

ECON 4335 Economics of Banking, Fall 2023

Postponed Final Exam: Grading Guidance

1. Are the following statements true, false, or uncertain? Briefly explain (40 points)

(a) (10 points) True. Banks are engaged in maturity transformation so that they have to frequently roll over their short debts in order to sustain their long assets. However, banks' capacity to roll over short debts, i.e., the funding liquidity, depends very much on borrower/lender characteristics such as counterparty risks. In normal times, when counterparty risks are low, banks can easily find lenders in the market and roll over their debts; in contrast, many market lenders will refuse to lend under higher counterparty risks when market is under stress, which leads to banks' funding problems or even bank failure. Therefore, it is crucial for banks to have more funding from stable funding sources, such as bonds or deposits with long maturity.

(b) (10 points) False. Due to asymmetric information, banks are not able to perfectly distinguish between prudent and risky borrowers, so that banks have to offer similar lending rates to all borrowers. When a bank attempts to clear the market by raising loan rate, higher loan rate also drives out prudent borrowers and makes the average remaining borrowers riskier; this increases the probability of borrowers' default and reduces the bank's profit. As a result, the bank would rather keep loan rate low to maintain less risky borrowers and ration credit in order to reduce credit risks, leaving some borrowers unserved in the credit market. Therefore, persistent excess demand for bank loans can exist in market equilibrium.

(c) (10 points) True. There are many challenges for central banks to stick to pre-defined conditions on bailing out troubled banks. For instance, it is often required that central bank should only bail out illiquid, not insolvent banks. However, it is very difficult to distinguish between illiquidity and insolvency during crises. Particularly, given banks play a central role in providing financial resources to the real economy and bank failure can generate devastating effects on the real economy (especially those systemically important banks), central bank are often forced to bail out failing banks ex post even if they do not necessarily fulfill those ex ante conditions, to avoid those potential consequences of bank failure.

(d) (10 points) True. Rational investors can still invest in a bubble even if they believe that the bubble will burst with a positive probability and become worthless afterwards, so long as investors believe that the price growth rate of the bubble is sufficiently high so that the expected return rate from the bubble is no less than the risk-free rate.

2. Shorter Analytical Questions: Adverse Selection in Credit Market (20 points)

(a) An entrepreneur with safe project is willing to borrow as long as

$$(2 - R) \times 0.85 \geq 0,$$

i.e., $R \leq 2$.

An entrepreneur with risky project is willing to borrow as long as

$$(4 - R) \times 0.4 \geq 0,$$

i.e., $R \leq 4$.

Under any R with $2 < R \leq 4$, only entrepreneurs with risky projects are willing to borrow from the bank, while under any R with $R \leq 2$, both types of entrepreneurs are willing to borrow.

(b) If the bank offers an R with $R \leq 2$, both types of entrepreneurs will borrow. To maximize its profit, the bank chooses an R such that

$$\max_{R \leq 2} 0.5 \times 0.85 \times R + 0.5 \times 0.4 \times R - 1. \quad (1)$$

The optimal solution is $R = 2$, and the bank's profit is 0.25.

If the bank offers an R with $2 < R \leq 4$, only entrepreneurs with risky projects will borrow. To maximize its profit, the bank chooses an R such that

$$\max_{2 < R \leq 4} 0.5 \times (0.4 \times R - 1). \quad (2)$$

The optimal solution is $R = 4$, and the bank's profit is 0.3.

Given that $0.3 > 0.25$, in equilibrium, the bank lends only to entrepreneurs with risky projects at $R = 4$. In this way, the bank loses its income from lending to entrepreneurs with safe projects, however, the bank gains from maximizing its profit from lending to entrepreneurs with risky projects, as the bank is able to charge highest possible lending rate on those entrepreneurs.

3. Longer Analytical Questions: Limited Liability and Liquidity Coverage (40 points)

(a) To ensure investors participate both market, in equilibrium, they must be indifferent between the expected returns from investing in both markets, i.e.

$$\frac{1}{P_0} = q \frac{1}{P_1} + (1 - q) \cdot 1,$$

$$P_0^{bid} = \frac{1}{1 - q + \frac{q}{P_1}}.$$

(b) If a bank decides to sell a fraction of its illiquid assets in $t = 0$ to fully prepare for the liquidity shock and not to sell any assets in $t = 1$, its expected profit is

$$q \left[Z - \frac{fD}{P_0} - (D - fD) \right] + (1 - q) \left[Z - \frac{fD}{P_0} + fD - D \right]$$

$$= Z - D - \left(\frac{1}{P_0} - 1 \right) fD.$$

If a bank decides not to prepare anything in and only sell assets in $t = 1$ if the liquidity shock takes place, its expected profit is

$$(1 - q)(Z - D).$$

(c) The bank is indifferent to participate both markets only if

$$Z - D - \left(\frac{1}{P_0} - 1 \right) fD = (1 - q)(Z - D),$$

$$P_0^{ask} = \frac{1}{1 + q \left(\frac{Z - D}{fD} \right)}. \quad (3)$$

Given that the bank is insolvent under

$$P_1 [Z - (1 - f)D] < fD$$

so that

$$\frac{Z - D}{fD} < \frac{1 - P_1}{P_1},$$

implying that (3) becomes

$$P_0^{ask} > \frac{1}{1 - q + \frac{q}{P_1}} = P_0^{bid}.$$

That is, there cannot be any market in $t = 0$.

(d) The claim is false. Given that banks are highly leveraged firms with limited liability, they gain on the head while do not lose much on the tail, so that they prefer to bet on the head and ignore the tail. For this reason, even if they are aware that a crisis is likely to take place, they will rather bet on the head and have no incentive to build up liquidity buffer beforehand.