



Capital adequacy ratios for banks - simplified explanation and example of calculation

Summary

Capital adequacy ratios are a measure of the amount of a bank's capital expressed as a percentage of its risk weighted credit exposures.

An international standard which recommends minimum capital adequacy ratios has been developed to ensure banks can absorb a reasonable level of losses before becoming insolvent.

Applying minimum capital adequacy ratios serves to protect depositors and promote the stability and efficiency of the financial system.

Two types of capital are measured - tier one capital which can absorb losses without a bank being required to cease trading, e.g. ordinary share capital, and tier two capital which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors, e.g. subordinated debt.

Measuring credit exposures requires adjustments to be made to the amount of assets shown on a bank's balance sheet. The loans a bank has made are weighted, in a broad brush manner, according to their degree of riskiness, e.g. loans to Governments are given a 0 percent weighting whereas loans to individuals are weighted at 100 percent.

Off-balance sheet contracts, such as guarantees and foreign exchange contracts, also carry credit risks. These exposures are converted to credit equivalent amounts which are also weighted in the same way as on-balance sheet credit exposures. On-balance sheet and off-balance sheet credit exposures are added to get total risk weighted credit exposures.

The minimum capital adequacy ratios that apply are:

- tier one capital to total risk weighted credit exposures to be not less than 4 percent;
- total capital (tier one plus tier two less certain deductions) to total risk weighted credit exposures to be not less than 8 percent.

Introduction

Banks registered in New Zealand are required to publish quarterly disclosure statements which include a range of financial and prudential information. (For an explanation of the disclosure arrangements, see the *Reserve Bank Bulletin* of March 1996). A key part of these statements is the disclosure of the banks' "capital adequacy ratios". These ratios are a measure of the amount of a bank's capital in relation to the amount of its credit exposures. They are usually expressed as a percentage, e.g. a capital adequacy ratio of 8 percent means that a bank's capital is 8 percent of the size of its credit exposures. Capital and credit exposures are both defined and measured in a specific manner which is explained in this article.

An international standard has been developed which recommends minimum capital

adequacy ratios for international banks. The purpose of having minimum capital adequacy ratios is to ensure that banks can absorb a reasonable level of losses before becoming insolvent, and before depositors funds are lost.

Applying minimum capital adequacy ratios serves to promote the stability and efficiency of the financial system by reducing the likelihood of banks becoming insolvent. When a bank becomes insolvent this may lead to a loss of confidence in the financial system, causing financial problems for other banks and perhaps threatening the smooth functioning of financial markets. Accordingly applying minimum capital adequacy ratios in New Zealand assists in maintaining a sound and efficient financial system here.

It also gives some protection to depositors. In the event of a winding-up, depositors' funds rank in priority before capital, so depositors would only lose money if the bank makes a loss which exceeds the amount of capital it has. The higher the capital adequacy ratio, the higher the level of protection available to depositors.

This article provides an explanation of the capital adequacy ratios applied by the Reserve Bank and a guide to their calculation. For more detail, the Reserve Bank policy document *Capital Adequacy Framework*, issued in January 1996, available from the Reserve Bank Library, should be consulted.

Development of Minimum Capital Adequacy Ratios

The "Basle Committee" (centred in the Bank for International Settlements), which was originally established in 1974, is a committee that represents central banks and financial supervisory authorities of the major industrialised countries (the G10 countries). The committee concerns itself with ensuring the effective supervision of banks on a global basis by setting and promoting international standards. Its principal interest has been in the area of capital adequacy ratios. In 1988 the committee issued a statement of principles dealing with capital adequacy ratios. This statement is known as the "Basle Capital Accord". It contains a recommended approach for calculating capital adequacy ratios and recommended minimum capital adequacy ratios for international banks. The Accord was developed in order to improve capital adequacy ratios (which were considered to be too low in some banks) and to help standardise international regulatory practice.

It has been adopted by the OECD countries and many developing countries. The Reserve Bank applies the principles of the Basle Capital Accord in New Zealand.

Capital

The calculation of capital (for use in capital adequacy ratios) requires some adjustments to be made to the amount of capital shown on the balance sheet. Two types of capital are measured in New Zealand - called tier one capital and tier two capital.

Tier one capital is capital which is permanently and freely available to absorb losses without the bank being obliged to cease trading. An example of tier one capital is the ordinary share capital of the bank. Tier one capital is important because it safeguards both the survival of the bank and the stability of the financial system.

Tier two capital is capital which generally absorbs losses only in the event of a winding-up of a bank, and so provides a lower level of protection for depositors and other creditors. It comes into play in absorbing losses after tier one capital has been lost by the bank. Tier two capital is sub-divided into upper and lower tier two capital. Upper tier two capital has no fixed maturity, while lower tier two capital has a limited life span, which makes it less

effective in providing a buffer against losses by the bank. An example of tier two capital is subordinated debt. This is debt which ranks in priority behind all creditors except shareholders. In the event of a winding-up, subordinated debt holders will only be repaid if all other creditors (including depositors) have already been repaid.

The Basle Capital Accord also defines a third type of capital, referred to as tier three capital. Tier three capital consists of short term subordinated debt. It can be used to provide a buffer against losses caused by market risks if tier one and tier two capital are insufficient for this. Market risks are risks of losses on foreign exchange and interest rate contracts caused by changes in foreign exchange rates and interest rates. The Reserve Bank does not require capital to be held against market risk, so does not have any requirements for the holding of tier three capital.

The composition and calculation of capital are illustrated by the first step of the capital adequacy ratio calculation example shown later in this article.

Credit Exposures

Credit exposures arise when a bank lends money to a customer, or buys a financial asset (e.g. a commercial bill issued by a company or another bank), or has any other arrangement with another party that requires that party to pay money to the bank (e.g. under a foreign exchange contract). A credit risk is a risk that the bank will not be able to recover the money it is owed.

The risks inherent in a credit exposure are affected by the financial strength of the party owing money to the bank. The greater this is, the more likely it is that the debt will be paid or that the bank can, if necessary, enforce repayment.

Credit risk is also affected by market factors that impact on the value or cash flow of assets that are used as security for loans. For example, if a bank has made a loan to a person to buy a house, and taken a mortgage on the house as security, movements in the property market have an influence on the likelihood of the bank recovering all money owed to it. Even for unsecured loans or contracts, market factors which affect the debtor's ability to pay the bank can impact on credit risk.

The calculation of credit exposures recognises and adjusts for two factors:

- On-balance sheet credit exposures differ in their degree of riskiness (e.g. Government Stock compared to personal loans). Capital adequacy ratio calculations recognise these differences by requiring more capital to be held against more risky exposures. This is done by weighting credit exposures according to their degree of riskiness. A broad brush approach is taken to defining degrees of riskiness. The type of debtor and the type of credit exposures serve as proxies for degree of riskiness (e.g. Governments are assumed to be more creditworthy than individuals, and residential mortgages are assumed to be less risky than loans to companies). The Reserve Bank defines seven credit exposure categories into which credit exposures must be assigned for capital adequacy ratio calculation purposes.
- Off-balance sheet contracts (e.g. guarantees, foreign exchange and interest rate contracts) also carry credit risks. As the amount at risk is not always equal to the nominal principal amount of the contract, off-balance sheet credit exposures are first converted to a "credit equivalent amount". This is done by multiplying the nominal principal amount by a factor which recognises the amount of risk inherent in particular types of off-balance sheet credit exposures. After deriving credit equivalent amounts for off-balance sheet credit exposures, these are weighted according to the riskiness

of the counterparty, in the same way as on-balance sheet credit exposures. Nine credit exposure categories are defined to cover all types of off-balance sheet credit exposures.

The credit exposure categories and the risk weighting process are illustrated by the second step of the calculation example.

Minimum Capital Adequacy Ratios

The Basle Capital Accord sets minimum capital adequacy ratios that supervisory authorities are encouraged to apply. These are:

- tier one capital to total risk weighted credit exposures to be not less than 4 percent;
- total capital (i.e. tier one plus tier two less certain deductions) to total risk weighted credit exposures to be not less than 8 percent;

There are some further standards applicable to tier two capital:

- tier two capital may not exceed 100 percent of tier one capital;
- lower tier two capital may not exceed 50 percent of tier one capital;
- lower tier two capital is amortised on a straight line basis over the last five years of its life.

The Reserve Bank will not register banks in New Zealand that do not meet these standards - and maintaining the minimum standards is always made a condition of registration.

- If the registered bank is incorporated in New Zealand, then the minimum standards apply to the financial reporting group of the bank.
- If the registered bank is a branch of an overseas bank, then it is the capital adequacy ratios of the whole overseas bank (and not the branch) which are relevant. Overseas banks which operate as branches are registered in New Zealand on the condition that they comply with the capital adequacy ratio requirements imposed by the financial authorities in their home country and that these requirements are no less than those recommended by the Basle Capital Accord.

When a registered bank falls below the minimum requirements it must present a plan to the Reserve Bank (which is publicly disclosed) aimed at restoring capital adequacy ratios to at least the minimum level required.

Even though a bank may have capital adequacy ratios above the minimum levels recommended by the Basle Capital Accord, this is no guarantee that the bank is "safe". Capital adequacy ratios are concerned primarily with credit risks. There are also other types of risks which are not recognised by capital adequacy ratios e.g.. inadequate internal control systems could lead to large losses by fraud, or losses could be made on the trading of foreign exchange and other types of financial instruments. Also capital adequacy ratios are only as good as the information on which they are based, e.g. if inadequate provisions have been made against problem loans, then the capital adequacy ratios will overstate the amount of losses that the bank is able to absorb. Capital adequacy ratios should not be interpreted as the only indicators necessary to judge a bank's financial soundness.

Calculation Example

Because off-balance sheet credit exposures are included in calculations, capital adequacy

ratios cannot be calculated by reference to the balance sheet alone. Even the calculation of capital adequacy ratios to cover on-balance sheet credit exposures usually cannot be done by using published balance sheets, as these will probably not provide sufficient detail about who the bank has lent to, or the issuers of securities held by the bank. However, the disclosure statements of the bank should contain the information necessary to confirm the bank's capital adequacy ratio calculations.

To illustrate the process a bank goes through in calculating its capital adequacy ratios, a simple worked example is contained in Figures 1 to 5. The steps in the calculation are explained below. The balance sheet information and the off-balance sheet credit exposures on which the calculations are based are set out in Figures 1 and 2.

Figure 1

Balance sheet			
Assets		Liabilities & Equity	
Cash	11	Deposits	182
5 Year Govt. Stock	20	Subordinated term debt	2
Lending to Banks	30	<i>Shareholders' Funds</i>	
Housing loans with mortgages	52	Ordinary capital	7
Commercial loans	64	Redeemable preference shares	3
Goodwill	3	Retained earnings	8
Shareholding in other bank	3	Revaluation reserve	4
Fixed assets	25		
General provision for bad debts	-2		
<i>Total Assets</i>	206	<i>Total Liabilities</i>	206

Figure 2

Off-Balance sheet exposures	
	<i>Nominal Principal Amount</i>
Direct credit substitute (guarantee of financial obligations)	10
Asset sale with recourse	18
Commitment with certain drawdown (forward purchase of assets)	23
Transaction related contingent item (performance bond)	8
Underwriting facility	28
Short term self liquidating trade related contingency	30
6 month forward foreign exchange contract (replacement cost = 4)	100
4 year interest rate swap (replacement cost = 4)	200
<i>Total</i>	417
<i>Note: The foreign exchange contract and interest rate swap are with banks. All other transactions are with non-bank customers.</i>	

First Step - Calculation of Capital

The composition of the categories of capital is as follows:

Tier One Capital

In general, this comprises:

- the ordinary share capital (or equity) of the bank; and
- audited revenue reserves e.g.. retained earnings; less
- current year's losses;
- future tax benefits; and
- intangible assets, e.g. goodwill.

Upper Tier Two Capital

In general, this comprises:

- unaudited retained earnings;
- revaluation reserves;
- general provisions for bad debts;
- perpetual cumulative preference shares (i.e. preference shares with no maturity date whose dividends accrue for future payment even if the bank's financial condition does not support immediate payment);
- perpetual subordinated debt (i.e. debt with no maturity date which ranks in priority behind all creditors except shareholders).

Lower Tier Two Capital

In general, this comprises:

- subordinated debt with a term of at least 5 years;
- redeemable preference shares which may not be redeemed for at least 5 years.

Total Capital

This is the sum of tier 1 and tier 2 capital less the following deductions:

- equity investments in subsidiaries;
- shareholdings in other banks that exceed 10 percent of that bank's capital;
- unrealised revaluation losses on securities holdings.

Figure 3 shows an example of a calculation of capital.

Figure 3

Calculation of capital	
Tier 1	
Ordinary capital	7
Retained earnings	8
less Goodwill	-3
<i>Total tier 1 capital</i>	12

Tier 2	
<i>Upper tier 2</i>	
General bad debt provision	2
Revaluation reserve	4
<i>Lower tier 2</i>	
Subordinated debt	2
Redeemable preference shares	3
<i>Total tier 2 capital</i>	11
Deduction	
Shareholding in other bank	-3
Total capital	20

Second Step - Calculation of Credit Exposures

On-Balance Sheet Exposures

The categories into which all credit exposures are assigned for capital adequacy ratio purposes, and the percentages the balance sheet numbers are weighted by, are as follows:

Credit Exposure Type	Percentage Risk Weighting
Cash	0
Short term claims on governments	0
Long term claims on governments (> 1 year)	10
Claims on banks	20
Claims on public sector entities	20
Residential mortgages	50
All other credit exposures	100

Off-Balance Sheet Credit Exposures

(1) Calculation of Credit Equivalents

Listed below are the categories of credit exposures, and their associated "credit conversion factor". The nominal principal amounts in each category are multiplied by the credit conversion factor to get a "credit equivalent amount":

Credit Exposure Type	Credit Conversion Factor (%)
Direct credit substitutes e.g. guarantees, bills of exchange, letters of credit, risk participations	100
Asset sales with recourse	100
Commitments with certain drawdown e.g. forward purchases, partly paid shares	100
Transaction related contracts e.g. performance bonds, bid bonds	50
Underwriting and sub-underwriting facilities	50

Other commitments with an original maturity more than 1 year	50
Short term trade related contingencies e.g. letters of credit	20
Other commitments with an original maturity of less than 1 year or which can be unconditionally cancelled at any time	0

The final category of off-balance sheet credit exposures, market related contracts (i.e. interest rate and foreign exchange rate contracts), is treated differently from the other categories. Credit equivalent amounts are calculated by adding the following:

(a) current exposure - this is the market value of a contract i.e.. the amount the bank could get by selling its rights under the contract to another party (counted as zero for contracts with a negative value); and

(b) potential exposure i.e.. an allowance for further changes in the market value, which is calculated as a percentage of the nominal principal amount as follows:

Interest rate contracts < 1 year	0%
Interest rate contracts > 1 year	0.5%
Exchange rate contracts < 1 year	1%
Exchange rate contracts > 1 year	5%

Although the nominal principal amount of market related contracts may be large, the credit equivalent amounts are usually small, and so may add very little to the amount of credit exposures to be risk weighted.

(2) Calculation of Risk Weighted Credit Exposures

The credit equivalent amounts of all off-balance sheet exposures are multiplied by the same risk weightings that apply to on-balance sheet exposures (i.e. the weighting used depends on the type of counterparty), except that market related contracts that would otherwise be weighted at 100 percent are weighted at 50 percent.

Figure 4 shows an example of a calculation of risk weighted assets.

Figure 4

Calculation of risk weighted exposures						
On-balance sheet						
Exposure type	Amount	X		Risk weighting	=	Risk weighted exposures
Cash	11			0%		0
5 Year Govt Stock	20			10%		2
Lending to banks	30			20%		6
Home loans	52			50%		26
Commercial loans	64			100%		64
Fixed assets	25			100%		25
<i>Total</i>						123
Off-balance sheet						
Exposure type	Amount	X	Credit conversion factor	X	Risk weighting	= Risk weighted exposures

Guarantee	10		100%		100%		10
Asset sale with recourse	18		100%		100%		18
Forward purchase	23		100%		100%		23
Performance bond	8		50%		100%		4
Underwriting facility	28		50%		100%		14
Trade contingency	30		20%		100%		6
<i>Exposure type</i>	<i>(Replacement cost</i>	<i>+</i>	<i>Potential exposure)</i>	<i>X</i>	<i>Risk weighting</i>	<i>=</i>	<i>Risk weighted exposure</i>
Forward FX contract	4		1		20%		1
Interest rate swap	4		1		20%		1
<i>Total</i>							77
Total risk weighted exposures							200

Third Step - Calculation of Capital Adequacy Ratios

Capital adequacy ratios are calculated by dividing tier one capital and total capital by risk weighted credit exposures.

Figure 5 shows an example of a calculation of capital adequacy ratios.

Figure 5

Calculation of capital adequacy ratios

Tier 1 capital to total risk weighted exposures = $12 \text{ divided by } 200 = 6\%$

Total capital to total risk weighted exposures = $20 \text{ divided by } 200 = 10\%$

Conclusions

Capital adequacy ratios measure the amount of a bank's capital in relation to the amount of its risk weighted credit exposures. The risk weighting process takes into account, in a stylised way, the relative riskiness of various types of credit exposures that banks have, and incorporates the effect of off-balance sheet contracts on credit risk. The higher the capital adequacy ratios a bank has, the greater the level of unexpected losses it can absorb before becoming insolvent.

The Basle Capital Accord is an international standard for the calculation of capital adequacy ratios. The Accord recommends minimum capital adequacy ratios that banks should meet.

The Reserve Bank applies the minimum standards specified in the Accord to banks registered in New Zealand. This helps to promote stability and efficiency in the financial system, and ensures that New Zealand banks comply with generally accepted international standards.