AFIN8003 Week 3 - Capital Management and Adequacy

Banking and Financial Intermediation

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1 Introduction

1.1 Defining "capital"

Understanding how *capital* safeguards a financial institution (FI) from insolvency risk requires a clear definition of capital. However, definitions vary significantly across different perspectives:

- **Economist's Perspective**: Economists define an FI's capital, or owners' equity, as the difference between the market values of its assets and liabilities, also known as **net worth**. This concept aligns with market value accounting.
- **Accounting Perspective**: Accountants typically focus on **book value**, which is the historical cost of assets minus liabilities as recorded in financial statements.
- **Regulatory Perspective**: Regulatory bodies have crafted definitions of capital that may diverge from economic net worth to prioritize financial stability. Regulatory capital requirements often rely on historical or book value accounting concepts.
  - Regulatory capital includes various tiers (e.g., Tier 1 and Tier 2) and is used to assess capital adequacy.

1.2 Capital of financial institutions (FIs)

The major functions of capital are

- to absorb unanticipated losses to enable the FI to continue as a going-concern
- to protect uninsured depositors, bondholders and creditors in case of insolvency and liquidation
- to protect FI insurance funds and the taxpayer
- to protect the FI owners against increases in insurance premiums
- to partially fund the FI's real investment activities

> **i** Why is capital important in a regulatory context? APRA's explanation of *capital*
>
> From a prudential regulator's perspective, capital is a measure of the financial cushion available to an institution to absorb any unexpected losses it experiences in running its business. For a bank, such losses might include loans that default and are written off. Insurers might be hit by an unexpectedly high volume of claims in the wake of a major natural disaster.

Sufficient capital levels

- inspire confidence in the FI
- enable the FI to continue as a going concern even in difficult times

2 Capital and insolvency risk

2.1 Example of bank net worth (capital) absorbing losses

The marking-to-market method allows balance sheet values to reflect current rather than historic prices.

Consider the following market value balance sheet of an FI:

Table 1: Market-value-based balance sheet before loan losses

Assets ($m)	Amount	Liabilities ($m)	Amount
Securities	70	Deposits	85
Loans	30	Net worth	15
Total assets	100	Total liabilities + equity	100

In this example the FI is **solvent** on a market value basis.

2.2 Example of bank net worth (capital) absorbing losses

The marking-to-market method allows balance sheet values to reflect current rather than historic prices.

Consider a fall in the market value of loans to $10 (a fall of $20m).

Table 2: Market-value-based balance sheet after loan losses

Assets ($m)	Amount	Liabilities ($m)	Amount
Securities	70	Deposits	85
Loans	**10**	Net worth	**-5**
Total assets	**80**	Total liabilities + equity	**80**

FI is now **insolvent**, its net worth has declined from $15 to -$5. The owners' net worth stake has been completely wiped out.

After the liquidation of the remaining **$80** in assets, depositors would get only 80/85 in dollars, without deposit insurance.

The FI's capital is used to absorb (partially) the losses.

The example also shows that market valuation of the balance sheet produces an economically accurate picture of the net worth and thus the solvency position of an FI.

2.3 The book value of capital

However, the FI's balance sheet based on book value *could* remain unchanged.

Table 3: Book-value-based balance sheet after loan losses

Assets ($m)	Amount	Liabilities ($m)	Amount
Securities	70	Deposits	85
Loans	30	Net worth	15
Total assets	100	Total liabilities + equity	100

Note that Table 3 looks identical to Table 1.

With book value accounting, FIs have discretion in how and when they report loan losses on their balance sheets.

This flexibility allows them to strategically manage the recognition of these losses and their subsequent effect on capital.

For example, the FI could just record an increase in **loan loss provisions** to reflect their *expected loan losses* (e.g., $5m).

Table 4: Book-value-based balance sheet with loan loss provisions

Assets ($m)	Amount	Liabilities ($m)	Amount
Securities	70	Deposits	85
Loans	30	Net worth	10
less loan loss provisions	(5)		
Total assets	95	Total liabilities + equity	95

2.4 Market-value vs book-value of equity

Obviously, market-value-based view of capital allows for a more accurate and comprehensive description of FIs' financial health.

> If regulators close a FI before it's market value of capital reaches zero, liability holders will not lose.

But not all assets and liabilities are valued as fair value (market value).

Note

- The Financial Accounting Standards Board (FASB) sets out Financial Accounting Standards (FAS) and the Generally Accepted Accounting Principles (GAAP), adopted in the U.S.
- The International Accounting Standards Board (IASB) sets out the International Financial Reporting Standards (IFRS), adopted in many other places.

All trading assets, marketable securities ("available for sale") are marked to market.

Loans and debt securities held for investment or to maturity are carried at amortized cost (book value).

Tip

Recall a bank's **banking book** and **trading book**.

Real-world case: Silicon Valley Bank (SVB), March 2023

SVB held ~$91 billion in long-dated US Treasuries and mortgage-backed securities classified as **held-to-maturity (HTM)** — reported at amortised cost on the balance sheet, not market value. As interest rates surged in 2022–2023, the market value of those bonds fell by ~$15 billion. On the book-value balance sheet? Nothing to see. When SVB was forced to sell some securities to raise cash, the $1.8 billion realised loss became visible — triggering a bank run. The bank collapsed in **48 hours**.
The punchline: mark-to-market accounting would have signalled the problem long before the panic.

2.5 Why not market value for all?

1. Difficult to implement, especially for small banks, building societies and credit unions with large amounts of non-traded assets
2. Introduces unnecessary variability into an FI's earnings
3. FIs are less willing to take long-term asset exposures such as commercial mortgages and business loans, since long-term assets are more interest rate sensitive.

As a result, market value accounting may interfere with FIs' special functions as lenders and monitors and may even result in (or accentuate) a major credit crunch.

2.6 Capital management and regulation

In summary,

- capital is useful to absorb losses and to mitigate insolvency risk;
- regulators use book value accounting standards to determine the *adequate* capital requirements for FIs.

As a result, FI's capital is guided by two key factors:

1. regulated capital adequacy requirements, and
2. the risk-return trade-offs.

3 Risk-based capital ratio

3.1 Who determines the capital requirements?

Actual capital ratios applied can be country-specific, determined by national regulators. However, the **Basel Accords** provide the global framework for these capital ratios.

> **i** Why does a global standard exist?
>
> Before 1988, capital requirements were left entirely to national regulators — creating an uneven playing field. Japanese banks were expanding aggressively internationally while holding far less capital than US or European peers. Basel I was partly about ending that arbitrage. Each subsequent accord followed the same pattern: a crisis exposed a gap, regulators patched it.

- The Basel Committee on Banking Supervision (BCBS) of the BIS sets out the 1988 Basel Capital Accord.
- Member countries of the BIS agreed and implemented the Basel Capital Accord (**Basel I**).
  - a minimum ratio of capital to risk-weighted assets of 8%.
- A series of updates led to the Basel Accord of 2006 (**Basel II**)
- **Basel III**: responding to the 2007-09 financial crisis.

3.2 Basel I

Two capital ratios:

1. **Tier 1 Capital Ratio**
   - Primarily composed of common equity, retained earnings, and disclosed reserves, less goodwill and other intangibles.
   - Calculation: Tier 1 Capital / Risk-Weighted Assets (RWA)
   - Minimum requirement: 4%
2. **Total Capital Ratio**
   - Minimum requirement: 8%

Features:

- Basel I introduced the systematic measurement of capital adequacy through the use of risk-weighted assets.
- Basel I utilized RWA to account for the varying risk levels of different asset classes, including both on-balance-sheet and off-balance-sheet exposures.

Criticisms:

- **Credit Risk Focus**: Basel I primarily recognized credit risk in the calculation of risk-weighted assets. It did not initially incorporate market risk or operational risk, leading to criticisms that it did not fully address the spectrum of risks faced by banks.[1]

3.3 Basel II

Basel II comprised three pillars:

1. **minimum capital requirements**, which sought to develop and expand the standardised rules set out in the 1988 Accord
2. **supervisory review** of an institution's capital adequacy and internal assessment process
3. **effective use of disclosure** as a lever to strengthen market discipline and encourage sound banking practices

- The measurement of capital did not change markedly in Basel II.
- The measurement of risk was significantly enhanced to include operational risk, some market risks in the banking book, and risks associated with securitisation.

Under Basel II, two options are allowed for banks to measure their credit risk:

1. **Standardized approach**. Similar to Basel I, but more risk-sensitive.
2. **Internal ratings-based (IRB) approach**. Banks can use their internal rating system or credit scoring models to assess their portfolios, subject to regulatory approval.

Three options are available for measuring operational risk:

1. basic indicator.
2. standardized approach.
3. advanced measurement approach.

3.4 GFC and Basel 2.5

The Global Financial Crisis (GFC) in 2007-09 revealed that Basel II was flawed. For example,

- credit ratings of complex securities were conducted by private companies without regulatory supervision or review
- Basel II capital adequacy formula was procyclical, meaning that the required capital was increasing as the crisis unfolded, making it even harder for banks during crisis

In response, Basel 2.5 was passed in 2009 (effective in 2013) and Basel III was passed in 2010 (phased in between 2013 and 2019).[2]

- Basel 2.5 updated capital requirements on market risk from banks' trading activities.

3.5 Basel III

Basel III is broader in perspective than just a revision of capital, capital adequacy, risk measurement and supervision. It introduced **macroprudential** measures, targeting the protection of the whole financial system.

Three pillars similar to in Basel II, but with significant enhancements.

[1] A 1996 amendment (effective January 1998) incorporated market risk into the framework.
[2] Basel III framework was revised and finalized in 2017 and the implementation was extended to January 1, 2022.

1. Improvements to both standardized and IRB approaches in calculating adequate capital.
2. Inclusion of new **capital conservation buffer** and **countercyclical capital buffer** to the minimum required capital level.
3. Introduction of two minimum standards for funding liquidity: **liquidity coverage ratio** and **net stable funding ratio**.[3]
4. Higher capital requirements for trading and derivative activities.
5. Enhanced bank governance.
6. Enhanced risk disclosure.

> **Note**
>
> Basel III is our focus, of course.

3.6 Risk-based capital ratio

Under Basel III, depositary institutions (DIs) calculate and monitor four capital ratios:

1. **Common equity Tier 1 (CET1) risk-based capital ratio**

$$\text{CET1 capital ratio} = \frac{\text{CET1 capital}}{\text{Risk-weighted assets}} \tag{1}$$

2. **Tier 1 risk-based capital ratio**

$$\text{Tier 1 capital ratio} = \frac{\text{Tier 1 capital}}{\text{Risk-weighted assets}} \tag{2}$$

3. **Total risk-based capital ratio**

$$\text{Total capital ratio} = \frac{\text{Total capital}}{\text{Risk-weighted assets}} \tag{3}$$

4. **Tier 1 leverage ratio**

$$\text{Tier 1 leverage ratio} = \frac{\text{Tier 1 capital}}{\text{Total exposure}} \tag{4}$$

- The calculation of these capital ratios is complex.
- Use risk-weighted assets (RWA) to distinguish the different credit risks of different assets.
- Measure a DI's **credit risk** (on-and off-balance-sheet).

> **Important**
>
> - Additional capital charges for **market risk** and **operational risk**.
> - For now, we do not consider these risks and their impact on RWA.
> - We briefly explain how they affect RWA and capital ratios at the end of this lecture.

3.7 Standardized and IRB approaches for credit risk

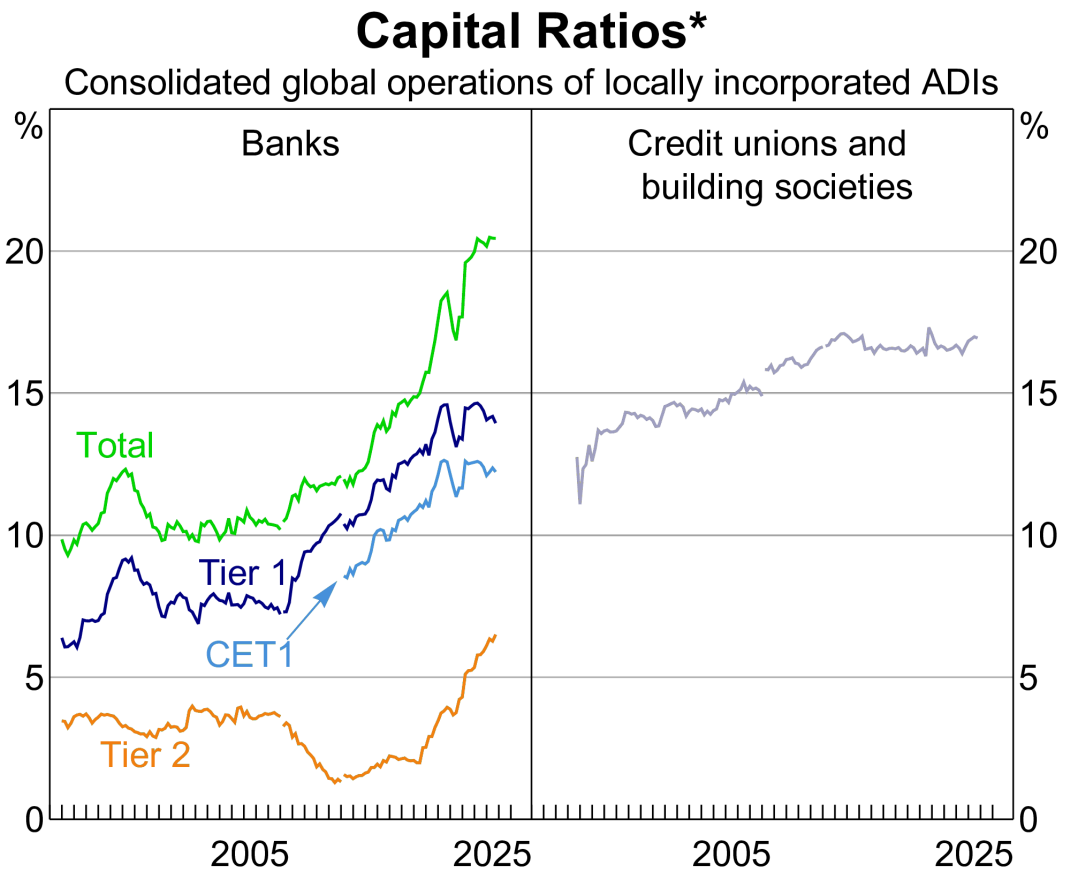
Since Basel II, two options are available for banks to measure credit risk for calculating capital requirements.

1. The standardized approach.
   - Used by smaller depositary institutions.
2. The internal ratings-based (IRB) approach.

[3] These liquidity ratios are discussed in Week 10 Liability and Liquidity Management.

- Used by large depositary institutions.
  - US: about 20 of the largest banking institutions with consolidated assets of $250 billion or more.[4] **The use of IRB is to be ended as US regulators are proposing new rules.**
  - Australia: currently approved for use by 6 of the largest banks in Australia.

3.8 Capital ratios of DIs in Australia



* Per cent of risk-weighted assets; break in March 2008 due to the introduction of Basel II for most ADIs; break in March 2013 due to the introduction of Basel III for all ADIs.

Source: APRA.

Figure 1: Capital ratios of DIs in Australia over time

[4] Or with consolidated on-balance-sheet foreign exposures of $10 billion or more.

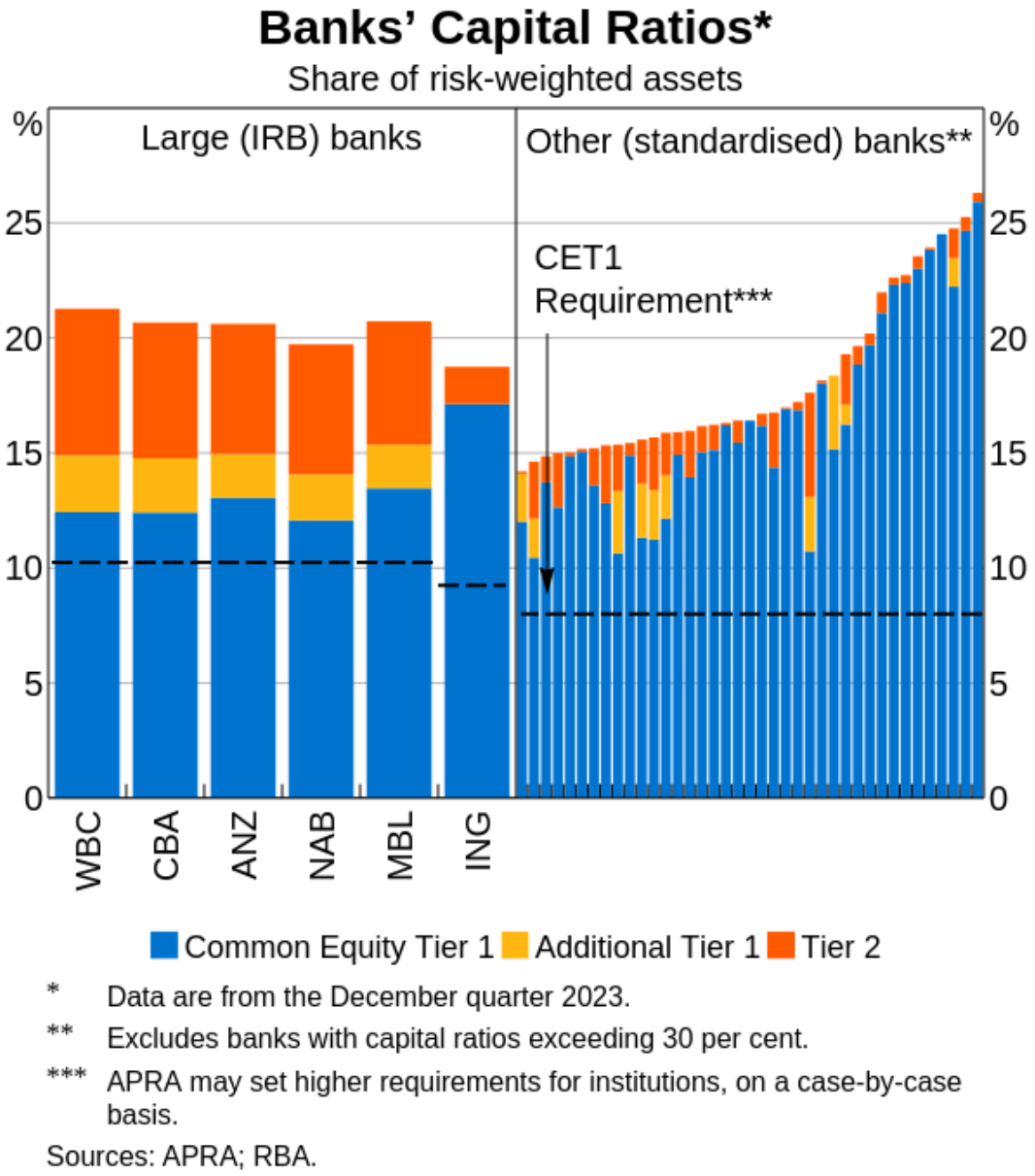


Figure 2: Capital ratios of DIs in Australia at December 2023

3.9 Type of capital: CET1 Capital

CET1 is the primary or core capital of a DI.

- **Common shares**
- Share premium resulting from the issue of CET1 instruments
- **Retained earnings**
- **Accumulated and other comprehensive income (AOCI)**
- Other disclosed reserves
- Certain minority interests
- Regulatory adjustment applied in the calculation of CET1 Capital.

3.10 Type of capital: Tier 1 Capital

Tier 1 Capital is the sum of CET1 Capital and Additional Tier 1 Capital.

Additional Tier 1 Capital:

- Instruments issued by a DI that qualify for Additional Tier 1 Capital and are not included in CET1 capital.
  - E.g., noncumulative perpetual preferred stock.
  - Certain Contingent Convertible Bonds (CoCos)
- Share premium resulting from the issue of instruments included in Additional Tier 1 Capital.[5]
- Tier 1 minority interest not included CET1 capital.
- Regulatory adjustments applied in the calculation of Additional Tier I Capital.

> ⚠ Real-world case: Credit Suisse AT1 bonds, March 2023
>
> When UBS was orchestrated to take over Credit Suisse in March 2023, Swiss regulator FINMA ordered ~CHF 16 billion (~$17 billion) of Credit Suisse's AT1 (CoCo) bonds to be written down to **zero**. Controversially, equity holders still received ~CHF 3 billion — inverting the usual creditor hierarchy. Bond markets globally were rattled. But this was legally permitted under the terms of those AT1 instruments, which explicitly allow regulators to impose losses in a resolution scenario. It was a live demonstration of what AT1 capital is actually for.

3.11 Type of capital: Total Capital

Total Capital is the sum of Tier 1 and Tier 2 capitals, where Tier 2 Capital is supplementary capital.

Tier 2 Capital:

- Instruments issued by a DI that qualify for Tier 2 Capital and are not included in Tier 1 capital.
  - Includes secondary "equity-like" capital resources, for example, loan loss reserves and some convertible and subordinated debt instruments.
- Share premium resulting from the issue of instruments included in Tier 2 Capital.[6]
- Tier 2 minority interest not included Tier 1 capital.
- Certain loan loss provisions.
- Regulatory adjustments applied in the calculation of Tier 2 Capital.

4 Capital adequacy

4.1 Capital adequacy framework

- Credit risk
  - The risk-based capital ratios as described earlier.
- Interest rate risk
  - No formal add on yet.
- Market risk
  - Additional capital charge.
- Operational risk
  - Additional capital charge.

[5] In Table 21-3 of the textbook Saunders, Cornett, and Erhemjamts (2023), this entry incorrectly reads "Stock surplus (share premium) resulting from the issue of instruments included in Common Equity Tier I". See page 15 of the original BIS publication "Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems", June 2011.

[6] In Table 21-3 of the textbook Saunders, Cornett, and Erhemjamts (2023), this entry incorrectly reads "Stock surplus (share premium) resulting from the issue of instruments included in Tier I capital". See page 17 of the original BIS publication "Basel III: A Global Regulatory Framework for More Resilient Banks and Banking Systems", June 2011.

4.2 Minimum required capital adequacy ratios

The minimum required capital ratios:

$$\begin{aligned}
\text{CET1 capital ratio} &= \frac{\text{CET1 capital}}{\text{Risk-weighted assets}} \geq 4.5\% \\
\text{Tier 1 capital ratio} &= \frac{\text{Tier 1 capital}}{\text{Risk-weighted assets}} \geq 6\% \\
\text{Total capital ratio} &= \frac{\text{Total capital}}{\text{Risk-weighted assets}} \geq 8\% \\
\text{Tier 1 leverage ratio} &= \frac{\text{Tier 1 capital}}{\text{Total exposure}} \geq 3\%
\end{aligned} \tag{5}$$

> **Note**
>
> The Basel III international minimum for the Tier 1 leverage ratio is **3%**. APRA sets a higher bar: **3.5%** for domestic systemically important banks (D-SIBs, i.e., the Big 4 plus Macquarie) and **3%** for other ADIs.

4.3 Overview of capital ratios calculation

1. Calculate the amount of capital (CET1, Tier 1, Total Capital).
2. Calculate the **risk-weighted assets (RWA)**[7]: sum of the amount of each asset multiplied by a risk weight specific to its riskiness.
    1. On-balance-sheet:
        1. Each asset has a risk weight
        2. Multiply the asset by the corresponding risk weight
    2. Off-balance-sheet:
        1. Convert each asset to an on-balance-sheet equivalent
        2. Multiply the equivalent exposure by the corresponding risk weight
    3. Sum the on-balance-sheet and off-balance-sheet RWA
3. Calculate the capital ratios based on the amount of capital and RWA.

4.4 Capital ratios calculation: risk-weighted assets

We will use an example to showcase how to calculate risk-weighted assets.

4.4.1 Balance sheet items

Asset type	$ million
Cash, Australian Treasury Bonds and deposits at the RBA	20
Local government bonds, S&P rating of AA-	10
Loans to other Australian banks, S&P rating of BBB+	5
Standard eligible residential mortgages	40
Corporate loans, S&P rating of BB- to BBB+	25
Corporate loans, S&P rating of B+ or lower	20

4.4.2 Off-balance-sheet items

[7] On- and off-balance-sheet assets whose values are adjusted for approximate credit risk.

OBS item	$ million
Contingencies and guarantees	
Two-year loan commitment	80
Standby letter of credit	10
Commercial letter of credit	50
Market contracts and derivatives	
Four-year fixed–floating interest rate swap	100
Two-year forward foreign exchange contract	40

4.5 Risk-weighted assets: on-balance-sheet

Consider the following example balance sheet of a DI.

We want to calculate its on-balance-sheet RWA.

Table 7: Example balance sheet of a DI

Asset type	$ million
Cash, Australian Treasury Bonds and deposits at the RBA	20
Local government bonds, S&P rating of AA-	10
Loans to other Australian banks, S&P rating of BBB+	5
Standard eligible residential mortgages	40
Corporate loans, S&P rating of BB- to BBB+	25
Corporate loans, S&P rating of B+ or lower	20

4.6 Risk-weighted assets: on-balance-sheet

Now map the assets' risk weights.[8]

Table 8: Example balance sheet of a DI with risk weights

Asset type	$ million	Risk weight
Cash, Australian Treasury Bonds and deposits at the RBA	20	0%
Local government bonds, S&P rating of AA-	10	20%
Loans to other Australian banks, S&P rating of BBB+	5	100%
Standard eligible residential mortgages	40	35%
Corporate loans, S&P rating of BB- to BBB+	25	100%
Corporate loans, S&P rating of B+ or lower	20	150%

4.7 Risk-weighted assets: on-balance-sheet

Calculate the risk-weighted value for each asset.

[8] Each asset is assigned to one of several categories of credit risk exposure. The risk weight for each category is determined in the Basel III.

Table 9: Example balance sheet of a DI with risk-weighted assets

Asset type	$ million	Risk weight	Risk-weighted value
Cash, Australian Treasury Bonds and deposits at the RBA	20	0%	0
Local government bonds, S&P rating of AA-	10	20%	2
Loans to other Australian banks, S&P rating of BBB+	5	100%	5
Standard eligible residential mortgages	40	35%	14
Corporate loans, S&P rating of BB- to BBB+	25	100%	25
Corporate loans, S&P rating of B+ or lower	20	150%	30

4.8 Risk-weighted assets: on-balance-sheet

Calculate the total risk-weighted assets.

Table 10: Total RWA for on-balance-sheet assets

Asset type	$ million	Risk weight	Risk-weighted value
Cash, Australian Treasury Bonds and deposits at the RBA	20	0%	0
Local government bonds, S&P rating of AA-	10	20%	2
Loans to other Australian banks, S&P rating of BBB+	5	100%	5
Standard eligible residential mortgages	40	35%	14
Corporate loans, S&P rating of BB- to BBB+	25	100%	25
Corporate loans, S&P rating of B+ or lower	20	150%	30
Total RWA			**76**

4.9 Risk-weighted assets: off-balance-sheet (OBS)

Two-Step Process:

1. The notional amount of each OBS item is first converted into an on-balance-sheet equivalent, **credit equivalent amount (CEA)**.
   - The CEA is determined by multiplying the notional amount by a **credit conversion factor (CCF)**.
   - CCF under Basel III.
   - In Australia, CCFs are specified in APRA's APS 112.
2. The resulting CEA must be multiplied by the appropriate risk weight (same as those used for on-balance-sheet assets).

Treatments differ for

- OBS guaranty-type contracts and contingent contracts, e.g., letters of credit
- derivative and market contracts, e.g., interest rate forward, option, and swap contracts

4.10 Risk-weighted assets: OBS contingent guaranty contracts

Consider the following example off-balance-sheet items of a DI. We want to calculate its RWA.

First, convert to on-balance-sheet CEA.[9]

[9] CCF for OBS contingent or guaranty contracts under Basel III.

OBS item	Face value ($ million)	CCF	CEA
Two-year loan commitment	80	0.4	32
Standby letter of credit	10	1	10
Commercial letter of credit	50	0.2	10

Second, calculate RWA.[10]

Table 12: Total RWA for OBS contingent guaranty contracts

OBS item	CEA	Risk weight	Risk-weighted value
Two-year loan commitment	32	20%	6.4
Standby letter of credit	10	20%	2
Commercial letter of credit	10	75%	7.5
Total RWA			**15.9**

4.11 Risk-weighted assets: OBS market contracts or derivative instruments

OBS market contracts and derivatives expose the DI also to *counterparty risk*.

First, when converting to CEA, both **potential future exposure** and **current exposure** are considered.

- The potential future exposure reflects the risk if a counterparty defaults *in the future*.

Type of Contract (remaining maturity)	Notional Principal	×	Potential Exposure Conversion Factor	=	Potential Exposure
Four-year fixed–floating interest rate swap	$100 m	×	0.005	=	$0.5 m
Two-year forward foreign exchange contract	$ 40 m	×	0.05	=	$2 m

- The current exposure reflects the cost of replacing a contract if the counterparty defaults *today*.

Type of Contract (remaining maturity)	Replacement Cost	Current Exposure
Four-year fixed–floating interest rate swap	$3 m	$3m
Two-year forward foreign exchange contract	–$1 m	**$0m**

CEA = potential future exposure + current exposure

Type of Contract (remaining maturity)	Potential Exposure	Current Exposure	CEA
Four-year fixed–floating interest rate swap	$0.5 m	$3 m	$3.5 m
Two-year forward foreign exchange contract	$2 m	$0	$2 m

Second, calculate RWA. Under Basel III, the risk weight for OBS market contracts or derivative instruments is generally 100%.

Total RWA = CEA × risk weight = CEA × 100% = $(3.5 + 2) \times 100\% = 5.5$(million)

[10]These risk weights are the same as those on-balance-sheet assets.

4.12 Risk-weighted assets: on-and off-balance-sheet

Total RWA of the DI is the sum of on-balance-sheet and off-balance-sheet RWAs:

Table 16: Total RWA (on-and off-balance-sheet)

Category	RWA ($ million)
On-balance-sheet	76
Off-balance-sheet	
- contingencies and guarantees	15.9
- market contracts and derivatives	5.5
Total RWA	**97.4**

4.13 Capital ratios

Suppose the DI's liabilities and equity are listed below:

Liabilities/Equity	Amount ($ million)	Capital class
Demand deposits	65	
Certificate of Deposits (CD)	20	
Subordinated bonds	8	Tier 2
Retained earnings	5	CET1
Common stock	20	CET1
Noncumulative perpetual preferred shares (qualifying)	2	Additional Tier 1

The DI's capital ratios are:

$$\text{CET1 capital ratio} = \frac{\text{CET1 capital}}{\text{Risk-weighted assets}} = \frac{25}{97.4} = 25.67\% \geq 4.5\%$$

$$\text{Tier 1 capital ratio} = \frac{\text{Tier 1 capital}}{\text{Risk-weighted assets}} = \frac{25+2}{97.4} = 27.72\% \geq 6\%$$

$$\text{Total capital ratio} = \frac{\text{Total capital}}{\text{Risk-weighted assets}} = \frac{27+8}{97.4} = 35.93\% \geq 8\%$$

Capital ratios of Australian banks

Figure 1 and Figure 2 show the capital ratios of Australian banks.

4.14 Capital conservation buffer and countercyclical capital buffer (CCyB)

Basel III introduced two buffers, **capital conservation buffer** and **countercyclical capital buffer**, to the minimum required capital level.

Capital conservation buffer:

- 2.5% of risk weighted assets comprised of CET1 only
- DI to hold minimum of 7% common equity Tier 1 (minimum of 4.5% plus conservation buffer of 2.5%)
- If a DI's capital conservation buffer falls below 2.5%, constraints are imposed on the DI's distributions (e.g. dividends and bonuses)

CCyB:

- May be declared by a country experiencing excess aggregate credit growth
- Vary between 0 and 2.5% of risk-weighted assets comprised of CET1 only
- If a DI's CCyB falls below the set level, constraints are imposed on the DI's distributions (e.g. dividends and bonuses)

> **Example**
>
> Suppose that a 2.5% capital conservation buffer currently applies and CCyB is 0, then the required CET1 capital ratio becomes 4.5%+2.5% = 7%.
> If a bank's CET1 capital ratio is 7.5%, it will receive no restrictions on its dividends payout, share buybacks, etc.

> **Example**
>
> Suppose that a 2.5% capital conservation buffer and a 1.5% CCyB currently apply, then the required CET1 capital ratio becomes 4.5%+2.5%+1.5% = 8.5%.
> If a bank's CET1 capital ratio is 7.5%, it will receive restrictions on its dividends payout, share buybacks, etc.

4.15 Global Systemically Important Banks (G-SIBs)

Under Basel III, additional capital surcharge applies on Global Systemically Important Banks (G-SIBs).

- 1% to 3.5% in addition to the 7% minimum CET1 requirement (CET1 + capital conservation buffer).
- A Bucket 1 G-SIB (1% surcharge) must hold at least **8%** CET1 (= 4.5% + 2.5% + 1%) to avoid payment restrictions; higher buckets require more.

List of G-SIBs at November 2024.

4.16 Leverage ratio

Basel III also introduced the **Tier 1 leverage ratio** to discourage the use of excessive leverage (recall Equation 5).

$$\text{Tier 1 leverage ratio} = \frac{\text{Tier 1 capital}}{\text{Total exposure (on-and off-balance-sheet)}} \geq 3\%$$

- Total exposure is equal to the DI's total assets plus off-balance-sheet exposure.
- For derivative securities, off-balance-sheet exposure is current exposure plus potential future exposure as described earlier.
- For off-balance-sheet credit (loan) commitments, a conversion factor of 100 percent is applied unless the commitments are immediately cancelable.

4.17 Risk-based capital: beyond credit risk

So far, the capital ratios (specifically, RWA) are calculated to account for the DI's credit risk. However, a DI's insolvency risk can also manifest from interest rate risk, market risk, operational risk, and more.

In Basel III, RWA should be the sum of three components:[11]

1. RWA for credit risk (covered in this lecture)
2. RWA for market risk. Can be calculated using two approaches:[12]

[11] To date, no formal add on has been required yet (development in progress).
[12] For details, see RBC20.9.

1. Standardized approach proposed by regulators. Revised standards published in 2016 to be implemented in 2019.
2. DI's internal market risk model subject to regulator approval. Move towards expected shortfall rather than value at risk (VaR).

3. RWA for operational risk. Some complicated calculation.[13]

> **!** Important
>
> The RWA in the minimum capital ratios (Equation 5) is the sum of all three RWAs.
> We covered only the RWA for credit risk.

4.18 Risk-based capital: beyond credit risk

In the previous example, we have calculated that the DI's RWA (for credit risk) is \$97.4 million.

Now, suppose that we have also calculated that the DI's

- RWA for market risk is \$10.2 million, and
- RWA for operational risk is \$9 million.

The total RWA is \$97.4 + \$10.2 + \$9 = \$116.6 million.

The DI's capital ratios are actually:

$$\text{CET1 capital ratio} = \frac{\text{CET1 capital}}{\text{Risk-weighted assets}} = \frac{25}{116.6} = 21.44\% \geq 4.5\%$$

$$\text{Tier 1 capital ratio} = \frac{\text{Tier 1 capital}}{\text{Risk-weighted assets}} = \frac{25+2}{116.6} = 23.16\% \geq 6\%$$

$$\text{Total capital ratio} = \frac{\text{Total capital}}{\text{Risk-weighted assets}} = \frac{27+8}{116.6} = 30.02\% \geq 8\%$$

> **i** Note
>
> In this course, no assessment will be on the calculation of RWA for market risk or RWA for operational risk.

4.19 RWA of Australian banks in 2023

Table 18: RWA of Australian banks in 2023 (source: Capital IQ)

	CBA	Westpac	NAB	ANZ	Macquarie
RWA for credit risk	362,869	339,758	355,554	349,041	97,485
RWA for market risk	61,968	51,676	38,274	41,967	11,663
RWA for operational risk	43,155	55,175	41,178	42,319	15,828
Other RWA	0	4,809	0	0	0
Total RWA	467,992	451,418	435,006	433,327	124,976

4.20 RWA of Australian banks in 2024

[13] For details, see RBC20.10.

Table 19: RWA of Australian banks in 2024 (source: Capital IQ)

	CBA	Westpac	NAB	ANZ	Macquarie
RWA for credit risk	370,444	351,724	350,891	361,185	98,250
RWA for market risk	52,132	37,510	26,953	30,875	14,277
RWA for operational risk	44,975	48,196	36,102	49,650	17,512
Other RWA	0	0	0	4,872	0
Total RWA	467,551	437,430	413,946	446,582	130,039

5 Finally...

5.1 Suggested readings

- The Basel Committee
- History of the Basel Committee
- "Capital explained" by the APRA
- APRA Discussion paper - Enhancing bank resilience: Additional Tier 1 Capital in Australia
- BIS - Calculation of minimum risk-based capital requirements (RBC20)

References

Saunders, Anthony, Marcia Millon Cornett, and Otgo Erhemjamts. 2023. *Financial Institutions Management ISE*. 11th ed. McGraw Hill.