Candidate instructions

ECON4335 – The Economics of Banking – Postponed exam – Open book, home exam

Exam date and time: Monday, 18 January, 2021 from 09.00 – 14.00 (five hours)
Language: The examination text is given in English. You should submit your response in English.

Guidelines: You should answer Question 1a)-e) verbally in Inspera. For questions 2a)-c) and 3a)-c) applies: You should upload your text in pdf format - **one pdf per problem**. You can scroll back and forth in the problem set.

You should familiarize yourself with the rules that apply to the use of sources and citations.

The answers to your exams are not expected to meet the formal requirements for references and citations in the fall 2020 exam. However, you should make references by indicating the source in the text. Creating a bibliography is not required. Whether you choose to do so, or not has no impact on your grade. The purpose of a reference is that the examiner should be able to look up the source him/herself, either to read it or to evaluate your interpretation. If you are referring to a limited part of the source, the reference should indicate which part of the source you refer to by using page numbers. If you are quoting directly from a source, follow the normal citation practice – with quotations marks and references to the source.

The exam lasts for only five hours. We recommend that you use the available time to work on the problem set, as well as allocate time to scan attachments with graphs and/or equations.

The problem set: The problem set consists of three questions, with several sub-questions. They count as indicated.

Digital hand drawings/graphs/equations: You will find information about options for hand drawings on this website: https://www.uio.no/english/studies/examinations/submissions/options-for-hand-drawings.html

Submission in Inspera

- Read more about exam and submission in Inspera. https://www.uio.no/english/studies/examinations/submissions/.
- Remember: It is your responsibility to upload the **correct version of the correct answer**. (Check that this is the right answer.) Be sure to allocate enough time to upload your answers.
- When your answer is uploaded, you will see that the exam is uploaded and saved.
- To submit your answer, please see https://www.uio.no/english/studies/examinations/submissions/submit_answer/. You can either choose the “submit now” or the “Automatic submission”.
- You can make changes in your exam until the deadline.
- You will find the answer under Archives (please check that this is the right answer by opening the file).

Do you need technical support, or do you have any questions during the exam?

Please send an e-mail, titled “ECON4335” To hjemmeeksamen@sv.uio.no from your university email.

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

1

Question 1(a)

Weight: 10 points

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

"Banks are highly leveraged institutions; with high leverage, banks have the incentive to take excess risks."

Fill in your answer here

Maximum marks: 10

2

Question 1(b)

Weight: 10 points

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

"Credit rationing is a temporary phenomenon in credit market, because if banks' credit supply cannot fulfill all borrowers' demand, the market interest rate for loans will rise to clear the market and make credit supply equal to credit demand again."

Fill in your answer here

Maximum marks: 10

3

Question 1(c)

Weight: 10 points

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

"For a central bank that conducts monetary policy using corridor system, raising discount rate implies the central bank is moving towards tightening monetary policy."

Fill in your answer here

Maximum marks: 10

4

Question 1(d)

Weight: 10 points

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

"All bubbles are irrational, because rational people know that a bubble is worth more than its fundamental value and will burst for sure, so that they will never invest in bubbles."

Fill in your answer here

Maximum marks: 10

5

Question 1(e)

Weight: 10 points

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

"Holding liquid asset only benefits a bank when the liquidity market is under pressure, otherwise holding liquid asset is costly in the normal time. As a result, banks tend to hold less liquid asset in the normal time and rely more on liquidity market for liquidity management."

Fill in your answer here

Maximum marks: 10

6

Question 2(a)

Consider an economy that is populated by banks and investors over two periods, $t = 0, 1$. It is publicly known that:

- Half of the banks are bad banks, each of them holds one unit of bad security that returns 0 in $t = 1$
- Half of the banks are good banks, each of them holds one unit of good security that returns 1 in $t = 1$

However, whether a bank is good or bad is private information that is only known to the bank itself.

Now in $t = 0$ a banking crisis occurs and banks need to raise liquidity by selling securities in the market. The security market works as follows: for a bank, it meets investors in the market and proposes a price on his security; if an investor agrees with the proposed price, the security will be sold for the price from the bank to the investor. A bank is only willing to sell its security if the price exceeds the security's return in $t = 1$.

(Weight: 5 points) Is it possible that both good and bad banks are able to sell their securities in the market equilibrium? If yes, what is the market price for their securities? If not, why?

Maximum marks: 5

7

Question 2(b)

(Weight: 5 points) Characterize each of the market equilibria (or, the equilibrium, if the equilibrium is unique) by: (1) Who are the sellers in the equilibrium? (2) What is the equilibrium price for each security that is sold in the market?

Maximum marks: 5

8

Question 2(c)

(Weight: 5 points) What can you learn from this exercise, for banks who attempt to raise liquidity in banking crises by selling assets in an asset market where the quality of assets is private information?

Maximum marks: 5

9

Question 3(a)

Consider an economy with one good that extends over three periods, $t = 0, 1, 2$: There are many ex ante identical consumers (whose population is normalized to 1), each of the consumers is endowed with one unit of resource in $t = 0$. Consumers may want to consume either in $t = 1$ or $t = 2$, but whether one consumer prefers to consume early or late is only known in $t = 1$: With probability p a consumer is an impatient one (type 1 consumer), who only values consumption in $t = 1$; with probability $1 - p$ a consumer (type 2 consumer) is a patient one, who only values consumption at $t = 2$. The value of p is public information, but a consumer's type is private information that is only known to the consumer herself.

Let c_i denote the consumption of a type $i = 1, 2$ consumer. In $t = 0$, without knowing her type, a consumer's expected utility from consumption is $u = p \ln(c_1) + (1 - p) \ln(c_2)$.

The economy has two technologies of transferring resources between periods: Storage technology with gross return equal to 1, and a long-term investment technology with a constant gross return $R > 1$ in $t = 2$ for every per unit invested at $t = 0$. If necessary, an on-going long-term project can be liquidated, or, stopped prematurely at $t = 1$, with a return $0 < \delta < 1$.

(Weight: 15 points) Assume that the long-term investment technology is owned by banks, so that the consumers have to deposit in the banks to benefit from the long-term return. For an arbitrary bank, it collects deposits from consumers and makes a deposit contract with them: If a consumer claims to be type 1, she will withdraw c_1 in $t = 1$; if a consumer claims to be type 2, she will withdraw c_2 in $t = 2$. After making deposit contracts and collecting deposits, the bank invests α, $0 \leq \alpha \leq 1$ in storage, and $1 - \alpha$ in the long-term investment.

Banks are competing with each other, so all of them try to maximize consumers' expected utility in $t = 0$ when they make deposit contracts. Specify a bank's maximization problem in $t = 0$ and calculate its optimal choices on α, c_1, and c_2. Remember to include the incentive compatibility constraint $c_1 \leq c_2$ in the bank's problem.

Maximum marks: 15

10

Question 3(b)

After banks have collected deposits and made their investments in $t = 0$, as specified in the last question, now in the beginning of $t = 1$, when consumers' types are revealed, a pandemic hits the economy and many consumers are sick. However, whether a consumer is sick or not is private information.

What is publicly known now, is that type 1 consumers (no matter whether they are sick or healthy) will withdraw in $t = 1$ for sure. What is also publicly known, is that a population f of type 2 consumers are sick so that they want to withdraw in $t = 1$ for health care expenditure, and $0 < f < 1 - p$.

A bank run is defined as a phenomenon that all type 2 consumers want to withdraw in $t = 1$. We further assume that a bank run only happens if the incentive compatibility constraint is violated, i.e. when a type 2 consumer expects a lower than c_1 return if she waits until $t = 2$ to withdraw.

(Weight: 10 points) Show that, after knowing that a population f of type 2 consumers want to withdraw early in $t = 1$, there will be a bank run that all type 2 consumers want to withdraw in $t = 1$, if f is larger than a threshold value. Using your results in Question 3(a), compute the threshold value of f.

Maximum marks: 10

11

Question 3(c)

Now we assume that there is a central bank in the economy that serves as a lender of last resort. Banks are allowed to borrow from the central bank at a gross borrowing rate of 1, using their long assets as collateral; for example, in $t = 1$ a bank can borrow one unit from the central bank, if the bank has long assets that will return one unit in the future on its balance sheet, then in $t = 2$ the bank will repay the central bank by one unit return collected from the long assets.

(Weight: 10 points) Show that, with a central bank as the lender of last resort in this economy, there will never be a bank run in $t = 1$, no matter how high f is.

Maximum marks: 10