A. 1. Explain what is meant by the "charter value" of a bank.

A form of monopoly rent, PV of banks' future profit, partially reflected by stock price

Discuss briefly factors that may create charter value

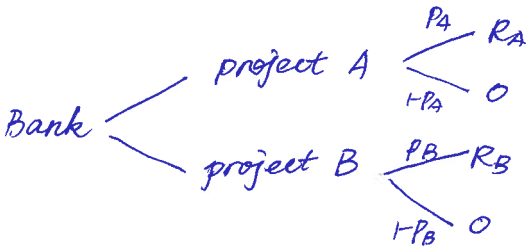
- Market power

  Banks with market power has more advantage (e.g. lower interest rate on the interbank market) over smaller banks and are likely to outcompete them.

- Behaviors that can increase market power
  - Efficient management, good performance
  - Lobbying and other rent-seeking activities

- Implicit guarantee. If the market believes that in case of default banks that are "too big to fail" will be backed up by government.

2.



$p_A R_A > p_B R_B$, $R_A < R_B$ $\Rightarrow p_A > p_B$ as $\frac{R_A, R_B}{p_A, p_B} > 0$

Project B is more risky as it has a lower probability of success.

3. Disregarding the insurance premium, at $t=0$, asset equals liability implies

$L = E + D$. as $L = 1$, k is the share of equity then let d be share of deposit

$1 = k + d$ or $d = 1-k$

R_D: the gross interest rate on deposits, determined in a competitive market

R_E: the cost of capital, alternative gross return shareholders forgo

Write down expected profits of the bank, π_A, π_B

$\pi_A = p_A [R_A - (1-k)R_D - kR_E] + (1-p_A) \cdot (0 - kR_E)$

$\pi_A = p_A R_A - p_A R_D (1-k) - kR_E$

$\pi_B = p_B R_B - p_B R_D (1-k) - kR_E$

If shareholders wouldn't get R_E for their equity k, they wouldn't have invested in the bank

Show that project A will always be profitable for the bank if $p_A R_A > R_E \geq R_D$

If $p_A R_A > R_E$ and $p_A R_A > R_D$, then $p_A R_A > kR_E + (1-k)R_D$ weighted average of R_E and R_D

then $p_A R_A > kR_E + (1-k)R_D > kR_E + (1-k)R_D \cdot p_A$

Hence $\pi_A > 0$ whenever $p_A R_A > R_E \geq R_D$.

A.4 Explain why project B may be more profitable for the bank than project A.

This is a moral hazard problem resulted from the deposit insurance.
In case of failure the bank owners losses the opportunity cost of capital for both projects
But in case of success project B gjelds a higher return aad is hence more profitable

What is the condition on k and R_D for this to happen?

$$\pi_B = p_B R_B - p_B R_D(1-k) - kR_E > p_A R_A - p_A R_D(1-k) - kR_E = \pi_A$$

$$(p_A - p_B) R_D (1-k) > p_A R_A - p_B R_B$$

$$(1-k) R_D > \frac{p_A R_A - p_B R_B}{p_A - p_B} \qquad (*)$$

(*) is the condition on k and R_D for project B to be more profitable than A.

Can project B be profitable even if A is not?

we need $\pi_A = p_A R_A - p_A R_D(1-k) - kR_E < 0$

and $\pi_B = p_B R_B - p_B R_D(1-k) - kR_E > 0$

$$\Rightarrow \begin{cases} p_A R_A < p_A R_D(1-k) + kR_E \\ p_B R_B > p_B R_D(1-k) + kR_E \end{cases} \quad \text{in addition, } p_A R_A > p_B R_B$$

So $$p_B R_D(1-k) + kR_E < p_B R_B < p_A R_A < p_A R_D(1-k) + kR_E \qquad (**)$$

$$p_B R_D(1-k) + kR_E < p_A R_D(1-k) + kR_E \quad \text{true as } p_A > p_B$$

(**) can be satisfied when p_B is sufficiently small as opposed to p_A

5. Suppose $R_D < p_A R_A < R_E$. Cost of capital sufficiently high.
Suppose project A is socially desirable, while project B is not.
Can a regulator set the capital requirement such that A is profitable while B not?
What information will be needed?

$R_E > p_A R_A$: cost of equity exists the expected return of the "good" project.
This implies that in an unregulated banking environment banks does not want to invest any of their own capital and set $k=0$ and invest elsewhere

Then, in case of failure, the deposit insurance covers everything and bankers get their cost of capital R_E from other markets. No loss.

In case of success, project B gjelds more return than A and should be chosen.

$\pi_A^S = R_A - R_D < R_B - R_D = \pi_B^S$, $\pi_A^F = \pi_B^F = 0$. Always choose B.

A.5. continued

B unprofitable: $\pi_B < 0$ A profitable: $\pi_A > 0$

$$\begin{cases} p_A R_A > p_A R_D (1-k) + k R_E \Rightarrow k(R_E - p_A R_D) < p_A (R_A - R_D) \\ p_B R_B < p_B R_B (1-k) + k R_E \Rightarrow k(R_E - p_B R_D) > p_B (R_B - R_D) \end{cases}$$

We have $R_D < p_A R_A < R_E$, $R_B > R_A$, $p_A > p_B$

as $p_A, p_B \in (0,1]$, $p_A R_A > R_D \Rightarrow R_A > R_D$, $R_B > R_A \Rightarrow R_B > R_D$

$p_B R_B < p_A R_A < R_E \Rightarrow R_E - p_A R_A > 0 \Rightarrow R_E - p_A R_D > 0$, $R_E - p_B R_D > 0$

Hence

$$\frac{p_B(R_B - R_D)}{R_E - p_B R_D} < k < \frac{p_A(R_A - R_D)}{R_E - p_A R_D} \qquad (**)'$$

$(**)'$ is the capital requirement that ensures project A being implimented because its social desirability and profitability, while B is no longer profitable.

6. Suppose A, B available in every period, but once the bank defaults it is shut down and the owners are banned from starting new banks. Discuss how this will affect the bank's investment choice.

By definition, charter value is the present value of the bank's future profit. If the bank is shut down there is no future and no future profit — charter value gets zero.

If bank owners are allowed to start new banks they are still willing to take the gamble - choose risky project B with minimum own capital, maximize own gain in case of success and let the insurance company pay for the losses. But now that this option is taken away, and that Bertrand competition implies normal profit - 0 profit in the long run unless there is economy of scale and scope - monopoly rent to exploit.

In this way, the only way bank owners can enjoy long-term gain is that they invest in safe project A in each period and make the market believe their business will be carried on in the future - positive charter value, so that in average, their return to capital will be greater than cost of capital R_E.

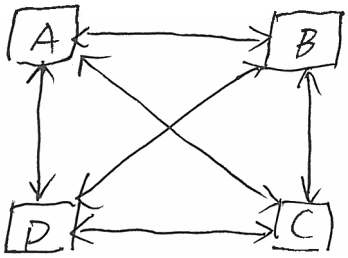
B. Discuss how solvency or liquidity problem in one bank / group of banks can create similar problems for other banks. How to solve this problem of contagion?

Definition of solvency.

A bank is said to be solvent, if it can meet the demands of every depositor who wants to withdraw by using only its liquid assets, i.e. short assets and deposits in other banks. If need to liquidate long assets, insolvent. If liquidating all assets still couldn't meet the demand of depositors, default.

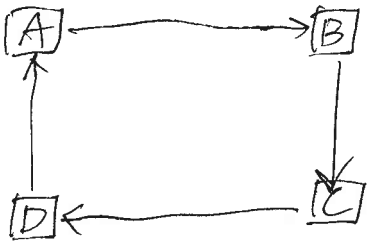
If there comes a demand shock at one bank, this bank will have to withdraw its deposits from other banks. Selling their assets will also demand liquidity from the interbank market. Then this liquidity shock will be transferred to the other banks which directly or indirectly have transactions with the bank in question. The network can be different:

Complete network



All banks are perfectly interacted.
Easy to get liquidity from many other banks, so that none of the other banks will get a burden of too much withdrawal – liquidity shock.

incomplete network structure.



Negative externality of withdrawal from neighbour bank.

Each bank depend heavily one its own "neighbour" instead of a number of banks. In this case, a shortage of liquidity of A will easily dry up B's liquidity, so that B turns to C and C turns to D etc. The fact that D deposits on A shows that the economy is still connected, but way more fragile towards liquidity shocks.

One measure to prevent contagion is liquidity requirement

E.g. Basel III – A bank must have enough liquid assets that are NOT interbank deposits or other claims. Build enough buffers in case of different shocks.

as well as other forms of bank capital like hybrid instruments.

In this way "asking for liquidity from neighbours" will not be the first and only alternative in case of shocks.