



Instructor's Guide to Money Creation and Banking

Laboratory implementation, theoretical foundations,
experimental evidence, and variants

Behavioral and Experimental Economics Research Lab
Department of Economics



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

How to use this guide

This guide supports a macroeconomics activity about loans, deposits and bank settlement. It is intended for instructors who want to build the explanation from decisions and visible balance sheets, including those who have never used a banking laboratory.

The quick route covers access, preparation and the classroom sequence. The operational route follows the bank managers and project operators through their screens. The conceptual route develops accounting, incentives, extensions and report interpretation through worked examples.

The package includes basic and extended editions in Spanish and English. Common concepts are explained once; each extension identifies its changes. The rules are a classroom adaptation, and their ratios do not represent universal regulatory requirements.

Author

This guide was prepared by Stanislao Maldonado, research professor in the Department of Economics at Tecnológico de Monterrey, Monterrey Campus. For questions or suggestions about its content, please contact the author at stanislao.maldonado@tec.mx.

For the instructor

Start with the accounting example and a demonstration using four links. Keep the report hidden during class. Never project individual codes or associate outcomes with names or seats. Screenshots come from synthetic sessions; they are not findings from a student pilot.

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Preparing the class

1.1 Access through the updated laboratory website

Start at <https://beer-lab.org/en/>. Select **CLASSROOM** in the top navigation menu; it opens <https://teaching.beer-lab.org/en/>. In the **Classroom experiments** catalog, use the search box to locate the activity by name. You can also filter by **Topic** or **JEL code**. Clear any filters left from an earlier search before looking for another game.

Each family's card distinguishes **Español** and **English** access links. The **Show extended version** checkbox selects that edition before following a link. Catalog language and session language are separate choices: verify both. Students use the room specified by the instructor; the instructor prepares and monitors the session through this family's own administrative pages.

Checking resources, comprehension, and participant requirements

Before opening the room, check the selected configuration and the number of students present. The session-creation form states the group size and minimum required by that configuration. An individual activity accepts any positive participant count; an interactive activity must satisfy its stated requirement: complete groups when size is fixed, or a minimum participant count when size is flexible. Requirements may change across treatments, for example when adding a third party or changing an institution's size. If you edit a grouping parameter, check the requirement for the edited configuration, rather than relying only on the demo's suggested count.

In the instructions, ensure that students can identify what each role receives, what they can decide, and how the outcome is calculated. An initial account, a distributable budget, and final earnings need not be the same amount. Refer to the resources panel and the example for the selected treatment. Do not carry the basic edition's endowment into a treatment that changes accounts or introduces additional positions.

ECU stands for *Experimental Currency Units*: the activity's unit of account. An outcome of 100 ECU does not automatically equal 100 pesos or 100 dollars. Conversion depends on the session configuration. Before announcing a payment, confirm with the laboratory whether money is paid, the conversion rate, and which decisions count for payment. In hypothetical modules, describe amounts as outcomes in the stated situation.

When a comprehension check is included, an incorrect response receives an explanation beside that question, identifying the submitted answer and the correct answer. Other answers remain in the form. Ask the student to return to the example, locate the relevant rule, and redo the calculation before correcting the response. Avoid revealing answers to the entire class for an individual error, and do not interpret a comprehension mistake as an economic choice in the game.

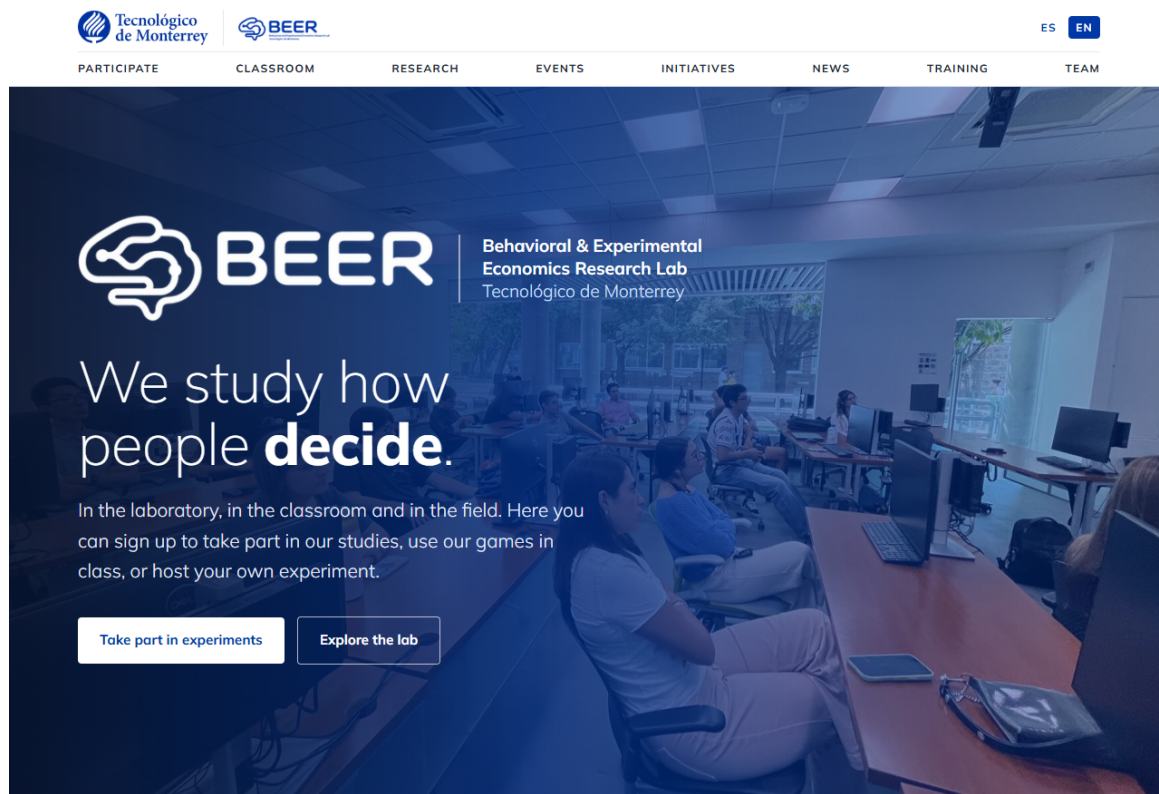


Figure 1.1: Current institutional website. Select CLASSROOM in the top navigation menu to open the teaching experiments. Captured on October 11, 2026.

Downloading a session with several rounds

For the instructor

Open **Data** within the relevant session and use that session's CSV or CSV-for-Excel download link. The general export has one row per participant and columns for the different rounds. Ten rounds do not necessarily mean ten rows per person. When the family provides its own long-format export, observations may instead be organized by participant and round or another unit defined by the design.

Save the original file together with the configuration name, session code, and active-round count. Check that columns for the last active round are present and that the data belong to the selected session. Empty cells can represent inactive rounds, a pending decision, or a field that does not apply to a role; do not automatically recode them as zeros. To compare learning, preserve round and group identifiers alongside participant identifiers. Share only anonymous aggregates in class, and record session incidents before constructing derived tables.

1.2 Purpose and scope

A banking explanation can begin with a simple question: when an institution approves a loan, what appears in the accounts, and who can spend the balance? This activity lets the class follow the answer without confusing credit, reserves, equity and profit. Two participants manage banks;

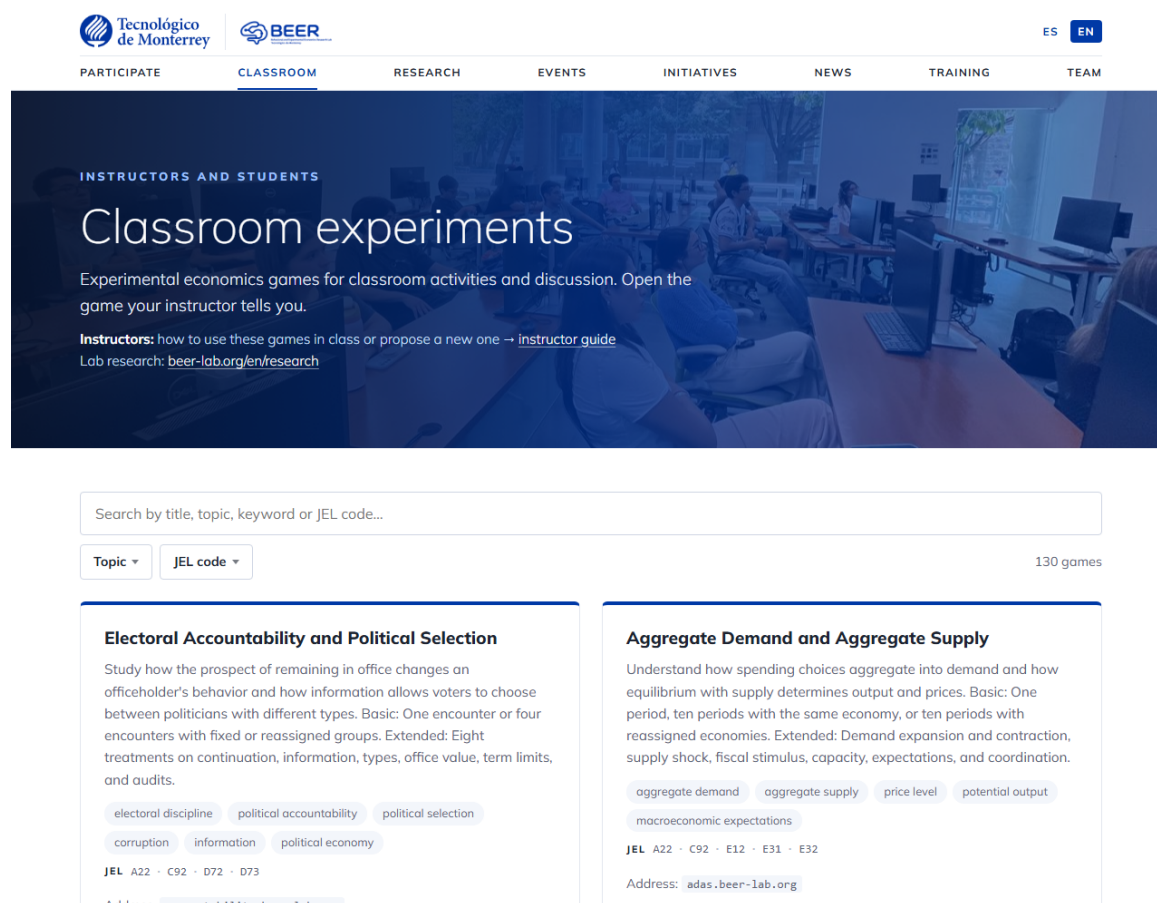


Figure 1.2: Current catalog: search by title, topic, or JEL code. Then locate this family's card and select language and edition. Captured on October 11, 2026.

two others request resources for projects. Suppliers, the central bank and a settlement bank are automated. People make actual decisions within the exercise, while the system preserves the counterparts of every operation.

The teaching objective is to recognize a macroeconomic mechanism. A credit contract can expand deposits used for payments; a transfer distributes those deposits between institutions; principal repayment reduces both credit and the deposit used to discharge the debt. An individual bank's balance sheet and an aggregate monetary measure are different objects. One institution may lose reserves when a purchase is made even though the total quantity of money stays unchanged. That distinction organizes the discussion.

This activity studies money creation through loans and deposits recorded by banks. It does not literally replicate Cameron's simulation or treat its rules as a comprehensive description of modern banking. It also differs from the bank-run game, in which depositors coordinate withdrawals, and the credit-market game, in which lenders transfer funds already available. Loan origination and reconciliation are the central features here.

Purpose	Understand deposit creation, payment settlement and credit constraints through decisions and reconciled balance sheets.
Experimental unit	An independent four-person economy: two banks and two project operators.
Participants	Multiples of four; fixed roles within each economy.
Basic edition	One cycle; ten with a fixed lending relationship; ten with relationships reassigned within the economy.
Extended edition	Reference and nine original extensions, plus fifteen comparisons of contracts, liability, protection, premiums, equity and income dependence.
Decision	Requests and approvals up to 80 ECU; rate quotation, reserve offers or contract selection when enabled.
Payoff	Original: 100 ECU for the activity plus net results. New contracts: 100 ECU per independent cycle plus personal change; total scores sum cycles.
Topics	deposit creation; interbank settlement; reserves and liquidity; bank capital; risk choice; deposit protection.
JEL	A22; C92; E42; E51; G21; G28.
Suggested duration	40–50 minutes for one cycle and discussion; 65–85 for ten. These are planning estimates without a timing pilot.
Author and contact	Stanislao Maldonado; stanislao.maldonado@tec.mx .

1.3 Access and selection

Start at <https://beer-lab.org/> and open the teaching section. The directory at <https://teaching.beer-lab.org/> supports searches by topics and JEL codes. This family's card is constructed from repository metadata and guides. Preparing those materials does not establish publication: at package delivery the subdomain is proposed and requires deployment. Before a remote class, confirm that the public address responds and that the lab has enabled the family.

The four canonical rooms are:

- ES basic: https://moneycreation.beer-lab.org/room/creacion_dinero_es.
- EN basic: https://moneycreation.beer-lab.org/room/money_creation_en.
- ES extended: https://moneycreation.beer-lab.org/room/creacion_dinero_extendido.
- EN extended: https://moneycreation.beer-lab.org/room/money_creation_extended.

The instructor entry is <https://moneycreation.beer-lab.org/demo>. Each room identifies language and edition and is the exact prefix of its configurations.

Demo shows 56 options: three basic and twenty-five extended per language. Basic rooms retain their three modes. Extended rooms contain a reference, nine original extensions and fifteen new comparisons of capital, contracts and protection. An option from another family is an operational signal to stop preparation and contact the lab. Do not resolve it by choosing a similar label: a separate database and filtered registration are part of the product's structure. Shared administrative access screens may retain Spanish labels; participant and report screens use the selected language.

The local preview uses <http://localhost:8184/demo>. It works only on the computer running the instance; other classroom devices cannot open that address by themselves. The family launcher preserves its database and uses a dedicated port. Restarting the process after changing templates does not mean deleting sessions. Distinguish opening a demonstration, creating a session, recording a commit, uploading it and deploying it on the laboratory server.

[ES] Un ciclo
[ES] 10 ciclos: relación fija
[ES] 10 ciclos: relación reasignada
[ES] Referencia
[ES] Pagos dentro del banco
[ES] Conversión a efectivo
[ES] Ingreso del proyecto incierto
[ES] Sin facilidad central
[ES] Financiación interbancaria voluntaria
[ES] Financiación central costosa
[ES] Tasa ofrecida y demanda de crédito
[ES] Restricción de capital
[ES] Reserva del 100 por ciento
[EN] One cycle

Figure 1.3: Demo excerpt: original modes.

1.4 Preparation before students arrive

First confirm attendance. The participant count must be a multiple of four. There are no unannounced passive participants or hidden rules that fill groups with invented decisions. If ten students arrive, arrange eight active links and two observers who do not decide, or wait until a compatible number is available. Explain this arrangement without changing group size after the session opens. Each economy synchronizes separately; a delay in one group should not stop the others.

Choose language, edition and mode before distributing links. A single interaction is useful for a first class because every entry can be discussed slowly. Ten cycles support observations about account accumulation and lending relationships. Select an extension to answer a specific question; do not describe the reference while verbally combining several rules. The interface shows its ratios and limits, and decisions are checked against those same parameters.

Test four distinct links in advance, one for each position. Two tabs with the same link represent one person, not two participants. A room link is a general entry; individual links belong to a particular session. Keep them in the instructor panel and distribute them privately. Do not project

Money creation extended — Full deposit restoration
Money creation extended — Partial deposit restoration
Money creation extended — Public equity restoration
Money creation extended — Full owner liability
Money creation extended — Higher equity requirement
Money creation extended — Higher equity and deposit restoration
Money creation extended — Equity requirement by contract
Money creation extended — Restoration with uniform premium
Money creation extended — Restoration with contract premium
Money creation extended — Higher initial equity
Money creation extended — Lower initial equity
Money creation extended — Reserve constraint
Money creation extended — Common draws
Money creation extended — Reduced higher income in C

Figure 1.4: Demo excerpt: new contract and protection options.

Rooms

Current rooms:

[ES] Creación de dinero: básica
[EN] Money creation: basic
[ES] Creación de dinero: extendida
[EN] Money creation: extended

Figure 1.5: Rooms contains the four rooms for this family: basic and extended editions in Spanish and English.

a list that publicly connects identities to banks and outcomes. Labels A and B are used inside the game, not as student names.

Check connectivity, browser access and the report. Open the report with authentication and confirm that results are hidden and the reveal button is disabled before completion. Have a worksheet for summing the example accounts and another for recording aggregate indicators after play. To compare conditions, prepare independent economies and document assignment. A second execution with the same people is affected by experience, order and learning, even when it uses a different label.

Room: [EN] Money creation: basic

Create a new session

Session Config

[EN] One cycle

Number of participants

Complete groups of 4 participants. Use a multiple of 4; minimum 4.

Create

[Configure session](#) 

App sequence

money_creation_game (10 rounds)

Deposit creation, settlement and credit constraints in independent four-person economies.

0 participants present

Start links

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

Room-wide URL

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

http://127.0.0.1:8184/room/money_creation_en

Figure 1.6: Session-creation form for the basic English room. Check the selected configuration and participant requirement before creating the session.

Checkpoint

The session is ready when all four rooms belong to the family, language matches the configuration, each person has a distinct link, instructions show the chosen parameters and the report reveals no early data. Four connections do not by themselves establish that four people understood the mechanism.

Create session

Tip: consider creating your session in a [Room](#), for more stable start links that are not opened accidentally.

Session Config

[ES] Un ciclo

Number of participants

4

Grupos completos de 4 participantes. Use un múltiplo de 4; mínimo 4.

Create

[Configure session](#) 

App sequence

money_creation_game (10 rounds)

Deposit creation, settlement and credit constraints in independent four-person economies.

Figure 1.7: Creating a four-person session.

1.5 Minimal sequence and objectives

Keep the initial verbal intervention short: explain that each person follows their screen, decisions are private and help should be requested without talking to other participants. Do not announce the behavior you expect to observe. Instructions provide roles, contracts, limits and scores; the explanation of money creation develops afterwards from the accounts. Navigation assistance should not become a recommendation about how much to lend.

Ask students to read, answer the two comprehension questions and decide. Incorrect answers return a message directing them to the example; this is not a knowledge survey or an additional payoff. The first question recognizes the two sides of a loan entry. The second distinguishes a transfer from monetary creation. The activity includes no demographic battery. If learning is to be measured, use a separate teaching exercise with its own purpose and administration.

At the end, students keep the closing screen open. Confirm that every economy completed its active cycles and reveal the report using its button. Begin with quantities requested, approved and executed before interpreting willingness to lend. Then reconstruct a loan, purchase and repayment. Finally compare an extension with the reference, stating which parameters and opportunities differ. An apparently lower lending average can reflect a binding rule rather than a change in preferences.

There are four observable objectives. First, write a balance sheet that closes. Second, identify each operation's effect on deposits, reserves and equity. Third, explain why liquidity and capital constrain different contracts. Fourth, justify a careful interpretation of classroom data. A student

who repeats that banks create money but counts principal as profit has not yet achieved the second objective. Use that error to motivate the next worked example instead of treating the slogan as sufficient understanding.

For the instructor

For a first session, reserve discussion time comparable to decision time. The activity may complete technically while students still need an explanation of deposits as bank liabilities. Always ask which account increases, who has the right to spend it, and which obligation appears at the same time.

From a loan to reconciled accounts

2.1 Objects that must be kept separate

A deposit is a customer's claim against a bank. Its owner can use it to pay, although the bank records the same amount as a liability. A loan is the bank's claim against a borrower. Reserves are bank balances at the central bank, used to settle payments between institutions. Equity is the difference between assets and liabilities: it absorbs losses, but is not a separate box of funds available for lending. Profit is a flow earned during a period. Confusing these objects prevents an explanation of either money creation or an individual institution's constraints.

Let R denote reserves, L project loans, I interbank assets, D deposits, F central bank debt, J interbank debt, and K equity. Each bank preserves $R + L + I = D + F + J + K$. An interbank balance appears as an asset of the lender and a liability of the borrower. The program checks both sides; it does not interpret an increase in I as the creation of a public deposit. Both banks open with $R = 20$, $K = 20$, and zero in all other accounts.

The economy includes an automated settlement bank with an external deposit of 10,000 ECU, fully backed by reserves. Project revenues and shareholder contributions come from this deposit. This arrangement avoids inserting unaccounted resources when projects close. The aggregate is $M = D_A + D_B + D_X + C$, where D_X is the external deposit and C is currency held by the public. Bank reserves are excluded from M . Initially $M = 10,000$. The large external balance provides funding for project payments throughout the ten cycles; it is not an initial deposit at either participant bank.

Theoretical foundation

Double-entry bookkeeping preserves the balance sheet of each institution. It does not imply that money held by the public is constant. Loan origination can increase both a bank asset and a liability used as a means of payment. Ask which accounts change, who owns them, and which accounts belong to the monetary aggregate being measured.

2.2 The sequence of transactions

Origination records approved credit that can actually be executed: a debit to L and a credit to the project's deposit. It requires no contemporaneous reserve transfer. The operator spends the deposit at automated suppliers. In the reference treatment the supplier banks elsewhere. The originating bank therefore loses reserves and deposits, while the receiving bank gains both. The purchase relocates money without changing its total. Under internal payments, only the account holder changes within the same bank. The difference is a settlement requirement, not a different

definition of a loan.

Execution is subject to two classroom coefficients. Equity limits lending through $L \leq K/k$, with $k = 0.08$ in the reference. Settlement must satisfy $R \geq \rho D$, with $\rho = 0.10$. The system jointly evaluates net payments and available funding before executing quantities. It does not issue infeasible loans and subsequently permit negative reserves. These coefficients are teaching parameters, rather than a statement of current regulation or a universal requirement applying to all banking systems. Their purpose is to make different constraints observable within a small economy.

Central bank funding raises R and F . Its limit is 100 ECU per bank, and its per-cycle fee is 2% of outstanding funding. Under the interbank extension, another bank can supply reserves within its offer and available surplus. This creates corresponding I and J balances. Funding and purchases settle as a single net batch: incoming reserves may finance an outgoing transfer in that batch. The simplified timing does not claim that every actual payment system follows the same sequence. Students should recognize the accounting requirements without treating the classroom calendar as a complete institutional model.

Projects normally receive $1.125L$ from the external account. Their revenue is funded with existing money. Repayment pays interest first, then principal. Liability is limited to current project revenue; earlier surpluses are not seized. Principal cancellation reduces D and L . Retained loan interest reduces D and raises K . Unpaid principal reduces L and K , without deleting the supplier's deposit. A credit loss is not itself a repayment of money. This distinction is particularly important when a risky project has already paid its supplier before its revenue is realized.

2.3 A complete example: a loan of 40

Suppose the project assigned to bank A requests 40 and receives approval for 40. The other project requests zero. The contract rate is 10% and project revenue is normal. A records $L = 40$, $D = 40$, $R = 20$, and $K = 20$. Assets equal 60, as do deposits plus equity. Public money rises to 10,040. The loan does not constitute profit of 40 for the bank manager: it is an asset that must be collected. The project operator has a deposit and an associated obligation, rather than a free addition to personal wealth.

A needs 20 additional reserves to pay the supplier at bank B. The central bank facility supplies 20. After the purchase, A has $R = 0$, $L = 40$, $F = 20$, $K = 20$, and $D = 0$. B has $R = 60$, $D = 40$, and $K = 20$. Total public deposits do not change during settlement. The apparent disappearance of the project's deposit at A has an observable counterpart: the supplier holds 40 at B. Asking students to locate that account is more useful than asking them to memorize a multiplier. It also separates the source of a payment from its ultimate recipient.

The project receives 45 from the external account. A moves to $R = 45$, $D = 45$, while D_X falls to 9,955. The borrower pays four in interest and 40 in principal, retaining a deposit of one. A then has $R = 45$, $D = 1$, $L = 0$, $F = 20$, and $K = 24$. It pays a funding fee of 0.40 and returns the 20 borrowed reserves. Its final accounts are $R = 24.60$, $D = 1$, and $K = 23.60$. B retains $R = 60$, $D = 40$, and $K = 20$.

Final money is $1 + 40 + 9,955 = 9,996$. Initial creation of 40 was followed by principal cancellation of 40 and retained interest of four. The net change is therefore minus four. A earns $4 - 0.40 = 3.60$, taking its score from 100 to 103.60. The project retains a deposit of one but incurs a score cost for effort of $0.01L = 0.40$. Its net result is 0.60 and its score is 100.60. A deposit balance, accounting profit, and an incentive score measure different things. This separation should be explicit before any class ranking or treatment comparison.

Reference example with 40 ECU

At a 10 percent rate, a loan of 40 creates an asset of 40 and a deposit of 40; reserves remain at 20. If the other bank does not lend, 20 from the facility is needed to pay the supplier. Income of 45 pays 4 in interest and 40 in principal; the operator keeps a deposit of 1 and a net score gain of 0.60 after effort. The facility charges 0.40; the bank gains 3.60. This example uses the facility at 2 percent, a 10 percent reserve ratio and no withdrawals; see your session values above.

Each person starts with a score of 100 ECU. The bank adds interest received minus credit losses and funding costs. The project operator adds income left over minus effort. Principal received, lent or repaid and owner contributions are not rewarded. All cycles accumulate.

Figure 2.1: Reference accounting example.

2.4 Monetary conservation and losses

For a complete cycle, $\Delta M = L_{\text{new}} - P - H - A$, where P is cancelled principal, H is interest retained by banks, and A is shareholder contributions from the external account. Currency withdrawal converts deposits into notes. Supplier payments and project revenues relocate deposits. Effort costs change incentives but are not financial transfers. Funding fees move reserves and change equity; they are not direct public payments in this identity. The equation refers to the defined aggregate and accounting convention, not to every possible national monetary statistic.

If losses or fees leave a bank with negative equity or insufficient reserves, an automated shareholder contributes from the external account according to the game's rule. This can reduce M : the shareholder exchanges a deposit for bank equity. The contribution is excluded from the manager's profit. Automation keeps the activity running but introduces an intervention that must be stated when discussing moral hazard. It does not imply that an actual institution is always recapitalized or that a loss has no consequence. The manager's score still records the loss, even if a shareholder restores the balance sheet.

Attention

A mechanical accounting rule does not predict how people behave. Reconciled balances establish accounting consistency; low credit can reflect caution, incentives, constraints, or misunderstanding. Explaining behavior requires decisions and comparisons, together with an examination of the accounts.

Checkpoint

Verify both bank balances, total money of 9,996, and the project score of 100.60. A score of 101 confuses the retained deposit with the net incentive after effort.

2.5 Relationship to the literature

Cameron (1997) proposed a classroom simulation involving bankers, borrowers, and firms. This precedent supports following transactions across roles; it does not validate every digital choice in this adaptation. McLeay, Radia, and Thomas (2014) explain how lending creates deposits and why a description based on previously multiplied reserves is incomplete. Their institutional analysis helps separate origination, payment settlement, and constraints. The present activity adds a small economy, automated settlement, explicit incentives, and a traceable journal. Its classroom performance still needs evaluation with actual students.

Feedback script

Start with an account: who now holds the deposit that was created? Move to an institution: which bank must settle the payment? Finish with the aggregate: did total money change, or did its distribution change? Only then compare the decision to lend with the capacity to sustain that decision. This sequence connects an individual entry to macroeconomic interpretation.

Decisions, incentives, and the participant journey

3.1 Entry and comprehension

Each link belongs to one person with a stable position in an economy of four. Positions one and two manage banks; three and four operate projects. The welcome page uses a neutral title about accounts and payments. It does not announce a behavioral hypothesis or request demographic information. Participants accept laboratory rules before proceeding. Explain that waiting means someone in the same economy is still deciding. Opening several tabs with one link is unnecessary and can make it harder to follow the current page.

Cycle 1 / 1

Accounts and payments activity

The Behavioral and Experimental Economics Research Lab in the Department of Economics at Tecnológico de Monterrey is a space for learning about economic decisions through controlled activities. In this activity you will work with three other people.

General rules

- Remain silent. Do not talk or communicate with others; decide individually and privately.
- Follow the instructions. Do not refresh, close or leave the page.
- If you have a problem, raise your hand and consult staff privately.

☐ I have read these rules.

Start

Figure 3.1: Laboratory entry and rules.

Instructions show the role, sequence, available quantities, and actual parameters. A reference example explains bookkeeping but does not replace the chosen treatment's values. If facility funding costs 10%, the basic example's fee cannot calculate that session's score. Ask participants to identify the applicable rate and payment destination before submitting a request. This simple check prevents misunderstandings. It directs attention to information participants are entitled to use without recommending a strategic choice or implying that one quantity is expected.

Two people manage banks and two request funds for projects. Each bank starts with 20 ECU in reserves, no deposits and 20 ECU in equity. Balances carry over between cycles. Suppliers and the institutions processing payments are automated.

In each cycle: the interest rate is announced; the operator requests funds; their bank approves up to the requested amount; the loan is recorded and settled; the purchase takes place; project income arrives and the debt is repaid.

You can choose 0, 20, 40, 60 or 80 ECU. Requesting or approving zero is valid. The executed amount may be lower because of the announced requirements. The feasible allocation maximizes total credit without exceeding requests or approvals; ties alternate priority between banks from one cycle to the next.

The supplier is paid at the other bank. Reserves and deposits move between banks; the purchase does not change total money.

Income comes from an existing deposit at an automated settlement bank. That account is included when adding up money.

Figure 3.2: Current basic-edition rules and opening balances.

Reference example with 40 ECU

At a 10 percent rate, a loan of 40 creates an asset of 40 and a deposit of 40; reserves remain at 20. If the other bank does not lend, 20 from the facility is needed to pay the supplier. Income of 45 pays 4 in interest and 40 in principal; the operator keeps a deposit of 1 and a net score gain of 0.60 after effort. The facility charges 0.40; the bank gains 3.60. This example uses the facility at 2 percent, a 10 percent reserve ratio and no withdrawals; see your session values above.

Each person starts with a score of 100 ECU. The bank adds interest received minus credit losses and funding costs. The project operator adds income left over minus effort. Principal received, lent or repaid and owner contributions are not rewarded. All cycles accumulate.

Figure 3.3: Accounting example and score rule in the basic edition.

The comprehension page asks which accounts arise when a loan is granted and what happens to the aggregate when a deposit moves between banks. Correct answers are a loan and a deposit, and unchanged total money, respectively. An incorrect answer produces an explanation and keeps the participant on that page. Attempts are not presented as a validated knowledge measure. If many

students stop here, explain the entry or draw two banks on the board. Avoid recommending a credit quantity while providing assistance.

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Cycle 1 / 1

Check the rules

What increases when a loan is recorded?

The loan asset and the deposit liability

What happens to total money when paying a supplier at another bank?

Principal doubles

Your answer: Principal doubles. The correct answer is It is conserved; each bank's accounts and reserves change. Review the example: loan and deposit increase together; a purchase transfers existing money.

Continue

Figure 3.4: Current comprehension check with an incorrect answer, its specific explanation, and retained responses.

What participants will see

Zero is available. A request does not guarantee execution, and approval does not remove balance sheet constraints. Read the outcome after each cycle to distinguish requested, approved, and executed quantities. Your initial score of 100 ECU is an incentive account, not a deposit available for bank payment settlement.

3.2 Request, approval, and settlement

The operator requests 0, 20, 40, 60, or 80 ECU. This sets desired project scale. The assigned bank sees the request and chooses approval on the same grid without exceeding it. The form rejects excess approval. The system may execute less than approved if reserves, funding, or equity are insufficient. Low execution should not automatically be attributed to voluntary rejection. Requested, approved, and executed quantities, together with opening accounts, identify the margin limiting the loan. Distinguishing these stages prevents a technical limit from being mistaken for a preference.

Automatic allocation seeks the largest feasible sum of loans within requests and approvals. It examines every combination on the grid of 20. When several reach the same sum, bank priority alternates by cycle. This does not estimate a welfare optimum or silently favor one bank throughout the session. Priority can matter when both desire quantities incompatible with the limits. Discuss rationing by comparing the joint feasible maximum and its distribution between banks, rather

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Cycle 1 / 1

Request for funds

Project operator · Bank A

Contract interest rate: 10%

Your bank may approve less. Income and effort apply only to the amount finally executed.

Amount requested for this project

----- ▼

Continue

Figure 3.5: Project request.

than only total observed credit. Symmetric opening accounts do not guarantee identical realized quantities.

Waiting is confined to each economy. A complete group can advance without waiting for every other economy in the room. Within a group, settlement requires all relevant decisions. A manager who submitted approval may wait while the other manager decides. The instructor observes progress while keeping aggregates hidden. Repeated refreshing is unnecessary: waiting may simply indicate a legitimate pending choice. Before diagnosing a fault, inspect which roles have submitted required forms and whether the second bank is still viewing its approval page.

3.3 Reference contract incentives

Normal revenue is $1.125L$ and interest is 10% of L . After principal repayment the project retains $0.025L$ as a deposit. Effort costs $0.01L$ in the score, giving a net gain of $0.015L$. A loan of 80 adds 1.20; zero credit neither adds nor subtracts. A participant who maximizes this score and anticipates full execution would request 80 in the reference. This conditional prediction does not describe every real student's preferences. Uncertainty about rules can produce a different choice even without uncertainty in the project technology.

The bank receives interest, loses unrecovered principal, and pays funding charges. For 80 with the other bank inactive, it receives eight and pays 1.20 for 60 borrowed reserves, earning 6.80. Reciprocal payments can reduce funding needs. The same loan can yield different profit depending on the other decision. The activity is not zero-sum: projects, suppliers, the shareholder, and the external account provide relevant counterparts. Bank scores alone do not identify the economy's

Cycle 1 / 1

Request review

Bank A

Requested 80 ECU	Contract interest rate 10%
Reserves 20.00 ECU	Loans 0.00 ECU
Deposits 0.00 ECU	Equity 20.00 ECU

Approval does not guarantee execution: capital and joint settlement are checked.
You may reject by choosing zero.

Amount approved

----- ▼

Continue

Figure 3.6: Bank approval.

Cycle 1 / 1

Please wait

The next stage begins when all four people in your economy finish this part.
Keep the page open.

Figure 3.7: Waiting within the economy.

total surplus or the distribution of gains to all account holders.

Repaid principal reduces a loan asset and a deposit liability without entering profit. A contribution maintains continuity without rewarding the manager. Effort lowers the project score without withdrawing money from a deposit. If scores become actual payments, announce a conversion rate and an approved budget before the activity. The implementation delivers ECU; the guide does not prescribe external payments or authorize changing conversion after observing outcomes. Apply the same announced rule to participants facing the same conditions, and distinguish this administrative choice from the accounting mechanism.

Theoretical foundation

Project surplus is $\max(Y - H - L, 0)$ under limited liability and interest priority. The net incentive subtracts effort. The bank receives collected interest, less losses and funding charges, plus interbank income where applicable. These functions make private costs visible but do not measure the economy's social welfare.

3.4 Outcomes and continuation

Each role sees executed credit, revenue, principal, interest, and losses. Banks also see charges and contributions; projects see effort. Both see score changes and cumulative scores. The associated bank's table shows opening, creation, settlement, currency withdrawal, income, repayment, resolution, and closing. Read horizontally to check the balance and vertically to follow an account. A closing stock is not the sum of transactions. Financing balances below the table help explain why reserves cannot be interpreted independently of liabilities or treated as profit simply because they increased.

Over ten cycles, deposits, reserves, equity, and outstanding funding persist. Project loans are repaid or written off within each cycle, so they do not accumulate as an overdue portfolio. Fixed relationships preserve assignments. Reassignment draws relationships again inside the same economy, without changing roles or resetting accounts. An operator may draw the same bank again. Reassignment does not create ten independent economies or erase accounting history. Comparisons must respect these continuing balance sheets, accumulated scores, and repeated decisions by the same people.

The final page announces completion and the final score without a button for another interaction. Wait for closing before revealing the report. Under interbank funding, the additional offer is separate from approval of the bank's own loan: it makes up to 40 reserves available to the other bank, subject to a surplus. Under rate-sensitive demand, banks quote before operators request. These distinct pages are explained with their predictions in the extensions chapter, and their extra decisions belong in the planned classroom time.

Feedback script

Compare the remaining deposit with the score change, then approval with execution. The first difference identifies effort; the second requires examining constraints. Ask which accounts would carry into another cycle. This converts an individual outcome into an explanation of incentives and persistence without treating the largest score as proof of the best social decision.

Score change	Cumulative score
6.80 ECU	106.80 ECU
Executed	80.00 ECU
Project income	90.00 ECU
Principal repaid	80.00 ECU
Interest received by the bank	8.00 ECU
Principal written off	0.00 ECU
Facility cost	1.20 ECU
Interbank cost	0.00 ECU
Owner contribution	0.00 ECU

Figure 3.8: Bank outcome.

Score change	Cumulative score
1.20 ECU	101.20 ECU
Executed	80.00 ECU
Project income	90.00 ECU
Principal repaid	80.00 ECU
Interest received by the bank	8.00 ECU
Principal written off	0.00 ECU
Effort cost	0.80 ECU

Figure 3.9: Project outcome.

Changes in your bank's accounts

Stage	Reserves	Loans	Deposits	Equity
Opening	20.00	0.00	0.00	20.00
Loan recorded	20.00	80.00	80.00	20.00
Purchase settlement	0.00	80.00	0.00	20.00
Cash conversion	0.00	80.00	0.00	20.00
Income received	90.00	80.00	90.00	20.00
Repayment and write-off	90.00	0.00	2.00	28.00
Interest and contributions	88.80	0.00	2.00	26.80
Closing	28.80	0.00	2.00	26.80

Funding at closing

Facility debt

0.00 ECU

Interbank asset

0.00 ECU

Interbank debt

0.00 ECU

Financial accounts and personal score are distinct. The automated settlement bank, supplier receipts and cash are also recorded.

Figure 3.10: Bank accounts and funding.



Cycle 1 / 1

Activity finished

Your decisions have been recorded. Wait for your instructor's directions and keep this screen open.

Cumulative score: **101.20 ECU**

Your cycle summary

Cycle	Score change	Cumulative score
1	1.20	101.20

Figure 3.11: Closing and final score.

Reading the report and building an explanation

4.1 Access, progress, and revelation

The report belongs to the session administrator and requires authentication. Its link is not a participant link. Results remain hidden on opening, and reloading hides them again. Revelation becomes available once every economy completes every active cycle; completion by the fastest group is insufficient. Before closing, the instructor can inspect progress and submitted decisions. This helps manage the class without showing distributions that could influence participants who are still choosing. Keep the report in a private instructor window until the planned discussion.

The counter's unit is economy-cycle. Three economies over ten cycles imply 30 expected units even though there are only twelve participants. The decision count records submitted requests and approvals, not executed contracts. The report retains the expected denominator and shows pending units. A one-cycle configuration uses that active cycle even if the administrator opens the application's last technical period. This prevents an empty report caused by consulting a period outside the chosen horizon. Technical storage and the classroom episode are different objects.

Visible aggregates use settled economies. A pending unit is not replaced with zero credit. A completed unit with zero requests is a valid observation. This distinction affects execution rates, means, and distributions. State how many units and independent economies support any claim. This guide's screenshots use synthetic test choices: they demonstrate interpretation rather than estimate student behavior. Their numbers should not be presented as an expected classroom distribution or evidence that a particular treatment successfully changes learning.

For the instructor

Before revealing, ask for written predictions about gross creation, net monetary change, and bank profit. Then show all three results. Begin with reconciled accounts and observation denominators rather than a ranking of winners. This makes clear which question each number answers.

4.2 Stocks, flows, and ratios

Gross creation sums new executed loans over completed units. Cancelled principal sums principal repayments; retained interest sums project interest collected and kept as bank equity. Contributions sum exchanges of external deposits for bank capital. Monetary change combines these items with different signs. Do not subtract credit losses a second time: a loss is already reflected in principal

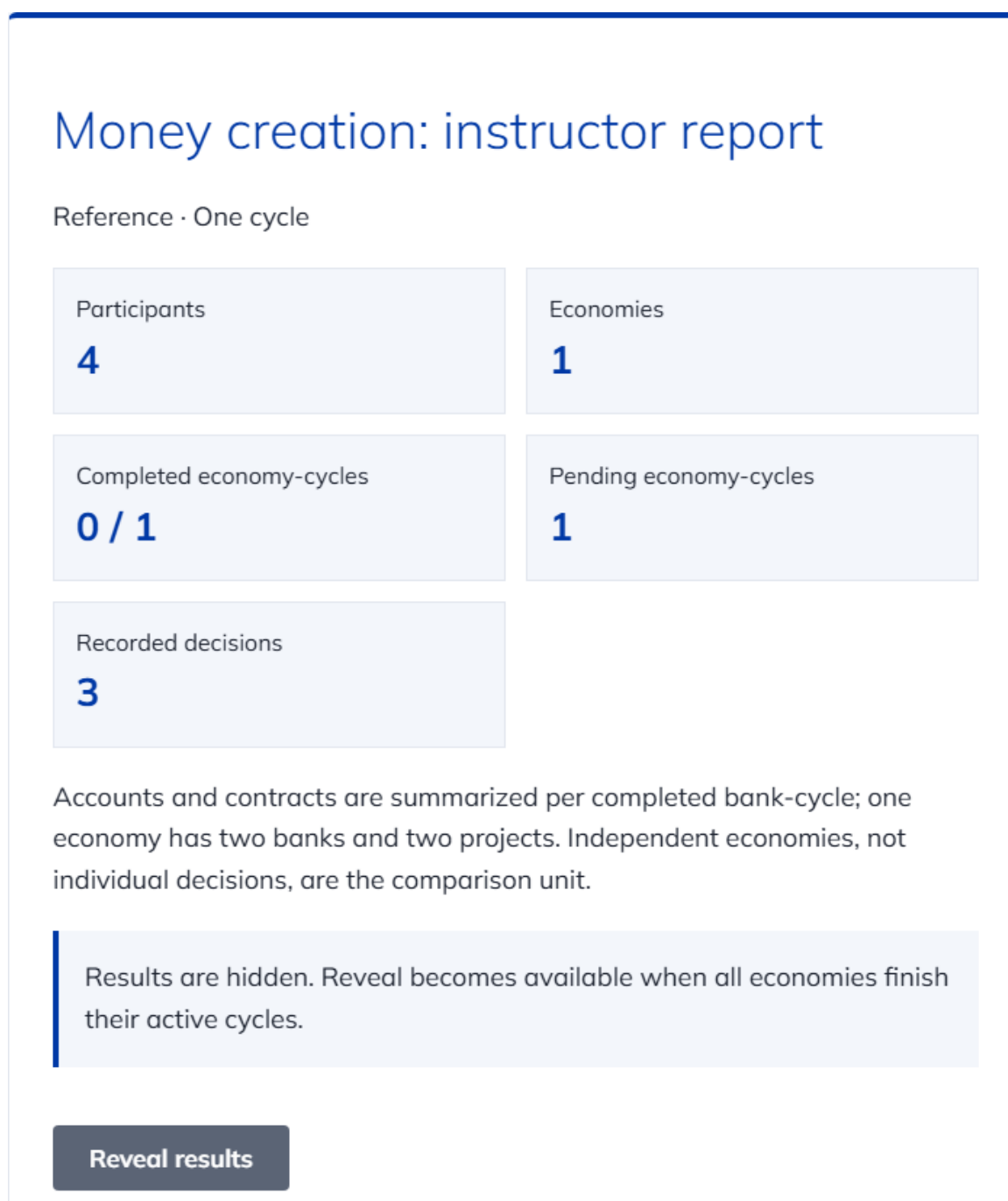


Figure 4.1: Report with pending decisions.

that was not cancelled and does not directly destroy the supplier's deposit. The monetary identity is an accounting check, not a theory that losses have no economic effect.

The execution ratio divides granted credit by requested credit, summing both over the same completed units. Total requests of 240 and execution of 180 yield 75%. This is not an unweighted mean of individual percentages; a request of 80 has more weight than one of 20. If all requests are zero, a dash replaces the undefined ratio. A high ratio can coexist with little credit when people ask for little. Read it with quantities, rather than interpreting it as a universal efficiency measure or a complete indicator of access to credit.

Reserves, deposits, and equity are closing stocks. Accumulated creation is a flow summed throughout the episode. Ten loans of 40 can create 400 deposits over time without leaving 400 at closing:



Figure 4.2: Progress over ten cycles.

repayments and other transactions occurred. Closing currency is also a stock, not a repeated sum of existing currency across periods. Interpret a final balance by reconstructing relevant flows and their initial position. Comparing a flow and a stock without identifying their dates can create an apparent discrepancy where the accounts are actually consistent.

4.3 Roles, histograms, and trajectories

The role table shows person-cycle observations from completed units and the mean score change. The final mean uses only participants in economies reaching the last active cycle, with its own denominator. Banks and operators have different outcome functions; their colors and labels

Deposits created through lending 1000.00 ECU	Deposits destroyed: principal 940.00 ECU
Deposits destroyed: retained interest 180.00 ECU	Net change in money -120.00 ECU
Deposits used for capital 0.00 ECU	Executed / requested credit 100.0%

Bank-cycles: 20. Zero requests: 5.

Reconciliation: final money = initial money + loans – principal repaid – retained interest – capital contributions. Cash replaces deposits; a loan write-off reduces equity without deleting the deposit already circulating.

Figure 4.3: Episode monetary reconciliation.

remain consistent. A score difference between roles does not establish exploitation or an equivalent transfer: effort, external suppliers, and funding also matter. Specify which role's incentives are being discussed before interpreting a mean as a response to a treatment.

Results by role

Your role	Observations	Mean change per cycle	Mean final score	People with closing
Bank	20	5.92	159.20	2
Project operator	20	-0.25	97.50	2

Figure 4.4: Outcomes and denominators by role.

The histogram classifies executed quantities at zero, 20, 40, 60, and 80. Its unit is bank contract per cycle, including a contract with zero execution. Two banks in three economies over ten cycles provide 60 observations when all finish. Height measures frequency, not equity or aggregate money. Inspect whether loans cluster at a limit or span several quantities. A concentration at 40 under tight capital can be mechanical; the same concentration in the reference needs another explanation. Use opening constraints to distinguish these cases.

Distribution of executed credit

Bank-cycles: 20

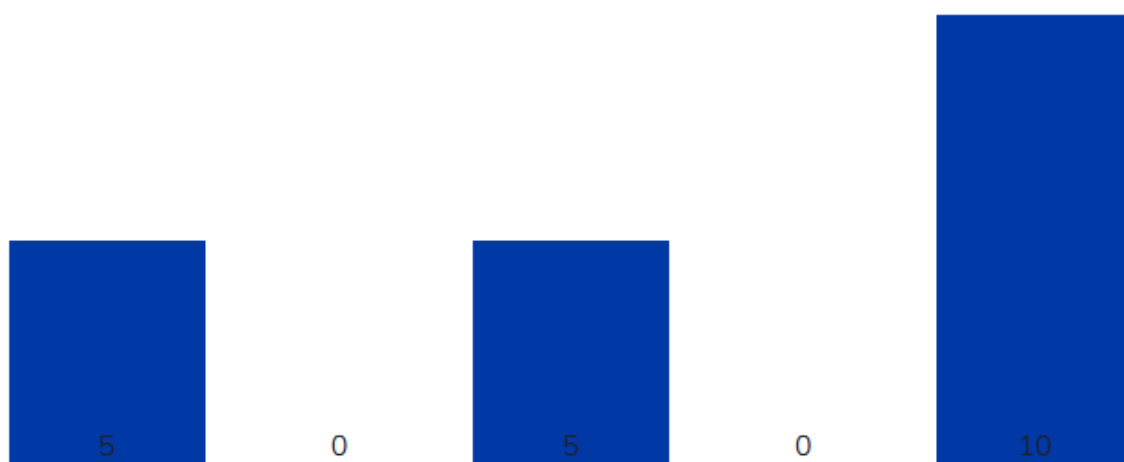


Figure 4.5: Executed credit distribution.

The credit trajectory shows average total credit per economy in each cycle, on a zero-to-160 scale. The money trajectory shows the mean change in M since the economy opened, rather than the isolated change during that cycle. The accompanying table gives available economy counts and mean reserves, deposits, and equity. If composition changes because some economies did not finish, a slope can reflect composition as well as learning. A plotted line does not remove this limitation, and a smooth trajectory is not proof of a smooth response by every participant.

4.4 An interpretation exercise

Suppose one economy executes two loans of 40 under normal revenue and needs no funding. Creation is 80, principal cancellation is 80, and retained interest is eight. Net change is minus eight even though deposits expanded at origination. Each operator gains 0.60 in score and each bank collects four. A claim that there was no creation because final change is negative confuses a gross flow with a net balance. A claim that new reserves equal new loans needs an entry establishing that relationship; the origination entry itself does not do so.

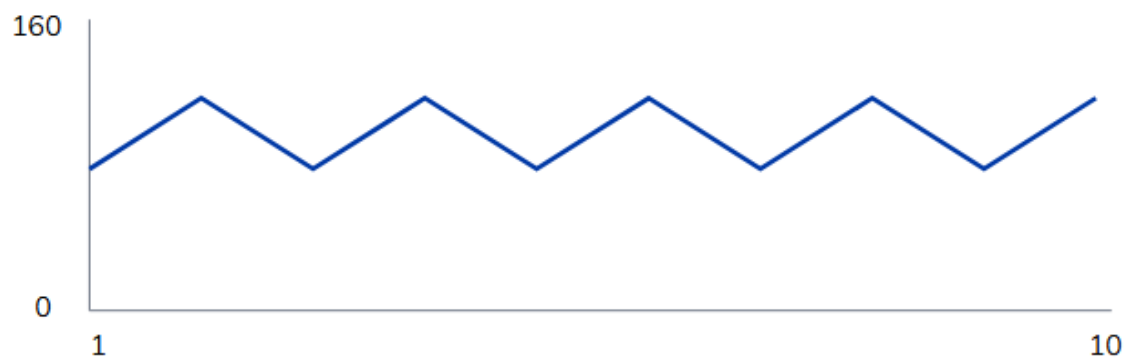
Now suppose one project receives only 36. It pays four in interest and 32 in principal, leaving eight to be written off. The other repays 40 and four in interest. Without contributions, $\Delta M = 80 - 72 - 8 = 0$. The loss reduces the affected bank's equity while the supplier's deposit remains. The low-revenue operator loses 0.40 in score through effort, although limited financial liability prevents a negative project deposit. This example connects monetary identity, risk, and incentives without presenting a numerical illustration as an empirical finding.

Feedback script

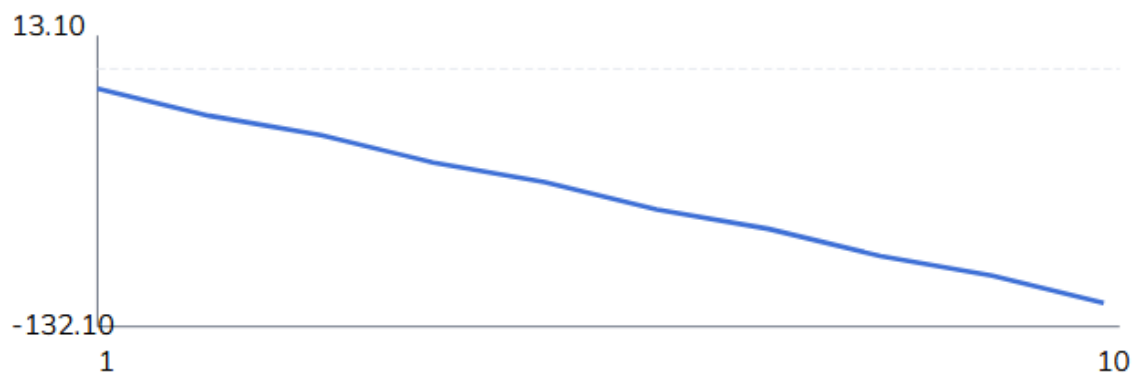
Ask which number was observed and in which unit. Request a compatible mechanism: a constraint, choice, or payment. Finally ask which additional evidence would distinguish competing explanations. Keeping these steps separate supports discussion in a small class without presenting its results as a general causal estimate.

Evolution by cycle

Mean credit per economy (ECU)



Mean cumulative change in money (ECU)



Each point uses only economies with that cycle completed. Money changes include automated-bank deposits and cash. A purchase or project payment creates no additional money.

Figure 4.6: Credit and monetary change by cycle.

4.5 Comparisons and inference

Keep language, horizon and relationship rule constant and record assignment. Economies are independent; cycles reuse participants and accounts. Summarize within economies before comparing treatments. With few economies, describe distributions and mechanisms rather than treating correlated bank contracts as independent observations. Classroom differences need not support population causal estimates.

Reassignment preserves balances; trends can reflect learning, composition, accumulation or closing. Distinguishing them requires additional design. Beliefs, trust and risk preferences are not elicited. The report describes accounts and choices; other claims need evidence.

Nine extensions for identifying mechanisms

5.1 A common reference for comparisons

The extended room offers a reference and nine mechanism changes. All preserve four participants, ten cycles, and continuing balance sheets. Change one condition per comparison and record the configuration. These extensions adapt accounting and economic principles; they are not presented as nine previously replicated experimental designs. McLeay, Radia, and Thomas (2014) provide an institutional framework for credit, reserves, and rates. Cameron (1997) provides the teaching precedent. Where a source supports a mechanism rather than a classroom effect, retain that distinction in the discussion.

State a conditional prediction before seeing results. Holding requests and approvals constant first identifies a mechanical effect; allowing new choices adds a behavioral response. The report shows execution, money, roles, and balances, while exported decisions support analysis of specific margins. A final difference can combine both components. Screenshots cover distinct pages: variants sharing forms do not require an entire duplicated journey to explain their rule. No extension has yet been evaluated with actual students, and synthetic test sessions cannot fill that evidence gap.

Feedback script

Choose two economies with comparable contracts. Identify the entry that changes, then the decision that can respond. Separate the mechanical effect, observed response, and external evidence. An unexpected result is a reason to inspect constraints and comprehension before attributing it to a preference or a macroeconomic law.

5.2 Within-bank payments

The supplier banks with the project operator. A loan changes L and D as in the reference, but spending transfers deposits between internal accounts without reserve outflow. The mechanical prediction is lower funding needs for asymmetric lending. With a request of 80 at A and zero at B, A avoids an outgoing transfer of 80 reserves, while still respecting the reserve floor on deposits. Holding executed contracts constant, gross creation does not change simply because the supplier moves. Payment location changes settlement requirements rather than the origination entry.

Inspect execution, funding charges, and reserves, then compare profit. McLeay and colleagues' institutional account supports separating creation from settlement. It does not estimate the effect of this screen on students, and this product has no classroom pilot. Ask why one bank

might hold more reserves with the same loans, and what evidence would establish an increase in demand. Greater execution alone demonstrates a demand response only if requests also change under comparable conditions. Otherwise, a funding constraint may have relaxed while desired project scale remained unchanged.

5.3 Converting deposits into currency

Half of new supplier receipts becomes cash. The receiving bank reduces D and R , and public currency C rises by the same amount. Conversion does not change M . A supplier receiving 40 keeps twenty as deposits and twenty as cash. The mechanical prediction is a different monetary composition and higher settlement resource needs for some profiles, without additional money creation from withdrawing notes. Cash remains in the economy across cycles; it is not automatically redeposited or consumed at closing.

Read closing cash together with deposits and funding. Do not sum each cycle's existing cash as if it were newly issued. The institutional source distinguishes commercial bank and central bank money; this activity adapts that distinction into simple accounts. It neither measures cash preferences nor creates a bank run: withdrawals are automatic and do not involve strategic depositor choices. Ask what would change if participants chose withdrawals themselves and why that question belongs to the catalog's bank-run activity. Keeping the mechanism separate avoids reproducing an existing family under a new title.

5.4 Project risk

Each project has a 25% probability of generating $0.9L$ rather than $1.125L$. Project-cycle draws use a documented seed. With $L = 40$ and a 10% rate, low revenue is 36: four pays interest, 32 pays principal, and eight is written off. The bank earns four minus eight before funding charges. The operator retains no surplus and loses 0.40 in score through effort. The loss reduces equity without withdrawing the supplier's deposit. Limited liability affects collection from the project, not the existence of money already paid elsewhere.

A score-maximizing operator's expected gain is $0.75(0.015L) + 0.25(-0.01L) = 0.00875L$. The bank expects $0.05L$ before charges, with uncertain realized outcomes. These are rule-based predictions, not measured preferences. Inspect losses, contributions, equity, and dispersion across economies. McLeay and colleagues connect lending limits to profitability and risks but do not estimate this treatment. Ask how to distinguish risk aversion from misunderstanding limited liability, and why one adverse outcome does not identify a subjective probability. A seed makes tests reproducible; it does not make classroom choices independent observations across cycles.

5.5 No central facility

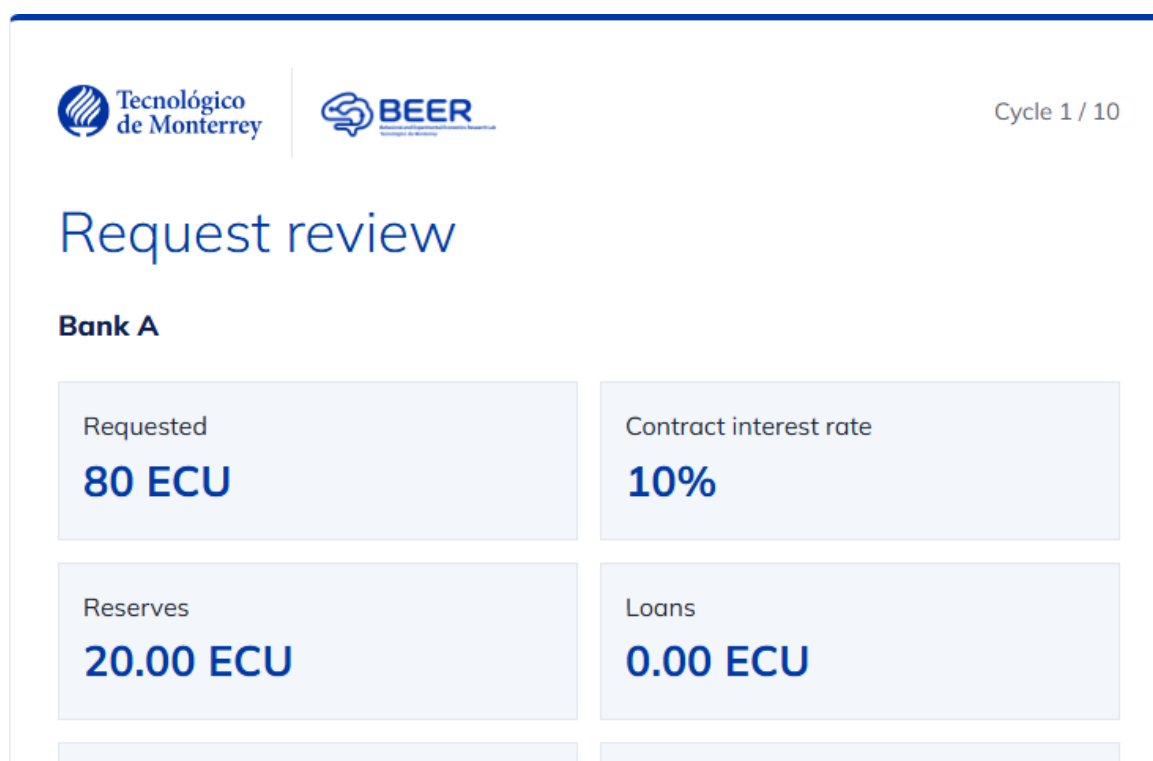
The central funding limit becomes zero. Lending must be supported by opening reserves and net incoming payments. Initial approvals of 40 and zero are infeasible, while twenty and zero can settle. Two loans of eighty can be feasible: their payments offset, leaving enough reserves for the deposit floor at both banks. The constraint therefore cannot be summarized as each bank lending at most its twenty opening reserves. A joint payment pattern matters even when aggregate reserves do not change at loan origination.

Predictions depend on joint choices and balance history. Inspect execution relative to requests and reconstruct netting. The institutional credit account supports separating funding and settlement,

but the exact cutoff of twenty is specific to this adaptation. It is not an estimate of an actual market operating without a central bank. Ask which loan combinations can settle with the same aggregate reserves, and why adding the second project can permit a larger first loan without creating reserves. Then ask which part of that reasoning would fail if payments no longer arrived in the same clearing batch.

5.6 Voluntary interbank funding

The central facility remains closed. Each bank offers zero, twenty, or forty reserves to the other at a 1% per-cycle charge. Only the feasible portion of an offer is used, based on surplus after net payments. The lender records I and the borrower J . Interbank principal is repaid before any inherited central funding. An offer is conditional availability, rather than an automatic transfer of its entire value or approval of the other bank's project. Outstanding claims carry forward when free reserves are insufficient for full repayment.



Request review	
Bank A	
Requested 80 ECU	Contract interest rate 10%
Reserves 20.00 ECU	Loans 0.00 ECU

Figure 5.1: Interbank funding offer. Continuation 1/2.

Initially, if A requests sixty and B zero, A needs forty reserves. B receives sixty from the supplier and can lend forty if it offers that amount. Eighty and zero require sixty, above the maximum offer, so full execution cannot be presumed. Inspect exported offers, executed credit, and net funding income by role. No classroom evidence validates this voluntary rule. The institutional framework explains the role of reserve markets rather than universal student cooperation. Ask why offering can produce income, what limits the actual transfer, and how interpretation would change if funding were compulsory instead of chosen.

Deposits 0.00 ECU	Equity 20.00 ECU
Approval does not guarantee execution: capital and joint settlement are checked. You may reject by choosing zero.	
Amount approved ----- ▼	
Each bank may offer 0, 20 or 40 ECU in funding to the other. Only the offer that can be funded from excess reserves after settlement is used. Its rate is 1 percent per cycle and it is repaid before the central facility.	
Maximum reserves offered to the other bank 0 ECU ▼	
Continue	

Figure 5.2: Interbank funding offer. Continuation 2/2.

5.7 A more expensive facility

The facility rate rises from 2% to 10% per cycle without reducing its limit. The project contract rate does not change directly. A bank using sixty reserves pays six rather than 1.20 with unchanged loans and funding. For a loan of eighty at 10%, profit falls from 6.80 to two. A bank needing no facility does not experience that direct cost. The main prediction is lower profitability for funding-intensive contracts, potentially inducing voluntary reductions in approval. The rule changes a price rather than imposing a smaller loan quantity mechanically.

Read profit and execution with F balances. Do not attribute every monetary change to the price of reserves without tracing choices. McLeay and colleagues discuss the role of interest rates in money creation but do not validate this classroom transmission. The extension holds the project contract fixed to isolate a supply cost; it includes no aggregate inflation or output curve. Ask why a central rate change might affect two economies differently despite equal total loans when their payment distributions differ. Then identify which additional behavioral response would be needed for a credit contraction.

5.8 Quoted rates and credit demand

Banks choose 0, 10, or 20% before operators request funds. The visible rate applies to the current loan and does not revise earlier contracts. Under normal revenue, zero interest leaves the project $0.115L$ after effort, 10% leaves $0.015L$, and 20% leaves no financial surplus while subtracting $0.01L$ for effort. A score-maximizing operator requests zero at 20%. Demand can respond to the announced price without programming an automatic participant response. The activity records

choices rather than inserting a predetermined demand curve into the form.

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Rate for the contract

Bank A

The operator will see your rate before requesting funds. Interest is calculated on the executed amount; if income is insufficient, the announced payment order applies.

Rate offered this cycle

10% ▼

Continue

Figure 5.3: Rate quotation before the request.

For the bank, zero interest yields no project interest and can leave funding charges; 10% permits a margin if credit executes. At 20%, positive credit and normal revenue do not repay full principal: interest priority leaves a loss of $0.075L$. Comparing rate times loan while ignoring repayment and demand is incorrect. Inspect quotes and requests in exported data alongside histograms and profit. The institutional precedent supports a price channel but supplies no estimated elasticity for these options. Ask which rate could sustain a profitable relationship for both roles and what observation would establish a demand response rather than only a change in executed quantities.

5.9 Capital constraining origination

The coefficient k rises from 0.08 to 0.50. Opening equity of twenty limits each bank to forty even with abundant reserves. The limit is recalculated from continuing equity: gains can expand it and losses can shrink it. Loans remain on a grid of twenty, so small equity changes need not change available quantities immediately. Automated contributions do not enter profit, although they change the state supporting future credit. Distinguish an incentive consequence from a balance sheet intervention when interpreting repeated decisions.

Bridges and colleagues (2014) examine capital requirements for UK banks from 1990 to 2011. They find adjustments in buffers and heterogeneous sector lending responses. This evidence motivates discussion of transition and heterogeneity without importing a causal coefficient into our game. Inspect initial concentration at forty, equity, and later evolution. The mechanical prediction is immediate; a voluntary response requires comparison. Ask why adding reserves does not remove this limit and how recapitalization differs from refinancing a short-term liability. A tighter coefficient can change lending capacity without removing the accounting possibility of creating a deposit.

5.10 Reserves equal to deposits

The coefficient ρ becomes one: reserves must cover all deposits, but loans can still originate with funding within the announced limit. Credit is not prohibited by definition. With two opening loans of eighty, payments offset, yet each bank needs sixty additional reserves to support eighty deposits. The facility can supply them. This constraint operates through reserves and funding, rather than through equity capacity.

Inspect charges, outstanding funding, reserves, and money. McLeay and colleagues help interpret these accounts; there is no empirical trial of this extension or regulatory recommendation established by the game. Ask what happens if the facility also closes: combining changes creates an additional comparison, different from the registered treatment.

To practice a controlled comparison, hold requests and approvals at eighty for A and zero for B, with opening accounts and normal revenue. The reference executes eighty: it needs sixty central reserves and pays 1.20 for them. Eight in interest leaves bank profit of 6.80. The operator gains 1.20 after effort. Looking only at the request is insufficient: the same desired credit can produce different execution under different funding conditions. The comparison first holds human decisions constant so that the mechanical margin is clear.

Without the facility, the same economy executes twenty. The purchase leaves A without reserves but also without deposits after payment, while B retains sufficient reserves against the supplier deposit. A collects two interest and the operator gains 0.30. With interbank funding and an offer of forty from B, sixty can execute: the forty-reserve requirement is funded. A's charge of 0.40 leaves profit of 5.60, B earns 0.40, and the operator gains 0.90. Offered funding changes feasibility rather than creating a new public deposit by itself.

Under internal payments, eighty can execute without central funding in this opening profile. The supplier keeps its deposit at A, which has twenty reserves against a minimum of eight after purchase. A earns eight interest and the operator gains 1.20. Executed quantities of eighty, twenty, sixty, and eighty represent rule effects with decisions held constant. In an actual class, requests, approvals, and offers can respond, so an observed contrast combines behavior and capacity. Matching the requests alone does not match the offers or opening balances in later cycles.

Reconstruct money as well: the four normal cases yield net changes of minus eight, minus two, minus six, and minus eight, with no contributions. A higher final monetary stock does not automatically imply greater welfare. Here it can result from originating and cancelling less credit and retaining less interest. Ask students to justify each number through the contract, cost, and entry. This exercise connects treatment comparisons with report reconciliation while preserving a common economic unit and initial conditions. It also shows why money stocks, credit quantities, and private profits should remain separate columns in a classroom analysis.

Running the class, solving exercises, and preserving evidence

6.1 A usable class plan

For a 50-minute class, allow five minutes for access and rules, eight for instruction and comprehension, seven for decisions and settlement, fifteen for account reconstruction, and ten for mechanism comparisons. Use the final five for an individual exit response. These are planning estimates rather than pilot measurements. If access takes longer, preserve the worked example and conceptual closing instead of sacrificing all discussion to complete a second session. One cycle can establish the accounting objective without requiring ten repeated decisions or a lengthy treatment comparison.

Before students arrive, select language and configuration, create a separate synthetic session, and check four links, both roles, and closing. Prepare blank accounts for A, B, and the external deposit. Open the report privately. Have a short task for economies finishing early: reconstruct their own outcome without exchanging decisions with those still playing. If using actual payments, confirm the budget and conversion beforehand and explain the score rule at entry. A test economy should never be pooled with student observations simply because both exist in the same local database.

The opening announcement can be brief: each person has a role; read the displayed contract; decide privately; zero is available; outcomes arrive when your economy finishes. Do not announce a treatment prediction at this stage. Assist comprehension with concepts rather than recommendations. When a bank waits, inspect whether a request or approval is missing. Private assistance preserves comparable conditions and prevents advice to one student from changing choices throughout the room. The instructor's role is to clarify the rules, not to make decisions on behalf of a participant.

For 75 minutes use ten cycles: five for access, ten for explanation, twenty to twenty-five for decisions, twenty for the report, and fifteen for comparisons and exercises. Early cycles may take longer. Closing requires every active economy; do not insert fictitious participants into a paid classroom session to fill a group. If attendance prevents a multiple of four, adjust composition before creation or use a clearly identified instructor demonstration. A demonstration must not later be described as student decisions. State any change to the planned composition in the session record.

Checkpoint

Before entry, check the family's four rooms, correct language, multiples of four, horizon, relationship rule, and rate. Before revelation, check completed cycles, denominators, and absence of identifying information. Before archiving, save the configuration, seed, and explanation of any interruption. These checks support interpretation as well as smooth operation.

6.2 Exercises with answer guidance

Exercise one: a bank records a loan of twenty before spending occurs. State account and money changes. Answer: L and D rise by twenty, R and K do not change, and M rises by twenty. The bank score does not yet earn principal as profit. To assess understanding, ask for the deposit holder and associated obligation. Saying only that assets increase omits the liability needed to explain the means of payment. The answer must recognize both sides even though one side is useful to the customer and the other is recorded by the bank.

Exercise two: that deposit pays a supplier at the other bank. The originating bank loses twenty deposits and twenty reserves; the receiver gains both. Total deposits and M remain unchanged. If the supplier converts ten to cash, deposits fall ten and currency rises ten, again leaving M unchanged. A common error adds the earlier deposit and new cash as if both remained outstanding. Draw the before and after states to correct double counting. Ask which institution has the reserve liability corresponding to the supplier's new form of money.

Exercise three: with equity of twenty, compare $k = 0.08$ and $k = 0.50$. Continuous capacity is 250 and forty, respectively; the game limits individual quantities to eighty and uses steps of twenty. Reference opening capital does not prevent eighty; tight capital prevents more than forty. Additional reserves do not increase equity capacity. Distinguish this capital maximum from joint executable credit, which also depends on requests, approvals, and funding. This distinction is essential because two constraints can be relevant even when only one binds for the chosen profile.

Exercise four: a project of forty at 20% receives 45. It pays eight interest and 37 principal, leaving a bank loss of three. The bank earns five before funding: eight collected minus three lost. The project retains no current revenue deposit and loses 0.40 in score through effort. A score-maximizing operator anticipating these rules requests zero. The exercise shows why a high contract rate does not guarantee a high outcome when demand responds. Ask students to compare promised interest, collected interest, and net profit, rather than treating them as interchangeable quantities.

Exercise five: three economies complete one cycle, each with two contracts. Executed quantities are zero, twenty, twenty, forty, sixty, and eighty. Total credit is 220, mean per contract is $220/6$, and mean per economy is $220/3$. These answer different questions. Histogram frequencies are one, two, one, one, and one. For a treatment comparison, the three economies are independent units rather than six contracts. Preserve original amounts instead of reconstructing totals from rounded intermediate means. State the unit whenever comparing this example with the report's trajectory.

Exercise six: an economy creates 160, cancels 144 principal, retains sixteen interest, and receives no contributions. Monetary change is zero. That does not imply absent origination or absent losses: with loans of 160 and only 144 principal cancellation, sixteen principal was unrecovered. Retained interest offsets that difference in the aggregate. Reconstruct equity separately from money. A satisfied monetary identity alone does not reveal whether managers gained or lost after funding charges. The exercise demonstrates why the report contains several complementary measures instead of a single success score.

Feedback script

Name the account and holder first, then the sign and amount, and finally check the identity. This routine locates concrete errors and supports brief feedback. A correct answer justifies the transaction rather than merely repeating the number printed in a solution. Ask for the missing counterpart whenever an explanation leaves one institution's accounts incomplete.

6.3 Assessing learning without changing the activity

An exit question can ask why a loan creates a deposit without new reserves. Another can compare capital and liquidity using two examples. A simple rubric awards one point for identifying accounts, one for preserving counterparts, one for distinguishing the aggregate from an individual bank, and one for interpreting incentives. Assess a short written explanation. The game score records decisions under specific rules; it cannot replace a learning measure or an academic grade for conceptual mastery. A financially successful choice may coexist with an incorrect explanation.

If using a before-and-after question, preserve wording and document the interval. Improvement can combine the activity, instructor explanation, and practice; without comparison it does not isolate the game's effect. Do not claim nine extensions improve learning merely because they are implemented. The product provides verifiable teaching opportunities, while evaluating effectiveness requires its own study and institutionally appropriate design. That evaluation is not included as a hidden participant survey. Keep the purpose and administration of any additional assessment distinct from the decisions generating bank and project scores.

6.4 Export and traceability

Exports distinguish bank contracts, project decisions, journal entries, and accounting snapshots. A contract appears once per bank-cycle. Journals and snapshots appear once per economy-cycle through the first role to avoid duplication. Do not combine every record type and sum quantities indiscriminately. Filter by type, session, and active cycles; use bank contracts to total credit. Numeric decision and score columns use ECU, while amounts inside structured accounting payloads use cents and require division by one hundred. Column units should be retained in any analysis notes or shared workbook.

Save language, edition, treatment, relationship rule, and seed with the file. Participant codes connect repeated records internally but should not be projected or included in a public report. No names or demographics are collected. Aggregate classroom analysis by economy and remove individual codes from shared tables. The seed reproduces assignments and random draws; it does not turn synthetic sessions into external evidence or predetermine future human choices. Reproduction of the accounting system and reproduction of student behavior are separate claims that require different evidence.

6.5 Troubleshooting and closing

If someone cannot advance, inspect rule acceptance, comprehension answers, and the other role's decision. Invalid approval requires checking that it does not exceed the request. Lower execution requires inspecting constraints before diagnosing a fault. A hidden report requires examining pending units. An unresponsive local view requires checking this family's running instance; preserve the database and sessions on restart. Refreshing the public catalog does not publish a local product. The instructor should use the exact family link rather than a general repository view exposing unrelated games.

Close with three claims: origination creates a deposit with an associated obligation; payments need settlement without necessarily creating money; credit is limited by incentives, funding, and capital. Ask for a counterexample to each mistaken shortcut: principal as profit, reserves as deposits, and a loss as automatic money cancellation. Archive the episode and its configuration. Public routes in this guide are product proposals, while the local preview works on the same computer.

Bank capital, contracts and deposit protection

7.1 An extension within the existing family

This expansion adds fifteen treatments to the original nine extensions. It replaces neither the three basic modes nor the deposit-creation example. Its central question is who selects the bank's exposure and who bears its consequences. Equity performs two roles: it constrains how much can be lent and represents something the owner can lose. Reserves perform a different role by settling payments. Public support can prevent a private loss, but it must be recorded as a transfer with a cost, rather than as production or a free receipt.

Select the extended room and the configuration describing your intended comparison. The new options use five independent cycles by default. Each cycle returns to opening balances and provides a hundred ECU in score to each person; the reference total for five cycles is five hundred ECU. Renewal prevents an insolvent bank from eliminating later decisions. This is different from the original ten-cycle mode with persistent balances. The horizon supports one to ten active cycles, but institutional comparisons should keep the horizon constant and distinguish total score from net results.

Four people still participate in each economy: two bank administrators and two project operators. Deposit customers are automated accounts, not the two people requesting loans. Suppliers, the public account and contributing owners are also automated. There is no depositor withdrawal, monitoring or negotiation decision. The independent unit remains the four-person economy because both banks' loans influence joint settlement. An administrator and their operator make separate decisions; their outcomes cannot be treated as independent observations of institutions.

Attention

Original and new screens use different continuity rules. In the original modes, a hundred ECU applies to the whole activity and accounts persist. In the new extensions, every cycle is a new economy and renews a hundred ECU per person. Announce the selected mode before distributing links. Equity and reserve coefficients are classroom rules, not descriptions of a universally applicable current regulation.

7.2 Contracts and the decision sequence

Each bank selects contract A, B or C before the request. The operator observes the selection, incomes and rate, then requests funds. The bank may approve less, and constraints can reduce

execution. Income is drawn after decisions. Rates are not negotiated in these treatments: each contract combines an income distribution with an announced rate. Consequently different selections do not by themselves identify risk aversion: probabilities, remuneration and liability change together.

Contract	Lower probability	Higher income	Lower income	Interest
A	0%	45	45	10%
B	20%	51.25	20	20%
C	40%	75	0	40%

Table incomes refer to forty ECU executed, not an operator endowment. An eighty-unit loan doubles incomes; a twenty-unit loan halves them. The engine rounds to hundredths of an ECU. Before rounding, all three contracts have the same expected income: forty-five ECU per forty invested. The expansion therefore separates total returns from the distribution of contractual claims and losses. One extension explicitly changes C's higher income to examine a project with a lower expected return.

Project liability remains limited to current income. It pays interest first, then principal, and keeps the remainder. Effort costing one percent of the loan reduces the operator's score without transferring funds. A zero loan executes no project. Do not count a stored draw for a zero loan as a productive failure: the report uses positive loans alone when counting realized lower incomes. A selected contract and a financed contract are distinct observations.

Rules for this session

The table shows income per 40 ECU executed and the probability of the lower income.

Amounts scale proportionally with the actual loan. Income pays contract interest first and then principal. Neither personal scores nor earlier project earnings pay the current project debt.

Contract	Probability of lower income	Higher income per 40 ECU	Lower income per 40 ECU	Contract interest rate
Contract A	0.0%	45.00 ECU	45.00 ECU	10%
Contract B	20.0%	51.25 ECU	20.00 ECU	20%
Contract C	40.0%	75.00 ECU	0.00 ECU	40%

Figure 7.1: Announced contracts: incomes per forty ECU and their probabilities. Check the table's unit before students calculate another loan amount.

7.3 Limited liability and the transfer of losses

Equity is the residual value of assets after subtracting obligations. Under limited liability, the owner can lose at most their equity contribution; a larger loss must reach another account. It does not disappear because the administrator has a personal limit. In this adaptation deposits are




Cycle 1 / 5

Select the contract

Bank A • Cycle 1

Reserves

100.00 ECU

Loans

0.00 ECU

Deposits

80.00 ECU

Equity

20.00 ECU

Each contract's probability and incomes are fixed. Your selection is communicated to the operator before they request funds. Income is drawn only after decisions. A zero amount executes no project and generates no losses.

Rules for this session

The table shows income per 40 ECU executed and the probability of the lower income. Amounts scale proportionally with the actual loan. Income pays contract interest first and then principal. Neither personal scores nor earlier project earnings pay the current project debt.

Contract	Probability of lower income	Higher income per 40 ECU	Lower income per 40 ECU	Contract interest rate
Contract A	0.0%	45.00 ECU	45.00 ECU	10%
Contract B	20.0%	51.25 ECU	20.00 ECU	20%
Contract C	40.0%	75.00 ECU	0.00 ECU	40%

Figure 7.2: The administrator selects a contract. Effective opening amounts distinguish reserves, deposits and equity.

reduced proportionally when equity is insufficient. Insurance may restore that reduction, whereas a bailout may restore equity directly. These are distinct operations even when both use public resources.

Let K_0 denote opening equity and π denote interest received minus principal written off and funding costs. Without premiums or bailouts, the private change is

$$v = \max\{0, K_0 + \pi\} - K_0.$$

Gross deposit reduction is $H = \max\{0, -K_0 - \pi\}$. With coverage γ , restoration is γH and net

Loss sharing and personal score

The administrator absorbs losses up to initial equity. Negative equity reduces deposits proportionally and the public account restores 100% of that reduction to depositors. Restoration does not return the administrator's equity.

No premium is charged.

The equity requirement applies to unweighted credit: equity / loan. It does not apply to total assets.

Each cycle uses new accounts with the same opening balances. A bank that exhausts equity does not disappear from the next cycle. The 100 ECU score is renewed each cycle; bank accounts and personal score are different quantities.

Contract offered this cycle

Continue

Figure 7.3: Continuation: loss-sharing rules and the contract selection control.

depositor loss is $(1 - \gamma)H$. Full liability instead charges the entire change π to the administrator through an owner contribution when necessary. Contributions come from existing deposits and are not profits. These equations describe the teaching mechanism without legal expenses, asset sales or resolution delays.

Theoretical foundation

With an eighty-ECU loan and equity of twenty, C pays thirty-two in interest in the higher state and loses eighty in the lower state. Under limited liability the administrator gains thirty-two or loses twenty. Expected personal change is $0.6(32) - 0.4(20) = 11.2$. Contract A yields eight for sure. Under full liability, expected change for C is $0.6(32) - 0.4(80) = -12.8$. The liability limit changes the private ranking even when projects' expected total income is equal.

For B, higher income on an eighty-unit loan is a hundred and two point five; it pays sixteen in interest, eighty in principal and leaves six point five to the project. Lower income is forty: it pays sixteen in interest and twenty-four in principal, writing off fifty-six. The bank result is minus forty. Under limited liability the administrator loses twenty, giving an expected change of eight point eight. Full liability gives four point eight. Work through these components to show why received interest and written-off principal must be read together.

Opening equity of twenty is different from the hundred-unit score. The score records individual outcomes and, under full liability, can finance a loss exceeding bank equity. Protection premiums come from an owner's personal deposit at the automated settlement bank, separate from bank equity. A premium reduces personal change and raises the public account; it does not reduce equity constraining lending. The external deposit of ten thousand ECU is subdivided into owner,



Cycle 1 / 5

Request for funds

Project operator · Bank A

Contract interest rate: **40%**

Contract selected by your bank: Contract C

The table shows income per 40 ECU executed and the probability of the lower income. Amounts scale proportionally with the actual loan. Income pays contract interest first and then principal. Neither personal scores nor earlier project earnings pay the current project debt.

The administrator absorbs losses up to initial equity. Negative equity reduces deposits proportionally and the public account restores 100% of that reduction to depositors. Restoration does not return the administrator's equity.

Contract	Probability of lower income	Higher income per 40 ECU	Lower income per 40 ECU	Contract interest rate
Contract A	0.0%	45.00 ECU	45.00 ECU	10%
Contract B	20.0%	51.25 ECU	20.00 ECU	20%
Contract C	40.0%	75.00 ECU	0.00 ECU	40%

Your bank may approve less. Income and effort apply only to the amount finally executed.

Amount requested for this project

▼

Continue

Figure 7.4: The operator sees the selected contract before requesting funds. Execution may differ from the requested amount.

project and public accounts, with transfers and contributions recorded in the journal.

7.4 Fifteen available comparisons

7.4.1 Liability and protection

Contract choice and limited liability provides the reference. Equity twenty, deposits eighty and reserves a hundred are renewed each cycle. The equity requirement is eight percent of lending, and the facility lends up to a hundred reserves at zero interest in these new options. Examine selected contracts and positive quantities before interpreting personal changes. The reference for an eighty-unit loan does not assume every operator requests eighty.

Full deposit restoration preserves decisions and equity losses, but the public account restores every deposit reduction. For C with eighty and zero income, the administrator loses twenty and the public account pays sixty. Depositors lose nothing. Free insurance does not change the administrator's payoff function here, because automated depositors change neither rates nor quantities. An observed selection difference requires caution; it is not a mechanical prediction of depositor monitoring.

Partial deposit restoration replaces half of each reduction. In the same example depositors lose thirty and the public account pays thirty; the administrator still loses twenty. The goal is to distinguish coverage, gross loss and net loss. Lower public cost may coexist with greater customer losses. Do not treat a smaller fiscal transfer as sufficient evidence of higher efficiency. The report retains all three quantities so students can reconstruct the allocation.

Public equity restoration contributes whatever is needed to restore opening equity after a decline. A zero outcome for C with eighty costs the public account eighty and leaves personal change zero. In the higher state the administrator keeps thirty-two. Expected personal change is nineteen point two. This bailout protects the owner's contribution and is broader than deposit insurance; that distinction appears in the instructions rather than being imposed retrospectively by the instructor.

Full owner liability records every loss in personal change. An automated owner contributes eighty in the zero-income state to restore opening equity. The administrator scores twenty ECU that cycle: a hundred minus eighty. There is neither deposit reduction nor public cost. Discuss incentive changes and how actual liability, collateral or supervision could differ from this simplified rule. Personal gains from prior cycles are not used to repay project debts.

7.4.2 Equity, requirements and reserves

Higher equity requirement raises the equity/loan ratio to fifty percent. Equity twenty allows at most forty in executed lending. Contract C has expected personal change of one point six, compared with four under A. Do not compare selected risk alone: lending and absolute exposure also change. The constraint applies to the loan rather than total assets, and it does not require reserves equal to credit.

Higher equity and deposit restoration combines that requirement with full coverage. It retains the forty-unit limit and changes who bears residual losses. Compare with the higher requirement without coverage and with coverage without a higher requirement. This is an explicit institutional interaction requiring no change to common instructions. The private reference remains the same as under the higher requirement with no premiums.

Equity requirement by contract uses a twenty-five-percent ratio and factors one, two and three

for A, B and C. With equity twenty, discrete maxima are eighty, forty and twenty. Operators and banks may still choose smaller amounts. The treatment illustrates an announced weighting rule rather than a calibration of actual banking regulation. Present loan/equity ratios and executed quantities alongside selected contracts.

Higher initial equity raises equity to forty and reserves to a hundred and twenty while keeping deposits eighty. The opening identity remains balanced. At lending eighty, C can lose forty personally and has expected personal change of three point two, below A's eight. This treatment increases owners' exposed funds without imposing the previous higher requirement. It can also alter settlement slack; disclose that difference when comparing institutions.

Lower initial equity uses five in equity, eighty in deposits and eighty-five in reserves, with a five-percent requirement. The maximum loan can still reach eighty. Contract C yields expected personal change of seventeen point two, while an eighty-unit loss leaves seventy-five for depositors. This example distinguishes a larger expected private gain from greater exposure of other accounts. Its opening balance is not the reference balance with only one label changed.

Reserve constraint retains equity twenty and requires reserves equal to eighty percent of deposits, without a central facility. Asymmetric lending can be reduced although equity permits eighty. When both banks lend, cross-payments can offset; the report's reference holds the other bank's loan at zero. Do not use that isolated reference to assert every economy must execute the same amount. Capital and liquidity constrain different operations.

7.4.3 Premiums, dependence and returns

Restoration with uniform premium adds a premium of one percent of credit, paid from the administrator's personal deposit in both states. With a loan of eighty the premium is eighty hundredths, regardless of contract. Net public cost subtracts the premium from realized restoration. The premium is public income and an owner expense, not a real production cost or an automatic destruction of money. It does not enter bank book equity.

Restoration with contract premium charges expected residual loss: $a = p \max\{0, \ell - K_0\}$, where p is the probability of lower income and ℓ is the bank loss in that state. For C with eighty, $a = 0.4(80 - 20) = 24$. Expected restoration is also twenty-four, although a particular cycle may pay sixty or collect a premium without paying restoration. Expected private change for C is minus twelve point eight after the premium. Keep expected and realized costs separate.

Common draws uses the same random number for both banks. With the same C contract and positive loans, their lower incomes coincide. With different contracts, different thresholds can yield different outcomes. Marginal probabilities do not change; dependence changes. Under independence two C contracts fail jointly with probability sixteen percent; with a common draw, forty percent. These are probability references, not guaranteed frequencies in five cycles.

Reduced higher income in C changes higher income to sixty per forty executed; lower income remains zero. Expected income is thirty-six, below the forty-five of A and B. At an eighty-unit loan the bank still receives thirty-two in the high state because income covers interest and principal; the project keeps less. Private incentives toward C can remain while total returns fall. This is the useful contrast for discussing risk transfer with a productive cost.

7.5 Reading the report without mixing concepts

The histogram counts bank-cycles by selected contract, including zero credit. The table distinguishes that denominator from positive executed contracts. Lower-income frequency uses positive loans, separating the decision not to execute from failure. Credit and personal change are shown as

means; depositor losses, premiums and public costs are sums by contract. Unit labels should accompany every verbal interpretation. A large total can reflect more observations rather than a larger average loss.

The reference calculates a loan requested and approved at eighty for one isolated bank, with the other making no loan. It applies equity and settlement constraints and weights the two outcomes by their probabilities. It estimates neither students' expectations, fund demand nor equilibrium. It is not a dominant-strategy recommendation: an operator may request less and joint settlement may change execution. Compare each reference with the applicable parameter and disclose its assumptions before assessing choices.

Distribution of selected contracts

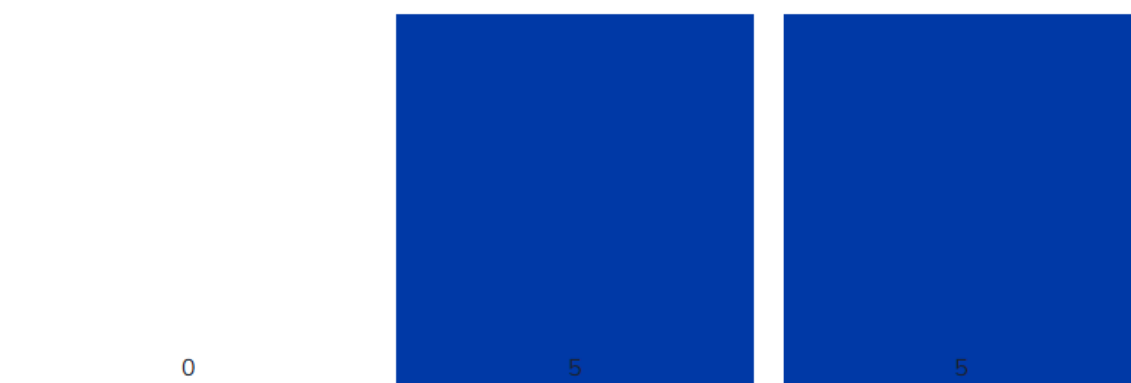


Figure 7.5: Selected-contract distribution. Observations are bank-cycles and may include zero lending.

Contract	Observations	Positive executed contracts	Realized lower incomes	Mean credit	Mean personal change
Contract A	0	0	0	—	—
Contract B	5	5	1	40.00	2.40
Contract C	5	5	2	80.00	11.20

Distribution of realized costs

Contract	Net depositor loss	Net public cost	Premium paid by the administrator
Contract A	0.00	0.00	0.00
Contract B	0.00	0.00	0.00
Contract C	0.00	120.00	0.00

Figure 7.6: Exposure, personal outcomes and transferred costs. Distinguish means from sums and positive loans from selected contracts.

Net costs by recipient

Sums across completed bank-cycles. Positive: cost; negative: gain. Personal cost is minus personal change and includes premiums. This is not total welfare.



Figure 7.7: Net costs by recipient: a negative number indicates a gain. The chart sums completed bank-cycles, excludes project profit, and does not measure total welfare.

Calculated reference for a requested loan of 80 ECU

The reference isolates one bank with the other making no loan, and applies capital and liquidity limits. It uses both possible incomes and their probabilities. It predicts neither students' choices nor a credit-demand equilibrium.

Contract	Executed	Loan / initial equity	Expected personal change	Expected public cost
Contract A	80.00	4.00	8.00	0.00
Contract B	80.00	4.00	8.80	4.00
Contract C	80.00	4.00	11.20	24.00

Figure 7.8: A reference calculated under current rules. It is not an estimate of behavior or the classroom credit equilibrium.

Feedback script

Begin with a contract and an executed quantity: "What income arrived, what was repaid, and what was lost?" Reconstruct equity and ask who covered the remainder. Compare selections before adding scores. Show which part of the observed result came from the draw and which came from the rule. Finish by separating productive return, private distribution and public transfer.

7.6 Worked exercises and classroom use

Exercise 1: insurance versus bailout. With C, lending eighty and zero income, principal loss is eighty. Equity twenty absorbs twenty and deposits are reduced by sixty. Full insurance restores sixty and leaves the administrator with a score of eighty; the equity bailout contributes eighty and leaves a hundred. The twenty-unit difference is equity protected by the second institution. Do not add insurance of sixty and a bailout of eighty as if they occurred in one configuration.

Exercise 2: expected and realized outcomes. Under the contract premium, C with eighty

pays twenty-four in both states. In the higher state net public cost is minus twenty-four; in the lower state it is thirty-six. The theoretical average is $0.6(-24) + 0.4(36) = 0$. Positive realized cost in a small class does not refute a premium equaling expected restoration. Ask students to reconstruct both branches before commenting on the class average or calling the premium insufficient.

Exercise 3: welfare criterion. Without a premium, C generates expected personal change of eleven point two for the administrator and twenty-two for the project after effort, at lending eighty. Depositors lose twenty-four on average. The joint net is nine point two, equal to A before small rounding differences. Free insurance transfers that loss to the public account. Scores of the four human participants exclude automated customers; adding them does not measure total welfare.

Exercise 4: two instruments. Compare the higher requirement with higher opening equity. The former reduces maximum lending to forty for a bank with equity twenty. The latter retains the possibility of eighty, but raises maximum personal loss to forty. Both can change contract selection; their lending effects differ. A complete answer should mention exposed owner funds, the credit limit and settlement conditions, rather than labeling all three objects reserves.

For a seventy-five-minute class reserve ten minutes for balances and the example, ten for instructions and comprehension, twenty for five cycles, fifteen for revealing and reconstructing costs, fifteen for a comparison, and five for closure. These are estimates without a timing pilot. For a shorter session select one active cycle and compare institutions across sections; do not run fifteen sessions merely to display every menu. Request a prediction before revelation and preserve it alongside outcomes to discuss changes in explanations.

7.7 Foundations, evidence and limits

Hazlett (2016) offers a classroom experiment about equity, insurance and bailouts for discussing incentives to take risk. This expansion is an original numerical adaptation: it retains the deposit-creation family, uses its own contracts and automated customers, and adds accounting traces. It reproduces neither that protocol nor a learning effect evaluated with students.

Gropp, Gruendl and Guettler (2010) study the withdrawal of public guarantees using linked bank and borrower information. Their evidence relates guarantees to bank exposure choices. It contextualizes mechanisms; this class replicates neither their identification nor a population causal effect inferred from a few economies. The classroom and field evidence answer different questions.

Inference requires separating request composition, approvals, executed credit, contract and realized state. Fewer losses may reflect smaller loans or favorable draws. More frequent C selection does not prove misunderstanding; reconstruct private payoffs under the announced liability rule. Five cycles permit practice and comparison, not guaranteed convergence. The report does not measure depositor preferences, rescue expectations or beliefs, because those variables are not elicited. Automated institutions permit transparent accounting at the cost of omitting those strategic responses.

7.8 Exporting and preserving accounts

The report's **Download this session CSV** button works with complete or pending data and uses the open session alone. It includes every active cycle. Filter **bank_contract** for bank statistics and **client_decision** for project decisions; the same operation recorded for both roles is not two loans. Journal and snapshot rows support account reconciliation. New final columns record contract, personal change, gross reduction, restoration, net depositor loss, public cost, premium, bailout and owner contribution.

A blank pending-result cell is not zero. The selected contract remains in the rate field once the bank decides; calculated protection columns appear after settlement. Keep identifiers only in protected working data; projection does not display them. Export before ending the session, document mode and horizon, and separate independent cycles from original persistent balances. Restarting a local process to refresh templates preserves its database; resetting the database is not a refresh procedure.

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