Written Exam Economics summer 2021

Financial Markets Microstructure

August 21, 2021

This exam question consists of 3 pages in total

Answers only in English.

A take-home exam paper cannot exceed 10 pages – and one page is defined as 2400 keystrokes

The paper must be uploaded as one PDF document. The PDF document must be named with exam number only (e.g. '1234.pdf') and uploaded to Digital Exam.

Be careful not to cheat at exams!

Exam cheating is for example if you:

- Copy other people's texts without making use of quotation marks and source referencing, so that it may appear to be your own text
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- Reuse parts of a written paper that you have previously submitted and for which you have received a pass grade without making use of quotation marks or source references (self-plagiarism)
- Receive help from others in contrary to the rules laid down in part 4.12 of the Faculty of Social Science's common part of the curriculum on cooperation/sparring

You can read more about the rules on exam cheating on your Study Site and in part 4.12 of the Faculty of Social Science's common part of the curriculum.

Exam cheating is always sanctioned by a written warning and expulsion from the exam in question. In most cases, the student will also be expelled from the University for one semester.

Problem 1

This problem explores the Glosten-Milgrom model with feedback, in which the firm can use the stock market to gauge the attractiveness of an investment project.

In particular, suppose that the firm is facing a binary investment decision. If it invests in the project (e.g., decides to develop a new product), this project will yield net return v_ω, which depends on the state of the world $\omega \in \{l, h\}$ with $\mathbb{P}(h) = 1/2$. If the firm does not invest, it gets zero. The returns are such that $v_h > 0 > v_l$, i.e., the firm wants to invest in the project if and only if the state is $\omega = h$. The baseline value of the firm is μ; it changes to $\mu + v_\omega$ if the firm invests and remains at μ otherwise.

The timeline is as follows: the firm announces the investment project to the public, one period of trading in the financial market follows, the firm observes trading outcomes and decides whether to proceed with investing in the project or not.

The financial market is modelled as a standard Glosten-Milgrom setting: one trader can submit a buy or a sell order for one unit of the asset. The trader is a profit-maximizing insider with probability $\pi \in (0, 1)$, in which case he knows the true state ω. (Think of the insider as an expert in this industry.) With probability $1 - \pi$, the trader is a noise trader, who submits a buy or a sell order with equal probabilities regardless of ω. Orders are executed by a representative competitive dealer, who provides bid and ask quotes.

1. Suppose that the insider buys the asset when $\omega = h$ and sells when $\omega = l$.

   (a) What is the expected net value of investment for the firm when it observes a buy order in the market? When it observes a sell order?

   (b) For which values of π is it optimal for the firm to "follow the market", i.e., to proceed with the investment when its announcement generates demand for its stocks and to revert its decision when the announcement triggers a "sell-off"? What does this condition mean intuitively?

   (c) Assuming that the condition you derived in (b) holds and that the firm thus follows the market, derive the bid and ask prices quoted by the dealer.

   (d) Assuming the condition from (b) holds and given everything you derived, is it optimal for the insider to follow the strategy we assumed? Conclude whether the situation described above constitutes an equilibrium.

2. Assume now the condition from (1b) does not hold and that $\bar{v} = \frac{v_h + v_l}{2} < 0$. Derive formally the pure-strategy equilibrium that occurs in this case. Explain intuitively what happens in this equilibrium and why.

3. Assume now the condition from (1b) does not hold and that $\bar{v} = \frac{v_h + v_l}{2} > 0$. Derive formally the pure-strategy equilibrium that occurs in this case. Explain intuitively what happens in this equilibrium and why.

Problem 2

We have discussed in class that corporate bond markets operate on the basis of RFQs (requests for quotes). The reality is slightly more intricate. The traders typically have a choice between calling a dealer on the phone (voice trading) and using an electronic platform to submit RFQs to a set of dealers (electronic trading). These two methods of trading have coexisted for some time, with electronic trading gradually gaining market share.

Answer the following questions to the best of your ability, relying on the knowledge you have obtained throughout the course. Provide at least two reasons/arguments/suggestions when answering each question.

1. Given the option to trade electronically, why could the traders and dealers prefer to use voice trading?

2. There is some evidence that the spread of electronic trading has led to better quotes being offered in voice trading, and that dealers with more electronic trading in a given bond tend to provide better prices in their voice trading. Why, in your opinion, could this happen?

3. Suppose you are contracted as a consultant by a small electronic exchange, with the goal of increasing the market share of this exchange in corporate bond trading. What suggestions can you give to the exchange that would allow it to attract trading flow?