Chapter 14: Price fixing

We have to assume that no firm wants to change its behavior once it knows that no firm wants to change its behavior. So each firm has to do as well as it can conditional on what other firms do.

This leads to a **Nash equilibrium**. Assume that two companies can choose to advertise or not. The table below shows their outcomes when they advertise and when they don't advertise.

		Firm 2	
		Advertise	**Don't advertise**
Firm 1	**Advertise**	150, 150	450, -75
	Don't advertise	-75, 450	225, 225

The first number in each cell reflects the outcome of firm 1 and the second number in each cell reflects the outcome of firm 2. If we look at the choice of firm 1, when the action of firm 2 is given:

1. When firm 2 advertises, the best option for firm 1 is to advertise too since 150 > -75.
2. When firm 2 does not advertise, the best option for firm 1 is to advertise since 450 > 225.

So firm 1 will choose to advertise no matter what firm 2 decides to do. The same holds for firm 2; it advertises no matter what firm 1 decides to do. Therefore we find a Nash equilibrium where both firms advertise ◊ (150,150). At this point each firm is doing the best it can given what the other firm does.

Situations like this are known as **prisoner's dilemmas**; situation in which the Nash equilibrium outcome is worse for all involved than under another (unstable) outcome.
If you repeat the game over and over again the number of strategies increases because you then also can consider what has happened in the past. A player should cooperate if everyone in the past has done so. If not the player should defect. Suppose the following game:

		2	
		Cooperate	Defect
1	Cooperate	1,1	-1,2
	Defect	2,-1	0,0

If you decide to always Cooperate, you will get 1 in each future period.

What happens if you Defect?

1. You will get 2 in this period. That's good.
2. You will get 0 in each future period. Because the other player then will also play defect. That's not so good.

Payoff of always Cooperate:

$1 + 1\cdot\delta + 1\cdot\delta^2 + 1\cdot\delta^3 + 1\cdot\delta^4 + 1\cdot\delta^5 + \ldots = 1/(1 - \delta)$.

Payoff of Defect:

$2 + 0\cdot\delta + 0\cdot\delta^2 + 0\cdot\delta^3 + 0\cdot\delta^4 + 0\cdot\delta^5 + \ldots = 2$.

So we have a Nash equilibrium whenever $1/(1 - \delta) > 2$ or $\delta > ½$.

That is, whenever players are sufficiently patient.

This really is a Nash equilibrium. This is known as a **trigger strategy**: a single defection immediately triggers non-cooperation forever. If the condition does not hold cooperation is not stable. Players know that if they would cooperate, everyone would immediately have an incentive to cheat. Hence, no one will cooperate in the first place.

The success of the trigger strategy is not guaranteed. In an infinitely repeated game there are many trigger strategies that allow a cartel agreement to establish. In some cases there are almost too many trigger strategies. This point leads us to the **Folk Theorem.**

Folk theorem states that when an infinitely repeated game has payoffs that exceed the Nash equilibrium, then these payoffs can be seen as a subgame for the repeated game.

To come closer to the monopoly level, firms can raise prices or restrict output. Output restrictions can be a result of collusion. **Collusion** is collaboration between firms to act together as one firm to maximize profits. It is prohibited by the European law

As said in most countries collusion is illegal, however, it is often difficult to make a distinction between independent decisions made by a company or decisions that were made jointly by a number of companies.

There are several factors that make successful collusion more likely:

- High concentration/smaller number of firms
- Barriers to entry. Easy entry undermines collusion.
- Frequent and regular orders
- Rapid market growth
- Technology and cost similarities between the colluding firms

- Product homogeneity. The colluding firms produce homogeneous or nearly homogeneous products.
- Multimarket contracts

The majority of the models of imperfect competitive markets prove that firms could increase profits by cooperating and restricting output. However, if all firms agree to a limited output, one firm could easily earn more profits by increasing its own output. After that, more firms will break the **cooperation contract** and start producing more.
Now, the firms together earn a lower combined profit than they could have earned if they kept producing the monopoly output. The difference between these two output levels reflects short-run and future profits.

The repetition of games among the players makes it possible for cartels to form. This is because the firm can threaten to punish anyone who is cheating on the collusion agreement by being more aggressive in the next periods.

An active antitrust policy reduces the likelihood of a cartel being self-sustained. However, this does not mean that cartels won't be formed. From historical evidence we can see that the formation of cartels often raises the price in the market.

The tactic of granting amnesty to the first cartel member that discloses the cartel agreement to the authorities helps detecting and deterring collusion.