

**ASSIGNMENT 2 (9 points)**

**Answer Key**

(Due Sunday November 2. One point per day will be deducted for each day late.)

**There are three multipart questions and three experiments.**

**Question 1 (3 points)** . . . *regional markets*

A prominent feature of geographically based markets, such as personal services, retailing, distribution, and travel is that the regional markets overlap. Thus, competition in one market can spill over into the next, creating a cascading effect. Perhaps nowhere is this more evident than in the airline industry. In this example, American competes with Delta, Delta also competes with United, United competes with Delta, and Southwest, while Southwest only competes with United. Thus the payoff to Southwest is unaffected by rivalry between American and Delta.

- (a) Explain why the best response of American does not depend on what any of the airlines do next. American has a dominant strategy. What is it?

If American maintains the current price, it receives -2000, but if it lowers the price, it leads to a higher potential outcome. Thus, American's dominant strategy is to lower the price.

- (b) Explain why Delta also has a dominant strategy. What is it?

If Delta maintains the price, its payoff is -1500, but if it lowers the price, it achieves better outcomes. Therefore, Delta's dominant strategy is to lower the price.

- (c) Does United have a dominant strategy? In other words does the best move by United depend on what Southwest will do?

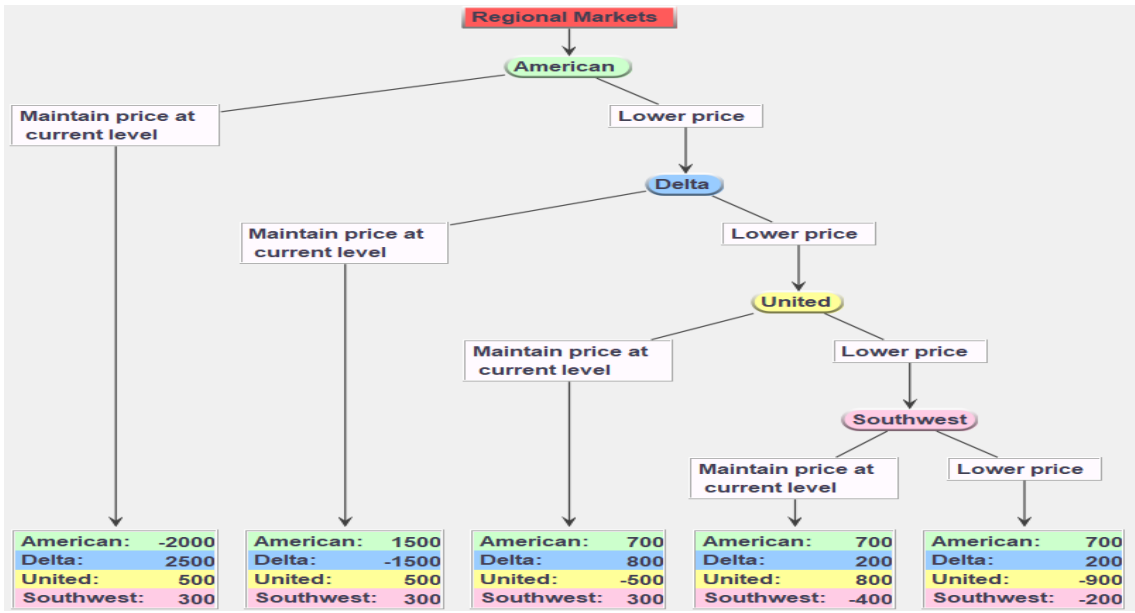
No. If Southwest plays "Lower price", United wants to play "Maintain price at current level". If Southwest plays "Maintain price at current level", United wants to play "Lower price". So United's best reply depends on what Southwest will do.

- (d) What will Southwest do if it has an opportunity to move?

Southwest will play "Lower price" if it has an opportunity to move.

- (e) What should United do?

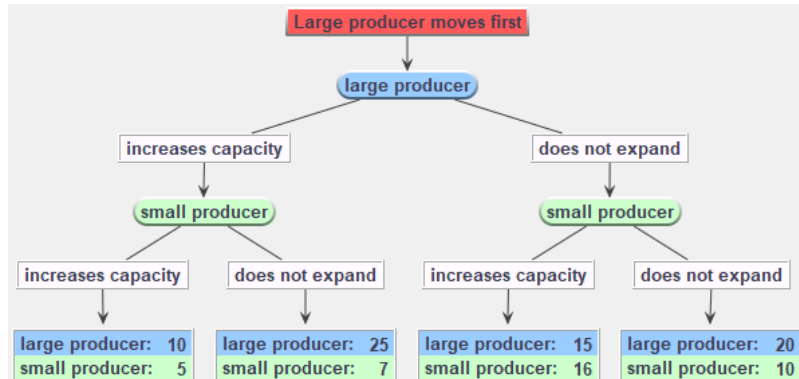
United should play "Maintain Price at Current Level".



**Question 2 (3 points)** . . . *first mover advantage*

Who enters a new market first might make a difference. In the following two panels we investigate a “new market” entry game between two producers, each of whom has the option of increasing their capacity to enter a new market. We see how the producer taking the initiative can benefit quite a lot, at the expense of the laggard.

*Diagram A*

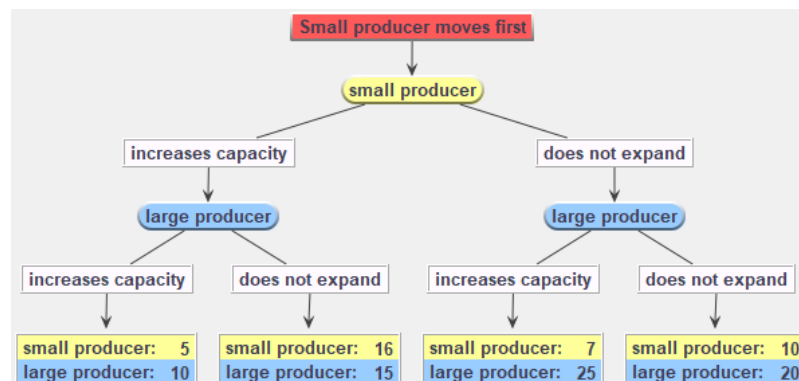


In *Diagram A*, the large producer moves first, perhaps because it commits earlier, and requires a longer start up time:

- Play this game within your **experimental group** four or more times and report a snapshot of the outcomes. (We do not grade your performance.)
- What is the empirical distribution and what is the best response to the empirical distribution?
- Solve the game depicted in *Diagram A* and predict which firm or firm will enter the new market (that is increase capacity).

The large producer will increase capacity, and the small producer will choose not to expand.

*Diagram B*



In *Diagram B*, the small firm makes the first move, perhaps because it is more flexible.

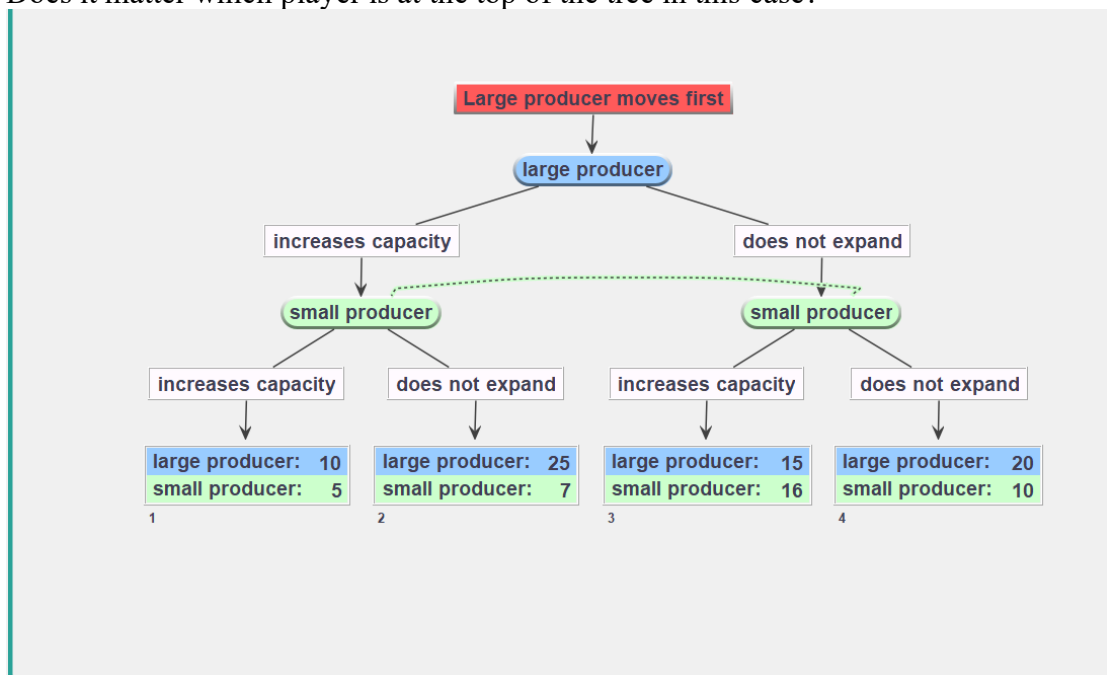
- (a) Redraw the extensive form as shown above (to reverse the order of who moves first) and play this game within your **experimental group** four or more times and report a snapshot of the outcomes. (We do not grade your performance.)
- (b) What is the empirical distribution and what is the best response to the empirical distribution?
- (c) Solve the game depicted in *Diagram B* to predict which firm or firms enter.

The small producer increases capacity, and the large producer does not expand.

**Question 3 (3 points)** . . . simultaneous decision making by rivals?

With reference to the question above, now suppose the payoffs are the same, but that both firms move without knowing what the other firm has done. That is each player makes a move as if it were simultaneous. This is called a simultaneous move game, and the moves in the extensive form correspond exactly to the strategies in the strategic form:

- (a) How is the simultaneity represented in the extensive form, in a game tree? Design the game in extensive form using comlabgames and paste the tree into your answer sheet. Does it matter which player is at the top of the tree in this case?



Information sets are used to show that neither player knows the other's choice, effectively making decisions at the same time.

No, it doesn't matter which player is at the top of the tree in a simultaneous-move game. Because both players move without knowledge of each other's choice.

- (b) How is the simultaneity represented in the strategic form, in a bi-matrix game? Design the game in strategic form using comlabgames and paste the bi-matrix into your answer sheet.

		Small	
		Increase Capacity	Does not Expand
Large	Increase Capacity	1 10, 5	3 25, 7
	Does not Expand	2 15, 16	4 20, 10

- (c) Play one or the other representation you coded in (a) or (b) within your **experimental group** four (or more) times and report the results using a snapshot.
- (d) What is the empirical distribution of your group, and what is the best reply to the empirical distribution?
- (e) Compare the payoffs achieved by both firms in the empirical distribution when the moves are simultaneous, versus your prediction about what would happen if the firms moved in a “more orderly” way.
- (f) Using best response arrows in the bi-matrix game representation, display the NE. What is it, or what are they? (Hint: there might be more than one, so we need to think about that later in the course.)

		Small	
		Increase Capacity	Does not Expand
Large	Increase Capacity	1 10, 5	3 25, 7
	Does not Expand	2 15, 16	4 20, 10

Best response arrows are shown: a downward arrow from cell 1 to cell 2, an upward arrow from cell 4 to cell 3, a rightward arrow from cell 1 to cell 3, and a leftward arrow from cell 4 to cell 2.

(Does Not Expand, Increases Capacity) with payoffs (15, 16)  
 (Increases Capacity, Does Not Expand) with payoffs (25, 7)