CAPITAL ADEQUACY

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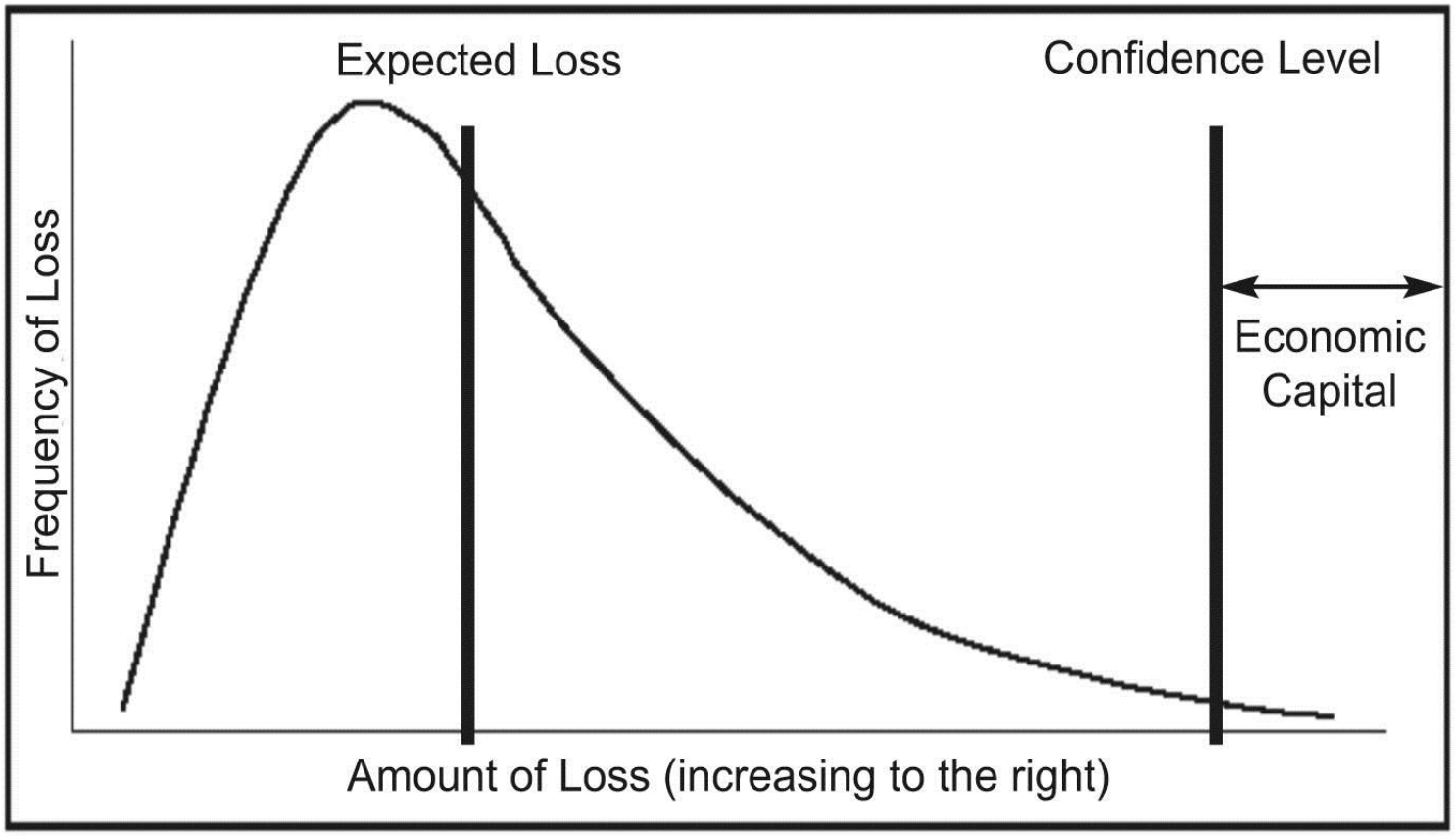
Lecture outline

Purpose: Gain a general understanding of why equity capital is important, how it is measured and how it is regulated

- Introduction to capital adequacy
  - What is it and why is it important
  - What are the costs and benefits to regulation
  - How to measure capital
- Calculation of Capital Ratios
  - Leverage
  - Risk-based
    - Tier I capital ratio
    - Total capital ratio

Tail Risk Measurement a Problem for Banks and Regulators - Why tail risk matters for banks and regulators



What Constitutes Bank Capital?

- Basel II Capital Standards
  - Pillar I
    - Credit risk
    - Market risk
    - Operational risk
  - Pillar II
    - Supervisory review of capital adequacy
  - Pillar III
    - Market discipline through enhanced public disclosure

Pillar 2
ICAAP = ECAP = ForCap

Pillar 2 Internal Capital Adequacy Assessment Process (ICAAP)

=

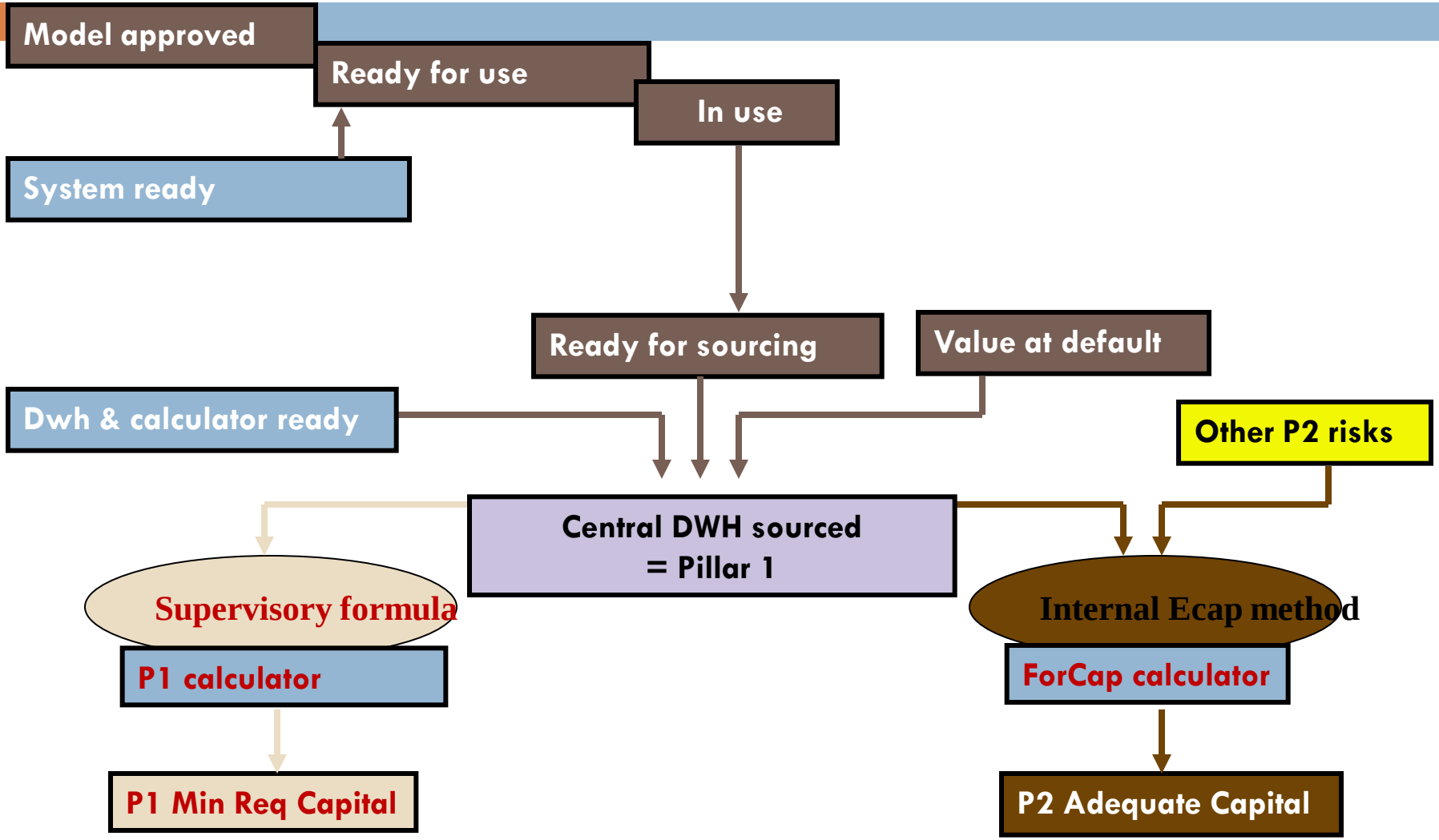
Economic Capital (ECAP)

=

Internal management tool (ForCap)

- Integrated risk management and organisation based on Business Lines.
- One single approach, one single management tool, one single capital figure
  - One single tool ForCAp and one single figure
  - ForCap incorporates the full diversification within and between risk types
  - Bottom-up computing
- Supervisory challenging
  - In line with principles 1 (ICAAP) & 2 (SREP) of Pillar 2
  - Approach, methodologies and models fully documented
  - SREP conclusions => Dialogue => ICAAP iteration

Pillars 1 & 2 Consistency



Permodalan

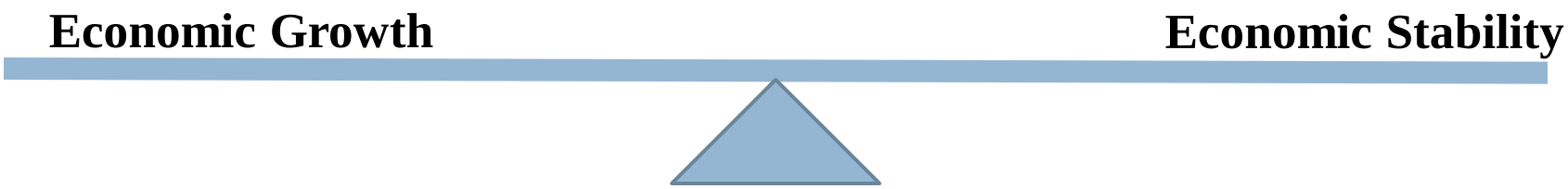
penilaian atas

- kecukupan modal dan
- kecukupan pengelolaan modal bank.

Why is Capital Adequacy Important?

- What happens when banks are under capitalized?
- Should banks be forced to hold more capital?

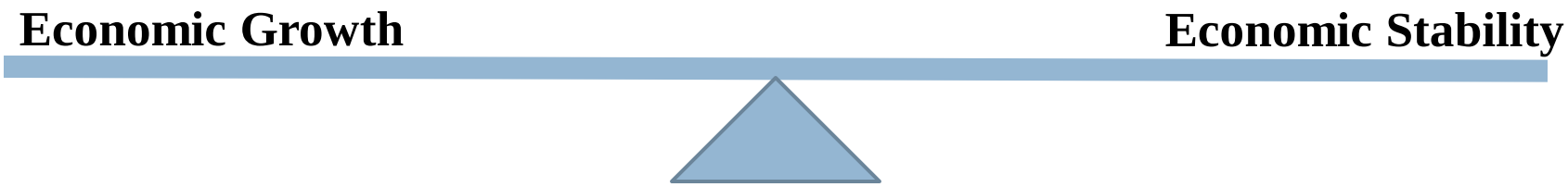
Cost Benefit of Regulating Capital



Increasing Capital Capital Requirements Lowers Insolvency Risk

- Absorbs unanticipated losses – equity capital acts as a buffer between the value of assets and liabilities. Losses in asset values decrease the value of equity. At zero equity value the firm is insolvent.
- Protects unsecured creditors against losses in the event of liquidation.
  - Proceeds from the sale of assets will more likely cover creditor claims for firms with high equity capital
- Protects FDIC insurance fund DIF and tax payers
  - Lower insolvency risk means fewer payouts from the FDIC insurance fund and lower likelihood of a tax-payer bailout of the FDIC

Cost Benefit of Regulating Capital



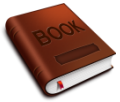
Increasing capital requirements decrease the credit supply

- Banks are required to hold more capital on their balance sheet which decreases the lending capacity of banks
- Decreased credit supply reduces corporate investment activity, which slows economic growth.

Increasing capital requirements can promote economic growth

- Increased stability increases consumer confidence which can promote growth
- More capital reduces FDIC Premiums which increases lending capacity

Measuring Equity Capital



Book Value of Equity

- The **historic** value of assets/ liabilities reflect total purchase price of all assets on the balance sheet less the face value of liabilities

Main Advantages

- Easy to measure
- Easy to observe (regulate)

Main Disadvantages

- The book value may not reflect the current value of the asset ie. What you could buy/sell it for
- Gives managers more discretion on when they report (realize) losses
- Does not consider off-balance sheet items

Measuring Equity Capital

Market Value of Equity

- Difference between the market value of assets and liabilities.
- Market value of equity is the remaining value after assets have been liquidated at market price and all liabilities have been repaid (or repurchased in the market)

Main Advantages:

- More current measure of liquidation value
- Quick to adjust

Main Disadvantage:

- Hard to measure especially for assets that do not have secondary markets
- Market prices do not always reflect the true (fundamental) asset value due to market imperfections – crisis

Measuring Capital Adequacy

1. Leverage Ratio — Book Value Measure
2. Tier I risk-based capital ratio — Book & Market Value – includes OBS
3. Total risk-based capital ratio — Book & Market Value – includes OBS

Risk-Based Ratios are defined in the Basel Accord

Measuring Capital Adequacy

Leverage Ratio

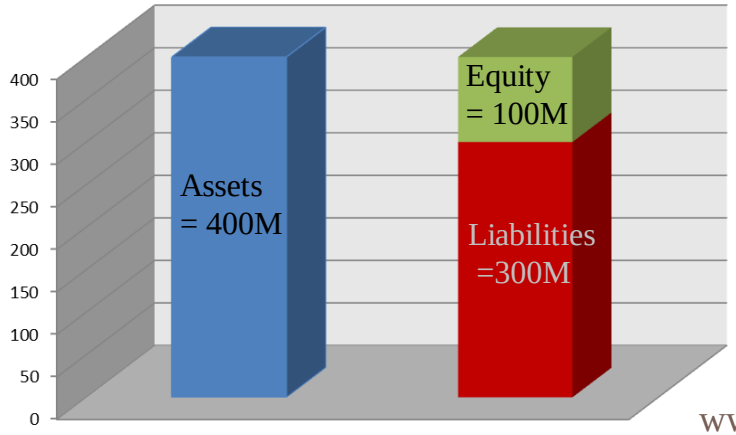
Leverage Ratio (Capital-to-Asset)

- The percentage of total assets protecting against insolvency or losses to liability holders

$$L = \frac{Core\ Capital}{Assets}$$

Book value Equity Capital

- Why do we call it a leverage ratio?



$$L = \frac{Core\ Capital}{Asset} = \frac{100}{400} = 25\%$$

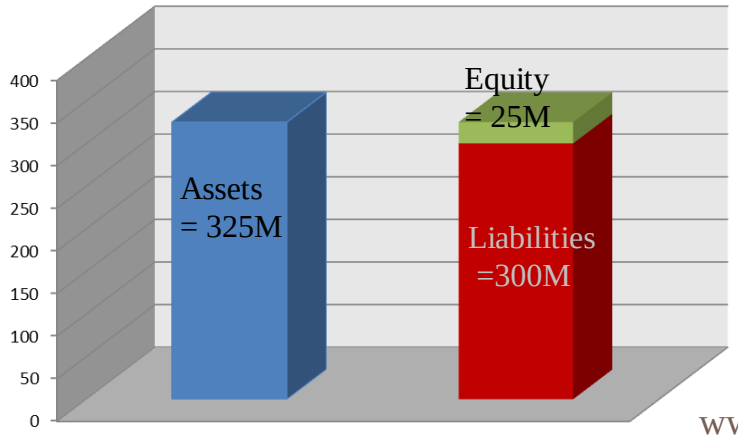
$$Old\ Leverage\ Ratio = \frac{Liabilitie\ s}{Assets} = \frac{300}{400} = 75\%$$

Leverage Ratio (Capital-to-Asset)

- The percentage of total assets protecting against insolvency or losses to liability holders

$$L = \frac{Core\ Capital}{Assets}$$

- How does it measure risk?



$$L = \frac{Core\ Capital}{Asset} = \frac{25}{325} = 7.69\%$$

Lower ratio = higher leverage

Core Capital Calculation

$$\textit{Core Capital} = \textit{Par value of equity} + \textit{surpluses value of equity} + \textit{Retained earnings} + \textit{Qualified cumulative perpetual preferred stock} + \textit{Minority interest in equity accounts of consolidated subsidiaries}$$

- **Par value of equity** – The value stated in the corporate charter – minimum price shares can be sold at issue. Par value = (par price) x (number of shares outstanding)
- **Surpluses value** – The difference between the price paid and par price times the number of shares outstanding
- **Retained earnings** – the accumulated value of past profits not paid out in dividends
- **Minority Interest** – less than a 50% ownership stake in the subsidiary
- **Qualified cumulative perpetual preferred stock** – perpetual preferred stock with a cumulative dividend that qualifies for inclusion in Tier 1 capital as defined in the Basel Accord

Given the following balance sheet calculate the leverage ratio

Weight	Assets		Liabilities/Equity	
0%	Cash	$ 8	Demand deposits	$ 150
	Balances due from Fed	13	Time deposits	500
	Treasury bills	60	CDs	400
	Long-term Treasury securities	50	Fed funds purchased	80
	Long-term government agencies (GNMAs)	42		
20	Items in process of collection	10	Convertible bonds	15
	Long-term government agencies (FNMAs)	10	Subordinated bonds	15
	Munis (general obligation)	20		
	AA+ rated loans to Bank of America	10		
	Commercial loans, AAA− rated	55	Perpetual preferred stock (nonqualifying)	5
50	University dorm bonds (revenue)	34	Retained earnings	10
	Residential 1–4 family mortgages	308	Common stock	30
	Commercial loans, A rated	75	Perpetual preferred stock (qualifying)	10
100	Commercial loans, BB+ rated	390		$1,215
	Third world loans, B+ rated	108		
	Premises, equipment	22		
150	Commercial loans, CCC+ rated	10		
N/A	Reserve for loan losses	(10)		
	Total assets	$1,215		

Off-Balance-Sheet Items:

$80 m in two-year loan commitments to a large BB+ rated U.S. corporation
$10 m direct credit substitute standby letters of credit issued to a BBB rated U.S. corporation
$50 m in commercial letters of credit issued to a BBB− rated U.S. corporation

One fixed–floating interest rate swap for four years with notional dollar value of $100 m and replacement cost of $3 m
One 2-year Euro$ contract for $40 m with a replacement cost of −$1 m

Draw-backs of leverage ratio

- Does not consider off-balance sheet risks
- Measures asset values using book value
- Assumes that all assets are equally risky

100 Billion in cash

Is there a difference in risk?

100 Billion in Greek bonds

Risk Based Capital Ratios

The Basel Accord

BASEL REVISED FRAMEWORK (June 2004)

PILLAR 1
Minimum capital requirement

Evolutionary approaches

Credit Risk

(New) Standardised Approach - NSA

Internal Ratings Based - IRB

Foundation IRB Approach - FIRBA
Advanced IRB Approach - AIRBA

Operational Risk

Basic Indicator Approach - BIA
Standardised Approach - STA

Advanced Measurement Appr - AMA

Market Risk

Standard Method (Conversion CRD risk)

Simulation Analysis Method

Value at Risk models

PILLAR 2
Supervisory review

4 principles

Internal assessment

Supervisory review

Capital > minimum

Supervisory intervention

PILLAR 3
Market discipline

Disclosure requir'ts

Capital

Capital adequacy

P 1 measurement methods and results

Risk Exposures

Basel Accords (I, II, & III)

A set of banking regulatory guidelines recommended by the Basel Committee on Banking Supervision (BCBS) a division of the Bank of International Settlement (BIS)

- Basel Accord Recommended Regulation

1. **Credit-Risk** based capital requirement (Basel I)
   - Asset values should include both on and off-balance sheet items
   - Asset values (capital) should be adjusted according to their **credit risk**
   - Banks equity capital should be no less than 8% of their risk adjusted asset value
2. Capital requirements should account for **market risk** (Basel II)
3. Capital requirements should also account for **operational** and **liquidity risk** (recommended)
4. Also has provisions for supervision (Pillar 2) and disclosure (Pillar 3)

Pillar 1
Credit risk management

Risk-Based Capital Ratio
Calculation

MINIMUM REQUIRED CAPITAL

Risk assets ratio

Unchanged, but
- Impacted by IFRS
- Limited to Unexpected Loss
- Under review by BC & EC

Unchanged, but
- Capital covers Unexpected Loss
- Shortfall coverage EL by provisions

$$\frac{\text{Capital (Tier 1 + 2 + 3)}}{\text{Credit risk} + \text{Market risk} + \text{Operational risk}} \geq 8\%$$

New : Add-on

New approaches
- Risk sensitive
- Based on Bank own estimates
- Credit risk mitigation integrated

Unchanged, but
Definition of Banking & Trading Books reviewed

Risk Adjustment Overview

- The Basel Accord proposed 2 risk-adjusted capital ratios
  - Tier 1 risk-adjusted capital ratio
  - Total risk-adjusted capital ratio

$$L = \frac{Core\ Capital}{Assets} \quad \Rightarrow \quad L = \frac{Core\ Capital}{Risk - Adjusted\ \ Assets}$$

- The risk adjusted asset value takes into account the **credit risk** only of on/off balance sheet assets and liabilities

- There are 2 components of risk adjusted asset value
  1. Credit risk-adjustment of on-balance sheet asset values
  2. Credit risk adjustment of off-balance sheet assets values

Tier I & Total Capital Ratios

- Tier I Capital:

$$Tier\ I = Core\ Capital - Goodwill$$

The amount paid for acquired targets above their book value

- Tier II Capital

$$Tier\ II = \underset{(1)}{\text{Loan Loss Reserves}} + \underset{(2)}{\text{Non-qualified perpetual preferred stock}} + \underset{(3)}{\text{Revaluation Reserves}} + \underset{(4)}{\text{Subordinate debt and intermediate preferred stock}} + \underset{(5)}{\text{Hybrid securities, perpetual debt, mandatory convertibles}}$$

1) Reserves set aside on the balance sheet to cover expected losses on the bank's loan portfolio
2) Perpetual preferred stock that does not qualify for inclusion in tier I capital
3) Reserve account that is credited when assets are revalued higher than their historical value
4) Limited to securities with weighted average life of greater than 5 years
5) Securities that are somewhere between a stock and bond

$$Tier\ I = \frac{Tier\ I}{Risk-adjusted\ \ Asset\ Value} \qquad Total = \frac{Tier\ I + Tier\ II}{Risk-adjusted\ \ Asset\ Value}$$

Types of capital

Types of Capital

1. What capital we need

1.1 Regulatory (Pillar 1)

1.2 Economic (ICAAP – Pillar 2)

2. What capital we have

2.1 Regulatory (Tier 1 + Tier 2)

Pillar 1 Regulatory Capital

• Credit Risk	Risk Weighted Assets x 8%	12
• Market Risk	None	0
• Operational Risk	Standardised Method	2
Total Regulatory Capital		14

Risk Capital - ICAAP

• Credit Risk	10
• Market Risk (IRRBB)	4
• Operational Risk	1
• Liquidity Risk	2
• Other risks: Strategic	1
Total Economic Capital	18

Calculating Risk-Adjusted Assets

Procedure

1. Calculate credit-risk adjusted asset value of on-balance-sheet assets

2. Calculate credit risk adjusted asset value of off-balance-sheet assets

1 . Calculate credit-risk adjusted asset value of on-balance-sheet assets

Calculating Risk-Adjusted Assets

- On Balance-Sheet Items – Procedure

2 steps to risk-adjusting on-balance sheet asset values

1. Classify assets into risk 1 of 5 risk categories to obtain the risk weight

2. Risk-adjust asset values: multiply risk weights by balance sheet asset values and sum

$$\text{Risk-adjusted asset value} = \sum \left(\text{Asset Value}\right) \text{Weight}$$

Calculating Risk-Adjusted Assets

- On Balance-Sheet Items – Risk Weights

Step 1: Under Basel II assets are assigned to 1 of 5 categories

TABLE 20–7
Summary of the Risk-Based Capital Standards for On-Balance-Sheet Items under Basel II

Source: Federal Reserve Board of Governors press release, January 1989, Attachment III; and Bank for International Settlements, "The New Basel Capital Accord," June 2006. *www.federalreserve.gov, www.bis.org*

Risk Categories
Category 1 (0% weight)
Cash, Federal Reserve Bank balances, securities of the U.S. Treasury, OECD governments, some U.S. agencies, and loans to sovereigns with an S&P credit rating of AA− or better.
Category 2 (20% weight)
Cash items in the process of collection. U.S. and OECD interbank deposits and guaranteed claims.
Some non-OECD bank and government deposits and securities. General obligation municipal bonds.
Some mortgage-backed securities. Claims collateralized by the U.S. Treasury and some other government securities.
Loans to sovereigns with an S&P credit rating of A+ to A−. Loans to banks and corporates with an S&P credit rating of AA− or better.
Category 3 (50% weight)
Loans fully secured by first liens on one- to four-family residential properties. Other (revenue) municipal bonds. Loans to sovereigns with an S&P credit rating of BBB+ to BBB−. Loans to banks and corporates with an S&P credit rating of A+ to A−.
Category 4 (100% weight)
Loans to sovereigns with an S&P credit rating of BB+ to B−. Loans to banks with a credit rating of BBB+ to B−. Loans to corporates with a credit rating of BBB+ to BB− and unrated C&I loans.
All other on-balance-sheet assets not listed above, including loans to private entities and individuals, some claims on non-OECD governments and banks, real assets, and investments in subsidiaries.
Category 5 (150% weight)
Loans to sovereigns, banks, and securities firms with an S&P credit rating below B−. Loans to corporates with a credit rating below BB−.

Calculating Risk-Adjusted Assets

- On Balance-Sheet Items – Example

Step 2: Convert to credit equivalent amounts and sum

Weight	Assets		Liabilities/Equity		Capital Class
0%	Cash	$ 8	Demand deposits	$ 150	
	Balances due from Fed	13	Time deposits	500	
	Treasury bills	60	CDs	400	
	Long-term Treasury securities	50	Fed funds purchased	80	
	Long-term government agencies (GNMAs)	42			
20	Items in process of collection	10	Convertible bonds	15	Tier II
	Long-term government agencies (FNMAs)	10	Subordinated bonds	15	Tier II
	Munis (general obligation)	20			
	AA+ rated loans to Bank of America	10			
	Commercial loans, AAA− rated	55			
50	University dorm bonds (revenue)	34	Perpetual preferred stock (nonqualifying)	5	Tier II
	Residential 1–4 family mortgages	308	Retained earnings	10	Tier I
	Commercial loans, A rated	75	Common stock	30	Tier I
100	Commercial loans, BB+ rated	390	Perpetual preferred stock (qualifying)	10	Tier I
	Third world loans, B+ rated	108		$1,215	
	Premises, equipment	22			
150	Commercial loans, CCC+ rated	10			
N/A	Reserve for loan losses	(10)			Tier II
	Total assets	$1,215			

Off-Balance-Sheet Items:

$80 m in two-year loan commitments to a large BB+ rated U.S. corporation
$10 m direct credit substitute standby letters of credit issued to a BBB rated U.S. corporation
$50 m in commercial letters of credit issued to a BBB− rated U.S. corporation

One fixed–floating interest rate swap for four years with notional dollar value of $100 m and replacement cost of $3 m
One 2-year Euro$ contract for $40 m with a replacement cost of −$1 m

$$\text{Risk-adjusted asset value} = \left[\text{Asset Value}\right] \text{Weight}$$

Category 1: $0 \times (8+13+60+50+42) = 0$

Category 2: $.2 \times (10+10+20+10+55) = 21$

Category 3: $.5 \times (34+308+75) = 208.5$

Category 4: $1 \times (390+108+22) = 520$

Category 5: $1.5 \times (10) = 15$

764.5 Mill

On Balance-sheet risk adjusted asset value

2 . Calculate credit-risk adjusted asset value of off-balance-sheet assets

Calculating Risk-Adjusted Assets
- Off Balance-Sheet Items - Procedure

1. Convert to on-balance sheet credit equivalent amounts using Basel conversation factors

   New

   - *Contingent or guaranty contracts*
   - *FX, interest rate forwards, options and swaps*

2. Classify off-balance sheet items into 1 of 5 risk categories to determine risk weights

3. Risk-adjust asset values: multiply risk weights by balance sheet asset values and sum

Contingent or guaranty contracts

Calculating Risk-Adjusted Assets

- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Contingent or guaranty contracts: Convert to credit equivalent amounts (CEA) using the Basel conversation factors

TABLE 20–9
Conversion Factors for Off-Balance-Sheet Contingent or Guaranty Contracts, Basel II

Source: Federal Reserve Board of Governors press release, January 1989, Attachment IV, and Bank for International Settlements, "The New Basel Capital Accord," June 2006. *www.federalreserve.gov, www.bis.org*

Sale and repurchase agreements and assets sold with recourse that are not included on the balance sheet (100%)
Direct-credit substitute standby letters of credit (100%)
Performance-related standby letters of credit (50%)
Unused portion of loan commitments with original maturity of *one year or less* (20%)
Unused portion of loan commitments with original maturity of *more than one year* (50%)
Commercial letters of credit (20%)
Bankers acceptances conveyed (20%)
Other loan commitments (10%)

$$CEA = \left[\begin{matrix}\textit{Off-balance sheet}\\ \textit{value (notional)}\end{matrix}\right]\left[\textit{Basel Factor}\right]$$

Market contracts or derivatives

FX, interest rate forwards, options and swaps

Calculating Risk-Adjusted Assets

- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Market contracts or derivatives: Convert to credit equivalent amounts (CEA) using the Basel conversation factors

Credit Equivalent Amount	=	Potential Exposure	+	Current Exposure

Potential Exposure: Risk of experiencing losses if the counterparty defaults sometime in the future. The potential exposure is calculated using Basel conversion factors

TABLE 20–10 Credit Conversion Factors for Interest Rate and Foreign Exchange Contracts in Calculating Potential Exposure

Remaining Maturity	(1) Interest Rate Contracts	(2) Exchange Rate Contracts
1. Less than one year	0%	1.0%
2. One to five years	0.5	5.0
3. Over five years	1.5	7.5

$$\textit{Potential exposure} = \left[\textit{Off-balance sheet value (notional)}\right]\left[\textit{Basel Factor}\right]$$

Calculating Risk-Adjusted Assets
- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Market contracts or derivatives: Convert to credit equivalent amounts (CEA) using the Basel conversation factors

- **Current Exposure:** the replacement cost or the contract if a counterparty defaults today
  - **Positive value:** The FI would have to pay out of pocket to reestablish the contract – regulators will recognize this value as the replacement cost
  - **Negative value:** The FI would receive money for taking the other end of the contract – regulators require that the FI sets replacement costs equal to zero.

- Because OTC derivatives are custom contracts, calculating the current exposure is difficult and usually determined using pricing model

Example

Calculating Risk-Adjusted Assets Example

- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Contingent or guaranty contracts: Example

Suppose an FI has the following off-balance-sheet items:

1. $80 Mill of 2-year loan commitments to large BB+ rated corporations
2. $10 Mill direct credit substitutes standby letters of credit issued to BBB rated US Corporations
3. $50 Mill in commercial letters of credit issued to BB- rated US Corporations

Convert OBS items to on-balance-sheet credit equivalent amounts using the Basel conversion factors:

OBS Item	Face value	Conversion Factor	Credit Equivalent Amount
2-year loan commitments	$80 mill	.5	$40 mill
Standby letters of credit	$10 mill	1	$10 mill
Commercial letter of credit	$50 mill	.2	$10 mill

Calculating Risk-Adjusted Assets

Example

- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Market contracts or derivatives: Example

Suppose an FI has the following off-balance-sheet items:

1. 4-year Fixed for floating Interest rate swap with notional amount of $100 mill and current market value of 3 Mill
2. 2-year forward foreign exchange contract with $40 mill In notional value and calculated value of -1Mill to the FI

Convert OBS items to on-balance-sheet credit equivalent amounts by adding potential and current exposures:

OBS Item	Face value	Conversion Factor	Potential Exposure	Replacement Cost	Current Exposure	Credit Equivalent Amount
4-year swap	$100 mill	0.005	0.5 mill	3 mill		
2-year forward	$40 mill	0.05	2 mill	-1 mill		

Remaining Maturity	(1) Interest Rate Contracts	(2) Exchange Rate Contracts
1. Less than one year	0%	1.0%
2. One to five years	0.5	5.0
3. Over five years	1.5	7.5

$$potential = (0.005)(100M) = 0.5M$$

$$potential = (0.05)(40M) = 2M$$

Calculating Risk-Adjusted Assets

Example

- Off Balance-Sheet Items – Convert to Credit Equivalents

Step 1 Market contracts or derivatives: Example

Suppose an FI has the following off-balance-sheet items:

1. 4-year Fixed for floating Interest rate swap with notional amount of $100 mill and current market value of 3 Mill
2. 2-year forward foreign exchange contract with $40 mill In notional value and calculated value of -1Mill to the FI

Regulators require the replacement cost to = 0

Convert OBS items to on-balance-sheet credit equivalent amounts by adding potential and current exposures:

OBS Item	Face value	Conversion Factor	Potential Exposure	Replacement Cost	Current Exposure	Credit Equivalent Amount
4-year swap	$100 mill	0.005	0.5 mill	3 mill	3 mill	$3.5 mill
2-year forward	$40 mill	0.05	2 mill	-1 mill	0 mill	$2 mill

$$Current = \max(0, 3M) = 3M \qquad CEA = 3M + 0.5M = 3.5M$$

$$Current = \max(0, -1M) = 0 \qquad CEA = 2M + 0 = 2M$$

Calculating Risk-Adjusted Assets

- Off Balance-Sheet Items – Determine Risk Weights

Step 2: Classify OBS items into risk categories

- Contingent or Guaranty contracts
  - Use the same risk category classifications as we used for on-balance sheet items
  - Classify the OBS item as if the contingent event had occurred and the asset was brought back on the balance sheet.

- Market contracts or derivatives
  - Derivatives and market contracts are assessed at 100% of their risk ie risk weight = 100%

Calculating Risk-Adjusted Assets Example

- Off Balance-Sheet Items – Determine Risk Weights

Contingent or guaranty contracts:

OBS Item	Face value	Conversion Factor	Credit Equivalent Amount	Risk Weight	Risk-Adjusted Asset Value
2-year loan commitments (BB+ rated corporations)	$80 mill	.5	$40 mill	1	$40 mill
Standby letters of credit (BBB rated US Corporations)	$10 mill	1	$10 mill	1	$10 mill
Commercial letter of credit (BB- rated US Corporations)	$50 mill	.2	$10 mill	1	$10 mill

Risk Categories

Category 1 (0% weight)

Cash, Federal Reserve Bank balances, securities of the U.S. Treasury, OECD governments, some U.S. agencies, and loans to sovereigns with an S&P credit rating of AA− or better.

Category 2 (20% weight)

Cash items in the process of collection. U.S. and OECD interbank deposits and guaranteed claims.

Some non-OECD bank and government deposits and securities. General obligation municipal bonds.

Some mortgage-backed securities. Claims collateralized by the U.S. Treasury and some other government securities.

Loans to sovereigns with an S&P credit rating of A+ to A−. Loans to banks and corporates with an S&P credit rating of AA− or better.

Category 3 (50% weight)

Loans fully secured by first liens on one- to four-family residential properties. Other (revenue) municipal bonds. Loans to sovereigns with an S&P credit rating of BBB+ to BBB−. Loans to banks and corporates with an S&P credit rating of A+ to A−.

Category 4 (100% weight)

Loans to sovereigns with an S&P credit rating of BB+ to B−. Loans to banks with a credit rating of BBB+ to B−. Loans to corporates with a credit rating of BBB+ to BB− and unrated C&I loans.

All other on-balance-sheet assets not listed above, including loans to private entities and individuals, some claims on non-OECD governments and banks, real assets, and investments in subsidiaries.

Category 5 (150% weight)

Loans to sovereigns, banks, and securities firms with an S&P credit rating below B−. Loans to corporates with a credit rating below BB−.

Calculating Risk-Adjusted Assets Example

- Off Balance-Sheet Items – Determine Risk Weights

Contingent or guaranty contracts:

OBS Item	Face value	Conversion Factor	Credit Equivalent Amount	Risk Weight	Risk-Adjusted Asset Value
2-year loan commitments (BB+ rated corporations)	$80 mill	.5	$40 mill	1	$40 mill
Standby letters of credit (BBB rated US Corporations)	$10 mill	1	$10 mill	1	$10 mill
Commercial letter of credit (BB- rated US Corporations)	$50 mill	.2	$10 mill	1	$10 mill
					$60M

Market and Derivative Contracts:

OBS Item	Face value	Conversion Factor	Potential Exposure	Replacement Cost	Current Exposure	Credit Equivalent Amount	Risk Weights	Risk Adjusted Asset Value
4-year swap	$100 mill	.005	.5 mill	3 mill	3 mill	$3.5 mill	1	$3.5M
2-year forward	$40 mill	.05	2 mill	-1 mill	0 mill	$2 mill	1	$2M
								$5.5M

Calculating Risk-Adjusted Assets
- Total Risk Adjusted Capital

- Total risk adjusted capital is the sum of:
  - Risk adjusted on-balance-sheet assets
  - Risk adjusted off-balance-sheet assets – contingent guaranty contracts
  - Risk adjusted off-balance-sheet assets – market contracts or derivatives

- From the above examples:

	Risk-Adjusted Capital
On-balance-sheet	764.5 mill
Off-balance-sheet	60 mill
Off-balance-sheet	5.5 mill
Total Risk Adjusted Asset Value	830 mill

Risk-Based Capital Ratios

TABLE 20–8 Bank's Balance Sheet under Basel II (in millions of dollars)

Weight	Assets		Liabilities/Equity		Capital Class
0%	Cash	$ 8	Demand deposits	$ 150	
	Balances due from Fed	13	Time deposits	500	
	Treasury bills	60	CDs	400	
	Long-term Treasury securities	50	Fed funds purchased	80	
	Long-term government agencies (GNMAs)	42			
20	Items in process of collection	10	Convertible bonds	15	Tier II
	Long-term government agencies (FNMAs)	10	Subordinated bonds	15	Tier II
	Munis (general obligation)	20			
	AA+ rated loans to Bank of America	10			
	Commercial loans, AAA− rated	55	Perpetual preferred stock (nonqualifying)	5	Tier II
50	University dorm bonds (revenue)	34			
	Residential 1–4 family mortgages	308	Retained earnings	10	Tier I
	Commercial loans, A rated	75	Common stock	30	Tier I
100	Commercial loans, BB+ rated	390	Perpetual preferred stock (qualifying)	10	Tier I
	Third world loans, B+ rated	108			
	Premises, equipment	22		$1,215	
150	Commercial loans, CCC+ rated	10			
N/A	Reserve for loan losses	(10)			Tier II
	Total assets	$1,215			

Off-Balance-Sheet Items:

$80 m in two-year loan commitments to a large BB+ rated U.S. corporation
$10 m direct credit substitute standby letters of credit issued to a BBB rated U.S. corporation
$50 m in commercial letters of credit issued to a BBB− rated U.S. corporation

One fixed–floating interest rate swap for four years with notional dollar value of $100 m and replacement cost of $3 m
One 2-year Euro$ contract for $40 m with a replacement cost of −$1 m

Tier 1

- Retained Earnings 10
- Common Stock 30
- Qualified perpetual preferred stock 10

50

$$Tier\ 1 = \frac{50}{830} = 6.02\%$$

Tier 2

- Convertible Bonds 15
- Subordinate Debt 15
- Non-Qualified perpetual preferred stock 5
- Loan loss reserves 10

45

$$\text{total risk-based capital} = \frac{45+50}{830} = 11.45\%$$

Capital Adequacy Regulation

Regulation

After obtaining the capital ratios, the bank capital adequacy can be assessed and regulated

$$Leverage = \frac{50}{1{,}225} = 4.12\%$$

$$Tier\ 1 = \frac{50}{830} = 6.02\%$$

$$\text{Total} = \frac{45+50}{830} = 11.45\%$$

Zone	(1) Total Risk-Based Ratio		(2) Tier I Risk-Based Ratio		(3) Leverage Ratio		Capital Directive/Other
1. Well capitalized	10% or above	and	6% or above	and	5% or above	and	Not subject to a capital directive to meet a specific level for any capital measure
2. Adequately capitalized	8% or above	and	4% or above	and	4% or above	and	Does not meet the definition of well capitalized
3. Undercapitalized	Under 8%	or	Under 4%	or	Under 4%		
4. Significantly undercapitalized	Under 6%	or	Under 3%	or	Under 3%		
5. Critically undercapitalized	2% or under	or	2% or under	or	2% or under		

Regulation

- Rules apply to: Commercial Banks; Securities Firms; Life insurers; Property and causality insurers
- Capital adequacy levels vary across institution types
- FDIC Improvement Act (1991): imposed risk based capital requirements based on two basic ratios:
  1. Capital-to-asset (leverage) ratio
  2. Risk based capital ratio
- Each ratio is calculated for both tier1 and tier 2 securities

3 Pillars - Key drivers

PILLAR 1
MINIMUM REQUIRED CAPITAL
SUPERVISOR - DRIVEN

BANKs CHOICE

Choice of approaches
Modelling : PD
LGD
EAD
VAR
Data
Use
Systems
Policy

SUPERVISOR'S REQ.

Approaches
Quantitative requirement
Qualitative requirement
Calculation Formula
Permission to go :
AIRBA
AMA

Pillar 2
Capital Adequacy Assessment
Bank's -Driven

Pillar 3
Disclosure
Market - Driven

3 Pillars - Key drivers

PILLAR 2
CAPITAL ADEQUACY ASSESSMENT
BANK's -DRIVEN

ICAAP
Produce ICAAP number and assessment

Dialogue
Challenge

SREP
Produce conclusions

ICAAP
Iteration

Supervisory measures

Pillar 1
Minimum Required Capital
Supervisor - Driven

Pillar 3
Disclosure
Market - Driven

3 Pillars - Key drivers

PILLAR 3
DISCLOSURE
MARKET -DRIVEN

Institution Disclosures

Minimum List CRD
= Pillar 1
Market pressure

=> Bank's Policy

Supervisory Disclosures

CRD requirements

Banking industry pressure
Market pressure

=> Supervisors Policy

Pillar 1
Minimum Required Capital
Supervisor - Driven

Pillar 2
Capital Adequacy Assessment
Bank's - Driven

Lecture Wrap-up

- What capital adequacy is it and why is it important
- What are the costs and benefits to regulation
- How to measure capital
- How to measure capital adequacy (capital ratios)
  - **Leverage**
  - Risk-based
    - Tier I capital ratio
    - Total capital ratio
  - Regulation