ECON 4335 Economics of Banking, Fall 2020

Final Exam: Grading Guidance

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

(a) (10 points) False. Fixed requirement on capital ratio increases procyclicality and volatility of bank credit. During the boom, with VaR constraint being relaxed by increased capital value, under fixed requirement on capital ratio, banks are encouraged to increase credit supply, leading to a credit boom; on the other hand, during the downturn, with VaR constraint being binding by falling capital value, under fixed requirement on capital ratio, banks are forced to deleverage, leading to a credit crunch. Such leverage cycle thus increases the likelihood of bankruptcy.

(b) (10 points) True (in thory)/False (in reality). In theory such as Diamond-Dybvig, full deposit insurance does eliminate the bank runs that are caused by patient depositors' fear that the return to long assets may be low. However, such insurance scheme is not implementable in reality, as the moral hazard will encourage banks to take excess risks and the insurance scheme will break down. (It is sufficient to answer either in theory or in reality)

(c) (10 points) False. Central bank shall only lend to solvent banks against good collateral, and shall not ex ante promise a free lunch, to avoid moral hazard problems (8 points), although in reality, it is difficult to distinguish between illiquid banks and insolvent banks during crises, and too-big-to-fail problem often forces central bank to offer free lunch to (even insolvent) banks (2 more points).

(d) (10 points) False. Even with perfect anticipation on forthcoming liquidity crunch, banks only prepare sufficient liquidity buffer if they fully internalize the cost of failure. Unfortunately, this is usually not possible due to various financial frictions. For example, limited liability implies that banks do not borne full cost of bank failure, this encourages banks to bet for the upside and neglect the downside, leading to insufficient investments in liquidity buffer.

(e) (10 points) True. Higher competition in the loan market forces banks to offer lower loan rate to borrowers; this increases borrowers' payoff when their projects are successful, thus reduces their incentive to choose riskier project, leading to lower credit risk.

2. Shorter Analytical Questions: Banking Friction and Pandemic (15 points)

(a) (5 points) A firm's profit maximization problem is.

$$\max_{L} f(W + L) - RL.$$

First-order condition requires $f'(x) = R$, i.e., its marginal output equals R.

(b) (5 points) A firm's profit maximization problem is now

$$\max_{L} \; f(W+L) - RL,$$
$$s.t.\; RL \leq PK.$$

Using Lagrangian, first-order condition requires $f'(x) = (1+\lambda)R$, given that the borrowing constraint is binding. Given that $\lambda > 0$ under binding borrowing constraint, $f'(x)$ is larger than that in question (a), implying a lower x, hence lower output $f(x)$.

(c) (5 points) Lower P implies that the firm's borrowing capacity, $L = \frac{PK}{R}$, falls, given that the borrowing constraint is always binding. This means the firm's input $x = W + L$ is lower, compared with (b), implying a lower output $f(x)$.

3. Longer Analytical Questions: Bank Run and Moral Hazard (35 points)

(a) (10 points) Given that the bank chooses project G, depositors perfectly observe its future return in $t = 1$. To maximize their return, they will require $R = R_H$ if the future return is R_H, or $R = R_L$ if the future return is R_L. In both cases, the bank receives 0 profit.

(b) (10 points) Given that the bank chooses project B, depositors only observe p in $t = 1$:

(1) If depositors set $R = R_H$ in $t = 1$, then in $t = 2$
   (a) With probability p the return turns out to be $R_H = R$, depositors receive $R = R_H$ and the bank receives 0 profit;
   (b) With probability $1 - p$ the return turns out to be $R_L < R$, depositors run on the bank, receive liquidation value βR_L and the bank receives 0 profit.

   Depositors' expected return is $pR_H + (1-p)\beta R_L$, and the bank's expected profit is 0.

(2) If depositors set $R = R_L$ in $t = 1$, then in $t = 2$
   (a) With probability p the return turns out to be $R_H > R$, depositors receive $R = R_L$ and the bank receives $R_H - R_L$ profit;
   (b) With probability $1 - p$ the return turns out to be $R_L = R$, depositors receive $R = R_L$ and the bank receives 0 profit.

   Depositors' expected return is $pR_L + (1-p)R_L$, and the bank's expected profit is $p(R_H - R_L) > 0$.

(c) (15 points) Given that the bank makes positive profit only when it chooses project B and depositors set $R = R_L$, the bank will choose project B. To induce depositors to set $R = R_L$, the bank will choose a p such that $pR_L + (1-p)R_L > pR_H + (1-p)\beta R_L$, or $p < \frac{(1-\beta)R_L}{R_H - \beta R_L}$. It is easy to see that $p < \frac{(1-\beta)R_L}{R_H - \beta R_L} < \frac{(1-\beta)R_L}{R_L - \beta R_L} = 1$.

In this case, the bank's expected profit $p(R_H - R_L) > 0$ is increasing in p, therefore, the bank's

optimal choice of p is $p \to \frac{(1-\beta)R_L}{R_H - \beta R_L}$.