Elements of Microeconomics: TA Session

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Mid-term 2

Pick up your exams at the front; they're arranged into four piles in alphabetic order of last names: A-F, G-M, N-S, T-Z

Mid-term 2, Q2b

Drew is taking Introduction to Robotic science and decided to drop the course after the second week. Drew paid $200 for the course's textbook, which can be resold for $70 on dontlikethecourse.com. What is Drew's sunk cost for the textbook and why.

Mid-term 2, Q2b

Drew is taking Introduction to Robotic science and decided to drop the course after the second week. Drew paid $200 for the course's textbook, which can be resold for $70 on dontlikethecourse.com. What is Drew's sunk cost for the textbook and why.

Answer: Drew's sunk cost is $130. A sunk cost is a cost that has already been committed and cannot be recovered. Drew has already committed $200 but is able to recover $70 back. Therefore, the remaining $130 is the amount that cannot be recovered.

Mid-term 2, Q3b

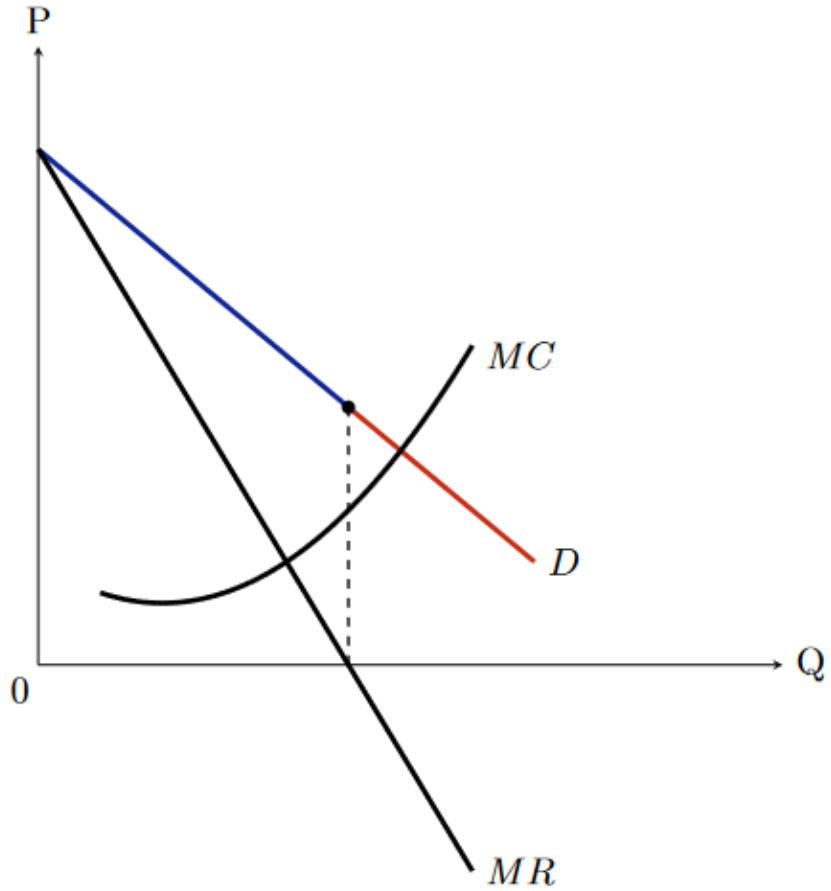
Why does a monopolist never operate on the inelastic portion of the demand curve?

Mid-term 2, Q3b

Why does a monopolist never operate on the inelastic portion of the demand curve?

Answer: In the inelastic region of the demand curve, total revenue falls as quantity rises. Therefore, $MR < 0$ in this region. The monopolist chooses profit-maximizing quantity of production such that $MR = MC$. But MC is always greater than 0, it cannot be that $MR = MC$ in the inelastic region.

Mid-term 2, Q3b



The red part of the demand curve is the inelastic region.

Characteristics of monopolistic competition

Three characteristics of monopolistic competition:

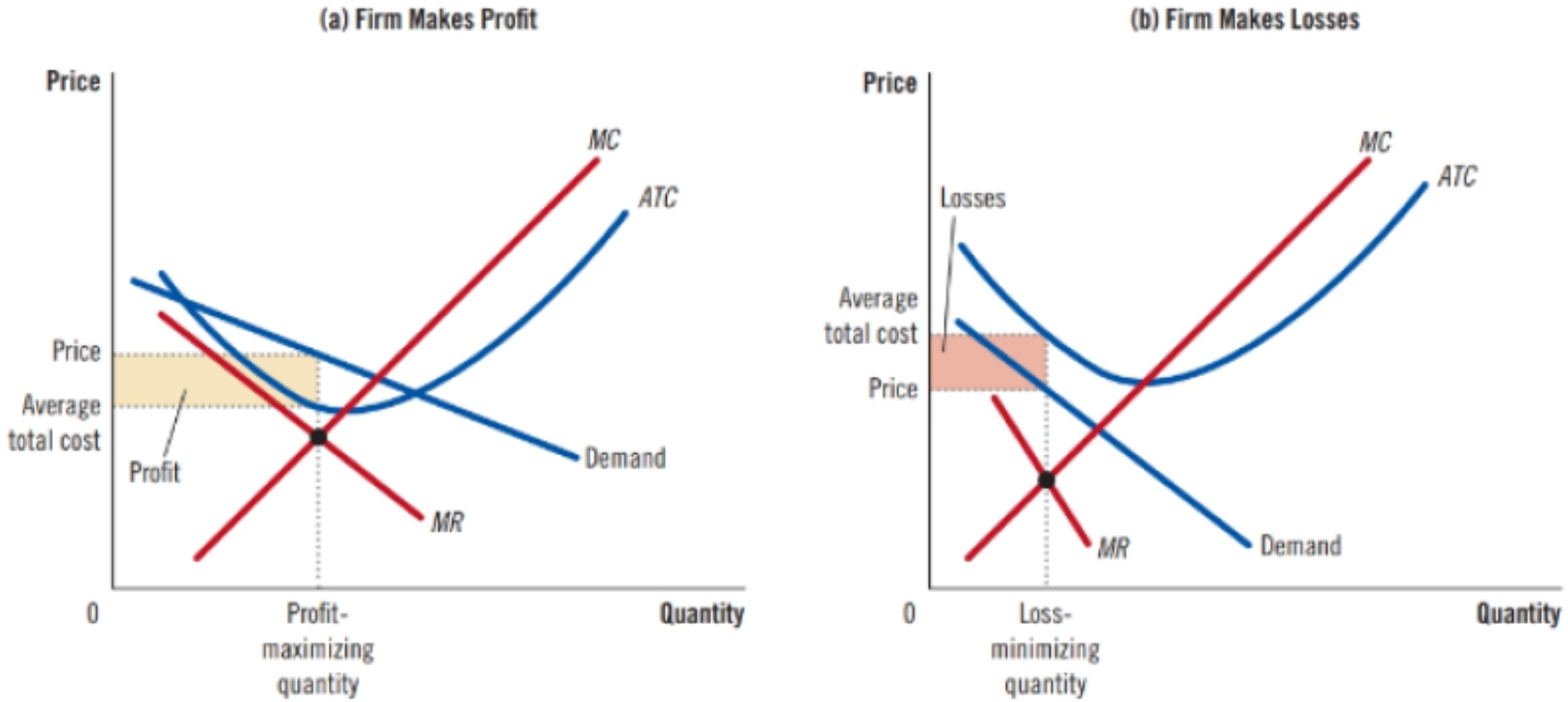
1. Many sellers
2. Product differentiation
3. Free entry and exit

Example: books, video games, restaurants...

Monopolistic competition in the short run

Like monopoly, a monopolisitically competitive firm has a downward-sloping demand curve

- $\Longrightarrow MR < D$



Monopolistic competition in the long run

If firm makes positive profit in the short run, then:

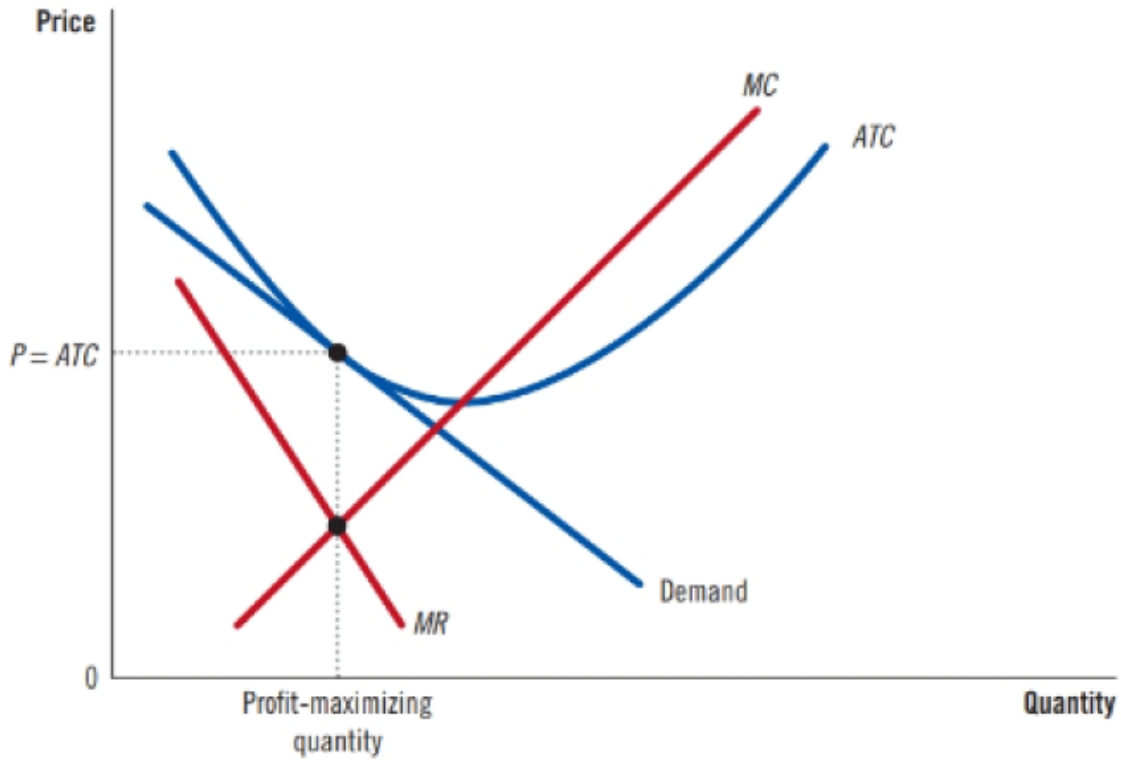
- More firms enter the market
- $\Longrightarrow$ number of products in the market increases
- $\Longrightarrow$ Some existing customers turn to new firms
  - This could be because the products are substitutes
- $\Longrightarrow$ Existing firm's demand curve shifts to the left
- $\Longrightarrow$ Existing firm's MR curve shifts to the left
- $\Longrightarrow$ Existing firm's profit decrease

Notice that the cost curves do not change

Monopolistic competition in equilibrium

If firms make positive profit, more firms will enter; if firms make negative profit, existing firms will exit

In equilibrium, all firms in monopolistic competition make zero profit!



Monopolistic competition in equilibrium

Two characteristics of monopolistic competition in equilibrium:

1. **Excess capacity:** Firms are producing on the decreasing portion of the ATC curve, below the efficient scale
2. **Markup over MC:** $P > MC$ because monopolistically competitive firms have some market power

Free entry and zero profit

Comparing perfect competition and monopolistic competition, we see that it is the free entry and exit of firms that makes firms earn zero profit

But the mechanism behind zero profit is different

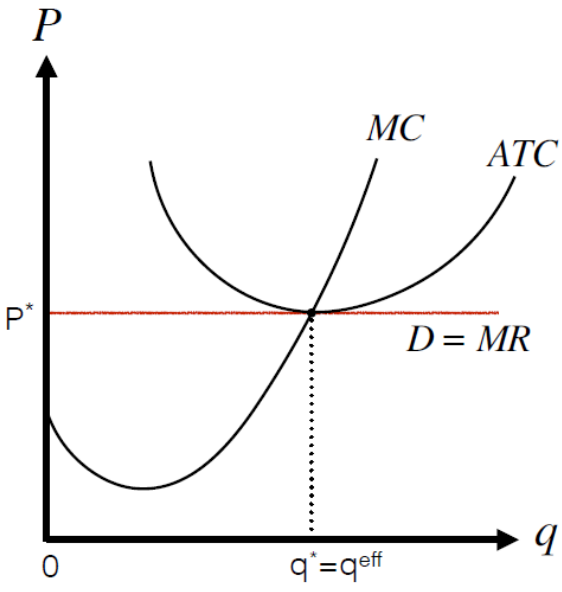
Under perfect competition, when firms make positive profit:

- $\Longrightarrow$ more firms enter the market $\Longrightarrow$ market supply shifts to the right $\Longrightarrow$ price falls
- $\Longrightarrow$ Profit falls $\Longrightarrow$ zero profit in the long run

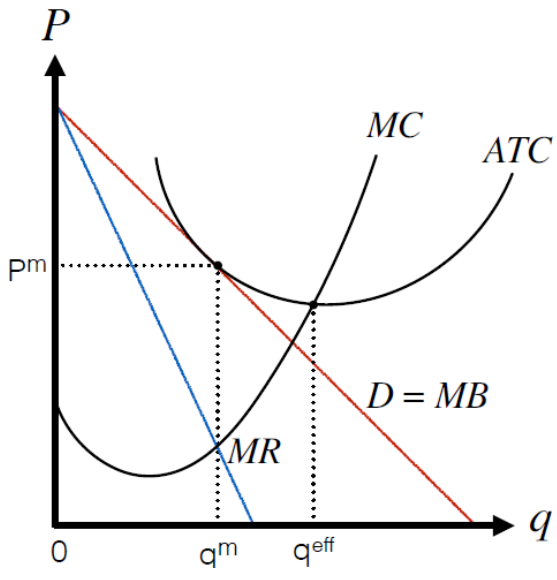
Under monopolistic competition, when firms make positive profit:

- $\Longrightarrow$ more firms enter the market $\Longrightarrow$ firm demand shifts to the left $\Longrightarrow$ MR shifts to the left
- $\Longrightarrow$ Profit falls $\Longrightarrow$ zero profit in the long run

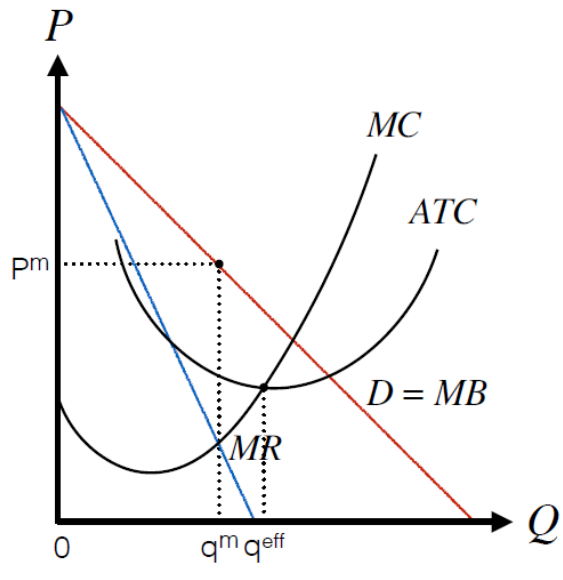
Comparison



Perfect competition



Monopolistic competition



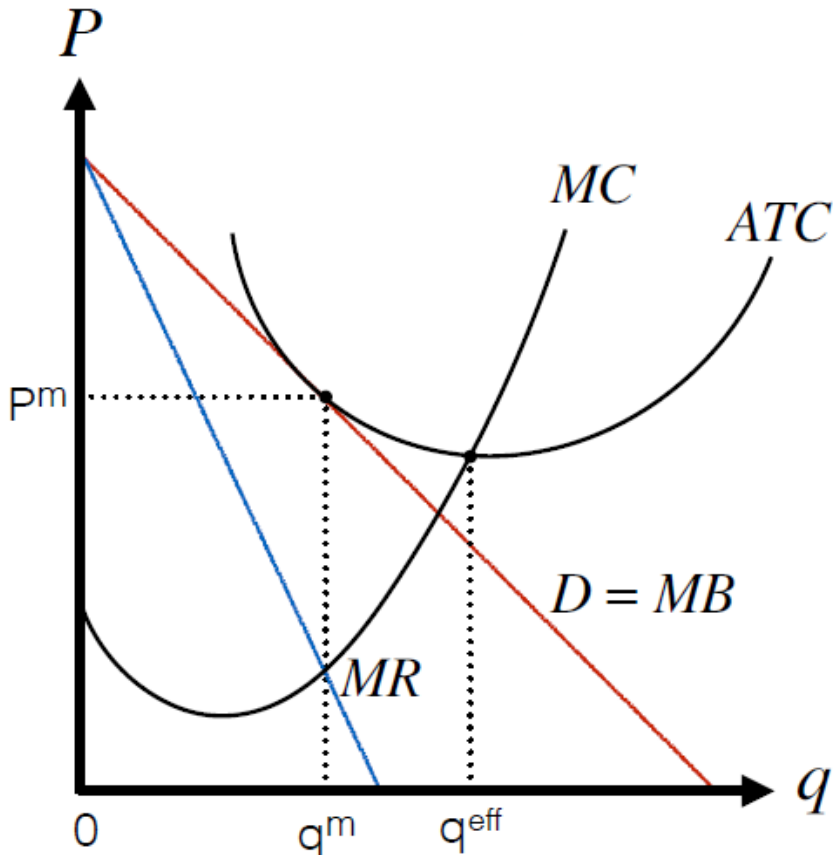
Monopoly

Comparison

	Perf. Competition	Mono. competition	Monopoly
Price taker or maker?	Price taker	Price maker	Price maker
Markup	No markup $P = MR = MC$	Markup $P > MR = MC$	Markup $P > MR = MC$
Excess capacity	No	Yes	Yes
Deadweight loss	No	Yes	Yes

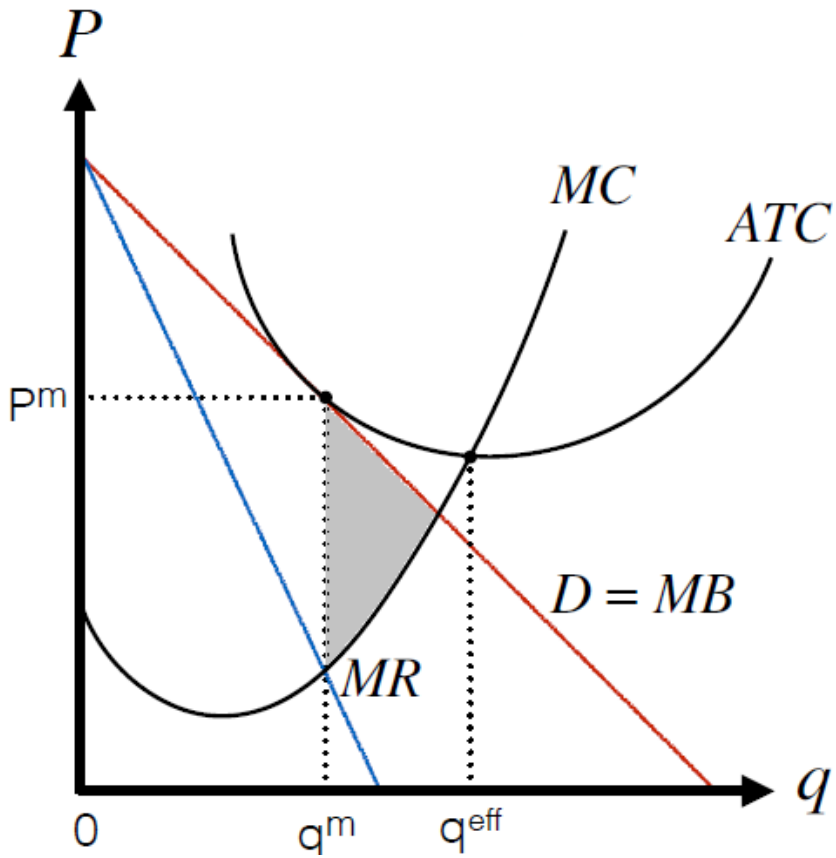
Monopolistic competition - exercise

Identify the deadweight loss on the graph for monopolistic competition.



Monopolistic competition - exercise explained

Deadweight loss arises from the fact that a monopolistic competitive firm produces less than it would have under perfect competition. Some consumers with a willingness to pay greater than MC are not served. This corresponds to the grey area on the graph.



Oligopoly

	Perf. Competition	Mono. competition	Monopoly	Oligopoly
No. of consumers	many	many	many	many
No. of producers	many	many	one	a few
Product differentiation	No	Yes	No	No
Barriers to entry	No	No	Yes	Yes

Strategic interaction

Under perfect competition:

- An individual seller's actions have no effect on the market $\Longrightarrow$ Sellers are price takers

Under monopoly:

- There is only one seller; market production is determined by him alone $\Longrightarrow$ Seller is price maker

Under oligopoly:

- With only a few sellers, each seller's action will affect other sellers' profit
- $\Longrightarrow$ a seller must take other's possible actions into account when making its own decision
- $\Longrightarrow$ Strategic interactions

To study strategic interactions, we need a new tool: Game Theory

Prisoners' dilemma

The police arrested two criminals, A and B, who are suspected of committing a major crime, and **questions them separately**

- If one of them confesses and the other remain silent, the confessed one goes free, whereas the silent one gets 10 years
- If both of them confess, they both get 5 years
- If none of them confess, they both get 2 years

		B	
		Confess	Silent
A	Confess	-5, -5	0, -10
	Silent	-10, 0	-2, -2

Prisoners' dilemma

Nash equilibrium: a situation in which players each choose their best strategy given the strategies that all other players have chosen

- i.e. a situation where nobody has an incentive to deviate from their choice

		B	
		Confess	Silent
A	Confess	-5, -5	0, -10
	Silent	-10, 0	-2, -2

Nash equilibrium: both A and B confess

Prisoners' dilemmma and welfare

		B	
		Confess	Silent
A	Confess	-5, -5	0, -10
	Silent	-10, 0	-2, -2

Nash equilibrium: both A and B confess

This outcome is not optimal (for the prisoners)

- If they could somehow credibly commit to cooperate and remain silent, they'll both get a lighter sentence
- But, since they're questioned separately, each has an incentive to defect behind the other's back

Prisoners' dilemma and oligopoly

In an oligopoly with two sellers (called **duopoly**)

- If they can somehow commit to collusion, each can earn half the monopoly profit
- But, without a way to enforce the collusion agreement, each seller has an incentive to secretly produce more and earn more profit (and make the other earn less)
- $\Longrightarrow$ Both firms produce more. But then, their combined production is more than under monopoly, so each earns less than half the monopoly profit

		B	
		High production	Low production
A	High production	150,150	240,120
	Low production	120,240	200,200

Prisoners' dilemma and oligopoly

		B	
		High production	Low production
A	High production	150,150	240,120
	Low production	120,240	200,200

Nash equilibrium: both firms choose high production

- This is why cartels are often unsustainable: each producer in a cartel has an incentive to unilaterally produce more and undermine the cartel

Further applications of prisoners' dilemma

Suppose two candidates, A and B, compete in an exam for a single job

- If both of them study before the exam, each has 50% chance of being hired
- If both of them relax before the exam, each has 50% chance of being hired
- If only one of them studies, he has 100% chance of being hired, and the other has 0% chance

		B	
		Study	Relax
A	Study	0.5, 0.5	1, 0
	Relax	0, 1	0.5, 0.5

Further applications of prisoners' dilemma

		B	
		Study	Relax
A	Study	0.5, 0.5	1, 0
	Relax	0, 1	0.5, 0.5

Nash equilibrium: both candidate study before the exam

- This is not optimal for them: they could have both relaxed, got the same chances of admission, and enjoyed more free time

Further applications of game theory

Game of Chicken: Two teenagers, A and B, drive towards each other on the same lane of the road

- If one of them swerves away, he is considered a coward and become an object of contempt, whereas the other wins the contest
- If both of them swerves away, nobody wins but nobody is hurt
- If both of them drives straight, they both die in a violent collision

		B	
		Straight	Swerve
A	Straight	-10, -10	1, -1
	Swerve	-1, 1	0, 0

For this kind of games in popular culture, see, for example, *Rebel Without a Cause* (1955)

Further applications of game theory

		B	
		Straight	Swerve
A	Straight	-10, -10	1, -1
	Swerve	-1, 1	0, 0

Two Nash equilibria:

- A drives straight, B swerves
- A swerves, B drives straight

Then, which outcome will happen?

- Without further information, the answer is "either"

What can people do about multiple outcome in the real world?

- Driver A can force a favorable outcome by tying his hands behind his back, giving B no choice but to swerve
- Credible commitment makes a difference!