2 The evolution of risk management and regulation in banking

In Chapter 1 we introduced the concept of regulation and explained why banks need to be regulated. The banking industry is different from other industries in that the failure of a bank, either partial or total, will have an impact on the entire economy; hence bank failure carries 'systemic risk'.

This chapter broadens the discussion. It first reviews the reasons for banking regulations and then explains the Basel I Capital Adequacy regulation in greater detail. The chapter focuses on the technical aspects of the Basel I Capital Accord, its objectives and how regulatory capital was calculated. Finally it describes how the Basel I Accord further evolved, highlighting its limitations and outlining how it will shortly be replaced by Basel II.

On completion of this chapter the candidate will have a basic understanding of:

- the effects of solvency crises
- the effects of liquidity crises
- the role of the central banks
- the impact of financial liberalization, globalization and how regulation evolved to cope with the changes
- the objectives of the Basel I Accord, its application to credit risk and how to calculate 'eligible' capital
- the structure of capital under Basel I
- how Basel I evolved to accommodate new methods of modeling market risk – the Market Risk Amendment
- Value at Risk
- the limitations of the Basel I Capital Accord and Basel II.

2.1 Why banks are 'special' and need to be regulated

2.1.1 Capital, liquidity and competition

It has long been recognized that banks are special in that problems in the banking sector can have a serious impact on the economy as a whole.

Banks as financial intermediaries are a powerful force for allocating loan capital to enterprises and thus 'employing' the savings of their depositors. If, however, a bank made loans that borrowers could not repay, the insolvency of the bank could lead not only to the destruction of shareholders' equity but to the destruction of depositors' funds as well. This is because a bank is, by its very nature, highly geared.

Gearing

Gearing is defined as the ratio of a company's debt (how much it has borrowed) to the amount of capital it holds. Thus a bank that has large amounts of debt when compared to its capital is said to be 'highly geared'. In the US the bank would be considered 'highly leveraged'.

Example

In the example of the capital structure of a typical bank given in Chapter 1 Bank A was shown to have the following balance sheet:

RWA = Risk-Weighted Assets

Assets	*Amount USD million*	*Risk weight %*	*RWA USD million*
Domestic government bonds	100	0	0
Cash	10	0	0
Loans to other banks <1yr	200	20	40
Loans to small and medium enterprises	390	100	390
Loans to local authorities	200	50	100
Loans to major international companies	100	100	100
Totals	1000		630

Liabilities	*Amount*
Capital	80
Deposits from customers	820
Loans from other banks	100
Total	1000

Bank A uses (borrows) the deposits from its customers to fund the loans to its customers. Bank A is highly geared. It should be noted that this is not an unusual situation as nearly all banks (the exceptions being very specialist banks) are highly geared because they raise loans from depositors to fund loans to borrowing customers.

Capital

The most important resource a bank has in ensuring its solvency is sufficient capital. A bank's capital is the one financial resource that is available to absorb losses because it does not require repayment.

Capital is the amount of the shareholders' investment in the bank as measured at its balance sheet value.

Insolvency

Insolvency is defined as the inability of a company to repay any type of claim when it becomes due. A bank in this position is said to be suffering a solvency crisis.

Example

Bank X has funded its customer loans by borrowing from depositors and the market at a fixed rate for five years. It has done this on the assumption that the majority of its customers will repay their loans within this period.

Unfortunately a far larger proportion of Bank X's customers than expected fail to pay back the loans. Bank X still owes its depositors and the bond market the fixed rate five-year funds, but does not have the capital to cover the shortfall caused by the defaulters.

The losses more than absorb the capital of the bank with the result that the value of the shareholders' investment in the bank falls below zero. The losses above the level of the capital will have to be absorbed by other providers of funds, such as bondholders and debtors.

Bank X now has a solvency crisis.

A solvency crisis in a bank can cause a minor, often local, fall in economic activity. However, if such a crisis were to affect the entire banking sector, then the whole economy could be affected (see Section 1.1.2).

Of equal concern, is that even the rumor of such a problem could cause depositors to rush to withdraw their funds. Since banks are not able to recall all their loans immediately, i.e. liquidate good loans, any bank could suffer the same fate as a bank that made bad loans. In this case the bank would have suffered a liquidity crisis.

Students should note that in the absence of some liquidity management mechanism illiquidity might cause insolvency. If the liquidity crisis became more widespread, the effects for the economy could be the same as a solvency crisis affecting the entire banking industry. History has shown that the failure of confidence in one bank can lead to the failure of confidence in banks in general.

Central banks as lenders of last resort

The issues of liquidity and solvency are as relevant today as they were in the 18th century when the current banking system in industrialized countries came into existence. The role of central banks as guardians (and soon supervisors) of the banking system also began in the 18th century.

It was rapidly realized that it was in the interests of society as a whole that banks, because of their special status, could occasionally require the support of their central bank. Central banks provide such support through their role as 'lender of last resort' to maintain the stability of the financial system.

As the lender of last resort a central bank stands ready to provide funds to commercial banks in order to ensure that neither a solvency nor a liquidity crisis in the commercial banking sector could turn into a general economic crisis.

Financial stability

The setting of standards for financial institutions has its origins in the need to improve the efficiency and resilience of the financial system. **Financial stability** is defined as the maintenance of a situation in which the capacity of financial institutions and markets to mobilize savings efficiently, provide liquidity, and allocate investment is unimpaired.

Financial stability can thus be consistent with the periodic failure of individual financial institutions. Such periodic failures are only of concern if they lead to the general impairment of the banking system.

Monetary stability

Monetary stability is defined as stability in the value of money, (i.e. low and stable inflation).

Monetary stability is not the same as financial stability. Though they can often exist together, they are not necessarily 'fellow travelers' as can be seen from the three distinct historical periods outlined below:

- a period of low inflation in the late 18th through to the early 20th century when governments were primarily concerned with financial stability
- a period from the end of World War I to the 1980s when monetary stability took center stage due to the threat of high and volatile inflation rates in many countries
- a period from the early 1980s onwards when newly implemented central bank policies managed to control inflation. However this did not, as many expected, lead to greater financial stability. Indeed financial stability has once again become the key focus of policy makers.

Financial liberalization

A major reason why successful monetary policy didn't lead to financial stability was the 'wave' of liberalization that began sweeping through the main financial markets in the 1970s and 1980s.

The role of the state in the direct functioning of economies was reduced through a number of actions including:

- the removal of barriers to competition between financial institutions, including the liberalization of banking license requirements that had been a major part of regulation up to the 1970s
- the removal of restrictions on the pricing of financial transactions, such as maximum rates of interest on loans and deposits
- the removal of restrictions on international capital movements which accompanied the introduction of convertible currencies.

Example

Latin American debt crisis in the 1980s

In the 1970s the major oil exporting countries placed the profits they had gained from the increases in oil prices in international banks, which then lent a large portion of these deposits to Latin American governments. With the start of recession in many industrialized countries in the early 1980s, Latin American countries faced an economic and financial crisis as commodity prices collapsed, and exports fell dramatically.

In August 1982 Mexico informed the International Monetary Fund (IMF) that it would not be able to meet its obligation on a USD 80 billion debt. The IMF, World Bank and the US put together a rescue package to prevent Mexico from defaulting. However the situation in Latin America deteriorated as banks and investors lost confidence in the ability of many developing countries to repay their debts. Some 16 Latin American countries, who together owed $176 billion, were left struggling to meet their obligations. Many of the largest international banks faced the prospect of major loans defaulting and potential insolvency. A significant banking collapse was averted by debt rescheduling, but the pressure to meet interest payments pushed the Latin American economies further into recession.

By 1989 the emphasis changed from debt restructuring to debt reduction. In return for commitments to introduce economic reforms the IMF and World Bank provided Latin American countries with funds to pay back outstanding commercial bank debt.

Competition and banking

The liberalization of financial markets greatly increased competitive pressures on banks by:

- reducing the capabilities of existing institutions to extract wide margins from their businesses – products had to be more competitively priced
- creating an influx of new entrants, thus increasing competition.

The difficulty of earning the same return in these circumstances meant that many institutions were forced to increase the risks they ran in order to maintain returns.

Example

Security First National Bank

In 1995 the world's first internet only bank was set up in the US in Atlanta, Georgia. Security First National Bank (SFNB) had only one office, no branches, very few staff and minimal overheads. It was based on the premise that banking customers want to conduct their business quickly, efficiently, at a time of their choosing and within a secure environment. It was also set up to test Security First banking software products.

Although now part of the Royal Bank of Canada, SFNB, proved how relatively easy it had become to set up a bank. It also proved that internet banks were a viable proposition. Internet banking now accounts for a substantial amount of the total turnover of the banking sector.

Financial product innovation

The liberalization of the financial sector also led to a period of rapid innovation, most notably in the growth of products such as futures, swaps and options (the derivative markets) and the securitization of assets. These products have the capability to greatly increase the ability of banks to transfer risks between themselves and investors in other markets.

International developments

The controls on cross-border competition were also liberalized partly as a result of the growth of free trade globally. But perhaps even more significant it was the result of the increasing economic and political strength of the European Union. The liberalization of cross-border controls tightened financial links between institutions, markets and countries.

2.1.2 Effects on supervisors and regulation

Developments in the financial markets and liberalization of cross-border controls led supervisors, and especially central banks, to consider that although the value of the safety net provided by their lender of last resort function had grown substantially the basis of much of their financial regulation had been weakened.

Prior to the period of financial liberalization in the 1970s and 1980s financial regulation had focused on:

- the authorization of financial institutions
- tightly defining the spheres of permitted activity of different financial institutions
- the definition of balance sheet ratios and requirements such as keeping a certain level of cash deposits with the central bank, or keeping a certain level of assets in domestic government securities.

2.1.3 New approaches to regulation

In this 'new' world prudential supervisors began to look at potential new approaches to regulation, drawing the following conclusions:

- significant market participants measured their own performance by looking at the return on the risks they took. If the supervisors could create regulatory processes that worked with the markets, they could make regulation both more effective and more relevant to the regulated institutions
- the increase in the globalization of capital markets greatly increased the need to ensure prudential norms were accepted internationally and implemented consistently
- regulation was only one part of the solution. The risks of financial intermediation, internationally, depended on such issues as ensuring minimum standards in contract and bankruptcy law, accounting and audit standards and disclosure requirements.

2.2 The original Basel Accord and capital adequacy for credit risk

2.2.1 Objectives of Basel I

The Basel Committee on Banking Supervision was established in 1974 by the central bank governors of the Group of Ten (G10), to focus on banking regulations and supervisory practices.

The Basel Committee is comprised of representatives of the central banks and banking supervisors from the 11 members of the G10 plus Spain and Luxembourg. Consequently it draws members from the following countries:

Belgium	Canada	France	Germany
Italy	Japan	Netherlands	Sweden
Switzerland	United Kingdom	United States	Spain
Luxembourg			

The Basel Committee had three main objectives in developing the Basel I Accord:

- to strengthen the soundness and stability of the international banking system
- to create a fair framework for measuring the capital adequacy of internationally active banks
- to have the framework applied consistently with a view to diminishing competitive inequalities between internationally active banks.

2.2.2 Risk-weighted assets and risk weights

In order to understand how the Basel I Accord meets its main objectives the student must first understand the concept of risk-weighted assets (RWA). A **risk-weighted asset** is a balance sheet asset class that has been multiplied by its risk weight. These are used to derive a balance sheet expressed in terms of risk-weighted assets, which in turn is used to derive the capital requirement (see Section 2.2.3).

The Basel Committee devised a system to help banks establish their level of risk-weighted assets. The system was based on the concept of risk weights as a series of factors. These risk weights were in turn based on the perceived relative credit risk associated with each asset class. Thus a mortgage has a risk weight of 50% and, under the Basel I Accord, can be said to be half the risk of a corporate loan which has a risk weight of 100%.

In order to derive a balance sheet weighted by risk factors each contract instrument (such as a loan) was grouped into five broad categories according to the perceived credit standing of the counterparty for the term of the contract.

The weights used were 0%, 10%, 20%, 50% and 100%. An abbreviated version of the full list, as it appears in Basel I, is given in Table 2.1 below.

Table 2.1

Asset class	*Risk weight %*
Cash	0
Domestic and OECD* central government	0
Government lending OECD	0
Domestic and OECD public sector and local government	0 to 50
Interbank (OECD) and international development banks	20
Non-OECD bank <1 year	20
Mortgage lending (first charge on residential property)	50
Corporate and unsecured personal debt	100
Non-OECD bank >1 year	100
Non-OECD government debt	100

** The Organisation for Economic Co-operation and Development (OECD) is a group of 30 countries sharing a commitment to democratic government and the market economy.*

In practice, banks have a multitude of different assets, each of which has to be weighted in accordance with the principles laid down in Basel I and reflected in Table 2.1 above.

It should be noted that under Basel I some of the risk weights are left to the discretion of the local supervisor, for example local government lending may be 0%, 10%, 20%, or 50%.

Example

Calculating risk-weighted assets

Bank A is a Basel I regulated bank and decides to lend USD 100 million to a non-OECD bank for six months. The risk-weighted asset of this loan is:

Loan advanced	USD 100 million	
Risk weight	20%	
RWA	USD 20 million	(100m x 20%)

Bank B lends USD 100 million to a large corporation. The risk-weighted asset of this loan is:

Loan advanced	USD 100 million	
Risk weight	100%	
RWA	USD 100 million	(100m x 100%)

2.2.3 The target capital ratio

The Basel I Accord established the relationship between risk and capital. It used a simple set of different multipliers for government debt, bank debt and corporate and personal debt and multiplied them by an overall target capital ratio. This **target capital ratio** is the ratio for eligible capital to risk-weighted assets (RWA) for international banks.

The Basel Committee laid down a minimum target capital ratio of 8%. National supervisors had the discretion to impose a higher ratio as they saw fit, which a number, notably the US and UK have taken up. However, some supervisors, such as Germany, are precluded from doing so for legal reasons.

There is no presumption that the 8% should be applied universally to all banks within a national supervisor's jurisdiction. The Committee specifically allows for this on the grounds that the actual minimum regulatory capital ratio for a bank needs to reflect risks other than credit risk. (Students should remember that credit risk is the only risk specifically covered in the Basel I Accord.)

The formula for computing the ratio is:

$$\frac{\text{Eligible capital}}{\text{Risk-weighted assets}} \times 100 = \text{Ratio (min 8\%)}$$

Thus we can compute the capital required given a known amount of RWAs, or the RWAs permitted for a given amount of capital by reversing the above equation.

Example

Calculating capital requirements

Bank A is a Basel I regulated bank and decides to lend USD 100 million to a non-OECD bank for six months. The capital Bank A is required to hold against this loan is:

Loan advanced	USD 100 million	
Risk weight	20%	
RWA	USD 20 million	
Capital required	USD 1.6 million	(20m x 8%)

Bank B lends USD 100 million to a large corporation. The capital Bank B is required to hold against this loan is:

Loan advanced	USD 100 million	
Risk weight	100%	
RWA	USD 100 million	
Capital required	USD 8 million	(100m x 8%)

Bank C holds USD 2 million of unallocated capital and wishes to lend to an OECD bank. For its given level of capital Bank C can lend up to USD 125 million.

Amount of capital	USD 2 million	
RWA	USD 100 million	(2m/20%)
Loan equivalent	USD 125 million	(25m/20%)

Students should take note of this example and contrast it to likely outcomes for capital requirements for similar lending under Basel II. While there are a number of potential differences in the principles laid down in the Standardised Approach of Basel II there are also many similarities and in practice many results will be very close or identical to those in Basel I.

The above examples for banks A, B and C use on-balance sheet items only. Off-balance sheet items, e.g. warranties will be introduced later in this chapter.

The target capital ratio was a simple equation for a highly complex set of products. The Basel Committee continued to revise the Basel I Accord to cover the increasing diversification of banking activities.

2.2.4 Credit risk equivalence

With banks diversifying their activities, there was a growing need for the capital adequacy accord to include off-balance sheet exposures. Usually off-balance items are contingent liabilities such as guarantees, options, acceptances or warranties. There is no cash or physical asset to represent the value in a balance sheet. Balance sheets do not record contracts, only the proceeds. A good example is an insurance contract

where the accounts will show the premium paid but the insurance contract itself will not be in the accounts.

To deal with off-balance sheet items the Basel Committee put forward the concept of credit risk equivalence. This was first proposed in the Basel Committee paper on the treatment of off-balance sheet exposures in March 1986 entitled "*The Management of Banks' Off-Balance-Sheet Exposures: A Supervisory Perspective*".

The concept behind credit risk equivalence is that any off-balance-sheet transaction can be converted to a loan equivalent and thus brought on-balance-sheet for purposes of computing risk-weighted assets. This ensures that the definition of RWA covered a wide range of a bank's obligations, not just those represented by loans and similar asset classes.

2.2.5 Standard credit substitute instruments

Some off-balance sheet transactions have very simple conversion factors. For example direct credit substitutes, (e.g. Guarantees), have a conversion factor of 100%.

A list of the main off-balance sheet instruments with simple Conversion Factors (CF) is given in Table 2.2 below.

Table 2.2

Off-balance sheet item	*CF %*
Direct credit substitutes, (e.g. Guarantees)	100
Certain transaction-related contingent items	50
Short-term self-liquidating trade-related contingencies	20
Sale and repurchase agreements and asset sales with recourse, where the credit risk remains with the bank	100
Forward asset purchases, forward-forward deposits and partly-paid shares and securities which represent commitments with certain draw downs	100
Note issuance facilities and revolving underwriting facilities	50
Other commitments with an original maturity of over one year	50
Similar commitments with an original maturity of up to one year, or which can be unconditionally cancelled at any time	0

It should be noted that the instruments listed here represent general categories and supervisors have some degree of national discretion to allocate specific instruments to categories.

2.2.6 Derivative instruments

Other off-balance sheet transactions such as derivatives are treated differently. A derivative is a financial instrument where the principal amounts of the transaction are not usually exchanged. The price is derived from the value of one or more of the following items:

- financial instruments
- indices
- commodities
- another derivative instrument.

Example

> Bank V enters into a forward rate agreement with Bank X. This gives Bank V the right to deposit USD 10 million for three months beginning in one-month's time at a rate of 2%. The following month the two banks compare the rate of 2% against the current interest rate which is now 1.5%. Bank X pays Bank V 0.5% as rates have fallen. Bank V can now enter into a deposit at 1.5% with any bank. The settlement of 0.5% from Bank X allows Bank V to receive 2% in total.
>
> This shows how a derivative can 'lock in' interest payments without any exchange of principal amounts.

Banks are not exposed to the full face value of a swap contract if the counterparty defaults, but only to the potential cost of replacing the cash flow equivalent of the contract (the credit equivalent). Any mark-to-market exposure (see Section 4.4) is reduced to 50% of the direct lending weight as shown in Table 2.2 above. For example a 100% counterparty is weighted at 50% for mark-to-market exposures. Depending on the movement of a number of factors relevant to the contract since its inception, this may or may not result in a credit risk equivalent exposure. There will always be an 'add on' to cover the potential for the contract value to change, and for the bank therefore to become exposed to its counterparty.

A full list of contracts covered is beyond the scope of the Certificate; however descriptions of the types of derivatives are provided in Chapter 4.

In general these contracts are:

- interest rate swaps and options, forward rate agreements, interest rate futures
- exchange rate swaps and options, forward foreign exchange contracts, currency futures (excluding contracts with an original maturity of less than 14 days)
- precious and non-precious metals swaps and options, forward contracts and futures
- equity swaps and options and equity futures contracts.

Two methods of calculating the credit equivalent of these contracts have been allowed under Basel I. These are:

- the Current Exposure Method
- the Original Exposure Method.

Neither of these methods reflected Value at Risk models (which did not appear in Basel-based regulation until the Committee published the Market Risk Amendment in 1996).

2.2.7 The Current Exposure Method

This was the method preferred by the Basel Committee under Basel I. The method calculates the current replacement cost of the contract by marking the contracts to market. This is usually a simple process given that derivative markets are overwhelmingly traded instruments. It is also accurate and gives a clear comparison of the derivative contract to a loan equivalent, at a point in time.

The mark-to-market value of a contract changes continuously because the value of a contract is driven by various risk factors depending on the type of contract it is. For example, changes in the value of an interest rate swap will largely depend on the relative movements of the interest rates to which it is linked.

If the current mark-to-market value of a transaction is positive, this represents the value the bank would lose if its counterparty defaulted on the transaction. However, as the mark-to-market value of the transaction will continue to fluctuate until the maturity date, there is a risk that the credit exposure may rise higher than the current mark-to-market value.

A capital charge was created for this additional exposure by adding a percentage of the notional principal to the current mark-to-market value. Table 2.3 shows the percentages to be applied to the notional amount of each transaction. The percentages are categorized by instrument and residual maturity to reflect the relative risk of each instrument over time.

Table 2.3

Residual maturity	*Interest rate* %	*Exchange rate and gold* %	*Equity* %	*Precious metals (not gold)* %	*Other commodities* %
<1 year	0.0	1.0	6.0	7.0	10.0
>1 and <5 years	0.5	5.0	8.0	7.0	12.0
>5 years	1.5	7.5	10.0	8.0	15.0

Example

Three years ago Bank A traded a seven-year interest rate swap for USD 10 million to pay 6% fixed rate against six-month LIBOR (London Interbank Offered Rate). Rates have risen and the current mark-to-market value of the swap to the bank is USD 1millon. The Credit Equivalent (CE) calculation under the current exposure method is:

CE = Mark-to-market value + (notional amount x add-on)
CE = USD 1,000,000 + (USD 10,000,000 x 0.5%) = USD 1,050,000

The add-on is 0.5% because the swap has four years to run and is an interest rate swap (see Table 2.3 above).

The credit exposure is to an OECD bank and therefore would normally be rated 20% (see Table 2.1), but this is reduced to 10% (see Section 2.2.6). The capital consumption of the transaction is thus:

Capital = USD 1,050,000 x 10% (risk weight) x 8 % (target capital ratio)
= USD 8,400

Eighteen months ago Bank B entered into a foreign exchange deal to buy USD 10 million worth of yen at a rate of 104 for delivery in two-years' time.

The exchange rate has now risen to 106 for the same delivery date. This means the current mark-to-market value shows a loss of approximately USD 189,000 for Bank B since the amount of yen purchased is now only worth approximately USD 9,811,000.

CE = 0 + (USD 10,000,000 x 1%) = USD 100,000

The add-on is 1% because the contract matures in six months' time and is an exchange rate transaction (see Table 2.3 above). The current mark-to-market value is set to zero because it is negative for Bank B.

2.2.8 The Original Exposure Method

The Original Exposure Method allowed a bank to calculate a percentage of the notional principal as the exposure without having to calculate the current value of a contract.

The conversion factors for this method are given in Table 2.4.

Table 2.4

Maturity	*Interest rate contracts %*	*Exchange rate contracts and gold %*
One year or less	0.5	2.0
Over one year to two years	1.0	5.0
For each additional year	1.0	3.0

Under Basel I national regulatory authorities had discretion to allow banks to use this method as an interim measure pending implementation

of the Current Exposure Model. This generally applied to banks that had a small matched position in an instrument. Banks that were engaged in forwards, swaps, purchased options or similar derivative contracts based on equities, precious metals (except gold), or other commodities had to use the Current Exposure Model.

2.2.9 Calculating eligible capital consumption

A bank can establish the minimum level of regulatory capital it is required to hold by first determining its risk-weighted assets and then multiplying this figure by the target capital ratio set by its supervisor.

Example

Calculating regulatory capital

Bank A has a target capital ratio of 8% and has the following positions in its books:

1. Six-month loan to a French bank for USD 100 million
2. Four-year interest rate swap to a UK chemical company for USD 10 million with a value of USD 500,000
3. A residential property mortgage book of USD 500 million.

1. This is an on-balance sheet item with an OECD bank with a maturity of less than one year.

   RWA = USD 100m x 20% = USD 20 million

2. This an off-balance sheet item with the private sector with a maturity of less than five years and using the Current Exposure Method.

   Credit equivalent = (USD 10m x 0.5%) + USD 500,000 = USD 550,000
   RWA = USD 550,000 x 50% = USD 275,000

3. This is an on-balance sheet item that is a loan book secured on residential properties.

   RWA = USD 500m x 50% = USD 250 million
   Total RWA = USD 20,000,000 + USD 275,000 + USD 250,000,000
   = USD 270,275,000
   Regulatory capital requirement = USD 270,275,000 x 8% = USD 21,622,000

2.3 The ‘grid’ and ‘look up’ table approach to capital adequacy and credit risk in Basel I

In practice every bank operating under Basel I produces a grid as shown in Tables 2.3 and 2.4 to calculate the level of credit risk equivalent of its transactions. It will also have a ‘look up’ table, as shown in Tables 2.1 and 2.2, to calculate the level of risk-weighted assets on which to determine its eligible capital requirement.

2.3.1 Adequacy of the return on regulatory capital

Under both Basel I and II a bank calculates its regulatory capital requirements for a given amount of risk-weighted assets. A bank’s business is not static and the level of RWAs will change as new contracts are written and old ones expire.

Under these circumstances a bank has two choices. It can either:

- set a limit to its level of regulatory capital; hence fixing the total amount of RWAs available. However, this limits its capacity to raise new business, or
- raise new regulatory capital as the RWAs increase.

It should be noted that ‘fixing’ a level of regulatory capital can be difficult as the RWAs of traded instruments can increase without new business being undertaken.

Return on regulatory capital is a performance measure used to ensure that a transaction creates a return sufficient to allow the bank to raise new capital.

It is important to note that risk costs are not specifically taken into account except through the margin return incorporated in ‘net earnings’. Determining if these returns are sufficient needs a separate set of performance metrics.

A simple example for calculating the return on regulatory capital is given below. It assumes that:

- the given capital structure is appropriate for capitalizing the given transaction
- the bank has actual capital equal to regulatory capital – which is very unlikely in the real world.

Example

Calculating return on regulatory capital

Bank T is considering offering a new fixed price loan to its customers, but will need to extend its regulatory capital if it does so. To make this decision it must first calculate the return on its required regulatory capital. It establishes a loan limit that is available throughout the term of the loan (the stand-by loan limit).

Transaction details

Stand-by loan limit (available for >365 days)	USD 20 million
Estimated utilization of limit	50%
Margin on utilized portion	1%
Risk weight	100%
RWAs on utilized portion (20m x 50% x 100%)	USD 10 million
Estimate of non-utilization	50%
Margin on non-utilized portion	0.5%
Credit conversion factor	50%
Risk weight	100%
RWAs on non-utilized portion (20m x 50% x 50% x 100%)	USD 5 million
Total RWAs (10m + 5m)	USD 15 million
Risk asset ratio	8%
Notional capital (15m x 8%)	USD 1.2 million
Net earnings (15m x 1%)	0.15 million
Return on regulatory capital = Net earnings/Notional capital x 100	
Return on regulatory capital (0.15m/1.2m x 100)	12.5 %

In the above example, only the margin is used to calculate the net income. In practice an adjustment is made to give a gross return to account for the base interest rate that the loan margin is added to. Most banks will have one agreed transfer price for their funds. In the above example, if we assume the transfer price for the funds is 3%, this gives a total return on regulatory capital of 15.5% (the calculated return plus the transfer price).

In the example above Bank T would need to judge if a return of 15.5% were sufficient for it to extend its regulatory capital and launch the new product.

2.4 The bank capital requirements in Basel I

2.4.1 Capital structure

The calculation of the minimum level of regulatory capital a bank is required to hold does not, however, determine the structure of capital that the bank should hold.

In Basel I the Committee not only created a framework for measuring capital adequacy; it also created a framework for the structure of bank capital, often called 'eligible capital'.

The Basel Committee considers that the key element of eligible capital for a bank is equity capital.

However for regulatory capital purposes most banks can hold capital in two tiers. They are:

- Tier 1 – issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock and disclosed reserves.
- Tier 2 – undisclosed reserves, asset revaluation reserves, general provisions and general loan loss reserves, hybrid capital instruments and subordinated debt.

Not more than 50% of the total capital can be held in Tier 2 capital.

The capital base should exclude:

- goodwill
- investments in unconsolidated banking and finance companies
- investments in the capital of other banks and finance companies (subject to national supervisor discretion), and
- minority investments in unconsolidated entities, (e.g. associate banks).

Students should be aware that there is a third tier of capital (Tier 3), which is available to support banks' trading portfolios only.

2.5 Basel I and the 1996 Market Risk Amendment

2.5.1 The Market Risk Amendment

Basel I is often incorrectly criticized for its lack of risk sensitivity. Risk sensitivity was fundamental to the thinking of the Committee as it developed the first Capital Accord.

The degree of risk sensitivity was greatly increased when the Basel Committee released the *"Amendment to the Capital Accord to Incorporate Market Risks"* in January 1996. This became known as the Market Risk Amendment.

The Market Risk Amendment was the culmination of a process that had begun when the Committee issued a paper entitled *"The Supervisory Treatment of Market Risks"* and asked banks and market participants for their comments. This led to an investigation by the Committee during 1994 of the use of internal models by banks to measure market risk.

The fact that banks were using their own internal models meant that their own views of the risk they were running differed, in many cases significantly, from the simple RWA-based approach of Basel I. In moving towards the acceptance of internal models of market risk the Committee was actually following the lead of banks.

The Basel Committee developed the Market Risk Amendment on a 'twin- track' approach. This twin-track approach appraised banks' internal quantitative models based on a set of published standards and similarly set qualitative standards. In particular this approach looked at the appropriateness of applying such quantitative models and the quality of processes supporting their implementation.

2.5.2 Value at Risk (VaR)

The quantitative models banks were using – those accepted by the Committee – are called Value at Risk (VaR) models. VaR models represent an estimate of the likely maximum amount that could be lost on a bank's portfolio of market risks:

- within a given time period, and
- with a certain degree of statistical confidence, (i.e. with a certain probability).

The Basel I techniques for off-market assets ('add-ons') and the VaR technique are both attempting to achieve a broadly similar objective. This objective is to show the value of a transaction (or more accurately the value of the portfolio of all of the bank's transactions, some of which may offset one another) over a period relevant to the bank's holding of the transaction.

The holding period of the transaction is known as the **VaR Horizon.** For many traded market transactions the appropriate VaR Horizon will be one trading day. Hence the commonly used Daily Value at Risk or DVaR measure.

A bank's risk report may contain the following statement:

"The trading portfolio has DVaR of USD 5 million at the 95% level."

Within this statement the level (the confidence level) relates to a level of probability that some event will occur. In the case of market risk this will be a loss of portfolio value above some level. Typically, probability is often calculated at the 95% or 99% level.

In simple terms the DVaR expressed above is:

"Within the period of one trading day there is a 5% (100% minus 95%) chance that losses on the portfolio could exceed USD 5 million."

This may seem a low probability; however, looked at another way, it says that in one year there would be approximately 12 days when portfolio losses exceeded USD 5 million (assuming approximately 240 days a year when the appropriate markets are open for trading).

It should be noted that VaR models numbers do not give any estimate of how big the actual losses could be, i.e. in the above example the model gives no indication of how much larger than USD 5 million the losses could be.

2.5.3 Risk-based regulation

The 1988 Basel I Accord did recognize that capital held by banks should relate in part to the credit standing of the:

- borrowers
- issuers of securities, and
- other counterparties who had financial obligations to banks (such as guarantors).

The broad categories of counterparties the Basel Committee had used, and the relatively crude risk sensitivity of the 'add-on' process for counterparty credit risk, limited the scope of risk-based regulation.

The Market Risk Amendment, in its conditional acceptance of banks' Value at Risk models, produced for the first time an element of true risk-based regulation.

2.6 Weaknesses in the Basel I Accord

2.6.1 Basel I and corporate credit risk

The creation and subsequent success of the Market Risk Amendment was a major milestone in the development of risk-based regulation.

At the same time many banks were shifting their internal credit processes toward the use of quantitative risk models with direct similarities to their market VaR techniques. This was due to:

- the success of many banks' VaR models, and
- the increase of credit risk trading.

Credit risk trading had already existed to a limited extent in commercial paper markets but increased significantly as the syndicated loan market became more sophisticated and the securitization of bank loans became more widespread.

The transparency of corporate credit risk increased significantly when even relatively unsophisticated models showed the huge disparities in quality (credit grade) and the resulting pricing of different corporate credits.

The Basel I approach to capital adequacy gave the same RWA weighting, and thus the same capital requirement, to all corporate loans irrespective of the credit grade of the borrower.

The problem with the Basel I approach was obvious: banks which lent to companies with a very good credit standing were obliged to hold exactly the same amount of capital for regulatory purposes as banks lending to companies with poor credit standing. This would not have mattered as much if banks could charge all borrowers the same. However, banks were increasingly in competition with rapidly growing corporate bond markets where credit margins related quite closely to the credit gradings awarded to bonds issues by such rating agencies as Standard & Poor's and Moody's Investors Service.

The same problem occurred in relation to unsecured personal lending (such as credit card lending) and to lending to governments (sovereign loans).

2.7 The development of a new Capital Accord – Basel II

In 1999 the Basel Committee started working closely with the major banks of member countries to develop a new Capital Accord. The general aim was to encompass all banking risk within a new

comprehensive capital adequacy framework. The new accord soon became known as Basel II.

The work on developing the Basel II Accord coincided with moves in the European Union to harmonize the financial markets. This was known as the Financial Markets Program. The need to harmonize banking and financial services regulation across the EU was considered an integral part of the Program.

There was the potential for the EU to adopt, in a harmonized fashion, the Basel II Accord as the basis for the ‘domestic’ capital regulation of banks and financial services companies. The wide application of Basel II in the EU beyond simply banks was made necessary partly by the lack of any common definition of a bank across member states. The Basel II Accord, with minor alterations, will thus become the basis for a new EU directive on capital adequacy – the Capital Requirements Directive (CRD).

Sample questions

1. Gearing (leveraging) of a bank is defined as:

   a) The ratio of its debt to its assets
   b) The ratio of its debt to its capital
   c) The ratio of its deposits to its capital
   d) The ratio of its deposits to its assets

2. The insolvency of a bank is defined as:

   a) The inability to pay any type of claim when due
   b) The inability to pay depositors on demand
   c) The inability to fund loans when required
   d) The inability to sell assets when necessary

3. Financial stability is consistent with:

   a) Stability in the value of money
   b) The periodic failure of individual financial institutions
   c) The maintenance of the 'lender of last resort role' of the central bank
   d) The insolvency of the banking system

4. The pressure on banks to take increased risks is due to:

   a) The need to recycle petro-dollars
   b) The need to fund inflation affected balance sheets
   c) The liberalization of financial markets
   d) The need to fund increased capital

5. One of the objectives of the Basel Committee in creating the first Accord was:

   a) To create risk-based regulation
   b) To create a minimum capital ratio
   c) To strengthen the soundness and stability of the international banking system
   d) To create a minimum standard for bank regulation

6. The Basel Committee minimum capital ratio is set at:

a) 4%
b) 8%
c) 6%
d) 10%

7. Off-balance sheet items may be measured under Basel I through:

a) Their capital equivalence
b) The credit risk equivalence
c) Their asset value equivalence
d) Their nominal value equivalence

Answers can be found in the Appendix.

Summary

This chapter has introduced a number of key concepts and issues involved in the evolution of risk management and regulation in banking. Students should review this summary before proceeding.

Why banks are 'special' and need to be regulated

- A bank is, by its very nature, highly geared (leveraged).
- Gearing is defined as the ratio of a company's debt (how much it has borrowed) to the amount of capital it holds.
- A bank's capital is the one financial resource that is available to absorb losses because it does not require repayment.
- Insolvency is defined as the inability of a company to repay any type of claim when it becomes due.
- Central banks act as the 'lender of last resort' providing funds to commercial banks in order to prevent a solvency or liquidity crisis from becoming a general economic crisis.
- With increased competition in the 1980s banks found it more difficult to maintain returns. This put pressure on many institutions to increase the risks they ran.
- The liberalization of cross-border controls tightened the financial links between institutions, markets and countries.
- Following liberalization prudential supervisors began to look at potential new approaches to regulation.

The original Basel Accord and capital adequacy for credit risk

- The Basel Committee had three main objectives in developing the Basel I Accord:
  - to strengthen the soundness and stability of the international banking system
  - to create a fair framework for measuring the capital adequacy of internationally active banks
  - to have the framework applied consistently with a view to diminishing competitive inequalities between internationally active banks.
- The target capital ratio is the ratio for eligible capital to risk-weighted assets (RWA) for international banks.
- Credit risk is the only risk specifically covered in the Basel I Accord.
- To deal with off-balance sheet items the Basel Committee put forward the concept of credit risk equivalence.
- Credit risk equivalence states that any off-balance sheet transaction can be converted to a loan equivalent and thus brought on-balance sheet for purposes of computing risk-weighted assets.
- The Current Exposure Method calculates the current replacement cost of the contracts by marking the contracts to market.

The bank capital requirements in Basel I

- In Basel I the Committee not only created a framework for measuring capital adequacy; it also created a framework for the structure of bank capital, often called 'eligible capital'.
- For regulatory capital purposes most banks hold capital in two tiers:
  - Tier 1 – issued and fully paid ordinary shares/common stock and non-cumulative perpetual preferred stock and disclosed reserves.
  - Tier 2 – undisclosed reserves, asset revaluation reserves, general provisions and general loan loss reserves, hybrid capital instruments and subordinated debt.

Basel I and the 1996 Market Risk Amendment

- The Market Risk Amendment used a 'twin-track' approach: appraising banks' internal quantitative models based on a set of published standards and similarly setting qualitative standards.
- It should be noted that VaR model numbers do not give any estimate of how big the actual losses could be.
- The Market Risk Amendment, in its conditional acceptance of banks' Value at Risk models, produced for the first time an element of true risk- based regulation.
- The creation and subsequent success of the Market Risk Amendment was a major milestone in the development of risk-based regulation.

Weaknesses in the Basel I Accord

- The Basel I approach to capital adequacy gave the same RWA weighting requirement to all corporate loans irrespective of the credit grade of the borrower.
- The problem with the Basel I approach was obvious: banks which lent to companies with a very good credit standing were obliged to hold exactly the same amount of capital for regulatory purposes as banks lending to companies with poor credit standing.

The development of a new Capital Accord – Basel II

- In 1999 the Basel Committee started working closely with the major banks of member countries to develop a new Capital Accord. The general aim was to encompass all banking risk within a new comprehensive capital adequacy framework.
- The new accord became known as Basel II.
- The Basel II Accord, with minor alterations, will become the basis for a new EU directive on capital adequacy – the Capital Requirements Directive (CRD).