Mixed Games

ECON 420: Game Theory

Spring 2018

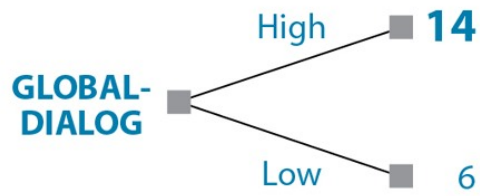
Mixed simultaneous and sequential games

- Real world games are often combinations of sequential and simultaneous games
- We can use a combination of roll-back and best response analysis to find NE of these games

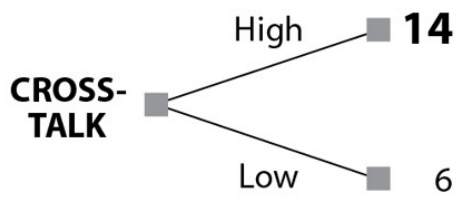
First stage:
investment game

		GLOBALDIALOG	
		Don't	Invest
CROSS-TALK	Don't	0, 0	0,
	Invest	, 0	

Second stage:
GlobalDialog's pricing decision



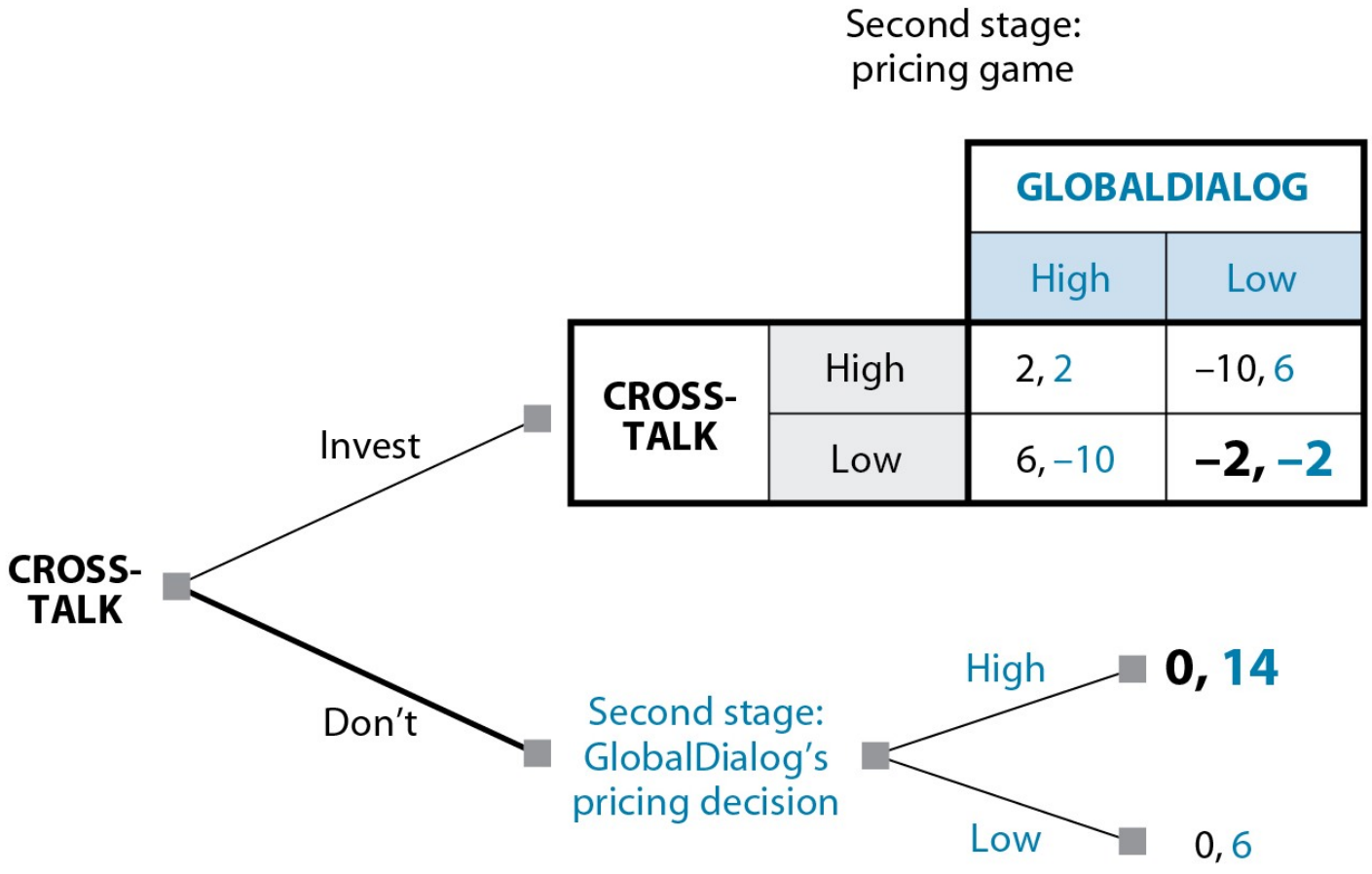
Second stage:
CrossTalk's pricing decision



Second stage:
pricing game

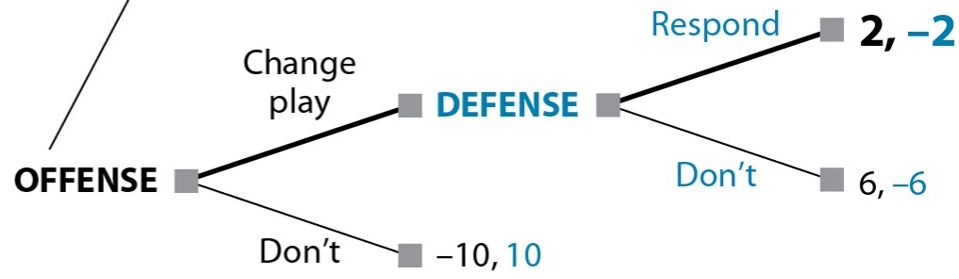
		GLOBALDIALOG	
		High	Low
CROSS-TALK	High	2, 2	–10, 6
	Low	6, –10	**–2, –2**

		GLOBALDIALOG	
		Don't	Invest
CROSSTALK	Don't	0, 0	0, 14
	Invest	14, 0	–2, –2


Second stage:
pricing game
GLOBALDIALOG
High
Low
CROSS-TALK
High
2, 2
–10, 6
Low
6, –10
–2, –2
CROSS-TALK
Invest
Don't
Second stage:
GlobalDialog's
pricing decision
High
0, 14
Low
0, 6

First stage:
coaches choose alignment

		DEFENSE TO COVER	
		Safe	Risky
OFFENSE TO PLAY	Safe	2, –2	6, –6
	Risky	30, –30	



Simultaneous as sequential

- Simultaneous games with multiple equilibria might have different outcomes if played sequentially (change the rules of the game)
- Payoffs may be better for one of the players depending on move order
  - First or second mover advantages

Example: Chicken (6.5)

Example: Tennis (4.14)

Example: Monetary-Fiscal Policy Game (6.6a)

Expressing simultaneous games in extensive form

- Simultaneous-move games don't actually require players to move at the same time
  - Players are simply unaware of what other player chooses when they make their choice
- We can use *information sets* to describe this situation in simultaneous games
  - We draw a circle around nodes that are in the same information set
  - Players at a particular information set do not know which node they are at (within the set)

Example: Tennis (4.14)

Expressing sequential games in normal form

- Strategies are *complete plans of action*
- In a sequential game, this means we must describe the action of a player at *any possible node* where they might move
- This includes actions on *off equilibrium paths*

Example: Monetary-Fiscal Policy Game (6.6c)

Subgame Perfect NE (SPNE)

- Some NE are supported by *threats* of actions that may not be *credible* if the player is actually made to choose at that particular node
- We can describe the NE outcomes that don't require threats as SPNE
- A *subgame* is any possible "mini game" that results after any path of play
- The NE that are also NE for their respective subgames are SPNE