Econ 301: Intermediate Microeconomics Spring 2014

Discussion Section #11 Handout April 25th

Oligopoly

- **Cournot-Nash:** Firms choose output quantities simultaneously. Each firm anticipates how the other(s) will respond to its choice. $y = y_A + y_B$. $BR_A(y_B)$ is driven from $\frac{\partial \pi_A}{\partial y_A} = 0$. If cost function is same for each firm, BR is symmetric.
- **Cartel:** Firms act as like monopolist to choose y. They split aggregated production level across firms in order to minimize total cost. If cost functions are identical, each firm produce equally.
- **Stackelberg (leader-follower):** Firms compete in quantities, but the leader firm chooses its quantity first, anticipating the best response of the follower.
- **Bertrand:** Firms compete in prices, choosing them simultaneously.

Cournot-Nash Equilibrium

1. Suppose there are two firms in the market, firm A and firm B. The two firms have the same total cost function, $TC(y^i) = 30y^i$. Demand for their product in the market is given by $p = 120 - y$, where y is the total output in the market.
    a. Give the best response function of each firm

    b. Determine the quantity supplied by each firm, the total quantity supplied, and the market price

    c. Find each firm's profit and the deadweight loss (DWL) in the market (show on a graph)

2. Now suppose the two firms form a cartel. What are the new equilibrium price and quantity, profit of each firm, and deadweight loss? Is collusion sustainable in the short run (think about whether the firms have an incentive to cheat)?

3. How would the analysis from part 1. change if there were N firms instead of just 2? Repeat parts a-c with N firms in the market (note that your answers should be functions of N). What happens to the equilibrium price and quantity as the number of firms grows large?

    (Hint: use the fact that $\lim_{N\to\infty} \frac{N}{N+1} = 1$)

Monopoly and Labor Market

- **Maximizing profit rule:** Consider short-run so there is one input: labor.
  Maximizing profit by choosing y : $\pi = \mathrm{TR}(y) - \mathrm{TC}(y)$. FOC : $\mathbf{MR(y) = MC(y)}$
  Maximizing profit by choosing L : $\pi = \mathrm{TR}\big(y(L)\big) - wL$. FOC : $\frac{dTR(y(L))}{dL} = w$

$$\frac{d\,TR(y(L))}{d\,y(L)}\frac{d\,y(L)}{d\,L} = w \quad \Leftrightarrow \quad \boldsymbol{MR(y)\,MP_L = w}$$

- **Monopsony:** The only demand party determines quantity to maximize its payoff. In labor market, if there is one firm hiring workers, then the monopsony firm chooses optimal labor level to maximize its profit. Wage is not a constant any more.

4. Consider a firm with the short run production function $y(L) = 20L - L^2$ where labor supply is $w(L) = 2L$. Output market is perfectly competitive and $p = 1$.

   a. Derive labor demand function in a competitive labor market, and find equilibrium employment and wage rate respectively.

   b. Find a monopsony optimal level of labor L and wage w.

   c. Compare **a** and **b** in a graph and find DWL of monopsony.