



Teacher guide for the irrigation reduction auction

Lab implementation, theoretical background,
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 lets you prepare, run and discuss the **irrigation reduction auction** developed for the Behavioral and Experimental Economics Research Lab (BEER Lab) at the Department of Economics, Tecnológico de Monterrey. It is written for instructors of intermediate microeconomics, environmental and natural resource economics, and mechanism design, with or without prior experience in experimental economics.

The game is a teaching adaptation of Charles Holt’s classroom version (the Veconlab “Water Auction” program) and of the laboratory work used to design the State of Georgia’s irrigation reduction auction (Cummings et al., 2004). It follows that version’s general mechanics: the state buys irrigation permits from farmers, choosing the lowest offers per acre within an acre target and a budget, over several bidding rounds with provisional results and a final round that is not announced. The parameters (plot sizes, values, target, budget, maximum offer) are this adaptation’s own, and so is the wording of the screens and of this guide.

The **quick-start chapter** gets a session running. The operational chapters explain every screen. The conceptual chapters give the theoretical benchmarks needed to interpret results. Shared rules are explained once; each variant lists only what changes relative to the basic game.

Author

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For the instructor

This guide matches the English interface. A separate Spanish version exists. Screenshots in this guide were taken on a local instance of the game with simulated decisions; the numbers shown illustrate the interface and are *not* results from a real class. Project only aggregate results: never link participant codes to names, student IDs, seats or individual decisions.

This game is still being prepared for the lab server. The access steps in Chapter 2 and the screen sequence in Chapter 3 are already final (tested on an identical copy of the game); only the screenshots of YOUR game’s card, login and rooms on teaching-admin.beer-lab.org and teaching.beer-lab.org are still missing — this guide will add them once the game goes live on those sites.

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Quick-start guide

1.1 Fact sheet

Purpose	Show how a procurement auction works (the state buys, farmers sell): what it costs to retire an acre from irrigation compared with the minimum possible, why people offer above their own value when they are paid their own offer, and what changes with provisional results, a random or announced end, and a uniform price.
Participants	Any number. Fixed auctions of 6 people formed at random; leftover people join the first auctions (31 → four of 6 and one of 7). With fewer than 6, a single smaller auction.
Permits	Each period, each person holds 2 permits; each covers a plot of 10, 20, 30 or 40 acres and has a whole-number farming value per acre between 20 and 100. They are new every period and only their holder knows them.
Decision	One offer per acre for each permit, a whole number from 0 to 150 (0 = not offered).
State's rule	Target = 40% of the auction's acres; budget = target × 60 ECU. It buys whole permits from the lowest offer per acre up, as long as they fit in the acres and the budget still left (it skips those that do not fit), and pays each its offer × acres.
Earnings	Per permit: sold → payment; kept → value per acre × acres. Never negative.
Rounds	Each period has 3 to 5 bidding rounds (random, not announced) with a provisional result after each; only the last one counts.
Duration	10–12 minutes for one period; 25–35 minutes for four, not counting discussion.
Instructor (you)	teaching-admin.beer-lab.org/en → the game's card → Open panel . Asks for username and password (section 2.1).
Students	Room link waterauction.beer-lab.org/room/water_auction_en , its QR code (section 2.5) or teaching.beer-lab.org .
Report	Least-cost benchmark, cost and value per acre retired, acres retired against the target, budget spent, offer as % of value by bidding round, comparison with the 1st round and with the other payment rule, histogram of offers, and tables by period and by auction.

Note

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

1.2 Minimal sequence

Before class

1. Request panel access from lab.economia@servicios.tec.mx, stating the game, course, num-

ber of students and date. You will receive the password for the **admin** user.

2. Open teaching-admin.beer-lab.org/en, find **Irrigation reduction auction** and click **Open panel**. Enter username and password.
3. Rehearse in **Demo**: open a configuration and play it in several tabs to see the screens and the report (section 2.3).

In class

4. Count the students present.
5. In the panel, open **Rooms** and the room **[EN] Irrigation Permit Auction** (or the extended one). Choose the configuration (usually several rounds, 4 periods), type the *exact* number of students under **Number of participants** and click **Create**.
6. Share the room link or project its QR code. Each student clicks **Start**.
7. In the room, click **Monitor the session**: the session page opens, with the **Monitor** (progress) and **Report** tabs. When done, open **Report**, click **Show results** and lead the discussion.

After class

8. In the room, click **Close this room**. It is then ready for the next group; the session's data stay under **Sessions**.

1.3 Checklist

- ☐ Panel password received and tested at waterauction.beer-lab.org/login.
- ☐ Rehearsal done in **Demo**, at least through one provisional result and one final result.
- ☐ Devices, internet, browser and projector ready.
- ☐ Configuration chosen: one period (short demonstration), four periods with several rounds (recommended) or a single round (for comparison).
- ☐ Number of 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 and there is no cash payment.
- ☐ Monitor and report open; the least-cost benchmark idea (section 5.1) ready for the wrap-up.

Platform access

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

The instructor page is teaching-admin.beer-lab.org/en. It does not appear in the beer-lab.org menu: type the address directly or bookmark it. It lists every classroom game in the lab; you can search by title, topic or JEL code.

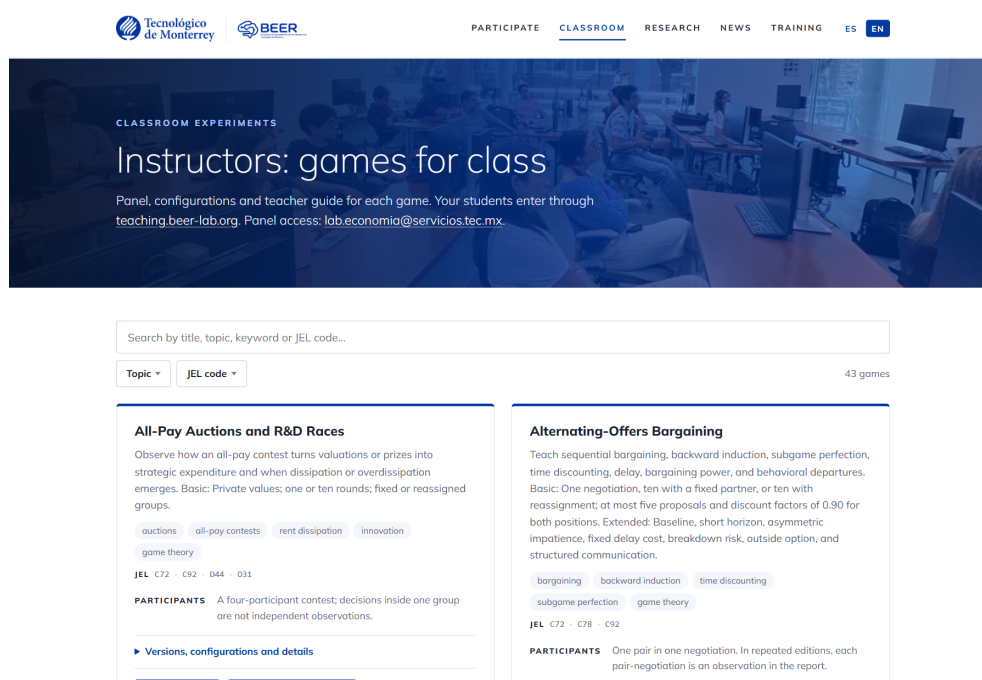


Figure 2.1: Instructor page: teaching-admin.beer-lab.org. Once this game goes live, its card will appear in this same directory (search for **Irrigation reduction auction**).

Each game has a card with its description, number of participants and duration, and two buttons: **Open panel**, which goes to the game's panel, and **Teacher guide (PDF)**, which downloads this guide. Expanding **Versions, configurations and details** lists the rooms, each with its own **open panel** straight to that room's session-creation form. The game's panel (<https://waterauction.beer-lab.org>) is protected: **Open panel** shows the **Admin Login** screen, where you type **admin** under **Username** and the password the lab gave you under **Password**. If you do not have it, request it at lab.economia@servicios.tec.mx.

Note

This game does not yet have its own card in the directory or an active panel at waterauction.beer-lab.org: it is still being prepared. The procedure above is identical to every other lab game's (see the Cournot, Bertrand and live market guides); once it goes live, this section will be updated with screenshots specific to **Irrigation reduction auction**.

2.2 The panel: minimal vocabulary

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

Demo	Practice sessions. Creates a session with fictitious participants that you play yourself across several tabs. Use it to rehearse, never with students.
Rooms	Fixed addresses for class. This game has four: basic and extended, in Spanish and English. Students always enter through a room.
Create / Number of participants	Create the session in the room and declare how many people will play.
Monitor	A table with each participant's round and screen. It does not show decisions.
Advance slowest participants	The Monitor button that moves along whoever has fallen behind (see section 9.2: in this game it keeps the previous round's offers).
Report	The instructor report for projecting aggregate results.
Data	Downloads the data as CSV.
Sessions	A list of all your sessions, to return to an earlier one.
Close this room	Frees the room when done, for the next group.

In this panel, **Demo** shows only this game's ten configurations and **Rooms** only its four rooms. Inside each room, the session-creation form filters further: the basic English room (**[EN] Irrigation Permit Auction**) only offers the three basic English configurations (several rounds with one period, several rounds with four periods, one sealed round with four periods); the extended English room only offers the two extended ones (uniform price and announced end). If a different game appears, do not start the session and notify the lab.

oTree Demo Sessions Rooms Data Server Check

Demo

[ES] Subasta de permisos de riego — varias rondas de ofertas, un período
[ES] Subasta de permisos de riego — varias rondas de ofertas (final al azar), 4 períodos
[ES] Subasta de permisos de riego — una sola ronda (sobre cerrado), 4 períodos
[EN] Irrigation permit auction — several bidding rounds, one period
[EN] Irrigation permit auction — several bidding rounds (random end), 4 periods
[EN] Irrigation permit auction — one sealed bidding round, 4 periods
[ES] Subasta de permisos de riego extendido — varias rondas, precio uniforme, 4 períodos
[ES] Subasta de permisos de riego extendido — 4 rondas de ofertas anunciadas, 4 períodos
[EN] Irrigation permit auction extended — several rounds, uniform price, 4 periods
[EN] Irrigation permit auction extended — 4 announced bidding rounds, 4 periods

Juegos de mercados / Market games — BEER Lab

Subasta de permisos de riego / Irrigation permit auction

Figure 2.2: Demo: the game’s configurations (six basic and four extended, in Spanish and English).

oTree Demo Sessions Rooms Data Server Check

Rooms

Current rooms:

[ES] Subasta de permisos de riego
[EN] Irrigation Permit Auction
[ES] Subasta de permisos de riego — extendido
[EN] Irrigation Permit Auction — extended

Figure 2.3: Rooms: the game’s four rooms.

2.3 Rehearsing before class

In **Demo**, click a configuration: a practice session with six participants (one full auction) is created and the links page appears. Open each **P1**, **P2**, ... link in a separate tab and play as if you were each student; then open **Report**. Submitting the six offers of the first round is enough to see a provisional result. These sessions do not affect your classes.

oTree Demo Sessions Rooms Data Server Check

[EN] Irrigation permit auction — several bidding rounds (random end), 4 periods: session 'jzl8fc9n'

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

You can either use the session-wide link, persistent links, or single-use links.

Session-wide link
If it's not practical for you to use a Room, you can distribute the following link to participants.

<http://localhost:8045/join/juzahote>

Persistent links
For a real session, you should use a [room](#).

Single-use links
Below are single-use links.

P1	http://localhost:8045/InitializeParticipant/2kohch0u
P2	http://localhost:8045/InitializeParticipant/1dkuj0ut
P3	http://localhost:8045/InitializeParticipant/85qwnx8p
P4	http://localhost:8045/InitializeParticipant/7scx8lg2
P5	http://localhost:8045/InitializeParticipant/3iyymrv4
P6	http://localhost:8045/InitializeParticipant/nuk7grdm
P7	http://localhost:8045/InitializeParticipant/e1zlep2l
P8	http://localhost:8045/InitializeParticipant/dfimv3ym
P9	http://localhost:8045/InitializeParticipant/ubyn0ljc
P10	http://localhost:8045/InitializeParticipant/xrrph712
P11	http://localhost:8045/InitializeParticipant/929x1foe
P12	http://localhost:8045/InitializeParticipant/jdtbu54j

Figure 2.4: A session's links. The screenshots in this guide were taken on a local copy, which is why the addresses say `localhost`; on the server they say `waterauction.beer-lab.org`.

Note

Do not rehearse with the room link open in several tabs of the same browser: oTree recognizes the browser, and every tab would count as the same person. Use **Demo** to rehearse instead.

oTree Demo Sessions Rooms Data Server Check

[EN] Irrigation permit auction — several bidding rounds (random end), 4 periods: session 'jzl8fc9n'

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

ID	Code	Label	Progress	App	Round	PageName	Waiting	WaitsFor	Since
P1	2kohch0u		62/140	water_auction	9	RoundResult			1m
P2	1dkuj0ut		62/140	water_auction	9	RoundResult			1m
P3	85qwnx8p		62/140	water_auction	9	RoundResult			1m
P4	7scx8lg2		62/140	water_auction	9	RoundResult			1m
P5	3iyymrv4		62/140	water_auction	9	RoundResult			1m
P6	nuk7grdm		62/140	water_auction	9	RoundResult			1m
P7	e1zlep2l		62/140	water_auction	9	RoundResult			1m
P8	dfimv3ym		62/140	water_auction	9	RoundResult			1m
P9	ubyn0ljc		62/140	water_auction	9	RoundResult			1m
P10	xrrph712		62/140	water_auction	9	RoundResult			1m
P11	929x1foe		62/140	water_auction	9	RoundResult			1m
P12	jdtbu54j		62/140	water_auction	9	RoundResult			1m

Figure 2.5: Monitor of a running session: each participant's round and screen.

The Monitor counts oTree rounds, not periods: each period takes up five oTree rounds (one per possible bidding round), so period 2 starts at Monitor round 6, period 3 at 11 and period 4 at 16, even if a period had fewer than five bidding rounds.

2.4 Creating the session in class

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

The screenshot shows the oTree web interface. At the top is a dark navigation bar with links: oTree, Demo, Sessions, Rooms, Data, and Server Check. Below this, the page title is "Room: [EN] Irrigation Permit Auction". Underneath is the heading "Create a new session". A light blue informational box states: "English room. Only the configurations of this game, language and edition are shown below." Below this is a "Session Config" section with a dropdown menu currently showing "[EN] Irrigation permit auction — several bidding rounds, one period". Underneath the dropdown is a "Number of participants" input field, which is currently empty. Below the input field, it says "Must be a multiple of 1". A blue "Create" button is positioned below the input field. At the bottom of the form, there is a link "Configure session" followed by a gear icon, and the text "App sequence" below that.

Figure 2.6: Form of the basic English room: only its three configurations appear.

Note

Declare the exact number, with no spare seats. Auctions are formed at random when the session is created, and each bidding round of an auction waits for all its members to submit offers. If one more student than declared arrives, they will see a “session is full” message (currently shown in Spanish, “La sesión está llena”, on English rooms too); in that case, before starting, click **Close this room**, create another session with the correct number, and ask the class to reopen the link or the QR code. If you declare more people than actually join, the auction with empty seats never finishes its first round.

2.5 How your students join

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

1. **QR code.** Project the one for the room you are using (below, and full-size in appendix A). They scan it with a phone camera.
2. **Room link.** Share it over the class chat or on Canvas: https://waterauction.beer-lab.org/room/water_auction_en.

3. **Catalogue.** At teaching.beer-lab.org they search for **Irrigation reduction auction** and click their language's button (once the game is live).



English, basic

waterauction.beer-lab.org/room/water_auction_en



English, extended

waterauction.beer-lab.org/room/water_auction_extended



Español, básica

waterauction.beer-lab.org/room/water_auction_es



Español, extendida

waterauction.beer-lab.org/room/water_auction_extendido

What the participant sees

The student opens the room and clicks **Start**. If you have not created the session yet, they see a waiting page and join as soon as you do; so you can share the link or QR code from the start of class. No email or password is needed: they receive an anonymous code.

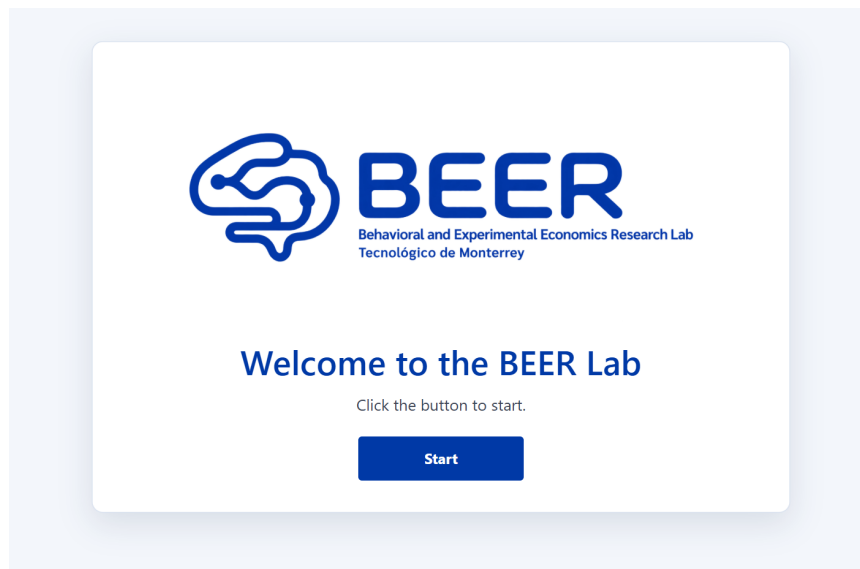


Figure 2.7: The room each student opens.

Language is set per room: a session created in the English room only admits students entering through the English room. If your group is mixed, pick one language for everyone.

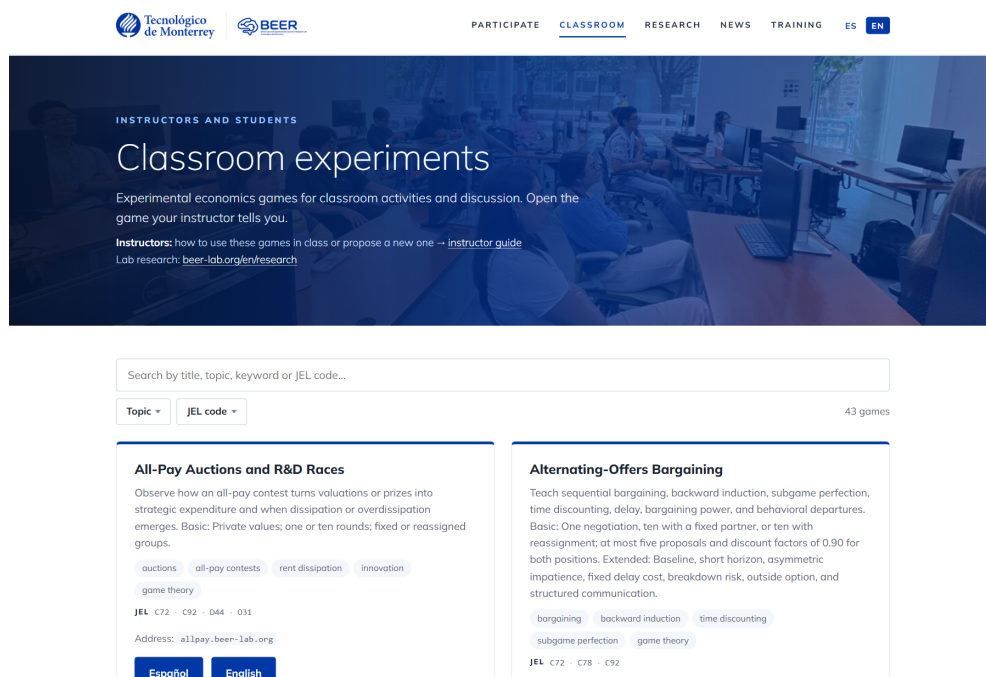


Figure 2.8: The teaching.beer-lab.org catalogue, your students' page. Once this game goes live, its card will appear here (search for **Irrigation reduction auction**).

The basic game and its screens

3.1 Rules, incentives and benchmarks

Auctions. When the session is created, the class is split at random into fixed auctions of 6 people, kept for every period (the instructions say so). If the class does not divide evenly by 6, the remaining people join the first auctions one by one: 31 participants form four auctions of 6 and one of 7; 35 form five of 7. With fewer than 6 participants a single smaller auction is formed; with a single person, the state buys only from them. The instructions tell each person the actual size of their auction. The buyer is the state (the computer); there is no buyer role for students.

Permits and values. In each period each person holds two irrigation permits, one per plot. Each plot has 10, 20, 30 or 40 acres (equally likely) and a whole-number *value per acre* between 20 and 100 (uniform): what its holder earns per acre by keeping the permit and farming. Permits are new every period, the same in all bidding rounds of the period, and only their holder knows them.

Offers. For each permit, each person enters the price per acre they ask for selling it: a whole number from 1 to 150, or 0 if they do not offer it. One may offer below one's own value (losing relative to keeping the permit, but earnings are never negative).

Target and budget. In each period, the state's target is 40% of all the acres in the auction and the budget is the target $\times$ 60 ECU. Both numbers are shown on screen; the budget formula is not explained to participants.

How the state buys (paid as offered). It ranks the positive offers from the lowest to the highest per acre (ties at random), goes down the list and buys a whole permit if it fits *both* in the acres still missing to reach the target and in the budget still left; if it does not fit, it skips it and moves on. Each permit bought receives its offer $\times$ its acres.

$$\pi_{\text{permit}} = \begin{cases} b \cdot a & \text{if the state buys it (offer } b \text{ per acre, } a \text{ acres)} \\ v \cdot a & \text{if kept (value } v \text{ per acre)} \end{cases}$$

Earnings in the period are the sum over the two permits; total earnings, the sum over periods.

Bidding rounds. Each period has several bidding rounds. After each round, the state works out which permits it would buy if that were the last round; each person sees whether their permits “would be bought” or “would not be bought” and the *provisional cutoff*: the highest offer per acre among the permits that would be bought. In the next round the boxes come pre-filled with the previous offers and can be changed. In the basic configuration the period ends after 3, 4 or 5 rounds, equally likely; the number is drawn per period for the whole session (every auction stops at the same round) and is not announced: the instructions only say it is between 3 and 5, and after each round people are told whether it was the last. **Only the offers of the last round count.**

Benchmarks. To read the results, the report uses the *least-cost benchmark*: retiring exactly the

target with the lowest-value acres, paying their values (section 5.1). With values uniform between 20 and 100, the cheapest 40% of acres are worth about 36 per acre on average, far below the budget of 60 per acre. The game's question is how much of that slack the markup takes.

For the instructor

Before playing, ask the class: if you were paid exactly your value per acre, would you care whether you sold or not? Then what offer would you write? The answer leads straight to the markup: when paid as offered, offering one's own value earns nothing; only a higher offer leaves a profit, at the risk of being left out.

3.2 Cover, instructions and comprehension check

The cover page introduces the BEER Lab and its rules of conduct. The instructions describe only the action and the payment rule: the permits and their values, the earnings rule, how the state buys and pays, a numerical example, the bidding rounds and the periods. They never mention “drought”, “scarce water”, “markup”, “efficiency”, “strategy”, “reverse auction” or “least cost”, and do not suggest any offer.



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 an activity in which you can sell permits. Your earnings depend on your decisions, on other people's decisions and partly on chance.

During the session

- Do not talk or communicate with other people.
- 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 page and lab rules.




Instructions

Period 1 of 4

You hold two irrigation permits, one for each of your plots. In each period, the state (the computer) buys irrigation permits from the people in your auction. Your auction has **6 people** (you and 5 others); they are the same people in every period.

Your permits

Each permit covers a plot of 10, 20, 30 or 40 acres and has a **value per acre**: what you get for each acre if you keep the permit and farm the plot.

The value per acre is a whole number between 20 and 100; every number is equally likely, and so are the four plot sizes. At the start of each period you receive two new permits. Only you know yours; the other people's permits are drawn the same way.

Your earnings from each permit: if the state buys it, you receive the payment; if you keep it, you receive its value per acre $\times$ its acres. Your earnings in the period are the sum over your two permits.

Your earnings cannot be negative.

How the state buys

For each permit you enter an offer: the price per acre you ask for selling it, a whole number between 1 and 150 (150 is the maximum offer). Enter 0 if you do not offer that permit. The state buys whole permits, never part of a plot.

In each period the state has an **acre target** (40% of all the acres of the plots in your auction) and a **budget** in ECU. It never buys more acres than the target or spends more than the budget. Both numbers are shown on screen in every period.

The state ranks all offers in your auction from the lowest to the highest (price per acre); ties are ordered at random. It goes down the list in that order and buys each permit that fits both in the acres still missing to reach the target and in the budget still left. **If a permit does not fit, the state skips it and moves on to the next one on the list.**

Payment: each permit bought receives its own offer per acre $\times$ its acres.

Example: a 30-acre permit with a value of 55 per acre. If the state buys it with an offer of 70 per acre, you earn $70 \times 30 = 2100$ ECU. If you keep it, you earn $55 \times 30 = 1650$ ECU.

Bidding rounds

Each period has between 3 and 5 bidding rounds; the number is not announced. After each round, the state works out which permits it would buy if that were the last round. You see whether your permits would be bought and the highest offer per acre among the permits that would be bought. After each round you are told whether it was the last one of the period; if it was not, you can change your offers in the next one. **Only the offers of the last round of the period count.**

- Auctions are formed with 6 people; when the class does not divide evenly, the remaining people join the first auctions. With fewer than 6 participants, a single smaller auction is formed.
- There will be 4 periods. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

Continue

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Figure 3.2: Instructions of the basic configuration (several rounds, random end, paid as offered).

The example uses a 30-acre permit with a value of 55 per acre: sold at 70 per acre it earns $70 \times 30 = 2100$ ECU; kept, $55 \times 30 = 1650$. The check asks two questions with different numbers: a 20-acre permit with value 45, offered at 80 and bought (earns $80 \times 20 = 1600$), and a 40-acre permit with value 35, offered at 90 and not bought (earns $35 \times 40 = 1400$). After a mistake the message restates the rule without giving the answer and lets the participant try again. These are payment cases, not benchmarks: none is the least-cost benchmark or the budget per acre (with random values, some actual value may match 55, 45 or 35 by chance).

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Before you start

Period 1 of 4

Answer based on the instructions.

Your permit has 20 acres and its value is 45 per acre. You offer 80 per acre and the state buys the permit. How much do you earn from that permit?

☐ 80 ECU ☐ 700 ECU ☐ 900 ECU ☐ 1600 ECU

Your permit has 40 acres and its value is 35 per acre. You offer 90 per acre and the state does not buy the permit. How much do you earn from that permit?

☐ 0 ECU ☐ 1400 ECU ☐ 2200 ECU ☐ 3600 ECU

Check

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Figure 3.3: Comprehension check.

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Before you start

Period 1 of 4

Por favor corrija los errores.

Answer based on the instructions.

Your permit has 20 acres and its value is 45 per acre. You offer 80 per acre and the state buys the permit. How much do you earn from that permit?

☐ 80 ECU ☐ 700 ECU ☐ 900 ECU ☐ 1600 ECU

Check: if the state buys the permit, you receive your offer per acre $\times$ the acres of the permit.

Your permit has 40 acres and its value is 35 per acre. You offer 90 per acre and the state does not buy the permit. How much do you earn from that permit?

☐ 0 ECU ☐ 1400 ECU ☐ 2200 ECU ☐ 3600 ECU

Check: if you keep the permit, you earn its value per acre $\times$ the acres of the permit.

Check

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Figure 3.4: Wrong answer: the message restates the rule without giving the answer.

3.3 Offers and waiting

The offers screen shows the auction's target and budget for the period, and a table with each permit: acres, value per acre and what it earns if kept. The boxes only accept whole numbers from 0 to 150: the browser does not let anyone submit a number outside that range or an empty box.

Your offers Period 1 of 4 - Bidding round 1

The state's target in your auction: **104 acres**. Budget: **6240 ECU**.

Permit	Acres	Value per acre	If you keep it you earn	Your offer per acre (0 to 150)
1	20	71	1420 ECU	128
2	20	100	2000 ECU	150

Enter 0 if you do not offer a permit. Maximum offer: 150 per acre.

Send offers

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Figure 3.5: Offers in the first round of period 1 (simulated decisions).

From the second bidding round of the period on, the screen adds the previous round's provisional cutoff and the provisional result of each permit, and the boxes come pre-filled with the previous offers.

Your offers Period 1 of 4 - Bidding round 2

The state's target in your auction: **152 acres**. Budget: **9120 ECU**.

In the previous round, highest offer per acre among the permits that would be bought: **80**

Permit	Acres	Value per acre	If you keep it you earn	Previous round	Your offer per acre (0 to 150)
1	20	43	860 ECU	Would not be bought	86
2	40	69	2760 ECU	Would not be bought	138

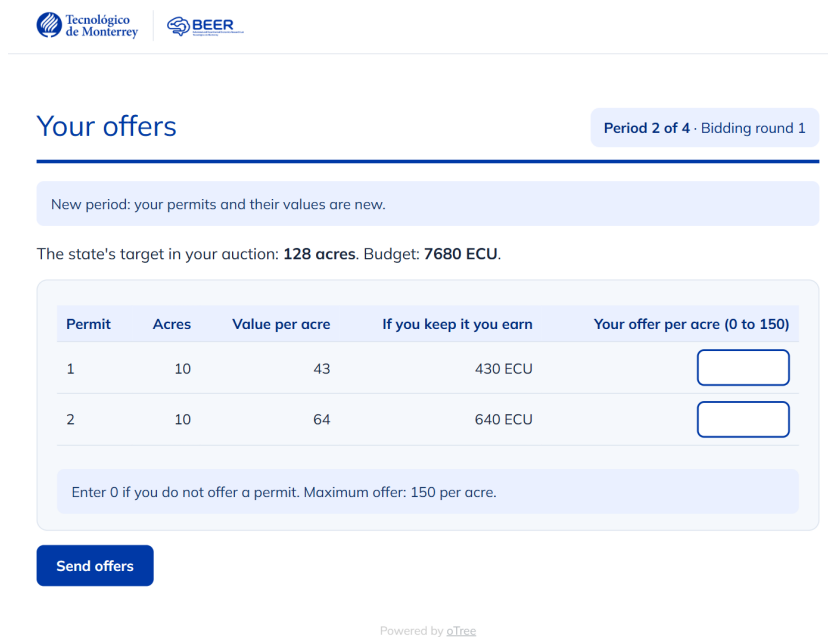
Enter 0 if you do not offer a permit. Maximum offer: 150 per acre. The boxes show your offers from the previous round; you can change them or leave them as they are.

Send offers

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Figure 3.6: Second bidding round: previous cutoff, provisional result of each permit and boxes pre-filled with the previous offers (simulated decisions).

At the start of each new period, a notice says the permits and their values are new; the boxes are empty again.



Your offers Period 2 of 4 - Bidding round 1

New period: your permits and their values are new.

The state's target in your auction: **128 acres**. Budget: **7680 ECU**.

Permit	Acres	Value per acre	If you keep it you earn	Your offer per acre (0 to 150)
1	10	43	430 ECU	
2	10	64	640 ECU	

Enter 0 if you do not offer a permit. Maximum offer: 150 per acre.

Send offers

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Figure 3.7: First round of a new period (simulated decisions).

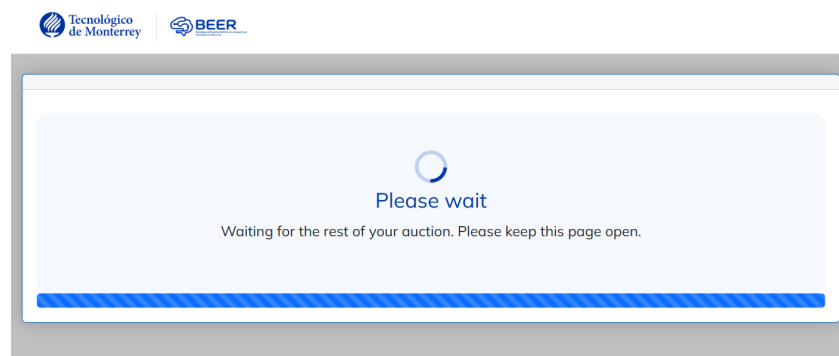


Figure 3.8: Waiting, while other people in the auction have not yet submitted offers.

What the participant sees

“Please wait” means other people in their auction have not yet submitted offers. It is not an error. Each auction moves at its own pace: one auction may be a round ahead of another. The participant should not close or refresh the page.

3.4 Results and wrap-up

After each round that was not the last, the **provisional result** appears: the status of each permit (“Would be bought”, “Would not be bought” or “Not offered”), the payment each permit that would be bought would receive, and the provisional cutoff. The screen says explicitly that the round was not the last.

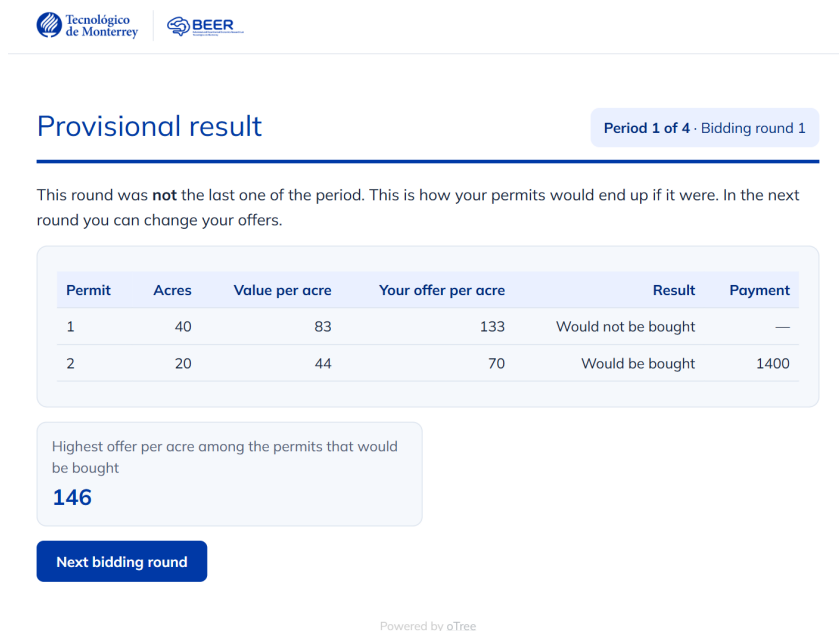


Figure 3.9: Provisional result: one permit would be bought and the other would not (simulated decisions).

After the last round, the **result of the period** appears: each permit “Sold” or “Kept” with its earnings, the final cutoff, and the period’s and cumulative earnings.

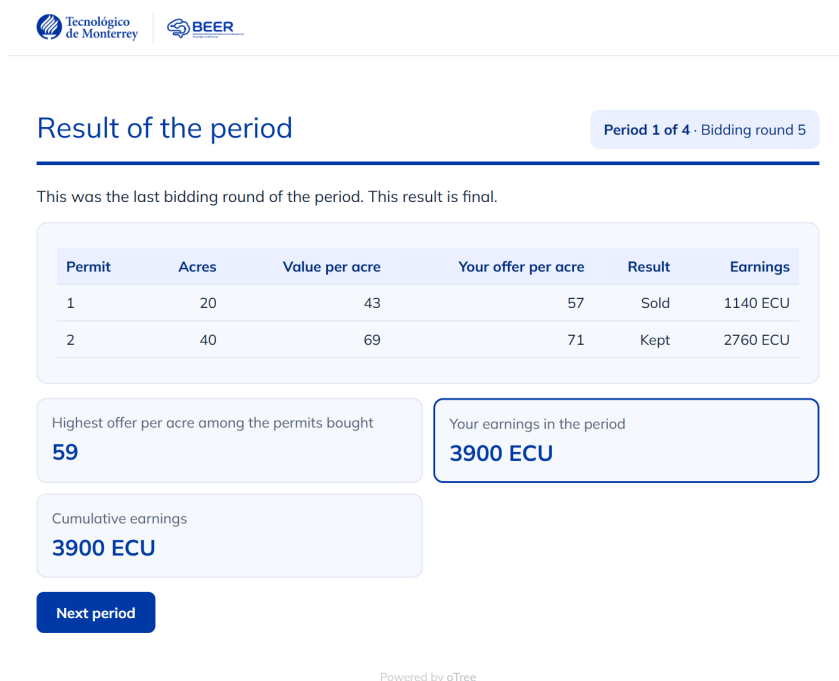


Figure 3.10: Final result of the period: one permit sold and one kept (simulated decisions).

End of the activity

Period 4 of 4

Your total earnings

12060 ECU

Period	Permit	Acres	Value per acre	Your offer per acre	Result	Earnings
1	1	20	71	74	Sold	1480
1	2	20	100	—	Not offered	2000
2	1	10	43	74	Sold	740
2	2	10	64	102	Sold	1020
3	1	10	33	54	Sold	540
3	2	20	94	—	Not offered	1880
4	1	10	72	112	Kept	720
4	2	40	92	100	Kept	3680

Thank you for taking part. Please wait for the instructor.

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Figure 3.11: Wrap-up: total earnings and history by period and permit (simulated decisions).

Instructor report and debrief

4.1 When to reveal

Report is a tab on the session page: reach it from the room with **Monitor the session**, or from **Sessions** if the session has ended. It opens with results hidden. At the top it shows participants, auctions and their sizes, completed periods and how many bidding rounds each completed period had, so you can project it from the start without giving anything away (it only counts periods already finished). Click **Show results** when the current period ends; **Refresh** adds new periods and **Hide results** covers them again.

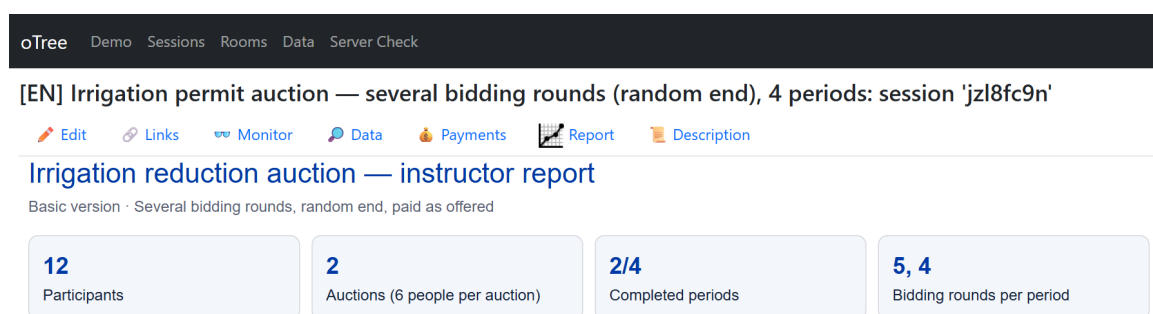


Figure 4.1: Report with results hidden.

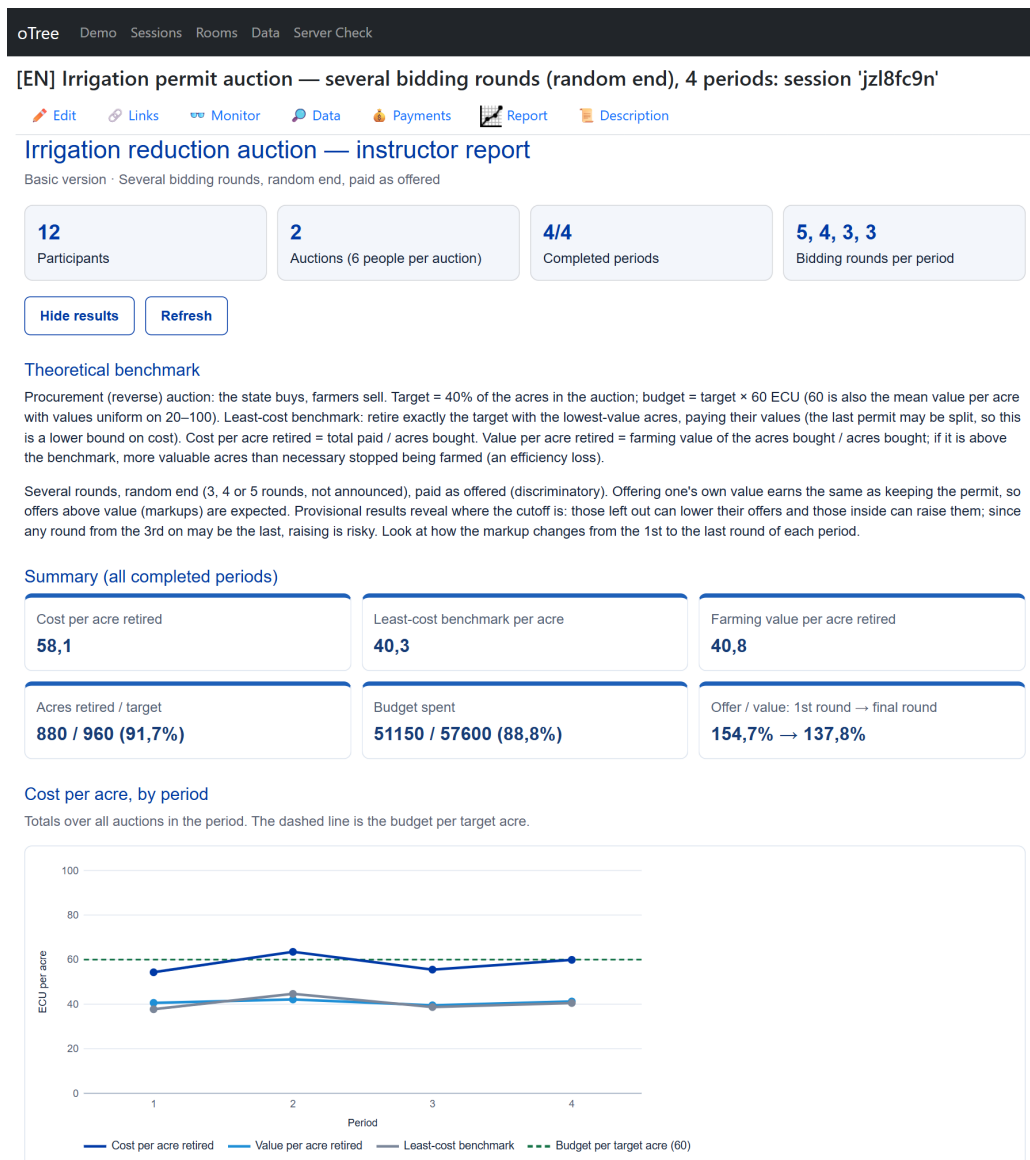


Figure 4.2: Revealed report: theoretical benchmark, summary and cost per acre by period (session of 12 participants, two auctions and 4 periods with simulated decisions).

Offer as % of value, by bidding round

Average offer/value $\times 100$ over permits offered (offer > 0) in each bidding round. Do offers fall or rise across the rounds of a period? Rounds 4 and 5 include only the periods that reached them.



Bidding round	Offer / value (%)	Offers
1	154,7	96
2	143,7	96
3	141,1	89
4	140,2	43
5	141,1	19

Figure 4.3: Revealed report: offer as % of value by bidding round (simulated decisions).

Comparing formats

Actual result; in multi-round formats, what would have happened if the 1st bidding round had been final; and the same final offers under the other payment rule (a mechanical calculation: it ignores that people would offer differently). To really compare formats, run sessions with different configurations (several rounds, one round, uniform price, announced end) and compare this table across reports.

Case	Cost / acre	Value / acre retired	Benchmark / acre	Acres / target (%)	Budget spent (%)
Actual result (final offers)	58,1	40,8	40,3	91,7	88,8
If the 1st round had been final	60,3	40,1	40,3	86,5	86,9
Same final offers, uniform price	68,1	37,4	40,3	69,8	79,2

Distribution of final offers per acre

Offers in the final round of each completed period (0s, i.e. permits not offered, excluded).

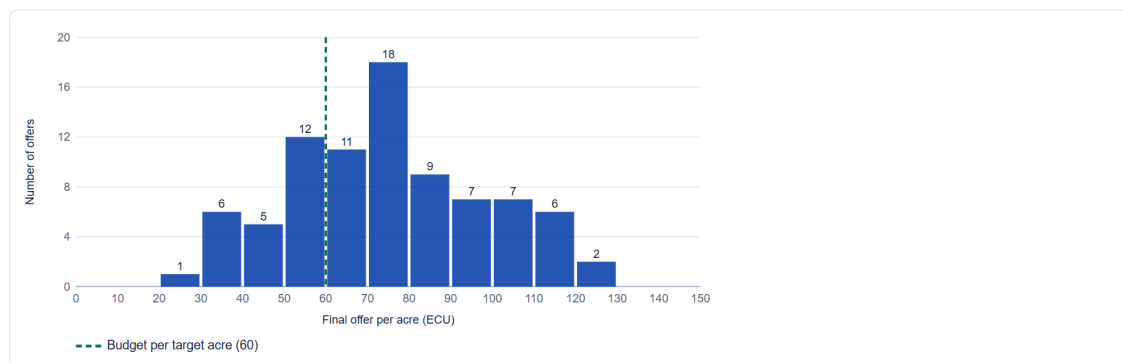


Figure 4.4: Revealed report: comparing formats and histogram of final offers (simulated decisions).

Results by period

Period	Bidding rounds	Auctions	Acres bought	Target	Spent	Budget	Cost / acre	Value / acre retired	Benchmark / acre	Offer/value 1st round (%)	Offer/value final round (%)
1	5	2	230	256	12500	15360	54,3	40,6	37,7	166,3	141,1
2	4	2	190	228	12060	13680	63,5	42,1	44,6	156,4	141,2
3	3	2	220	220	12210	13200	55,5	39,5	38,7	151,8	134,1
4	3	2	240	256	14380	15360	59,9	41,2	40,5	144,4	134,8

Auctions in the last completed period (Period 4)

Auction	People	Total acres	Target	Budget	Acres bought	Spent	Cutoff	Benchmark cost
1	6	360	144	8640	140	8560	78	5960
2	6	280	112	6720	100	5820	77	4406

Individual data: Data → Custom export (water_auction), one row per person and bidding round (binding = final round of the period). Design: Holt (Veconlab, "Water Auction"); Cummings, Holt and Laury (2004).

Figure 4.5: Revealed report: tables by period and by auction in the last period (simulated decisions).

4.2 How to read the report

1. The **theoretical benchmark** defines the target, the budget and the least-cost benchmark, and describes the session's format and what to expect from it.
2. The **summary** pools all completed periods: cost per acre retired (total paid / acres bought), least-cost benchmark per acre (per target acre), farming value per acre retired, acres retired against the target, budget spent, and the offer as a percentage of value in the 1st round and in the final round.
3. The gap between **cost per acre** and **value per acre retired** is what the state paid above the value of what it retired: the rent captured by those who sold. The gap between **value per acre retired** and the **benchmark** shows whether more valuable acres than necessary were retired (an efficiency loss). Caveat: the benchmark is per target acre and lets the last permit be split; if fewer acres than the target were bought, the value per acre retired can even fall below the benchmark without meaning anything special.
4. **Acres retired / target** and **budget spent** show which constraint bound: with high markups the budget runs out before the target; since the state buys whole permits, it sometimes misses the target even with budget to spare.
5. The **offer as % of value by round** chart answers the central question of multiple rounds: do offers fall over a period? Rounds 4 and 5 only include the periods that reached them, so they have fewer offers (**Offers** column). Offers of 0 (withdrawn permits) are not averaged in.
6. **Comparing formats** sets beside the actual result what would have happened had the 1st round been final, and what the same final offers would give under the other payment rule. It is a mechanical calculation: it ignores that people would offer differently under another rule. The real comparison is across sessions with different configurations.
7. The **histogram** shows final offers per acre with the budget per acre as a reference; the **tables** give details by period and, for the last period, by auction (including the cutoff and the benchmark cost).

Note

The English report currently prints decimals with a comma (58,1) because the server's base language is Spanish, while chart legends use a point. Read "58,1" as 58.1.

For the instructor

In the simulated session in the figures (12 participants in two auctions, 4 periods that had 5, 4, 3 and 3 bidding rounds; *scripted* decisions for illustration, not class results), cost per acre retired was 58.1 against a least-cost benchmark of 40.3 and a value per acre retired of 40.8; 880 of the 960 target acres were retired (91.7%) using 88.8% of the budget. The average offer was 154.7% of value in the 1st bidding round and 137.8% in the final round. With the same final offers and a uniform price, the mechanical calculation gives 68.1 per acre and 69.8% of the target. The script had each person start by asking 1.4 to 2 times their value (a little less each period), lower the offer on a permit that would not be bought (half of them to just below the provisional cutoff), never offer below their value plus a small margin, and withdraw high-value permits (80 or more) that were left out; three people slightly raised offers that would be bought. The game drew the permits and the number of rounds. Your class's numbers will differ.

Debrief script

Start with the summary: how much did the state pay per acre, and what were the acres it retired worth to those who farmed them? Ask someone who sold what offer they wrote and why. Then show the chart by round: did offers fall after seeing the provisional cutoff? Did anyone raise an offer that would be bought, and in which round? Close with the least-cost benchmark: if the state knew the values, retiring the same target would cost much less; the auction is the way to find out who farms the least valuable acres, and the markup is the price of that information.

Theoretical background and evidence

5.1 Theoretical benchmark: least cost, rent and markup

Theoretical background

Take an auction with permits $j = 1, \dots, J$, each with a_j acres and value per acre v_j , and a target of T acres.

Least-cost benchmark. Sort permits by increasing v_j and retire acres from the lowest-value ones until T is reached, allowing the last one to be split. The cost $C^* = \sum_j v_j x_j$ (with x_j the acres retired from each permit) is the lowest possible cost of retiring T acres: it is also society's minimum loss of farming. Since in the game the state buys whole permits, C^* is a lower bound. With $v \sim U\{20, \dots, 100\}$ and $T = 40\%$ of the acres, the retired acres have values between 20 and about 52, averaging close to 36.

Paid as offered. Relative to keeping the permit, an offer b_j the state buys earns $(b_j - v_j) a_j$; if not bought it earns 0. Offering the value earns the same as not selling, so any offer that can make a profit lies above value: a *markup* ($b_j/v_j > 1$) is expected, larger the less likely one is to be left out. The state's cost per acre is the average of the offers bought, not the value of the acres retired; the difference is rent to those who sell.

Uniform price. Every permit bought is paid the first offer not bought. One's own offer changes the payment only when it is exactly that first rejected offer (it sets the price); otherwise it only decides whether one sells, and there offering one's value is best. There is less reason to mark up, but every acre bought is paid the cutoff price. Since each person holds two permits, someone with one permit inside may gain by raising the other permit's offer if that other one sets the price.

Budget. The budget (60 per target acre) equals the mean value per acre. With offers equal to value, the target is normally met with budget to spare; with high markups, the budget runs out before the target.

Several rounds with provisional results. What follows are intuitions for discussion, not results attributed to a source. Each provisional result reveals where the cutoff is: those left out can lower their offer to get in, and those inside are tempted to raise theirs to be paid more. With a random end, raising is risky, because from the third round on any round may be the last and a raised offer may end up out for good. With an announced end, earlier rounds commit nobody to anything: one can probe with high offers and decide only in the last round. With a single sealed round, each person chooses without knowing the cutoff.

Efficiency. Someone with a high-value permit may offer high and be left out, which is efficient; the problem arises when markups on low-value permits are so high that the state, to meet its target or within its budget, buys higher-value permits instead, or misses the target.

5.2 Experimental evidence and origin of the design

Cummings et al. (2004) describe how laboratory experiments were used to design the State of Georgia's irrigation reduction auction. This guide cites that work as the origin of the design; it does not attribute specific results to it. The classroom version this game follows is Holt (2019) and his Veconlab "Water Auction" program (<https://veconlab.com>), with bidding rounds, announced provisional winners and a final round unknown to bidders. The parameters of the actual Georgia auction are not reproduced.

5.3 Patterns worth discussing

These are the questions the design aims to make visible; they are expectations to check in your own session's report, not guaranteed results or results attributed to a source:

- Are offers above value? When paid as offered, a markup is the expected answer.
- Do offers fall from the 1st to the final round within each period? And from one period to the next?
- How much does the state pay per acre compared with the least-cost benchmark and with the value of what it retires?
- Were high-value acres retired while low-value ones with high offers were left out?
- What changes across sessions with several rounds, a single round, a uniform price and an announced end?

Note

Class results are descriptive. With two to six auctions per session and permits drawn at random, cost per acre varies a lot from one period to another because of the values drawn (always compare with the same period's least-cost benchmark). The same person's offers across rounds and periods are not independent observations, and comparisons between formats require separate sessions.

Basic modes

The three basic modes live in the same room (basic, in each language); the panel only allows one active session per room at a time. All of them pay as offered.

6.1 Several rounds, one period

`water_auction_en_multi_round_1_period`: a single period of 3 to 5 bidding rounds. Useful as a short demonstration (10–12 minutes) or to collect a first reaction before explaining the least-cost benchmark. With one period, the report has one point per chart and the numbers depend heavily on the values drawn.

6.2 Several rounds, four periods

`water_auction_en_multi_round_4_periods`: the reference configuration, described in Chapter 3. It shows how offers evolve within each period (provisional results) and across periods (experience).

6.3 One sealed round, four periods

`water_auction_en_single_round_4_periods`: each period has a single sealed bidding round, with no provisional results. The instructions say so and each period's result is final. It serves as a contrast with the multi-round configuration, running each with a different group (or one after the other with the same group, knowing that the second mixes the format with experience).

Instructions

Period 1 of 4

You hold two irrigation permits, one for each of your plots. In each period, the state (the computer) buys irrigation permits from the people in your auction. Your auction has **6 people** (you and 5 others); they are the same people in every period.

Your permits

Each permit covers a plot of 10, 20, 30 or 40 acres and has a **value per acre**: what you get for each acre if you keep the permit and farm the plot.

The value per acre is a whole number between 20 and 100; every number is equally likely, and so are the four plot sizes. At the start of each period you receive two new permits. Only you know yours; the other people's permits are drawn the same way.

Your earnings from each permit: if the state buys it, you receive the payment; if you keep it, you receive its value per acre $\times$ its acres. Your earnings in the period are the sum over your two permits.

Your earnings cannot be negative.

How the state buys

For each permit you enter an offer: the price per acre you ask for selling it, a whole number between 1 and 150 (150 is the maximum offer). Enter 0 if you do not offer that permit. The state buys whole permits, never part of a plot.

In each period the state has an **acre target** (40% of all the acres of the plots in your auction) and a **budget** in ECU. It never buys more acres than the target or spends more than the budget. Both numbers are shown on screen in every period.

The state ranks all offers in your auction from the lowest to the highest (price per acre); ties are ordered at random. It goes down the list in that order and buys each permit that fits both in the acres still missing to reach the target and in the budget still left. **If a permit does not fit, the state skips it and moves on to the next one on the list.**

Payment: each permit bought receives its own offer per acre $\times$ its acres.

Example: a 30-acre permit with a value of 55 per acre. If the state buys it with an offer of 70 per acre, you earn $70 \times 30 = 2100$ ECU. If you keep it, you earn $55 \times 30 = 1650$ ECU.

Bidding rounds

Each period has a single bidding round: the offers of that round are the ones that count.

- Auctions are formed with 6 people; when the class does not divide evenly, the remaining people join the first auctions. With fewer than 6 participants, a single smaller auction is formed.
- There will be 4 periods. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

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Figure 6.1: Instructions of the single-round mode.

Result of the period

Period 1 of 4

This is the final result of the period.

Permit	Acres	Value per acre	Your offer per acre	Result	Earnings
1	30	51	102	Kept	1530 ECU
2	30	34	68	Sold	2040 ECU

Highest offer per acre among the permits bought

68

Your earnings in the period

3570 ECU

Cumulative earnings

3570 ECU[Next period](#)

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Figure 6.2: Result of a period with a single round (simulated decisions).

Extended variants

Variant	What changes	What it is for
Uniform price	Several rounds with a random end, but every permit bought is paid the first offer not bought. The state buys without skipping permits.	Comparing markups and cost per acre between payment rules.
Announced end	Always 4 bidding rounds, announced; only the 4th counts. Paid as offered.	Seeing whether offers stay high until the last round when everyone knows which one counts.

Both live in the extended room ([EN] **Irrigation Permit Auction — extended**) and have 4 periods.

7.1 Uniform price

`water_auction_extended_uniform_price_4_periods`: the state ranks offers as in the basic game, but buys the longest run of offers from the lowest, *without skipping any*, such that the acres bought do not exceed the target and the price $\times$ the acres bought does not exceed the budget; the price per acre is the first offer it does not buy (150 if it buys every offer). Each permit bought is paid that price $\times$ its acres, which is never less than its offer. Why no skipping? If the state skipped a permit, that permit would be the first rejected offer and would set the price, and any permit bought after it would be paid less than it asked. The instructions explain this in plain language. The first comprehension question changes: a 20-acre permit with value 45, offered at 75 and bought at a price of 85, earns $85 \times 20 = 1700$. Results show “Price per acre that would be paid” (provisional) and “Price per acre paid” (final).

Instructions

Period 1 of 4

You hold two irrigation permits, one for each of your plots. In each period, the state (the computer) buys irrigation permits from the people in your auction. Your auction has **6 people** (you and 5 others); they are the same people in every period.

Your permits

Each permit covers a plot of 10, 20, 30 or 40 acres and has a **value per acre**: what you get for each acre if you keep the permit and farm the plot.

The value per acre is a whole number between 20 and 100; every number is equally likely, and so are the four plot sizes. At the start of each period you receive two new permits. Only you know yours; the other people's permits are drawn the same way.

Your earnings from each permit: if the state buys it, you receive the payment; if you keep it, you receive its value per acre $\times$ its acres. Your earnings in the period are the sum over your two permits.

Your earnings cannot be negative.

How the state buys

For each permit you enter an offer: the price per acre you ask for selling it, a whole number between 1 and 150 (150 is the maximum offer). Enter 0 if you do not offer that permit. The state buys whole permits, never part of a plot.

In each period the state has an **acre target** (40% of all the acres of the plots in your auction) and a **budget** in ECU. It never buys more acres than the target or spends more than the budget. Both numbers are shown on screen in every period.

The state ranks all offers in your auction from the lowest to the highest (price per acre); ties are ordered at random. It buys permits in that order, without skipping any, and stops at the first offer it does not buy. It buys as many permits as it can in that order without going over the acre target and without the total payment (price per acre $\times$ acres bought) going over the budget.

Payment: the first offer the state does not buy sets the price per acre. Each permit bought receives that price $\times$ its acres, which is never less than its own offer. If the state buys every permit offered, the price per acre is 150.

Example: a 30-acre permit with a value of 55 per acre. If the state buys it and the price per acre is 70, you earn $70 \times 30 = 2100$ ECU. If you keep it, you earn $55 \times 30 = 1650$ ECU.

Bidding rounds

Each period has between 3 and 5 bidding rounds; the number is not announced. After each round, the state works out which permits it would buy if that were the last round. You see whether your permits would be bought and the price per acre that would be paid. After each round you are told whether it was the last one of the period; if it was not, you can change your offers in the next one. **Only the offers of the last round of the period count.**

- Auctions are formed with 6 people; when the class does not divide evenly, the remaining people join the first auctions. With fewer than 6 participants, a single smaller auction is formed.
- There will be 4 periods. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

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Figure 7.1: Instructions with a uniform price.




Before you start

Period 1 of 4

Answer based on the instructions.

Your permit has 20 acres and its value is 45 per acre. You offer 75 per acre; the state buys the permit and the price per acre is 85. How much do you earn from that permit?

☐ 800 ECU
 ☐ 900 ECU
 ☐ 1500 ECU
 ☐ 1700 ECU

Your permit has 40 acres and its value is 35 per acre. You offer 90 per acre and the state does not buy the permit. How much do you earn from that permit?

☐ 0 ECU
 ☐ 1400 ECU
 ☐ 2200 ECU
 ☐ 3600 ECU

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Figure 7.2: Comprehension check with a uniform price: the first question uses a price above the offer.




Result of the period

Period 1 of 4 · Bidding round 4

This was the last bidding round of the period. This result is final.

Permit	Acres	Value per acre	Your offer per acre	Result	Earnings
1	10	23	28	Sold	530 ECU
2	30	65	68	Kept	1950 ECU

Price per acre paid
53

Your earnings in the period
2480 ECU

Cumulative earnings
2480 ECU

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Figure 7.3: Result with a uniform price: the permit sold is paid the cutoff price, above its offer (simulated decisions).

Note

Without skipping, the uniform price can retire considerably fewer acres than the target: as soon as a large permit does not fit, the state stops. This is part of the rule and worth anticipating when comparing with pay-as-offered (in the simulated session in the figures, the same final offers under a uniform price would have retired only 69.8% of the target).

7.2 Announced end

`water_auction_extended_announced_final_4_periods`: each period always has 4 bidding rounds and the instructions say so: only the offers of round 4 count. The header shows “Bidding round k of 4” and the provisional result recalls how many rounds there are. Everything else is as in the basic game.




Instructions

Period 1 of 4

You hold two irrigation permits, one for each of your plots. In each period, the state (the computer) buys irrigation permits from the people in your auction. Your auction has **6 people** (you and 5 others); they are the same people in every period.

Your permits

Each permit covers a plot of 10, 20, 30 or 40 acres and has a **value per acre**: what you get for each acre if you keep the permit and farm the plot.

The value per acre is a whole number between 20 and 100; every number is equally likely, and so are the four plot sizes. At the start of each period you receive two new permits. Only you know yours; the other people's permits are drawn the same way.

Your earnings from each permit: if the state buys it, you receive the payment; if you keep it, you receive its value per acre $\times$ its acres. Your earnings in the period are the sum over your two permits.

Your earnings cannot be negative.

How the state buys

For each permit you enter an offer: the price per acre you ask for selling it, a whole number between 1 and 150 (150 is the maximum offer). Enter 0 if you do not offer that permit. The state buys whole permits, never part of a plot.

In each period the state has an **acre target** (40% of all the acres of the plots in your auction) and a **budget** in ECU. It never buys more acres than the target or spends more than the budget. Both numbers are shown on screen in every period.

The state ranks all offers in your auction from the lowest to the highest (price per acre); ties are ordered at random. It goes down the list in that order and buys each permit that fits both in the acres still missing to reach the target and in the budget still left. **If a permit does not fit, the state skips it and moves on to the next one on the list.**

Payment: each permit bought receives its own offer per acre $\times$ its acres.

Example: a 30-acre permit with a value of 55 per acre. If the state buys it with an offer of 70 per acre, you earn $70 \times 30 = 2100$ ECU. If you keep it, you earn $55 \times 30 = 1650$ ECU.

Bidding rounds

Each period has exactly 4 bidding rounds. After each round, the state works out which permits it would buy if that were the last round. You see whether your permits would be bought and the highest offer per acre among the permits that would be bought, and you can change your offers in the next round. **Only the offers of round 4 count.**

- Auctions are formed with 6 people; when the class does not divide evenly, the remaining people join the first auctions. With fewer than 6 participants, a single smaller auction is formed.
- There will be 4 periods. Your earnings from all periods are added up.
- Amounts are in ECU (experimental currency units). There is no cash payment.

Continue

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Figure 7.4: Instructions with an announced end.

Debrief script

If the class played with a random end and with an announced end (in separate sessions), compare the offer-as-%-of-value charts by round: in which did offers fall more before the last round? Why might it matter not to know which round counts?

Lesson plan and reading the results

8.1 Suggested 50-minute session

0–5 min	Create the session (room [EN] Irrigation Permit Auction , configuration <code>water_auction_en_multi_round_4_periods</code>). Students join by QR code or link.
5–10 min	Cover page, instructions and comprehension check. Make clear that the computer is the state and that offers are per acre.
10–35 min	Four periods of 3 to 5 bidding rounds (about one minute per round). Follow progress in the Monitor.
35–38 min	Open the hidden report; ask for predictions: how much did the state pay per acre? What were those acres worth to those who farmed them?
38–46 min	Reveal results. Show the summary, the cost-per-acre chart, the chart by round and the format comparison. Discuss.
46–50 min	Wrap-up: least-cost benchmark, sellers' rent, and why a markup is the expected response when paid as offered; connect with real programs that buy back water rights or pay for conservation.

8.2 Questions to guide the discussion

- What offer did you write in the first round, and why? Did it change after seeing the provisional cutoff?
- If the state knew each plot's value, how much would it cost to retire the target? Why can it not simply ask?
- Who kept the difference between what the state paid and what the retired acres were worth?
- Did anyone raise an offer that would be bought? Did it work? Would the answer change if you knew which round counts?
- Were the lowest-value acres retired? If not, what did society lose?
- Which payment rule would the state prefer: paying each person their offer, or paying everyone the same price? And the sellers?

8.3 Common misreadings

Misreading	Clarification
“If I am paid my value, I gain.”	Selling at your value earns exactly the same as keeping the permit; the gain from selling is what you are paid above value.
“The state paid 58 per acre and the budget was 60: it bought cheap.”	The budget is not the benchmark. Compare with the value of the acres retired and with the least-cost benchmark.
“Offering high always pays, because if I am bought I earn more.”	A high offer can also be left out, and then the gain from selling is 0. The provisional cutoff shows how high one could go in that round, not in the final one.
“With a uniform price the state always pays more.”	It pays everyone the cutoff price, but offers may be lower; the report’s mechanical comparison ignores that change in behaviour.
“The value per acre retired fell below the benchmark: the auction beat the optimum.”	The benchmark is per target acre and allows splitting permits; if fewer acres than the target were bought, the value per acre retired can fall below it.

Operation, privacy and troubleshooting

9.1 Privacy and conduct

Participant codes are anonymous: do not ask for or show names, student IDs or seats alongside individual decisions. Project only aggregate results (averages, charts, histograms). The session's data remain available to you under **Data**; do not share them outside teaching use or research authorized by the lab.

9.2 If someone disconnects: Advance slowest participants

Each bidding round of an auction waits for its six (or seven) members to submit offers. If a student disconnects, ask them to reopen the room in the same browser: it resumes where it left off (from the second bidding round on, with the previous round's offers in the boxes). If they cannot, use **Advance slowest participants** in the Monitor. This is what the game records in that case:

- **On the offers screen**, the advanced person keeps the offers they submitted in the previous bidding round of the same period. In the first round of a period there are no previous offers, so both permits are recorded as 0 ("Not offered"): if that round turns out to be the last, they keep both permits and earn their value. Anything typed in the boxes but not submitted is not used.
- Their result for that round shows a notice: no offers were sent and their offers from the previous round of the period were used (0 if it was the first). The case is flagged in **Data** (column `auto_offer`).
- In the report, kept offers count as ordinary offers. The 0s from a first round are not included in the average offer/value or in the histogram, but they reduce the acres offered and can reduce the acres retired.
- On the cover page, the instructions and the comprehension check, advancing someone just moves them to the next screen. On the result screens, it just moves them to the next round.

9.3 Common problems

Situation	What to do
Someone sees “La sesión está llena” (session full).	You declared fewer participants than arrived. Close the room and create another session with the correct number.
The round keeps waiting.	Someone in that auction has not submitted offers. Ask them to reopen the room in the same browser, or use Advance slowest participants (section 9.2).
Someone cannot submit their offers.	A box is empty or has a number outside 0–150 or with decimals; the browser points it out.
Someone asks how many rounds are left.	In the basic configuration nobody knows: there are 3 to 5 and the last one is announced when it ends. Do not give it away.
One auction is ahead of another.	This is normal: each auction moves on when its members submit offers.
A different game appears in Demo or Rooms.	The panel does not belong to this game. Do not start the session; notify the lab.
You need to repeat the activity with the same group.	Create a new session in the same room; the previous session’s data stay under Sessions .

9.4 Data for later analysis

Data → **Custom export (water_auction)** gives one row per participant and bidding round: session, anonymous code, oTree round, period, bidding round, last round of the period, whether the round was final (**binding**), language, edition, treatment, payment rule, auction and its size, total acres, target and budget; for each permit, acres, value, offer, whether it was (or would be) sold and the payment; whether the offers were filled in automatically, earnings in the period (final round only), the auction’s acres bought, spending and cutoff, benchmark cost and comprehension-check attempts. It contains no personal identifiers.

Annotated bibliography

- [Cummings et al. \(2004\)](#): laboratory experiments used to design Georgia’s irrigation reduction auction; the origin of this game’s design.
- [Holt \(2019\)](#): the classroom version and its Veconlab program (“Water Auction”).

Bibliography

- Cummings, R. G., Holt, C. A. and Laury, S. K. (2004). Using laboratory experiments for policymaking: An example from the Georgia irrigation reduction auction. *Journal of Policy Analysis and Management*, 23(2), 341–363. doi:10.1002/pam.20007.
- Holt, C. A. (2019). *Markets, Games, and Strategic Behavior: An Introduction to Experimental Economics* (2nd ed.). Princeton University Press. No DOI. “Water Auction” program on Veconlab: <https://veconlab.com>.

Room QR codes

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

Irrigation reduction auction

English room



`waterauction.beer-lab.org/room/water_auction_en`

Scan the code and press **Start**.

Irrigation reduction auction

English room, extended version



`waterauction.beer-lab.org/room/water_auction_extended`

Scan the code and press **Start**.

Irrigation reduction auction

Sala en español



waterauction.beer-lab.org/room/water_auction_es

Escanee el código y pulse **Comenzar**.

Irrigation reduction auction

Sala en español, versión extendida



waterauction.beer-lab.org/room/water_auction_extendido

Escanee el código y pulse **Comenzar**.