

## TA Info

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## Ch. 9 – Liquidity and capital-adequacy management

### Liquidity management – Maximum deposit outflows

Suppose a bank has a required reserve ratio of 10%. How much deposit outflow can it sustain before it needs to start borrowing from other banks or selling assets to maintain the reserve requirement?

The answer isn't obvious because deposit outflows reduce reserves, but they also reduce deposits so the required amount of reserves also falls.

$$\text{Total Reserves} = \underbrace{\text{Required Reserves}}_{RRR \times \text{Total Deposits}} + \text{Excess Reserves}$$

To calculate the maximum reserve draw, imagine the bank keeps its required reserves and excess reserves in separate accounts. If someone wants to withdraw  $L$  dollars, the bank has  $L$  less in deposits and thus can remove  $RRR \times L$  from the required reserves account and move it into the excess reserves account, but then must pay the  $L$  withdraw from the excess reserves account.

$$\begin{aligned} \text{New Total Reserves} &= \underbrace{RRR \times (\text{Total Deposits} - L) + (\text{Initial Excess Reserves} + RRR \times L)}_{RRR \times L \text{ moved from required to excess reserves}} - \underbrace{L}_{\text{Reserve outflow}} \\ &= \text{New required reserves} + \text{Initial Excess Reserves} - (1 - RRR) \times L \end{aligned}$$

After paying out the withdrawal, we want to still have excess reserves, so we want

$$\begin{aligned} \text{Initial excess reserves} &\geq (1 - RRR) \times L \quad \text{or equivalently} \\ L &\leq \frac{\text{Initial excess reserves}}{1 - RRR} \end{aligned}$$

### Capital-adequacy management

$$\underbrace{\frac{R}{E}}_{\text{Return on equity}} = \underbrace{\frac{A}{E}}_{\text{Equity multiplier}} \times \underbrace{\frac{R}{A}}_{\text{Return on assets}} = \frac{A}{E} \times \left[ \underbrace{\frac{R}{GR} \times \frac{GR}{A}}_{\text{Profit margin} \times \text{Asset utilization}} \right]$$

$R$  = Net returns (profit)     $E$  = Total equity     $A$  = Total assets     $GR$  = Gross revenue

- Bank managers need to balance two competing factors:
  1. The bank must maintain a high enough ratio of capital to assets to meet regulatory requirements and to ensure they have sufficient funds to cover their liabilities in case asset values fall
  2. But the bank owners want to maximize the return on their investments, i.e. they want high return on equity (ROE). This necessarily required keeping equity low relative to total assets.
- How can a bank *increase* capital-to-asset ratio?
  1. Increase capital by issuing new shares (increasing *equity*)
  2. Increase capital by reducing dividends and thus increasing *retained earnings*
  3. Decrease assets by selling loans/securities and paying off liabilities
- Similarly a bank can *decrease* its capital-to-asset ratio by
  1. Buying back shares (reducing *equity*)
  2. Increasing dividend payouts (reducing *retained earnings*)
  3. Increasing liabilities (e.g. issuing CDs) to purchase more assets.

## Ch. 13 – Central banks and the Federal Reserve System

### Federal Reserve balance sheet

Assets	Liabilities
Government securities	Currency in circulation
FX reserves	Bank reserves
Discount loans	

### Multiple deposit creation

The banking system can create a money supply beyond the actual currency in circulation through taking deposits and making loans which then become deposits themselves.

For example, if banks hold no excess reserves, then from a \$1 initial deposit, a bank will keep  $RRR$  as required reserves, and lend the remaining  $1 - RRR$ . This then becomes a deposit itself, and the loop repeats.

So from this \$1 deposit, total deposits increase by

$$\Delta D = 1 + (1 - RRR) + (1 - RRR)^2 + (1 - RRR)^3 + \dots = \underbrace{\frac{1}{RRR}}_{\text{Simple deposit multiplier}}$$

(Remember the geometric series equations!)

- Limitations of the simple model:
  1. Banks typically hold excess reserves
  2. Individuals don't hold all their money as bank deposits. They keep some as cash.
- Thus the true deposit multiplier will be smaller than the simple multiplier above.

### Exercises

1. Suppose the  $RRR$  is 10%. If banks do not hold excess reserves, by how much will total checking deposits change if the fed removes \$10 million of currency from the money supply?
  - (a) +1 million
  - (b) + 100 million
  - (c) - 100 million
  - (d) - 1 million
2. Which of the following is not a function the Fed?
  - (a) Conduct monetary policy
  - (b) Clear checks
  - (c) Regulate banks
  - (d) Regulate stock exchanges
3. There are \_\_\_\_\_ members of the Board of Governors of the Federal Reserve System:
  - (a) 5
  - (b) 7
  - (c) 12
  - (d) 19
4. The Federal Open Market Committee usually meets \_\_\_\_\_ times a year.
  - (a) four
  - (b) six
  - (c) eight
  - (d) twelve