Worksheet 10.2

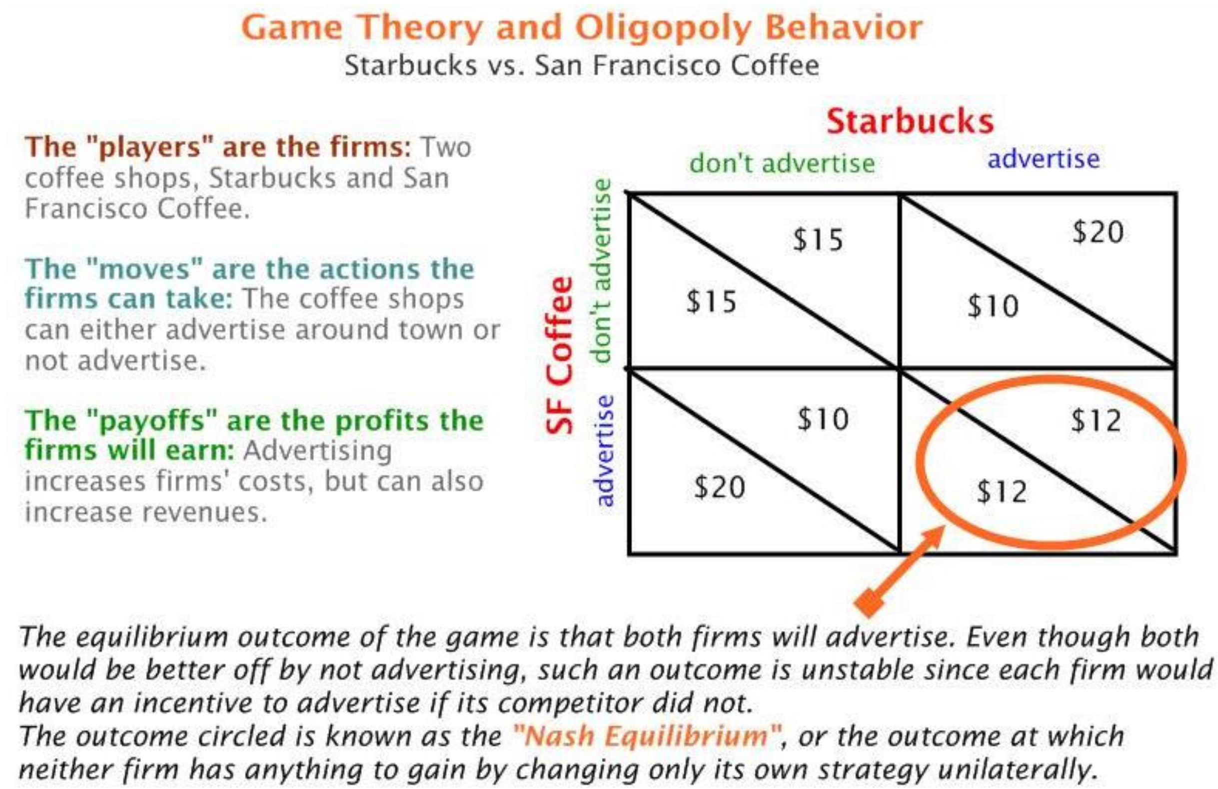
Understanding Oligopoly Behavior, a Game Theory Overview

Part 1:

What makes oligopolistic markets, which are characterized by a few large firms, so different from the other market structures we study in microeconomics? Unlike in more competitive markets in which firms are of much smaller size and one firm's behavior has little or no effect on its competitors, an oligopolist that decides to lower its prices, change its output, expand into a new market, offer new services, or adverstise, will have powerful and consequential effects on the profitability of its competitors. For this reason, firms in oligopolistic markets are always considering the behavior of their competitors when making their own economic decisions.

To understand the behavior of non-collusive oligopolists (*non-collusive meaning a few firms that do NOT cooperate on output and price*), economists have employed a mathematical tool called Game Theory. The assumption is that large firms in competition will behave similarly to individual players in a game such as poker. Firms, which are the 'players' will make 'moves' (referring to economic decisions such as whether or not to advertise, whether to offer discounts or certain services, make particular changes to their products, charge a high or low price, or any other of a number of economic actions) based on the predicted behavior of their competitors.

If a large firm competing with other large firms understands the various 'payoffs' (referring to the profits or losses that will result from a particular economic decision made by itself and its competitors) then it will be better able to make a rational, profit-maximizing (or loss minimizing) decision based on the likely actions of its competitors. The outcome of such a situation, or game, can be predicted using payoff matrixes. Below is an illustration of a game between two coffee shops competing in a small town.



In the game above, both SF Coffee and Starbucks have what is called a *dominant strategy.* Regardless of what its competitor does, both companies would maximize their outcome by advertising. If SF coffee were to *not advertise,* Starbucks will earn more profits ($20 vs $10) by advertising. If SF coffee were to *advertise,* Starbucks will earn more profits ($12 vs $10) by advertising. The payoffs are the same given both options for SF Coffee. Since both firms will do best by advertising given the behavior of its competitor, both firms will advertise.

Clearly, the total profits earned are less when both firms advertise than if they both did NOT advertise, but such an outcome is *unstable* because the incentive for both firms would be to *advertise.* We say that *advertise/advertise* is a***Nash Equilibrium*** since neither firm has an incentive to vary its strategy at this point, since less profits will be earned by the firm that stops advertising.

As illustrated above, the tools of Game Theory, including the 'payoff matrix', can prove helpful to firms deciding how to respond to particular actions by their competitors in oligopolistic markets. Of course, in the real world there are often more than two firms in competition in a particular market, and the decisions that they must make include more than simply to advertise or not. Much more complicated, multi-player games with several possible 'moves' have also been developed and used to help make tough economic decisions a little easier in the world of competition.

Game theory as a mathematical tool can be applied in realms beyond oligopoly behavior in Economics. In each of the videos below, Game Theory can be applied to predict the behavior of different 'players'. None of the videos portray a microeconomic scenario like the one above, but in each case a payoff matrix can be created and behavior can be predicted based on an analysis of the incentives given the player's possible behaviors.

Part 2:

Watch each of the videos below. For each one, create a payoff matrix showing the possible 'plays' and the possible 'payoffs' of the game portrayed in the video. Predict the outcome of each game based on your understanding of *incentives* and the assumption that humans act rationally and in their own self-interest.

'The Princess Bride' – Where's the poison?

'Golden Balls' – Split or steal

'Murder by Numbers' – Whoever talks first

Discussion Questions:

1. Why is oligopoly behavior more like a game of poker than the behavior of firms in more competitive markets?
2. What does it mean that firms in oligopolistic markets are 'interdependent' of one another?
3. Among the videos above, which games ended in the way that your payoff matrix and understanding of human behavior and rational decision making would have predicted?
4. How often did the equilibrium outcomes according to your analysis of the payoff matrices correspond with the socially optimal outcome (i.e. the one where total payoffs for all players are maximized or the total losses minimized)?