

Economics 390
Topics in Macroeconomics
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Table 12.1

Balance Sheet of U.S. Commercial Banks, January 2010

Assets in billions of dollars (numbers with % sign are percentages of total assets)				
Cash items			1246.7	10.6%
Securities*			2336.8	19.9%
U.S. government and agency	1421.2	12.1%		
Other securities	915.5	7.8%		
Loans			6693.8	57.1%
Commercial and industrial	1320.1	11.3%		
Real estate (including mortgage)	3794.3	32.4%		
Consumer	817.7	7.0%		
Interbank	212.4	1.8%		
Other	761.6	6.5%		
Other assets			1439.5	12.3%
Total Commercial Bank Assets			11716.8	
Liabilities in billions of dollars (numbers with % sign are percentages of total liabilities)				
Deposits			7716.1	74.0%
Large time deposits	1886.2	18.1%		
Borrowings			1901.6	18.2%
From banks in the U.S.	256.3	2.5%		
From others	1645.4	15.8%		
Other liabilities			807.8	7.7%
Total Commercial Bank Liabilities			10425.5	
Bank Assets – Bank Liabilities = Bank Capital			1291.3	

Bank Risk

Table 12.3

Risks Banks Face and How They Manage Them

Type of Risk	Source of Risk	Recommended Responses
<i>Liquidity Risk</i>	Sudden withdrawals by depositors or takedowns of credit lines	<ol style="list-style-type: none">1. Hold sufficient cash reserves to meet customer demand.2. Manage assets—sell securities or loans (contracts the size of the balance sheet)3. Manage liabilities—attract more deposits (maintains the size of the balance sheet)
<i>Credit Risk</i>	Default by borrowers on their loans	<ol style="list-style-type: none">1. Diversify to spread risk.2. Use statistical models to screen for creditworthy borrowers.3. Monitor to reduce moral hazard.
<i>Interest-Rate Risk</i>	Mismatch in maturity of assets and liabilities coupled with a change in interest rates	<ol style="list-style-type: none">1. Closely match the maturity of both sides of the balance sheet.2. Use derivatives such as interest-rate swaps.
<i>Trading (Market) Risk</i>	Trading losses in the bank's own account	Closely monitor traders using risk management tools, including value at risk.

Dealing with Liquidity Risk

Figure 12.6

Balance Sheet of a Bank Following a \$5 Million Withdrawal and Asset Adjustment

Withdrawal Is Met by Selling Securities

Assets		Liabilities	
Reserves	\$10 million	Deposits	\$100 million → \$95 million
Loans	\$100 million	Borrowed funds	\$30 million
Securities	\$40 million → \$35 million	Bank capital	\$20 million

Withdrawal Is Met by Reducing Loans

Assets		Liabilities	
Reserves	\$10 million	Deposits	\$95 million
Loans	\$95 million	Borrowed funds	\$30 million
Securities	\$40 million	Bank capital	\$20 million

Deposits initially at \$100m; Loans at \$100m, Securities at \$40m

Dealing with Liquidity Risk

Figure 12.7

Balance Sheet of a Bank Following a \$5 Million Withdrawal and Liability Adjustment

Withdrawal Is Met by Borrowing

Assets		Liabilities	
Reserves	\$10 million	Deposits	\$95 million
Loans	\$100 million	Borrowed funds	\$35 million
Securities	\$40 million	Bank capital	\$20 million

Withdrawal Is Met by Attracting Deposits

Assets		Liabilities	
Reserves	\$10 million	Deposits	\$100 million
Loans	\$100 million	Borrowed funds	\$30 million
Securities	\$40 million	Bank capital	\$20 million

Deposits initially at \$100m; borrowed funds at \$30m.

Credit Risk/Capital Adequacy Management:

Screen assets or keep **high capital**

Commercial Bank (Before)			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$90M	Bank Capital (or “equity”)	\$10M

Commercial Bank (After)			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$81M	Bank Capital (or “equity”)	\$01M

Assume a \$9 million loss to loans

Credit Risk/Capital Adequacy Management:

Consider in contrast a **low capital bank**

Commercial Bank (Before)			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$95M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$90M	Bank Capital (or “equity”)	\$5M

Commercial Bank (After)			
Assets		Liabilities	
Reserves	\$10M	Deposits	\$91M
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$81M	Bank Capital (or “equity”)	\$0M

Assume \$9 million loss, no government intervention so that depositors take some losses

Bank Capital and Profitability

There are several measures of bank profitability.

1. Return on assets (ROA): ROA is the bank's profit left after taxes divided by the bank's total assets.
2. **return on equity (ROE)**. The bank's return to its owners. This is the bank's net profit after taxes divided by the bank's capital.
3. Net interest income. Difference between interest rates on assets, liabilities.
4. Net interest margin. Net interest income divided by assets.

¹²⁻⁸
NB: "Leverage" is bank assets to capital

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

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

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

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

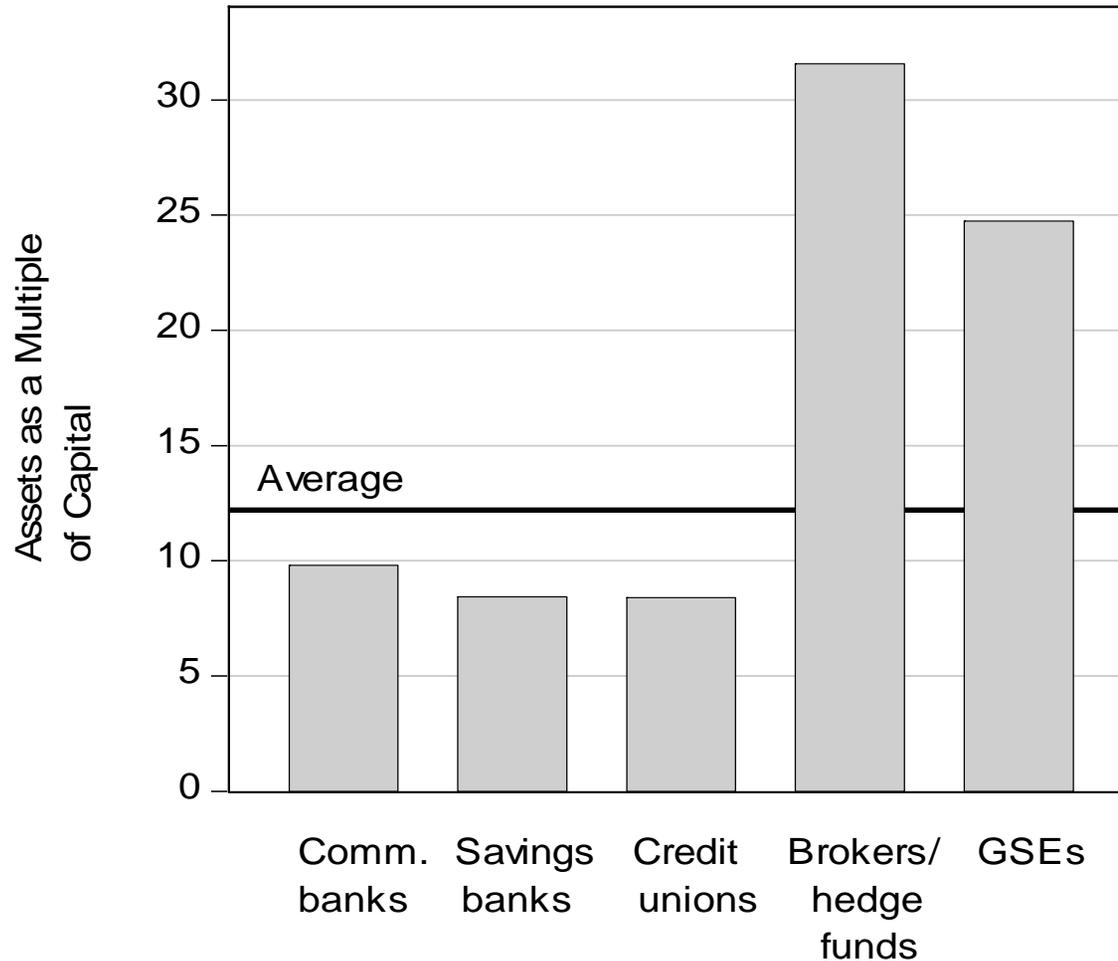
Incentives: High & Low Capital Banks

Commercial Bank (Before)				Commercial Bank (Before)			
Assets		Liabilities		Assets		Liabilities	
Reserves	\$10M	Deposits	\$90M @2%	Reserves	\$10M	Deposits	\$95M @2%
Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$90M @5%	Bank Capital (or “equity”)	\$10M	Loans (Mortgages, CRE) T-Bills Other bonds (GSEs)	\$90M @5%	Bank Capital (or “equity”)	\$5M

ROE for high capital firm = $((0.05 - 0.02) \times 90) / 10 = 27\%$

ROE for low capital firm = $(0.05 \times 90 - 0.02 \times 95) / 5 = (2.6) / 5 = 52\%$

Leverage in 2007



Leverage, measured as assets to capital, in the financial sector, in July-September 2007. GSE's are Fannie Mae and Freddie Mac. Source: Greenlaw, Hatzius, Kashyap, and Shin (2008).

- *Mark-to-market* accounting rules require banks to adjust the recorded value of the assets on their balance sheets when the market value changes.
 - When the price falls, the value is “written down” and *writedowns* reduce a bank’s capital.
- Banks don’t like to hold a large capital cushion because capital is costly.
- The more leverage the greater the possible reward for each unit of capital and the greater the risk.

Interest-Rate Risk

- A bank's liabilities tend to be short-term, while assets tend to be long term.
 - The mismatch between the two sides of the balance sheet create **interest-rate risk**.
- When interest rates rise, banks face the risk that the value of their assets will fall more than the value of their liabilities, reducing the bank's capital.
 - Rising interest rates reduce revenues relative to expenses, directly lowering a bank's profits.

Table 12.2**An Example of Interest-Rate Risk**

The impact of an interest-rate increase on bank profits (per \$100 of assets)

	Assets	Liabilities
Interest-rate sensitive	\$20	\$50
Not interest-rate sensitive	\$80	\$50
Initial interest rate	5%	3%
New interest rate on interest-rate-sensitive assets and liabilities	6%	4%
	Revenue from Assets	Cost of Liabilities
At initial interest rate	$(0.05 \times \$20) + (0.05 \times \$80) = \$5.00$	$(0.03 \times \$50) + (0.03 \times \$50) = \$3.00$
After interest-rate change	$(0.06 \times \$20) + (0.05 \times \$80) = \$5.20$	$(0.04 \times \$50) + (0.03 \times \$50) = \$3.50$
Profits at initial interest rate: $(\$5.00) - (\$3.00) = \$2.00$ per \$100 in assets		
Profits after interest-rate change: $(\$5.20) - (\$3.50) = \$1.70$ per \$100 in assets		
Gap Analysis		
Gap between interest-rate-sensitive assets and interest-rate-sensitive liabilities:		
$(\text{Interest-rate-sensitive assets of } \$20) - (\text{Interest-rate-sensitive liabilities of } \$50) = (\text{Gap of } -\$30)$		

Trading Risk

- Today banks hire traders to actively buy and sell securities, loans, and derivatives using a portion of the bank's capital.
- Risk that the instrument may go down in value rather than up is called **trading risk**, or *market risk*.
- Traders normally share in the profits from good investments, but the bank pays for the losses.
 - This creates moral hazard - traders take more risk than the banks would like.

Trading Risk

- The solution to the moral hazard problem is to compute the risk the traders generate.
 - Use standard deviation and Value at Risk analysis.
- The bank's risk manager limits the amount of risk any individual trader is allowed to assume and monitors closely.
- The higher the inherent risk in the bank's portfolio, the more capital the bank will need to hold.