100 - 65 = 35$ ECU.

How trading works

- Each period lasts 240 seconds. There is no single public price: you negotiate privately, one at a time, with whoever you choose on the other side of the market.
- To negotiate with someone, send them a price. That person can accept it, or answer with a different price. You can have several negotiations open at once, with different people.
- At any time you can accept the price you have been offered in one of your negotiations. Accepting closes the trade immediately at that price.
- The system will not let you propose or accept a price that would lose you money. You can buy or sell at most one unit per period; if you do not trade, your earnings for that period are 0. If the person you were negotiating with has already closed another trade, you will be told.

- There will be 8 periods. Your role and your value or cost stay the same in every period. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

[Continue](#)Powered by [oTree](#)

Figure 3.2: Buyer instructions: value, earnings, example, and trading rules.

Instructions

Period 1 of 8

In this activity you are a seller. Each period you want to sell one unit of a product.

Each period you have your own **cost** for your unit: the lowest price it is worth accepting. If you sell at a higher price you earn the difference; if you sell at a lower price you lose. No one else knows your cost.

Your earnings = the price you sell at – your cost. If you do not sell, your earnings are 0.

Example: if your cost is 40 and you sell at a price of 65, your earnings are $65 - 40 = 25$ ECU.

How trading works

- Each period lasts 240 seconds. There is no single public price: you negotiate privately, one at a time, with whoever you choose on the other side of the market.
- To negotiate with someone, send them a price. That person can accept it, or answer with a different price. You can have several negotiations open at once, with different people.
- At any time you can accept the price you have been offered in one of your negotiations. Accepting closes the trade immediately at that price.
- The system will not let you propose or accept a price that would lose you money. You can buy or sell at most one unit per period; if you do not trade, your earnings for that period are 0. If the person you were negotiating with has already closed another trade, you will be told.

- There will be 8 periods. Each period you are given a new value or cost. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

[Continue](#)

Powered by [oTree](#)

Figure 3.3: Seller instructions: cost, earnings, and example.

The example uses a value of 100, a cost of 40, and a price of 65 (earnings of 35 and 25 ECU). These numbers match neither the equilibrium price (120) nor any value or cost on the ladder, so that the example does not act as an anchor. The comprehension check asks both questions to everyone, regardless of role; after a mistake it restates the rule and allows another attempt. The number of attempts is recorded in the data.

Before you start

Period 1 of 8

Answer both questions based on the instructions (they apply to any buyer or seller).

A buyer has a value of 100 and buys at a price of 65. What are their earnings?

- ☐ -35 ECU
 ☐ 35 ECU
 ☐ 65 ECU
 ☐ 100 ECU

A seller has a cost of 40 and sells at a price of 65. What are their earnings?

- ☐ -25 ECU
 ☐ 25 ECU
 ☐ 40 ECU
 ☐ 65 ECU

[Check](#)

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Figure 3.4: Comprehension check.

Figure 3.5: Wrong answer: the message restates the rule without giving the answer.

When done, each participant waits until the whole group is ready; trading starts at the same time for everyone.

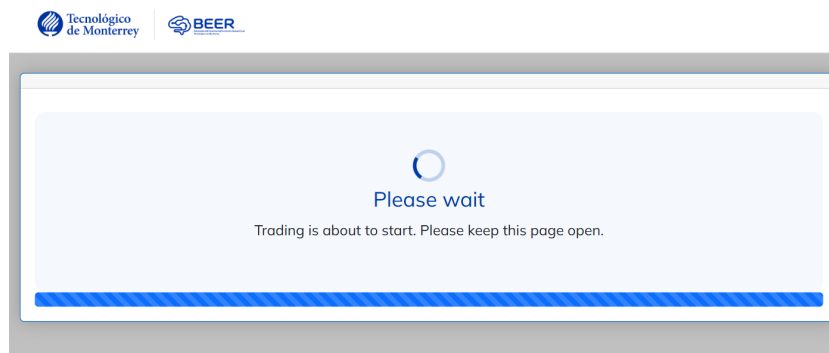


Figure 3.6: Waiting before trading.

What participants will see

“Please wait” means other people in the market are not ready yet. It is not an error. Participants should not close or refresh the page.

3.3 Trading

The trading screen shows the time left, the participant’s role, their own value or cost, and two blocks. Under **Negotiate with**, the participant picks a person on the other side from a drop-down list and types the **Price you propose**. Under **Your negotiations**, there is one row for each person they are negotiating with: the standing price, whether it is “Your offer” or “Offered to you” and, in the latter case, the **Accept this price** button.



Time left to complete this page: 3:51

Trading

Period 1 of 8

You are a buyer.

Your value (the most it is worth paying)
220 ECU

Negotiate with (Seller)
#1
Price you propose

Your negotiations

Seller	Price		
#1	150	Offered to you	Accept this price
#6	135	Offered to you	Accept this price

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Figure 3.7: Trading as seen by a buyer: two sellers answer with a price (simulated decisions).




Time left to complete this page: 3:50

Trading

Period 1 of 8

You are a seller.

Your cost (the least it is worth accepting)

40 ECU

Negotiate with (Buyer)

#2 ▾

Price you propose

150

Send proposal

Your negotiations

Buyer	Price	
#3	150	Your offer
#8	100	Offered to you

Accept this price

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Figure 3.8: Trading as seen by a seller: one own offer and one received (simulated decisions).

Attention

In the current version, the number (#) that the **Negotiate with** list uses for a person is not the same number shown for that person in the **Your negotiations** table. In Figure 3.7, for example, the numbers in the table do not correspond to the sellers with the same number in the list, and they can even be larger than the last number in the list. To answer a proposal, the participant must pick the right person in the list; when in doubt, it is safer to accept an offer directly from the table. Warn the class about this before the first period.

A proposal that would make its sender lose money is rejected with a notice that disappears after a few seconds. The same happens when trying to accept one's own proposal or a negotiation with someone who has already closed another trade.



Time left to complete this page: 3:49

Trading

Period 1 of 8

You are a seller.

Your cost (the least it is worth accepting)
40 ECU

That price would lose you money.

Negotiate with (Buyer)
#4 ▾
Price you propose

30

Send proposal

Your negotiations

Buyer	Price	
#3	150	Your offer
#8	100	Offered to you Accept this price

Powered by [oTree](#)

Figure 3.9: Rejected proposal: the price is below the seller's cost (simulated decisions).

When a trade closes, the screen shows the price and the earnings, and the participant waits for time to run out. The list of available people is built when the period starts; if someone on the list has already traded, the system says so when one tries to negotiate with that person.




Time left to complete this page: 3:46

Trading

Period 1 of 8

You are a buyer.

Your value (the most it is worth paying)
220 ECU

Price
135

Your earnings
85 ECU

You have already closed your trade for this period. You can keep watching until time runs out.

Your negotiations

Seller	Price		
#1	150	Offered to you	<button>Accept this price</button>
#6	135	Offered to you	<button>Accept this price</button>

Powered by [oTree](#)

Figure 3.10: Trade closed: price and earnings; the rest of the period is for watching only (simulated decisions).

What participants will see

No one sees anyone else's negotiations: neither who negotiates with whom nor at what price. There is no public price board either. That is the difference from the double auction.

3.4 Result and wrap-up

When time runs out and the whole group reaches the waiting page, each participant sees their role, their value or cost, whether they traded, the price, the period's earnings, and cumulative earnings. They do not see other people's trades.

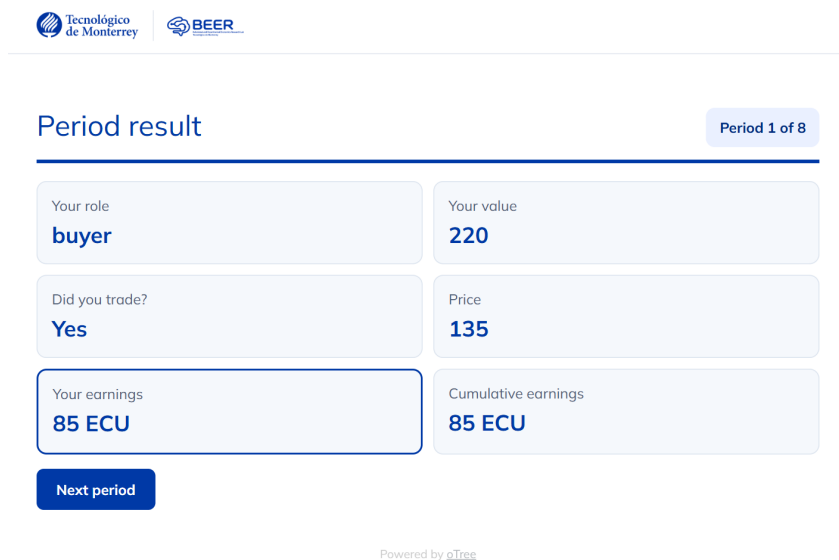


Figure 3.11: Period result (simulated decisions).

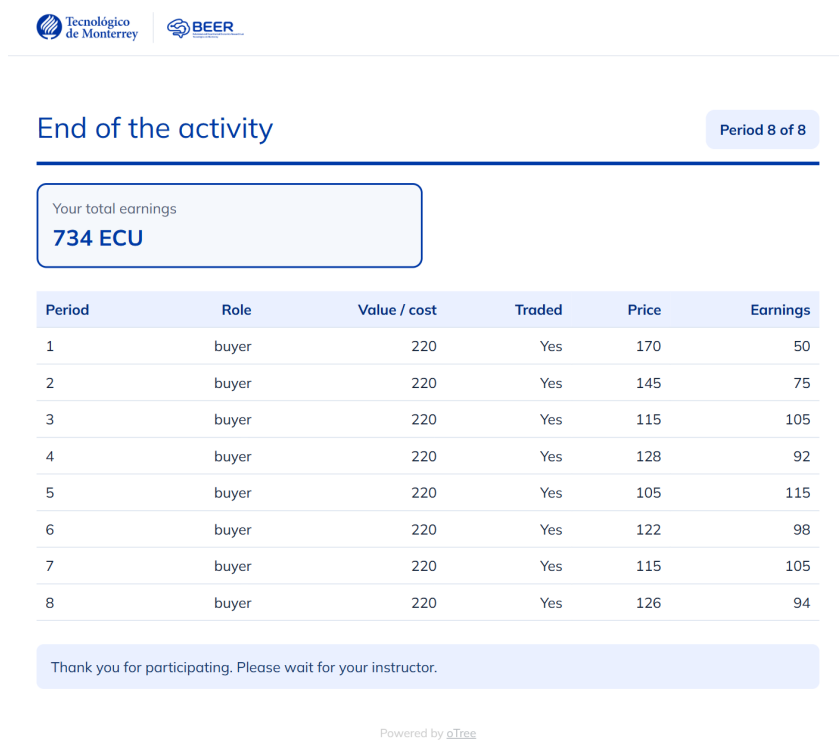


Figure 3.12: Wrap-up: total earnings, history of periods, and a prompt to wait for the instructor (simulated decisions).

Instructor report and debrief

4.1 When to reveal

Report is a tab of the session page: reach it from the room with **Monitor the session**, or from **Sessions** if the session is over. It opens with results hidden. At the top it shows participants, buyers, sellers, and completed periods (for example, 3/8). A period counts as completed when the whole group has finished trading. You can therefore project it from the start without giving anything away. Click **Show results** after the last period; **Refresh** adds new periods and **Hide results** covers them again.

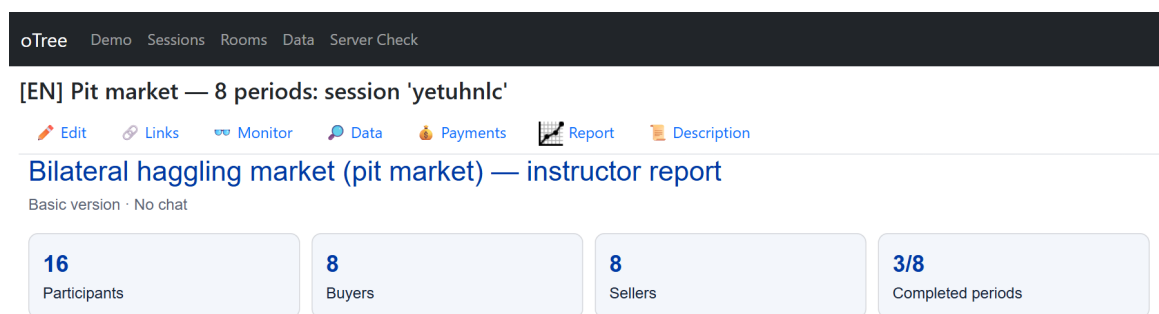


Figure 4.1: Report with results hidden and progress counter.

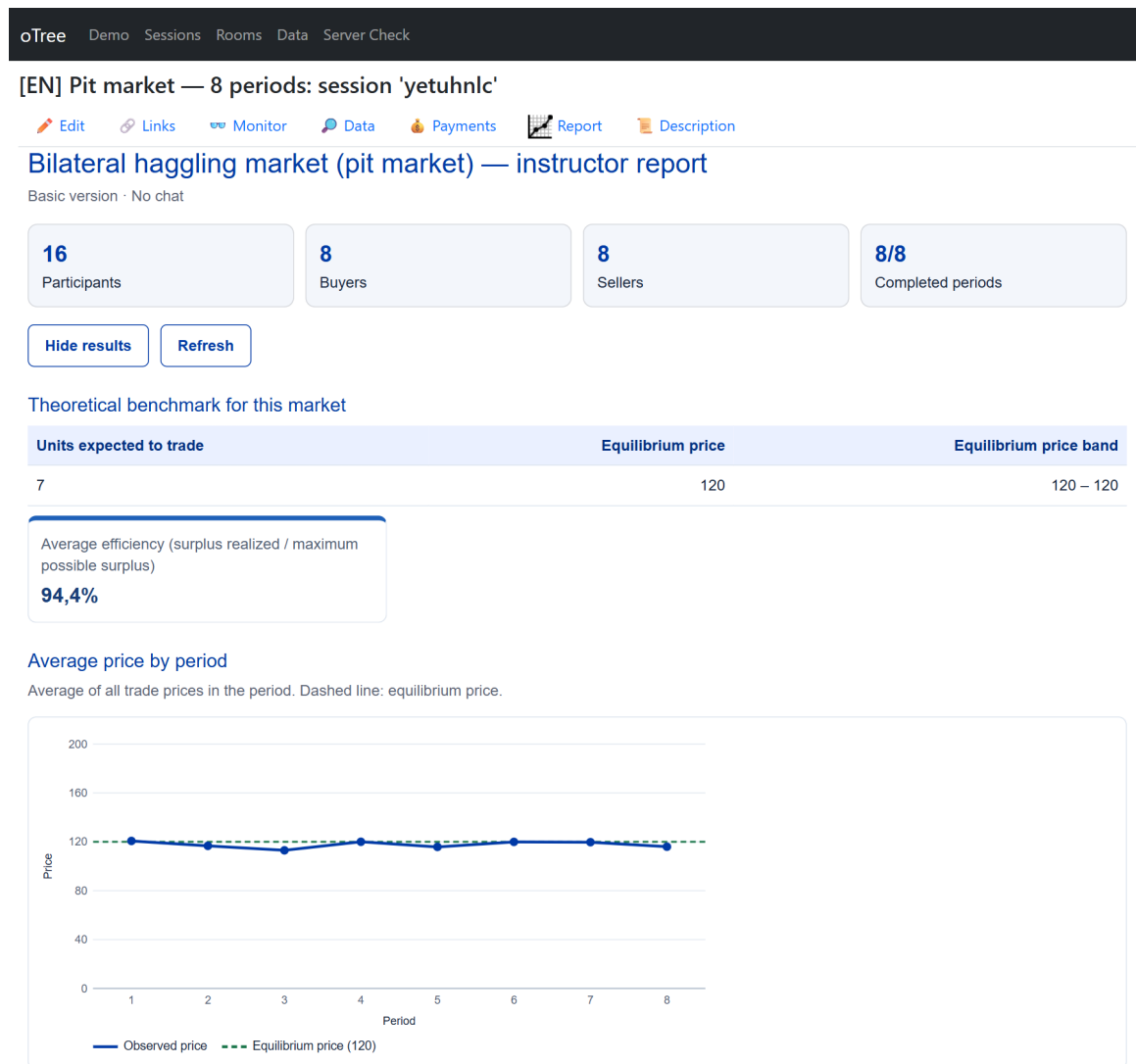


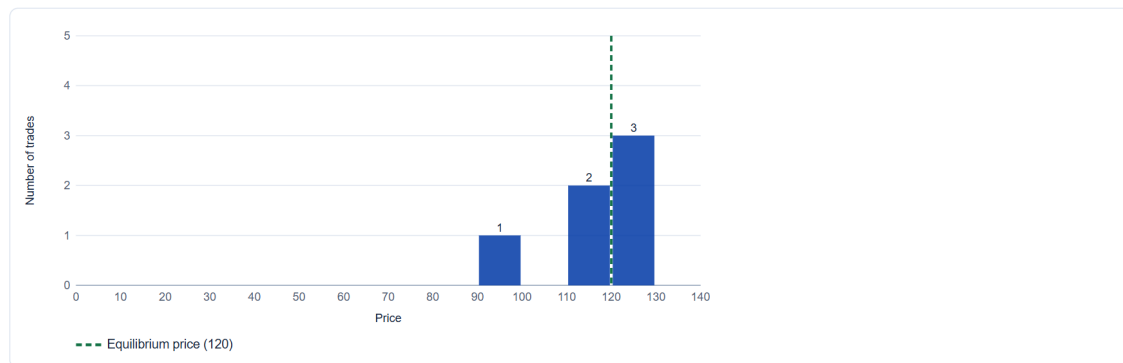
Figure 4.2: Revealed report: theoretical benchmark, average efficiency, and average price by period, with 16 participants (simulated decisions).

Early periods versus late periods (efficiency)

	Efficiency
Periods 1–3	92,1%
Periods 6–8	96,0%

Distribution of trade prices

Trade prices in the last completed period.



Results by period

Period	Trades	Average price	Efficiency
1	7	120,7	92,9%
2	7	116,7	90,5%
3	6	113	92,9%
4	7	120	100,0%
5	6	115,8	90,5%
6	7	119,9	100,0%
7	6	119,7	100,0%
8	6	116	88,1%

Individual data: Data → Custom export (pit_market). Chat messages: Data → Chat.

Figure 4.3: Revealed report: early versus late periods, price histogram, and table by period (simulated decisions).

4.2 How to read the report

1. Start with the **theoretical benchmark**: units expected to trade, equilibrium price, and equilibrium price band. With 14 or more participants, the benchmark is 7 units at a price of 120.
2. **Efficiency** is the surplus realized (sum of values minus sum of costs of those who traded) divided by the maximum possible surplus. The report shows the average across completed periods and each period's value in the final table.
3. The **average price by period** chart compares the mean price of each period's trades with the equilibrium price (dashed line). It appears when there is more than one period.
4. With six or more completed periods, the **early versus late periods** table compares the efficiency of the first three with that of the last three.
5. The **histogram** shows prices in the last completed period. In this market it deserves attention:

the average may be close to 120 while dispersion is large.

6. The **table by period** gives the number of trades, the average price, and efficiency. More trades than the equilibrium quantity mean that extramarginal buyers or sellers traded.

The report does not show individual negotiations or who traded with whom.

Debrief script

Ask first what price they thought things were selling for and how they found out. Then reveal the histogram: was there one price or many? Ask those who did not trade to explain why (for example, a buyer with value 100 who never found anyone willing to sell for less). Finish by drawing supply and demand with the ladder of values and costs.

Theory and evidence

5.1 Induced values, supply, and demand

Theoretical foundation

Values and costs are *induced*: the experimenter sets how much each person earns by buying or selling at each price (Smith, 1962; Davis and Holt, 1993). Sorting values from highest to lowest yields a step demand, 240, 220, 200, ...; sorting costs from lowest to highest yields a step supply, 0, 20, 40, ... Unit k generates surplus $v_k - c_k = 240 - 40(k - 1)$, positive up to $k = 6$ and zero at $k = 7$ ($v_7 = c_7 = 120$). The competitive equilibrium is a price $p^* = 120$ and a quantity of 6 or 7 units (the seventh pair is indifferent). Maximum surplus is $240 + 200 + 160 + 120 + 80 + 40 + 0 = 840$ ECU. Buyers of rank 8 or higher (value 100 or less) and sellers of rank 8 or higher (cost 140 or more) are *extramarginal*: they do not trade in equilibrium.

The report computes the benchmark from the session's participants. With fewer than 14 participants the ladder is cut before the crossing and the equilibrium quantity is the number of sellers:

Participants	Buyers	Sellers	Units	Report band	Maximum surplus
8	4	4	4	60–180	720
10	5	5	5	80–160	800
12	6	6	6	100–140	840
14 or more	≥ 7	≥ 7	7	120–120	840

The equilibrium price the report shows is the midpoint of the band and is always 120. With an odd number below 14, the extra buyer has a value above the last seller's cost; the report ignores it, and the strictly competitive price interval is narrower than the band shown (with 9 participants, 160–180 instead of 60–180). With 14 or more participants this detail does not affect the benchmark.

In a class of 30 students (15 buyers and 15 sellers), only seven pairs should trade. Eight buyers and eight sellers are extramarginal; buyers of rank 13 to 15 have value 0 and sellers of rank 13 to 15 have costs (240 to 280) equal to or above the highest value, so the system never lets them trade at a profit. This is by design: in a competitive market many people are left out. Say so, so that no one thinks their screen is broken.

5.2 Decentralized trading versus a central book

The pit market reproduces the “pit” of an open-outcry exchange: people look for a counterpart and negotiate in pairs. [Chamberlin \(1948\)](#) ran such a market with his students and found systematic deviations from the competitive prediction; in most of his markets trading volume exceeded the equilibrium quantity and the average price fell below the equilibrium price. [Smith \(1962\)](#) changed the institution: a double auction with public bids and asks, and repeated periods with the same values and costs. In his markets, prices and quantities approached the competitive equilibrium. [Holt \(1996\)](#) presents the pit market as a classroom exercise to introduce supply and demand.

	Double auction	Pit market (this game)
Order book	One best bid and one best ask, visible to the whole group.	None: each negotiation is private and seen only by the two people involved.
Offer rule	A new offer replaces the standing one only if it improves on it.	No improvement rule: either side can propose another price, higher or lower.
Who you trade with	The market as a whole: the best opposing offer, regardless of who posted it.	A specific person, chosen by the proposer; several negotiations can run at once.
Accepting	One accepts the market’s best opposing offer.	One accepts the standing price of a negotiation, only if the other side proposed it.

Both games share the economic layer (induced values and costs, one market for the whole class, a report with efficiency and convergence); the ladder has the same shape, with different numbers. If your class also played the double auction in the catalogue, the comparison isolates the effect of the institution.

5.3 Experimental evidence

The surveys by [Holt \(1995\)](#) and [Davis and Holt \(1993\)](#) document that the double auction is the institution with the fastest convergence and highest efficiency in market experiments, and that outcomes depend on the trading rules. [Gode and Sunder \(1993\)](#) show that, in a double auction, even traders who propose random prices without incurring losses achieve high efficiency: much of the efficiency comes from the institution and from the no-loss constraint, which this game also imposes. That evidence concerns the double auction; do not simply extend it to bilateral haggling.

5.4 Regularities worth discussing

- Prices tend to be more dispersed than in a double auction: the same unit sells at very different prices depending on who negotiates with whom.
- Part of the efficiency loss comes from extramarginal trades (a low-value buyer buys from a low-cost seller and crowds out a higher-value buyer) and part from trades that never close.
- With values and costs fixed across periods, participants learn which prices are attainable; dispersion may shrink with repetition, although there is no guarantee.

- The average may approach 120 even though almost no trade happens at that price.

Attention

The results of one class are descriptive. Without random assignment to treatments, enough sessions, and a research protocol, a difference between two classes (or between this game and the double auction) does not estimate a causal effect. Periods within the same session are not independent observations.

Baseline modes

The two baseline modes use the same market, without chat, with 240-second periods.

6.1 One period

`pit_market_en_1_period` has a single period. It suits a short class introducing supply and demand: the histogram shows all of the class's trades. There is no chart by period and no early-versus-late comparison.

6.2 Eight periods

`pit_market_en_8_periods` repeats the market eight times with the same roles, values, and costs. It supports a discussion of learning: whether price dispersion shrinks, whether efficiency rises, and whether the average price approaches 120. With the default values, trading takes 32 minutes; for a 50-minute class, reduce `trade_seconds` or `active_rounds` under **Configure session** (see Chapter 8). Do not announce aggregate results between periods.

Extended variants

7.1 Treatment map

Variant	What changes	Teaching question
With chat	60-second chat for the whole group before each period; eight periods.	Does sharing price information reduce dispersion? Are prices announced that are later not honoured?

7.2 With chat

`pit_market_extended_communication` adds, before each period, a 60-second chat open to the whole group. Everyone appears under the same name (“Participant”; one’s own messages also show “(Me)”), so messages are anonymous. Nothing written is binding and negotiations remain private. The **Go to trading** button does not bring the start forward: trading begins when the whole group has left the chat or time has run out.

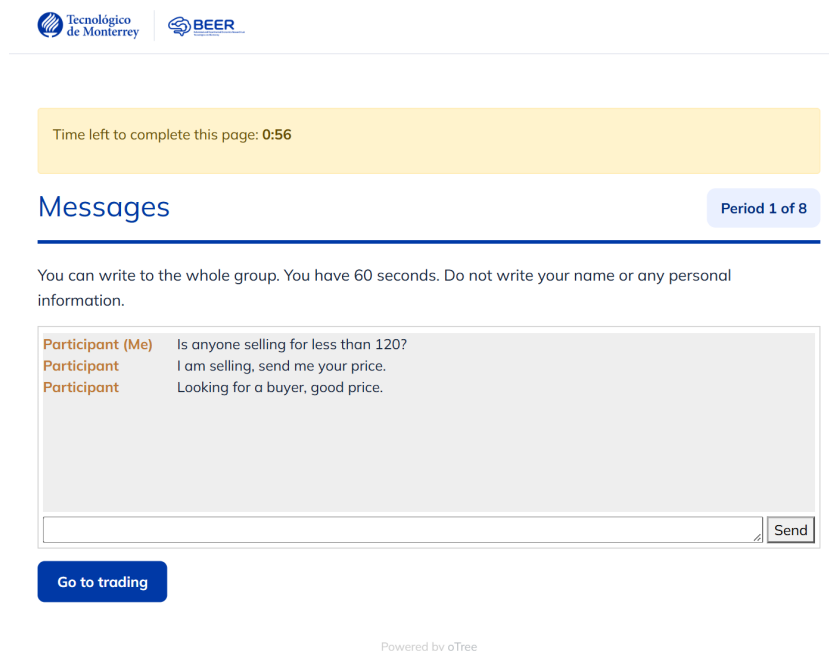


Figure 7.1: Chat before trading (demo messages).

The chat turns part of the private information into public information: participants can announce the prices at which they buy or sell. It is a simple way to discuss why a price board, like the double auction's, can bring prices closer together.

Debrief script

Compare price dispersion and efficiency with the no-chat version, if you have it. Read some messages aloud (**Data** → **Chat**) and ask whether the announced prices resembled those negotiated afterwards.

Class plan and interpretation

8.1 Suggested 50-minute session

The suggestion starts from the eight-period configuration and sets, under **Configure session**, `active_rounds = 6` and `trade_seconds = 180`: six 3-minute periods. Six periods keep the report's early-versus-late comparison. If you have more time, use the defaults (eight 4-minute periods).

0–5 min	Room access, lab rules, and role assignment.
5–12 min	Instructions, example, and comprehension check. Warning about the numbering in the list and in the negotiations table.
12–32 min	Six trading periods. Do not reveal the report between periods.
32–35 min	Class predictions: price and number of trades.
35–43 min	Histogram, price by period, and efficiency.
43–48 min	Supply and demand on the board with the ladder; maximum surplus; comparison with the double auction.
48–50 min	Applications: markets with bilateral bargaining (housing, used cars, wholesale markets).

8.2 Questions to guide the discussion

1. At what price did you close your trade? How did you know whether it was a good price?
2. Was there a single price in the market? Why did the same unit sell at different prices?
3. With the ladder of values and costs on the board, how many trades maximize surplus? Who should not trade?
4. Were there trades by low-value buyers or high-cost sellers? What did they cost in total surplus?
5. Did trading change between the first and the last period?
6. What would change if everyone saw everyone's proposals, as in a double auction?

8.3 Common misreadings

Hasty reading	Correction
If the average price is 120, the market reached equilibrium. More trades is better.	Check the histogram and efficiency: an average of 120 can hide very dispersed prices and extramarginal trades. Beyond 7, each additional trade involves an extramarginal buyer or seller and cannot raise surplus; it usually crowds out a more valuable pair.
Those who did not trade lost.	Their earnings are 0. In equilibrium, extramarginal traders do not trade; they did nothing wrong.
Whoever got the better price bargained better.	It depends on one's own value or cost, which differs across people; compare earnings, not prices.
A difference from the double auction is causal.	That requires comparable assignment, several sessions, and the same parameters.

Operations, privacy, and troubleshooting

9.1 Privacy and conduct

- Do not ask for names, student IDs, or demographic information during this activity.
- Project the aggregate report. Keep codes, roles, and individual screens private.
- In the basic version, ask students not to negotiate out loud: all trading happens on screen.
- Ask students not to write personal information in the chat; the screen itself reminds them.
- Do not use the session to grade anyone on their earnings: they depend on a randomly assigned role.
- Treat the session as a teaching activity unless there is a research protocol with specific consent.

9.2 Common problems

Situation	Action
I went to <code>teaching.beer-lab.org</code> and cannot see how to create the session	That is the students' page. Use <code>teaching-admin.beer-lab.org</code> → Open panel .
The panel asks for a username and password	Username admin and the lab's password. If you do not have it, write to <code>lab.economia@servicios.tec.mx</code> .
"Por favor espere" (in Spanish) before starting	You have not yet created the session in that room, or the student opened another room (another language or edition). Once you create it, they get in automatically.
"Please wait" for a long time before trading or before the result	Someone in the group is missing. Check Monitor . If someone disconnected, ask them to reopen the room in the same browser. If they cannot, or if more participants were declared than are present, use Advance slowest participants until the group moves on.
"La sesión está llena" (in Spanish: the session is full)	More students joined than were declared. Before starting: Close this room , a new session with the correct number, and everyone opens the link again.
The market never starts	More participants were declared than joined and no one advanced them. Click Close this room and create a new session with the correct number.
Several tabs of the same browser are the same participant	This is normal with the room link. To rehearse, use Demo .
"That price would lose you money"	The price is above the buyer's value or below the seller's cost. This is an intentional safeguard.
A student cannot trade at any price	They are a buyer with value 0 or a seller whose cost exceeds every value (large classes). Explain that they are extramarginal by design.
"That person has already closed another trade"	The counterpart traded with someone else. Negotiate with another person.
Everyone has traded and the clock is still running	The period only ends on the clock. If no more trades are possible and everyone is on the trading page, you may use Advance slowest participants to close the period; anyone who has not traded gets 0.
Not Found on a /p/... link	The individual link belongs to an earlier session. Share the room again (link or QR code), not the individual link.
I want to see a session from another day	Panel → Sessions → the session → Report or Data .
Report without data	No period is complete yet. Wait and click Refresh .

9.3 Data for later analysis

Data → **Custom export (pit_market)** provides one row per participant and period: session, anonymous code, period, language, edition, treatment, chat, role (buyer or seller), rank, value or cost, whether they traded, price, earnings, and comprehension-check attempts. The export does not include the history of proposals and does not identify who traded with whom. Chat messages are under **Data** → **Chat**. Treat periods within a session as dependent.

Annotated bibliography

- [Chamberlin \(1948\)](#): the original classroom pit market and its deviations from the competitive prediction.
- [Smith \(1962\)](#): the double auction with repeated periods and induced values; the contrasting benchmark.
- [Davis and Holt \(1993\)](#): textbook on experimental economics; market institutions and induced values.
- [Gode and Sunder \(1993\)](#): efficiency of the double auction with strategy-free traders.
- [Holt \(1995\)](#): survey of industrial organization experiments, including market institutions.
- [Holt \(1996\)](#): the pit market as a classroom game.

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- Holt, C. A. (1996). Classroom games: Trading in a pit market. *Journal of Economic Perspectives*, 10(1), 193–203. [doi:10.1257/jep.10.1.193](https://doi.org/10.1257/jep.10.1.193).
- Smith, V. L. (1962). An experimental study of competitive market behavior. *Journal of Political Economy*, 70(2), 111–137. [doi:10.1086/258609](https://doi.org/10.1086/258609).

Room QR codes

Project or print the page for the room you will use. Students scan it with their phone camera and click **Start**.

Bilateral Haggling Market

English room



pitmarket.beer-lab.org/room/pit_market_en

Scan the code and press **Start**.

Bilateral Haggling Market

English room, extended version



pitmarket.beer-lab.org/room/pit_market_extended

Scan the code and press **Start**.

Bilateral Haggling Market

Sala en español



pitmarket.beer-lab.org/room/pit_market_es

Escanee el código y pulse **Comenzar**.

Bilateral Haggling Market

Sala en español, versión extendida



pitmarket.beer-lab.org/room/pit_market_extendido

Escanee el código y pulse **Comenzar**.