NTNU – Trondheim
Norwegian University of
Science and Technology

Department of Economics

Examination paper for SØK2010 Banking

Academic contact during examination: Snorre Lindset
Phone: 73 59 13 95

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Permitted examination support material: C /Flg formelsamling: Knut Sydsæter, Arne Strøm og Peter Berck (2006): Matematisk formelsamling for økonomer, 4utg. Gyldendal akademiske. Knut Sydsæter, Arne Strøm, og Peter Berck (2005): Economists' mathematical manual, Berlin.
Calculator: Casio fx-82ES PLUS, Citizen SR-270x, SR-270X College or HP 30S.

Language:	English
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Number of pages enclosed:	0

Final Exam - SØK2010 Banking

Lecturer: Xunhua Su

Spring 2015

<u>Note</u>: *The exam consists of eight problems. Each problem starts with a key word in bold.*

1. Bank Loan. (6%)

Researchers find that it is easier for firms to get a loan from the bank, where they have their daily checking accounts, than from other banks. Explain possible reasons for this finding. (Answer the question within 100 words.)

2. Functions of Financial Markets. (8%)

i) Give one example of financial markets that can transfer wealth from one period to another. Briefly explain how the market works to do so? (Answer the question within 80 words.)

ii) Give one example of financial markets that can transfer wealth from one state to another state of the same period. Briefly explain how the market works to do so? (Answer the question within 80 words.)

3. Adverse Selection and Moral Hazard. (6%)

Explain the key differences between adverse selection and moral hazard, and give one example of each. (Answer the question within 100 words.)

4. Bank Balance Sheet. (10%)

A bank balance sheet is a financial statement that summarizes the bank's assets (i.e., what the bank owns) and liabilities (i.e. what the bank owes) at a specific point of time.

i) Which of the following items belong to the assets-side of a bank balance sheet?

    (a) Bank's cash and deposit in the central bank

    (b) Deposit from depositors

    (c) Loans lent to business borrowers

    (d) Bank stocks issued to investors

    (e) Mortgages to homeowners

    (f) Banks ATM machines

    (g) Bank's bonds issued to the public

ii) What are the differences between bank capital requirement and reserve requirement? (Answer the question within 100 words.)

iii) In the above seven items of question i), which one(s) is the target of capital requirement and which one(s) is the target of reserve requirement?

5. Bank Run. (10%)

List three possible ways to stop a bank run. Discuss how they work to stop a bank run. Discuss their limitations. (Answer the question within 200 words.)

6. Monetary Policy. (10%)

Central banks influence the real economy through monetary policies. One of the important policy tools is to set the policy rate.

   i) Explain how a central bank can affect the real economy through changing the policy rate? (Answer the question within 100 words.)

  ii) The Norwegian policy rate has often been above 6% in the past 30 years, but currently it is only 1.25%. This low policy rate contributed to the housing market boom in Norway in the past decade. People say that the housing market boom will end if the policy rate increases to a high level. Explain why a high policy rate may stop the housing market boom. (Answer the question within 100 words.)

7. Diversification and Existence of Banks (22%)

You have 1 million to invest today and the payoff will be realized in one year, when there are two states (*good* and *bad*) of the world. The good state has a probability 1/3, and the bad state has a probability 2/3. You can choose from two investment projects, A and B. Each project needs an initial investment of 1 million.

- Project A's payoff will be 2 million in the good state and 1 million in the bad state.
- Project B's payoff will be 0.8 million in the good state and 1.6 million in the bad state.

You are a log-utility optimizer. Your expected utility from the investment is

$$U = \frac{1}{3} \log y_g + \frac{2}{3} \log y_b$$

where y_g is your payoff in the good state and y_b is your payoff in the bad state.

   i) If you can only choose one of the project to invest in, which project will you choose? Your answer should be based on calculations. (6%)

  ii) Suppose that you invest half a million in project A and half a million in project B. What is your expected utility? Is this a better or worse strategy than investing only in one project? (4%)

iii) Suppose that you can invest partly in project A and partly in project B. Let x million be the money you invest in project A and $1 - x$ million be in project B. Solve for the optimal x. What is your expected utility in this case? (6%)

iv) Based on your calculations in i)-iii), explain (within 100 words) why diversification is one of the key reasons for banks to exist. (6%)

8. Interest Rate, Loan Size and Agency (28%)

Suppose that you are risk-neutral and operate a limited-liability firm. The discount rate is zero. Consider two projects:

- The **safe** project: With initial investment 1 million, the payoff is 1.25 million for sure.

- The **risky** project: With initial investment 1 million, the payoff is 1.5 million with probability 0.4, and the payoff is 0.6 million with probability 0.6.

Suppose that you borrow 1 million from a bank to finance the investment.

i) The bank asks for an interest rate of 10%. Which project will you choose to undertake? Give an answer by comparing your payoffs from the two projects. Can the bank break even? (8%)

ii) Instead, if the bank asks for an interest rate of 5%. Which project will you choose to undertake? Give an answer by comparing your payoffs from the two projects. Can the bank break even? (4%)

iii) Suppose that the bank cannot observe your project choice, so you are free to choose one of the projects to undertake. Denote the interest rate as r. For what range of r, will you undertake the safe project? (4%)

Now suppose that you finance the investment with bank loan, x, and own money, $1 - x$. The bank cannot observe your project choice, you are free to choose one of the projects to undertake.

iv) The bank asks for an interest rate of 20%. What is your net profit by undertaking the safe project? What is your net profit by undertaking the risky project? What is the maximum x (called *debt capacity* in practice) that the bank accepts? (7%)

v) Denote the interest rate as r. What is the maximum x (as a function of r) that the bank accepts? Prove that this debt capacity is decreasing in r. (Hints: calculate the first-order derivative of x over r.) (5%)

(END)