MANAGERIAL ECONOMICS · WEEK 4

Monopolistic markets

How does a firm act when it has market power?

MARKET POWER

What does it take to set price?

One seller, no close substitutes, a barrier to entry.

MONOPOLY

Three conditions

01 A single seller.

02 No close substitutes.

03 A barrier that keeps rivals out.

BARRIERS TO ENTRY

How persistent is the position?

BARRIER	EXAMPLES	DURABILITY
Legal	Patents, licenses, exclusive contracts	Strong, but the law can change
Structural	Scarce inputs, natural monopoly	Lasts as long as the cost advantage
Strategic	Excess capacity, threats	Depends on credibility (Week 8)

MARKET POWER

Who has market power?

Any firm that produces a unique product and solely dictates its demand dynamics.

THE KEY DIFFERENCE

Price-taker and price-setter

COMPETITIVE FIRM

Faces a flat demand curve at the market price. Chooses quantity only.

given p

MONOPOLIST

Faces the market demand curve. Chooses a price and quantity pair on it.

$p = p(Q)$

MAIN EXAMPLE

Ride On

Children's rides in a shopping mall

$Q^d(p) = 140 - 40p$ rides per day

$C(Q) = 40 + 0.5Q$

Daily rental 40, cost per ride 0.5

RIDE ON

Inverse demand

$$Q = 140 - 40p$$

$$40p = 140 - Q$$

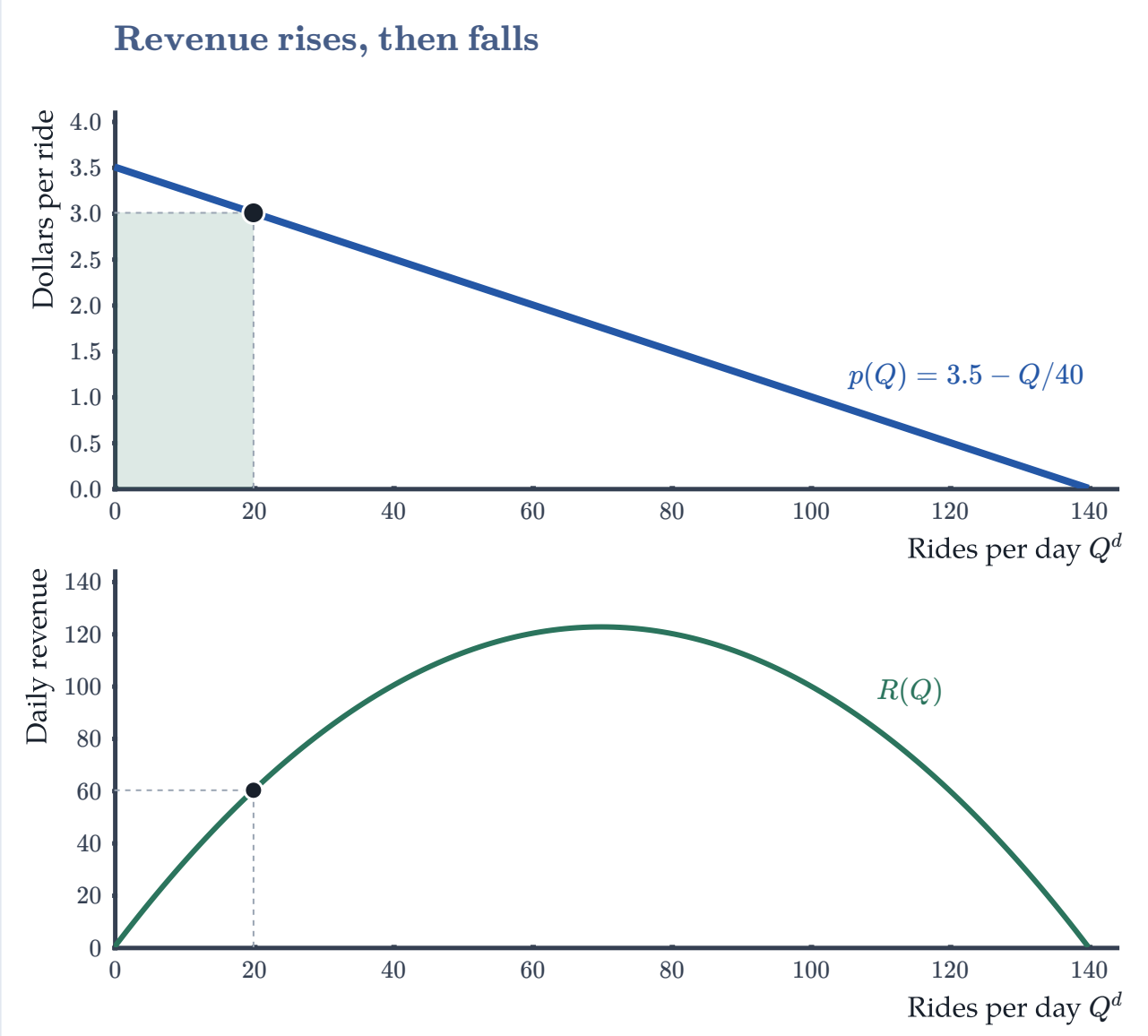
$$p(Q) = 3.5 - \frac{Q}{40}$$

If Ride On wants to sell Q rides, the price must be $p(Q)$.

MARGINAL REVENUE

What does one more sale change?

Selling more means charging less on every unit.



Move along demand

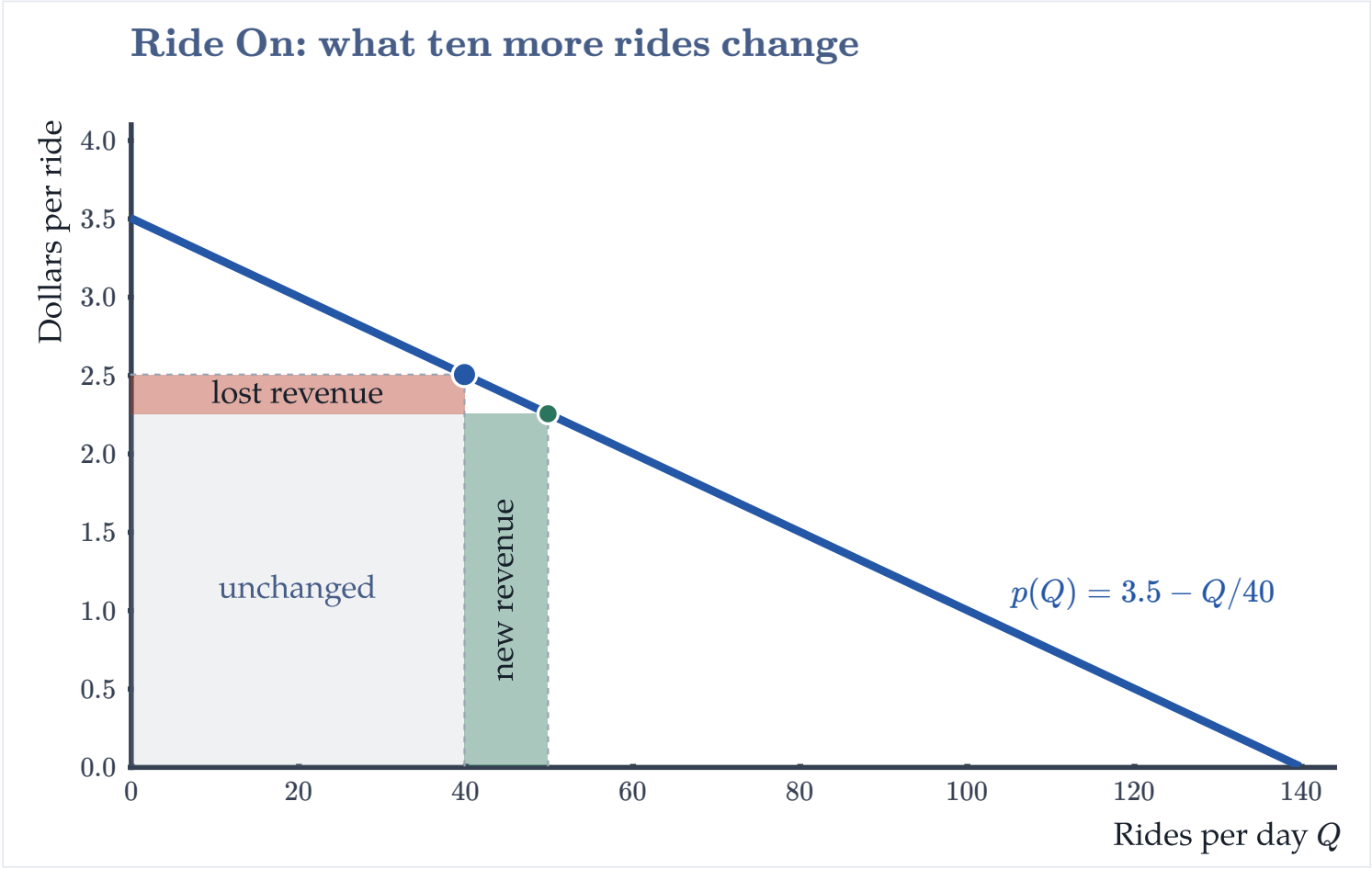
Rides per day Q 20

To sell 20 rides a day, Ride On charges 3 per ride. Revenue is 3 times 20, which is 60.

The shaded rectangle in the top panel is revenue. Its height is the price and its width is the number of rides.

Below 70 rides, selling more raises revenue.

DISSECT THE CHANGE IN REVENUE



Sell ten more rides

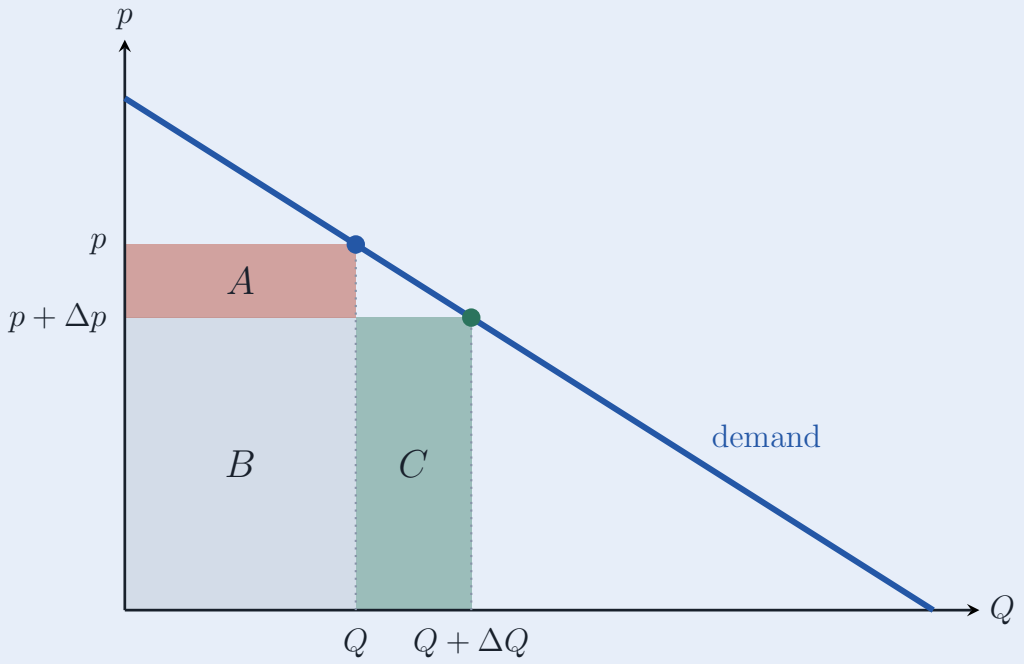
Current rides per day Q 40

To sell 50 rides instead of 40, Ride On must cut the price per ride from 2.50 to 2.25.

New revenue from the ten extra rides: 22.50.
Revenue lost on the 40 rides that would have sold anyway: 10.

Revenue rises by 12.50. Expanding still adds revenue.

FROM Q TO $Q + \Delta Q$ RIDES



MARGINAL REVENUE

New revenue minus lost revenue

$$\Delta R = C - A$$

$$C = (p + \Delta p) \times \Delta Q \quad \text{new revenue}$$

$$A = -\Delta p \times Q \quad \text{lost revenue}$$

$$\begin{aligned}
\frac{\Delta R}{\Delta Q} &= \frac{(p + \Delta p) \times \Delta Q - (-\Delta p \times Q)}{\Delta Q} \\
&= \frac{(p + \Delta p) \times \Delta Q + Q \times \Delta p}{\Delta Q} \\
&= p + \Delta p + Q \times \frac{\Delta p}{\Delta Q}
\end{aligned}$$

When revenue is continuous

Changes can be infinitesimally small: dQ and dp.

When $dQ \searrow 0$, $dp \searrow 0$

$$MR(Q) = p(Q) + Q \times \frac{dp}{dQ}$$

$p(Q)$: the price at which the extra unit sells

$Q \times dp/dQ$: the discount on the units that were already selling

LINEAR DEMAND

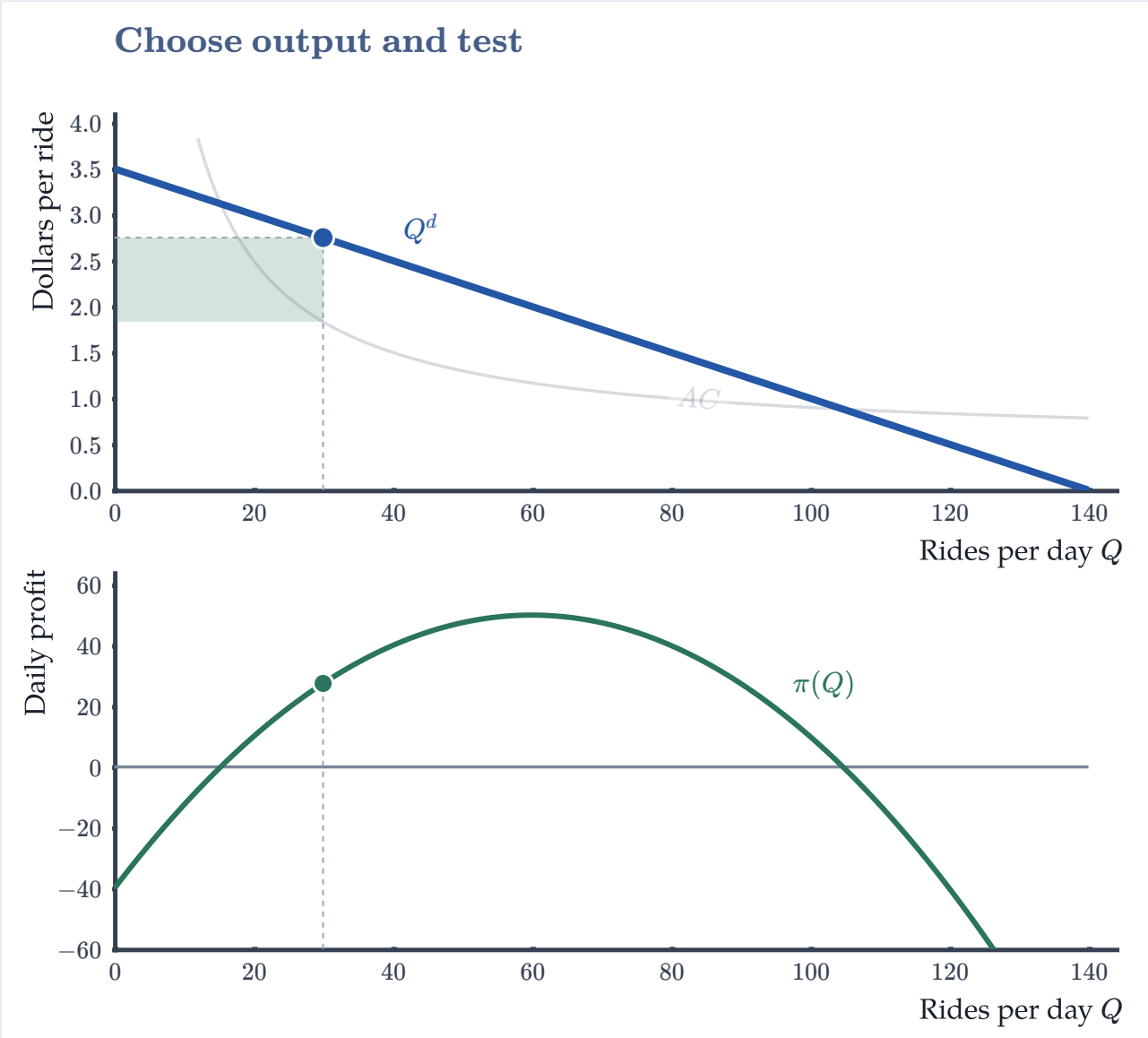
Same intercept, twice the slope

$$p(Q) = a - bQ$$

$$MR(Q) = a - 2bQ$$

$$MR(Q) = 3.5 - \frac{Q}{20}$$

Ride On: $MR = 0$ at 70 rides, halfway to 140.



Choose output, then read the price

Show MR and MC

Rides per day Q 30

To sell 30 rides a day, Ride On charges 2.75 per ride. Average cost is 1.83 and daily profit is 27.50.

Find the number of rides that makes profit as large as possible. Then turn on MR and MC.

MARGINAL COMPARISON

Should Ride On run one more ride?

01 $MR > MC$: expand.

02 $MR < MC$: contract.

03 $MR = MC$: profit is at its peak.

The monopoly solution

$$3.5 - \frac{Q}{20} = 0.5$$

$$Q^m = 60$$

$$p^m = 3.5 - \frac{60}{40} = 2$$

$$\pi = 2 \times 60 - (40 + 0.5 \times 60)$$

$$= 50$$

CHECK THE NEIGHBORS

Profit peaks at 60 rides

RIDES	PRICE	REVENUE	COST	PROFIT
40	2.50	100.00	60.00	40.00
50	2.25	112.50	65.00	47.50
60	2.00	120.00	70.00	50.00
70	1.75	122.50	75.00	47.50
80	1.50	120.00	80.00	40.00

Revenue peaks at 70 rides, profit at 60. Maximizing revenue isn't maximizing profit.

TWO THINGS THE ANSWER SAYS

Above cost, below the maximum

PRICE ABOVE MARGINAL COST

Since $MR < p$ and $MR = MC$.

$2 > 0.5$

NOT THE HIGHEST PRICE

At $3, Ride On sells 20 rides and earns 10.

$\pi(20) = 10 < 50$

THE MALL RAISES THE RENTAL

Rent rises from $40 to $60

Demand and the cost per ride don't change.

What happens to Ride On's price?

FIXED COSTS

The price stays at $2

A cost that doesn't vary with output affects whether the firm operates, not how much it sells.

MARGINAL COST RISES

A ride now costs $1 to run

$$3.5 - \frac{Q}{20} = 1$$

$$Q^m = 50$$

$$p^m = 2.25$$

Marginal cost rose by 50 cents; the price rose by 25 cents.

IN-CLASS EXERCISE

Fenway hotdogs

$Q^d(p) = 55{,}000 - 10{,}000p$ per game

$MC = 1.50$, fixed cost 500

Find price, output and profit

Then: only 10,000 hotdogs; a $3 price cap

WELFARE

What does monopoly cost?

Separate the transfer from the loss.

SURPLUS AT MARKET SCALE

Consumer and producer surplus

CONSUMER SURPLUS

Below demand, above the price.

$$\sum(WTP - p)$$

PRODUCER SURPLUS

Above marginal cost, below the price.

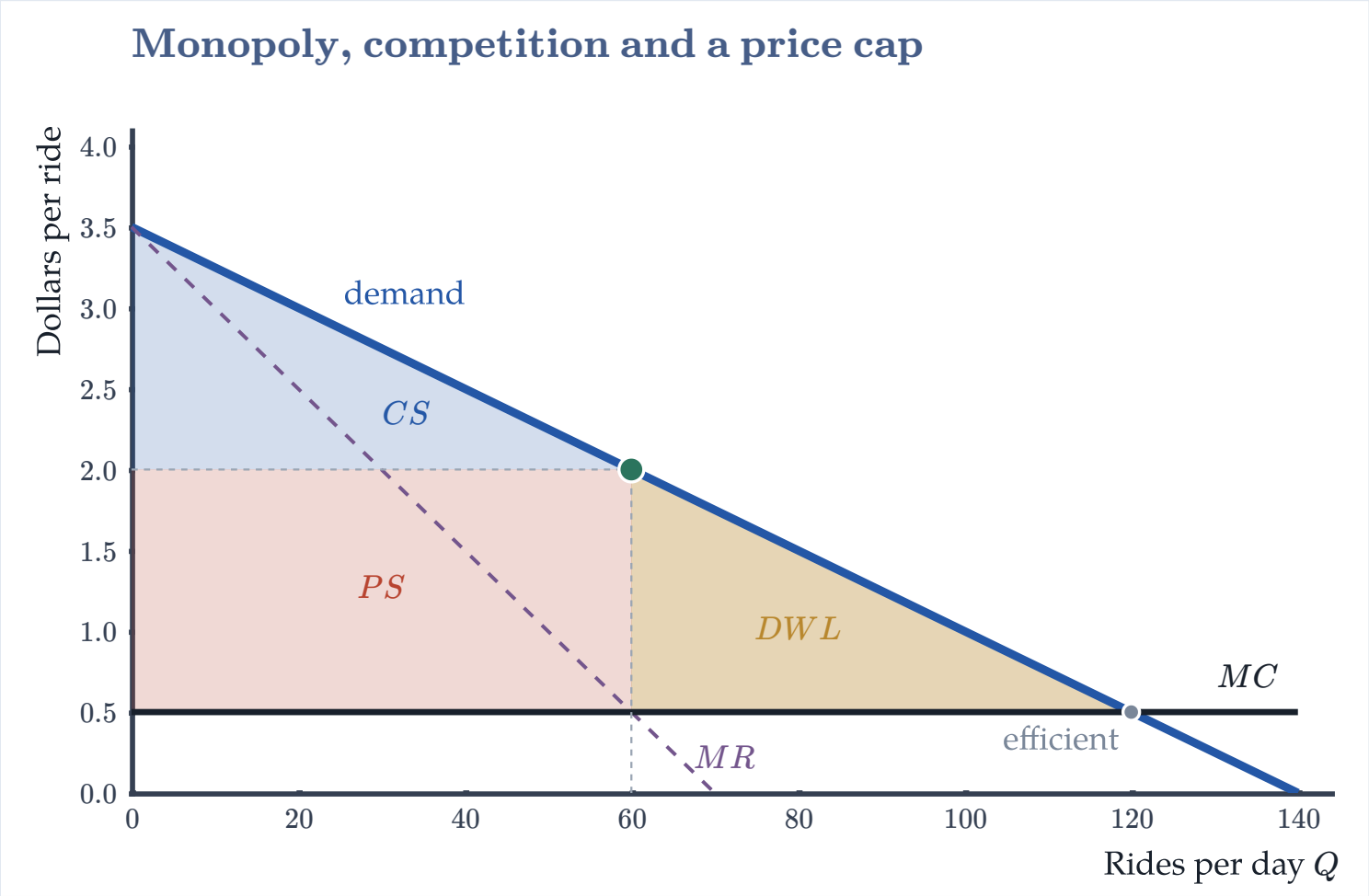
$$PS = \pi + \text{fixed cost}$$

RIDE ON

Monopoly against the efficient outcome

	MONOPOLY	EFFICIENT
Price	2.00	0.50
Rides	60	120
Consumer surplus	45	180
Producer surplus	90	0
Total surplus	135	180

Consumers lose 135. Ride On gains 90. The remaining 45 is deadweight loss.



Lower the price cap

Price cap per ride (3.50 means no cap) 3.50

Ride On sells 60 rides at 2 each.

Consumer surplus 45
Producer surplus 90
Deadweight loss 45
Total surplus 135

With no binding cap, Ride On sets $MR = MC$: 60 rides at 2.

DEADWEIGHT LOSS

The loss is not the profit

Profit is a transfer from buyers. Deadweight loss is the value of trades that never happen.

PRICE CONTROLS

Same policy, opposite effect

COMPETITIVE ROSES (WEEK 3)

A ceiling below equilibrium creates a shortage.

Fewer roses sold

MONOPOLY RIDES

A cap above marginal cost removes the reason to restrict output.

More rides sold

PATENTS

A monopoly created on purpose

COST

Deadweight loss while the patent lasts.

Easy to measure

BENEFIT

Inventions that would not otherwise exist, and disclosure.

Hard to measure

ELASTICITY

How large is the monopoly markup?

Can we estimate it without the whole demand curve?

PRICE ELASTICITY OF DEMAND

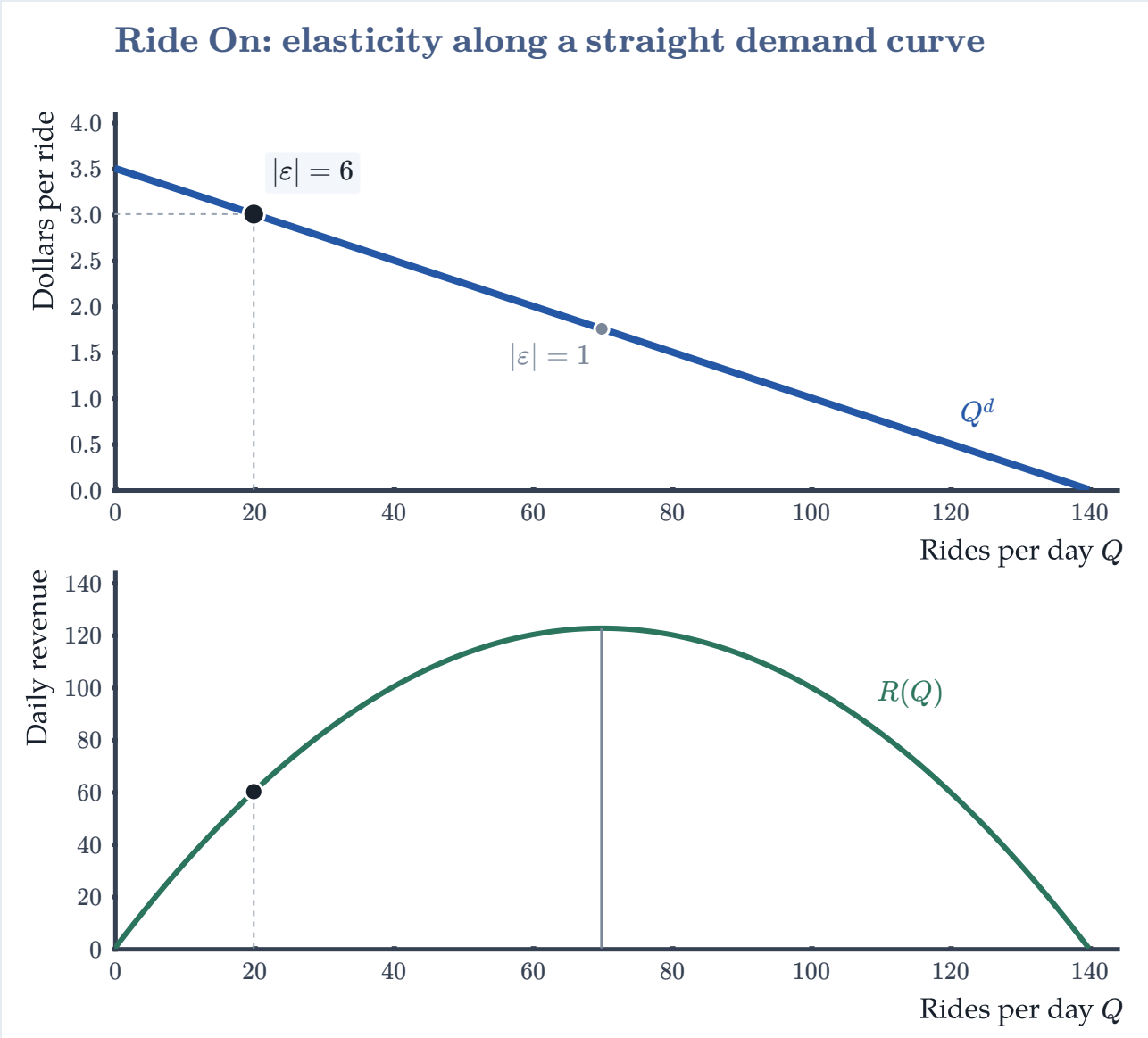
A measure that doesn't depend on units

$$\varepsilon = \frac{dQ}{dp} \times \frac{p}{Q}$$

Elastic: $|\varepsilon| > 1$

Unitary elastic: $|\varepsilon| = 1$

Inelastic: $|\varepsilon| < 1$



Move along demand

Rides per day Q 20

At 20 rides and a price of 3, elasticity is $\varepsilon = -40 \times 3/20 = -6$.

Demand is elastic here. A price cut raises revenue.

The slope of demand never changes. Elasticity does, because the ratio p/Q falls as you move down the line.

MARGINAL REVENUE AND ELASTICITY

The markup rule

$$MR = p\left(1 + \frac{1}{\varepsilon}\right)$$

$$\frac{p - MC}{p} = -\frac{1}{\varepsilon}$$

Ride On: $\varepsilon = -\frac{4}{3}$**, so** $(2 - 0.5)/2 = \frac{3}{4}$**.**

A DIAGNOSTIC

Never on the inelastic part of demand

If demand is inelastic, a price rise raises revenue and lowers cost.

IN-CLASS EXERCISE

U-Strap

At $p = 1{,}200$, $\varepsilon = -4$ and $MC = 1{,}000$.

Produce more or less?

ASSIGNMENT FOR QUIZ 4

Carnegie Hall

Choose a concert hall and a ticket price, then evaluate a new contract.