ECON 4335 Economics of Banking, Fall 2023

Final Exam: Grading Guidance

Working Draft *29 December 2023*

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

(a) (10 points) False. Although banks may charge higher lending rate to compensate high cost of bank capital, bank capital is an important buffer to absorb bank losses and avoid bankruptcy. More importantly, bank capital is a bank's skin-in-the-game, aligning the bank's interests with the creditors' interests. As banks are highly leveraged, limited liability financial institutions, they have strong incentive to take excess risk, as they can pocket the high yield when they succeed while let the creditors take most of the losses when they fail. Allowing banks to increase leverage and reduce capital holdings will further strengthen such an incentive and make banks even more risky, which may increase the likelihood of bank failure and reduce social welfare.

(b) (10 points) Uncertain/false. Whether higher reserve requirement leads to monetary tightening depends on the initial interbank lending rate. If initial interbank lending rate is below central bank's discount rate, increasing reserve requirement leads to banks' higher demand for reserves and higher interbank lending rate, which increases banks' funding cost and indeed implies monetary tightening (7 points on how higher reserve requirement may lead to monetary tightening). However, if initial interbank lending rate equals to central bank's discount rate and banks are already borrowing from central bank's discount window, increasing reserve requirement only results in banks' more borrowing from the discount window and interbank lending rate remains the same, which does not necessarily increase banks' funding cost and does not necessarily lead to monetary tightening. Another possibility is that banks initially hold excess reserves, i.e., initial interbank lending rate is equal to the interest rate paid on reserves. In this case, banks do not necessarily increase their reserves under higher reserve requirement so that higher reserve requirement does not necessarily lead to monetary tightening (3 points on one of the two reasons why higher reserve requirement may not lead to monetary tightening).

(c) (10 points) False. Making mortgage loan borrowers' borrowing constraints binding implies their borrowing capacity is linked house prices, increasing their vulnerability to macroeconomic/financial shocks that affect house prices. Although borrowers can increase consumption by making their borrowing constraints binding under increasing house prices, when the house prices fall in the downturn, their borrowing capacity falls so that they have to cut consumption to pay back loans instead of smoothing consumption through increasing debts. To make it worse, falling aggregate demand in the downturn makes house prices fall even further, which further decreases borrowers' debt capacity and forces them to cut consumption even more... Overall, borrowing at binding constraints increases volatility in borrowers' consumption and makes borrowers worse off.

(d) (10 points) Uncertain/false. Although more bank competition in deposit market increases deposit rates and more bank competition in credit market reduces loan rates, which benefits depositors and borrowers, more bank competition may also lead to more banks' risk-taking which results in higher cost to social welfare (5 points on the possibility of excess risk-taking). In theory, how competition affects bank risk depends on in which market banks compete and

who are taking the risks. If banks compete in deposit market and take risks themselves, more competition will force banks to increase deposit rates, this will increase banks' funding cost and decrease their profit. In order to maintain their franchise value, banks with limited liability will take more risks ("charter value hypothesis"). In this case, pushing banks towards perfect competition makes the banking system less stable. In contrast, if banks compete in credit market and borrowers decide on risk-taking, more competition will force banks to reduce loan rates for borrowers. This will reduce borrowers' moral hazard incentive on risk-taking, hence reduces bank risk ("moral hazard hypothesis"). In this case, pushing banks towards perfect competition makes the banking system more stable. As the reality is rather a mixture of these two cases, it is uncertain that pushing banks towards perfect competition makes the banking system more stable, hence it is uncertain that social welfare will be improved (5 points on explaining the impact of bank competition on bank risk).

2. Shorter Analytical Questions: Moral Hazard and the Information Rent (20 points)

(a) (5 points) The expected gross return from a good project is $0.8 \times 1.5 = 1.2 > 1$, while the expected gross return from a bad project is $0.4 \times 1.5 = 0.6 < 1$, the lender will only want to lend to borrowers with good projects.

(5 points) With lending to borrowers with good projects, the lender maximizes the profit by setting R under which borrowers make non-negative profit

$$\begin{aligned} &\max_{R} \ R \times 0.8 - 1, \\ &s.t. \ 0.8 \times (1.5 - R) \geq 0. \end{aligned}$$

The optimal solution is $R = 1.5$.

In equilibrium, the lending rate is $R = 1.5$ and all borrowers choose good projects.

(b) (7 points) Without being able to observe the borrowers' choices, the lender maximizes the profit by setting R which should also ensure that borrowers choose good projects, i.e.

$$\begin{aligned} &\max_{R} \ R \times 0.8 - 1, \\ &s.t. \ 0.8 \times (1.5 - R) \geq 0.4 \times (1.5 - R) + 0.1 \ (IC) \\ &\quad 0.8 \times (1.5 - R) \geq 0 \ (PC - Borrower) \\ &\quad 0.8 \times R - 1 \geq 0 \ (PC - Bank) \end{aligned}$$

The optimal solution is $R = 1.25$, and borrowers will choose good projects.

(3 points) The lending rate is lower than that in Question 2(a). Without being able to observe

borrowers' choices, in order to induce the borrowers self-select the good projects, the lender must give away some profit to borrowers so that borrowers are (weakly) better off by choosing good projects.

3. Longer Analytical Questions: Fundamental-Driven Bank Runs and Deposit Insurance (40 points)

(a) (5 points) The bank maximizes depositors' expected utility by

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

(5 points) Solve to get the optimal solution $c_1 = 1$, $c_2 = R$, $\alpha = p$.

(5 points) Because the bank cannot observe the types of consumers, the deposit contract must ensure that consumers self-select the timing of withdrawal according to their true types. It is therefore important to ensure $c_1 \le c_2$ so that type 2 consumers do not mimic type 1 consumers and withdraw in $t = 1$.

(b) (8 points) Type 2 consumers will want to withdraw in $t = 1$ if the incentive compatibility constraint is violated, i.e., type 2 consumers' expected return $\tilde{c}_2$ becomes

$$\tilde{c}_2 = \frac{(1-\alpha)\tilde{R}}{1-p} < c_1.$$

(7 points) Given that $c_1 = 1$ and $\alpha = p$, $\tilde{R} < 1$, $\underline{R} = 1$.

(c) (5 points) Under the deposit insurance with full coverage, the type 2 consumers will be guaranteed to receive $c_2 = R$ in $t = 2$; therefore, mimicking type 1 consumers and withdrawing $c_1 = 1 < c_2$ will only make them worse off. Type 2 consumers will thus have no incentive to run on the bank.

(5 points) In reality, banks are highly leveraged financial institutions with limited liability, so that they have strong incentive to take excess risks as they can obtain higher profit if they win and let creditors bear most of the losses if they lose. As a result, providing full public deposit guarantee may encourage banks' excess risk-taking and shifting risks to the insurance scheme, making the scheme break down.