Competitive Market (Double Auction)

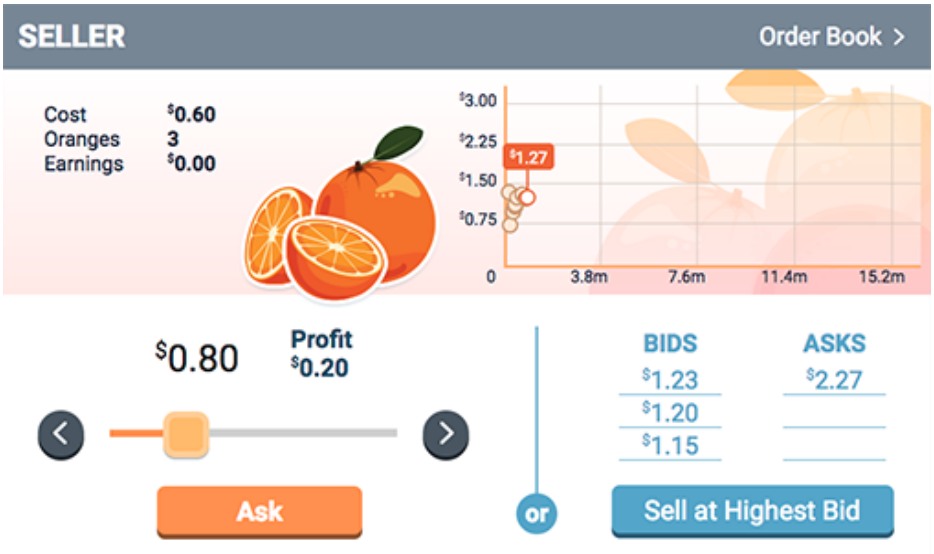
Teaching Note | MobLab x Harvard Business Impact

Primary Topic:	Principles of Microeconomics, Auctions, Managerial Economics
Typical Duration:	Prep & Instructions: 5 min	Experiment Play: 5-20 min	Debrief: 10-15 min
Group Size:	10 to 20 students per group is standard. Up to 100+ students per group.
Difficulty Level:	Introductory / Intermediate
Prerequisites:	Can be used before or after teaching Supply & Demand theory. Most commonly run after covering Markets, Demand, and Supply.

1. Simulation Overview

In this simulation, students take on the role of buyers and sellers of oranges in a double auction market. Buyers submit bids or accept the lowest available ask price, while sellers submit asks or accept the highest available bid. Through repeated rounds of trading, the market price converges to the equilibrium price that equates supply and demand — demonstrating spontaneous market order without any central coordination.

Students are randomly and evenly divided into buyers and sellers. By default, buyers demand up to three units with decreasing marginal valuations, and sellers supply up to three units at increasing marginal costs. A transaction occurs when a seller accepts the highest bid, or when a buyer accepts the lowest ask — or when submitted prices cross. The experiment vividly illustrates how individuals pursuing their own self-interest collectively discover the market-clearing price.



Learning Objectives

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

- **Market Equilibrium**: Explain how a competitive market, without external guidance, finds the price that equates quantity supplied with quantity demanded.
- **Market Efficiency**: Demonstrate that self-interested buyers and sellers in a competitive market for a private good (without externalities) reach the surplus-maximizing allocation.
- **Market Adjustment**: Predict how a market responds to a shift in supply or demand, identifying the new equilibrium price and quantity transacted.
- **Market Interventions**: Evaluate how binding price controls, taxes, or subsidies alter the equilibrium price and quantity, and reduce total surplus in a private-good market.
- **Price Floors & Ceilings**: Distinguish between the effects of price floors, price ceilings, taxes, and subsidies on market outcomes.

2. Classroom Setup

Configuration	Recommended Setting
Role Assignment	Randomly assigned initially. Instructors can reassign roles after round 1 using the Repeat button or 'Player Role Assignment in Groups.' Robot players can be added once the game is underway to round out the group.
Number of Rounds	2-4 rounds of Competitive Market. Add additional rounds with modified parameters (e.g., supply/demand shifts, price controls).
Communication	Disabled
Payoff Structure	Buyers: Value minus Price = Earnings. Sellers: Price minus Cost = Earnings.
Technology Required	Laptop with an up-to-date web browser
Special Setup Notes	Default parameters work well for most classes. Use 'Preview Activity' to experience the game from the student perspective before running it live. Additional configurations (supply/demand curves, price controls, taxes, subsidies) can be added between rounds.

3. Pedagogical Instructions

Pre-Game Briefing

Before starting the game, instruct students to focus on maximizing their individual payoffs:

- Buyers should aim to purchase oranges for less than their personal value for each unit.
- Sellers should aim to sell oranges for more than their cost to supply each unit.
- Caution students that it is possible to make transactions at a loss — they should keep a close eye on their own valuations or costs to avoid this.

- Encourage students to monitor the pricing trends and the highest bids/lowest asks table visible on their screens throughout the game.

Instructor Tip: Use the 'Preview Activity' button before class to experience the game exactly as students will see it. When you open the activity, a waiting screen will appear for students to join. Wait until most students have joined, then click 'Begin.' Students will be assigned roles automatically and can continue joining even after the game has started.

The Gameplay Experience

Once the game starts, you will be directed to the Monitor tab in the instructor console. From here you can observe student activity in real time and, if needed, add robot players to fill out the market. Robots are automated participants that will transact at market rates, helping ensure sufficient market activity even with smaller classes.

Watch for the following dynamics as the rounds progress:

- Early rounds typically show a wide dispersion of transaction prices as students experiment with their bids and asks.
- As students observe completed transactions and adjust their strategies, prices will begin to converge toward the equilibrium.
- By the final rounds, most transactions should cluster tightly around the theoretical equilibrium price — a powerful live demonstration of market discovery.

Facilitator Checklist

1. Share the activity link or access code with students before class.
2. Use 'Preview Activity' to confirm the setup looks correct from the student view.
3. Open the activity and wait on the lobby screen as students join.
4. Click 'Begin' once most students have joined. Latecomers can still join after the game starts.
5. Monitor the Monitor tab during play; add robot players if needed.
6. Between rounds, consider modifying parameters (supply shifts, price controls) to explore additional concepts.
7. Navigate to the Results tab before the debrief to prepare the charts and scoreboard.

4. Debriefing & Discussion

The debrief is where the core economic learning is consolidated. Allocate at least 10-15 minutes. Begin with the scoreboard to spark engagement, then move into the conceptual discussion using the supply and demand results charts.

Suggested Discussion Questions

- At the start of the first period, none of you knew the market price. How did you decide what price to bid or ask? By the final period, how did your strategy change once a market price emerged?
- Sellers, why did you eventually lower your asking prices? Buyers, why did you eventually raise your bids? What pressure drove those adjustments?

- If no single person in this room knew the right price, how did the market calculate it? What specific information does a single completed transaction price convey to everyone else?
- Why does the gap between a buyer's valuation and the actual trade price represent created wealth? If a student buys an orange for $1.00 that they valued at $5.00, the same amount of physical stuff exists in the world — so where did that $4.00 of value actually come from?
- Describe the transition from the first period to the last. Why does a market move from a wide range of random prices to a narrow band of similar prices? What role does competition play in narrowing that gap?

Theoretical Connections

This experiment provides a vivid empirical grounding for several foundational concepts in microeconomics:

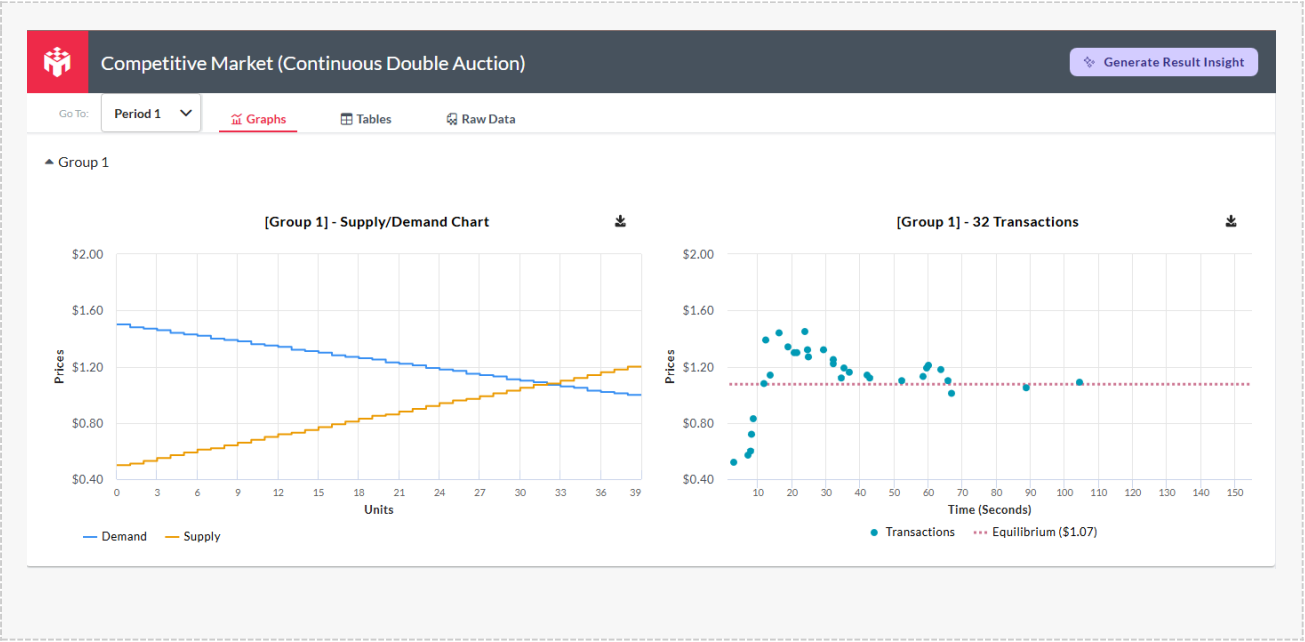
- Supply and Demand: The convergence of transaction prices toward the theoretical equilibrium is a direct, lived demonstration of the supply-demand model.
- Consumer and Producer Surplus: The scoreboard and results charts allow students to see surplus creation in action — buyers who trade below their value and sellers who trade above their cost.
- The Price Mechanism / Hayek's Knowledge Problem: The experiment illustrates how dispersed, private information (each student's personal valuation or cost) is aggregated and communicated through the price system without any central coordinator.
- Market Efficiency: In the absence of externalities or market power, the double auction reliably reaches the surplus-maximizing allocation.
- Market Interventions: Subsequent rounds with price floors, price ceilings, taxes, or subsidies demonstrate deadweight loss directly from student outcomes.

5. Results & Data Interpretation

Reading the Results Dashboard

Three views are particularly useful for this experiment:

- Scoreboard: Ranks students by total earnings. Call on top performers with concept questions — ask them to explain their strategy. This energizes the debrief immediately.
- Results Tab - Supply and Demand Charts: The left panel displays the theoretical supply and demand curves (as configured by the instructor). The right panel plots actual student transactions on the same axes. Instructors can toggle between groups and navigate period by period to show how prices converged over time.
- Tables Tab: Displays the average transaction price across all groups, allowing for a clean comparison of class-wide outcomes against the theoretical equilibrium price.



Common Outcome Patterns

- Convergence to Equilibrium (expected): In most runs, transaction prices visibly converge toward the equilibrium price across rounds. This is the experiment's signature result. Highlight this in the charts and ask students what drove that convergence.
- Slow Convergence or No Convergence (divergent): Occasionally, particularly with small groups or highly risk-averse students, prices may not fully converge within the allotted rounds. Use this as a teaching moment: discuss what conditions (more participants, more rounds, better information) would accelerate convergence.
- Market Intervention Effects: When price controls, taxes, or subsidies are introduced in later rounds, students will directly observe reduced transaction volumes and changes in who captures surplus — making the concept of deadweight loss concrete.

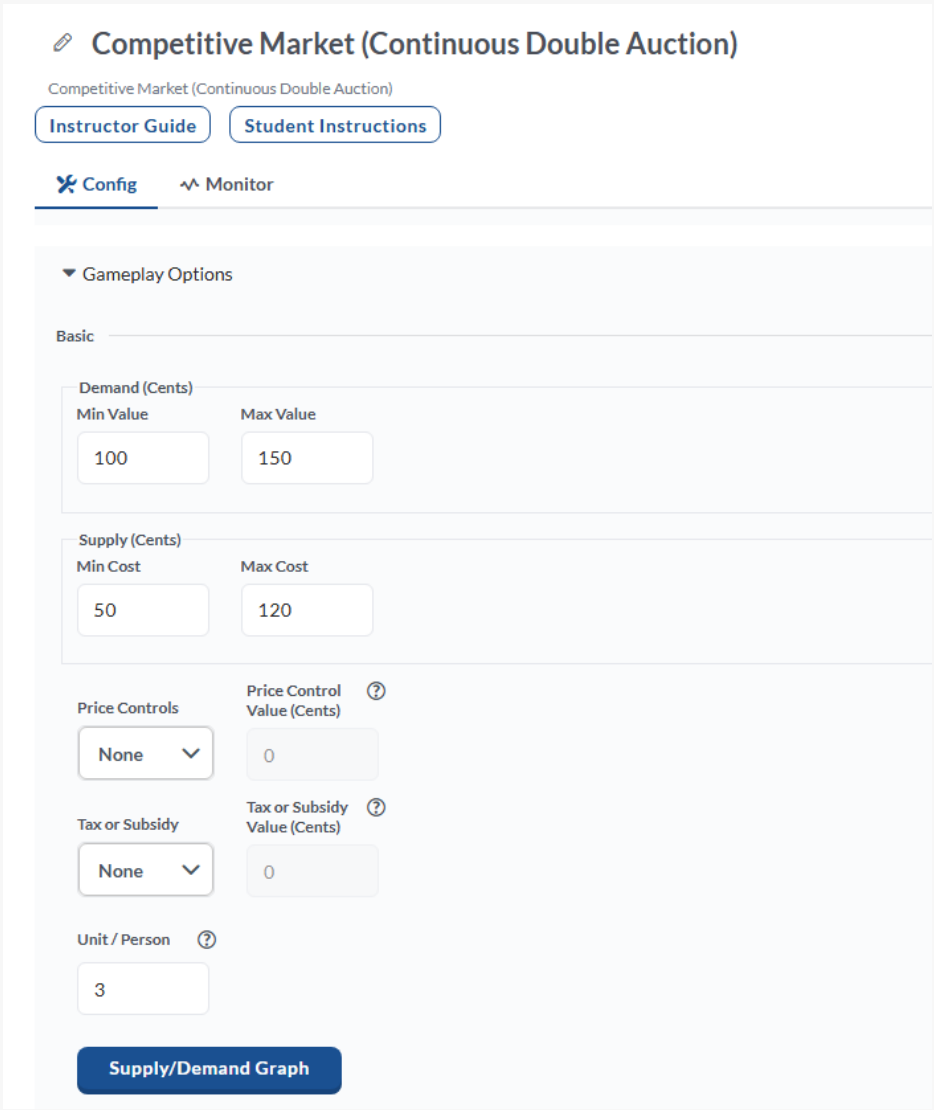
6. Extensions & Variations

Parameter Adjustments

The Competitive Market experiment is highly flexible. Between rounds, instructors can modify any of the following to explore additional concepts:

- Supply and Demand Curves: Shift supply or demand to create a new equilibrium. Students observe price and quantity adjustments in real time, illustrating comparative statics.
- Price Floors and Ceilings: Introduce a binding price control and observe how it creates surpluses or shortages and reduces total surplus.
- Taxes and Subsidies: Add a per-unit tax or subsidy and observe changes in transaction prices, quantities, and the distribution of surplus between buyers and sellers.

- Group Size and Number of Rounds: Smaller groups show slower convergence; larger groups converge more quickly. Adjusting the number of rounds lets students experience multi-period market dynamics.



Cross-Disciplinary Connections

- Finance and Asset Markets: The double auction closely resembles the mechanics of an order book in financial markets. The experiment can spark discussion about how stock prices are discovered through competing bids and offers.
- Managerial Economics: Firms making pricing decisions in competitive industries face the same pressures as student sellers — the market imposes discipline on anyone who prices too far from equilibrium.
- Public Policy: The market intervention rounds connect directly to policy debates around rent control, minimum wages, agricultural price supports, and carbon taxes.

7. References & Further Reading

The following resources pair well with this experiment:

- Smith, V.L. (1962). An Experimental Study of Competitive Market Behavior. Journal of Political Economy, 70(2), 111-137. The foundational paper demonstrating double auction convergence to equilibrium.
- Hayek, F.A. (1945). The Use of Knowledge in Society. American Economic Review, 35(4), 519-530. Essential background on the price mechanism as an information aggregation device.
- Mankiw, N.G. (current edition). Principles of Economics. Cengage. Chapters on Supply and Demand, Market Efficiency, and Government Policies and Markets.
- Pindyck, R.S. & Rubinfeld, D.L. (current edition). Microeconomics. Pearson. Chapters on supply, demand, and market equilibrium pair well with the managerial economics framing.