

UCL ECON0002 Week 4. The Economy - Unit 4: Social Interactions



Another really important Unit for understanding how economists analyse decision-making

Unit 4 is important because it provides you with the foundations of a core tool of economic analysis, game theory. The examples of global climate change agreements, community flooding solutions and innovation highlight the value of understanding, at the start of your economics degree, cooperative and conflicting strategic interactions. Game theory also helps us to analyse choices that individuals have made, for example with their toilet roll consumption in response to different Covid-19 restrictions.

You will be using the tools of game theory repeatedly in this course, and in other courses in your economics degree this year and in future years. For example, in Unit 6 you will see how game theory can be used to analyse wage agreements and in Unit 7 you will explore rivalry between firms where there is strategic interaction. It is very important that you invest the time now to get to grips with the concepts and modelling tools. You will be better able to understand, even emulate, the seminal work of the 2020 Economic Science Nobel Prize Winners, and many others before them.

Learning objectives

By the end of the week's work on Unit 4, you will be able to:

1. answer the big question of Unit 4, "How does social interaction impact on individual decision-making and when does it lead to socially desirable outcomes?"

2. use payoff matrices and game trees to explain the structure of a game between players, illustrating the nature of the strategic interaction and possible returns (payoffs) from different choices
3. identify potential outcomes of decision-making with strategic interaction, using the concepts of dominant strategies, best responses, and Nash equilibrium
4. explain the circumstances in which individuals may reach socially desirable outcomes by themselves and conditions under which socially desirable outcomes do not arise when we assume decisions are only affected by self-interest
5. analyse the impact of altruism, punishment, fairness concerns, cooperation (negotiation) and conflict on decision-making when there is strategic interaction
6. explain how economists gather data on decision-making with strategic interaction and understand the value of classroom experiments for your own learning.

Learning activities

4.A | Understand what strategic interactions are, why they matter, and how we use game theory to analyse outcomes with strategic interactions

In Unit 3 we explored how individuals make decisions using feasible sets and indifference curves. One of the limitations of the model in Unit 3 was that it did not allow us to explicitly explore situations where what an individual can or wants to do is affected by what others do. When we have strategic interactions like this individuals are still trying to make decisions that make them as well off as they can be given the constraints that they face, but they have to take account of how what others do affects their decisions and how what they do affects the decisions of others. We need to understand how the interactions affects what they can get from different choices (their payoffs) and how the nature of the interaction (rules of the game) affects their choices.

1. Read [Introduction to Unit 4](#), to see how game theory can help us understand social dilemmas such as climate change and overfishing.
2. Read [Section 4.1](#) to understand how we set up a game, using payoff matrices, and the terms that we use to describe different elements of the game. Take your time to ensure you understand how economists use terms like players, strategies, payoffs, and information when describing a situation with strategic interaction.
3. Answer [Question 4.1](#) in the ebook.
4. Post any questions or comments on the [Week 4 Discussion Forum](#) – name the thread if there is not one already on this topic.

4.B | Learn how to find the solution to a game when the pursuit of self-interest determines the outcome(s)

We know from Unit 3 that an individual will want to maximise their utility subject to the constraint of their feasible set when making decisions. With strategic interaction, self-interest still determines what the individual chooses and what the outcome of the game is. In some

situations, the decisions driven by self-interest can get us to outcomes that are socially desirable. In others, society could be better off if we could find ways to take the decision-makers away from the self-interest path.

1. Read [Section 4.2](#) to learn out how to find the outcome in a game. You should make sure that you understand how each individual analyses their options when there is strategic interaction. They work through potential options, reactions, and counter-reactions in their head before they make a choice; a bit like you might do in a Chess game. How they do this will vary depending on whether they are interacting once (simultaneous) or over time (sequential). Note that we express equilibrium outcomes by specifying the combination of choices of the players in the game, putting the row player's choice first and then the column player. So if you see an outcome of (A,B) it means that the row player has chosen option A in equilibrium and the column player has chosen option B.
2. The Invisible Hand game, discussed in [Section 4.2](#), is an example of a game where we get a socially desirable outcome when individuals make choices based on self-interest. Pay particular attention to [Figure 4.2b](#) and watch the video from UCL's Dr Ramin Nassehi to get a deeper insight into how to use best responses to find the equilibrium outcome of the game: [YouTube](#), [Bilibili](#), [Download](#).
3. Read [Section 4.3](#) to see a different example, the Prisoners' Dilemma, where decisions based on self-interest do not yield the outcome that is best for both players.
4. Answer [Question 4.2](#) and [4.3](#) in the ebook.
5. Post any questions or comments on the [Week 4 Discussion Forum](#) – name the thread if there is not one already on this topic.

4.C | Understand what happens when individual preferences and hence strategic interactions are affected by more than the pursuit of self-interest

So far, we have looked at strategic interaction games where individuals make decisions only thinking about their own self-interest. In life and in experiments, we observe that individuals make decisions that are not always in their self-interest. They can make decisions to help someone else, even at a cost to themselves (altruism). This is one reason why individuals may not settle at the self-interest outcome. We can adapt the game to take account of these situations.

1. Read the '[When Economists Disagree](#)' box in Section 4.2 to find out more about the idea that individuals do not only consider self-interest when making decisions.
2. Read [Section 4.4](#) to see how we can use our feasible set and indifference curve analysis to explore decision-making with altruistic preferences. Pay particular attention to [Figure 4.5](#). You should be able to follow the logic with the diagrams. It is not necessary to delve into the mathematical analysis in the [Leibniz on optimal decision-making with altruism](#) at this stage, but you can if you want. Take note that it is here if you want to return to it later.

3. Move to [Section 4.5](#) to see how the Prisoner's Dilemma game changes with altruistic preferences. Again, focus on understanding the analysis in [Figure 4.6](#) at this stage, *it will be helpful practice for the Week 4 Quiz alongside Question 4.5*. To test yourself, think about what Bala's indifference curves would look like if they were altruistic or selfish, remembering that you are drawing the indifference curves relative to the y-axis.
4. Answer Questions [4.4](#) and [4.5](#) in the ebook.
5. Post any questions or comments on the [Week 4 Discussion Forum](#) – name the thread if there is not one already on this topic.

4.D | Find out how individuals may get to socially optimal outcomes when self-interest or altruism do not get them there

In some situations, individuals in the game could be better off if they could find a way to move to a different outcome than that determined by self-interest choices. The move to an alternative outcome, or equilibrium, can come from voluntary cooperation or negotiation. Of course, at times negotiation will not be successful. As we discuss in Unit 5, alternative institutional arrangements may be needed to get individuals to different outcomes.

1. Read [Section 4.6](#) to find out how the problem of free-riding, already discussed in the context of the Prisoners' Dilemma, can affect the provision of public goods. Repeating the game over time and having the ability to punish can help deal with the social dilemma, as discussed in [Section 4.6](#) and [Section 4.7](#).
2. As the Great Economists section on [the work of Elinor Ostrom](#) explains, better outcomes can also be achieved through collective community agreements. [Read Section 4.9](#) to understand how we capture coordination in the game set-up.
3. In some negotiations one individual makes a take-it-or-leave-it offer to another, called an ultimatum game. Read [Section 4.10](#) to find out how the available economic rent will be shared in this situation. We make use of game trees to describe the sequential nature of the game and find the minimum acceptable offer, with details [in the Einstein](#).
4. Read [Section 4.11](#) to understand how beliefs about what is fair, and expectations about what others will do in response to difference choices, affects the ultimatum game.
5. The expectations and the outcomes of the ultimatum game can also be influenced by the existence of more players in the game. Read [Section 4.12](#) to find out how competition amongst those being offered the contract affects the game.
6. So far, we assumed in our games that there was only one possible equilibrium outcome. In some games we can get multiple Nash equilibria, with the value to society varying between the equilibria. Read [Section 4.13](#) to cement your understanding of how to find one Nash equilibrium in a game and to consider situations where you can have more than one equilibrium. Watch the walk-through video from Dr Ramin Nassehi to understand [Figure 4.15](#) better: [YouTube](#), [Bilibili](#), [Download](#). Pay particular

attention to what happens when the players cannot agree on what equilibrium to go to (conflict). We will discuss in Unit 5 how institutional arrangements can affect the balance of power and the outcome of the game when there is conflict.

7. Answer Questions [4.6](#), [4.9](#), [4.10](#), [4.11](#) and [4.12](#) in the ebook.
8. Post any questions or comments on the [Week 4 Discussion Forum](#) – name the thread if there is not one already on this topic.

4.E | How do economists know how decision making works with social interaction

You may be wondering how we know so much about decision-making when we are economists, not psychologists. The answer is that we collect data to understand choices made, in different circumstances (rules of the game), better. We often work with psychologists and other disciplines when collecting and analysing this data. Read [Section 4.8](#) to learn how economists use surveys, data on revealed preferences, laboratory experiments and randomised control trials to get a better understanding of decision-making by individuals.

To help you understand the games in Unit 4 we are going to run our own classroom experiments in the live online session on Wednesday October 28th at 11am (BST). This can be time consuming but is a great way to learn and can be fun. To help us get as much as possible out of the session, please come prepared by having this website open: <https://classex.uni-passau.de/bin/>. Firefox is the recommended browser and make sure Java and Cookies are enabled. It does not work on Internet Explorer or Safari. You can open the link on your computer or on a mobile phone or tablet. Choose whatever has best/stable internet access for you. You should also have the normal lecture link open via Moodle on a computer/tablet.

When you get to the login screen, as shown to the right, you will need to enter the following information:

Choose institution – ***

Choose course – ***

Participant password – ***

Please also listen and follow the instructions given very carefully as we will move fast from one game to the next. Please do not put any information about what or how you are playing in the Chat during the session as this will influence the decisions that people make and the outcomes we get.

class
EX

version 3.6.1
information on classEx
classEx@school (DE)

University College London

Economics

participant

password

login

classEx was just updated to [version 3.6.1](#). If you have any problems, please write to classEx@uni-passau.de or visit <https://groups.google.com/forum/#forum/classex>.

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Review activities

Before you move on to the next unit, make sure you:

- Complete the activities tracker for Unit 4 on Moodle.
- Using the concepts listed in Section 4.14 and the Glossary make sure you understand all the definitions used in this course. As emphasised in Week 1, some of the ideas may be familiar to you but you must ensure you are using the concepts as they are defined in The Economy.
- Test yourself using CORE's Definition Tests. Select Unit 4 glossary (accept the cookies if needed) and go to the drop-down menu in the bottom right corner to choose your preferred study mode.
- Make sure you have completed all the quiz questions in Unit 4 in the ebook. You can find them all in one place here. Select Unit 4.

When you have time, between now and the end of reading week:

- Read the Great Economists section on the work of John Nash. Now is a great opportunity to celebrate game theory with the Economics Nobel prize in 2020 being awarded to two theorists, Milgrom and Wilson. You may find this article about the history of game theory, and the contributions of Milgrom and Wilson, of interest.
- There is a lot of material to get through this week so none of the **Exercises** in Unit 4 have been assigned as a specific activity in the Route Map. You should make sure to make your way through them when you have time. You can work on these on your own or you might want to form a study group with two or three classmates. Working together on any work that is not assessed is permitted and indeed encouraged as a good way to learn from each other. Please be aware that it would be considered

Academic Misconduct if you were to work together on any assessed work. There are checks in place to detect and prevent collusion and penalties if you are caught.

- You were hopefully able to understand the concepts and tools in this Unit without needing to dig into the Leibniz unless you wanted to. Please make sure to return to these more technical aspects when you need them. Take note of what is here for later in this module and to complement what you cover in your Mathematics module.

Assignments

Complete the Quiz on Unit 4

Complete the quiz on Unit 4 and submit your answers to this quiz by 12noon on Friday 30th October.

Submit the Tutorial Assignment for Unit 4

The two questions for the Unit 4 assignment can be found on Moodle here. Your answers, which do not count towards your final grade for the course, must be submitted through the Turnitin link on the Moodle page by 1159hrs (11:59am) on Friday October 30th, 2020. Please type your answers and scan in any hand-drawn diagrams or formulas used. Please follow the instructions on Moodle (Assessment area) about submitting to Turnitin.

It is best to consider the assignments as compulsory to provide yourself with an incentive to submit the best work that you can on time each week. Working consistently on submitted assignments will increase the depth of your understanding of the material on each unit and prepare you well for all assessments

One of these two questions will be discussed in the tutorial and the explanation of the other question will be presented in a recorded video. Your tutor will give you written feedback in Turnitin on one of the questions and will give verbal group feedback during the tutorial. You are expected to compare your answers to what is discussed in the tutorial and to the recorded video and consider what you have done well and what could you change, in your next assignment, to do even better. Reflecting on feedback in this way will help you to improve as the course progresses.