

2

CHAPTER 2

Supply and Demand

The most widely used tool in all of economics, built one piece at a time, then put to work.

What this chapter covers



2.2–2.3 The pieces

- Demand: buyers at each price
- Supply: sellers at each price
- What shifts each curve



2.4–2.5 The model

- Market equilibrium
- Shortages & surpluses
- Comparative statics: shifts



2.6–2.8 Evidence

- Case: surge pricing
- Empirical: coffee 2021–22
- Behavioral & experimental

THE BIG IDEA

In a competitive market no one sets the price, it emerges from the interaction of all buyers and sellers. Our task is to understand that interaction.

2.1

Introduction

- Prices that move on their own
- What a market is
- Why we focus on competitive markets

2.1 INTRODUCTION

Four prices that moved sharply, and no one decreed them



Coffee, 2021

The world price of a pound nearly doubled in months.



Surge, Dec 2022

A Friday-night ride that cost \$15 could cost \$45.



Bikes, 2020

Lockdown bicycle prices rose by roughly a third.



Oil, Apr 2020

U.S. crude briefly fell below zero, sellers paid buyers to take it.

WHAT THEY SHARE

In each case the price moved because the forces of demand and supply shifted, not because any government or company set the new figure.

2.1 INTRODUCTION

What is a market?

■ Market

Any arrangement that brings buyers and sellers of a good or service into contact, a farmers' market, a stock exchange, or a phone app that matches riders with drivers.

■ Competitive market

One with so many buyers and sellers that no single one can move the price on its own. The price is not chosen by anyone, it emerges from everyone's interaction.

2.2

Demand

- The demand schedule and curve
- The law of demand
- Market demand
- What shifts demand

The demand schedule for coffee

■ Demand

How much of a good buyers are willing and able to purchase at each possible price, holding everything else fixed.

■ Demand schedule

A table listing the quantity buyers would purchase at each price.

Price (per lb)	Quantity demanded (million lbs/week)
\$2	100
\$3	90
\$4	80
\$5	70
\$6	60
\$7	50

Table 2.1 A demand schedule for coffee.

2.2.1 DEMAND

The law of demand

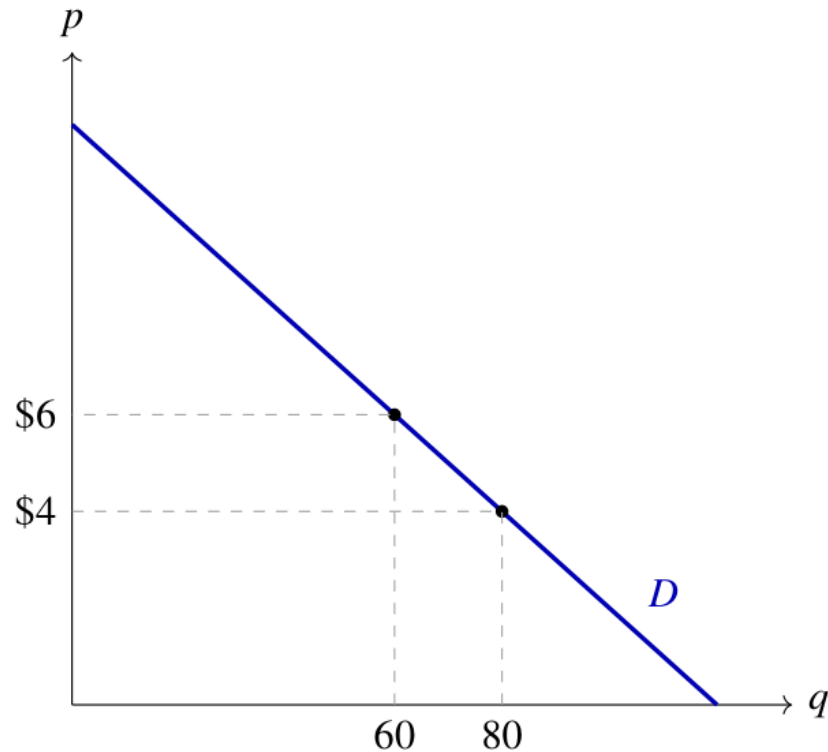
THE LAW OF DEMAND

Holding other things constant, a higher price reduces the quantity demanded, and a lower price raises it.

- When coffee becomes more expensive, some buyers brew at home, some switch to tea, and some simply drink less.
- When it becomes cheaper, they do the reverse.
- The pattern is so common that economists call it a law.

2.2.1 DEMAND

The demand curve slopes downward



- Plot each price–quantity pair and connect the points.
- The curve slopes downward from left to right, the law of demand, drawn.

Figure 2.1 The demand curve for coffee, plotted from Table 2.1.

2.2.1 DEMAND

Market demand is the sum of individual demands

■ Market demand schedule

It adds up the amounts demanded by every individual buyer in the market.

HOW TO BUILD IT

To get the market quantity at \$4, simply add the amount each buyer would purchase at \$4. Market demand is the horizontal sum of individual demands.

2.2.2 WHAT SHIFTS DEMAND?

Movement along vs. shift of the curve



Change in own price

Moves us *ALONG* a fixed curve, from one row of the schedule to another.



Change in anything else

SHIFTS the whole curve, buyers want a different quantity at every price.

The Single Most Common Confusion

Only a change in the good's own price moves us along the curve; everything else shifts the curve. A rightward shift is an increase in demand; a leftward shift, a decrease.

Five shifters of demand (1–2)

■ 1. Income

Normal goods: higher income raises demand (more restaurant meals, more coffee). Inferior goods: higher income lowers demand (fewer instant-noodle packets).

■ 2. Prices of related goods

Substitutes: a rise in one's price raises demand for the other (coffee & tea). Complements: a rise in one's price lowers demand for the other (coffee & sugar).

Five shifters of demand (3–5)

3

3. Tastes

Anything that makes the good more appealing, a study praising coffee, a new café culture, raises demand.

4

4. Expectations

If buyers expect coffee to be costlier next month, some buy extra today, raising demand now.

5

5. Number of buyers

More buyers, population growth, a new country reached, means greater demand at every price.

2.3



Supply

- The supply schedule and curve
- The law of supply
- What shifts supply

2.3.1 SUPPLY

The supply schedule for coffee

■ Supply

How much of a good sellers are willing and able to offer for sale at each possible price.

WHY IT SLOPES UP

A higher price makes it worthwhile to harvest more carefully, bring marginal land into production, and draws new sellers in.

Price (per lb)	Quantity supplied (million lbs/week)
\$2	40
\$3	50
\$4	60
\$5	70
\$6	80
\$7	90

Table 2.2 A supply schedule for coffee.

2.3.1 SUPPLY

The law of supply

THE LAW OF SUPPLY

Holding other things constant, a higher price raises the quantity sellers want to sell.

Plotting the pairs gives the upward-sloping supply curve.

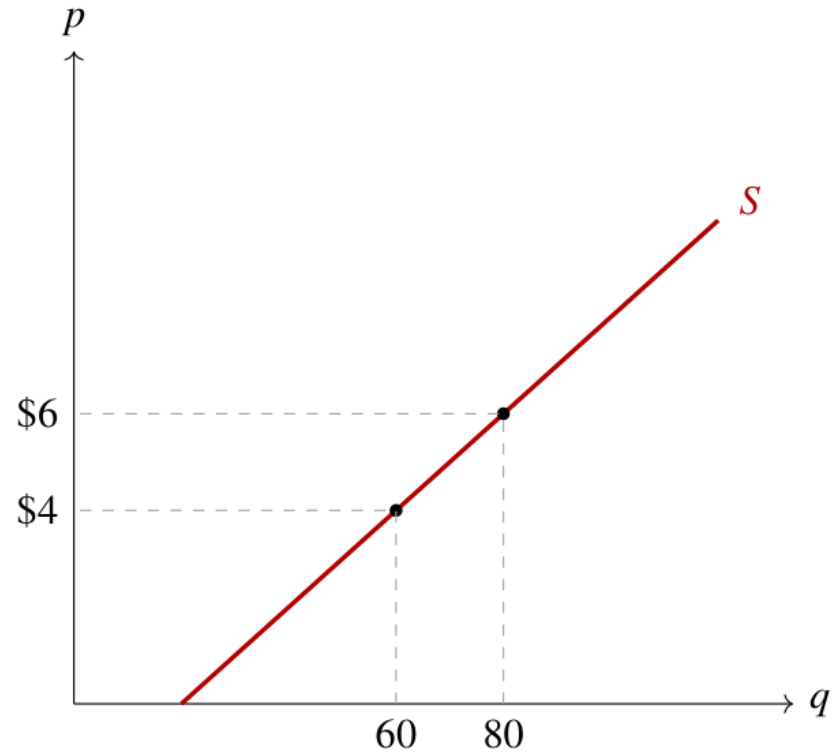


Figure 2.2 The supply curve for coffee, plotted from Table 2.2.

2.3.2 WHAT SHIFTS SUPPLY?

Four shifters of supply

1

1. Input prices

Cheaper fertilizer, fuel, or labor increases supply; costlier inputs decrease it.

2

2. Technology

A better drying or roasting method that lowers cost per pound increases supply.

3

3. Expectations & weather

A frost that destroys a harvest, or expected higher future prices, reduces supply today.

4

4. Number of sellers

More growers or roasters raise supply at every price.

2.3.2 WHAT SHIFTS SUPPLY?

And one more: taxes and subsidies

A PREVIEW OF CHAPTER 4

Taxes and subsidies also shift supply, since they change the net price sellers receive.

We study their effects in detail in Chapter 4.

2.4

Market Equilibrium

- Bringing buyers and sellers together
- Shortages and surpluses
- Price as signal and rationing device

2.4 MARKET EQUILIBRIUM

Where the two schedules meet

Price	Quantity demanded	Quantity supplied	Pressure on price
\$2	100	40	shortage of 60, price rises
\$3	90	50	shortage of 40, price rises
\$4	80	60	shortage of 20, price rises
\$5	70	70	EQUILIBRIUM
\$6	60	80	surplus of 20, price falls
\$7	50	90	surplus of 40, price falls

Table 2.3 Finding the equilibrium price for coffee.

2.4 MARKET EQUILIBRIUM

Supply meets demand at \$5 and 70 million lbs

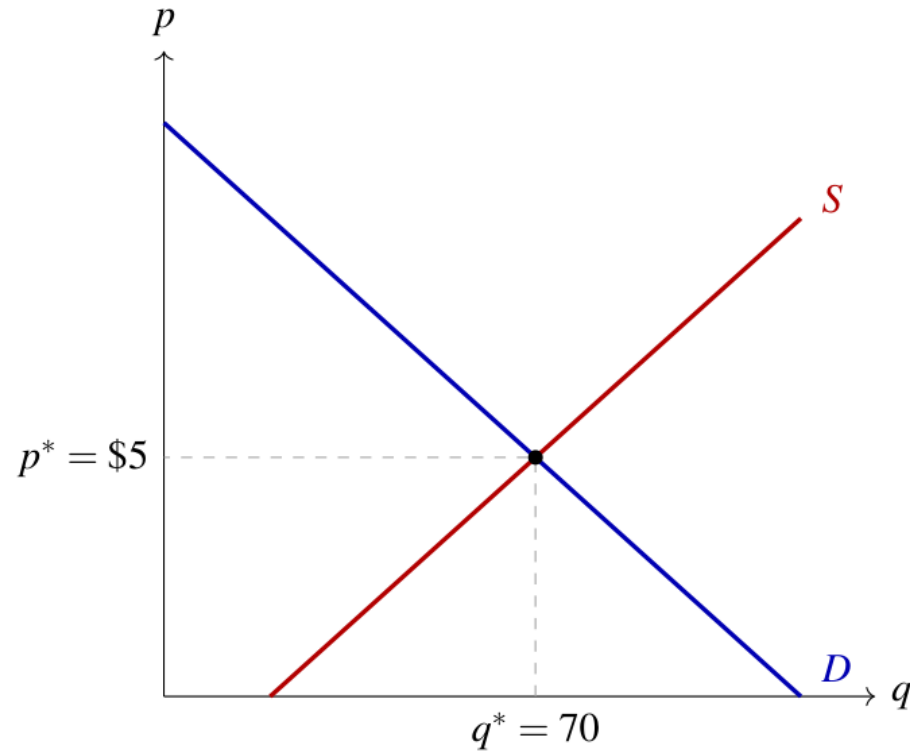


Figure 2.3 Market equilibrium for coffee, where supply meets demand.

■ Equilibrium

At \$5, quantity demanded (70) exactly equals quantity supplied (70). The market clears: every buyer willing to pay \$5 finds coffee, every seller willing to sell at \$5 finds a buyer.

2.4.1 SHORTAGES & SURPLUSES

Too low a price: a shortage

■ Shortage, price below \$5 (say \$4)

Buyers want 80 million lbs, sellers offer only 60. A shortage of 20 million: more buyers want coffee than there is to go around.

WHAT HAPPENS NEXT

Frustrated buyers offer to pay more; sellers, seeing eager customers, raise prices. The price rises toward \$5.

2.4.1 SHORTAGES & SURPLUSES

Too high a price: a surplus

■ Surplus, price above \$5 (say \$6)

Sellers offer 80 million lbs, buyers want only 60. A surplus of 20 million: unsold coffee piles up.

THE SELF-CORRECTING MARKET

Sellers cut prices to move inventory; the price falls toward \$5. From either direction the price is pushed to equilibrium, the only price with no pressure to change. That self-correction makes equilibrium a useful prediction.

2.4.2 PRICE AS A SIGNAL AND A RATIONING DEVICE

A price does two jobs at once (1)

■ Rationing

When coffee is scarce relative to demand, the rising price gently pushes the least eager buyers out, so the limited supply goes to those willing to pay the most. No official decides who goes without, the price quietly settles it.

First job: it allocates the scarce good among buyers.

WHEN PRICE CANNOT RATION

When the price is not allowed to ration, some other rule must: rent-controlled apartments in New York and San Francisco are rationed by waiting lists and personal connections, university dorm rooms by lottery, and wartime or Soviet-era systems used paper coupons for bread, gasoline, and meat.

A price does two jobs at once (2)

■ Signal

A high price tells producers that buyers value the good and rewards making more; a low price says cut back. A shortage that bids the price up says “make more of this”; a surplus says “make less.”

THE INVISIBLE HAND

No one sends these messages deliberately. Adam Smith called this coordination of countless self-interested choices the “invisible hand”, we return to it, and where it fails, in Chapters 10 and 18.

2.5

Changes in Equilibrium: Shifts in Demand and Supply

- A supply shift: the Brazil frost
- A demand shift, worked out
- When both curves shift, two dominance cases
- The same model, many markets

2.5 CHANGES IN EQUILIBRIUM

A supply shock: the 2021 Brazil frost

THE SHOCK

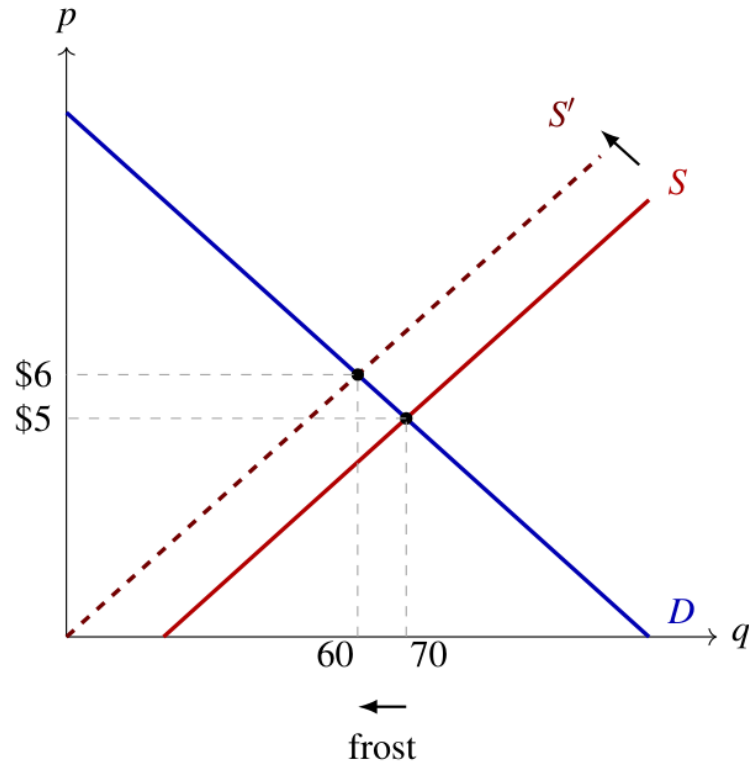
A severe frost in Brazil, the world's largest producer, destroyed part of the harvest. A decrease in supply: at every price, sellers can offer ~20 million lbs less. Demand is unchanged.

Price	Qty demanded	New qty supplied	Pressure
\$4	80	40	shortage 40, rises
\$5	70	50	shortage 20, rises
\$6	60	60	NEW EQUILIBRIUM
\$7	50	70	surplus 20, falls

Table 2.4 A leftward shift in supply raises the equilibrium price.

2.5 CHANGES IN EQUILIBRIUM

The frost shifts supply left: price up, quantity down



\$5 → \$6

equilibrium price rises

70 → 60

quantity traded falls

INTUITIVELY

A smaller harvest makes coffee scarcer; buyers compete for the reduced supply, bidding the price up until enough drop out to match what is available.

Figure 2.4 The frost shifts supply from S to S' , raising price, lowering quantity.

2.5 CHANGES IN EQUILIBRIUM

How equilibrium responds to a single shift

Shift	Equilibrium price	Equilibrium quantity
Demand increases (shifts right)	rises	rises
Demand decreases (shifts left)	falls	falls
Supply increases (shifts right)	falls	rises
Supply decreases (shifts left)	rises	falls

Table 2.5 The four single-shift cases. Worth memorizing.

2.5 CHANGES IN EQUILIBRIUM

A three-step habit for any “what happens?” question

1

Step 1

Does the event shift demand, supply, or neither?

2

Step 2

In which direction does the curve shift?

3

Step 3

Read the new equilibrium off the schedule.

SELF-CHECK

A severe drought cuts the wheat harvest. Predict price and quantity.

(1) It shifts SUPPLY. (2) Supply shifts LEFT (smaller harvest). (3) Price RISES, quantity FALLS.

2.5.1 A WORKED EXAMPLE: A SHIFT IN DEMAND

A health study raises demand by 20 million

Price	Old qty demanded	New qty demanded	Qty supplied
\$4	80	100	60
\$5	70	90	70
\$6	60	80	80
\$7	50	70	90

Table 2.6 A health study shifts coffee demand right by 20 million lbs.

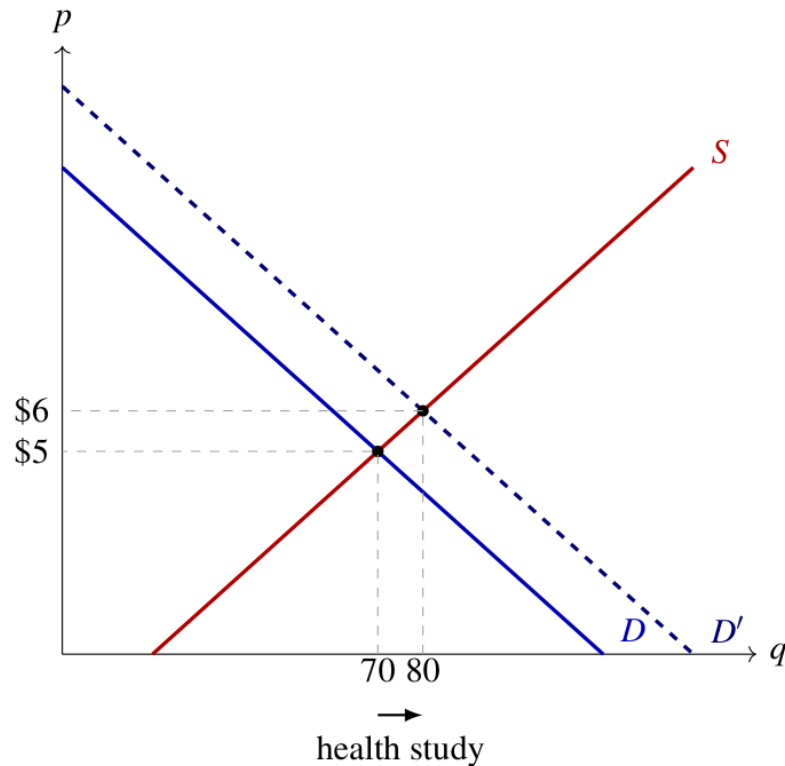
READ THE NEW EQUILIBRIUM

New equilibrium where NEW quantity demanded = quantity supplied: at \$6, both are 80 million.

Price: \$5 → \$6. Quantity: 70 → 80. Both rise, as Table 2.5 predicts.

2.5.1 A WORKED EXAMPLE: A SHIFT IN DEMAND

The health study shifts demand right



\$5 → \$6
equilibrium price rises

70 → 80
equilibrium quantity rises

INTUITIVELY

The favorable news makes coffee more desirable; buyers compete for it and bid the price up, and the higher price brings out the extra coffee they now want.

Figure 2.5 Demand shifts from D to D' , raising both equilibrium price and quantity.

2.5.2 WHEN BOTH CURVES SHIFT AT ONCE

Health study AND frost in the same season

Price	New qty demanded	New qty supplied
\$5	90	50
\$6	80	60
\$7	70	70

Table 2.7 Demand rises by 20 and supply falls by 20, together.

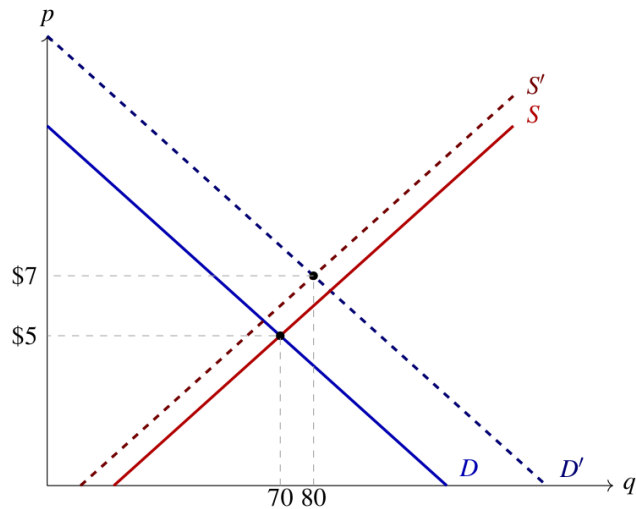
THE OUTCOME

New equilibrium: \$7, with both quantities at 70 million.

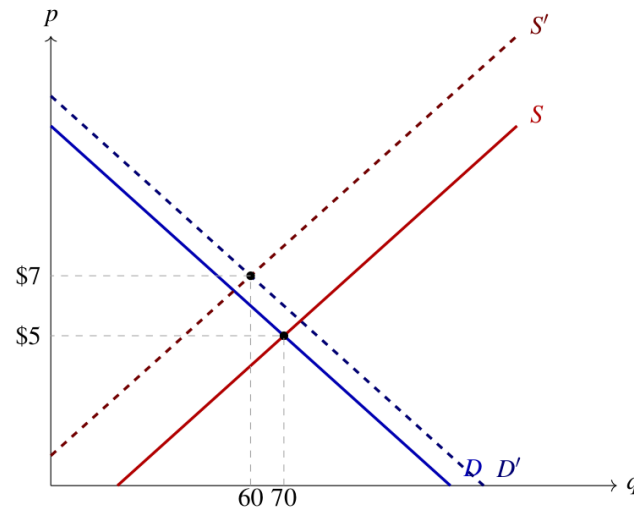
Price rises clearly (\$5 → \$7); quantity is unchanged (70 → 70).

2.5.2 WHEN BOTH CURVES SHIFT AT ONCE

Two dominance cases: which shift is larger?



Case 1: demand shift dominates



Case 2: supply shift dominates



Case 1, demand dominates

Demand
+30, supply
-10. Price
and quantity
both rise:
new
equilibrium
at \$7 and 80
million.



Case 2, supply dominates

Demand
+10, supply
-30. Price
rises but
quantity
falls: new
equilibrium
at \$7 and 60
million.

Figure 2.6 Left: demand shift dominates (quantity rises). Right: supply shift dominates (quantity falls).

2.5.2 WHEN BOTH CURVES SHIFT AT ONCE

Sign what you can; the rest depends on which shift is larger

THE GENERAL LESSON

When demand rises and supply falls, the price **MUST** rise, both forces push it up. The quantity moves in the direction of the dominant shift: up when the demand shift dominates, down when the supply shift dominates.

- In the equal-shift case (Table 2.7), the two forces on quantity exactly cancel and quantity is unchanged.
- Whenever both curves move: sign the change you can, and let the size of each shift decide the direction of the other.

2.5.3 THE SAME MODEL, MANY MARKETS

One model, with the axes relabeled



Rental housing

Price = monthly rent. New residents shift demand right, raising rents until construction catches up.



Labor

Price = the wage. A shortage of nurses bids their wages up.



Foreign currency

Price = the exchange rate.



Crude oil

A war in a producing region shifts supply left and raises the world price, 2020 and 2022.

WHY THE MODEL MATTERS

Master the model once with coffee, and you hold a tool for reading the front page of business newspapers and understanding many economic situations.

2.6

Case Study: Surge Pricing at Uber and Lyft

The model of Section 2.4, operating minute by minute.

2.6 CASE STUDY

Surge pricing is the equilibrium model in real time

- On an ordinary afternoon, riders requesting trips roughly match drivers on the road at the standard fare, the market clears.
- At 12:30 a.m. on New Year's Eve, or the moment a rainstorm begins, requests jump, a sharp rightward shift in demand.
- At the old fare, riders far exceed drivers: a shortage. The app raises the fare, sometimes to two or three times normal.

2.6 CASE STUDY

The higher fare does two things, both predicted



Demand side

Riders who value the trip least, those who could wait, walk, or share, drop out, rationing cars to those who value them most.



Supply side

Driving during the surge is more lucrative, so more drivers come onto the road; quantity supplied rises.

EVIDENCE

Hall, Kendrick & Nosko (2015) studied demand spikes (a sold-out concert, New Year's Eve): letting the fare surge sharply reduced the number of riders who could not get a car and shortened wait times, versus a glitch that held the fare fixed. (Why riders still call it unfair: Section 2.8.)

2.7

Empirical Evidence: The 2021–22 Global Coffee Price Spike

A clean, large-scale example of a supply shift moving a price.

2.7 EMPIRICAL EVIDENCE

A supply contraction, and the price it produced

- Brazil grows ~a third of the world's coffee.
- 2021: its worst drought in nearly a century, then a July frost damaged trees across main regions.
- Both reduced the harvest, a leftward shift in supply, exactly as in Table 2.4.

+44%

ICO composite price, Oct 2020
– Jul 2021 (highest since 2014)

~2×

price of Brazilian Naturals by
Oct 2021

THE MECHANISM

Demand did not surge in 2021, the supply contraction moved the price. The quantity traded fell even as price rose: fewer pounds changed hands.

2.8

A Look into Behavioral and Experimental Economics

- 2.8.1 Fairness and price gouging
- 2.8.2 Do markets actually find the equilibrium?

2.8.1 FAIRNESS AND PRICE GOUGING

Why firms often refuse to raise prices

A FAMOUS SURVEY

Kahneman, Knetsch & Thaler (1986): a hardware store sells snow shovels for \$15; the morning after a storm it raises the price to \$20. Though demand clearly rose, 82% of respondents called the increase “unfair.”

- People hold a norm that sellers should not exploit a sudden hardship, even when the model says the price “should” rise.
- Firms that violate it risk losing customer loyalty; many keep prices fixed in emergencies, and some governments pass price-gouging laws.
- The same tension surrounds surge pricing: efficient, yet often seen as unfair.

2.8.2

A Look at the Experimental Evidence

Do markets actually find the equilibrium?

Testing a bold claim in the laboratory

THE CLAIM

The model claims a market converges to the price where supply meets demand, even though no single trader knows the overall supply or demand curve.



Chamberlin (1948)

Students struck private bilateral deals around a room; prices did NOT settle cleanly on the predicted equilibrium.

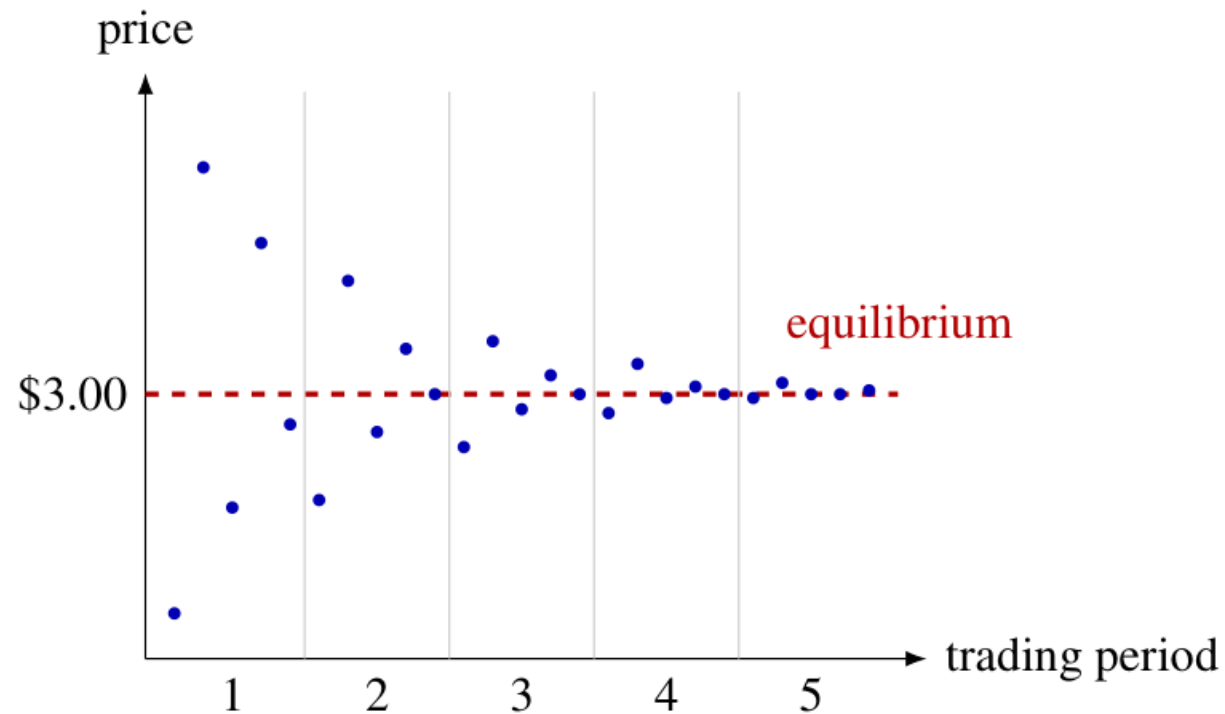


Smith (1962)

Replaced haggling with an oral double auction, open bids and asks, repeated periods. Prices converged rapidly to equilibrium.

2.8.2 EXPERIMENTAL EVIDENCE

Prices converge, period by period



The invisible hand is real. Self-interested traders, each knowing only their own valuation, find the market-clearing price.

How they trade matters. The double auction converged where free-form bargaining did not.

Nobel 2002. Smith's experiments earned the prize.

Figure 2.7 Transaction prices converge to the competitive equilibrium (after Smith, 1962).

Key takeaways

1

Demand & supply

Demand slopes down (law of demand); supply slopes up (law of supply).

2

Along vs. shift

Own price moves us along a curve; everything else shifts it.

3

Equilibrium

Where quantity demanded = quantity supplied; the market clears and self-corrects.

4

Comparative statics

Table 2.5 signs the four single-shift cases; both-shift cases leave one variable ambiguous.

5

Price's two jobs

It rations the good and signals producers, Adam Smith's invisible hand.

6

Evidence

Coffee 2021–22, surge pricing, fairness norms, and Smith's converging double auctions.