

Transcription: 1st class: Introduction
What is game theory and Why we study it in economics?

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Hello everyone. I am Ryuichiro Ishikawa, who is in charge of this lecture. Welcome to my class.

With the pandemic of COVID-19, I apologize to all of you for the change to online delivery of this class. But, it is during these difficult times that you should prepare yourself for the future while relishing the joy of studying. It's up to you to create the future, so I think it's now important to learn and prepare for that.

Well, this kind of online lecture is a new challenge for us, academics. However, if you look at the universities around the world, there are programs that have been working on online and text-based lectures even before this situation.

As an example, the University of Liverpool in the U.K. offers a master's degree programs with a focus on textbooks and assignments. Thanks to development of information technology, it's time for us to look for new ways to teach. I believe now is a good time to introduce a new way to teach.

Fortunately, there are many nice textbooks on the microeconomics & game theory, which you learn in this lecture. The textbook for this lecture, Advanced microeconomic theory by Jehle and Reny, is also a good standard textbook. It has been used by graduate schools around the world.

In the online lectures, we don't explain the textbook from scratch, but rather have you read the assigned parts of the textbook and prepare the exercises and questions. I decided to go with the "University of Liverpool" method because I believe this way would be more beneficial to you than making a video and running

it. This will also reduce the internet load and allow you to cope with time differences.

In this lecture, I ask you to understand chapters 7 & 8 of the textbook, and move to an overview of the mechanism design in chapter 9.

Please check that you download today's "handout" and "description" from Waseda moodle.

OK. I hope everyone gets today's handout. Please see page 2 of the handout, which is the bottom of its first page. This is a course outline. I split 12 weeks into 4 parts by each exercise.

The first three weeks explain the strategic form games which analyze simultaneous decision making. The second three weeks consider dynamic decision making, called extensive form games. The third three weeks study an application of game theory for economic analyses. Since we focus on the issue of information that decision makers hold, this application is called information economics. The last three weeks introduce a recent development in game theory, which is called mechanism design.

In three exercise classes, 3rd, 6th 10th week, I will give answers of questions assigned in description each class. Please see the PDF of today's description. The last line of the description shows the assignments as exercises. The students are expected to submit your answer before the exercise class.

Those are live classes. I will announce how to connect the live classes. Of course I know it is hard for some students to connect to high-speed internet. Since those are exercise classes, I put answers explained in the class.

Finally I grade you based on the answers you submit and the final report. The final report consists of problem sets of all the contents of this lecture. The weights are 20% and 40% for each of three exercise classes and the final report, respectively.

Lecture: What is game theory:

Ok, we move to today's lecture. Please see page 3 of the handout. This lecture is a counterpart of Microeconomics I, which studies market theory. In microeconomics II or game theory, we study rational decision making without markets. Actually, thanks to game theory, economics can extend its scope. This is because it previously focused on market mechanism before introducing game theory to economics.

Game theory deals with the more general problems of decision making. It does not necessarily assume markets where the theory can reduce like one-person decision problems. But game theory rather focuses on decision making under interactive situations.

As I said before, we use the textbook of Advanced microeconomic theory written by Jehle and Reny. As a similar textbook, the textbook titled as non-cooperative game theory by Prof. Fujiwara-Greve at Keio University is also useful. The e-book of this textbook is available at Waseda University library. The topics studied in this class are very common in grad level of microeconomics and game theory, so you can refer any other textbook.

We move to the bottom page, page 4. Again, "games" of game theory means interactive situations that your behavior/actions have impacts on other players' benefits, profits, payoffs.

To analyze such interactive situations, game theory consists of non-cooperative games and cooperative games. Simply, the former does not assume cooperation among players while the latter assumes players' cooperation.

The assumption of cooperation is often reasonable when we consider a big public project such as building of communal facilities, say refuse disposal plants. Cooperative game theory is popular in the field of operation research, which is

applied math for engineering.

But, the assumption of non-cooperation is rather consistent with pursuit of self interest in economics. Then, non-cooperative theory is mainly applied in economics analyses. For the reason, we focus on non-cooperative game theory. In the sense, non-cooperative game theory provides a mathematical framework to predict a consequence in interactive decision making. Such a prediction is called a solution or an equilibrium.

OK. Please see page 5.

As I said now, a solution or an equilibrium is a key concept in game theory. On another front, we can choose an action of our own accord in actual decision making. In such actual situations, each person may choose an action from different viewpoint. Then, how do we analyze people's decision making.

Game theory assumes an assumption or a criterion of decision making: That is, Rationality.

As studied in market theory, economics assumes all the people maximize their utilities/profits under constraints. That is a common postulate of rationality in economics. In game theory, we need to consider another rationality: All the people can have very high reasoning abilities. Without the abilities, people cannot infer others' behavior to maximize their own payoffs. That view is important in interactive situations because their own payoffs are affected not only by their own choices, but also by others' choices.

So rationality in game theory covers both the two rationalities.

OK. I have explained basic background of game theory. So, please read the textbook following the PDF of the description, and submit the answers of exercises to the 1st class of this lecture in Waseda moodle before the 3rd lecture. See you.