

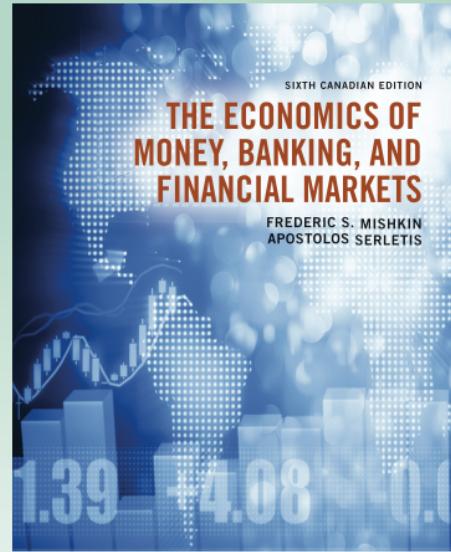
Mishkin/Serletis

The Economics of Money, Banking, and Financial Markets

Sixth Canadian Edition

Chapter 12

Banking and the Management of Financial Institutions



Learning Objectives

- 1. Summarize the features of a bank balance sheet
- 2. Apply changes to a bank's assets and liabilities on a T-account
- 3. Identify the ways in which banks can manage their assets and liabilities to maximize profit
- 4. List the ways in which banks deal with credit risk
- 5. Apply gap analysis and duration analysis, and identify interest-rate risk
- 6. Summarize the types of off-balance sheet activities

The Bank Balance Sheet

- A bank's **balance sheet** lists its assets and liabilities
- As the name implies, it balances:

$$Total\ Assets = Liabilities + Capital$$

- Liabilities are the *sources* of bank funds
- Assets are the *uses* of bank funds

Liabilities

- Banks acquire funds by issuing (selling) liabilities
- Demand and Notice Deposits
 - *Typically the lowest-cost source of funds*
- Fixed-Term Deposits (or CDs) *Certificates of Deposit.*
- Borrowings
 - *Overdraft loans (advances)*
 - *Settlement balances*
- Bank Capital

Liabilities:

Bank requires funds by issuing liabilities such as deposits.

Deposits are the source of funds which can then be used by the bank to purchase income-earning assets.

There are various types of deposits.

Demand deposits: have no time element attached to them, pay little or no interest, are mostly transactional accounts.

Notice Deposit: have a time element which is rarely enforced.

Fix-term Deposits are the main source of bank funds. usually paying a higher interest rate.

- Saving accounts - were, at one time, the most common type of deposit.
- Certificates of deposit - are considered non-liquid because of substantial penalties for withdrawal before maturity

The bank can obtain funds by borrowing from the BoC, other bank, large firms.

- Borrowing from BoC called Advance.

Banks may need to borrow in order to clear their balance sheet each business day.

Bank Capital.

- is the difference btw bank's assets and liabilities, it represents the net worth of the bank and its value to investors.

Assets

- Reserves
 - Settlement balances (deposits at the Bank of Canada) plus currency physically held by banks (called **vault cash**)
 - Reserve requirements removed in 1994
- Cash Items in Process of Collection
- Deposits at Other Banks
- Securities - debt instruments only - holding stock
is not permitted.
- Loans
- Other Assets

Balance Sheet of All Banks in Canada

TABLE 12-1

Balance Sheet of All Banks in Canada (items as a percentage of the total, August 31 2014)

Assets (Uses of Funds)*		Liabilities (Sources of Funds)	
Reserves and cash items	5.38	Demand and notice deposits	33.70
Securities	20.89	Fixed term deposits	31.71
Loans		Advances from the Bank of Canada	0.01
Non-mortgage loans	36.92	Borrowings	28.90
Mortgages	25.45	Bank capital	5.68
Other assets	11.36		
Total	100.00	Total	100.00

*In order of decreasing liquidity

Source: OSFI web site, www.osfi-bsif.gc.ca

Basic Banking

- Banks make profits through **asset transformation**
 - *Acquire funds of one type, buy assets of another*
- Use **T-accounts** to make the analysis concrete
- Example: Jane Brown open a chequing account with First National Bank with a \$100 deposit

First National Bank			
Assets		Liabilities	
Vault cash	+\$100	Chequable deposits	+\$100

Asset Transaction - Simply - turning liabilities into assets.

Example: A bank makes loans with funds raised by issuing deposits.

Basic Banking (cont'd)

- When a bank receives additional deposits, it gains an equal amount of reserves
 - *Vault cash are part of the bank's reserves*

First National Bank			
Assets		Liabilities	
Reserves	+\$100	Chequable deposits	+\$100

Basic Banking (cont'd)

- If Jane had opened her account with a \$100 cheque written on an account at another bank, then

First National Bank			
Assets		Liabilities	
Cash items in process of collection	+\$100	Chequable deposits	+\$100

- Net result: Bank of Canada transfers \$100 from one bank to the other

First National Bank			
Assets		Liabilities	
Reserves	+\$100	Chequable deposits	+\$100

Second National Bank			
Assets		Liabilities	
Reserves	-\$100	Chequable deposits	-\$100

Basic Banking: Making a Profit

- If the **desired reserve ratio** is 10%, then loan out \$90 from the initial \$100 increase in deposits
 - *Earn profit from the higher interest rate on the loan*

First National Bank			
Assets		Liabilities	
Desired Reserves	+\$10	Chequable deposits	+\$100
Excess Reserves	+\$90		

First National Bank			
Assets		Liabilities	
Desired Reserves	+\$10	Chequable deposits	+\$100
Loans	+\$90		

Basic Banking:

FNB could collect the \$100 from SNB, but it's inefficient. Instead, FNB deposits the cheque in its account at BoC. The BoC collects \$100 from SNB.

FNB Reserves

↓ deposits.

This is how bank gain and lose reserves.

SNB. ↓ reserves

↓ deposits

The banks hold a fraction of deposits - desired reserves.

That fraction is desired reserve ratio. In the example is 10%.

All funds over this amount is excess reserves.

In the example - the bank chooses not to keep excess reserves. It uses these funds to make loans.

This is profitable as higher interest rate.

General Principles of Bank Management

- Liquidity Management
- Asset Management
- Liability Management
- Capital Adequacy Management
- Credit Risk
- Interest-rate Risk

Liquidity Management: Ample Reserves

with deposit outflow of \$10 million



First Bank			
Assets		Liabilities	
Reserves	\$20M	Deposits	\$100M
Loans	\$80M	Bank Capital	\$10M
Securities	\$10M		

First Bank			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans	\$80M	Bank Capital	\$10M
Securities	\$10M		

- If a bank has ample excess reserves, a deposit outflow does not necessitate changes in other parts of its balance sheet

Liquidity management : Ample Reserves.

Desired Reserve Ratio : 10%.

Desired Reserve : \$10M.

Currently holding : \$20M.
Excess Reserve : \$10M.

If \$10M. in deposits is withdrawn. the bank still has sufficient reserves (\$9M desired, \$1M excess).

Liquidity Management: Shortfall in Reserves

with deposit outflow of \$10 million



First Bank			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$100M
Loans	\$90M	Bank Capital	\$10M
Securities	\$10M		

First Bank			
Assets		Liabilities	
Reserves	\$0M	Deposits	\$90M
Loans	\$90M	Bank Capital	\$10M
Securities	\$10M		

- Reserves are now \$0; this is unacceptable
- The shortfall must be dealt with

Desired Reserve Ratio : 10%.

Desired Reserve : \$10M.

Excess Reserves : \$0.

If \$10 is withdrawn, reserves are reduced to \$0.
This is a problem.

Liquidity Management: Borrowing from other Banks

First National Bank			
Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Borrowings from other banks or corporations	\$9M
Securities	\$10M	Bank Capital	\$10M

- Cost is the interest rate paid on the borrowed funds
- Excess reserves are insurance against the costs associated with deposit outflows

(i) Borrowing from other Banks.

ENB regains \$9M in reserves.

Has \$9M liabilities.

Must pay interest on the loan.

Liquidity Management: Securities Sale

First National Bank			
Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Bank Capital	\$10M
Securities	\$1M		

- An alternative to borrowing is selling other assets
- The cost of selling securities is the brokerage and other transaction costs

Sell securities:

Sell \$9M of its securities.

Deposit the proceeds at BoC.

Regain \$9M in reserves.

Value of securities has been reduced.

Liquidity Management: Bank of Canada Advances

First National Bank			
Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$90M	Borrowings from the Bank of Canada	\$9M
Securities	\$1M	Bank Capital	\$10M

- A third option: borrow from the Bank of Canada
- Borrowing from the Bank of Canada also incurs interest payments based on the discount rate

Liquidity Management: Bank of Canada Advances

First National Bank			
Assets		Liabilities	
Reserves	\$9M	Deposits	\$90M
Loans	\$81M	Bank Capital	\$10M
Securities	\$1M		

- Finally, a bank could reduce (or calling in) its loans
- Reduction of loans is the most costly way of acquiring reserves
- Calling in loans antagonizes customers
- Other banks may only agree to purchase loans at a substantial discount

Borrow from BoC .

Leave their securities and loans the same.

Borrow from BoC .

Interest must be paid , called bank rate .

Reduce (call-in) loans. (worst case)

Reduce loans by \$9M . Deposit proceeds at BoC .

Regain \$9M reserves

Deposit Outflow

if a bank has \$100,000 of demand deposits. desired reserve ratio is 2%. It holds \$40,000 in reserves. what is max deposit outflow it can sustain without altering its balance sheet.

Let:

D: deposits

R: reserves.

W: withdrawal.

p: % of deposits to be held in reserve ($0 < p < 1$)

After the withdrawal.

$$\text{Total Deposits} = D - W$$

$$\text{Total Reserves} = R - W$$

To be in compliance: $p(D-W) = (R-W)$

$$\Rightarrow W = \frac{R-pD}{1-p}$$

$$W = \frac{40000 - 0.2(100,000)}{1-0.2} = 25000$$

Asset Management: Three Goals

- To maximize profits, banks must seek the highest possible returns on loans and securities, reduce risk, and have adequate liquidity
 - *Four basic ways to accomplish these goals*
 - 1. Find low-risk borrowers that pay high interest rates
 - 2. Purchase securities with high returns and low risk
 - 3. Diversifying their asset holdings
 - 4. Manage liquidity to meet deposit outflow

1. Good screening to find best borrowers.
- 2.
3. Diversify:
 - * short-term Example: Gov't of Canada Bonds.
 - long-term Example: municipal bonds.
 - approve a variety of loans to a variety of customers.
 - Rather than focus on one industry eg. industry .
4. Manage liquidity and reserves as just discussed.

Liability Management

- This is a recent phenomenon due to rise of **money center banks**
- Expansion of overnight loan markets and new financial instruments (such as negotiable CDs)
- Checkable deposits have decreased in importance as source of bank funds

Money Center Banks.

A Money centre bank is similar in structure to a common bank; but, its borrowing and lending activities are with gov., large corps. and regular banks. These types of FIs (or designated branches of these institutions) generally do not lend/borrow to/from consumers.

Capital Adequacy Management

- Banks have to make decisions about the amount of capital they need to hold for three reasons:
 1. Bank capital helps prevent bank failure
 2. The amount of capital affects return for the owners (equity holders) of the bank
 3. Regulatory requirement

Liability Management

Liability were primarily demand deposits.

The overnight fund market was not well-developed.
Banks did not borrow from each other.

Starting in the 1960s, money center banks started to appear. These institutions wanted to explore the possibility of making their liabilities work for them (provide reserves and liquidity).

Certificates of deposit - a type of bank deposit that usually promises a fixed return on a large sum of money for a specified maturity.

Certificates of deposit developed in 1961.  How it works

- Big bank find a good loan opportunity
- Sells negotiable CD to get money
- Basically, managing liability side.
- Not depending on deposits

Capital Adequacy Management: Preventing Bank Failure

High Capital Bank			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans	\$90M	Bank Capital	\$10M

Low Capital Bank			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$96M
Loans	\$90M	Bank Capital	\$4M

Imagine \$5M of their loans become worthless

High Capital Bank			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans	\$85M	Bank Capital	\$5M

Low Capital Bank (now insolvent)			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$96M
Loans	\$85M	Bank Capital	-\$1M

(i) Preventing Bank failure.

High:

$$\frac{\text{Bank Cap.}}{\text{Assets.}} = \frac{10}{100} = 10\%$$

Low:

$$\frac{4}{100} = 4\%$$

e.g.: \$5M bad loans need to be written off, reducing assets and bank capital (net worth) by \$5M.

High:

$$\frac{\text{Bank Cap.}}{\text{Assets.}} = \frac{5}{95} = 5.3\%$$

Low:

$$\frac{\text{Bank Cap.}}{\text{Assets.}} = \frac{-1}{95} = -1\%$$

positive net worth

Negative net worth

Bank is insolvent

Regulators will close

A bank holds bank capital to prevent the bank insolvency.

High Capital:

Low Capital:

$$EM = \frac{\text{assets}}{\text{equity cap}}$$

$$EM = \frac{100M}{25M} = 25$$

$$= \frac{100M}{10M}$$

$$= 10$$

Assume ROA is the same for both banks = 1%.

$$ROE = 1\% \times 10 = 10\%$$

High

$$ROE = 1\% \times 25 = 25\%$$

Low

Therefore, For a given ROA - decreasing the bank Capital increases ROE.

However,

Increasing bank capital helps prevent insolvency.
Decreasing bank capital increases ROE.

Trade-off?

Capital Adequacy Management: Returns to Equity Holders

Return on Assets: net profit after taxes per dollar of assets

$$\text{ROA} = \frac{\text{net profit after taxes}}{\text{assets}}$$

Return on Equity: net profit after taxes per dollar of equity capital

$$\text{ROE} = \frac{\text{net profit after taxes}}{\text{equity capital}}$$

Relationship between ROA and ROE is expressed by the

Equity Multiplier: the amount of assets per dollar of equity capital

$$\text{EM} = \frac{\text{Assets}}{\text{Equity Capital}}$$

$$\frac{\text{net profit after taxes}}{\text{equity capital}} = \frac{\text{net profit after taxes}}{\text{assets}} \times \frac{\text{assets}}{\text{equity capital}}$$

$$\text{ROE} = \text{ROA} \times \text{EM}$$

(ii) Returns to equity holder (owners of the bank)

Return on Assets. indicates how much profit is earned on average, by each dollar of assets

Return on Equity indicates how much the bank is earning for each dollar of an owner's investment.

Equity Multiplier determines the direct relationship btw ROA and ROE

$$ROE = ROA \times EM$$

$$\frac{\text{net profit after taxes}}{\text{equity cap}} = \frac{\text{net profit after taxes}}{\text{assets}} \times \frac{\text{assets}}{\text{equity cap}}$$

Capital Adequacy Management: Safety

- Benefits the owners of a bank by making their investment safe
- Costly to owners of a bank because the higher the bank capital, the lower the return on equity
- Choice depends on the state of the economy and levels of confidence

Strategies for Managing Bank Capital

- Lowering Bank Capital:
 - Buying back some of Bank's stock*
 - Pay out higher dividend to shareholders*
 - Acquire new funds and increase assets*
- Raising Bank Capital:
 - Issue more common stock*
 - Reducing dividend to shareholders*
 - Issue fewer loans or sell securities and use proceeds to reduce liabilities*

Managing the EM = $\frac{\text{Assets}}{\text{equity cap}}$.

Decrease bank capital relative to assets will

- increase EM.
- increase ROE

Increase bank cap relative to assets will

- decrease EM
- decrease ROE

Recall : $\text{ROE} = \text{ROA} \times \text{EM}$.

Application: How a Capital Crunch Caused a Credit Crunch During the Global Financial Crisis

- Shortfalls of bank capital led to slower credit growth
 - *Huge losses for banks from their holdings of securities backed by residential mortgages*
 - *Losses reduced bank capital*
- Banks could not raise much capital on a weak economy, and had to tighten their lending standards and reduce lending

Managing Credit Risk

- A major component of many financial institutions business is making loans
- To make profits, these firms must make successful loans that are paid back in full
- The concepts of moral hazard and adverse selection are useful in explaining the risks faced when making loans

Managing Credit Risk: Adverse Selection

- Adverse selection is a problem in loan markets because bad credit risks (those likely to default) are the ones which usually line up for loans
- Those who are most likely to produce an adverse outcome are the most likely to be selected

Managing Credit Risk: Moral Hazard

Moral hazard is a problem in loan markets because borrowers may have incentives to engage in activities that are undesirable from the lenders point of view

Once a borrower has obtained a loan, they are more likely invest in high-risk investment projects that might bring high rates of return if successful

The high risk, however, makes it less likely the loan will be repaid

Managing Credit Risk (cont'd)

To be profitable, lending firms must overcome adverse selection and moral hazard problems

Attempts by the lending institutions to solve the problems explains a number of principles for managing risk

Managing Credit Risk (cont'd)

- Screening and Monitoring
 - *Screening*
 - *Specialization in Lending*
 - *Monitoring and Enforcement of Restrictive Covenants*
- Long-term customer relationships
- Loan commitments
- Collateral and compensating balances
- Credit rationing

Restrictive Covenant - a promise a borrower makes not to conduct certain activities, usually in return for a loan.

Loan commitments - a bank's commitment to provide a firm with loans, under certain conditions to be specified.

Collateral and Compensating Balances.

Collateral - property promised to the lender if the borrowers default.

Compensating balances - firm receiving the loan must keep an account there with a specified balance.

Credit rationing.

- refuse to make loan, or
- Restrict the size of loan

Interest Rate Risk

- If a financial institution has more interest rate sensitive liabilities than interest rate sensitive assets, a rise in interest rates will reduce the net interest margin and income *Assets < Liabilities ; $\uparrow ITR \rightarrow \downarrow \text{interest income}$*
- If a financial institution has more interest rate sensitive assets than interest rate sensitive liabilities, a rise in interest rates will raise the net interest margin and income *Assets > Liabilities ; $\uparrow ITR - \uparrow \text{interest income}$*

Managing Interest Rate Risk

First National Bank			
Assets		Liabilities	
Rate-sensitive assets	\$20M	Rate-sensitive liabilities	\$50M
Variable-rate and short-term loans		Variable-rate CDs	
Short-term securities		Money market deposit accounts	
Fixed-rate assets	\$80M	Fixed-rate liabilities	\$50M
Reserves		Checkable deposits	
Long-term loans		Savings deposits	
Long-term securities		Long-term CDs	
		Equity capital	

- If a bank has more rate-sensitive liabilities than assets, a rise in interest rates will reduce bank profits; a decline in interest rates will raise bank profits

Gap Analysis

- We can measure sensitivity of profits to interest rate changes using **gap analysis**
- The “gap” is the difference between interest rate sensitive liabilities and interest rate sensitive assets
 $GAP = \text{rate-sensitive assets} - \text{rate-sensitive liabilities}$
 $GAP = RSL - RSA$
- A change in the interest rate (Δi) will change bank income (ΔI) depending on the Gap
 $\Delta Income = GAP \times \Delta i$

GAP Analysis — the subdividing of a bank's assets and liabilities into components that are interest-rate sensitive and those that are not.

$$\text{GAP} = \text{RSA} - \text{RSL} \text{ where}$$

RSA - rate sensitive assets

RSL - rate sensitive liabilities.

What does it mean?

Banks with a positive GAP ($\text{RSA} > \text{RSL}$) experience a reduction in their net interest income when the interest rate decreases because the decline in total revenue generated by their assets exceeds the decline in the total interest cost of their liabilities.

Banks with negative GAP ($\text{RSA} < \text{RSL}$) experience a reduction in their net interest income when the interest rate increases, because the total interest costs associated with their liabilities rise faster than the total revenue earned on their assets.

Only a neutral GAP ($\text{RSA} = \text{RSL}$) insulates net interest income from interest rate risk regardless of the direction in which the interest rate moves.

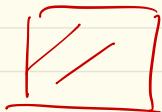
GAP Analysis.

$$A \text{ Income} = \text{GAP} \times \Delta I \quad i: \text{interest rate.}$$

Example from slide 12-32.

$$\begin{aligned}\text{GAP} &= \text{RSA} - \text{RSL} \\ &= \$20M - \$50M \\ &= -\$30M.\end{aligned}$$

If the interest rate rises by 5 percentage points,
income will decline by ($\$30M \times 0.05$) = $\$1.5M$



End of Quiz 3

Duration Analysis

- Owners and managers care not only about the change in interest rates on income but also on net worth of the institution
- **Duration Analysis** examines the sensitivity of the market value of the financial institution's net worth to changes in interest rates

Duration Analysis (cont'd)

$$\% \Delta P = - DUR \times [\Delta i / (1+i)]$$

Where: P is the market value of a security

$$\% \Delta P = (P_{t+1} - P_t) / P$$

DUR = duration

i = interest rate

Off-Balance-Sheet Activities

- **Off-balance sheet activities** affect profits but do not appear on bank balance sheets
- Loan sales (secondary loan participation)
- Generation of fee income
- Trading activities and risk management techniques
 - *Futures, options, interest-rate swaps, foreign exchange*
 - *Speculation*

Off-Balance-Sheet Activities (cont'd)

- May create **principal-agent problems**
 - *Traders have incentive to take big bets at high risk (if trades lead to profit, they are rewarded, while loses born by firm)*
- Internal controls to reduce the principal-agent problem
 - *Separation of trading activities and bookkeeping*
 - *Limits on exposure*
 - *Value-at-risk*
 - *Stress testing*

