NYU STERN
NEW YORK UNIVERSITY · LEONARD N. STERN SCHOOL OF BUSINESS

Firms and Markets
Examinations

December Examination
December 2007

Please check that you have 16 pages in your copy of this exam. Answer each question in the space provided. If you need more space, please use the back of each page (but be clear to the grader where the answer is). You may consult both sides of a single page of notes. Calculators are permitted.

There are 75 points to be gained in this examination. Since the examination will last 75 minutes, you should use the points allocated to each question as an indication of how much time to spend answering it. It is not necessarily optimal to do the questions in order – look to see where the quick points are and get those first.

When we start take the time to look through the exam and allocate your time strategically. The first question is worth 25 points, with several parts, the second is worth 20 points, with a few parts, and the last is worth 30 points with several parts.

I understand that the honor code applies: *I will not lie, cheat, or steal to gain an academic advantage, or tolerate those who do.*

_____
(Name and Signature)

Every question in this exam builds on the following fact scenario, so have a read of it now:

> "Dave is looking to start a carbon trading exchange. At this exchange carbon credits would be traded between carbon emitting companies. An exchange makes money by taking a % fee on each transaction: for example, if $50 is transacted, and the fee for each party to the transaction is 2% then the exchange (in total) earns $1 + $1 = $2. (Remember there has to be both a seller and a buyer for a transaction to go through – so the buyer and the seller are both paying a 2% fee)."

1. [25 points] The Game Theory Question

The value proposition for Dave's exchange rests on the government capping carbon emissions and then allocating property rights in emissions so that they can be traded. Without the government capping emissions anyone can create as much carbon as they wish and carbon trading is a mere sideline to give the public relations team a "we are green" set of talking points.

To get carbon credits capped Dave engages in lobbying. His scheme needs to get endorsed by the Senate Industry Committee which is headed by Senator 'Stinky' Miasma. Miasma is a senator from Michigan and thus cares deeply about the effect of a cap on the auto industry.

Dave can choose to lobby for three levels of emissions cap: High, Medium and Low. Miasma can either choose to endorse or block Dave's proposal. If Miasma blocks, he will suffer some political fallout that does not vary with the level of the proposal: the value of this political fallout is -10. If Miasma endorses a scheme, the auto industry may get hurt: a high cap does not hurt the auto industry and so there is no political cost; a medium cap hurts the auto industry and results in a political cost to Miasma of -5; and endorsing a low cap results in a political cost of -15. Endorsing a scheme has no additional impact on the senator's payoffs beyond these impacts on the auto industry.

If any of Dave's propositions get blocked, he gets a payoff of zero. If he gets a high cap endorsed, there will not be many transactions, and the market price will be low, so total market transactions will be $100; if the medium cap is endorsed, market transactions will amount to $200; and if the low cap is endorsed, market transaction will amount to $400. Dave is planning on charging a 2% fee, payable by both buyers and sellers, on his exchange.

The game proceeds by Dave engaging in his lobbying effort and then, following that, Miasma choosing to endorse or block the proposal.

a. [8 points] What are the strategies available to each player?

b. [5 points] Diagrammatically portray the game (i.e. show it in a matrix or game tree).

c. [2 points] What is the SPNE?

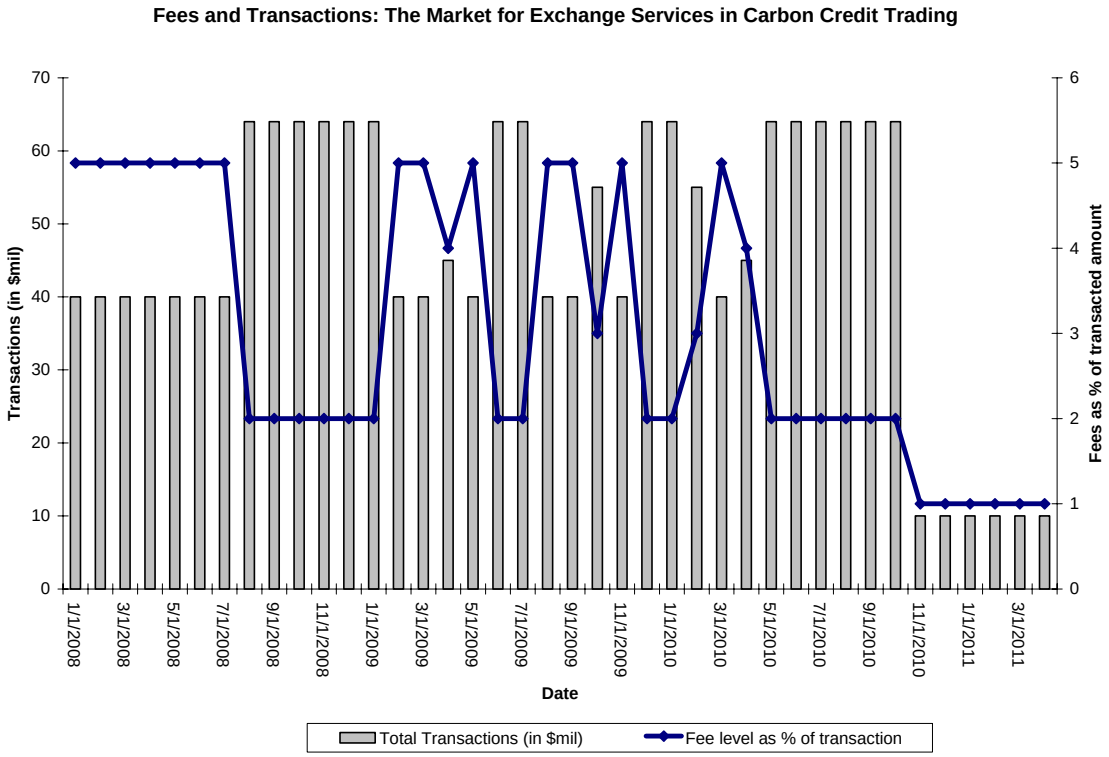
d. [4 points] Find all Nash equilibria in this game.

e. [6 points] Explain why economists tend to prefer to use the SPNE rather than one of the other Nash equilibria as a prediction about how a game such as this would be played.

2. [30 points] A Market Data Question

Dave's carbon exchange is now in business. After experimenting with pricing, Dave's carbon trading exchange eventually settles on offering a flat fee of x%. No matter how much each party transacts, each party has to pay x% of the value of the transaction. This flat fee structure becomes the industry standard.

The graphs below show data on the level of fees in the market for exchange services and the total amount of transactions of carbon credits occurring across all exchanges. Remember, if there are two exchanges, they will compete against each other for transactions. The exchange with the lowest fees should (all things being equal) attract more transactions.



The following information accompanies the data:

- Until 7/1/2008 Dave's exchange is the only place to trade carbon credits.
- By 8/1/2008 a competing exchange, E2, was up and running. E2 offered exactly the same services as Dave's exchange. Dave's exchange and E2 were perfect substitutes.
- On 5/1/2010 a third exchange E3 enters the market.
- Up until 11/1/2010, all traded credits were guaranteed to be useable in all states in the USA and Canada. On 11/1/2010 California, Florida and Texas all issue credits that are not useable in any other states. Furthermore these credits cannot be recognized as state-specific in any of the exchanges, so that a buyer only finds out if they are state-specific after they have been bought.
- Also on 11/1/2010 two more exchanges enter the market for exchange services: E4 and E5 are offshoots of existing stock exchanges and share back-office trade processing facilities with their parent stock exchanges.

a) [3 points] Use one word to describe the market structure up until 7/1/2008.

b) [4 points] On 8/1/2008 the amount of transactions was $64 million. Using the variation in price and quantity between 7/1/2008 and 8/1/2008 quantify the elasticity of market demand for exchange services. (show your working)

c) [4 points] What economic model of competition best describes the market structure between 8/1/2008 and 1/1/2009? (one sentence only).

d) [4 points] What do you think is the marginal cost to an exchange of a $100 transaction on 12/1/2008? (Max. 3 sentence answer)

e) [6 points] What is going on between 1/1/2009 and 4/1/2010? What is up with that volatile pricing?

f) [9 points] Interpret the market changes that occur following 10/1/2010. In your answer you should refer to specific economic models where appropriate.

In all these questions ignore any issues that might depend on the duration of the carbon credit. That is, treat the time within which the credit must be used as irrelevant to any of the questions I have asked.

3. [20 points] A Price Discrimination Question

After a while Dave decides to expand his business. He starts up a firm that plants trees in rainforests in Brasil, Indonesia and Sub-Saharan Africa on behalf of individuals that want to do something "green".

Dave notices that individuals come in three types that have varying valuations for trees planted in different locations. There are equal numbers of each type. Each individual is willing to plant up to three trees, but never more than one in each location. They value the three locations as follows:

	Value per tree		
Consumer Type	Brasil	Indonesia	Sub-Saharan Africa
1	$1000	$50	$200
2	$160	$90	$1000
3	$10	$81	$5

These values tell you, for example, that a consumer of type 1 values equally $1000 in cash and a tree planted in Brasil. Dave's marginal cost is zero for a tree planted in any of the three locations.

(a) [5 points] If Dave can identify the type of each consumer, how should Dave set his price to type 2 consumers to maximize his profit?

(b) [5 points] Suppose Dave cannot identify buyers' types. And further, suppose that Dave can only post prices for individual locations (i.e. bundling is impossible). How should Dave price to maximize profits? Show and explain your working clearly.

(c) [10 Points] Now suppose Dave can bundle, in addition to offering prices for individual locations. How should he price? [Still assuming that Dave cannot identify buyers' types]. Show and explain your working clearly.