LECTURE 2.3

SINGLE PERIOD GAMES:

SEQUENTIAL MOVES

SEQUENTIAL DECISION MAKING

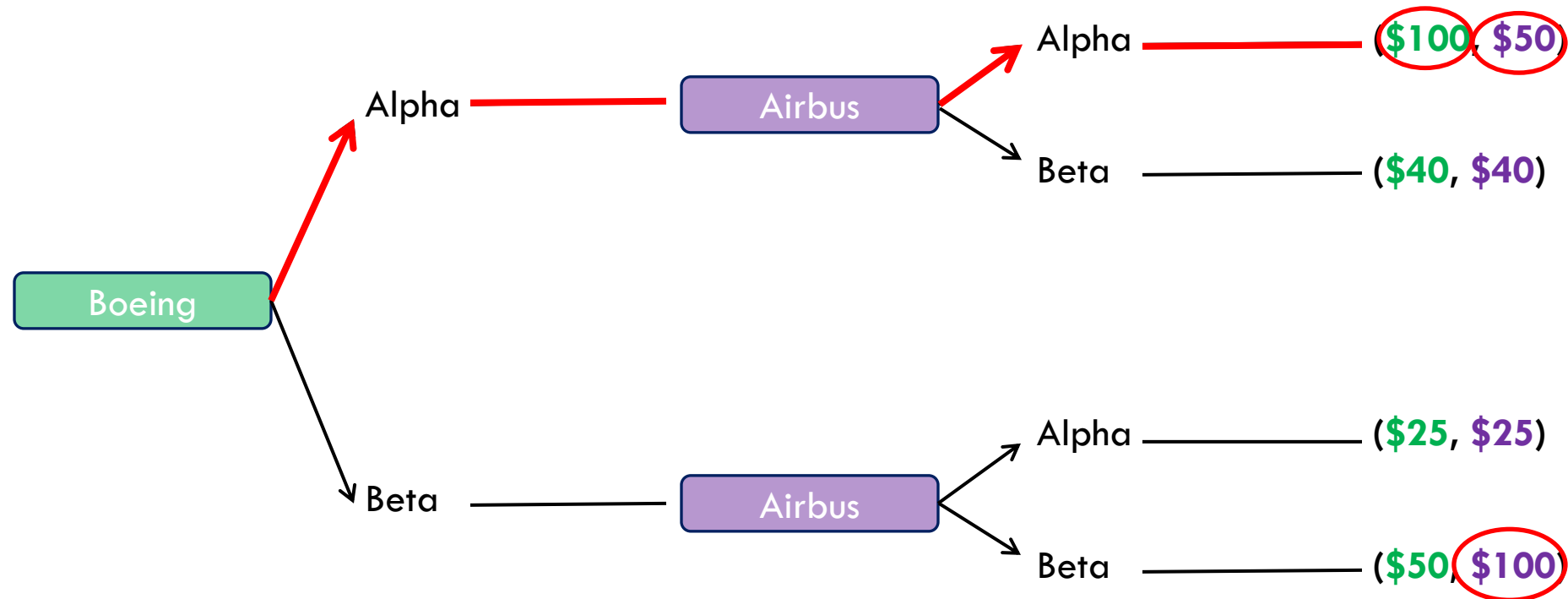Boeing

Alpha — Airbus

Alpha — ($100, $50)

Beta — ($40, $40)

Beta — Airbus

Alpha — ($25, $25)

Beta — ($50, $100)
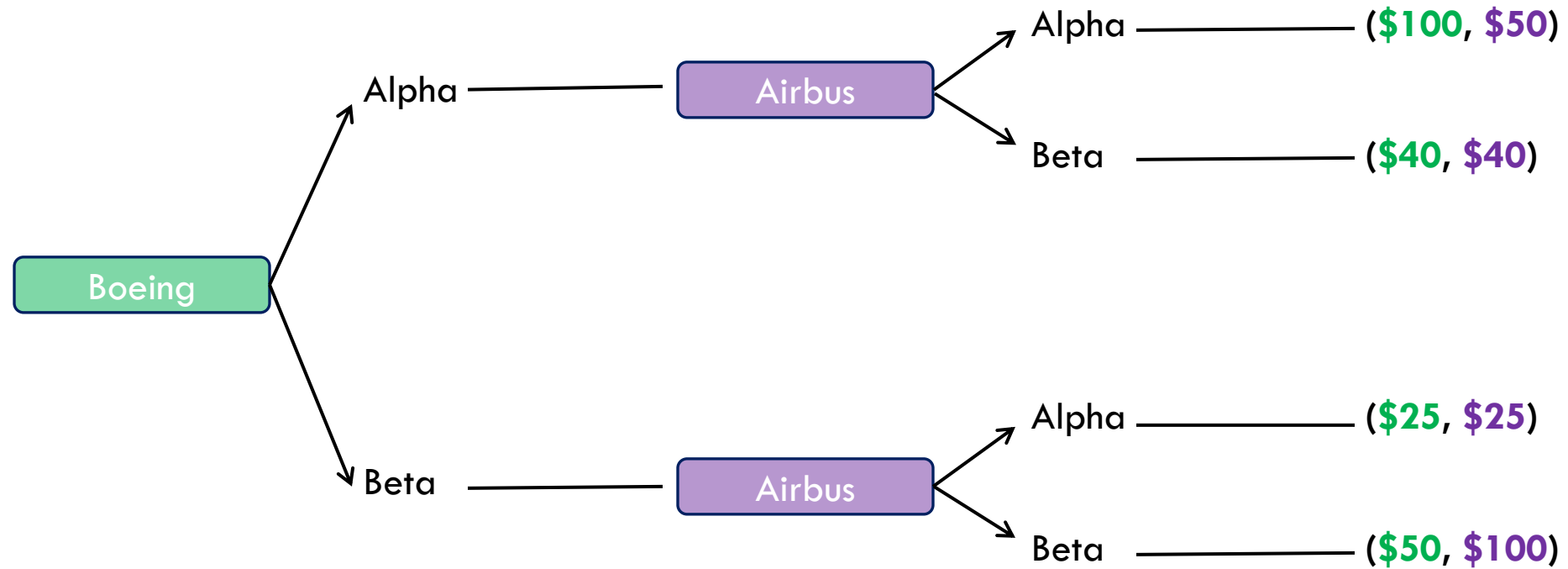
SEQUENTIAL DECISION MAKING
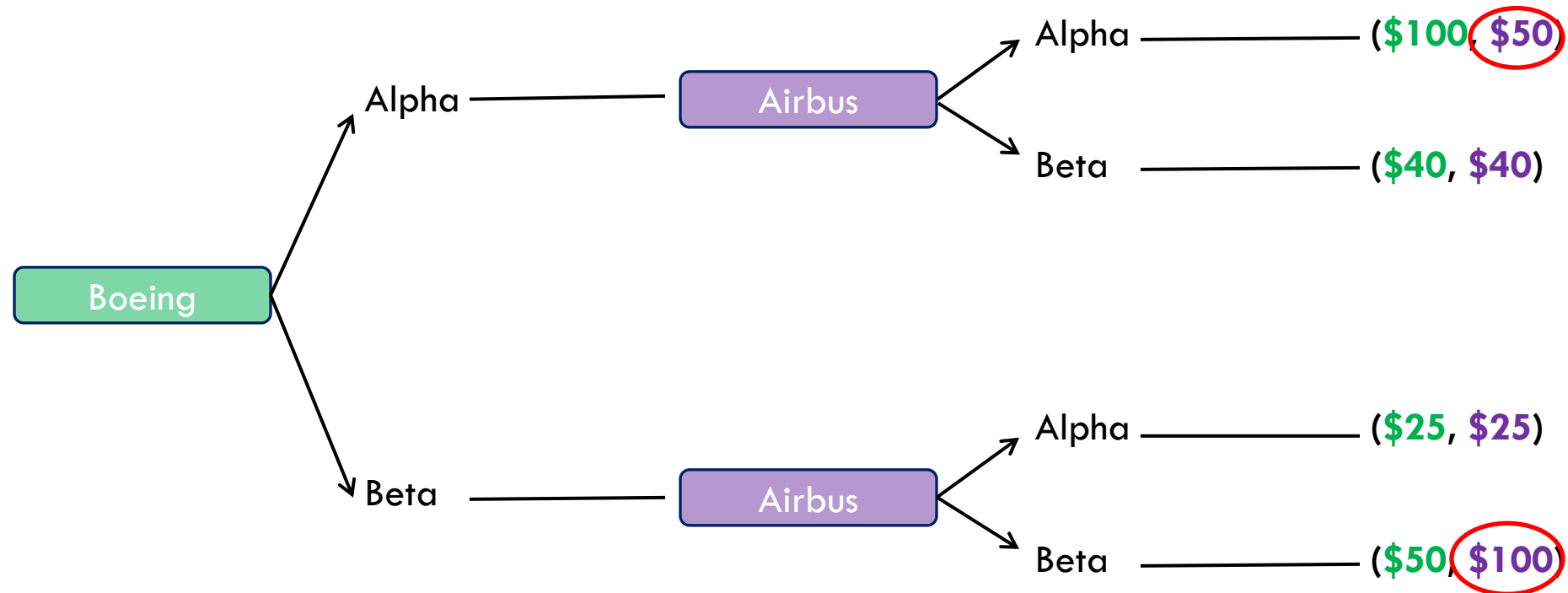
SEQUENTIAL DECISION MAKING

SEQUENTIAL DECISION MAKING

The extensive form representation explicitly shows the timing of play. The left number for each outcome is the payoff to the first player.

We can solve sequential games like this by backward induction using the concept of a Subgame perfect Nash equilibrium:

- solve for the decision nodes at the end of the game first

- work your way to the beginning of the game

A subgame is a part of a game that can be played as a game itself. A collection of nodes and branches that:

- Begins at a single node

- Contains every successor node.

- Contains all the relevant information

Why is the concept of subgame important? Threats exhibit a lack of credibility of at the time that they are to be carried out, the player does not maximise utility by carrying out the threat.

A Nash Equilibrium is subgame perfect if every player plays the Nash Equilibrium in every subgame

SEQUENTIAL DECISION MAKING

Here a threat by Airbus to always choose Beta is simply not credible as it is not subgame perfect
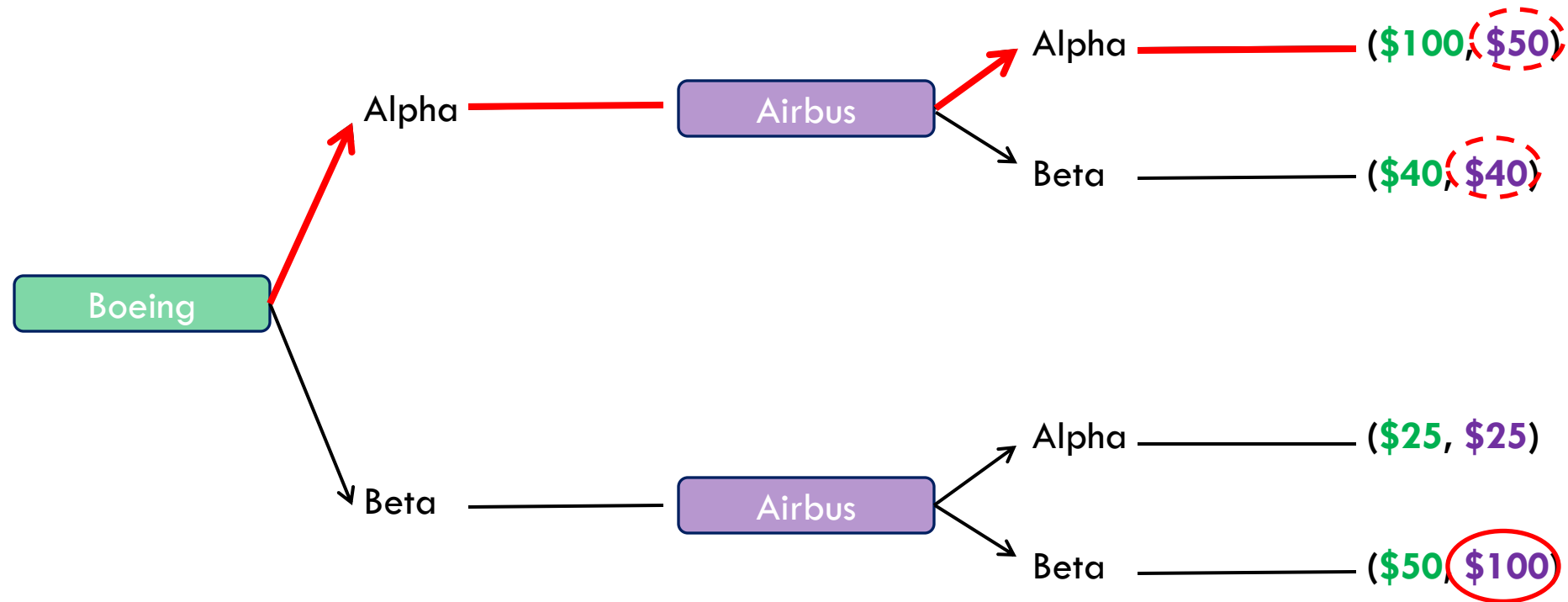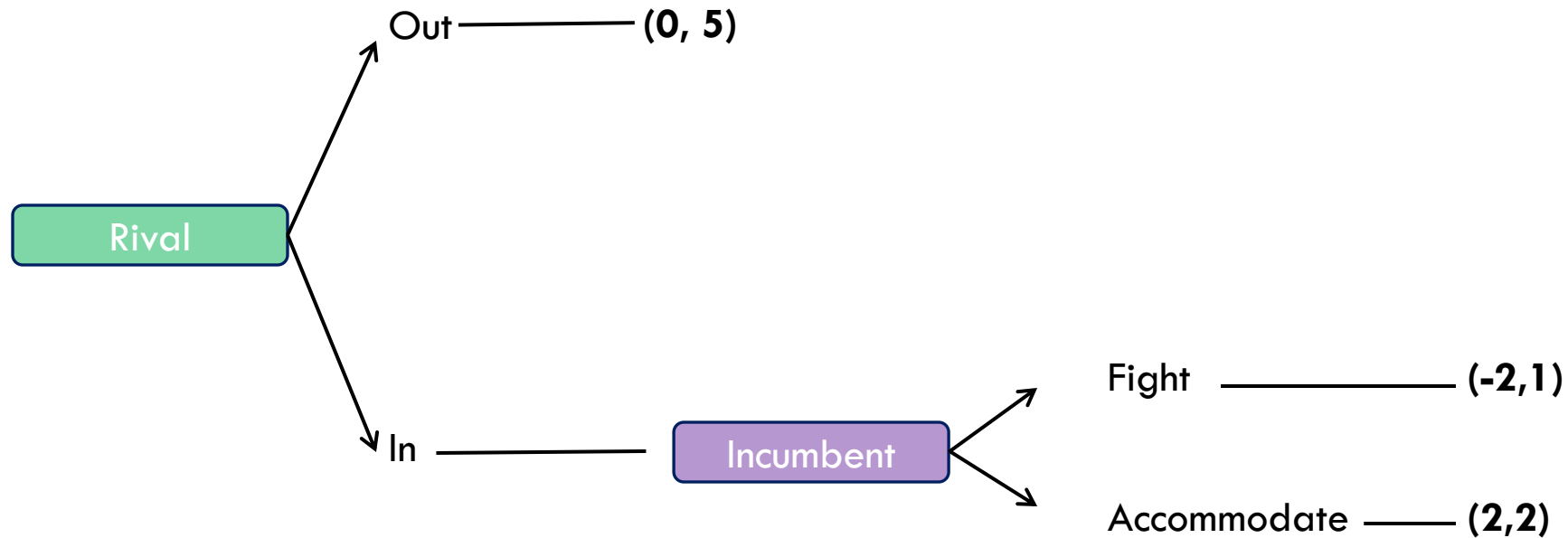
COMMITMENT

One way that a threat can be made credible is through some form of commitment.

For a commitment to be credible in general we would expect that it would

- Be visible

- Be understood by rivals

- Be credible – for example through some aspect of irreversibility such as capacity expansion in assets that are can not be redeployed or an agreement which makes a credible commitment not to compete on price.

COMMITMENT

In this game there are two Nash equilibrium, but only one Subgame perfect equilibrium as the incumbent's threat to fight is not credible.

Out ——————— (0, 5)

Rival

In ——————— **Incumbent**

Fight ——————— (-2,1)

Accommodate ——— (2,2)

COMMITMENT

If you can't see the Nash equilibrium in the extensive form, look at the game in normal form.

Incumbent

	Fight	Accommodate
Out	0, 5	0, 5
In	-2, 1	2, 2

Rival

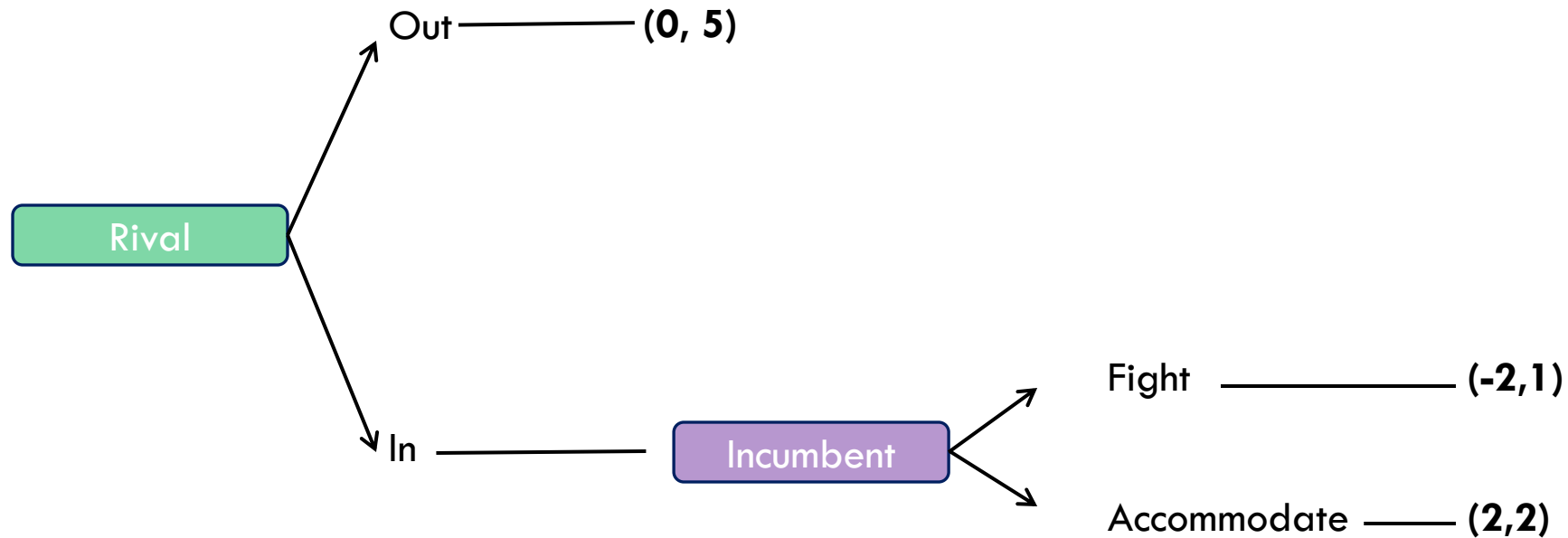# COMMITMENT

If you can't see the Nash equilibrium in the extensive form, look at the game in normal form.

<div align="center">

Incumbent

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		Fight	Accommodate
Rival	**Out**	0, 5	0, 5
	In	-2, 1	2, 2

COMMITMENT

In this game there are two Nash equilibrium, but only one Subgame perfect equilibrium as the incumbent's threat to fight is not credible.

Out ——————— **(0, 5)**

Rival

Fight ——————— **(-2,1)**

In ——————— **Incumbent**

Accommodate ——— **(2,2)**

COMMITMENT

Consider a commitment such as building a new production facility that ensures the incumbent will fight. Assume that is such that **rivals are aware** of it and it **cannot be reversed and is therefore credible.**

Consider the following timing:

- Stage 1 – the incumbent makes commitment to fight.

- Stage 2 – the rival decides whether to enter.

This games enables the other Nash equilibrium of the rival not entering to be reached.