Case study: Repeated games

Duopoly market:

In a duopoly market involving two firms, A and B, producing the same product, they face a choice between cooperation (setting high prices) and competition (setting low prices). When they cooperate, they both enjoy high profits, while competition results in lower profits. Furthermore, if one firm cooperates and the other competes, the competing firm gains more profit.

This scenario is a repeated game, where firms interact multiple times and can consider each other's past actions. One potential outcome is cooperation with a strategy known as the "grim trigger." In this strategy, firms cooperate as long as the other does. But if one firm competes, the other retaliates by competing in all subsequent periods. The threat of retaliation motivates cooperation, as competing leads to lower profits when the other firm punishes.

Another possible outcome is competition with a "tit-for-tat" strategy. Here, firms cooperate as long as the other does, but if one firm competes in a given period, the other reciprocates in the next period. Tit-for-tat is more forgiving than grim trigger, allowing firms to restore cooperation after a competitive episode, useful for accidental competition or mistakes.

In this duopoly market, cooperation is incentivized, as it yields higher joint profits than competition. Strategies like grim trigger and tit-for-tat help maintain cooperation over repeated interactions.

Other examples of repeated games:

- Competitive sports: In many competitive sports, such as tennis and basketball, players interact with each other multiple times. This means that players can take into account the other player's past behavior when making decisions about their own behavior.
- Arms races: Arms races are another example of repeated games. Two countries may compete to build up their militaries. Each country knows that the other country will respond if it increases its military spending. This can lead to a cycle of escalating military spending.
- Trade agreements: Trade agreements are also a type of repeated game. Two countries can agree to trade with each other at lower tariffs. This can benefit both countries. However, if one country breaks the agreement and imposes higher tariffs, the other country can retaliate by imposing higher tariffs of its own.

Repeated games are a complex and fascinating topic in game theory. They have many applications in the real world, from business to politics to sports.