Candidate instructions

ECON4335 – Economics of Banking

This is some important information about the written exam in ECON4335. Please read this carefully before you start answering the exam.

Date of exam: Wednesday, 23 November 2022

Time for exam: 09.00 – 12.00 (3 hours)

Language: The examination text is given in English, and you submit your response in English.

The problem set: The problem set consists of three questions, with several sub-questions. They count as indicated. Start by reading through the whole exam, and make sure that you allocate time to answering problems you find easy.

Sketches: In this exam, you may submit sketches on all questions. You are to use the sketching sheets handed to you. You can use more than one sketching sheet per question. See instructions for filling out sketching sheets below. It is very important that you make sure to allocate time to fill in the headings (the code for each problem, candidate number, course code, date etc.) on the sheets that you will use to add to your answer. You will find the code for each problem under the problem text. You will NOT be given extra time to fill out the "general information" on the sketching sheets (codes for each problem, candidate number etc.)

Access to your answer: You will not have access to your exam answer right after the exam. The reason is that the sketches must be scanned into your answer. You will have access to the answer after approx. 2-3 days.

Resources allowed: No written or printed resources is allowed (except if you have been granted use of a dictionary from the Faculty of Social Sciences).

Grading: The grades given: A-F, with A as the best and E as the weakest passing grade. F is fail.

Grades are given: 14 December 2022

1(a) Question 1(a)

Weight: 10 points

Is the following statement true, false, or uncertain? Briefly explain verbally.

"Achieving perfect market competition shall be a goal of banking regulation. Because under higher degree of market competition, banks will be forced to be prudent and take less risks in order to avoid bankruptcy, the banking system will be more stable."

Fill in your answer here

Maximum marks: 10

1(b) Question 1(b)

Weight: 10 points

Is the following statement true, false, or uncertain? Briefly explain verbally.

"Central bank's large-scale purchases of illiquid assets during banking crises can prevent the prices of illiquid assets from falling too much, thus reduce the likelihood of bank runs."

Fill in your answer here

Maximum marks: 10

1(c) Question 1(c)

Weight: 10 points

Is the following statement true, false, or uncertain? Briefly explain verbally.

"Regulatory liquidity requirements are not needed to avoid bank runs; because when banks see any sign that shows an increased probability of bank run in the near future, banks will have the incentive to get themselves prepared, for example, by selling assets in the market and increasing their liquidity buffer to avoid the potential bank run."

Fill in your answer here

Maximum marks: 10

1(d) Question 1(d)

Weight: 10 points

Is the following statement true, false, or uncertain? Briefly explain verbally.

"There is sometimes a shortage of credit in the market, such that some borrowers cannot get loans from banks even if these borrowers are willing to pay higher loan rates. When this happens, banks should be encouraged to increase their loan rates, in order to clear the market and to satisfy those borrowers who have the willingness to pay higher interest rates on their loans."

Fill in your answer here

Maximum marks: 10

2(a)

Question 2(a)

Consider an economy where there is a large number of risk-neutral entrepreneurs with limited liability and no initial wealth. Each of the entrepreneurs owns one project, and each project can only be started after 1 unit of initial investment. To finance the projects, each entrepreneur can borrow 1 unit from a monopolistic and risk-neutral bank, then pay back after her project returns. The bank raises deposits from depositors and lends to the entrepreneurs at a gross lending rate R for each loan. The bank does not have deposit insurance, and depositors are happy to deposit in the bank as long as the expected gross return rate of the bank deposits is equal to 1.

The population of the entrepreneurs can be normalized to be 1. Half of the entrepreneurs' projects are safe projects: Each safe project generates a gross return of 2 with probability 0.85, or a gross return of 0 otherwise. Half of the entrepreneurs' projects are risky projects: Each risky project generates a gross return of 4 with probability 0.4, or a gross return of 0 otherwise. Entrepreneurs know the types of their own projects; the bank only knows the payoff structure of each type of the projects, but it does not know the exact type of any individual entrepreneur's project. As a result, the bank has to ask for the same gross lending rate R for every entrepreneur that borrows from the bank.

Suppose that the bank can choose any value of R. Is there any range of R, under which **only** entrepreneurs with risky projects are willing to borrow from the bank? (5 points)

Is there any range of R, under which **only** entrepreneurs with safe projects are willing to borrow from the bank? (5 points)

Fill in your answer here

Maximum marks: 6

2(b)

Question 2(b)

Show that in this economy, in equilibrium the profit-maximizing bank is only willing to lend to entrepreneurs with risky projects (5 points). Compute the bank's lending rate in the equilibrium (5 points).

Fill in your answer here

Maximum marks: 10

2(c) Question 2(c)

Note that the expected gross returns of both types of projects are greater than 1, so that both types of projects are socially desirable and should both be financed. To induce the bank to lend to all entrepreneurs, the regulator in the economy can set a cap, $\overline{R}$, on the gross lending rate so that the bank is not allowed to charge any gross lending rate that is greater than $\overline{R}$. Compute the $\overline{R}$ that fulfills the regulator's purpose (5 points).

Fill in your answer here

Maximum marks: 5

3(a)

Question 3(a)

Consider a small open economy with two sectors. One sector (oil sector) produces oil, which can be traded internationally; the other sector (house sector) produces houses, that are nontradable and **have to be consumed domestically in the same period when they are produced**.

The economy is populated by infinitely many consumers, who live for two periods, $t = 0, 1$. All the consumers are identical, so that we can focus on one representative consumer. The timeline of events is as follows:

At $t = 0$, the representative consumer is born with an initial nominal debt b_0, with $b_0 < 0$. She receives a real income y_0^T (with $y_0^T > 0$) from the oil sector and a real income y_0^N (with $y_0^N > 0$) from the house sector. y_0^T is a random variable whose value is drawn from a probabilistic distribution, and y_0^N is a constant number. After y_0^T and y_0^N are revealed, the consumer has to determine how much oil she wants to consume (denoted by c_0^T) and how much house she wants to consume (denoted by c_0^N). Normalize the price of oil to be 1 and denote the price of houses by P_0^N.

There is a financial market where the consumer can borrow and adjust her debt level. Assume that the net nominal interest rate in the financial market is fixed at 0. At $t = 0$, the consumer needs to pay down her initial debt b_0, then she can borrow new nominal debt b_1 and carry it on to the next period. The consumer's new borrowing has to be collateralized by her income, such that $b_1 \geq -\kappa\left(y_0^T + P_0^N y_0^N\right)$, with $0 < \kappa < 1$. **It is known** that the consumer has a lot of initial debt (that is, b_0 is very negative), so that her borrowing constraint is binding -- that is, $b_1 = -\kappa\left(y_0^T + P_0^N y_0^N\right)$.

At $t = 1$, the representative consumer starts with debt b_1 and receives a real income y_1^T (with $y_1^T > 0$) from the oil sector. y_1^T is a constant number, and we normalize the price of oil to be 1. She has to pay down her debt b_1 and determine how much oil she wants to consume (denoted by c_1^T). As the economy will end after $t = 1$, the consumer must pay down all her debt within period $t = 1$.

The consumer gains utility from consumption, measured by the sum of the natural logarithms of her real consumptions. That is, her lifetime utility can be specified as $\ln\left(c_0^T\right) + \ln\left(c_0^N\right) + \ln\left(c_1^T\right)$.

(a) Specify the representative consumer's budget constraints in both periods, and specify her lifetime utility optimization problem under the budget constraints and the borrowing constraint (10 points).

Fill in your answer here

Maximum marks: 10

3(b)

Question 3(b)

Derive the first-order conditions with respect to c_0^T and c_0^N (5 points).

Show that the house price is determined as $P_0^N = \frac{c_0^T}{c_0^N}$ (5 points).

Fill in your answer here

Maximum marks: 10

3(c)

Question 3(c)

Given that the consumer's borrowing constraint is binding, using the results in Question 3(b) and the consumer's budget constraints, compute the consumer's oil consumption c_0^T at period $t = 0$ which is a function of y_0^T (5 points).

Suppose that the economy can be in one of the two states at $t = 0$:

(1) The economy can be in the normal state, such that the consumer's revealed oil income y_0^T is equal to a constant number $\overline{y}$;
(2) The economy can also be in the crisis state, such that the consumer's revealed oil income y_0^T is equal to a constant number $\overline{y} - 1$. That is, in the crisis state, the consumer's oil income drops by 1, compared with her oil income in the normal state.

How does c_0^T react to the crisis state, compared with c_0^T in the normal state (5 points)?

Explain why, in the crisis state, although the consumer's oil income drops by 1, her oil consumption c_0^T has to drop by more than 1, compared with c_0^T in the normal state (5 points).

Fill in your answer here

Maximum marks: 15