

Comparative Advantage

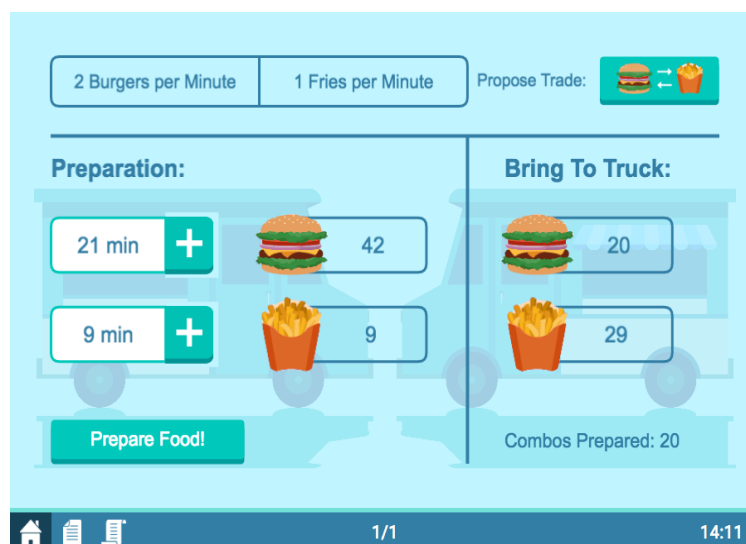
Teaching Note | MobLab x Harvard Business Impact

Primary Topic:	Macroeconomics, Microeconomics, Trade, Managerial Economics
Typical Duration:	No-trade round: 2-5 min Trade round: 5-10 min Debrief: 10-15 min
Group Size:	Pairs (2 players per group); scales to any class size
Difficulty Level:	Introductory / Intermediate
Prerequisites:	Can be used before or after teaching comparative advantage theory. Works well as motivation for the concept.

1. Simulation Overview

In this simulation, each student operates a food truck and must allocate 30 minutes each morning between preparing burgers and preparing fries. The only product either truck sells is a Combo — one burger paired with one order of fries — so each student's earnings equal the number of complete combos they can bring: that is, whichever is smaller, their number of burgers or their number of fries.

Students are paired and differ in their production rates. By default, one player has an absolute advantage in producing both items, but the two players have different opportunity costs — one gives up fewer fries to make an extra burger, and the other gives up fewer burgers to make an extra serving of fries. This difference creates a basis for mutually beneficial trade. When trade is enabled, students can propose swapping burgers for fries with their partner before finalizing their production. The experiment makes the abstract concept of comparative advantage concrete: students directly experience how specialization and exchange allow both parties to consume beyond their individual production possibilities.



Learning Objectives

By the end of this simulation, students will be able to:

- **Opportunity Cost and Gains from Trade:** Explain how differences in opportunity cost between two producers create the conditions for mutually beneficial trade, even when one producer has an absolute advantage in both goods.
- **The Linear Production Model:** Use a linear production possibilities frontier (PPF) to distinguish between absolute advantage and comparative advantage, and to calculate opportunity costs precisely.
- **Specialization:** Demonstrate how partial or full specialization in one's comparative advantage increases total output and enables both trading partners to consume outside their individual PPF.
- **Trade as Welfare-Improving:** Evaluate why voluntary trade between self-interested individuals improves outcomes for both parties, connecting individual decisions to broader gains from exchange.

2. Classroom Setup

Configuration	Recommended Setting
Role Assignment	Two types (players differ in production rates). Randomly assigned by the system.
Number of Rounds	Run as two separate games: Round 1 with trade disabled (baseline), Round 2 with trade enabled. For additional learning, run a third game with trade enabled and shuffled partners (click Repeat and Random).
Trade	Game 1: Disabled. Game 2+: Enabled. This contrast is the core pedagogical structure.
Payoff Structure	Earnings = number of Combos = min(burgers brought, fries brought). Students maximize combos, not individual items.
Time per Round	No-trade game: 2 minutes is sufficient. Trade game: allow more time for negotiation (recommended 3-6 minutes). Round ends when both players complete their production, or when time expires.
Technology Required	Laptop or tablet with an up-to-date web browser
Special Setup Notes	Default PPF parameters work well. If adjusting: the greater the difference in opportunity costs between the two types, the easier it is for students to find mutually beneficial trades. If one type's opportunity cost is below 1 and the other's is above 1, simple 1-for-1 trades will be mutually beneficial — a good starting point for novice classes.

3. Pedagogical Instructions

Pre-Game Briefing

Before the no-trade round, explain the setup clearly:

- Each student has 30 minutes to split between making burgers and making fries. Their screen shows their personal production rate for each item (e.g., 2 burgers per minute, or 1 serving of fries per minute).
- They sell only Combos. Earnings equal the number of complete combos — that is, the minimum of their burger count and their fry count.
- Students should use the plus and minus buttons to allocate their 30 minutes and then press Bring X Combos to lock in their choice.
- Goal for round 1: maximize the number of combos on your own, without trading.

Instructor Tip: In round 1, most students will quickly find the payoff-maximizing no-trade allocation (splitting time so burgers and fries come out equal). Let them discover this rather than telling them. It sets up the key insight: even after optimizing on their own, trade will let them do better.

Before the trade round, introduce the mechanic:

- Students can now propose trades with their partner: offering some of their burgers in exchange for fries, or vice versa.
- Trades are finalized before clicking Bring X Combos. Students should experiment with offers to find exchanges both partners want to accept.
- Remind students the goal is still to maximize combos — so a good trade is one that increases the number of complete pairs they can bring.

Instructor Tip: Do not explain comparative advantage or tell students which direction to specialize before the trade round. The experience of discovering a beneficial trade is the learning. After the round, the debrief can connect what they did instinctively to the formal theory.

The Gameplay Experience

During the no-trade round, watch for:

- Most students arriving at the equal-split allocation (equal numbers of burgers and fries) quickly. This is the no-trade optimum and will serve as the benchmark for comparison in the debrief.
- Students who misallocate — producing many more of one item than the other — ending up with fewer combos. This is a useful illustration of waste through imbalance.

During the trade round, watch for:

- Pairs who figure out which direction to trade and specialize at least partially, consuming noticeably more combos than in round 1 — this is your highlight example for the debrief.
- Pairs who trade in the wrong direction or propose offers that leave one partner worse off — these are equally valuable as discussion material.
- Students who hold back from trading out of uncertainty — use these cases to motivate the role of price signals and trust in markets.

Robot Players Note: If group sizes are uneven, robot players can be added. The robot proposes trades whose ratios fall between the two players' relative opportunity costs, ensuring both partners are made strictly better off. Note: robots will not trade if round duration is set below 45 seconds.

Facilitator Checklist

1. Set up Game 1 with Allow Trade unchecked and Duration set to approximately 2 minutes.
2. Open the activity and wait for students to join, then click Begin.
3. After Game 1 concludes, note the no-trade payoffs for comparison. Do not debrief yet.
4. Set up Game 2 with Allow Trade checked and a longer duration (3-6 minutes).
5. After Game 2, optionally run Game 3: click Repeat and Random to reshuffle partners for a second trade round.
6. Navigate to Results before the debrief and prepare the PPF graphs and summary table.

4. Debriefing & Discussion

The debrief is the heart of this experiment. The visual of students consuming outside their PPF is one of the most striking results in introductory economics — plan for 10-15 minutes of discussion.

Suggested Discussion Questions

- In round 1 (no trade), how did you decide how to split your 30 minutes? What was your strategy for maximizing combos?
- When trade opened up, which direction did your trades go — did you end up with more burgers or more fries than you produced? Why did that make sense for you?
- Did both you and your partner end up with more combos after trading? If not, what went wrong — and what would a better trade have looked like?
- One player in each pair had an absolute advantage in both items — they were faster at making both burgers and fries. Did that player benefit from trade too? Why?
- What does it mean to have a comparative advantage rather than an absolute advantage? Based on today's game, explain the difference in your own words.
- The result graphs show some students consuming outside their individual production possibilities frontier. Where did those extra combos come from? What created that value?

Theoretical Connections

This experiment provides an experiential foundation for several core concepts in trade theory:

- Comparative Advantage (Ricardo): The key insight — that trade is beneficial whenever opportunity costs differ, regardless of absolute productivity — is directly visible in the results. One player being faster at both tasks does not eliminate the gains from specialization.

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- **Production Possibilities Frontier:** The linear PPF is the backbone of the game's mechanics. The results screen plots each student's production and consumption on their PPF, making the model tangible.
 - **Opportunity Cost:** Students experience opportunity cost directly — every minute spent on burgers is a minute not spent on fries, with a precise tradeoff ratio they can read from their screen.
 - **Gains from Trade:** The comparison between no-trade and trade payoffs gives students a quantified measure of the welfare gains from exchange.
 - **Absolute vs. Comparative Advantage:** The default setup gives one player an absolute advantage in both goods, making it ideal for dispelling the common misconception that only the more productive party benefits from trade.

5. Results & Data Interpretation

Reading the Results Dashboard

Three views are particularly valuable for this experiment:

- **Summary Table:** Shows the no-trade optimum (burgers, fries, and payoff per player type) in the second row, then each group's actual trade outcomes in subsequent rows. Use this to quickly identify which pairs found mutually beneficial trades by comparing each player's payoff to the no-trade benchmark. Select a group's radio button to graph that group's specific decisions.
- **Production and Trade Graph (group-level):** Displays each player type's PPF with their final production choice plotted on it. When trade is enabled, consumption after trade is also shown — students consuming outside their PPF is the visual payoff of the experiment.
- **Aggregate Production and Consumption Graphs:** When the top-row radio button is selected, these graphs display all students' production and consumption decisions across all groups. Look for clusters of production near each type's comparative advantage and consumption points pushed beyond the PPF frontier.



Common Outcome Patterns

- **Successful Specialization and Trade (expected):** Most pairs in the trade round will at least partially specialize in their comparative advantage and find mutually beneficial exchanges, consuming more combos than in round 1. Highlight these pairs in the debrief — point to their consumption dots appearing outside the PPF.
- **Symmetric or Reversed Trades (divergent):** Some pairs trade in a direction that hurts one or both partners, or trade at a ratio outside the range of mutual benefit. Use these as discussion examples: ask the class what ratio would have made both parties better off, and why.
- **No Trade Attempted:** Some students may not engage with the trade mechanic, especially in the first trade round. This is also instructive — ask what barriers prevented trade and connect the discussion to real-world transaction costs and information asymmetries.

6. Extensions & Variations

Parameter Adjustments

The default PPF parameters work well for most classes, but the following adjustments are worth considering:

- **Increase Opportunity Cost Difference:** A larger gap between the two types' opportunity costs makes mutually beneficial trades easier to identify, which is helpful for introductory classes encountering the concept for the first time.
- **1-for-1 Trade Setup:** If one type's opportunity cost is below 1 (fewer fries given up per burger) and the other's is above 1, then simple 1-for-1 trades are mutually beneficial. This focal trade ratio lowers the negotiation burden and can accelerate learning.
- **Multiple Trade Rounds:** Running a second trade round with reshuffled partners (Repeat and Random) allows students to apply what they learned and typically produces better trade outcomes, illustrating how learning and experience improve market efficiency.
- **Survey Pairing:** MobLab surveys can be run in the same session to check for conceptual understanding. A short survey after the experiment asking students to identify comparative advantage from a new example reinforces transfer of the concept.

Cross-Disciplinary Connections

- **International Trade and Policy:** The two food trucks are a direct analogy for two countries trading goods. The gains from specialization in this game connect directly to debates about free trade, tariffs, and protectionism.
- **Business Strategy:** Firms, like food trucks, have opportunity costs. Outsourcing, offshoring, and division of labor within organizations all rest on the same comparative advantage logic students experience in this game.
- **Labor Economics:** The model connects naturally to discussions of why workers specialize, how labor markets allocate tasks, and why wage differences across countries do not eliminate the benefits of trade.

7. References & Further Reading

The following resources pair well with this experiment:

- Ricardo, D. (1817). *On the Principles of Political Economy and Taxation*. London: John Murray. The original statement of comparative advantage.
- Mankiw, N.G. (current edition). *Principles of Economics*. Cengage. Chapter on Interdependence and the Gains from Trade directly maps to this experiment's learning objectives.
- Krugman, P. & Wells, R. (current edition). *Economics*. Worth Publishers. Part on International Trade covers comparative advantage and PPF in the context this game illustrates.
- Bergstrom, T. & Miller, J. (1999). *Experiments with Economic Principles*. McGraw-Hill. Contains classroom experiments on comparative advantage that complement the MobLab digital version.