



Instructor's Guide to Territorial Spending

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



Revised edition | October 2026

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

How to use this guide

This guide supports the preparation, implementation, and classroom discussion of the territorial spending game family available through the Behavioral and Experimental Economics Research Lab (BEER Lab) at the Department of Economics of Tecnológico de Monterrey. It is intended for instructors with different levels of familiarity with experimental and behavioral economics.

The document offers three reading paths. The **quick guide** is enough to launch a session. The operational chapters explain each screen used by instructors and students. The conceptual chapters present the theories, predictions, and empirical findings needed to lead the post-game discussion.

Access instructions and common screens are explained once. Each variant then focuses only on what changes relative to the basic game: configuration, group size, decisions, predictions, relevant outcomes, and academic literature.

Author

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For the instructor

This guide follows the English-language interface. Spanish configurations use the same logic. Never project individual codes or connect outcomes to names, student identification numbers, or seats in the room.

Contents

How to use this guide	i
1 Objectives and organization	1
1.1 The political economy question	1
1.2 Learning outcomes	1
1.3 Curricular placement and prerequisites	2
1.4 A focused teaching sequence	2
1.5 Participation, information, and privacy	2
2 Rules and worked accounts	4
2.1 Accounts, resources, and the budget	4
2.2 Each voter's account	4
2.3 Why a distributive tradeoff exists	5
2.4 A complete binding-election example	5
2.5 Rounding and resource conservation	5
3 Preparation and screen sequence	6
3.1 Instructor preparation and access	6
3.2 The four rooms and configuration choice	7
3.3 Welcome, instructions, and understanding	8
3.4 Announcements, ballots, and waiting	9
3.5 Closing and recording the session	9
4 Predictions and comparison criteria	14
4.1 Individual preferences and electoral support	14
4.2 National and territorial majorities	14
4.3 The mechanical counterfactual using the same ballots	15
4.4 Efficiency, inequality, and representation	15
4.5 What the theory does and does not predict	15
5 Extended versions	16
5.1 The general spending floor	16
5.2 Districts with one, two, and three residents	16
5.3 Bonuses associated with the winner	16
5.4 An announcement and a later decision	17
5.5 Tenure and reelection with a matched horizon	19
5.6 Three parties and seat allocation	19
5.7 Proposal, partners, and government formation	20
5.8 Coalition rewards and the scope of comparison	21
6 Report, data, and discussion	22
6.1 Reading the private report	22

6.2	Distributions and change across periods	23
6.3	CSV, genuine zeros, and pending decisions	23
6.4	An analysis table that respects the units	23
6.5	A debrief script	24
7	Lesson plans and solved exercises	25
7.1	An introductory lesson plan	25
7.2	Institutional comparison over two sessions	25
7.3	Exercise: moving ten budget units	25
7.4	Exercise: unequal representation and ballots	26
7.5	Exercise: consumption and a personal bonus	26
7.6	Exercise: a coalition and rejection	26
7.7	Exercise: credibility and electoral discipline	27
8	Literature, limits, and instructor support	28
8.1	Theoretical readings and design provenance	28
8.2	Empirical evidence and extrapolation limits	28
8.3	Operational problems and recovery	29
8.4	Preparation checklist and assessment criteria	29

List of Figures

3.1	Access through the public portal	6
3.2	Teaching catalog and filters	7
3.3	The four local rooms	8
3.4	Creating a session in the basic room	9
3.5	Initial instructions; scroll to read the remaining rules	10
3.6	Understanding questions with validation	10
3.7	A candidate announces an allocation	11
3.8	Ballot and announcement comparison	12
3.9	Implemented allocation and period account	13
5.1	Information with unequal district sizes	17
5.2	Public personal-bonus table	18
5.3	The government's subsequent allocation	18
5.4	Second ballot with the preceding period's record	19
5.5	Selecting a coalition and actual budget	20
5.6	Partner acceptance or rejection (end of the screen)	21
6.1	Private report after revealing results	22

Objectives and organization

Purpose	Connect competition, allocation, and representation
Participants	Multiples of 8; multiples of 9 for coalitions
Suggested duration	30–45 minutes one election; 60–80 ten periods; 80–100 coalitions
Experimental unit	Group of 8; group of 9 in the parliamentary module
Basic edition	One election; ten fixed or reassigned periods
Extended edition	Eleven institutional configurations per language
Decision	Announce, vote, and, when applicable, implement or accept
Payoff	Initial account 100, public budget 100, total office reward 40 ECU
Topics	Electoral competition; territorial distribution; public goods; political representation; credibility; coalitions
JEL	A22, C92, D72, H41, H61

1.1 The political economy question

For the instructor

This activity examines how competition for office changes the allocation of a public budget. Candidates choose between general spending, which benefits every voter, and transfers directed to three districts. Voters compare announcements and select an option. An electoral rule transforms these individual decisions into authority to spend. The outcome reveals a central tension: a policy may attract enough support to win while producing less aggregate material consumption than another feasible policy.

The teaching objective is to connect three separate objects: the resources each person receives, the distribution of electoral support, and the rule determining who governs. Keep these objects separate from the beginning. A majority of votes is not a measure of efficiency; winning a district is not the same as attracting one additional voter; an announcement is not necessarily an implemented decision. Extended versions alter one or more links in this sequence and help students identify which comparison is informative.

1.2 Learning outcomes

By the end of the activity, students should be able to construct a feasible budget allocation, calculate a voter's account, and explain why preferences can differ across districts. They should

also reconstruct a national election and a district election using the same six ballots. Comparing these calculations is especially useful: it shows how aggregation changes without assuming that candidates and voters would behave identically when facing different announced rules.

A second outcome is recognizing the limits of each interpretation. Students should distinguish descriptive comparisons from causal estimates, separate material consumption from a bonus associated with the winner's identity, and explain why the parliamentary module is an institutional package. They should also identify the denominator behind every report indicator: participants, voters, groups, or periods. Assessment can require a short explanation supported by a checkable calculation. Using technical vocabulary without connecting it to an actual decision or observed result should not be sufficient.

1.3 Curricular placement and prerequisites

The family fits political economy, public economics, and introductory courses that have already introduced opportunity cost and constrained choice. Students do not need to solve a mixed-strategy equilibrium. Before playing, check that they understand a budget sum, a per-resident transfer, and a majority rule. In advanced courses, the same choices provide a route into credible commitment, unequal representation, and the difference between material preferences and partisan support.

The catalog uses JEL codes A22, C92, D72, H41, and H61, covering undergraduate teaching, laboratory group experiments, political processes, public goods, and budget systems. Search topics include electoral competition, territorial distribution, public goods, political representation, promise credibility, and government coalitions. These labels help instructors select an activity. Participant screens instead describe choices and consequences without announcing a hypothesis. Avoid presenting the conceptual title as an instruction about expected behavior. Ask students to establish their own reasoning before introducing theoretical interpretations during the debrief.

1.4 A focused teaching sequence

For a first class, use one binding national election and reserve district aggregation for the subsequent discussion. Spend a few minutes on instructions, allow everyone to answer the understanding questions, and begin only when students can explain a voter's account. After decisions, reconstruct one platform and one election before displaying averages. A single complete observation that students understand contributes more than several variants without time to discuss them.

In a second session, assign independent groups to national voting and district voting. Keep the budget, public return, district sizes, and temporal structure constant. Introduce the general spending floor later as an institutional restriction. Promise and coalition versions deserve another session because they add decisions after the election. Suggested durations are planning estimates: one election may take thirty to forty-five minutes including discussion; ten periods commonly require sixty to eighty minutes, while the parliamentary module may require longer. Adjust pacing to the class rather than treating these estimates as guaranteed completion times.

1.5 Participation, information, and privacy

Two-candidate versions require complete groups of eight people: two candidates and six voters. The proportional module uses nine: three parties and six voters. Several groups may run simultaneously, provided the total is a multiple of the relevant group size. Prepare an alternative activity for

students who cannot enter a complete group. Do not add fictitious participants to a session that you intend to interpret as evidence of student behavior.

Participants know the resources, district sizes, electoral rule, and consequences of their choices. Personal-bonus variants also display a public table of induced preferences. Individual ballots should not be projected during play. Use group outcomes during discussion and remove names or identifiers that could reveal an individual's decision. Acceptance of laboratory rules organizes this classroom exercise; it does not replace a research consent procedure when a separate research project requires one. Explain any actual payment arrangement before students start, and use the same announced arrangement consistently throughout that session.

Rules and worked accounts

2.1 Accounts, resources, and the budget

What participants will see

Each participant starts every active period with an account of 100 ECU. Separately, candidates allocate a public budget of 100 ECU. This budget is not deducted from their accounts or from voters' accounts. An allocation contains four quantities: G for general spending and X1, X2, and X3 for the respective districts. Every quantity must be nonnegative and a multiple of ten. The four entries must total exactly one hundred; leaving a field empty is not equivalent to entering zero.

The winner receives an external office reward of 40 ECU in addition to the initial account. Thus, in two-candidate versions, the winner finishes with 140 and the loser with 100. This reward does not reduce the public budget. The accounting separation matters: charging it to the budget would create an unintended tradeoff between office compensation and citizen spending. In the coalition module, the 40 ECU is a total reward divided among government parties, rather than an additional forty for every coalition member.

2.2 Each voter's account

General spending gives each of the six voters 0.20 ECU for every ECU allocated to G. A territorial transfer is divided only among residents of its district. With two residents in each district, each receives half of X. A voter's material account equals 100 plus 0.20 times G plus the district's transfer per resident. Induced-preference variants may add a personal bonus of ten, which is recorded separately.

Consider G=40, X1=40, X2=20, and X3=0. The budget totals one hundred. Every voter receives eight from general spending. Residents of district one receive another twenty and finish with 128; district two residents receive another ten and finish with 118; district three residents finish with 108. Total citizen material consumption is 708. Check it by adding two accounts of each type. This calculation prevents a common mistake: treating the entire district allocation as income received separately by every resident. Only the per-resident share belongs in an individual account.

$$m_{id} = b + \alpha G + \frac{X_d}{n_d}, \quad y_{id} = m_{id} + z_i(w). \quad (2.1)$$

Here b=100, $\alpha=0.20$, n is district population, m is material consumption, z is the personal bonus depending on winner w, and y is the voter's total earnings.

2.3 Why a distributive tradeoff exists

Theoretical foundation

When the full budget is implemented, total material consumption of the six voters equals 700 plus 0.20 times G . Add the six initial accounts, six general returns, and territorial transfers, which together equal 100 minus G . Allocating the entire budget to general spending therefore produces 720 in citizen material consumption; allocating everything to territorial transfers produces 700. General spending has a social return of 1.20 per unit, whereas territorial transfers have an aggregate return of one.

An individual in a two-resident district nevertheless receives 0.50 per unit directed to that district and only 0.20 per general unit. Four voters can prefer a platform placing fifty in each of their two districts: their accounts become 125, compared with 120 under all-general spending. The excluded residents remain at 100. That platform can attract four votes while reducing aggregate citizen consumption from 720 to 700. This possibility motivates the exercise; it does not establish that participants will always choose that outcome.

2.4 A complete binding-election example

Suppose A announces $G=100$ with no territorial transfers, while B announces $G=0$, $X_1=50$, $X_2=50$, and $X_3=0$. Residents of districts one and two compare 120 with 125; residents of district three compare 120 with 100. If each person votes for the larger material account, B receives four votes and A receives two. Under national aggregation, B wins and its announcement is implemented automatically. B receives 140, A receives 100, and citizen accounts sum to 700.

The total for all eight people is 940. Under A's announcement it would have been 960: 720 for voters and 240 for candidates. The external office reward is the same size in both outcomes. With personal bonuses, add those in a separate column before comparing total monetary earnings. Ask students to identify who gains and loses when the platform changes, then calculate the aggregate change. This order helps explain why an improvement for a majority need not improve the sum of everyone's accounts.

2.5 Rounding and resource conservation

Accounts use two decimal places. When a transfer cannot be divided into exact cents among residents, each person first receives the integer-cent portion of their quota. Remaining cents are assigned by largest remainders, using a drawn order among equal remainders. For example, dividing ten ECU among three people produces shares of 3.34, 3.33, and 3.33. The recorded draw determines who receives the extra cent.

Do not calculate three shares of 3.33 and claim that the district received ten: those shares total 9.99. The program conserves the exact territorial transfer and the parliamentary office reward. Individual forecasts displayed before voting may differ from realized accounts by one cent. That difference follows the explicit allocation rule and is not a later choice by the government. For classroom analysis, retain two decimals and use recorded realized sums. If you round a projected table for readability, explain that presentation values may no longer sum exactly even though underlying accounts do.

Preparation and screen sequence

3.1 Instructor preparation and access

Start at <https://beer-lab.org/en/> and select CLASSROOM to reach the teaching catalog. Search for territorial spending or its associated topics; clear earlier filters if the card does not appear. The card distinguishes Español and English and provides an extended-version option. Catalog language and session language are separate choices. Check the configuration label before creating a session and give students only the corresponding participant room.

For this delivery, the isolated preview runs at <http://localhost:8140>. The /demo and /rooms routes allow local configuration and room checks. Proposed public addresses must be activated through the laboratory deployment procedure; a guide or Git commit does not establish that publication has occurred. Instructor access and reports require authentication. Do not share an administrative credential or project a page containing individual links. Before class, open the participant room in a separate window and verify its language and required group size. This small preparation step prevents avoidable delays when the full class arrives.

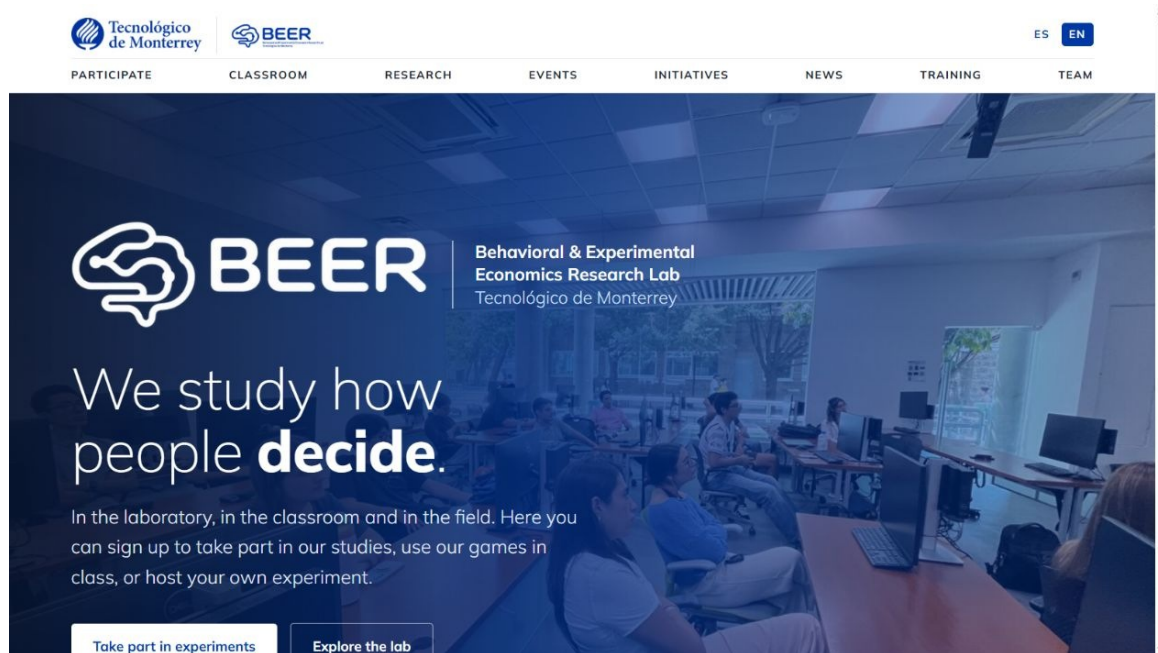


Figure 3.1: Access through the public portal

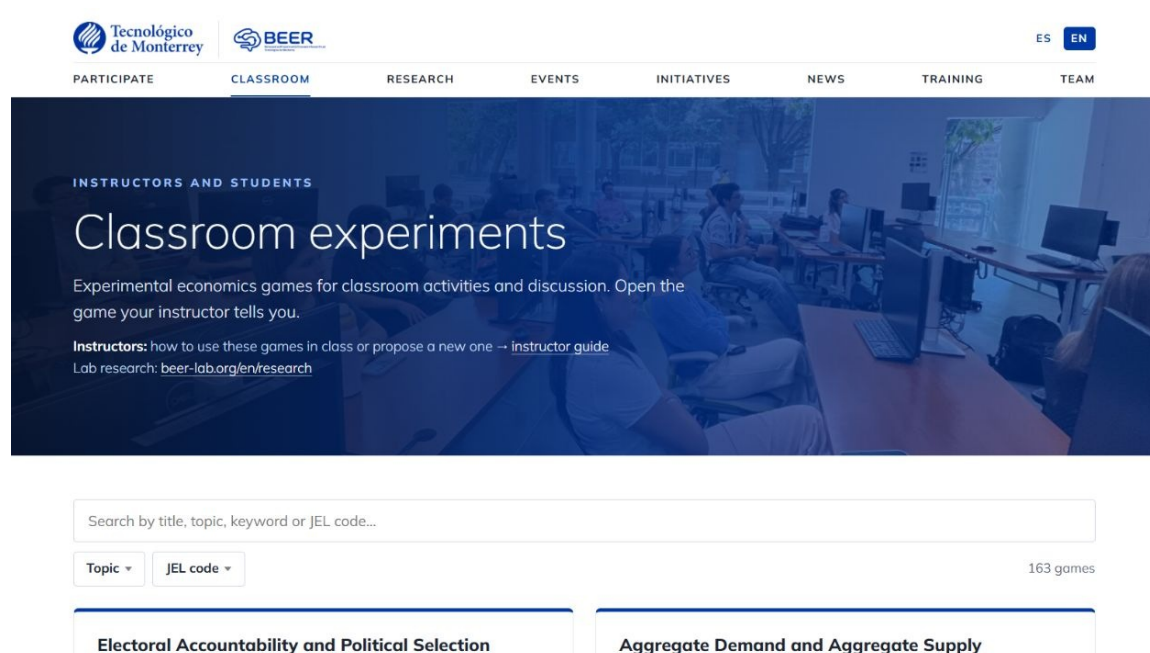


Figure 3.2: Teaching catalog and filters

3.2 The four rooms and configuration choice

The family provides four rooms: Spanish basic, English basic, Spanish extended, and English extended. Each basic room offers three modes: one election, ten periods with fixed groups, and ten periods with reassigned groups. Each extended room offers eleven configurations. There are twenty-eight configurations overall, with identical payoff logic across languages. The binding national extension provides a reference inside the extended menu; its logic duplicates the repeated national basic version.

When creating a session, explicitly select the configuration and participant count. Reassigned groups change composition, roles, and district each period. Fixed groups retain these positions throughout the activity. Extensions use fixed groups. Tenure and reelection versions contain ten periods arranged as five two-period encounters. The nonbinding single-election version has only one active period. Respect these differences when comparing earnings: a ten-period sum cannot be compared directly with the account from one election. Use per-period outcomes or a clearly defined common horizon before interpreting a difference between sessions.

Exact configurations

<code>territorial_spending_en_one</code>	One election
<code>territorial_spending_en_fixed</code>	Ten rounds, fixed group
<code>territorial_spending_en_random</code>	Ten rounds, reassigned groups
<code>territorial_spending_extended_national</code>	National vote, binding platforms
<code>territorial_spending_extended_district</code>	District majority
<code>territorial_spending_extended_floor</code>	Minimum general provision
<code>territorial_spending_extended_unequal_national</code>	Unequal districts: national vote

<code>territorial_spending_extended_unequal_district</code>	Unequal districts: district majority
<code>territorial_spending_extended_ideology_national</code>	Personal bonuses: national vote
<code>territorial_spending_extended_ideology_district</code>	Personal bonuses: district majority
<code>territorial_spending_extended_nonbinding</code>	Promises and subsequent choice: one election
<code>territorial_spending_extended_tenure</code>	Two periods with guaranteed tenure
<code>territorial_spending_extended_reelection</code>	Two periods with a second election
<code>territorial_spending_extended_proportional</code>	Three parties, seats, and coalition

http://localhost:8140/room/territorial_spending_en

http://localhost:8140/room/territorial_spending_extended

Proposed public routes: <https://territorialspending.beer-lab.org/> and the same room paths under that domain. Deployment is pending.

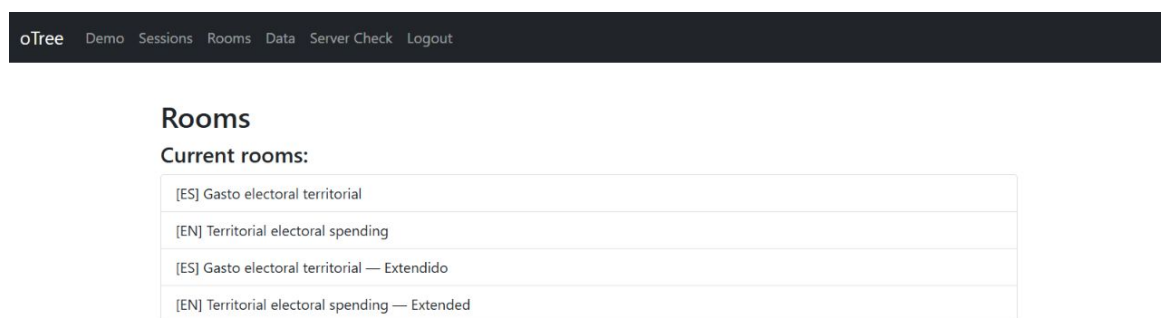


Figure 3.3: The four local rooms

3.3 Welcome, instructions, and understanding

The welcome screen presents laboratory rules and asks for individual confirmation. Instructions describe resources, decision order, district sizes, and the election rule. Four understanding questions then ask about the remaining budget, a voter's account when everything goes to G, the required majority, and the account of a person receiving the entire office reward. Answers are checked before participants advance. When an answer is wrong, the screen explains the relevant calculation rather than substituting a default answer.

The screenshot shows the oTree interface for creating a session. At the top, a dark navigation bar contains the text 'oTree Demo Sessions Rooms Data Server Check Logout'. Below this, the page title is 'Room: [EN] Territorial electoral spending'. The main heading is 'Create a new session'. Under 'Session Config', there is a dropdown menu showing 'Territorial electoral spending · EN · One election'. Below that, the 'Number of participants' is set to '1' in a text input field, with a note: 'Complete groups of 8 participants. Use a multiple of 8; minimum 8.' A blue 'Create' button is visible. Below the button is a link 'Configure session' with a gear icon. The 'App sequence' section shows 'territorial_spending_game (10 rounds)' with a description: 'Competing spending platforms, national or district votes, promises, and parliamentary coalition formation.' At the bottom, it states '0 participants present'.

Figure 3.4: Creating a session in the basic room

With standard parameters, the answers are fifty for the remaining budget, one hundred twenty for the voter, and one hundred forty for a sole officeholder. The majority is four national votes, two districts, or four parliamentary seats, depending on the version. In the coalition module, the full-reward question is conditional: a party can receive it all when governing alone. A coalition partner receives only its share. Clarify rules without recommending platforms or ballots. A participant finishing quickly is not a reason to answer on someone else's behalf.

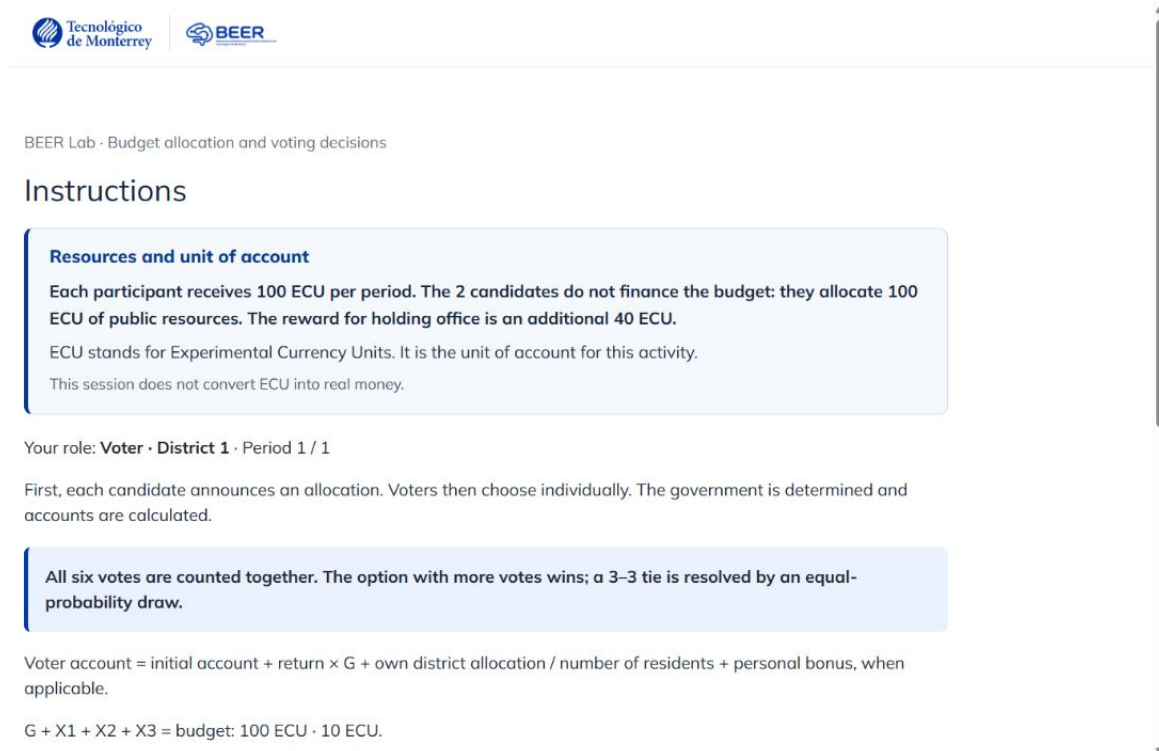
3.4 Announcements, ballots, and waiting

In an ordinary period, candidates receive four numerical fields for their announced allocation. Validation requires the exact total, the ten-unit grid, and the minimum G when applicable. Once all candidates submit, voters see a table of announcements and a forecast of their own account under each one. The ballot requires an option; abstention and blank ballots are unavailable.

Waiting pages coordinate decisions within the same group. A voter who finishes early should not go back or use another participant's link. If a wait becomes prolonged, the instructor checks the monitor to identify the pending stage. Waiting alone does not establish a software problem: a candidate may be correcting a sum or a partner may still be evaluating a government proposal. Results appear after all required choices have been resolved. In nonbinding versions, voting does not yet determine the final allocation. An additional government decision must be completed before accounts can be calculated and displayed to participants.

3.5 Closing and recording the session

The result screen shows the implemented allocation and period account. The closing screen presents accumulated earnings from all active periods. Initial accounts and the office reward are renewed each period; there is no limited balance carried across budgets. The platform does not randomly select a single period for payment. If ECU will be converted into real money, announce a rate beforehand that is consistent with this sum and with the resources available for the class.



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BEER Lab · Budget allocation and voting decisions

Instructions

Resources and unit of account

Each participant receives 100 ECU per period. The 2 candidates do not finance the budget: they allocate 100 ECU of public resources. The reward for holding office is an additional 40 ECU.

ECU stands for Experimental Currency Units. It is the unit of account for this activity.

This session does not convert ECU into real money.

Your role: **Voter · District 1** · Period 1 / 1

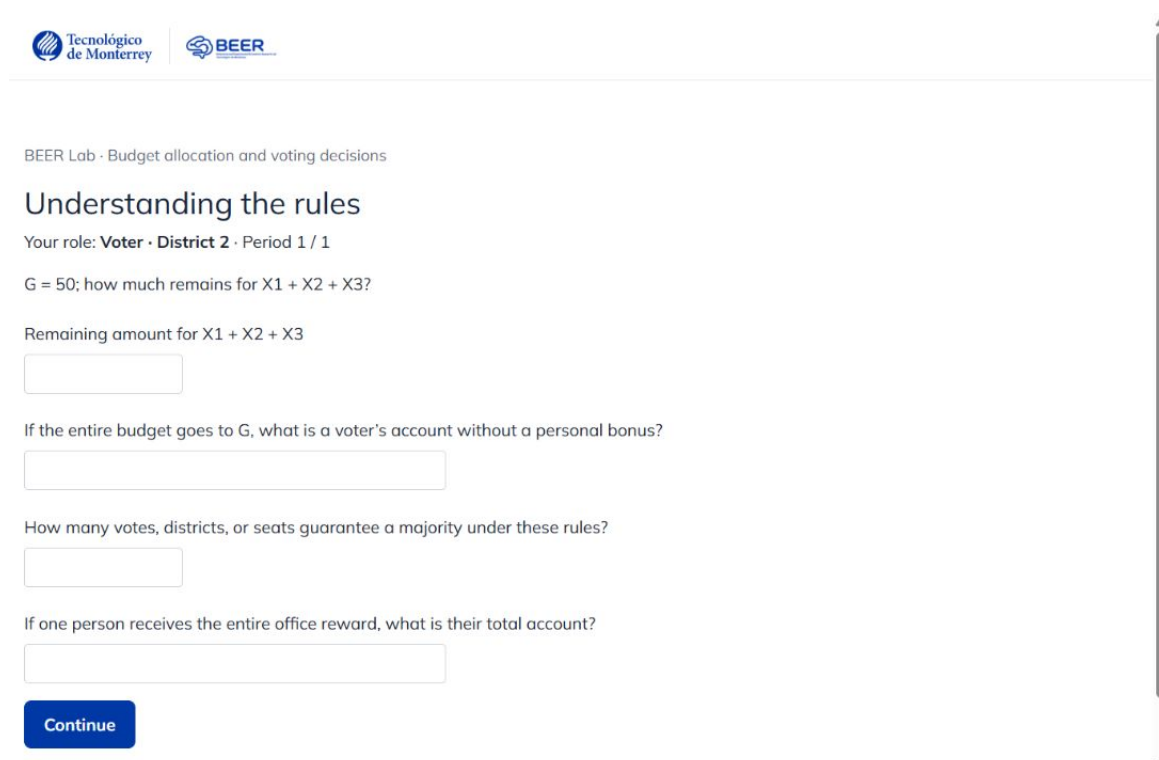
First, each candidate announces an allocation. Voters then choose individually. The government is determined and accounts are calculated.

All six votes are counted together. The option with more votes wins; a 3–3 tie is resolved by an equal-probability draw.

Voter account = initial account + return $\times$ G + own district allocation / number of residents + personal bonus, when applicable.

$G + X_1 + X_2 + X_3 = \text{budget: } 100 \text{ ECU} \cdot 10 \text{ ECU}.$

Figure 3.5: Initial instructions; scroll to read the remaining rules



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BEER Lab · Budget allocation and voting decisions

Understanding the rules

Your role: **Voter · District 2** · Period 1 / 1

G = 50; how much remains for $X_1 + X_2 + X_3$?

Remaining amount for $X_1 + X_2 + X_3$

If the entire budget goes to G, what is a voter's account without a personal bonus?

How many votes, districts, or seats guarantee a majority under these rules?

If one person receives the entire office reward, what is their total account?

Continue

Figure 3.6: Understanding questions with validation



BEER Lab · Budget allocation and voting decisions

Allocate the budget

Your role: **Candidate A** · Period 1 / 1

Public budget: **100 ECU**. $G + X1 + X2 + X3 = \text{budget}$. $G \geq 0$; 10 ECU.

G · general spending

X1 · district 1

X2 · district 2

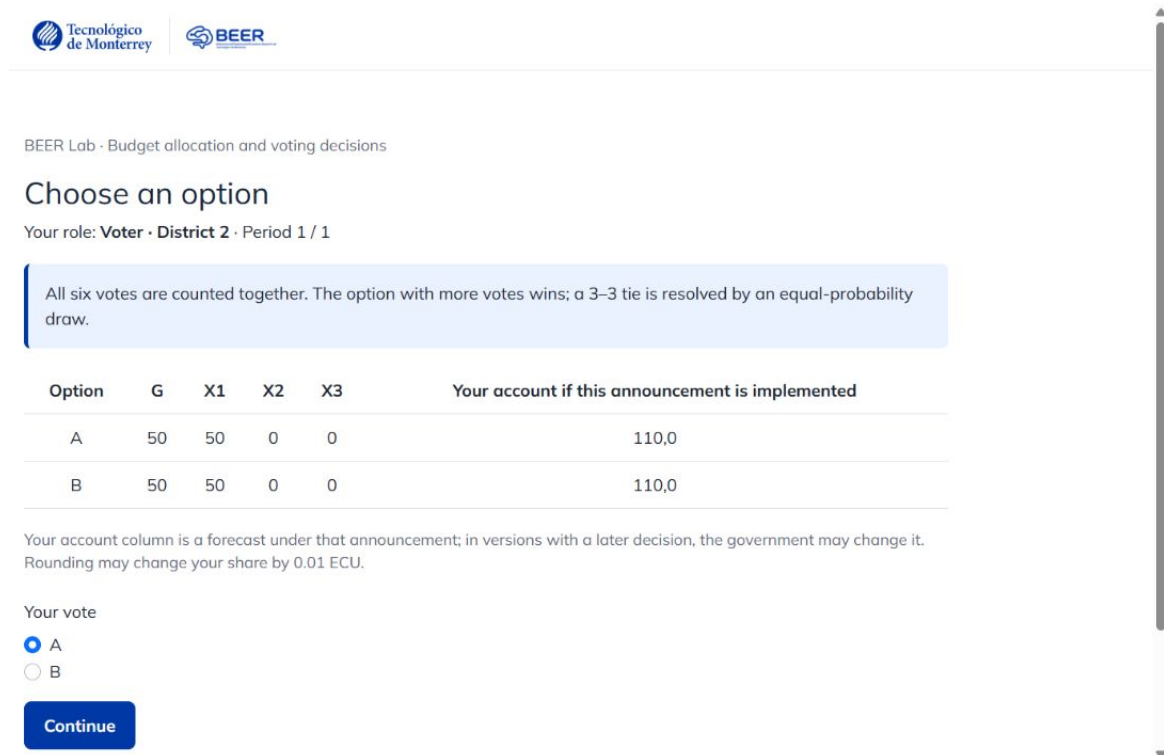
X3 · district 3

Continue

ECU stands for Experimental Currency Units. It is the unit of account for this activity.

Powered by [oTree](#)

Figure 3.7: A candidate announces an allocation



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BEER Lab · Budget allocation and voting decisions

Choose an option

Your role: **Voter** · **District 2** · Period 1 / 1

All six votes are counted together. The option with more votes wins; a 3–3 tie is resolved by an equal-probability draw.

Option	G	X1	X2	X3	Your account if this announcement is implemented
A	50	50	0	0	110,0
B	50	50	0	0	110,0

Your account column is a forecast under that announcement; in versions with a later decision, the government may change it. Rounding may change your share by 0.01 ECU.

Your vote

☒ A

☐ B

[Continue](#)

Figure 3.8: Ballot and announcement comparison

Before closing, download the participant-period CSV and, when all native fields are needed, the full CSV. Record the configuration, language, number of groups, completed periods, and any substantive interruption. Keep debrief notes separately. A report screenshot helps document the class but does not replace data. Identify demonstration sessions explicitly and exclude them from behavioral averages. Images in this guide come from native demonstration states prepared to verify the interface. They show what a screen displays; they are not observations of actual student choices or estimates of how students generally behave.



BEER Lab · Budget allocation and voting decisions

Period results

Your role: **Voter** · **District 3** · Period 1 / 1

Government: **A**

Allocation to be implemented: G=50, X1=50, X2=0, X3=0.

Your period account: **110,0 ECU**

Material consumption: 110,0 · Personal bonus: 0,0

Accumulated earnings: 110,0 ECU

Option	G	X1	X2	X3	Your account if this announcement is implemented
A	50	50	0	0	110,0
B	50	50	0	0	110,0

Your account column is a forecast under that announcement; in versions with a later decision, the government may change it.
Rounding may change your share by 0.01 ECU.

[Continue](#)

Figure 3.9: Implemented allocation and period account

Predictions and comparison criteria

4.1 Individual preferences and electoral support

A material comparison between two platforms can be solved by subtracting accounts. The initial account cancels because it is equal under both options. For a resident of district d , the change is 0.20 times the difference in G plus the difference in X_d divided by the number of residents. This expression identifies precisely which allocation benefits that person. It does not require the person to vote for the larger account: the ballot remains an observed decision.

When accounts coincide, the material model leaves the voter indifferent. Do not automatically assign that ballot to whichever candidate produces a convenient prediction. Describe a set of possible outcomes or state an additional behavioral tie rule, separate from the institutional lottery. Discussion can explore reciprocity, inequality concerns, or imperfect understanding, but a deviation is not proof of one particular motive. Identifying those explanations would require additional information and a design that separates them. Ask for students' reasoning without treating retrospective explanations as independently verified causal mechanisms.

4.2 National and territorial majorities

Under national aggregation, all six votes are counted together. Four votes guarantee victory; three create a tie resolved by an equal-probability draw. Under territorial aggregation, each district chooses a local winner and contributes one seat. Winning two of three seats guarantees government. A local tie is resolved independently of ties in other districts. The same national vote totals can therefore produce different probabilities of governing under the two rules.

With two residents in every district, consider ballots AA, AB, and BB. Nationally, each option has three votes and A wins with probability one half. Territorially, A wins one district, B wins another, and the remaining seat is drawn, again giving A probability one half. This example does not establish general equivalence; it describes one distribution. Ask for another pattern, such as AA, AB, and AB. A has four votes and wins nationally with certainty, but territorially it must win at least one of two independent draws, giving probability three quarters.

4.3 The mechanical counterfactual using the same ballots

Checkpoint

The CSV records A's winning probability under national and district aggregation for the ballots actually submitted in two-candidate versions that hold an election. These are aggregation calculations: they fix platforms and all six ballots while changing the rule that converts those decisions into a winner. When ties occur, the calculation integrates over possible draws rather than confusing one realized draw with the probability before it occurred.

The difference between these columns answers a precise question: what would the other rule have produced with these same decisions? It does not reveal which platforms candidates would have chosen or how people would have voted if that other rule had been announced at the outset. Study that behavioral response using groups assigned to different rules. During the debrief, call the first comparison a mechanical counterfactual and the second a comparison between sessions or treatments. This distinction prevents an exact ballot calculation from being presented as a causal estimate of institutional change.

4.4 Efficiency, inequality, and representation

This guide uses citizen material consumption for the sum of the six voters' accounts before personal bonuses. With standard parameters, that sum rises with G whenever the full budget is implemented. It supplies a monetary efficiency benchmark for this environment. It does not incorporate external public benefits, collection costs, or a social welfare function that gives extra weight to participants with fewer resources. These can be discussed as conceptual extensions, but the activity does not measure them.

Inequality is another dimension: two allocations with the same G have the same material sum but can distribute it very differently. Representation is a third dimension, measured through territorial seats or correspondence between votes and governing authority. None of these indicators automatically substitutes for the others. A good assessment answer identifies its criterion and shows the calculation. Ask, for example, whether a reform that increases G while concentrating the remaining transfers in one territory should count as an improvement under every possible criterion, and require students to explain their judgment.

4.5 What the theory does and does not predict

The example of a favored majority demonstrates the possibility of tension between electoral support and aggregate consumption. It does not establish a unique equilibrium platform or show that every participant maximizes monetary income. Candidates compete for an external reward and may anticipate different voting behavior. The ten-unit grid restricts announcements and creates some indifferences. These features favor comparative hypotheses and concrete calculations before asserting a precise convergence prediction.

A useful hypothesis asks whether changing the rule alters G or transfer concentration. Write it before opening the report and identify the relevant comparison. Allow evidence to contradict the conjecture. High general spending raises a useful question about why a territorially favored majority did not emerge. Keep outcome definitions fixed and distinguish plausible mechanisms from demonstrated regularities.

Extended versions

5.1 The general spending floor

The floor configuration requires G to be at least fifty. It keeps the hundred-unit budget, two candidates, six voters, national voting, and fixed groups. The restriction removes low-general-spending announcements without determining how remaining territorial resources are distributed. When $G=50$, fifty remains for X_1 , X_2 , and X_3 ; when $G=100$, no territorial transfer remains. An allocation below the floor is rejected before it can enter the election.

The accounting implication is immediate: with the full budget implemented, total citizen material consumption cannot fall below 710. The behavioral question is whether candidates locate at the minimum, choose a higher G , or redistribute remaining transfers differently. Compare this configuration with binding national voting over ten periods, rather than a single election, when holding the horizon constant. The floor can raise general spending by construction, but the size of its effect relative to the reference depends on what that reference would have chosen without a restriction. Report compliance and behavioral adjustment as separate facts.

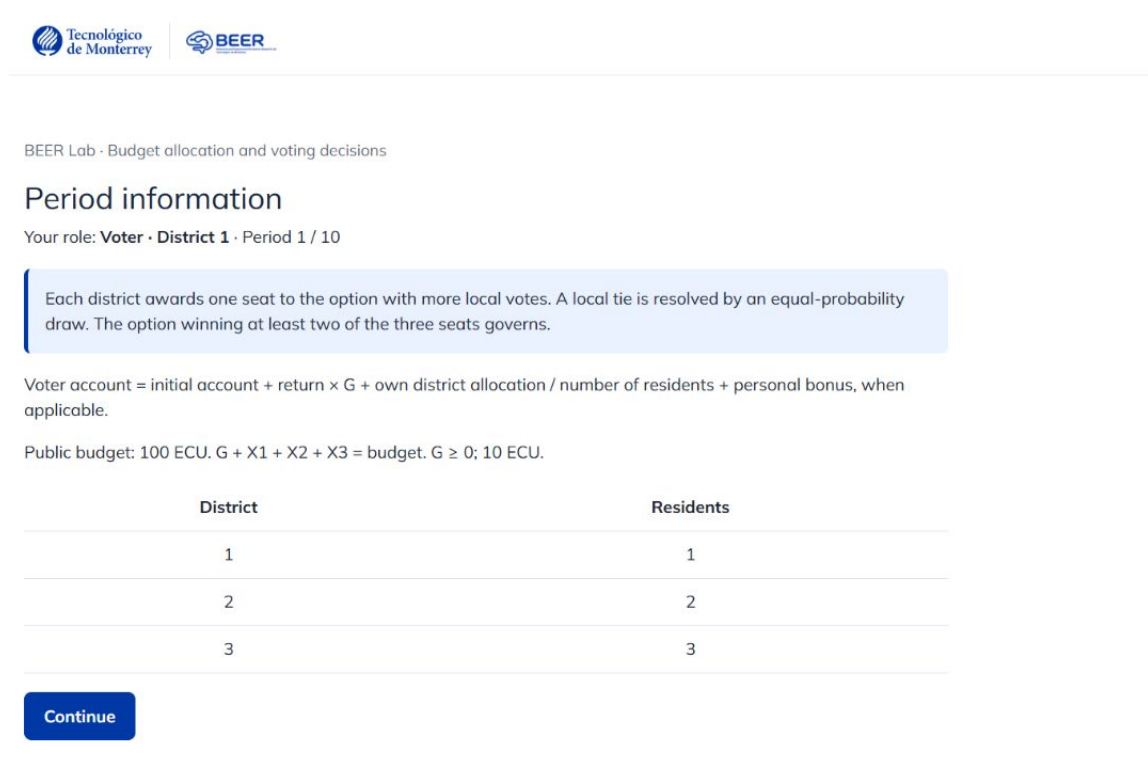
5.2 Districts with one, two, and three residents

The `unequal_national` and `unequal_district` configurations retain six voters but place them in districts of one, two, and three residents. The same territorial expenditure produces different individual benefits. A transfer of thirty gives thirty to the sole resident of district one, fifteen to each district two resident, and ten to each district three resident. General spending still provides 0.20 per unit to every person, so total material consumption for a given G does not change with this population redistribution.

Under territorial aggregation, each district continues to award one seat. The single-resident district therefore represents one person per seat, while the three-resident district represents three. Two votes concentrated in the smaller districts can secure two seats when they produce the corresponding local victories. Under national aggregation, people are counted and four supporters are needed to guarantee victory. Compare the two unequal-population configurations with each other to study aggregation while holding district population constant. Comparing unequal district voting with equal national voting combines two institutional differences.

5.3 Bonuses associated with the winner

The `ideology_national` and `ideology_district` versions add induced preferences through payments. Among the six voters ordered by position, the first and fifth receive an extra ten when A governs;



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BEER Lab · Budget allocation and voting decisions

Period information

Your role: **Voter** · **District 1** · Period 1 / 10

Each district awards one seat to the option with more local votes. A local tie is resolved by an equal-probability draw. The option winning at least two of the three seats governs.

Voter account = initial account + return $\times$ G + own district allocation / number of residents + personal bonus, when applicable.

Public budget: 100 ECU. $G + X_1 + X_2 + X_3 = \text{budget}$. $G \geq 0$; 10 ECU.

District	Residents
1	1
2	2
3	3

[Continue](#)

Figure 5.1: Information with unequal district sizes

the second and sixth receive ten when B governs; the third and fourth receive no bonus. The table is public, and its distribution is held constant across the two electoral rules. The bonus depends on the winner, regardless of the recipient's own ballot.

Voting against the option that activates a bonus does not remove it if that option ultimately wins. The payment is neither a reward for demonstrating loyalty nor a payment for selling a vote. It changes the benefits of political outcomes and allows students to examine whether platforms respond to induced political preferences. The report keeps material consumption and bonuses separate. Do not describe an assigned monetary preference as an observed real-world ideology of students. For a focused comparison, contrast each bonus version with its reference under the same electoral rule and matching structure.

5.4 An announcement and a later decision

The nonbinding configuration contains one active election. Candidates announce an allocation and voters choose, but the winner can subsequently select another feasible allocation. The implementation screen again requires the hundred-unit total and ten-unit grid. Results apply this later decision. Announcements remain recorded so the distance between promised and implemented allocations can be calculated. A favorable announcement is therefore not an executed transfer.

The change indicator is half the sum of absolute differences across the four announced and implemented budget entries. If twenty moves from G to X1, absolute differences sum to forty and the indicator is twenty. It measures reassigned resources without counting the outflow and inflow twice. Zero distance indicates an exact match but does not identify the motivation. It may reflect reputation, government preferences, understanding, or indifference. With just one active period, this configuration contains no subsequent election through which voters can sanction the winner for changing the announcement. Keep that distinction explicit when discussing credibility.

2	2
3	2

Public personal bonuses

This bonus depends on who governs, not on your own vote. It is added to material consumption.

Voter	District	If A governs	If B governs
1	1	10	0
2	1	0	10
3	2	0	0
4	2	0	0
5	3	10	0
6	3	0	10

[Continue](#)

ECU stands for Experimental Currency Units. It is the unit of account for this activity.

Powered by gTreg

Figure 5.2: Public personal-bonus table




BEER Lab · Budget allocation and voting decisions

Government decision

Your role: **Candidate A** · Period 1 / 1

Public budget: **100 ECU**. $G + X1 + X2 + X3 = \text{budget}$. $G \geq 0$; 10 ECU.

Allocation to be implemented

G · general spending

X1 · district 1

X2 · district 2

X3 · district 3

Option	G	X1	X2	X3
A	50	50	0	0
B	50	50	0	0

[Continue](#)

Figure 5.3: The government's subsequent allocation

5.5 Tenure and reelection with a matched horizon

The tenure and reelection configurations organize five two-period encounters. In the first period, candidates announce platforms, voters choose, and the winner selects the actual expenditure. In the second, participants see the original announcements and the previous government's record. No new announcements are collected. Under tenure, the same person continues without another election. Under reelection, voters choose A or B again, and the new winner selects the second budget allocation.

Each period renews accounts, budget, and reward. Both treatments have the same horizon of two budget decisions per encounter, allowing comparison of a second election without adding another period to only one treatment. Groups and roles remain fixed across the five encounters. This repetition may create reputation across encounters even under tenure, so do not describe tenure as eliminating every future incentive. Analyze the first encounter separately from later evolution. Less announcement revision before a second election would be consistent with electoral discipline, but interpreting that pattern requires a comparison that addresses other differences between groups.

The screenshot shows the BEER Lab interface for a second ballot. At the top, there are logos for 'Tecnológico de Monterrey' and 'BEER'. Below the logos, the text 'BEER Lab · Budget allocation and voting decisions' is displayed. The main heading is 'Choose an option'. Below this, it says 'Your role: Voter · District 1 · Period 2 / 10'. There are two light blue boxes containing information: the first box states 'Previous government: A · Implemented allocation: G=50, X1=50, X2=0, X3=0. Initial announcements remain visible. No new announcements are collected this period.'; the second box states 'All six votes are counted together. The option with more votes wins; a 3–3 tie is resolved by an equal-probability draw.' Below these boxes is a table with columns: 'Option', 'G', 'X1', 'X2', 'X3', and 'Your account if this announcement is implemented'. The table has two rows, A and B, both showing G=50, X1=50, X2=0, X3=0, and a forecasted account of 135,0. Below the table, a note states: 'Your account column is a forecast under that announcement; in versions with a later decision, the government may change it. Rounding may change your share by 0.01 ECU.' At the bottom, there is a section for 'Your vote' with a radio button and the label 'A'.

Option	G	X1	X2	X3	Your account if this announcement is implemented
A	50	50	0	0	135,0
B	50	50	0	0	135,0

Figure 5.4: Second ballot with the preceding period's record

5.6 Three parties and seat allocation

The proportional module uses three parties, six voters, and seven seats. Each party announces an indicative platform; ballots are converted into seats using D'Hondt. To allocate the next seat, divide each party's votes by its seats already awarded plus one. Award the seat to the largest quotient and repeat until seven seats are filled. Quotient ties are drawn and recorded. This creates an actual legislature within the exercise, rather than giving each party a winning probability equal to its vote share.

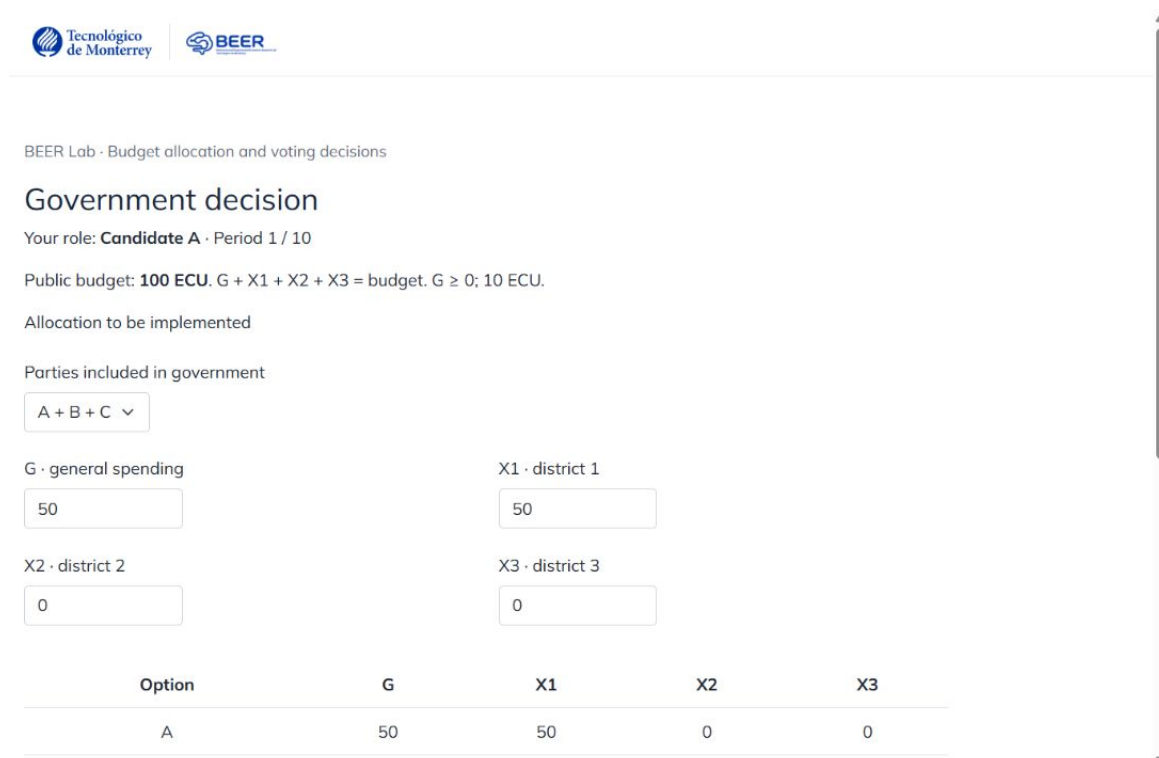
With six votes for A, A receives all seven seats and the others receive none. With two votes per party, symmetry gives each party two seats, while a draw assigns the seventh among them. The

allocation is a permutation of three, two, and two. No party has a majority alone. With three, two, and one vote, the final allocation can also depend on quotient ties. Reconstruct all seven allocation steps rather than simply rounding vote percentages into seats; the two procedures are not interchangeable.

5.7 Proposal, partners, and government formation

The party with most seats becomes proposer; a draw selects among tied leaders. The proposer chooses a coalition and an actual budget allocation. The coalition must include the proposer, exclude parties with no seats, and hold at least four seats. A proposer with its own majority can govern alone. If partners are needed, every invited party accepts or rejects simultaneously. The proposer does not vote again on its own offer. This implementation has no unrestricted communication stage or second round of offers.

If all partners accept, the proposed allocation is implemented. If any partner rejects, government does not form and the hundred-unit public budget remains unused. Everyone retains the initial account and no office reward is paid. Participants must know this default before deciding, otherwise rejection has no clear strategic meaning. Citizen consumption under failed formation is six hundred, unlike the minimum seven hundred under a fully executed budget. Do not treat failure as an ordinary feasible allocation with $G=0$ and one hundred in transfers.



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BEER Lab · Budget allocation and voting decisions

Government decision

Your role: **Candidate A** · Period 1 / 10

Public budget: **100 ECU**. $G + X1 + X2 + X3 = \text{budget}$. $G \geq 0$; 10 ECU.

Allocation to be implemented

Parties included in government

G · general spending

X1 · district 1

X2 · district 2

X3 · district 3

Option	G	X1	X2	X3
A	50	50	0	0

Figure 5.5: Selecting a coalition and actual budget

If anyone rejects, there is no government or spending that period: the budget remains unused and everyone keeps their initial account. There is no second proposal. If government forms, the total office reward is divided among its members in proportion to their seats.

Option	G	X1	X2	X3
A	50	50	0	0
B	50	50	0	0
C	50	50	0	0

Option	Your vote	Seats
A	2	3
B	2	2
C	2	2

Do you accept this government proposal?

☐ Accept

☐ Reject

[Continue](#)

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Figure 5.6: Partner acceptance or rejection (end of the screen)

5.8 Coalition rewards and the scope of comparison

Attention

When government forms, the forty-unit office reward is divided among included parties in proportion to their seats. If coalition partners hold three and two seats, their shares are twenty-four and sixteen. Their total accounts become 124 and 116, while the excluded party retains one hundred. The reward does not depend on G, and parties do not receive voters' territorial transfers. Coalition acceptance therefore does not incorporate legislators' own district interests except through motivations participants voluntarily bring to the task.

This extension simultaneously changes party numbers, conversion of votes into seats, subsequent allocation, and government formation. Comparing it with binding national voting examines an institutional package, not an isolated effect of proportional representation. Raw totals across nine-person and eight-person groups are also unsuitable: an additional initial account changes the sum automatically. Use material consumption of the same six voters, implemented G, and government formation rates for substantive comparisons. Keep the office reward and public budget in separate accounting columns, including when presenting the results in a compact classroom table.

Report, data, and discussion

6.1 Reading the private report

The instructor report shows completed participant-periods, the expected total, pending decisions, and completed group-periods. The expected total depends on participants and active periods. One eight-person group playing ten periods has eighty participant-periods even though there are only eight people. A single eight-person election has eight. A completed group-period requires the budget to be resolved and accounts calculated; submitting an announcement does not make an outcome complete.

Results remain hidden until the instructor uses the show button. This allows progress to be projected without immediately revealing aggregates that might influence later decisions. Means use completed group-periods only. An empty report gives an explicit message and still provides a download containing pending observations. In a partial report, means describe completed outcomes while the pending denominator remains visible. Do not interpret an average changing as additional groups finish as an update to an unchanged sample. The composition of available observations has also changed, which can matter when faster and slower groups make different decisions.

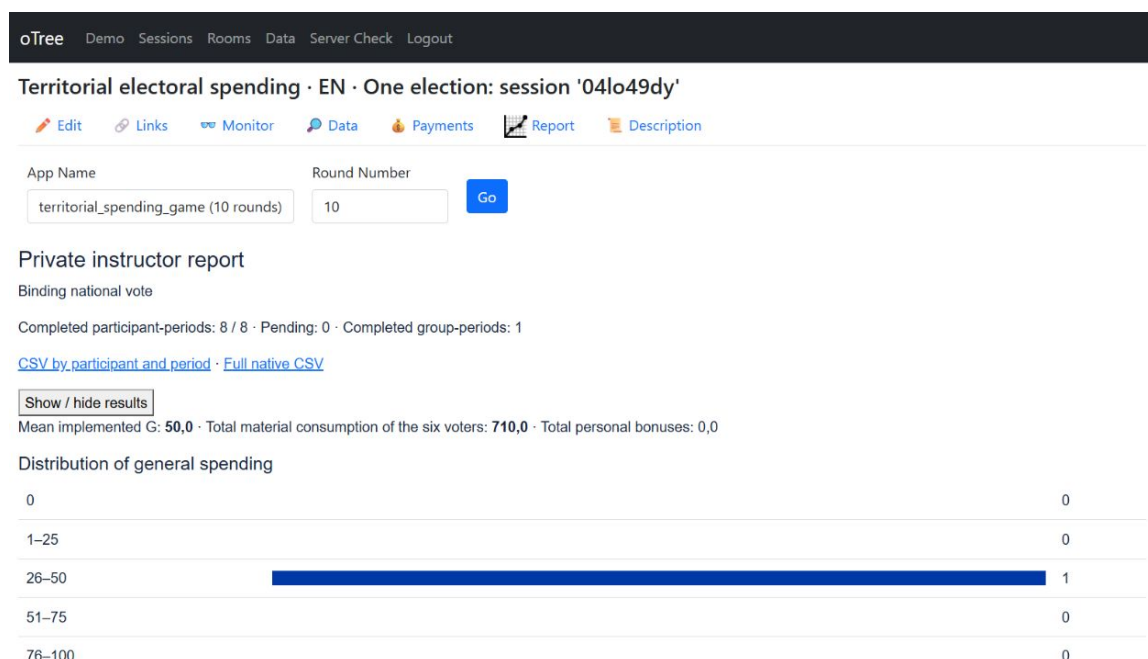


Figure 6.1: Private report after revealing results

6.2 Distributions and change across periods

The report includes the distribution of implemented G and a table by period. The distribution separates zero from four budget intervals. Its purpose is to show dispersion alongside the mean: two sessions may have the same average G but very different concentrations at the extremes. Histogram observations are group-periods, not individual voters. Repeating the same G six times to represent six voters would create a misleading appearance of a larger sample.

The time table reports completed groups in each period, average G , total citizen material consumption, change from the announcement, and the percentage of governments formed. Promise distance is defined for two-candidate versions; an equivalent number is not forced onto a coalition that implements its own budget. A time trend may reflect learning, reputation, fatigue, or selection among groups progressing at different speeds. With fixed groups, periods share participants and histories and are not independent replications. Describe the pattern first, then ask what additional information would distinguish competing explanations for it.

6.3 CSV, genuine zeros, and pending decisions

The participant-period download provides one row for each person in every active period. It includes institutional settings, role, district, announcement, ballot, aggregate result, seats, government, implemented budget, and account components. A choice not yet made remains empty. A deliberately selected zero transfer appears as zero. Failed government formation has an explicit nonimplementation outcome and an unused budget; it must not be confused with an unfinished waiting stage.

Begin cleaning with the completed indicator and retain an unmodified copy. Do not replace every empty field with zero: that would invent ballots, transfers, and accounts that never existed. Inapplicable fields can also be empty, such as a third party's seats in a two-candidate election. The native wide download preserves additional system fields for detailed auditing. When combining files from sessions, use a key containing session, participant, and period. A group number by itself does not uniquely identify an observation across sessions, and participant codes should not be replaced by student names in a shared analytical file.

6.4 An analysis table that respects the units

First build a table with one row per group and period. Retain one copy of G , the three transfers, winner, rule, and implementation status. Then build a voter table with six people per completed group-period to calculate district accounts, dispersion, and support. Each candidate's platform belongs to a third observational unit. Joining these tables without considering their structure can artificially multiply a group outcome by the number of voters and announcements.

To summarize a treatment, first average G over periods within each group and then compare groups. When presenting statistical uncertainty, recognize the assignment unit and interaction structure: ten periods from one group are not ten independent groups. In a small classroom, displaying group-level points and explaining the mechanism is often more informative than emphasizing a significance threshold. If different classes are compared, record composition, timing, instructions, and previous experience before attributing differences to an institutional rule. Make exclusions explicit, especially when interruptions leave different numbers of completed periods across groups.

6.5 A debrief script

Feedback script

Begin with a descriptive question: what was announced, who won, and what was implemented? Ask one student to reconstruct a citizen account and another to verify the budget sum. Then ask who would have preferred an alternative platform and why. Only after these operations are clear should you display aggregate citizen consumption and ask whether the winning platform maximized it. This order prevents a label such as inefficient spending from replacing an understanding of incentives.

The second part compares institutions. Hold ballots fixed to calculate another aggregate, then explain why choices might change if a different rule had been known from the outset. In non-binding variants, compare announcements and implementation before discussing credibility. In the parliamentary module, reconstruct seats, proposal, and acceptance separately. Close with a written explanation containing an observed result, a compatible mechanism, and a limitation of that interpretation. Do not require students to reveal individual ballots publicly or justify them to a classmate who lost. Evaluate reasoning rather than conformity to an expected voting pattern.

Lesson plans and solved exercises

7.1 An introductory lesson plan

Prepare a single national election and a worksheet containing two platforms for subsequent analysis. Allow about five minutes for resources and roles, ten for instructions and understanding questions, ten for decisions, and fifteen for discussion, adjusting to class size. While choices are being made, monitor progress without projecting other groups' announcements. If time permits, request an individual calculation before opening the report. This helps distinguish prior reasoning from an explanation constructed after seeing the aggregate outcome.

Use a short exit sheet: a voter's account in each district, total citizen consumption, votes needed to win, and one sentence distinguishing an electoral winner from an aggregate maximum. Assess arithmetic accuracy and clarity of reasoning. An answer calling a majority selfish without identifying gains and losses does not meet the objective. If students still confuse the public budget with the initial account, postpone extensions. Repeating a calculation with a different G is then more useful than adding coalitions and a new seat rule. Match complexity to the learning problem actually observed.

7.2 Institutional comparison over two sessions

For a two-class module, assign groups to binding national voting or district majorities with fixed groups and ten periods. Before playing, ask every student for a conjecture about G and transfer concentration, and retain those answers. Use the first class for instructions and decisions and the second for group-period data analysis. In a small course, emphasize dispersion and reconstructed examples rather than general statistical conclusions.

A third treatment with a general spending floor can be added when enough independent groups are available. Do not simultaneously alter district sizes and personal bonuses when comparing the first two rules. If the same students play both, record the order and discuss learning and carryover. Rotation does not erase previous knowledge. A take-home assignment can require a group-average table, one mechanical counterfactual, and a note on causal interpretation. The conclusion must be allowed to be negative: no observed difference in this class is a possible outcome, not a reason to keep searching across measures until a significant difference appears.

7.3 Exercise: moving ten budget units

Consider $G=60$, $X_1=20$, $X_2=10$, and $X_3=10$ with equal district sizes. Material accounts are 122 for each resident of district one and 117 for each resident of the other two districts. Now move ten

from G to X_1 . The new budget is $G=50$, $X_1=30$, $X_2=10$, and $X_3=10$. Everyone loses two from the general return; district one residents additionally receive five more in transfers. Their accounts therefore rise by three, while the other four accounts fall by two.

The citizen sum falls by two: two gains of three minus four losses of two. This agrees with the aggregate formula because G fell by ten and its net social coefficient is 0.20. Ask whether the move can increase electoral support for the candidate proposing it. Answering requires the rival platform and voter preferences; the marginal account calculation alone does not determine an election. This question distinguishes a local economic benefit from an actual electoral advantage against a specific alternative.

7.4 Exercise: unequal representation and ballots

Use districts of one, two, and three residents. Suppose the sole voter in the first chooses A, the second district splits A and B, and all three voters in the third choose B. A has two national votes and B has four, so B wins nationally with certainty. Territorially, A wins the first district, B wins the third, and the second district is drawn. Each candidate then has probability one half of governing. The same ballots decisively favor B under one rule and leave uncertainty under the other.

To solve, write votes by district, identify possible local winners, and finally add seats. Do not average district percentages as if every percentage represented the same number of people. As an extension, change one ballot and calculate both winning probabilities again. Identify whether that voter is decisive for the national outcome, for a district seat, or for neither. A ballot's influence depends on the other ballots; it is not simply the inverse of district population. Require the actual calculation rather than an intuitive claim about small districts.

7.5 Exercise: consumption and a personal bonus

A district three voter compares A allocating everything to G with B choosing $G=0$, $X_1=50$, $X_2=50$, and $X_3=0$. Without a bonus, the accounts are 120 under A and 100 under B. If the voter's induced preference favors B, B's total rises to 110, leaving A better by ten. A political bonus therefore does not mechanically eliminate every material difference. For a voter in a district favored by B, the comparison would instead be 120 against 135 when B also activates the personal bonus.

Now consider announcements yielding material accounts of 120 and 115, with a ten-unit bonus favoring the second option. The overall ranking reverses: 125 exceeds 120. Identify which part comes from the budget and which from the winner's identity. Then ask whether observing the ballot measures the strength of a real ideology. It does not: the induced payment here is known and assigned. Outside this environment, preferences and circumstances contain other components that the activity does not identify.

7.6 Exercise: a coalition and rejection

Suppose seats are allocated three, two, and two. The three-seat party proposes a coalition with one two-seat party and a budget of $G=50$, $X_1=50$, $X_2=0$, and $X_3=0$. The coalition holds five seats and satisfies the majority requirement. If the partner accepts, the office reward is divided twenty-four for the proposer and sixteen for the partner. District one voters receive 135; other voters receive 110. Citizen consumption totals 710, and the excluded party retains its initial account.

If the partner rejects, no budget entry is implemented: all six citizen accounts remain at one hundred, and all three parties retain one hundred. No office reward is paid and resources are not automatically transferred to the proposer. Calculate the citizen cost of failure, 110 relative to the proposal, and the cost to each prospective government party separately. Then discuss why, under strictly monetary preferences and no uncertainty, accepting a positive reward improves a partner's account relative to rejection. Other motivations may matter, but they remain behavioral hypotheses.

7.7 Exercise: credibility and electoral discipline

A candidate announces $G=80$ and $X1=20$, wins, and implements $G=40$, $X1=40$, and $X2=20$. The absolute change in G is forty, in $X1$ twenty, and in $X2$ twenty. Their sum is eighty, giving a reassignment distance of forty. Citizen consumption falls from the announced 716 to 708. The aggregate material difference is eight, while the budget distance is forty. These are different indicators and should not receive the same label.

In a second period with reelection, voters observe that record before voting again. A different winner can be consistent with sanctioning but can also reflect preexisting candidate differences or a draw in a tied election. To argue for discipline, compare implementation before a second election with guaranteed tenure and examine similar initial choices. Do not claim that every turnover proves punishment or that every incumbent victory proves an absence of accountability. The possibility of losing office can change the first allocation even when turnover never occurs. Evaluate behavior and institutional opportunity separately.

Literature, limits, and instructor support

8.1 Theoretical readings and design provenance

Lizzeri and Persico (2001) analyze how electoral incentives can distort public-good provision relative to targeted benefits. Cox and McCubbins (1986) study redistributive competition and the importance of assumptions about risk and support bases. Persson, Roland, and Tabellini (2000), together with Persson and Tabellini's book (2003), provide a broader framework linking institutions and fiscal choices. These references motivate questions; they do not make the classroom parameters a literal replication of a published model or experiment.

The implementation selects a budget and return that produce an understandable tradeoff. In particular, a general return of 0.20 avoids a situation in which, with equal districts and the original content proposal's resources, all-general spending weakly dominates every transfer for each voter. This adaptation serves the incentives the lesson must illustrate. Do not attribute the hundred-unit budget, ten-unit grid, or four understanding questions to the cited articles. They are choices of this teaching protocol, whose internal consistency is established through explicit calculations. The distinction matters when students write literature-based interpretations of classroom evidence.

(Lizzeri and Persico, 2001; Cox and McCubbins, 1986; Persson et al., 2000; Persson and Tabellini, 2003).

8.2 Empirical evidence and extrapolation limits

Aidt and Shvets (2012) study seven United States state legislatures and find less district-directed funding when a legislator cannot seek reelection. This illustrates that electoral incentives may reinforce territorial interests, so another election does not automatically imply more general spending. Institutional context and spending opportunities matter. Their evidence comes from outside this activity; it does not validate its payoffs or estimate the effect that a particular classroom will display.

In related laboratory evidence, Fréchette, Kagel, and Lehrer (2003) find longer delays and more equal allocations under open amendment, and convergence toward minimal winning coalitions under closed amendment. This module instead excludes amendments and repeated offers and divides a reward by seats. Their evidence motivates questions about procedure and acceptance without predicting this module's rejection rate (Fréchette et al., 2003).

Classroom sessions provide local evidence about decisions in a simplified environment. They cannot establish how much a country's public expenditure would change after electoral reform. Real

political systems contain organized parties, incomplete information, financing, bureaucracies, and multiple government levels. The exercise is useful because it isolates accounting and strategic relationships that students can compare with research. Ask students to identify one missing institution and explain which incentive it would alter before speculating about the direction of reform. A useful analogy preserves an identifiable mechanism and recognizes where correspondence ends. This is a substantive boundary on interpretation, not a reason to discard the learning value of the exercise.

(Aidt and Shvets, 2012).

8.3 Operational problems and recovery

If an allocation cannot advance, first check that all four fields have values, total one hundred, and use multiples of ten. Under floor, also verify G of at least fifty. Zero is valid when the restriction permits it; an empty entry is not. If no ballot appears in the second tenure period, that absence is part of the rule: government continues automatically. Neither paired treatment requests new announcements in the second period.

If a parliamentary proposal fails validation, check that it includes the proposer, excludes zero-seat parties, and holds at least four seats. If participants are waiting, consult the monitor before reloading pages. A disconnection does not authorize the instructor to submit someone's decision. Preserve the database and session records, document the interruption, and follow the laboratory's normal recovery procedure. Do not reinitialize a database containing decisions as a way of unblocking it. An identified partial session is preferable to mixing earlier decisions with a reconstructed session that lacks a clear record of what happened.

8.4 Preparation checklist and assessment criteria

Before class, confirm language, edition, configuration, group size, and duration. Check the four budget entries in the example, the tie rule, and the meaning of any personal bonus. Prepare participant access and keep administrative access separate. Decide which outcome will be discussed and which graph is needed; opening every panel without a question consumes valuable time. If real payments are planned, explain conversion, summation across periods, and the closing procedure before anyone decides.

Assess four criteria: a correct budget restriction, a correct individual calculation, correct electoral aggregation, and a conclusion with an explicit scope. An excellent answer may find that a treatment did not change outcomes, provided the result is documented. An incorrect answer may use sophisticated vocabulary while counting transfers twice or interpreting an empty field as zero. Give feedback on the operation that failed. For a short activity, two calculations and a paragraph may suffice. For advanced assessment, add group comparisons, a mechanical counterfactual, and an identification discussion. Keep assessment demands proportional to the curricular objective.

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