Final Exam: Econ 3300

December 13, 2012

There are a total of 120 points on the exam. Show all of your work. This is closed book exam. You are not allowed to use your textbook, notes, or any other resource besides what I have given you. If you do not understand a question or find the question vague, ask me about it. Likely other people will be having the same trouble. If you decide you need to make additional assumptions after asking me, clearly state your assumptions when completing the problem.

You may use calculators for arithmetic but no functions (or other short-cuts). Good luck!

Medium Length Questions (*40 pts.*)

True / False / Uncertain: Please answer the following questions in 2-4 paragraphs. Where appropriate, you are encouraged to draw pictures / diagrams to help explain your answer. Each question is worth ***10 points***.

1. Since states with restructured (de-regulated) electricity markets have not seen an appreciable decrease in retail electricity prices, there are unlikely to ever be any cost savings associated with making wholesale electricity markets competitive.
2. A cap-and-trade system for pollution is equivalent in ***outcomes*** to a pollution tax if the cap on emissions is set at the level where the marginal benefits of pollution reduction are equal to the ***expected*** marginal cost of abatement. (The expected marginal cost of abatement curve is not the curve that necessarily determines outcomes; the actual marginal cost of abatement curve determines outcomes which may be different.)
3. Building new transmission lines is always a complement to building a new electricity generating unit.
4. There is no way to regulate a natural monopoly in a way that does not result in any deadweight loss *and* for the natural monopoly to have non-negative profits.

Analytical and Longer Questions (*80 pts.*)

Answer 4 of the following 5 questions. All questions are worth 20 points. Answering more questions will not get you extra points. I will only grade the first four I see.

1. There are two firms (A and B) in a town that produce pollution, all of which stays in the town and mixes uniformly in the town. Firm A's marginal cost of abatement is $MC_A = 4000 - E$ and firm B's marginal cost of abatement is $MC_B = 6000 - E$ where E is the tons of emissions for each firm. The Department of Environmental Quality (DEQ) has determined that the efficient level of emissions is 5,000 tons.

   (a) ***(5 pts.)*** How many tons of pollution does each firm emit without regulation? The DEQ decides to impose a regulation such that the efficient amount of pollution is emitted. The DEQ decided it is fair that each firm emits the same amount of pollution (2,500 tons each), what is the total cost of abatement for each firm and how much pollution must each firm abate?

   (b) ***(5 pts.)*** If instead of requiring each firm to emit the same amount, the DEQ decided to pursue a cap-and-trade program where each firm is given 2,500 pollution permits (at no cost) and then is free to trade them with each other, how much will each firm pollute?

   (c) ***(5 pts.)*** What is each firm's total cost of abatement (abatement costs plus permit costs) under the cap-and-trade program? Assume that all permit trades happen at the same price.

   (d) ***(5 pts.)*** Which policy (cap-and-trade or uniform standard) is more efficient? Why? How much deadweight loss is created by the less efficient option?

2. You are considering buying a new car and are choosing between a Toyota Prius that gets 50 miles per gallon and a Toyota Corolla that gets 30 miles per gallon. The Prius cost $24,000 and the Corolla costs $16,000. Both cars will last 15 years and you expect that you will drive 15,000 miles per year in either car. Furthermore, you expect gasoline will cost $4 per gallon over the life of the car.

   (a) ***(10 pts.)*** If you have a 5% discount rate, which car should you buy if you view them as equivalent in every other manner? Recall that

   $$PV = AV\Big(\frac{(1+r)^t - 1}{(1+r)^t}\Big)$$

   (b) ***(10 pts.)*** The government is considering subsidizing the cost of a Prius to consumers through a tax credit. Present an economic argument for ***or*** against this plan based on what we have discussed in class.

3. Doug's Doo-Dads has bought all of the other doo-dad manufacturers in the US and has convinced legislators to ban doo-dad imports. Thus Doug has a doo-dad monopoly. Doug faces an demand curve of $Q = 200 - P$ and his marginal cost is \$20 per doo-dad.

   (a) ***(6 pts.)*** What price should Doug charge for his doo-dads and how many doo-dads will be consumed? What is the deadweight loss from Doug's monopoly?

   (b) ***(7 pts.)*** Suppose that making doo-dads creates a large amount of pollution and has a external marginal cost of \$30 per doo-dad. What is the deadweight loss from Doug's monopoly now? Note that there is no regulation that would cause Doug to take account of the pollution he produces when making doo-dads. He does not bear any of the external cost.

   (c) ***(7 pts.)*** Legislators realize that they are paying a lot for their doo-dads compared to other countries and lift the doo-dad import ban. Assume this means the doo-dad market is perfectly competitive and that all manufacturers have a marginal cost of \$20 per doo-dad. What is the deadweight loss in the doo-dad market now? Compare your answer to part (b) and explain why there are any differences if there are.

4. Describe how restructured electricity markets work. Describe the incentives faced by all market participants (electricity generators, independent system operators,[1] transmission firms, distribution firms, retail providers, and end consumers.) and how we expect them to behave. How is this market structure different from states that have not restructured their electricity markets?

5. Clearly and precisely define what you mean by energy security. Using this definition, propose a set of policies that you believe would make the United States energy secure. Describe in detail what you would expect each of these policies to achieve. Discuss the costs and benefits of your set of policies and then discuss if you believe they should be implemented. (Do the benefits outweigh the costs?)

[1] Independent system operators are the, usually non-profit, entities that operate the wholesale markets.