

ECON 4335 Economics of Banking, Fall 2020

Postponed Exam: Grading Guidance

1. Are the following statements true, false, or uncertain? Briefly explain (50 points)

(a) (10 points) True. Banks are firms with limited liability, therefore, if a bank is bankrupted, it only bears the bankruptcy cost up to its total equity; with high leverage, the bankruptcy cost will be mostly borne by creditors. As a result, a bank has the incentive to take excess risks, to gamble for the high yield from risky assets if it is successful, neglecting the bankruptcy cost when it fails because the bankruptcy cost will be mostly borne by someone else.

(b) (10 points) (Mostly) false. Credit rationing can be persistent, as a result of adverse selection. Given that banks cannot perfectly screen borrowers by their types, banks can only offer them uniform loan rate. However, when banks try to raise loan rate to maximize profit, higher loan rate also drives prudent borrowers out because of adverse selection, and the remaining risky borrowers increase credit risk. Therefore, banks will deliberately keep loan rate low and ration credit, to avoid attracting only risky borrowers and keep credit risk low.

(c) (10 points) Uncertain. Whether it leads to monetary tightening or not depends on the equilibrium in the market for reserves before conducting the monetary policy. If the equilibrium market rate equals discount rate, raising discount rate leads to a fall in the non-borrowed reserves in the banking system, a contraction in bank lending, and hence implies a monetary tightening. If the equilibrium market rate is lower than discount rate, the change in discount rate will not affect market equilibrium, and hence does not lead to monetary tightening.

(d) (10 points) (Mostly) false. Bubbles can be rational, too. Even if there is a probability of burst, as long as the expected growth rate of the bubble's value exceeds the risk-free rate, rational people are still willing to invest in bubbles to earn a higher profit than risk-free assets. With a positive probability of burst, the growth rate of bubble price needs to be higher than the risk-free rate to attract rational buyers.

(e) (10 points) True. Holding liquid assets generates positive externality: holding liquid assets implies an opportunity cost, as banks invest less resources on other assets with higher yields, and such opportunity cost is fully borne by the holding banks. Liquid assets only benefit holding banks in market stress, but in the normal time, holding banks lend liquid assets to other banks who need liquidity, so that the benefit of holding liquid assets is not totally enjoyed by the holding banks. As a result, banks have the incentive to reduce holdings of liquid assets, and rely more on liquidity market for liquidity management.

2. Shorter Analytical Questions: Market Liquidity in Banking Crises (15 points)

(a) (5 points) No. If both participate in the market, both types of banks would ask for a price of 1, because bad banks would mimic good banks. However, knowing both types of banks participate, investors would only accept a price of $\frac{1}{2}$, so that no sale will happen.

(b) (5 points) The only market equilibrium is that only bad banks participate in the market, and knowing this, the market price for securities is 0.

(c) (5 points) This implies that during crises, banks cannot raise enough liquidity by selling assets in a market where the asset quality is private information. In such market, the adverse selection will drive out good sellers and only retain bad sellers (“lemons”), and as a result, the low market price that reflects the lemons on sale in equilibrium makes it impossible for banks to raise enough liquidity.

3 Longer Analytical Questions: Pandemic, Bank Run, and the Lender-of-Last-Resort (35 points)

(a) (15 points) The bank’s optimization problem in $t = 0$ is defined by

$$\begin{aligned} \max_{\alpha, c_1, c_2} & p \ln(c_1) + (1 - p) \ln(c_2), \\ \text{s.t.} & pc_1 = \alpha, \\ & (1 - p)c_2 = (1 - \alpha)R, \\ & c_1 \leq c_2. \end{aligned}$$

Solve to get $\alpha = p$, $c_1 = 1$, and $c_2 = R$.

(b) (10 points) When f type 2 consumers also demand c_1 in $t = 1$, the total demand for deposits in $t = 1$ is

$$pc_1 + fc_1 > \alpha,$$

meaning that the bank has to liquidate some of the long assets L so that

$$\alpha + \delta L = pc_1 + fc_1,$$

solve to get $L = \frac{f}{\delta}$.

The healthy type 2 consumers then can calculate their expected return $E[c_2]$ in $t = 2$, should they wait:

$$E[c_2] = \frac{(1 - \alpha - L)R}{1 - p - f} = \frac{(1 - p - \frac{f}{\delta})R}{1 - p - f}.$$

Bank run will happen if the incentive compatibility constraint is violated, so that $E[c_2] < c_1$,

$$E[c_2] = \frac{(1 - p - \frac{f}{\delta})R}{1 - p - f} < c_1,$$

solve to get

$$f > \frac{\delta(1 - p)(R - 1)}{R - \delta} = f^*,$$

with the threshold value $f^* = \frac{\delta(1-p)(R-1)}{R-\delta}$.

(c) (10 points) Suppose that there is a bank run so that all type 2 consumers demand repayment c_1 in $t = 1$. In this case, the total cash demand in $t = 1$ is $c_1 = 1$, and the bank's shortage of cash is $1 - \alpha$. On the other hand, the future value of the bank's long assets is $(1 - \alpha)R$, which is larger than $1 - \alpha$. This means that the bank's collateral value is high enough to borrow from the central bank and cover the entire cash shortage. Even after borrowing from the central bank, the bank can still collect $(1 - \alpha)R - (1 - \alpha)$ return from long assets in $t = 2$ after repaying the central bank; therefore, it would be profitable for a healthy type 2 consumer to wait until $t = 2$ to benefit from the high return of the long assets. Knowing this, all healthy type 2 consumers have no incentive to run on the bank in $t = 1$, independent on the value of f .