Homework assignment #2

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Due date: May 21, 2013 (before final)

Problem 1

Derive equation 6 and 8 from Barro (1998).

Problem 2

Production in a capital abundant country, $\frac{K}{L} > 1$, is described by $Y = K^{\alpha}L^{1-\alpha}$. The country welfare function is $W = rK + wL$, where r and w are the competitive rental and wage rates. The country chooses between two policies: importing capital and importing labor. Rank these two policies.

Problem 3

Derive equation 11 from Gokmen (2012). Briefly explain why in regression 13 it is necessary to account for country fixed effects, year fixed effects and selection.

Problem 4

In the Solow model with population and technology growth derive the steady state level of capital.

Problem 5

There are two producers, each having zero marginal costs. The demand function is $p(q) = (a+q)^{-3}$, $a > 1$, $q = q_1 + q_2$.

1. Both producers play the Cournot quantity competition game. Find q_1, q_2, p_1, p_2.

2. Now suppose that both producers play the Stackelberg game, producer 1 being the leader and producer 2 being the follower. Find q_1, q_2, p_1, p_2.

Problem 6

Consumers are located on interval $[0, 1]$, and each wants to buy one unit of the homogenous product produced by firms. Each firm is situated on the edges of the interval. When a consumer buys a unit from the firm located at distance d, her utility is $U = d - p$ (i.e. the consumer prefers goods located further away).

1. The two firms produce at 0 costs and compete in prices. Find an equilibrium in prices and the market shares of each firms.

2. Now a third firm enters in the middle of the interval, i.e. its location is $x = 0.5$. Given that the two firms at the edges charge the same price p, find the best response of the middle firm.

3. Given that one of the edge firms charges p and the middle one charges $q > p + 0.5$, what is the best response of the other edge firm?

Problem 7

Consider a monopolist that produces a single good whose quality is either high or low. The marginal cost of production is \$4 if high and \$3 if low. Each of N consumers is willing to pay \$10 for high and \$5 for low quality. Consumers buy a product in the first period, learn its true quality and possess complete information in the second period. Suppose, the firm can advertise for its good on TV. The cost of an ad is $\$A$ if low and $\$\alpha A$ if high, $\alpha \in (0,1)$. That is, a high quality good is easier to advertise. The discount rate is β. Find the minimum number of ads that the high monopolist needs to buy to signal its quality.

Problem 8

In a job market signaling game two identical firms compete for a worker, whose productivity can be low, $\theta = 1$, or high, $\theta = 2$. The costs of acquiring e years of education is $c(e, \theta) = \frac{e^2}{\theta}$. Worker's wage is $2(1 + \mu e)$ if considered high and $(1 + \mu e)$ if considered low, $\mu > 0$.

1. Find e_L and e_H in a perfect information outcome. Draw a graph.
2. Find such $\bar{e}$ that a high worker can separate herself from a low worker. Define firms' beliefs and the wage schedule.
3. For what values of μ is the separation possible?

Problem 9 (this topic is to be covered on May 14.)

An object is to be sold on a first-price sealed-bid auction. There are two risk-neutral bidders with private values for that object, v_i, $v_i \sim G[0, \bar{v}]$, where G is a cumulative distribution function.

1. Find agent's expected utility from bidding r when the agent's private value is v.
2. Find the bidding function $b^*(v)$, show that $b^*(v) < v$ and $\frac{\partial b^*(v)}{\partial v} > 0$.

Suppose that the owner of the object considers selling the object on the second-price auction.

1. How does the bidding behavior of bidders change? Draw a graph.
2. Compare the expected revenue in both auctions.