



Instructor Guide: Integrated Economy

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

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

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

Author

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For the instructor

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

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Preparation and access

1.1 An activity connecting markets

The integrated economy follows a complete chain of choices: a bank grants a loan, a company posts jobs, a household produces and earns wages, the household buys goods, and the company attempts to repay its debt. Every transfer has a counterpart. The learning objective is to explain why financing an operation, producing a good, and receiving income are different events even when closely connected. Loans are not counted as output, and deposits are not treated as participant scores.

This family belongs to the macroeconomics set. Its contribution is interaction across markets with persistent balances and reconciled sector accounts. Existing employment, money-creation, and aggregate-policy games isolate individual mechanisms; this activity connects them through separate household, company, and bank decisions. International trade, exchange rates, speculative assets, and government succession are outside its rules. The catalogue review on 8 October 2026 found no existing family implementing this operational combination. Other subject folders were consulted only to check for overlaps.

The activity is an original teaching adaptation, rather than an exact replication of a published experiment. Automated tests and browser journeys verify rules, accounts, and functionality. They do not supply evidence about human classroom behavior. Instructors should separate conditional model predictions, observations from their own session, and findings from earlier research. A session may show scarce goods, incomplete employment, or bank losses without establishing a universal explanation of recessions. These outcomes are occasions to examine the particular sequence of choices and constraints.

Purpose	Connect decisions and accounts in a closed economy
Experimental unit	One fixed economy of 16 or 26 participants
Basic edition	One period; ten periods; twenty households
Extended edition	Reference and thirteen mechanism changes
Decision	Credit, employment, prices, purchases, and public rules
Outcome	Goods, employment, prices, balances, and role scores
Topics	macroeconomic accounting; employment and production; bank credit; inventories and investment; prices and expectations; fiscal and monetary policy
Participants	16 or 26 per economy: households plus six institutional roles.
Suggested duration	Two classes of 90 minutes; short introduction with one period.
JEL	A22, C92, E23, E24, E51, E63

1.2 Laboratory website and family rooms

Start at <https://beer-lab.org/>. The CLASE menu opens <https://teaching.beer-lab.org/>; the catalogue supports searches by title, topic, and JEL classification. Clear earlier filters before searching. Cards distinguish Español and English, while Mostrar versión extendida selects the extended edition. Catalogue language and session language are separate choices. This family is prepared for incorporation but has not been published yet: the images show current navigation, rather than an already installed public card.

Use <http://localhost:8092/demo> to review the local production. Demo contains 34 configurations, with 17 in each language. Each language offers three basic modes and fourteen extended options: a reference plus thirteen extensions. Rooms contains exactly four rooms. Basic rooms offer only their three basic modes, and extended rooms offer only their fourteen conditions. Participants receive the assigned room link or individual access link; they should not navigate the administrative configuration list themselves.

The proposed English route is shown below. It becomes available after publication and domain configuration; it does not replace the local preview used for validation. https://macro-economy.beer-lab.org/room/integrated_economy_en

Other proposed routes are https://macro-economy.beer-lab.org/room/economia_integrada_es, https://macro-economy.beer-lab.org/room/economia_integrada_extendido, and https://macro-economy.beer-lab.org/room/integrated_economy_extended. Confirm language, edition, and condition before creating a session. A reference economy should not be compared with an extension that also changes group size, opening endowments, and horizon without explicitly accounting for those changes. The configuration list is a teaching resource, not a requirement to conduct every condition in one lesson.

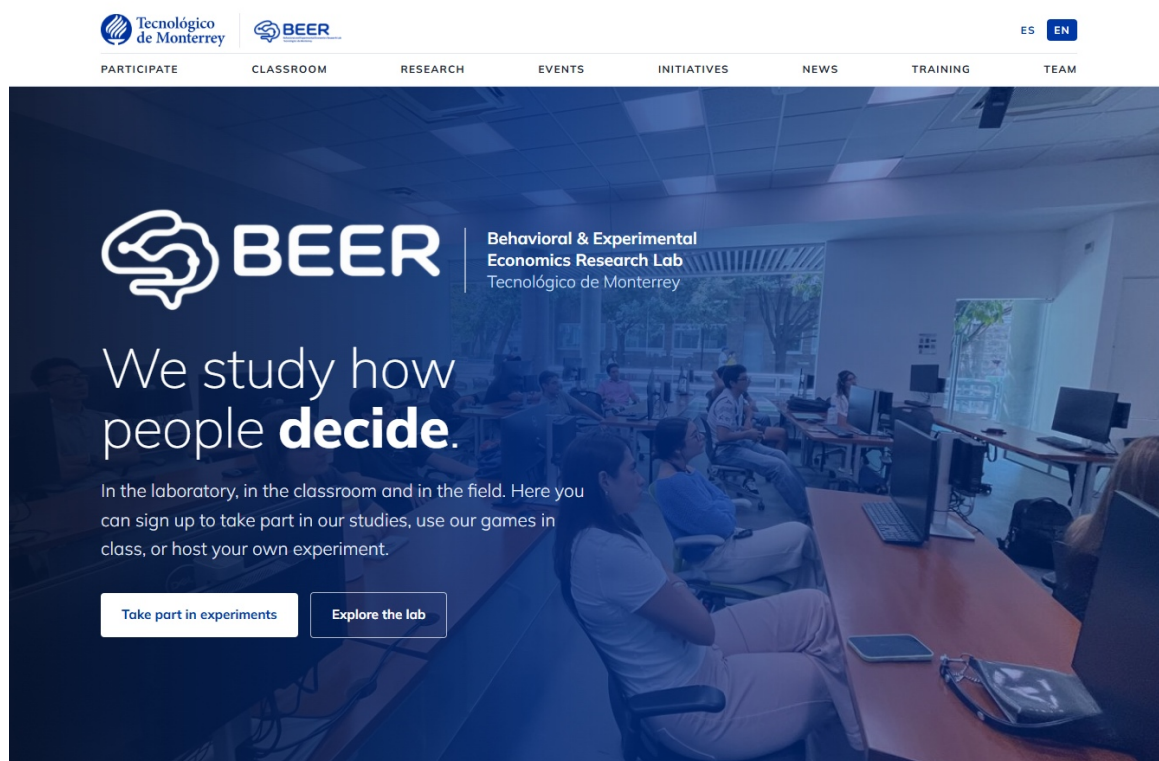


Figure 1.1: Current institutional website: CLASE access, 8 October 2026.

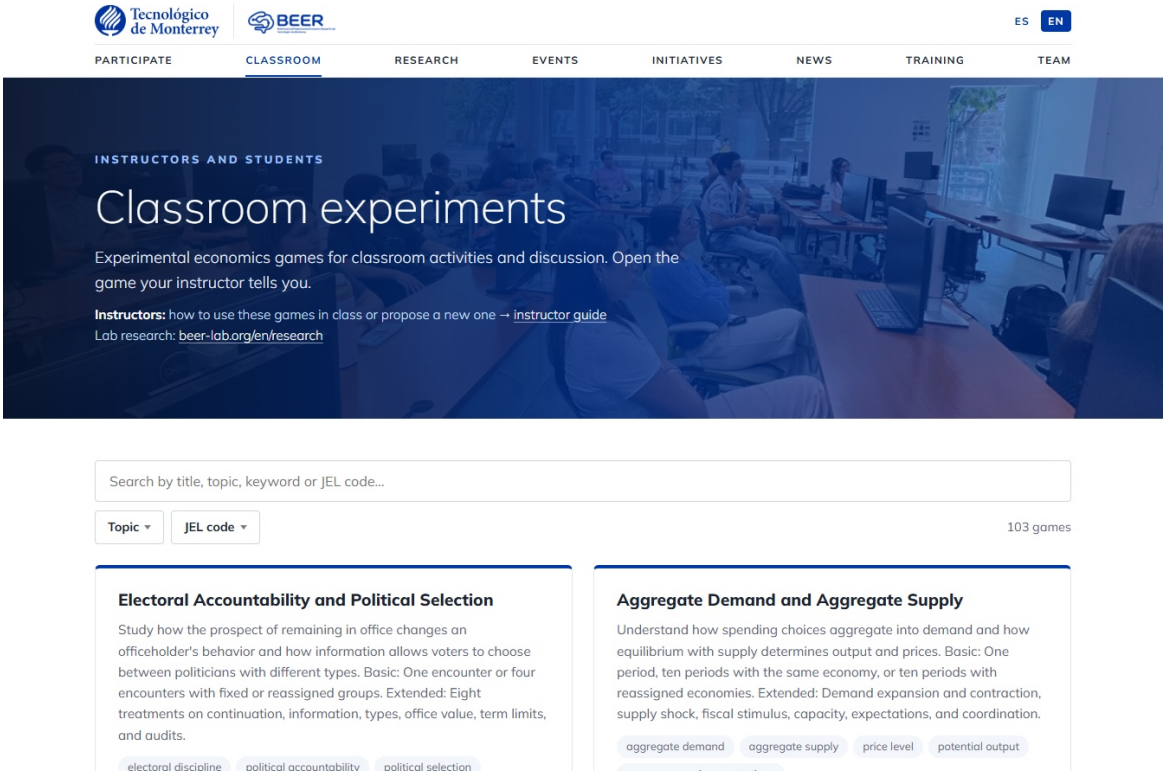


Figure 1.2: Current catalogue search and filters; the new family awaits publication.

Rooms

Current rooms:

Economía integrada — Básica
Integrated Economy — Basic
Economía integrada — Extendida
Integrated Economy — Extended

Figure 1.3: Four isolated integrated-economy rooms.

Labor, goods, and accounts economy — One period
Labor, goods, and accounts economy — Ten periods, persistent economy
Labor, goods, and accounts economy — Ten periods, twenty households
Extended labor, goods, and accounts economy — Integrated reference
Extended labor, goods, and accounts economy — Productivity change
Extended labor, goods, and accounts economy — Tighter credit limit
Extended labor, goods, and accounts economy — Investment and depreciation
Extended labor, goods, and accounts economy — Interest-rate choice
Extended labor, goods, and accounts economy — Contribution and spending choice
Extended labor, goods, and accounts economy — Joint rule choice
Extended labor, goods, and accounts economy — Public-bond finance
Extended labor, goods, and accounts economy — Private forecasts
Extended labor, goods, and accounts economy — Budgeted deposit support
Extended labor, goods, and accounts economy — Fixed wage and productivity change
Extended labor, goods, and accounts economy — Purchase priority
Extended labor, goods, and accounts economy — Purchase-budget limit
Extended labor, goods, and accounts economy — Aggregate history and accounts

Figure 1.4: Configurations in this language within Demo.

Roles, resources, and classroom organization

2.1 Fixed groups and opening endowments

The usual economy has ten households, three companies, two banks, and one public account: sixteen people. The large mode has twenty households and the same six institutional roles: twenty-six people. Roles are assigned when the session is created and remain fixed. Do not move participants across economies between periods: their deposits, inventories, loans, and assets belong to their original economy. A treatment compared in a separate session begins with its own endowments, rather than informally copied balances.

Every household starts with 100 ECU and can supply one unit of labor per period. Every company opens with 20 ECU in deposits and equity, with no goods or installed capital. Every bank has 20 ECU of equity and reserves matching its customers' deposits plus that equity. The public account starts with 100 ECU. Opening private deposits total 1,060 ECU; joint bank reserves total 1,100 ECU. Neither the public account nor settlement reserves are added to the private-deposit measure.

The large economy has a scale factor of two. Opening company deposits and equity, bank equity, the public balance, requested reference public spending, and the public-debt ceiling all double. Each household still starts with 100 ECU. More generally, the scale factor equals households divided by ten. The three producers and two banks remain individual institutions, so doubling households does not double the number of companies or remove market concentration. Comparisons should report quantities per household as well as totals.

Bank affiliation remains fixed. Households alternate between the two banks; the first and third companies use the first bank, while the second company uses the other. Affiliation determines whose deposits absorb a bank loss. The issuer account recognizes settlement reserves and the public balance as its obligations; opening equity is negative because monetary endowments have been granted. This explicit counterpart prevents the economy from claiming real assets that nobody produced. It is not a private-bank insolvency indicator, and it must not be interpreted using the private-bank loss rule.

2.2 Practical preparation and pace

Reserve two ninety-minute classes for a persistent journey and a comparison. In the first class, allocate fifteen minutes to resources and rules, ten to comprehension, forty to decisions, and twenty-five to reconstructing one period. The second can use ten minutes for review, forty for a selected condition, and forty for discussion. A shorter introduction should use the one-period

mode, whose score immediately includes terminal valuation. Do not describe that score as though it belonged to the first period of a ten-period horizon.

Before participants arrive, verify connectivity, links, participant count, and configuration. The count must be a multiple of a complete economy's size. Two usual markets require thirty-two people, rather than two incomplete groups of ten households sharing institutional players. If the household count is edited, recompute size as households plus six. Edited parameters change the valid size; the administrative form checks that relationship. Check resources shown on the actual instructions rather than relying on an old handout.

Keep choices private. Ask for silence, individual devices, and pages that remain open without manual refreshes. Handle errors privately. Do not recommend a wage, price, or loan amount during a decision, because doing so introduces advice outside the assigned condition. Waiting pages close each phase once everyone in that economy arrives. A bank that has finished approving loans can still wait for later household and company phases. Waiting is not evidence that a decision was lost.

If someone disconnects, recover their individual access and continue from the saved page. Do not reset the database or create a new identity to replace an existing role in an active market. An incomplete session should retain its state and remain marked pending. Do not fill missing choices with zero to produce a seemingly finished report. Zero is a legitimate economic choice; a missing response is a different status, with a different denominator. Record interruptions when interpreting any resulting trajectory.

For the instructor

Choose one main comparison. To separate credit from productivity, hold population, opening prices, and horizon constant. To study scale, retain the rules and compare quantities per household. Running all thirteen extensions in one class is unnecessary.

Participant screens and decisions

3.1 Welcome, resources, and comprehension

The welcome screen identifies the laboratory and explains general conduct. Acceptance is required to proceed. Instructions explain ECU, the sequence, credit, employment, shopping, loss resolution, and scoring for every role. The resource box displays effective endowments from the selected configuration. Each participant should distinguish their score from available deposits: seeing an opening 100 ECU balance does not mean consuming one hundred goods or earning one hundred additional points.

The comprehension check asks what a loan creates, what happens when requested purchases exceed inventory, and what counts as new production. Correct answers are a deposit together with matching debt, delivery of available goods only, and new goods produced using labor. Incorrect responses retain the chosen option and display an explanation for each question. Ask participants to read that explanation before answering again. The check verifies operational rules needed for choices; it is not a test of the macroeconomic explanations that will be discussed afterward. A successful check does not certify a participant's later strategy as economically optimal.

3.2 Public account and period rules

The public-account participant confirms rules at the beginning of each period. In the reference, rates and contributions are automatic rather than discretionary choices. Monetary policy shows the interest rate; fiscal policy shows the contribution and purchase budget; joint policy shows all three. Shares are entered as decimals: 0.03 means three percent, and 0.10 means ten percent. Requested spending is a nominal budget, not a guaranteed quantity of goods. An absent control must not be recorded as a human choice of zero. The export explicitly distinguishes automatic and human rules, making that difference available for later analysis.

What participants will see

Review the current rules. Purchases are limited by funded resources; requested and executed quantities may differ.

This account follows automatic rules; there is no discretionary choice on this page.

Public account: under automatic rules its score is 100. When it controls a rule, it receives 100 times the mean of $\exp(-L/25)$, where $L = (\text{percentage price change} - 2)^2 + 100(\text{unemployment} - 0.10)^2$. This is a role-specific formula and should not be directly compared with other role scores.



Period 1 / 1

An economy of decisions

Welcome to the Behavioral and Experimental Economics Research Lab at the Department of Economics of Tecnológico de Monterrey. This activity supports learning about economic decisions in a controlled environment.

Remain silent and make individual, private decisions. Do not communicate with others or close or refresh the page. If a problem occurs, raise your hand and contact the staff privately.

I have read the general rules.

Yes

No

Continue

Figure 3.1: Welcome and acceptance of general rules.

Resources and unit of account

There are 10 households, each with an opening deposit of 100.0 ECU and one unit of labor available each period.

There are three companies, each with 20.0 ECU of opening deposit and equity; opening inventory and capital are zero.

There are two banks, each with 20.0 ECU of opening equity. Their joint reserves are 1100.0 ECU and match deposits and equity.

The public account opens with 100.0 ECU, separate from private deposits. This endowment is not automatically renewed.

Opening private deposits total 1060.0 ECU. Bank reserves and the public account are not included in that quantity.

Opening reserve issuance has an explicit counterpart in the issuer account. Subsequent loans create matching assets and liabilities. Scores and deposits are recorded separately.

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

This session does not convert ECU into real money.

Figure 3.2: Effective opening endowments in the usual economy.



Period 1 / 1

Check the rules

What happens when a company receives a loan?

What can be delivered when goods requests exceed inventory?

What counts as new physical production?

Continue

Figure 3.3: Three operational questions before the economy begins.



Period 1 / 1

Check the rules

Resources and unit of account

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

This session does not convert ECU into real money.

What happens when a company receives a loan?

An immediate score increase without a debt.

Your answer: An immediate score increase without a debt.. The correct answer is A deposit and a debt of the same amount.. A 20 ECU loan adds 20 to deposits and 20 to debt. Equity does not change because of that operation.

What can be delivered when goods requests exceed inventory?

Every request, creating any missing goods. ▾

Your answer: Every request, creating any missing goods.. The correct answer is Only available inventory; delivered goods are charged.. Inventory of 8 permits delivery of at most 8 goods. Requests follow the allocation rule, and unspent balances are retained.

What counts as new physical production?

The sum of loans, wages, and every transfer.

Your answer: The sum of loans, wages, and every transfer.. The correct answer is New goods produced using labor.. A loan finances activity and a wage transfers income; neither is another good produced. Two people producing 2 goods each add 4 new goods.

Continue

Figure 3.4: Explanatory feedback retaining the chosen answers.



Period 1 / 1

Public account and period rules

Public account

Public-account balance (ECU)	100
Outstanding public bonds (ECU)	0

Productivity is 2 goods per worker; loan rate 3%; wage contribution 10%; public purchases request 10 ECU per scale unit. Inventories carry forward.

Current loan rate (%): 3 · Wage contribution (%): 10 · Requested purchases (ECU): 10

Review the current rules. Purchases are limited by funded resources; requested and executed quantities may differ.

This account follows automatic rules; there is no discretionary choice on this page.

Continue

Figure 3.5: Actual screen: public account and period rules.

3.3 Request company credit

Every company requests credit up to four times its positive equity. This bound does not promise approval; it only constrains the request. Following a residual debt write-off, the company cannot receive new credit or post new jobs during the next period. Suspension does not erase deposits it already holds. A request of twenty ECU adds twenty to deposits and twenty to debt only if the bank approves it. The company should consider both the payroll funded before sales and the principal and interest due at settlement. Asking for credit and receiving credit remain separate recorded events.

What participants will see

Request up to the stated limit. The bank can approve less. Debt is due at this period's settlement.

A loan simultaneously creates a company deposit and a debt. The bank limits approvals according to its equity. Principal and the announced interest are due at the end of the period. Credit does not itself increase equity or scores.

3.4 Choose bank approvals

The bank sees its affiliated companies' requests and bounds, then chooses an approval for each. Approval cannot exceed a request or violate the joint bank limit. The two banks serve different numbers of companies, so compare monetary exposure rather than approval counts alone. Extending a loan simultaneously increases a bank asset and a company deposit. Bank equity does not rise at origination. Profit depends on collection and losses depend on resolution, rather than on the amount entered in an approval box. The interface rejects a set of individually valid approvals when their sum breaches the shared equity-based limit.

What participants will see

Each approval must lie between zero and the request. Their sum must satisfy the bank's joint limit.

Total approvals exceed the bank's available joint limit.

3.5 Post jobs, wage, and price

Companies post vacancies, wages, and goods prices before employment and purchases are realized. Vacancies multiplied by wages must fit available deposits. Payroll cannot be financed by future sales that have not occurred. Unfilled jobs carry no wage bill, but every hired worker must be paid even if the company's resulting goods remain unsold. Under wage rigidity the wage field is absent and the reference wage remains visible. Posted prices enter the equal-weight index even when companies sell different quantities. Neither posting a high price nor posting many jobs guarantees that customers or workers select the company.

What participants will see

Jobs $\times$ wage cannot exceed the available deposit. Only workers actually hired are paid. The wage per person is fixed for this session.

New credit is suspended this period following nonpayment; no new jobs can be offered.



Period 1 / 1

Request company credit

Company 3	
Available deposit (ECU)	20
Available inventory (goods)	0
Inventory book value (ECU)	0
Equity (ECU)	20
Installed capital (goods)	0
Maximum credit request (ECU)	80

Productivity is 2 goods per worker; loan rate 3%; wage contribution 10%; public purchases request 10 ECU per scale unit. Inventories carry forward.

Current loan rate (%): 3 · Wage contribution (%): 10 · Requested purchases (ECU): 10

Request up to the stated limit. The bank can approve less. Debt is due at this period's settlement.

Credit requested (ECU)

Continue

Figure 3.6: Actual screen: request company credit.




Period 1 / 1

Choose bank approvals

Bank 2

Settlement reserves (ECU)	540
Equity (ECU)	20
Maximum joint approval (ECU)	80
Debt to the issuer account (ECU)	0
Outstanding public bonds (ECU)	0
Available inventory (goods)	0

Productivity is 2 goods per worker; loan rate 3%; wage contribution 10%; public purchases request 10 ECU per scale unit. Inventories carry forward.

Current loan rate (%): 3 · Wage contribution (%): 10 · Requested purchases (ECU): 10

Each approval must lie between zero and the request. Their sum must satisfy the bank's joint limit.

Applicant	Requested (ECU)	Equity (ECU)	Maximum credit request (ECU)
Company 2	20	20	80

Credit approved (ECU) — Company 2

Continue

Figure 3.7: Actual screen: choose bank approvals.



Period 1 / 1

Post jobs, wage, and price

Company 3	
Available deposit (ECU)	40
Available inventory (goods)	0
Inventory book value (ECU)	0
Equity (ECU)	20
Installed capital (goods)	0
Maximum credit request (ECU)	80

Productivity is 2 goods per worker; loan rate 3%; wage contribution 10%; public purchases request 10 ECU per scale unit. Inventories carry forward.

Current loan rate (%): 3 · Wage contribution (%): 10 · Requested purchases (ECU): 10

Jobs × wage cannot exceed the available deposit. Only workers actually hired are paid.

Jobs offered

Price per good (ECU)

Wage per person (ECU)

[Continue](#)

Figure 3.8: Actual screen: post jobs, wage, and price.

3.6 Choose your job application

Each household sees posted offers and applies to one company, or chooses not to work. It cannot submit three applications and subsequently choose the best available job. When applications exceed vacancies, reproducible random priority is used within that company. Actual employment, not applications, determines wages and production. An unsuccessful applicant receives no labor income in that period but retains deposits and can still shop. Ask afterward why a household might consume without having worked. Distinguish not applying from applying unsuccessfully: both appear unemployed in the aggregate rate, but they reflect different decisions and matching outcomes.

What participants will see

Apply to one company. Random priority resolves applications exceeding available jobs. Each household can apply to one company or choose not to work. Jobs cannot be financed with future revenue not yet received. Excess applications are allocated by reproducible random priority. Nobody works for two companies at once.

3.7 Choose your goods purchase

Shopping follows wages and contributions. A household selects one supplier and authorizes a share of its updated deposit. The share is not a physical quantity, and the authorized budget need not be fully executed. Banks appear as suppliers of recovered goods, although they have no opening inventory. Reference allocation is proportional within each supplier when goods are scarce. Only delivered goods are charged. A household cannot switch suppliers after observing its rationing outcome. Under expectations it also reports a private gross factor for the next price index; the final period has no forecast question because no subsequent in-session price exists.

What participants will see

The share applies to your deposit after wages and contributions. Actual cost depends on goods delivered. Households choose a supplier and the share of their deposit authorized for purchases. Only executed purchases are charged. Goods are divisible. Excess requests follow the announced allocation rule; unused budgets stay in the account. 1.20 means expecting an index 20% higher. Forecasts are private and not separately paid. No forecast is requested in the final period.

3.8 Investment, settlement, and the horizon

The capital extension adds a company choice: the budget for buying goods from the specified other company. Fixed cross-company sourcing prevents self-sales that would merely manufacture accounting profit. Households, company investment, and the public account compete for the same inventories in the shopping phase. Executed investment depends on rationing and prices. Requested budgets are not installed as capital: actual acquired goods are installed and support production starting next period.

Settlement repays loans using deposits and, when necessary, transfers inventory to the bank. Residual debt is written off as a loss. If bank equity remains negative, the rules apply public support where available, proportional deposit reductions, and, in an extreme case, an issuer-advance

Period 1 / 1

Choose your job application

Household

Available deposit (ECU)

100

Apply to one company. Random priority resolves applications exceeding available jobs.

Company	Jobs offered	Wage per person (ECU)	Price per good (ECU)
Company 1	4	6	5
Company 2	4	6	5
Company 3	4	6	5

Company receiving your application

▼

Continue

Figure 3.9: Actual screen: choose your job application.




Period 1 / 1

Choose your goods purchase

Household

Available deposit (ECU) 105.4

Productivity is 2 goods per worker; loan rate 3%; wage contribution 10%; public purchases request 10 ECU per scale unit. Inventories carry forward.

Current loan rate (%): 3 · Wage contribution (%): 10 · Requested purchases (ECU): 10

The share applies to your deposit after wages and contributions. Actual cost depends on goods delivered.

Maximum authorized share this period: 1

Supplier	Price per good (ECU)	Available goods
Company 1	5	8
Company 2	5	6
Company 3	5	6
Recovered goods — Bank 1	2.5	0
Recovered goods — Bank 2	2.5	0

Selected supplier

----- ▾

Authorized deposit share (0 to 1)

Continue

Figure 3.10: Actual screen: choose your goods purchase.

write-off. These are activity rules, not advice for handling a real financial crisis. Personal outcomes show balances and scoring; the instructor report reveals aggregates only after the whole horizon is complete and the instructor deliberately releases them.

The final screen remains open without a continue button leading into inactive technical rounds. It adds neither a purchase nor another economic settlement. Company, bank, and public-account scores are credited at the horizon; households receive consumption-utility credits during the horizon and terminal valuation of deposits. The personal summary makes it possible to check that each credit appears once. Carrying balances forward differs from counting retained earnings again in the score. A technical record existing in the export does not mean an additional decision period took place.

Investment budget (ECU)

Figure 3.11: Company purchase for installed capital, available only in that extension.

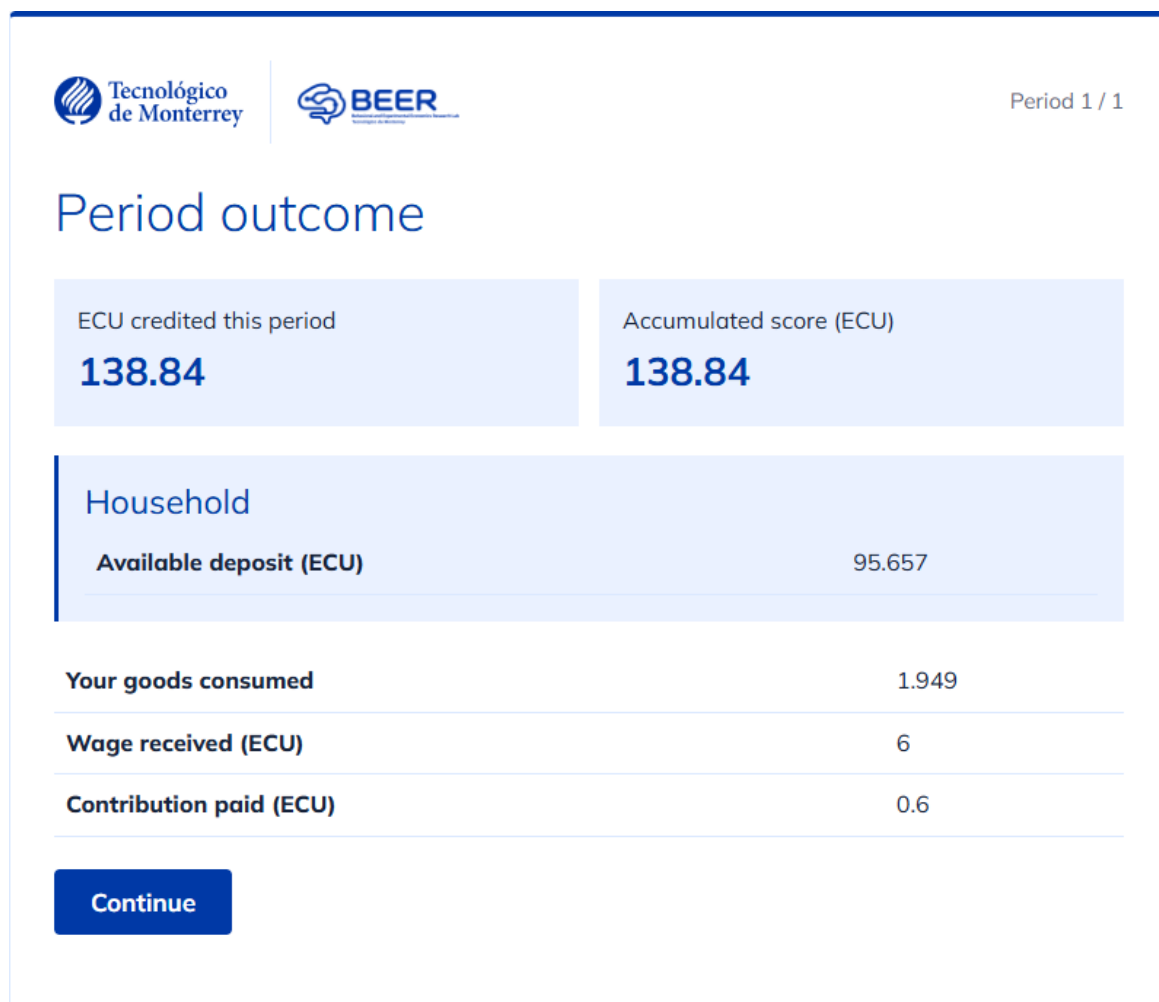


Figure 3.12: A household's personal outcome.



Period 1 / 1

Period outcome

ECU credited this period
111.4

Accumulated score (ECU)
111.4

Company 3	
Available deposit (ECU)	31.4
Available inventory (goods)	0
Inventory book value (ECU)	0
Equity (ECU)	31.4
Installed capital (goods)	0
Maximum credit request (ECU)	125.6

Company, bank, and public-account scores are determined at the horizon. Receiving a loan carries no additional score bonus.

Continue

Figure 3.13: A company's personal outcome.



Period 1 / 1

Period outcome

ECU credited this period
100.6

Accumulated score (ECU)
100.6

Bank 2	
Settlement reserves (ECU)	530.532
Equity (ECU)	20.6
Maximum joint approval (ECU)	82.4
Debt to the issuer account (ECU)	0
Outstanding public bonds (ECU)	0
Available inventory (goods)	0

Company, bank, and public-account scores are determined at the horizon. Receiving a loan carries no additional score bonus.

Continue

Figure 3.14: A bank's personal outcome.




Period 1 / 1

Activity complete

You have completed the horizon. Keep this screen open and wait for the instructor. Each score credit is included once.

ECU credited this period

111.4

Accumulated score (ECU)

111.4

Company 3

Available deposit (ECU)	31.4
Available inventory (goods)	0
Inventory book value (ECU)	0
Equity (ECU)	31.4
Installed capital (goods)	0
Maximum credit request (ECU)	125.6

Company, bank, and public-account scores are determined at the horizon. Receiving a loan carries no additional score bonus.

Personal period summary

Period	ECU credited this period	Available deposit (ECU)	Equity (ECU)	Your goods consumed
1	111.4	31.4	31.4	—

Figure 3.15: Persistent final screen with personal summary.

Model, accounts, and conditional predictions

4.1 Production and the goods identity

Let N_{jt} denote workers actually employed by company j in period t , and let A_t denote goods per worker. The reference has $A_t = 2$. Production is $Q_{jt} = A_t N_{jt}$, and adding the three producers gives Q_t . Without capital, no other source creates new goods. The issuer account creates monetary obligations, not merchandise. Recovering company inventory does not create new output either: it changes ownership of goods that already existed.

Let C_t be household physical consumption, G_t physical public purchases, I_t goods installed as capital, and S_t combined company and bank inventories at the close. Opening inventory is S_{t-1} . The exact identity is

$$Q_t = C_t + G_t + I_t + (S_t - S_{t-1}).$$

Selling older inventory can make the change negative. Consumption and purchases may then exceed current production without creating goods. The report shows the residual of this equality, which should be zero within numerical tolerance. An accounting identity does not predict employment or desired spending; it checks compatibility of quantities actually executed under the choices.

Real output at reference prices is $5Q_t$ in the usual configuration. Posted-price nominal production is the sum of $p_{jt}Q_{jt}$. Do not add loans or wages to that value: those are financing and factor payments associated with the same production. Do not automatically equate nominal sales with nominal production when inventory remains or banks resell recovered goods at a different price. Constant reference prices reconcile physical quantities; transaction values reflect differing prices and purchase composition. The distinction matters especially when a production shock changes the quantity of unsold goods.

Theoretical foundation

A budget constraint limits feasible choices; an identity reconciles executed operations; a prediction describes behavior under assumptions. Reconciled accounts do not establish full employment or competitive equilibrium. With three companies, posted prices, and rationing, the activity does not impose an auctioneer clearing every market.

4.2 Deposits, reserves, and equity

Let M_t be closing private deposits held by households and companies. It excludes settlement reserves and the public balance. Let L_t denote newly created loans, R_t repayments to banks using

deposits, T_t wage revenue collected, B_t executed public spending, and H_t deposit reductions after losses. Then

$$M_t - M_{t-1} = L_t - R_t - T_t + B_t - H_t.$$

Private wage payments and customer purchases move deposits between owners without changing the total. A loan creates deposits and debt. Repayment to a bank extinguishes deposits; writing off unpaid debt reduces a bank asset and company liability but does not by itself destroy a deposit already spent. Consequently, total written-off debt cannot replace R_t in this identity.

Company equity equals deposits plus inventory and capital at book cost, less loans. Production costs entering inventory are actual wages paid. Selling goods releases average inventory cost and recognizes the difference between revenue and that cost. Bank assets comprise reserves, outstanding loans, public bonds, and recovered inventory; liabilities comprise deposits and issuer advances. New lending leaves equity unchanged because both sides grow. Accrued interest transfers equity from company to bank, and payment extinguishes the matching deposit. Treat accrued interest, collected interest, and unpaid interest as different measures.

Transfers across banks settle through reserves. A bank needing reserves receives an issuer advance with a matching obligation. An advance is not a private deposit and is not consumption or output. The interest rate applies to the period's peak outstanding advance; the bank pays using reserves and retains any unpaid advance obligation. Loss resolution can transfer a remaining loss to the issuer only after earlier rules are exhausted. That transfer appears in issuer equity, rather than as a gain generated from nothing.

Inventory delivered as collateral is valued at the smaller of book cost per unit and half the company's posted price. Banks sell recovered goods at a fixed 2.5 price in the usual configuration. Original cost, recovery value, and subsequent sales revenue remain separate. Installed capital is not pledged collateral in this activity. After deposits and collateral are used, remaining unpaid debt is written off and the company is suspended for the next period. Receiving inventory gives a bank goods, but does not necessarily recover every ECU originally due. Check both the physical and financial entries before describing recovery as successful repayment.

4.3 Prices, incentives, and limits of prediction

The index P_t is the simple average of the three posted company prices. Observed inflation is $100(P_t/P_{t-1} - 1)$, with opening $P_0 = 5$. It is neither an average price paid across all transactions nor an estimated household basket with expenditure weights. A company with no sales still affects the index. Buying cheaper recovered goods can lower transaction prices without changing company announcements. Compare these measures before interpreting changes in purchasing power; an index must be read together with its construction.

Households maximize a score combining consumption and terminal balances: $100 + \sum_t [10 \ln(1 + c_{it}) - 2e_{it}] + 10 \ln(1 + d_{iT}/P_T)$, where c is consumed goods, e indicates employment, and d is deposits. Additional goods have decreasing marginal utility; working costs two points but may finance consumption. Terminal deposits have value without a fictitious last purchase. Companies and banks receive $100 + (E_T - E_0)/s$, where E denotes equity and s is the scale factor. Retained earnings are already included in equity and are not added a second time.

When the public account controls a rule, its score is one hundred times the mean of $\exp(-\ell_t/25)$, where $\ell_t = (\pi_t - 2)^2 + 100(u_t - 0.10)^2$. Here π uses percentage points and u is a fraction. An automatic public account receives one hundred. These functions are different role objectives; summing them as social welfare confuses units and preferences. The activity promises no automatic conversion to real money. Any classroom payment arrangement must be explained beforehand and must not change during the session.

More credit can relax a binding payroll constraint; it does not guarantee employment when applicants are scarce or sales when purchasing choices change. Lower productivity reduces goods per worker by construction, while employment can adjust. A higher wage may attract applications while exhausting available funding. A company can respond through prices, vacancies, inventory, or lower profit. No imposed equation converts every deposit expansion into inflation. Interpretation therefore relies on a chain of choices and constraints rather than a unique path all economies must reproduce. A directional prediction is conditional on those other choices, and a failed prediction should prompt examination of the conditions.

Attention

Do not compare scores across roles as equivalent income. Do not call every deposit change inflation. Check the index, base, and physical goods. Constant prices can coexist with employment constraints, rationing, and defaults.

Reconstructing one complete period

Consider the usual one-period economy. Every company requests and receives twenty ECU, posts four jobs at wage six, and sets price five. The ten households apply cyclically: four to the first company, three to the second, and three to the third. Each authorizes thirty percent of its deposit and shops at its employer. The wage contribution is ten percent and requested public spending is ten.

Private deposits open at 1,060 and rise to 1,120 through sixty of new credit. Each company now has forty in deposits, enough to fund posted jobs. Actual employment is ten and total wages are sixty. Every household receives six and contributes 0.6, leaving 105.4 before shopping. Contributions total six, and the public account has 106 before executing purchases. Production is twenty goods, distributed as eight, six, and six across companies. Vacancies total twelve, but the two unfilled posts do not generate production or a wage bill.

Every household authorizes 31.62 ECU, equivalent to 6.324 goods at price five. Requested household purchases greatly exceed inventory. The public account requests two goods overall and divides its budget among the three companies holding inventory. Its request at each company is two thirds of a good. The first company's total request is $4(6.324) + 2/3 = 25.9627$ against eight available; the proportional factor is $8/25.9627$. Each household receives approximately 1.9486 goods and the public account 0.2054. At each other company, the factor is $6/[3(6.324) + 2/3]$, households receive 1.9321 each, and the public account 0.2037. Private consumption totals 19.3872 and public purchases 0.6128. Public orders face the same rationing rule, so the requested ten ECU is not fully spent.

Only deliveries are charged. The first four households each pay approximately 9.7432; the remaining six pay 9.6605. Closing household deposits sum to 957.0639. Company sales total one hundred ECU against a sixty wage bill. Each company pays its bank 20.6 in principal and interest. The first closes with equity of 35.4, and the other two with 31.4 each, totaling 98.2. Bank equity rises from twenty to 21.2 and 20.6 because the first financed two loans and the second one. No loans, inventory, or losses remain. Rounded displayed amounts should not replace full-precision entries when checking identities.

The deposit account verifies $1,060 + 60 - 61.8 - 6 + 3.0639 = 1,055.2639$. Closing deposits comprise 957.0639 held by households and 98.2 held by companies. The goods account verifies $20 = 19.3872 + 0.6128 + 0 + 0$. The public balance closes at 102.9361: it began at one hundred, collected six, and spent 3.0639. Issuer equity is $-1,200$, reconciling the monetary endowment: $957.0639 + 98.2 + 41.8 + 102.9361 - 1,200 = 0$, equal to closing physical book assets.

The index remains five; inflation and unemployment are zero. Company scores are 115.4, 111.4, and 111.4; bank scores are 101.2 and 100.6; the automatic public account receives one hundred. The first household receives $100 + 10 \ln(1 + 1.9486) - 2 + 10 \ln(1 + 95.6568/5)$, rounded to 138.84. Other-company households receive 138.79. Terminal valuation applies to this one-period horizon.

Thirteen extensions with defined comparisons

Each extended option preserves the decision order while changing an identifiable rule. The extended reference permits comparisons without attributing an interface or horizon change to a treatment. Extensions are alternatives, not a bundle of thirteen simultaneous changes. Read each specific rule together with the common constraints. The following examples are calculated mechanism scenarios; they are neither human participant findings nor unconditional predictions of a class. References motivate questions, but do not causally validate this original implementation. Choose comparisons according to the question rather than the number of available options.

Checkpoint

Before revealing graphs, ask students to identify four example values: physical output twenty; closing deposits 1,055.2639; contributions six; approved lending sixty. Each has a different unit and accounting location. Ask which changes if budgets rise while inventories remain exhausted.

6.1 Productivity change

Exact rule. From period six, each worker produces half as many goods. The schedule is known from the start.

Halving productivity from period six halves goods per worker, holding employment constant. Companies can adjust jobs, wages, or prices, so total production and consumption also depend on choices. Compare the five earlier periods with the five later periods and a reference economy with the same horizon. Because the schedule is known, responses before period six can reflect anticipation rather than a program error. Do not call the scheduled change an unexpected shock when explaining household or company behavior.

Read production, employment, inventories, and prices together. Falling output at unchanged employment reveals the technical channel. If jobs also decline, examine payroll and sales. Unemployment alone does not identify the technology contribution. Sales-price uncertainty can matter for hiring, as discussed by Riedl and van Winden; this announced productivity rule has less uncertainty than their experimental environment.

Solved exercise. Example: three workers previously produced six goods and now produce three at an unchanged eighteen wage bill. Unit cost rises from three to six. At price five, selling all production yields fifteen, below payroll. Other deposits or inventories may prevent immediate default, but do not make that production profitable. Ask which price or employment adjustment

could cover payroll and what purchase demand that adjustment would require. Distinguish cash available from current operating profitability.

Discussion. Did output fall because of fewer workers, lower productivity, or both? Reference: Riedl and van Winden (2007); Duffy (2016).

6.2 Tighter credit limit

Exact rule. Joint bank approvals cannot exceed bank equity; other bounds remain unchanged.

The joint approval ceiling falls from four times bank equity to one times equity. Company request bounds remain unchanged. This changes feasible credit supply rather than mechanically lowering every actual loan. Banks already lending below the new ceiling may not change financing. A lower-payroll prediction requires marginal credit and insufficient retained company deposits to compensate. Inspect whether the constraint binds before explaining an employment difference as the effect of tighter bank credit.

Compare created credit, employment, and bank equity in the report. Exports separate requested and approved amounts. Rejection differs from not requesting. McLeay, Radia, and Thomas distinguish deposit creation from transferring prior saving; this added ceiling depends on equity rather than mechanically multiplying existing reserves. Examine the funded company deposit before connecting an approval shortfall to a vacancy decision.

Solved exercise. Example: a bank with equity twenty receives requests of twenty from each of its two companies. The reference permits forty; this condition caps the sum at twenty. Ten and ten is valid; twenty and twenty is rejected even though each amount is within the individual request. A company holding twenty of its own deposits and ten in new credit can fund five wages of six. This calculation identifies a feasible margin without dictating the bank's approval allocation.

Discussion. Did the ceiling change a choice or only remove an unused possibility? Reference: McLeay, Radia, and Thomas (2014).

6.3 Investment and depreciation

Exact rule. Companies can buy from another company to install capital. Production uses $1 + 0.10 \times \text{capital}$; 10% depreciates at the next period's start.

Companies can convert goods purchased from another company into installed capital. Production uses $A_t N_{jt}(1 + 0.10K_{jt})$, and previous capital depreciates ten percent at the next period's beginning. Investment competes with household and public purchases for goods and uses company deposits. Its productive effect arrives later and cannot explain same-period production. Returns depend on employment, subsequent prices, and the remaining horizon. Investment is a choice over real resources, not a free productivity bonus associated with a checkbox.

Read physical investment, subsequent production, inventory, and equity together. An ECU request is not acquired capital when purchases are rationed. Existing isolated growth or capital activities study a different mechanism; here investment interacts with banks and buyers. Duffy provides the broader context of interdependent macroeconomic experiments, not an empirical estimate of the activity's chosen 0.10 capital coefficient. State that parameter as a design rule rather than a calibrated classroom result.

Solved exercise. Example: two capital goods are acquired at the close. At the next opening, 1.8 remain. With three workers and productivity two, production is $6(1 + 0.18) = 7.08$, versus six without capital. A budget of two ECU at price five requests only 0.4 goods before rationing, not

two capital goods. Separate budget, supplier price, delivered quantity, and installed stock. The depreciation loss also reduces book capital and therefore company equity; it is not an unexplained disappearance of deposits.

Discussion. Did lower current consumption fund actual future capacity or merely an unexecuted request? Reference: Duffy (2016).

6.4 Interest-rate choice

Exact rule. The public account chooses the loan and settlement-advance rate, from 0% to 20% per period.

The public account chooses a period rate between zero and twenty percent. It applies to company loans and settlement advances, while contributions and spending retain reference rules. The rate changes costs and equity transfers, but banks and companies still choose quantities. A lower rate may support payroll, although opening reserves, loan demand, and solvency influence that relationship. No imposed equation immediately translates the chosen rate into inflation. Read the announced rate before firms request loans because its timing is part of the mechanism.

Compare rates, credit, employment, prices, and collected interest. The public objective penalizes inflation away from two percentage points and unemployment away from ten percent; creating credit itself carries no bonus. McLeay and coauthors explain a role for rates in monetary creation, but the activity omits many actual central-bank instruments and expectations. Duffy helps frame the distance between a laboratory mechanism and a complete macroeconomic system. Neither source establishes the optimal rate for this scoring rule.

Solved exercise. Example: a twenty loan requires 20.6 at three percent and twenty-two at ten percent. The additional 1.4 reduces the company margin when sales are unchanged. If only twenty-one ECU remain at settlement, the second case requires collateral or loss resolution while the first repays in full. This is conditional: posted prices, hiring, and shopping may respond to the announced rate. Trace those intervening choices before assigning the difference in final output to the rate alone.

Discussion. Did the rate change financing, margins, prices, or several stages? Reference: McLeay, Radia, and Thomas (2014); Duffy (2016).

6.5 Contribution and spending choice

Exact rule. The public account chooses wage contributions and the requested purchase budget. Only purchases funded by its balance are executed.

The public account chooses a wage contribution between zero and fifty percent and requested spending up to forty ECU per scale unit. Spending requires available funds; this option issues no public debt. Higher contributions reduce household shopping deposits while funding the public account. Greater requested spending may not raise execution if funds or goods are scarce. Compare private consumption and public purchases without treating the wage transfer as new production. The nominal public budget is chosen before employment, so realized wage revenue can differ from what the participant anticipated.

Read contributions, executed purchases, public balances, and household goods together. Riedl and van Winden study interaction between wage taxation and employment under different institutions; their findings do not prescribe a multiplier here. Budget execution can be checked in the accounts. Large household orders can ration public purchases, so a high closing public balance does not

demonstrate that the public participant chose a small spending request. Compare the requested and actual amounts explicitly.

Solved exercise. Example: total wages of sixty yield twelve at a twenty-percent contribution versus six at ten percent. Households jointly receive six fewer ECU. If the public account subsequently spends the additional six, private deposits rise by six again. Physical production changes only if employment or inventory decisions respond. Spending six at price five requests 1.2 goods but does not guarantee delivery when competing buyers are rationed. This exercise separates the financial transfer from the resource outcome and the possible behavioral response.

Discussion. Were additional funds spent, retained, or unable to purchase all requested goods? Reference: Riedl and van Winden (2007).

6.6 Joint rule choice

Exact rule. The public account chooses loan rate, wage contribution, and purchases. Funding and bank limits remain binding.

The public account jointly controls rates, contributions, and spending. Constraints remain binding: purchases require funds and banks retain their approval limits. This option studies instrument trade-offs after students understand the separate options. Do not attribute an overall difference to whichever instrument moved first; all three may respond to the same history. The public score aggregates price and unemployment losses across the horizon. Students can compare policy sequences rather than merely rank final scores without examining the intervening constraints.

Use exports to trace all instruments and connect each period to employment, the index, and the public balance. Duffy and Riedl and van Winden motivate interaction among decisions, not an automatic recommendation of optimal rules. Separating rates from contributions avoids confusing company borrowing cost with reduced household net wages. A rising score shows improvement under the announced loss function; it does not establish a welfare improvement for every participant role.

Solved exercise. Example: zero inflation and zero unemployment produce loss five: four from the inflation deviation and one from the unemployment deviation. That period contributes $100 \exp(-5/25)$, approximately 81.87, to the public average. Inflation of two and unemployment of ten percent produce zero loss and value one hundred. This explains the chosen objective, rather than claiming every household prefers the second outcome. The unemployment term uses a fraction, so inserting ten instead of 0.10 would be an incorrect calculation.

Discussion. Which balances, consumption, or exposure accompanied improvement in the public objective? Reference: Duffy (2016); Riedl and van Winden (2007).

6.7 Public-bond finance

Exact rule. Purchases request 40 ECU per scale unit. If funding is short, banks can fund public bonds up to the announced total cap using reserves. Bonds remain valued at face value at the horizon.

Requested spending is forty per scale unit. If opening funds are insufficient, banks finance public bonds using available reserves up to a cumulative ceiling of two hundred per scale unit. Funding is automatic under this rule, not another discretionary bank choice. Bonds are long-term public obligations valued at face value at the horizon. No within-horizon redemption or final endowment of redemption goods is promised. Financing is determined before subsequent wage contributions

Period loan rate (0 to 0.20)

0,03

Wage contribution share (0 to 0.50)

0,1

Requested purchase budget (ECU)

10,0

Figure 6.1: The extension's specific visible change.

arrive, so timing matters when comparing borrowing with the closing public balance.

Read debt, public balances, reserves, and executed spending. A bank bond asset must match a public liability. Funding source does not directly create physical output. The existing public-debt family studies consumption and generations; this extension studies bank portfolios and purchase funding inside the integrated economy. Duffy provides general policy-design context, rather than validation of the activity's face-value terminal convention. Closing debt remains a claim, even when closing inventories are zero.

Solved exercise. Example: the public account opens a period with ten and requests forty. If the debt ceiling and bank reserves permit, thirty is financed, fifteen by each bank. Scarce goods can still reduce execution and leave cash; issued bonds do not disappear because purchases are rationed. If outstanding debt is already one hundred ninety, at most ten more can be issued. Distinguish the cumulative debt ceiling from a single-period budget, and distinguish bank reserve use from company deposit creation.

Discussion. Did debt finance executed spending or partly remain as public cash? Reference: Duffy (2016).

6.8 Private forecasts

Exact rule. Before shopping, each household reports a private forecast of next price-index growth. Accuracy is not separately rewarded.

Each household reports a private gross factor for next-period index growth without a separate accuracy reward. Elicitation permits examination of associations between beliefs and purchases; no equation automatically makes forecasts determine demand. Accuracy is recorded when the following price becomes observed. The final period requests no forecast. A completed usual ten-period economy therefore has ninety evaluable forecasts. Forecasting is an additional human decision even when realized prices are constant, and should not be filled automatically by the instructor.

Read mean logarithmic forecast error and its evaluable count together with price paths. Duffy places expectations and coordination among laboratory questions; this particular elicitation has

no established published causal effect. Forecasting higher inflation and spending more can both reflect common news or constraints. Forecasts sharing the same future index are not independent observations of a policy outcome. Preserve the forecast's origin period when joining it to the subsequent realized factor.

Solved exercise. Example: a household forecasts 1.20 and the index moves from five to 5.5, a realized factor of 1.10. Error is $|\ln(1.20) - \ln(1.10)|$, approximately 0.0870. Do not divide 1.20 by the level 5.5 or interpret 1.20 as one hundred twenty percent inflation. If the next period remains incomplete, accuracy is unobserved rather than zero. An accuracy comparison needs the evaluated count as its denominator, and should keep pending forecasts identifiable.

Discussion. Did purchases change before the future price, and what constraints did similar forecasters share? Reference: Duffy (2016).

Selected supplier

Authorized deposit share (0 to 1)

Expected gross price-index growth next period

Figure 6.2: The extension's specific visible change.

6.9 Budgeted deposit support

Exact rule. Before reducing deposits for bank losses, the available public balance is used. Support may be partial and does not automatically rebuild capital.

Bank losses use available public funds before private deposits are reduced. Support can be partial and its cost is charged to the public account. It provides neither unlimited outside funding nor recapitalization above zero. Suspended companies remain suspended: protecting deposits does not reverse company debt write-offs. Predicting smaller deposit reductions requires actual bank losses and public resources at resolution. A no-loss session does not reveal whether insurance would have been sufficient under a larger exposure.

Read loan write-offs, support, and deposit reductions as three separate quantities. McLeay and coauthors' banking accounts help distinguish deposit obligations from equity; they do not establish that this budgeted rule eliminates crises. The extension also differs from the catalogue's bank-run game: it contains neither strategic withdrawal nor a depositor queue. The comparison concerns absorption of loan losses, and any shift in subsequent lending remains an endogenous response rather than guaranteed recovery.

Solved exercise. Example: after equity is exhausted, a bank has thirty in remaining losses. The public account holds twelve, provides twelve, and leaves eighteen to be absorbed by deposits if

sufficient deposits exist. With affiliated private deposits of six hundred, each customer loses three percent of their balance, not eighteen each. An empty public account supplies no imaginary fund. Compare the loss allocated to depositors with the corresponding decline in the public balance, rather than describing insurance as costless protection.

Discussion. Who absorbed losses, and which public purchases became harder to fund? Reference: McLeay, Radia, and Thomas (2014).

6.10 Fixed wage and productivity change

Exact rule. Wages are fixed at the reference value. From period six, productivity halves. Prices and vacancies remain choices.

Wages stay at six and productivity halves from period six. The appropriate comparison is flexible wages facing the same productivity schedule, rather than the reference alone, which mixes two differences. Prices and jobs remain choices. Fixed wages restrict nominal adjustment but do not fix employment. Companies can still fund fewer jobs or change prices, and households can choose other applications. The absence of a wage field is part of the rule, while the posted fixed value should remain visible to both workers and companies.

Read wages, employment, unit costs, inventory, and prices. Riedl and van Winden relate hiring to the price and tax environment but do not test this exact fixed-wage rule. The variant teaches an adjustment restriction within interdependent decisions. Credit may cover losses for several periods, so no immediate unemployment increase does not establish that productivity was irrelevant. Inspect declining equity or inventories before drawing conclusions from a flat employment path.

Solved exercise. Example: after the change, wage six purchases labor producing one good, so labor unit cost is six. A flexible wage of three would produce the same good at cost three, provided the household still applies. That condition matters: lowering wages can change labor supply. Compare margins at price five and distinguish an accounting possibility from actual hiring. Do not assume workers accept every positive wage; their consumption, balances, work cost, and remaining horizon affect the decision.

Discussion. Which variable absorbed adjustment when the wage could not change? Reference: Riedl and van Winden (2007).

6.11 Purchase priority

Exact rule. Purchases use reproducible random priority until inventory is exhausted, instead of proportional allocation. Unused budgets are retained.

Orders use reproducible random priority within suppliers until inventory is exhausted, replacing proportional allocation. Total goods do not increase and unused budgets remain in deposits. Consumption dispersion may increase, although its average depends on who orders and how much. Priority is neither participant merit nor an instructor choice. The same rule includes public purchases and investment where applicable. Preserve the session's priority realization when reviewing accounts, rather than rerandomizing until a preferred distribution appears.

Read the consumption histogram together with total goods. Duffy emphasizes market institutions in laboratory designs; this comparison studies a specific allocation institution without a calibrated distributional effect. Exports permit checking requests, deliveries, and spending. Someone receiving zero through priority retains deposits, so current consumption and terminal wealth can move in opposite directions. Describe both before declaring which person obtained the better total score.

Solved exercise. Example: three households request four goods each from a supplier holding six. Proportional allocation gives two each. A priority realization can give four to the first, two to the second, and zero to the third. Both distribute six; only allocation differs in this calculation. Different request sizes or public buyers change the household average, so this example is not an unconditional prediction. Each customer pays for their actual delivery rather than paying for four regardless of outcome.

Discussion. Did dispersion change because goods were fewer or because different buyers received them? Reference: Duffy (2016).

6.12 Purchase-budget limit

Exact rule. From period six, households can authorize at most 50% of deposits for that period's shopping.

From period six, households may authorize at most half their deposit for purchases, instead of the full deposit. Households already choosing thirty percent may leave orders unchanged. Executed purchases fall only if requests change and are not constrained solely by inventory. This is an announced purchase-budget ceiling, not an imposed preference change or automatic deposit loss. Higher desired saving is a possible behavioral interpretation of choices, but is not programmed as a hidden household utility shock.

Read consumption, inventories, subsequent production, and deposits. Duffy provides macroeconomic coordination context; this artificial ceiling supports a teaching comparison rather than an empirical confidence estimate. If all purchases remain rationed, smaller budgets can preserve total household goods while changing their distribution. Retained deposits are neither consumed goods nor installed capital. Examine sales and inventory before claiming that a nominal budget restriction created an aggregate demand contraction.

Solved exercise. Example: with deposits one hundred, price five, and enough stock, the full authorization requests twenty goods and the new maximum requests ten. If the supplier holds only four and these are its only orders, both scenarios execute four and cost twenty. With adequate stock, delivery does change. This explains why a seemingly large constraint can leave reported outcomes unchanged: its effect depends on the other active limit. Compare authorized shares and delivered quantities, rather than relying on the rule's name.

Discussion. Was the spending ceiling binding, or did goods scarcity still dominate? Reference: Duffy (2016).

6.13 Aggregate history and accounts

Exact rule. All previous aggregate history and last-period accounts are displayed. Current private choices are not revealed.

The full aggregate history and available closed-period accounts are displayed. The reference retains own-account information and essential market announcements; the public account sees only the latest aggregate. The extension does not reveal current private loan requests or purchases before settlement. Additional information may support learning or coordination, but participants can interpret it differently. Productivity, endowments, and budgets remain unchanged. Any outcome effect depends on use of the information rather than a mechanical balance transfer caused by displaying a table.

Compare persistence in prices, employment, and credit while holding the horizon constant. Duffy

places learning and coordination within laboratory research, but this exact screen has no prior human outcome attributed to it. Check that histories contain closed periods rather than pending records converted to zeros. The instructor report retains its private reveal procedure: expanded participant information does not open administrative access. Distinguish data made available from evidence that a participant actually consulted or understood it.

Solved exercise. Example: after two periods, two history rows and the latest closed accounts become available. A household can compare its own deposit change with the total but cannot identify another person's forthcoming third-period order. Lower total lending is compatible with bank rejection or smaller requests; aggregate participant history alone does not separate them. Treat transparency as an information opportunity rather than perfect knowledge, and use instructor exports after completion when distinguishing competing mechanisms.

Discussion. Which choice could change using visible history, and what information was still missing? Reference: Duffy (2016).

Available aggregate history

Period	New production (goods)	Unemployment (%)	Posted-price index (ECU/good)	Closing private deposits (ECU)
1	20	0	5	1055.264
2	20	0	5	1050.654

Figure 6.3: The extension's specific visible change.

Sector balance sheets	
New production (goods)	20
Household consumption (goods)	19.362
Public purchases (goods)	0.638
Investment (goods)	0
Inventory change (goods)	0
Goods residual	0
Opening deposits (ECU)	1055.264
Credit created (ECU)	60
Loans paid using deposits (ECU)	61.8
Revenue collected (ECU)	6
Executed public purchases (ECU)	3.19
Deposit reductions (ECU)	0
Closing private deposits (ECU)	1050.654
Monetary residual	0
Company equity (ECU)	136.4
Bank equity (ECU)	43.6
Public-account balance (ECU)	105.746
Issuer-account equity (ECU)	-1200
Financial residual	0

Figure 6.4: Closed accounts available without current private choices.

Reports, data, and final discussion

7.1 Reveal after completion

The instructor report belongs to the administrator and is not accessible from participant links without authentication. Data are hidden on opening. The first display shows scheduled, completed, and pending records; revealing is disabled while any active economy-period remains unfinished. Once the horizon is complete, the instructor chooses when to reveal. Hiding or reloading protects the display again. This prevents an economy still making decisions from observing another economy's aggregate outcomes during play.

A usual horizon contains 160 person-period records per economy: ten households and six institutional roles over ten periods. That does not mean 160 independent economies. There are ten economy-periods, one hundred completed household-periods, and one independent economy. The consumption histogram uses household-periods, excluding companies and banks. Final score means use roles at the horizon, so each household appears once in that table. Unavailable intermediate scores are not observed zeros. Always identify the level of observation before interpreting a frequency or average.

Consumption bins run from zero to two, two to four, four to six, six to eight, and eight or more. Upper endpoints enter the following interval. Ask whether dispersion reflects orders, employment, supplier choice, or rationing. Paths show output, the index, deposits, and employment using different units; similar shapes do not imply equivalent magnitudes. The goods account explains where products went, while the monetary account explains changes in total deposits. Role score means should remain separated because the objectives and scales differ.

7.2 Exports and traceability

The private session download retains all ten technical oTree rounds even for a one-period horizon. Extra records are inactive and should not enter the decision denominator. The custom export records language, treatment, sector, position, choices, balances, and score credits with pending, completed, or inactive status. Public rules distinguish human and automatic origins. Forecasts lacking an observed subsequent price retain missing error rather than zero. Never replace missing values before checking status and whether the field belongs to that role or condition.

Account exports contain state and metrics for each economy-period. The event ledger records phase, source, target, monetary amounts, physical goods, and balance changes before and after. It permits reconstructing the sequence and reconciling results. Retain configuration, session, economy, and period when reproducing calculations; use aggregates for communication. Session and participant codes are private technical identifiers, not names, student numbers, or demographic categories. The activity asks no age, gender, nationality, or other personal characteristic. Avoid inferring such

characteristics from roles or decisions.

Downloads must be restricted to the selected session and retain every technical period. Tests cover pending and completed sessions, and one session must not include observations from another. Custom API access requires the private key and an explicit session; never distribute that key. Sharing a graph does not require releasing individual links or identifiable rows. Classroom tables should aggregate by economy and period with units and denominators. A ledger event is not an independent treatment observation, and a large number of events does not compensate for a small number of independent economies.

7.3 Prior evidence and scope

Duffy (2016) surveys experimental macroeconomics and its opportunities to study coordination and institutions under control. Riedl and van Winden (2007) examine wage taxation and employment in closed and open experimental economies; sales-price uncertainty helps explain limited hiring in their design. McLeay, Radia, and Thomas (2014) explain how bank loans create deposits and why reserves should not be treated as a mechanical multiplier. This activity uses that accounting distinction, rather than replicating a complete real monetary institution.

The three sources motivate mechanisms and questions. None published the exact combination of posted prices, priorities, scores, and closing rules implemented here. No estimated effects, effect sizes, or unobserved classroom results are attributed to this family. A human pilot should assess comprehension, pace, and recurring errors before evaluating learning. Technical validation verifies accounts and operation; pedagogical effectiveness needs additional criteria and evidence. JEL classifications were checked against the official list: A22, C92, E23, E24, E51, and E63. They identify teaching and macroeconomic themes, rather than claiming the activity covers every model within those categories.

7.4 A discussion sequence

Begin descriptively: how many goods were produced, and how many people worked? Then examine financing: which payroll depended on newly granted credit? Reconstruct allocation: who bought goods, and which budgets were not executed? Finally reconcile losses and balances. This sequence lets each role explain a stage without making its own outcome an explanation of the entire economy. Require an accounting entry and a recorded choice to support each proposed interpretation, and allow participants to distinguish what they knew when deciding from what the report revealed afterward.

For treatment comparisons, state the changed rule and ask which other choices could respond. Next compare facts: employment, consumption, inventory, prices, and deposits. Only then discuss compatible mechanisms. Lower output together with less lending can reflect a bank constraint, smaller requests, or reduced financing needs; the aggregate does not distinguish these alternatives. Use choice fields to investigate the sequence while protecting identities. A regression with one hundred household-periods does not provide one hundred independently assigned treatments. Report the number of economies and acknowledge learning across periods when describing evidence.

Feedback script

First describe an operation and its counterpart. A twenty loan creates deposits and debt, not twenty goods. A purchase changes who owns money and goods; it does not produce the sold good again. Then explain which constraint bound and which choice could change it. Finish by separating an identity that must hold from a hypothesis that may fail.

Completed economy-periods

Completed economy-periods	1
Independent economies	1
Completed household-periods	10
Forecasts with an observed following price	0
Mean logarithmic forecast error	—
Maximum absolute reconciliation residual	0

Deposits exclude reserves and the public account. The index uses fixed weights across three companies; transaction prices can change through composition. Negative issuer equity reflects the opening monetary endowment. Scores use different objectives across roles.

Figure 7.1: Aggregate summary after instructor reveal.

Final scores by role

Final scores by role	Observations	Accumulated score (ECU)
Household	10	138.81
Company	3	112.733
Bank	2	100.9
Public account	1	100

Household-period consumption distribution



Figure 7.2: Final role scores and consumption distribution; actual report panels.

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