MANAGERIAL ECONOMICS · WEEK 3

Equilibrium in competitive markets

How does a competitive market reach and move in and out of equilibrium?

SHORT-RUN EQUILIBRIUM

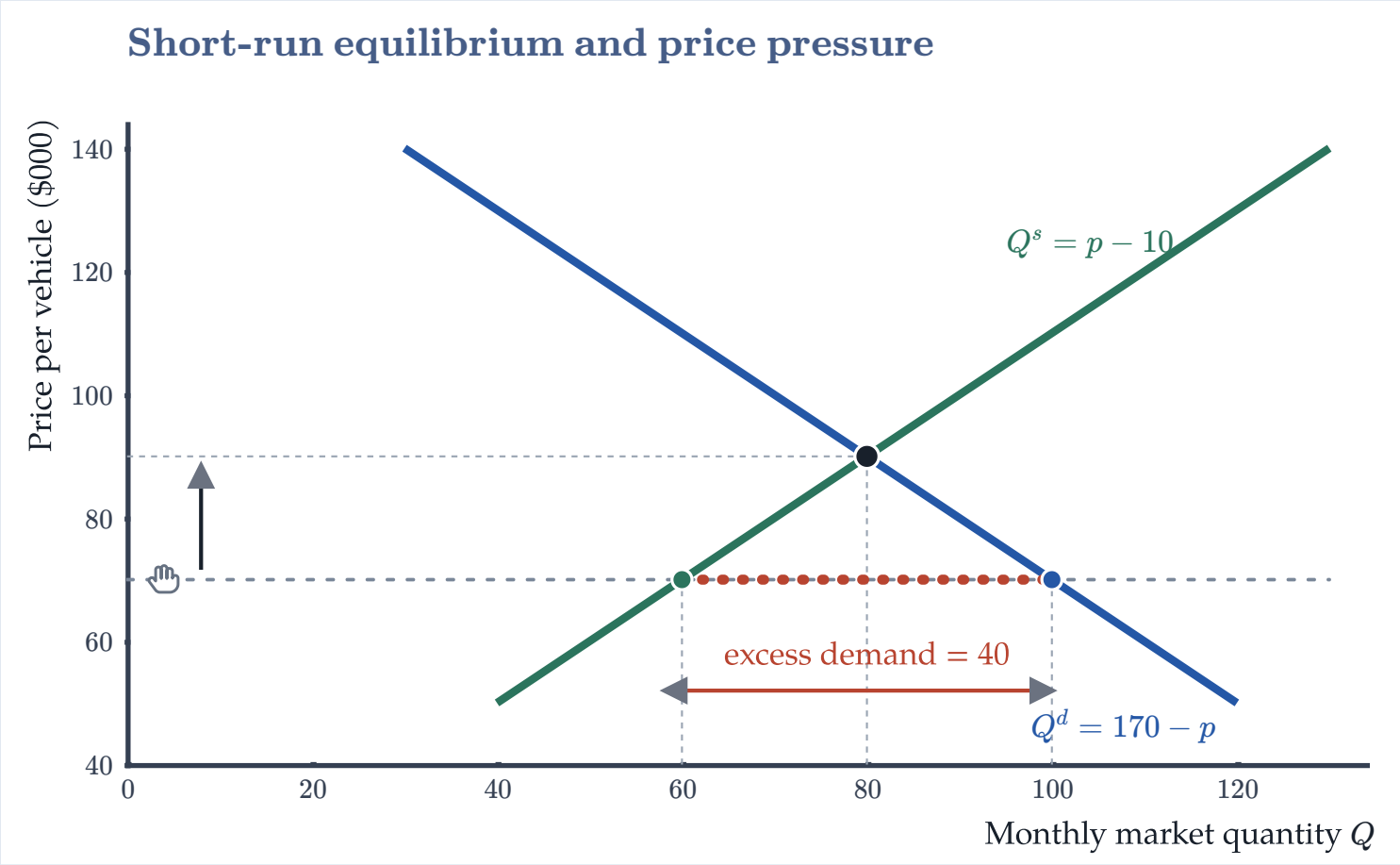
When do the two sides agree?

One market price must coordinate buyers and firms.

DEMAND AND SUPPLY

Market Analysis

The demand-supply analysis sheds light on a market's dynamics based on its fundamentals.



Move the market price

Current market price p 70

At $p = 70$, buyers demand $Q^d = 100$ and firms supply $Q^s = 60$.

There is excess demand of 40. Buyers compete for scarce output, so price is pushed up.

MARKET CLEARING

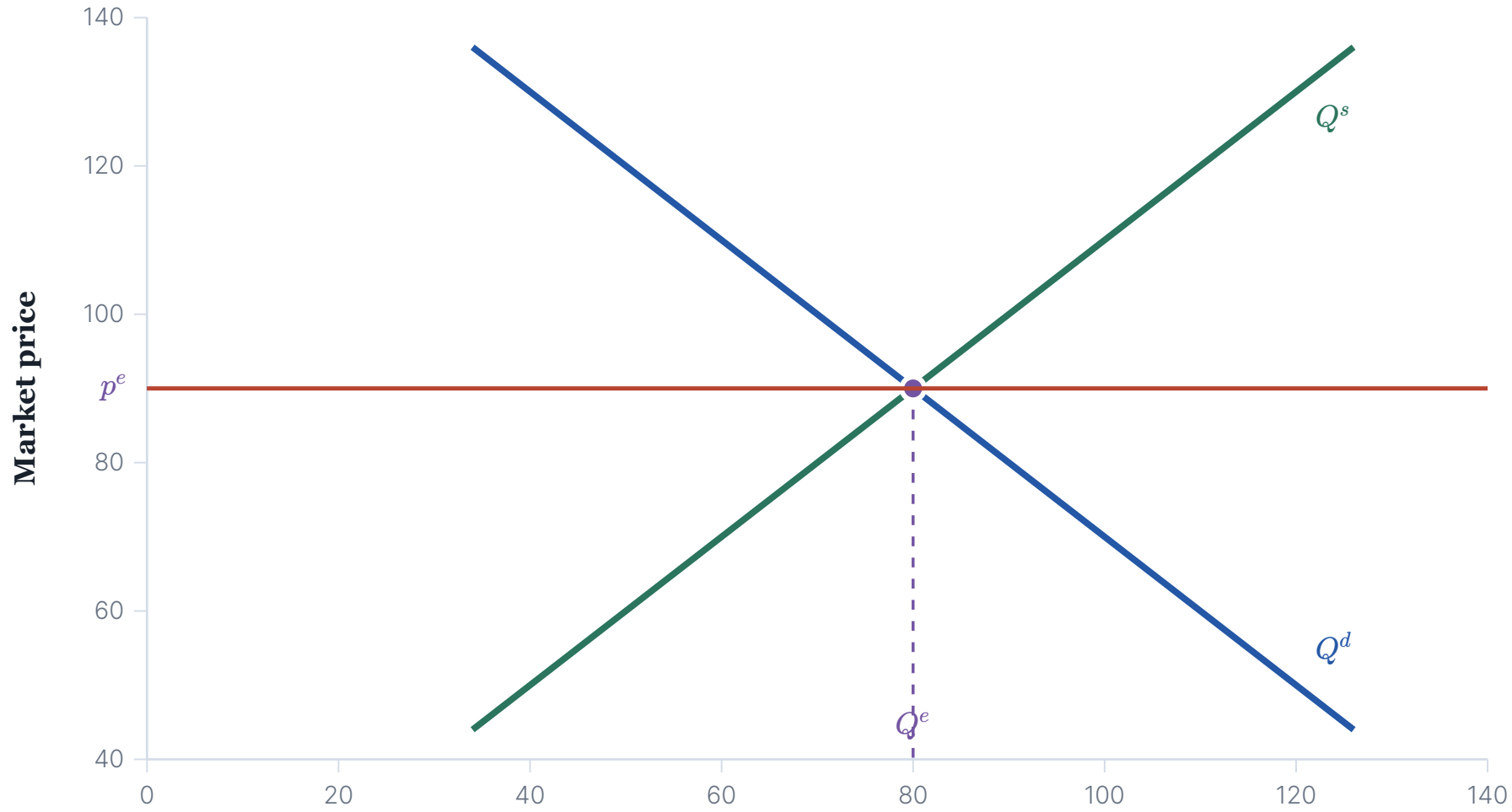
Competitive equilibrium

$$Q^d(p^e) = Q^s(p^e) = Q^e$$

Every buyer and firm chooses optimally at the same price.

Market shocks and adjustments

Press Animate to give price a random shock.



Animate

AUTO ECO MARKET

Continue from Week 2

Ten identical firms

$C(q) = 80 + 10q + 5q^2$

$q^s(p) = (p - 10)/10$ above the threshold

$Q^d(p) = 170 - p$

AGGREGATE SUPPLY

Ten Auto Eco firms

$$Q^s(p) = \begin{cases} 0 & \text{if } p < 50, \\ \{0, 4, \ldots, 40\} & \text{if } p = 50, \\ 10p - 100 & \text{if } p > 50. \end{cases}$$

AUTO ECO MARKET

Short-run equilibrium

$$Q^d(p) = 170 - p$$

$$\begin{aligned} 170 - p &= p - 10 \\ 180 &= 2p \\ p^e &= 90 \\ Q^e &= 80 \end{aligned}$$

AT P = 70

Who cannot carry out their plan?

$Q^d(70) = 100, Q^s(70) = 60$

What changes next?

EXCESS DEMAND

A shortage pushes price up

Buyers compete for scarce output. Quantity demanded falls and quantity supplied rises along fixed curves.

AT P = 110

Who cannot carry out their plan?

$Q^d(110) = 60, Q^s(110) = 100$

What changes next?

EXCESS SUPPLY

Unsold output pushes price down

Sellers compete to clear inventory. Quantity demanded rises and quantity supplied falls along fixed curves.

EQUILIBRIUM

No pressure for price to move

A claim about consistent plans, not fairness or desirability.

ONE FIRM

What does equilibrium imply for Auto Eco?

Market price determines output; average cost determines profit.

FIRM OUTPUT

Use the market price

$$p^e = MC(q)$$

$$90 = 10 + 10q$$

$$q^e = 8$$

FIRM PROFIT

Revenue minus economic cost

$$\begin{aligned}\pi(8) &= 90 \times 8 - [80 + 10 \times 8 + 5 \times 8^2] \\ &= 720 - 480 \\ &= 240\end{aligned}$$

TWO COST MEASURES

Don't confuse output with profit

MARGINAL COST

Determines whether one more unit is worth producing.

$$p^e = MC(q^e)$$

AVERAGE COST

Determines the profit margin on output.

$$\pi^e(q^e) = [p^e - AC(q^e)] \times q^e$$

SHORT-RUN EQUILIBRIUM

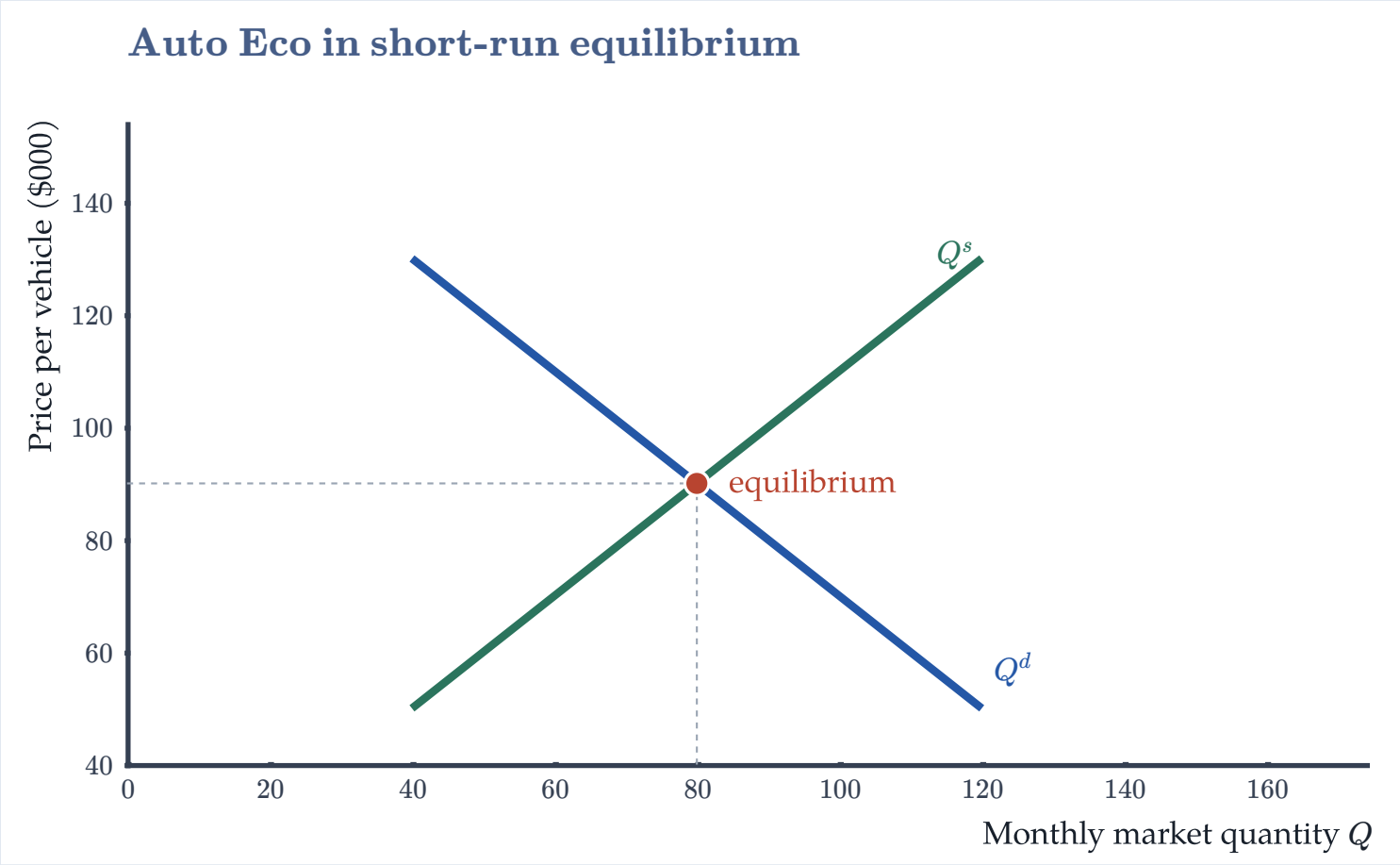
Positive profit can persist

The number of firms is fixed for now.

COMPARATIVE STATICS

When a curve shifts

Compare the old and new equilibria, then explain the pressure between them.



Change in demand and supply

Demand shift 170

Supply shift 10

Moving the demand slider shifts demand to the right. Moving the supply slider shifts supply to the left.

FOUR BASIC CASES

Price and quantity

SHIFT	PRICE	QUANTITY
Demand right	Rises	Rises
Demand left	Falls	Falls
Supply right	Falls	Rises
Supply left	Rises	Falls

Demand shifts move price and quantity together. Supply shifts move them in opposite directions.

BOTH CURVES MOVE

Demand right and supply left

PRICE

Both shifts push in the same direction.

Rises

QUANTITY

The two shifts pull in opposite directions.

Ambiguous

LONG RUN

Entry and exit

The number of firms becomes endogenous.

ENTRY AND EXIT

Firms make entry and exit decisions in the long run

01 An entrant compares profits in this market with its next-best alternative.

02 An incumbent exits the market if it cannot earn economic profit.

03 The number of firms in the market is determined by market dynamics.

LONG-RUN COSTS

All resources can be adjusted

In the long run, firms can adjust all resources. So all options are feasible.

All costs are avoidable.

The difference between long-run and short-run costs equals the unavoidable costs.

IN-CLASS EXERCISE

Apple seller at QVM

An entrepreneur from Red Hill sells apples at QVM.

He buys apples for $10 per case.

He rents a truck for $250 per day. The truck can carry 500 cases.

He hires one worker for $150 per day.

The City of Melbourne charges an annual $13,000 fee for a QVM stand license covering Saturdays. The license is non-refundable and non-transferable.

Once he pays the fee, it becomes unavoidable for a year.

IN-CLASS EXERCISE

Long-run average cost

$$LAC = AC + \frac{\text{unavoidable cost}}{q}$$

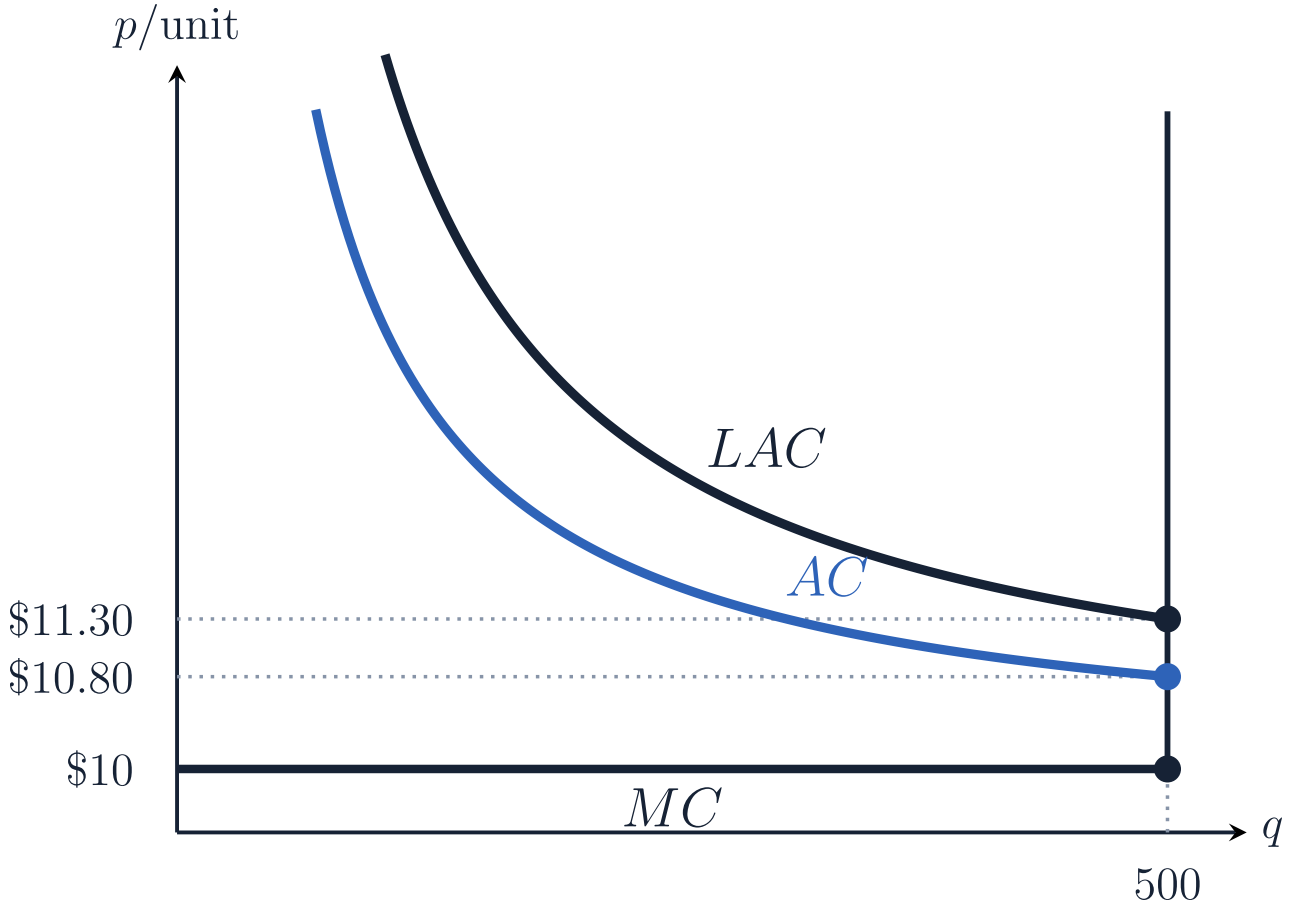
$$LAC(q) = 10 + \frac{650}{q}$$

$$\min LAC = 10 + \frac{650}{500} = \$11.30$$

Average cost rises by $250/q$ at every output level. The annual licence costs $\$13{,}000$, or $\$250$ per weekend over 52 weekends.

IN-CLASS EXERCISE

Short-run and long-run average cost



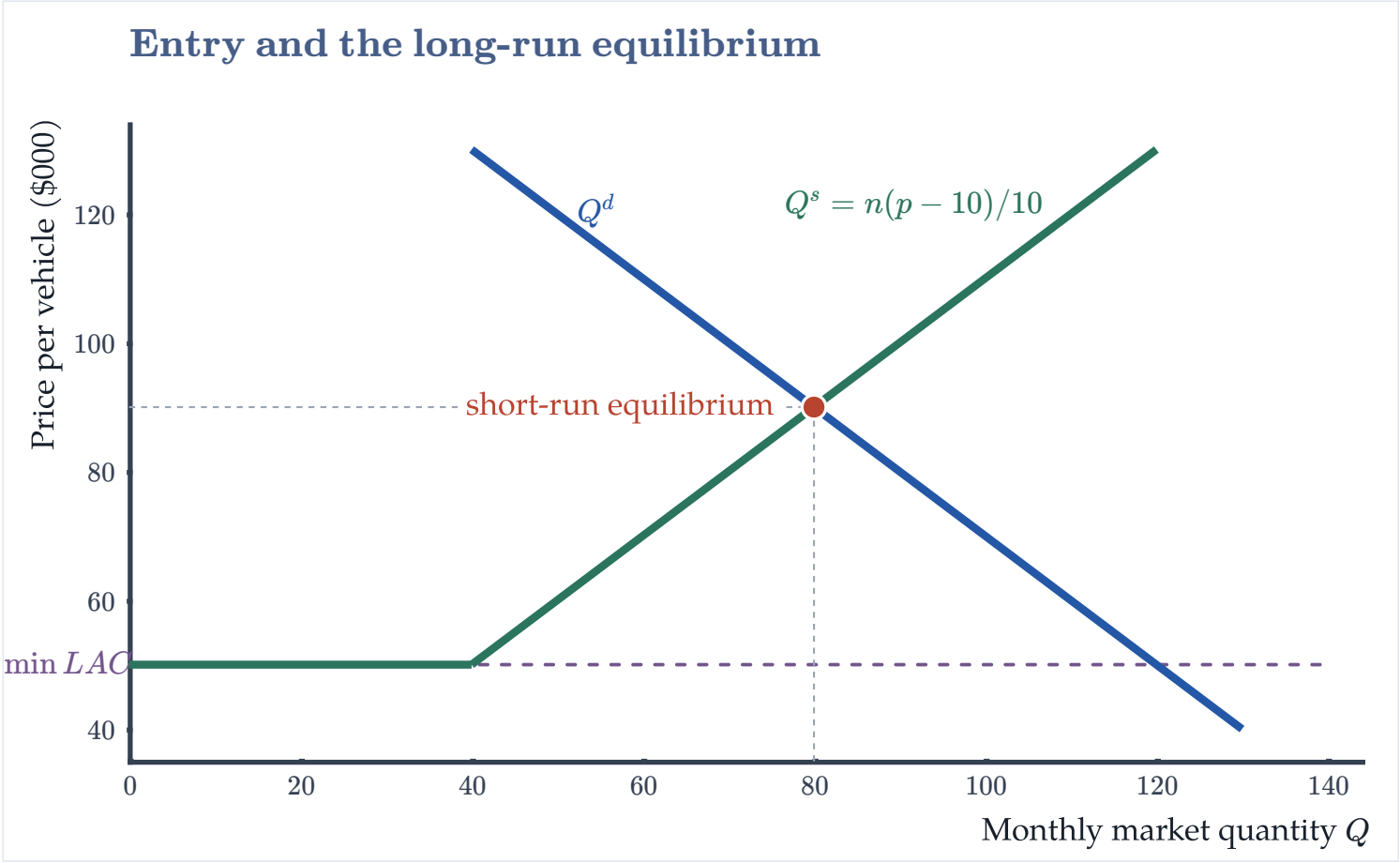
ENTRY AND EXIT

Long-run market equilibrium

The long-run equilibrium determines the market price, the quantity traded and the number of firms in the industry.

The market is in long-run equilibrium if and only if:

1. The equilibrium price p^e adjusts so that $Q^d(p^e) = Q^s(p^e)$.
2. There is no entry or exit in the market.



Let firms enter

Number of active firms n 10

With 10 firms, $p^e = 90$, $Q^e = 80$, and each firm produces $q = 8$.

Each firm earns economic profit of 240. Positive profit attracts entry.

PORTAKAL

When entry is capped

Competitive behavior with a scarce right to produce.

ORANGE FARMING

The island

$Q^d(p) = 3{,}100 - 100p$

$C_i(q) = 100 + q + q^2$

$\min AC_i = 21$ at $q = 10$

At most fifty island farms

ORANGE SUPPLY IN THE ISLAND

Excess demand at the min AC

At $p = \min AC = 21$, market demand is $Q^d(21) = 1{,}000$.

At $p = 21$, each farm produces 10 tonnes.

$Q^s(21) = 10 \times 50 = 500$, which does not meet demand.

EQUILIBRIUM IN THE ISLAND

Restricted market supply

$$Q_i^s(p) = 25p - 25$$

$$3{,}100 - 100p = 25p - 25$$

$$p^e = 25, \quad Q^e = 600$$

ISLAND FARMERS' PROFIT

Positive profits

$$\pi_i = 25 \times 12 - [100 + 12 + 12^2]$$
$$= 44$$

There is no land in the market to enter.

MAINLAND FARMERS

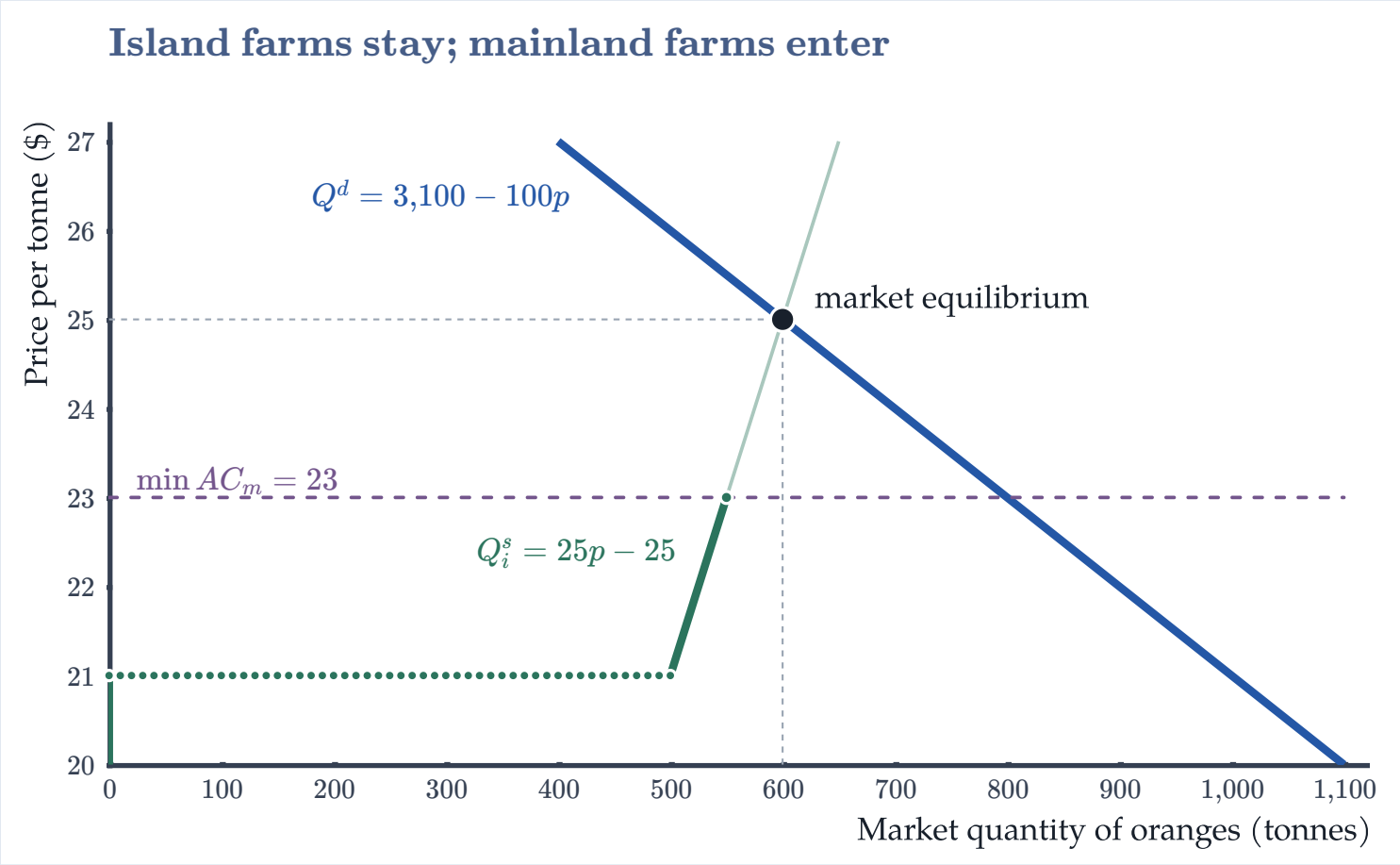
A higher-cost technology

Transportation adds $2 per tonne.

$C_m(q) = 100 + 3q + q^2$

$\min AC_m = 23$ at $q = 10$

A large pool of mainland entrants pins price at 23.



Let mainland farms enter

Mainland farms n_m 0

The 50 island farms are fixed. With no mainland farms, $p^e = 25$ and $Q^e = 600$. A mainland entrant could earn profit, so entry begins.

ONE PRICE, TWO PROFITS

Cost advantage

MAINLAND FARM

The inferior technology enters until profit is zero.

$\pi_M = 0$

ISLAND FARM

The superior technology earns a rent.

$\pi_I = 21$

ASSIGNMENT FOR QUIZ 3

The market for roses

Derive supply and equilibrium, then analyze Valentine’s Day demand and a $20 price ceiling.