CHARTA LEARNING · LESSON NOTES

Market structures and how firms set price and output

CFA Level I · Economics

You will learn: Contrast perfect competition, monopoly, oligopoly and monopolistic competition, find a monopolist's output with MR = MC, measure concentration with the n-firm ratio and the Herfindahl-Hirschman index (HHI), and decide when a firm breaks even and when it should shut down.

Running example: Examples use made-up figures: a monopolist with demand P = 70 − Q and marginal cost $10; a market of seven firms with shares 30, 25, 15, 10, 8, 7 and 5 (%); and a firm making 5,000 units with fixed cost $20,000 and variable cost $4 a unit.

1. Market structure and perfect competition

- Market structure is how much power sellers have over price. Sort markets by three questions: how many sellers, is the product identical or differentiated, how hard is entry.
- Perfect competition: very many sellers, identical product, free entry, no pricing power. Monopolistic competition: many sellers, differentiated products, free entry, small power. Oligopoly: a few sellers, hard entry, each must watch rivals. Monopoly: one seller, no close substitute, blocked entry, large power.
- A perfectly competitive firm is a price taker: marginal revenue (extra revenue from one more unit) equals price, so it produces where P = MC. In the long run economic profit (profit after paying owners a fair return) is competed away to zero, which is not zero accounting profit.

2. Monopoly: choose MR = MC, then read the price

- A monopoly is protected by a patent, licence, control of a key input, or scale costs so high that one firm serves the market more cheaply than two. It faces the whole market demand curve.
- To sell more it must cut the price on every unit, so marginal revenue is below price. Sell 1 at $9, or 2 at $8 each: revenue goes from 9 to 16, so the extra unit brings only $7.
- Every firm produces where marginal revenue equals marginal cost: if MR is bigger, one more unit adds to profit; if MC is bigger, stop. Then read the price from demand at that output. The monopolist does not charge MR; its price is higher.
- Competition ends where price equals marginal cost: lower price, bigger quantity. The gap is what monopoly costs buyers (deadweight loss, lost trade nobody gets).

Produce where MR = MC, then read the price from demand

EXAMPLE 1: DEMAND P = 70 − Q, MARGINAL COST $10 (MR = 70 − 2Q)

Set MR = MC	70 − 2Q = 10	**Q = 30**
Price from demand	70 − 30	**$40**
Monopoly profit	30 × (40 − 10)	**$900**
Competition: P = MC	70 − Q = 10	**Q = 60, P = $10**
Deadweight loss	0.5 × 30 × 30	**$450**

Watch out: Charging marginal revenue instead of reading the higher price off demand.

3. Oligopoly and monopolistic competition

- Oligopoly: a few large firms, high barriers to entry, interdependence (my best move depends on yours). Fierce competition gives a near-competitive result; cooperation, a near-monopoly one.
- Models: kinked demand (rivals match cuts but not rises, so prices stay put); Cournot (each picks output assuming the rival's is fixed; Nash equilibrium: nobody gains by changing alone); Stackelberg (a leader moves first); dominant firm (one large firm sets the price).
- Cartel: each firm's best move is to cheat, the prisoner's dilemma, so the cartel tends to collapse.
- Monopolistic competition: many sellers, free entry, differentiated products. Each firm sets MR = MC, prices above MC, and may profit in the short run. Entry shifts demand left and makes it more elastic until price equals average total cost.
- Long run: zero economic profit, price still above MC, and excess capacity (output below efficient scale). Variety is the benefit.

EXAMPLES 2 TO 4

Cournot, two firms, P = 70 − total output	q = (60 − q) ÷ 2	**20 each, total 40, price $30, profit 20 × 20 = $400 each**
Cartel quota 15 each at $40	15 × 30	**$450 each**
One cheats (22.5 units) / both cheat	price falls to 32.50	**$506 and $338 / $400 each**
Monopolistic competition, short run	(14 − 11) × 100	**$300**
Long run: price = ATC = $12, 80 units	(12 − 12) × 80	**$0 (efficient scale 120)**

4. Measuring concentration

- Market share = a firm's sales ÷ total market sales. Two tools turn shares into one number. Both use shares only and ignore barriers to entry, so a high share is not pricing power if entry is easy.
- The n-firm concentration ratio adds the shares of the n largest firms, taken in order of size. It is not an average and you must say which n. Its weakness: it ignores how shares are spread within the top group.
- The HHI squares every firm's share in whole percentage points (30, not 0.30) and adds the squares. From near 0 (many tiny firms) up to 10,000 (monopoly). Big shares count far more than small ones.
- Merger shortcut: the HHI rises by 2 × the product of the two merging shares.

> **CRn = $s_1 + s_2 + \ldots + s_n$ (n largest). HHI = $s_1^2 + s_2^2 + \ldots + sN^2$ (every firm, shares in % points)**

EXAMPLES 5 TO 7: SEVEN FIRMS (30, 25, 15, 10, 8, 7, 5)

Two-, three-, four-firm ratio	30 + 25; + 15; + 10	**55%, 70%, 80%**
HHI	900 + 625 + 225 + 100 + 64 + 49 + 25	**1,988**
15% firm buys the 10% firm	rise = 2 × 15 × 10	**+300, HHI 2,288**
A: four at 25%; B: 40, 30, 20, 10	4 × 625; 1,600 + 900 + 400 + 100	**2,500; 3,000 (both CR4 100%)**
100 firms at 1%; monopoly		**100; 10,000**

Watch out: Adding every firm in the ratio, stopping after squaring a few shares, or using 0.30 instead of 30.

5. Break-even and shut-down

- Fixed cost is owed whether or not you produce; variable cost rises with each unit. ATC = total cost ÷ units; AVC = variable cost ÷ units. ATC is above AVC and bottoms out further right.
- Break-even: profit is zero, total revenue equals total cost, per unit P = ATC (all costs, fixed included, must be covered). The lowest point of ATC is the break-even price; the lowest point of AVC is the shut-down price.
- Short run: shut down if P < AVC; the fixed cost is owed either way. Between AVC and ATC the firm loses money but keeps producing, because it loses less than by closing. Long run: every cost can be avoided, so exit if P < ATC.
- Decision by price: above ATC profit; equal to ATC break even; between AVC and ATC loss, keep going; below AVC shut down. For a price taker, the rising part of MC above AVC is the supply curve.

Profit = (P − ATC) × Q. Break-even: P = ATC. Short-run shut-down: P < AVC

EXAMPLES 8 TO 10: 5,000 UNITS, FIXED COST $20,000, VARIABLE COST $4 A UNIT

Average total cost = break-even price	(20,000 + 4 × 5,000) ÷ 5,000	**$8.00**
Profit at P = $10	(10 − 8) × 5,000	**$10,000**
P = $6: loss if operates	revenue 30,000 − variable 20,000 = 10,000; 10,000 − 20,000	**−$10,000 (shut down: −$20,000): keep producing**
P = $3.50: loss if operates	17,500 − 40,000	**−$22,500**
Loss if it shuts down	fixed cost only	**−$20,000: shut down, saves $2,500**

Watch out: Shutting down because of a loss: in the short run compare P with AVC, not ATC.

Key takeaways

- Market structure is power over price: none in perfect competition, small in monopolistic competition, strategic in oligopoly, large in monopoly.
- Every firm produces where MR = MC; the monopolist then reads a higher price off demand.
- Oligopoly firms are interdependent; cartels tend to collapse because each firm's best move is to cheat.
- Monopolistic competition ends with zero economic profit, price above MC and excess capacity.
- CRn adds only the top n shares; HHI squares every share in whole points; neither sees entry barriers.
- Break-even is P = ATC; shut down in the short run only if P < AVC, exit in the long run if P < ATC.

Quick check

1. Shares are 50%, 30% and 20%. Find the four-firm ratio and the HHI.
   Answer: Ratio 100%; HHI = 2,500 + 900 + 400 = 3,800.
2. A monopolist's MR is $18 and MC is $12 at its output. More or less?
   Answer: More: the next unit adds more revenue than cost.
3. P = $5, ATC = $7, AVC = $4. What should the firm do, short run?
   Answer: Keep producing: price covers AVC, so the loss is less than the fixed cost.